

Document Title	Specification of Manifest
Document Owner	AUTOSAR
Document Responsibility	AUTOSAR
Document Identification No	713

Document Status	published
Part of AUTOSAR Standard	Adaptive Platform
Part of Standard Release	R25-11

Document Change History			
Date	Release	Changed by	Description
2025-11-27	R25-11	AUTOSAR Release Management	• Improve support for SOVD • Add support for suspend-to-RAM • Rework support for cryptography • minor corrections / clarifications / editorial changes
2024-11-27	R24-11	AUTOSAR Release Management	• Improve configuration of diagnostic transport layers • Improve configuration of IEEE 1722-related transport • Offset Time Base Feature Removal • minor corrections / clarifications / editorial changes
2023-11-23	R23-11	AUTOSAR Release Management	• Improve diagnostic configuration • Improve firewall configuration • minor corrections / clarifications / editorial changes
2022-11-24	R22-11	AUTOSAR Release Management	• Support for MACsec • Support for firewall • Modeled State Management • Support for Service-oriented Vehicle Diagnostic • minor corrections / clarifications / editorial changes





2021-11-25	R21-11	AUTOSAR Release Management	• Removal of REST support • Rework of signal-to-service conversion • Rework of raw data stream configuration • Rework of diagnostic mapping • minor corrections / clarifications / editorial changes
2020-11-30	R20-11	AUTOSAR Release Management	• Remodeling of Phm contribution • Reporting of Security Events • Support for cryptographic Operations • Remodeling of Diagnostic Mapping • minor corrections / clarifications / editorial changes
2019-11-28	R19-11	AUTOSAR Release Management	• Overhaul of Signal-to-Service Translation • Support for Raw Data Streams • Support for Vehicle Package • Support for Service Versioning • Changed Document Status from Final to published
2019-03-29	19-03	AUTOSAR Release Management	• Introduction of Diagnostic Port Interfaces • Overhaul of Software Cluster and introduction of Software Package • Support for Identity and Access Management • Network Management Configuration
2018-10-31	18-10	AUTOSAR Release Management	• Finish introduction of CppImplementationDataType • Support for optional elements in structures • Rework configuration of adaptive platform modules





2018-03-29	18-03	AUTOSAR Release Management	• Time Synchronization • DDS Deployment
2017-10-27	17-10	AUTOSAR Release Management	• Optional elements in Service Interfaces • Interaction with web services • Secure Communication • Support for interaction with crypto and persistency • Signal-to-Service translation • Support for E2E communication • Platform Health Management • Uploadable Software Package
2017-03-31	17-03	AUTOSAR Release Management	• Initial release

Disclaimer

This work (specification and/or software implementation) and the material contained in it, as released by AUTOSAR, is for the purpose of information only. AUTOSAR and the companies that have contributed to it shall not be liable for any use of the work.

The material contained in this work is protected by copyright and other types of intellectual property rights. The commercial exploitation of the material contained in this work requires a license to such intellectual property rights.

This work may be utilized or reproduced without any modification, in any form or by any means, for informational purposes only. For any other purpose, no part of the work may be utilized or reproduced, in any form or by any means, without permission in writing from the publisher.

The work has been developed for automotive applications only. It has neither been developed, nor tested for non-automotive applications.

The word AUTOSAR and the AUTOSAR logo are registered trademarks.

Table of Contents

1	Introduction	26
1.1	Modeling Approach	27
1.1.1	General Considerations	27
1.1.2	Modeling of Diagnostic Configuration	28
1.2	The Term Service	29
1.3	Document Conventions	29
1.4	About Tables	31
2	Big Picture of Manifest Definition	32
2.1	Design vs. Target Configuration	32
2.1.1	Preface	32
2.1.2	Overview	32
2.1.3	Relation between Design and Target Configuration Models	33
2.1.4	Structure of the document	34
2.2	About Manifest	34
2.3	Serialization Format	34
2.4	Scope	35
2.5	Manifests described in this Document	36
3	Application Design	37
3.1	Overview	37
3.2	Application Structure	37
3.2.1	Software Component	37
3.2.2	Executable	39
3.2.2.1	Overview	39
3.2.2.2	Category	41
3.2.2.3	Root Software Component Prototype	41
3.2.2.4	Reporting Behavior	45
3.2.2.5	Implementation Props	46
3.2.2.6	Logging	46
3.2.3	TraceSwitchConfig	47
3.2.4	Interaction Endpoint for Application	49
3.2.4.1	Service-oriented Communication	49
3.2.4.2	Port Prototype Props	50
3.2.5	Port Prototype ComSpec	52
3.2.5.1	Port Prototypes typed by Service Interfaces	54
3.2.5.2	Port Prototypes typed by Persistency Data Interfaces	64
3.2.6	Process Design	67
3.3	Data Type	69
3.3.1	Overview	69
3.3.2	ApplicationDataType	69
3.3.2.1	String Data Type	70

3.3.2.2	Associative Map Data Type	72
3.3.2.3	Attributes of SwDataDefProps	77
3.3.3	CplusplusImplementationDataType	78
3.3.3.1	Overview	78
3.3.3.2	Attributes of SwDataDefProps	92
3.3.3.3	Primitive Data Types	96
3.3.3.4	String Data Type	96
3.3.3.5	Array Data Type	97
3.3.3.6	Vector Data Type	98
3.3.3.7	Struct Data Type	100
3.3.3.8	Enumeration Data Type	100
3.3.3.9	Map Data Type	101
3.3.3.10	Variant Data Type	102
3.3.3.11	Bitfield Data Type	103
3.3.4	Compatibility of ApplicationDataType and CplusplusImplementation- DataType	104
3.3.5	Optional Members in complex Data Structures	107
3.3.5.1	Background	107
3.3.5.2	Definition of Optionality	109
3.4	Serialization Of Data	111
3.4.1	Default Values for Serialization Properties	112
3.4.2	Individual Definition of Serialization Properties	117
3.4.3	Assignment of TLV properties	123
3.4.3.1	Assignment of TLV Data IDs	123
3.4.3.2	Assignment of Wire Type Selection	130
3.5	Identity and Access Management	131
3.5.1	Com Grant Design	132
3.5.2	Remote access control	138
3.5.2.1	Remote subject in case of TLS	140
3.5.2.2	Remote subject in case of IPsec	142
3.5.2.3	Remote subject in case of IP communication	143
3.5.2.4	Remote subject in case of SecOC communication	145
3.6	Intrusion Detection Design	145
3.7	Relation to Crypto System Design	147
4	Application Port Interface Design	150
4.1	Overview	150
4.2	Service Interface	150
4.2.1	Overview	150
4.2.2	Event	153
4.2.3	Trigger	153
4.2.4	Field	154
4.2.5	Method	156
4.2.5.1	Fire and Forget Method	157

4.2.6	Versioning of <code>ServiceInterfaces</code>	158
4.2.6.1	Versioning driven by transport layer	159
4.2.7	Namespace	160
4.2.8	Error Handling	163
4.2.9	Service Interface Data Type Mapping	167
4.3	Service Interface Mapping	170
4.4	Service Interface Element Mapping	175
4.4.1	Overview	175
4.4.2	Service Interface Event Mapping	178
4.4.3	Service Interface Trigger Mapping	179
4.4.4	Service Interface Field Mapping	180
4.4.5	Service Interface Method Mapping	181
4.5	State Management Interface	183
4.5.1	Overview	183
4.5.2	State Management Interfaces for Notifications	185
4.5.3	State Management Interfaces for Triggers	186
4.5.4	State Management Interfaces for Errors	187
4.5.5	State Client Interface	188
4.6	Persistency Interface	189
4.6.1	Overview	189
4.6.1.1	The big Picture	189
4.6.1.2	Modeling of Persistency Interface	190
4.6.1.3	Redundancy Handling	191
4.6.1.4	Update Handling	196
4.6.2	Persistency Key Value Storage Interface	197
4.6.3	Persistency File Storage Interface	202
4.7	Time Synchronization Interface	204
4.8	Platform Health Management Interface	207
4.8.1	Overview	207
4.8.2	Supervised Entities and Checkpoints	207
4.8.3	Recovery notification to State Management	210
4.9	Diagnostic Interface	212
4.9.1	Overview	212
4.9.2	Diagnostic Interfaces for UDS	213
4.9.2.1	Diagnostic Routine Interface	213
4.9.2.2	Interface to Data Identifier and Element of Data Identifier	216
4.9.2.3	Security Level Interface	219
4.9.2.4	Service Validation Interface	220
4.9.2.5	Generic UDS Interface	220
4.9.2.6	Diagnostic Interfaces for Upload and Download	221
4.9.2.7	Interface to support managing the <code>EcuReset</code>	222
4.9.2.8	Diagnostic Authentication Interface	223
4.9.2.9	Diagnostic External Authentication Interface	224

4.9.2.10 Diagnostic Communication Control Interface	225
4.9.2.11 Diagnostic Request File Transfer Interface	226
4.9.3 Diagnostic Interfaces for Fault Memory	226
4.9.3.1 Interface for providing Data to Extended Data Record	226
4.9.3.2 Interface to diagnostic Events	227
4.9.3.3 Interface to diagnostic Condition	229
4.9.3.4 Interface for multiple diagnostic Resources	230
4.9.3.5 Indicator Interface	232
4.9.3.6 Operation Cycle Interface	233
4.9.4 Diagnostic Interfaces for SOVD	233
4.9.4.1 Overview	233
4.9.4.2 Port Interface for SOVD Client Authorization	234
4.9.4.3 Port Interface for SOVD Proximity Challenge	235
4.9.4.4 Port Interface for SOVD Bulk Data	235
4.9.4.5 Port Interface for SOVD Service Validation	236
4.9.4.6 Port Interface for SOVD Update	236
4.9.4.7 Port Interface for SOVD Configuration	237
4.9.4.8 Port Interface for SOVD Operation	237
4.9.4.9 Port Interface for SOVD Content Access	239
4.9.5 Diagnostic Interfaces for DoIP	241
4.10 Crypto Interfaces	244
4.10.1 Interaction with Crypto Software	244
4.10.2 Crypto Key Slot Interface	245
4.10.3 Crypto Certificate Interface	251
4.10.4 Crypto Certificate Group Interface	251
4.10.5 Crypto Provider Interface	252
4.10.6 Linking of Crypto Certificate to a Crypto Key Slot	252
4.11 Raw Data Stream Interface	254
4.12 Intrusion Detection Interface	257
4.12.1 Security Event Report Interface	258
4.12.2 Intrusion Detection Timestamp Provider Interface	259
4.12.3 Intrusion Detection Context Provider Interface	259
4.12.4 Intrusion Detection Reporting Mode Provider Interface	259
4.12.5 Intrusion Detection Qualified Events Receiver Interface	260
4.13 Log And Trace Interface	260
4.14 Firewall Interface	262
4.15 Network Management Interface	263
4.16 Suspend to RAM Interface	264
5 Diagnostic Design	266
5.1 Extensions to the Diagnostic Common Props	266
5.1.1 Diagnostic SOVD Props	269
5.1.2 Diagnostic Address	270
5.1.3 Diagnostic Authentication Configuration	272

5.2 Diagnostic Mapping	273
5.2.1 Overview	273
5.2.1.1 Mapping of multiple Diagnostic Resources to a PortPrototype	276
5.2.2 Fault-Memory-related Diagnostic Mapping	278
5.2.2.1 Diagnostic Monitor to Port Mapping	278
5.2.2.2 Diagnostic Event to Port Mapping	282
5.2.2.3 Multiple Diagnostic Event to Port Mapping	283
5.2.2.4 Diagnostic Operation Cycle to Port Mapping	285
5.2.2.5 Diagnostic Enable Condition to Port Mapping	287
5.2.2.6 Diagnostic Clear Condition to Port Mapping	289
5.2.2.7 Multiple Diagnostic Condition to Port Mapping	290
5.2.2.8 Diagnostic Indicator to Port Mapping	292
5.2.2.9 Diagnostic Memory Destination to Port Mapping	293
5.2.2.10 Diagnostic Extended Data Record Port Mapping	296
5.2.3 UDS-related Diagnostic Mapping	298
5.2.3.1 Diagnostic Security to Port Mapping	299
5.2.3.2 Diagnostic Data Identifier to Port Mapping	300
5.2.3.3 Diagnostic Generic UDS Service Handler to Port Mapping	305
5.2.3.4 Diagnostic Service Validation Mapping	311
5.2.3.5 Diagnostic Authentication Mapping	312
5.2.3.6 Diagnostic External Authentication Mapping	315
5.2.4 SOVD-related Diagnostic Mapping	316
5.2.4.1 Diagnostic SOVD Proximity Challenge Mapping	317
5.2.4.2 Diagnostic SOVD Authorization Port Mapping	319
5.2.4.3 Diagnostic SOVD Bulk Data Port Mapping	320
5.2.4.4 Diagnostic SOVD Update Port Mapping	322
5.2.4.5 Diagnostic SOVD Service Validation Port Mapping	324
5.2.4.6 Diagnostic SOVD Configuration Port Mapping	326
5.2.4.7 Diagnostic SOVD Data Port Mapping	328
5.2.4.8 Diagnostic SOVD Operation Port Mapping	331
5.2.4.9 Diagnostic SOVD Configuration to SOVD Content Mapping	333
5.2.5 DoIP-related Diagnostic Mapping	334
5.2.5.1 Diagnostic DoIP Mapping	334
5.2.5.2 Diagnostic DoIP Group Identification Mapping	335
5.2.5.3 Diagnostic DoIP Activation Line Mapping	337
5.2.5.4 Diagnostic DoIP Trigger Vehicle Announcement Mapping	339
5.2.5.5 Diagnostic DoIP Entity Identification Mapping	341
5.2.5.6 Diagnostic DoIP Power Mode Mapping	343
5.3 Diagnostic Clear Condition	345
5.4 Security Access	346
5.5 Diagnostic Provided Data Mapping	347
5.6 Usage of Diagnostic Environmental Data Element Condition	348
5.7 SOVD Configuration Elements	352

5.7.1	SOVD Service Instance	352
5.7.1.1	Overview	352
5.7.1.2	SOVD Log	354
5.7.1.3	SOVD Update	355
5.7.1.4	SOVD Fault Memory Access	356
5.7.1.5	Diagnostic SOVD Data	356
5.7.1.6	SOVD Operation	359
5.7.2	SOVD Method	362
5.7.3	SOVD Lock	365
5.7.4	SOVD Content	366
5.7.4.1	Overview	366
5.7.4.2	SOVD Composite Content	369
5.7.4.3	SOVD Primitive Content	371
5.7.5	Environmental Data Condition to SOVD Content Element	373
5.7.6	SOVD Snapshots	374
5.8	Diagnostic Miscellanea	375
6	Machine Design	377
6.1	Overview	377
6.2	Processor	378
6.2.1	Overview	378
6.2.2	Core Affinity	379
6.3	Functional Cluster Design	380
6.3.1	Dolp Functional Cluster Design	380
6.4	Network Design aspects of Machine Design	387
6.5	Service Discovery Configuration	390
6.5.1	SOME/IP Service Discovery Configuration	390
6.6	TcpIp stack configuration properties	392
7	System Design	393
7.1	Overview	393
7.2	Specification of Communication System Structure	395
7.2.1	Network connection	395
7.2.1.1	Support of 10BASE-T1S Network Topologies	400
7.2.1.2	Support of Ethernet tunneling through CAN XL	400
7.2.1.3	IP configuration properties	402
7.2.1.4	TCP and UDP configuration properties	409
7.2.1.5	ICMP configuration properties	411
7.2.2	Securing Communication with IPsec	413
7.2.3	MACsec	421
7.2.4	Partial Network	427
7.3	Specification of Application Software System Structure	429
7.4	Modeling of service oriented communication between Classic and Adaptive platform	431

7.4.1	MethodMapping	432
7.4.2	EventMapping	433
7.4.3	FieldMapping	434
7.4.4	FireAndForgetMethodMapping	436
7.5	Crypto System Design	438
7.6	Process Design to Machine Design Mapping	442
8	Sub-System Design	444
8.1	Overview	444
8.2	Software Cluster Design	444
8.3	Relevance of Software Cluster Design for Diagnostics	450
8.4	Software Cluster Dependency	450
8.4.1	Overview	450
8.4.2	Modeling of a Software Cluster Dependency	451
8.5	Provided and required Services of Software Cluster Design	455
8.6	Mapping of Services to Executables	458
9	Signal-based communication	461
9.1	Overview	461
9.2	Signal-based prerequisites	466
9.2.1	Message Header for IP based transport	467
9.2.2	Message Identification for IEEE1722 ACF based transport	469
9.3	Signal-based Deployment	472
9.4	Signal/Service Translation Mapping	473
9.4.1	Handling of <code>ISignalGroups</code>	474
9.4.2	Direction of Signal/Service Translation Mapping	475
9.4.3	SignalBasedEvent Mapping	477
9.4.4	SignalBasedTrigger Mapping	480
9.4.5	SignalBasedField Mapping	481
9.4.6	SignalBased Fire and Forget Method Mapping	483
9.5	Service Discovery and Static Communication Configuration	485
9.5.1	Service discovery control	487
9.5.2	Service control right after translation start	489
9.5.3	Service control due to availability of related service instance	490
9.5.3.1	Signal-service-translation	490
9.5.3.2	Service-signal-translation	490
9.5.4	Static Communication Configuration	490
9.5.4.1	Static Communication Configuration for the Server	491
9.5.4.2	Static Communication Configuration for the Client	491
9.6	Translation behavior	492
9.6.1	<code>ServiceInterface</code> representation of translation data	492
9.6.1.1	Optional elements in case <code>signal-service-translation</code>	492
9.6.1.2	Optional elements in case <code>service-signal-translation</code>	493
9.6.2	Event and update-bit semantics	493

9.6.3	Data filtering	496
9.6.4	Translation from one source	498
9.6.5	Translation from several sources	499
9.6.6	Signal-Service-Translation to several targets	500
9.7	Translation pass-through composition	500
9.8	Expected features of Classic platform	501
9.8.1	Processing order	501
9.8.2	Reception data filter	501
9.8.3	Reception of invalid signal	502
9.8.4	Update Bit handling	502
9.8.5	Transfer properties and transmission modes for Service-Signal-Translation	503
9.8.6	Deadline monitoring	504
9.8.7	Signal and IPdu Transmission	504
9.8.8	IPdu multiplexing	504
9.9	End-to-End considerations	506
9.9.1	Safety	506
9.9.1.1	Signal-service-translation	509
9.9.1.2	Service-signal-translation	509
9.9.2	Security	510
9.9.2.1	Restrictions on Classic Platform SecOC	511
9.9.2.2	Link between Classic Platform SecOC and CryptoKeySlot	512
10	Execution Manifest	514
10.1	Overview	514
10.2	Process	514
10.2.1	Process relates to Executable	516
10.2.2	Process States	517
10.3	Startup Configuration	517
10.3.1	State-dependent Startup Configuration	518
10.3.2	Scheduling	522
10.3.3	Process Arguments	522
10.3.4	Association with Resource Group	523
10.3.5	Execution Dependency	524
10.3.6	Assignment of Processes to Function Group states	528
10.3.7	Resource Consumption Boundaries	528
10.3.8	Error and Termination Behavior	529
10.4	Function Groups	530
10.4.1	Semantics of Function Group	530
10.5	Reporting of Security Events	532
11	Machine Manifest	534
11.1	Machine	534
11.2	Environment Variable	536

11.3 Process To Machine Mapping	537
11.3.1 General Modeling Approach	537
11.3.2 Core Affinity	539
11.3.3 Default Start-up and Termination Timeout	540
12 Platform Module Development	542
12.1 OS Module configuration	544
12.2 Persistency Target-Configuration	546
12.2.1 Overview	546
12.2.1.1 Redundancy Handling	551
12.2.1.2 Update Handling	552
12.2.1.3 Size Handling	553
12.2.1.4 Security Handling	554
12.2.1.5 Preference Rules	554
12.2.2 Target-Configuration of Persistent Key-Value Storage	555
12.2.3 Target-Configuration of File Storage	559
12.3 Platform Health Management Target-Configuration	563
12.3.1 Overview	563
12.3.2 Relation between design and Target-Configuration	566
12.3.3 Supervision Target-Configuration	567
12.3.3.1 Global supervision	570
12.3.3.2 Supervision Mode	572
12.3.3.3 Supervision Mode condition	574
12.3.3.4 NoSupervision definition	577
12.3.3.5 AliveSupervision definition	578
12.3.3.6 CheckpointTransition definition	581
12.3.3.7 LogicalSupervision definition	582
12.3.3.8 DeadlineSupervision definition	584
12.3.3.9 NoCheckpointSupervision definition	585
12.3.4 Supervision Recovery Notification Target-Configuration	585
12.3.5 Recovery Notification	587
12.4 Time Synchronization Target-Configuration	588
12.4.1 Overview	588
12.4.2 Time Synchronization functional cluster configuration	589
12.4.3 Time Base	590
12.4.3.1 Synchronized time base	590
12.4.3.2 Persistent Time Base value storage	593
12.4.3.3 Ethernet synchronized time	595
12.4.4 Time Base to Port Prototype mapping	598
12.5 DoIP configuration	600
12.6 Log and Trace module configuration	606
12.6.1 Log and Trace Target-Configuration	607
12.6.2 Relation between Design and Target-Configuration	611
12.7 Network Management configuration	614

12.7.1 UDP Network Management	614
12.7.2 Relation between Application Software and Network Handles	620
12.7.3 Relation between Function Group states and Network Handles	621
12.7.3.1 UdpNm configuration constraints	624
12.7.4 CAN XL Network Management	625
12.8 Update and Configuration Management	629
12.8.1 Overview	629
12.8.2 Retry Strategy	631
12.8.3 UCM Master Module Instantiation	632
12.8.4 UCM Subordinate Module Instantiation	633
12.9 CM configuration	635
12.9.1 Com Grant Target-Configuration	637
12.9.1.1 Com Field Grant Target-Configuration	637
12.9.1.2 Com Method Grant Target-Configuration	639
12.9.1.3 Com Event Grant Target Configuration	640
12.9.1.4 Com Trigger Grant Target-Configuration	641
12.9.1.5 Com Offer Service Grant Target-Configuration	643
12.9.2 Remote access control	643
12.10 Crypto Target-Configuration	646
12.10.1 Crypto Provider	647
12.10.2 Crypto Key Slot	649
12.10.2.1 Crypto Key Slot to Port Prototype Mapping	651
12.10.2.2 Crypto Key Slot to Client Port Prototype Mapping	653
12.10.3 Crypto Certificate	654
12.10.4 Crypto Certificate Group	656
12.10.5 Relation to Crypto System Design	657
12.11 IdsM Target-Configuration	658
12.11.1 IdsM Instantiation	658
12.11.2 Time Stamps for Security Events via Time-Base Resource	663
12.11.3 Mapping to Timestamp Provider	663
12.11.4 Mapping to Context Provider	665
12.11.5 Mapping to Reporting Mode Provider	666
12.11.6 Mapping to Qualified Event Receiver	668
12.11.7 Target-Configuration for Security Events	670
12.12 Service-oriented Vehicle Diagnostics	671
12.12.1 Overview	671
12.12.2 SOVD Server	673
12.12.3 SOVD Gateway	674
12.13 Firewall Target-Configuration	676
12.13.1 Firewall rules on Datalink layer	683
12.13.2 Firewall rules on Network layer	684
12.13.3 Firewall rules on Transport layer	687
12.13.4 Firewall rules via byte pattern	688

12.13.5 Firewall deep packet inspection of SOME/IP SD and SOME/IP messages	689
12.13.6 Firewall deep packet inspection of DoIP messages	691
12.13.7 Firewall deep packet inspection of DDS messages	692
12.14 State Management Target-Configuration	694
12.14.1 Overview	694
12.14.2 Requests to State Management	696
12.14.2.1 Trigger Requests to State Management	698
12.14.2.2 Error Requests to State Management	699
12.14.3 Notifications from State Management	699
12.14.4 Rules	701
12.14.4.1 Overview	701
12.14.4.2 Trigger Rules	705
12.14.4.3 Error Rules	706
12.14.5 Action Items	707
12.14.5.1 State Machine State Machine Action Item	709
12.14.5.2 Sync Action Item	712
12.14.5.3 Function Group Action Item	712
12.14.5.4 Network Management Action Item	714
12.14.5.5 Sleep Action Item	716
12.14.5.6 Suspend to RAM Action Item	717
12.14.6 State Client	719
12.14.7 Error Handling inside State Management	721
12.14.7.1 Request Function Group State	722
12.15 Suspend to RAM	722
12.15.1 Suspend to RAM Module Instantiation	723
12.15.2 Suspend to RAM Module Satellite Mapping	724
12.15.3 Suspend to RAM Module Hub Mapping	726
12.16 GenericDiagnosticTransportInstantiation	728
12.17 Ethernet Endpoint Configuration for Platform Modules	729
13 Service Instance Manifest	731
13.1 ApplicationEndpoint	731
13.1.1 VLAN Priority	733
13.2 Service Interface Deployment	733
13.2.1 SOME/IP Service Interface Deployment	739
13.2.2 DDS Service Interface Deployment	750
13.2.3 User Defined Service Interface Deployment	755
13.3 Service Instance Target-Configuration	759
13.3.1 SOME/IP Service Instance Deployment	766
13.3.1.1 Provided Service Instance	767
13.3.1.2 Required Service Instance	790
13.3.1.3 Provided Service Instance with static remote peers	800
13.3.1.4 Required Service Instance with static remote peers	803

13.3.2 DDS Service Instance Deployment	804
13.3.2.1 Provided DDS Service Instance	806
13.3.2.2 Required DDS Service Instance	810
13.3.2.3 DDS Service Instance to Machine mapping	812
13.3.3 User Defined Service Instance Deployment	813
13.3.4 Service Deployment Relations	814
13.4 EndToEndProtection	815
13.5 Secure Communication	823
13.5.1 Secure Communication over TLS	827
13.5.2 Secure Communication over SecOC	836
13.5.3 Secure Communication over DDS	840
14 Raw Data Stream Manifest	844
14.1 Raw Data Stream Deployment	844
14.2 Raw Data Stream Mapping	844
14.3 Raw Data Streams over Ethernet using IP based Protocol	845
14.3.1 Ethernet Raw Data Stream Client Mapping	849
14.3.2 Ethernet Raw Data Stream Server Mapping	851
14.4 Raw Data Streams over Ethernet using MAC Layer Protocol	853
14.4.1 Raw Data Streams over Ethernet using IEEE1722 Protocol	853
14.4.2 Raw Data Streams for Control Messages over Ethernet using IEEE1722 ACF Protocol	856
15 Cross-FunctionalCluster interaction	860
15.1 Com Certificate To Crypto Certificate Mapping	862
15.2 Com Key To Crypto Key Slot Mapping	863
15.3 Com SecOc To Crypto Key Slot Mapping	865
15.4 Persistency Deployment To Crypto Key Slot Mapping	866
15.5 Persistency Deployment Element To Crypto Key Slot Mapping	868
15.6 Persistency Deployment To Dlt Log Sink Mapping	869
15.7 Functional Cluster To Dlt Log Sink Mapping	869
15.8 Ucm To Time Base Resource Mapping	870
15.9 Functional Cluster Interacts With Persistency Deployment Mapping	871
15.10 Adaptive Module Instantiation to Security Event Definition Mapping	873
15.11 State Management interacts with Network Management and vice versa	874
15.11.1 State Management interacts with Network Management	874
15.11.2 Network Management interacts with State Management	875
15.12 Functional Cluster reports Production Error	877
16 Software Distribution	879
16.1 Overview	879
16.2 Uploadable Package Element	880
16.3 Software Cluster	883
16.3.1 Software Cluster General Modeling	883
16.3.2 Relevance of Software Cluster for Diagnostics	889

16.3.2.1 Diagnostic Props	889
16.3.2.2 Relation to the Diagnostic Contribution Set	890
16.3.2.3 Diagnostic Service Validation	891
16.3.3 Contract between Software Cluster and Software Cluster Design	893
16.3.4 References between Software Clusters	893
16.3.5 Software Cluster Artifact Checksum	895
16.3.6 Software Cluster Artifact Locator	896
16.4 Software Package	898
16.5 Vehicle Package	903
16.5.1 Overview	903
16.5.2 VehicleRolloutStep	907
16.5.3 UcmStep	909
16.5.4 SoftwarePackageStep	909
17 Interoperability between Classic Platform and Adaptive Platform	912
17.1 Usage of majorVersion in the SOME/IP network binding	912
A Reference Material	914
A.1 Terms and Abbreviations	914
A.2 Imposition Times of Constraints	916
B Examples	917
B.1 Data Type	917
B.1.1 Definition of Map Data Type	917
B.1.2 Definition of String Data Type	918
B.1.3 Definition of String Data Type	918
B.1.4 Definition of Vector Data Type	919
B.1.5 Definition of Struct Data Type	921
B.1.6 Definition of Enumeration Data Type	921
B.1.7 Definition of Map Data Type	922
B.1.8 Definition of Variant Data Type	922
B.1.9 Scenarios to define a Vector	923
B.2 Service-oriented Communication	924
B.2.1 Radar and Camera ServiceInterface example	924
B.2.2 Service Interface Mapping	928
B.2.2.1 Service Interface Element Mapping	928
B.2.2.2 Service Interface Event Mapping	929
B.2.2.3 Service Interface Field Mapping	930
B.2.2.4 Service Interface Method Mapping	930
B.2.3 Service Instance Deployment	930
B.2.3.1 Service Instance Deployment by Service Interface Mapping	930
B.2.3.2 Service Instance Deployment by Service Interface Element Mapping	932
B.2.4 Service Instance Mapping	935
B.2.4.1 SOME/IP Service Instance Mapping	935

B.2.4.2 User-Defined Service Instance Mapping	936
B.2.5 Definition of VLAN Priority	937
B.2.6 Static Configuration of remote Peers	938
B.2.6.1 Provided Service Instance with remote Peers	938
B.2.6.2 Required Service Instance with remote Peers	939
B.3 Execution Management	940
B.3.1 Definition of Startup Configuration	940
B.4 Persistency	943
B.4.1 Definition of Persistent Data	943
B.4.2 Definition of Persistent File	944
B.5 Interaction with the PHM	945
B.5.1 Relation between Instance Specifier and Instance Ref	945
B.5.2 Phm Application Design example	946
B.5.3 Phm configuration example	947
B.6 State Management	948
B.6.1 Consideration of User Perspective	948
B.6.2 Scenario for Trigger	948
B.6.3 Scenario for Error	953
B.7 Crypto	955
B.7.1 Relation between a Crypto Certificate and a Crypto Key Slot	955
B.8 Machine Manifest	956
B.8.1 Distributed Definition of Environment Variables	956
B.9 Ethernet Raw Data Stream Configuration	957
B.9.1 Preamble	957
B.9.2 Fully formalized Model Example	959
B.9.3 Only Client is formalized	960
B.9.4 Only Server is formalized	961
B.10 Signal/Service Translation	962
B.10.1 Signal/Service Mapping	962
B.10.1.1 Map Event to Signal	962
B.10.1.2 Map Field to Signal	963
B.10.2 Signal/Service Translation Behavior	964
B.10.2.1 Optional Structure Element in the context of Signal/Service Translation	964
B.10.2.2 Optional Structure Element in the context of Service/Signal Translation	964
B.10.2.3 Translation from different Sources	965
B.10.2.4 Translation to different Targets	966
B.11 Software Cluster Design	967
B.11.1 Dependencies among Software Cluster Designs	967
B.11.2 Usage of SoftwarePackageStep	968
B.11.2.1 Usage of transfer and process	968
B.12 Miscellaneous Examples	970

B.12.1 Relation of ApApplicationError and ApApplicationErrorDomain . . .	970
C Custom Model Extension	971
C.1 Overview	971
C.2 Custom Attribute Definition	973
C.2.1 Custom Primitive Attribute Definition	973
C.2.2 Custom Complex Attribute Definition	975
C.3 Custom Foreign Reference Definition	976
C.4 Custom Subclass Configuration	979
C.5 Custom Constraints	981
C.6 Definition of Reference from SdgClass to SdgClass	981
D General Modeling	985
D.1 Reference to a DataPrototype in a PortInterface	985
D.1.1 Reference to the inside of an ApplicationDataType	985
D.1.2 Reference to the inside of a CppImplementationDataType	987
D.2 Reference to a AutosarDataPrototype in an Executable	989
D.3 Reference to a PortPrototype in an Executable	992
D.4 Modeling of a Method in an Executable	997
D.5 Modeling of Diagnostic-related InstanceRefs	998
D.6 Modeling of PHM-related InstanceRefs	1000
D.7 Modeling of Time-related InstanceRefs	1002
D.8 Modeling of Persistency-related InstanceRefs	1003
D.9 Modeling of SoftwareClusterDesign-related InstanceRefs	1003
D.10 Modeling of State-Management-related InstanceRefs	1006
D.11 Modeling of Intrusion-Detection-related InstanceRefs	1008
D.12 Modeling of Crypto-related InstanceRefs	1009
E Mentioned Class Tables	1010
F Change History of AUTOSAR Traceable Items	1089
F.1 Traceable item history of this document according to AUTOSAR Re- lease R17-03 (original version)	1089
F.1.1 Created Constraints in R17-03	1089
F.1.2 Created Specification Items in R17-03	1091
F.2 Traceable item history of this document according to AUTOSAR Re- lease R17-10	1096
F.2.1 Added Specification Items in R17-10	1096
F.2.2 Changed Specification Items in R17-10	1100
F.2.3 Deleted Specification Items in R17-10	1101
F.2.4 Added Constraints in R17-10	1101
F.2.5 Changed Constraints in R17-10	1103
F.2.6 Deleted Constraints in R17-10	1103
F.3 Traceable item history of this document according to AUTOSAR Re- lease R18-03	1104

F.3.1	Added Specification Items in R18-03	1104
F.3.2	Changed Specification Items in R18-03	1107
F.3.3	Deleted Specification Items in R18-03	1109
F.3.4	Added Constraints in R18-03	1109
F.3.5	Changed Constraints in R18-03	1112
F.3.6	Deleted Constraints in R18-03	1112
F.4	Traceable item history of this document according to AUTOSAR Release R18-10	1113
F.4.1	Added Specification Items in R18-10	1113
F.4.2	Changed Specification Items in R18-10	1115
F.4.3	Deleted Specification Items in R18-10	1117
F.4.4	Added Constraints in R18-10	1119
F.4.5	Changed Constraints in R18-10	1121
F.4.6	Deleted Constraints in R18-10	1122
F.5	Traceable item history of this document according to AUTOSAR Release R19-03	1123
F.5.1	Added Specification Items in R19-03	1123
F.5.2	Changed Specification Items in R19-03	1126
F.5.3	Deleted Specification Items in R19-03	1127
F.5.4	Added Constraints in R19-03	1127
F.5.5	Changed Constraints in R19-03	1128
F.5.6	Deleted Constraints in R19-03	1129
F.6	Traceable item history of this document according to AUTOSAR Release R19-11	1130
F.6.1	Added Specification Items in R19-11	1130
F.6.2	Changed Specification Items in R19-11	1133
F.6.3	Deleted Specification Items in R19-11	1134
F.6.4	Added Constraints in R19-11	1134
F.6.5	Changed Constraints in R19-11	1136
F.6.6	Deleted Constraints in R19-11	1136
F.7	Traceable item history of this document according to AUTOSAR Release R20-11	1137
F.7.1	Added Specification Items in R20-11	1137
F.7.2	Changed Specification Items in R20-11	1140
F.7.3	Deleted Specification Items in R20-11	1142
F.7.4	Added Constraints in R20-11	1144
F.7.5	Changed Constraints in R20-11	1146
F.7.6	Deleted Constraints in R20-11	1147
F.8	Traceable item history of this document according to AUTOSAR Release R21-11	1148
F.8.1	Added Specification Items in R21-11	1148
F.8.2	Changed Specification Items in R21-11	1150
F.8.3	Deleted Specification Items in R21-11	1153
F.8.4	Added Constraints in R21-11	1154

F.8.5	Changed Constraints in R21-11	1158
F.8.6	Deleted Constraints in R21-11	1159
F.9	Traceable item history of this document according to AUTOSAR Release R22-11	1160
F.9.1	Added Specification Items in R22-11	1160
F.9.2	Changed Specification Items in R22-11	1163
F.9.3	Deleted Specification Items in R22-11	1164
F.9.4	Added Constraints in R22-11	1164
F.9.5	Changed Constraints in R22-11	1173
F.9.6	Deleted Constraints in R22-11	1173
F.9.7	Added Advisories in R22-11	1174
F.9.8	Changed Advisories in R22-11	1175
F.9.9	Deleted Advisories in R22-11	1175
F.10	Traceable item history of this document according to AUTOSAR Release R23-11	1175
F.10.1	Added Specification Items in R23-11	1175
F.10.2	Changed Specification Items in R23-11	1177
F.10.3	Deleted Specification Items in R23-11	1178
F.10.4	Added Constraints in R23-11	1178
F.10.5	Changed Constraints in R23-11	1182
F.10.6	Deleted Constraints in R23-11	1183
F.10.7	Added Advisories in R23-11	1184
F.10.8	Changed Advisories in R23-11	1184
F.10.9	Deleted Advisories in R23-11	1184
F.11	Traceable item history of this document according to AUTOSAR Release R24-11	1184
F.11.1	Added Specification Items in R24-11	1184
F.11.2	Changed Specification Items in R24-11	1186
F.11.3	Deleted Specification Items in R24-11	1187
F.11.4	Added Constraints in R24-11	1188
F.11.5	Changed Constraints in R24-11	1191
F.11.6	Deleted Constraints in R24-11	1193
F.11.7	Added Advisories in R24-11	1193
F.11.8	Changed Advisories in R24-11	1194
F.11.9	Deleted Advisories in R24-11	1194
F.12	Traceable item history of this document according to AUTOSAR Release R25-11	1194
F.12.1	Added Specification Items in R25-11	1194
F.12.2	Changed Specification Items in R25-11	1196
F.12.3	Deleted Specification Items in R25-11	1197
F.12.4	Added Constraints in R25-11	1198
F.12.5	Changed Constraints in R25-11	1201
F.12.6	Deleted Constraints in R25-11	1204
F.12.7	Added Advisories in R25-11	1205

F.12.8 Changed Advisories in R25-11	1205
F.12.9 Deleted Advisories in R25-11	1205
G Splitable Elements in the Scope of this Document	1206
H Variation Points in the Scope of this Document	1209
I Upstream Mapping	1210
I.1 Introduction	1210
I.2 Persistency	1211

References

- [1] Adaptive Platform Machine Configuration
AUTOSAR_AP_TPS_MachineConfiguration
- [2] Software Component Template
AUTOSAR_CP_TPS_SoftwareComponentTemplate
- [3] Diagnostic Extract Template
AUTOSAR_CP_TPS_DiagnosticExtractTemplate
- [4] System Template
AUTOSAR_CP_TPS_SystemTemplate
- [5] Layered Software Architecture
AUTOSAR_CP_EXP_LayeredSoftwareArchitecture
- [6] Reference Model for Service Oriented Architecture 1.0
<https://www.oasis-open.org/committees/download.php/19679/soa-rm-cs.pdf>
- [7] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate
- [8] Generic Structure Template
AUTOSAR_FO_TPS_GenericStructureTemplate
- [9] Demonstrator Design of Functional Cluster Identity and Access Management
AUTOSAR_AP_EXP_FCDesignIdentityAndAccessManagement
- [10] Explanation of ara::com API
AUTOSAR_AP_EXP_ARAComAPI
- [11] SOME/IP Protocol Specification
AUTOSAR_FO_PRS_SOMEIPProtocol
- [12] ISO 10646:2012 – Information technology – Universal Coded Character Set (UCS)
<https://www.iso.org>
- [13] Specification of Execution Management
AUTOSAR_AP_SWS_ExecutionManagement
- [14] Specification of Platform Health Management
AUTOSAR_AP_SWS_PlatformHealthManagement
- [15] Specification of Persistency
AUTOSAR_AP_SWS_Persistency
- [16] IEEE Standard for Information Technology- Standardized Application Environment Profile (AEP)-POSIX Realtime and Embedded Application Support
<https://standards.ieee.org/findstds/standard/1003.13-2003.html>
- [17] Specification of Time Synchronization

AUTOSAR_AP_SWS_TimeSynchronization

- [18] Specification of Cryptography
AUTOSAR_AP_SWS_Cryptography
- [19] IEEE Standard 1722-2016 - IEEE Standard for a Transport Protocol for Time-Sensitive Applications in Bridged Local Area Networks
- [20] Specification of Raw Data Stream
AUTOSAR_AP_SWS_RawDataStream
- [21] ISO 17978-3:2025 – Road vehicles — Service-oriented vehicle diagnostics (SOVD) – Part 3: Application programming interface (API)
<http://www.iso.org>
- [22] Specification of Diagnostics
AUTOSAR_AP_SWS_Diagnostics
- [23] Specification of Communication Management
AUTOSAR_AP_SWS_CommunicationManagement
- [24] Specification of Secure Onboard Communication
AUTOSAR_CP_SWS_SecureOnboardCommunication
- [25] Security Extract Template
AUTOSAR_FO_TPS_SecurityExtractTemplate
- [26] Technical Report on Operating System Tracing Interface
AUTOSAR_AP_TR_OperatingSystemTracingInterface
- [27] ISO 13400 – Road vehicles – Diagnostic communication over Internet Protocol (DoIP)
<https://www.iso.org>
- [28] Log and Trace Protocol Specification
AUTOSAR_FO_PRS_LogAndTraceProtocol
- [29] Specification of Update and Configuration Management
AUTOSAR_AP_SWS_UpdateAndConfigurationManagement
- [30] ASAM Service Oriented Vehicle Diagnostics V1.0.0
<http://www.asam.net>
ASAM_SOVD_BS_V1-0-0_PR.pdf
- [31] Multicast DNS
<https://www.ietf.org/rfc/rfc6762.txt>
- [32] DNS-Based Service Discovery
<https://www.rfc-editor.org/rfc/rfc6763>
- [33] mDNS IPv4 Parameters
<https://www.iana.org/assignments/multicast-addresses/multicast-addresses.txt>
- [34] mDNS Port Parameters

<https://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.txt>

[35] mDNS IPv6Parameters

<https://www.iana.org/assignments/ipv6-multicast-addresses/ipv6-multicast-addresses.txt>

[36] SOME/IP Service Discovery Protocol Specification

AUTOSAR_FO_PRS_SOMEIPServiceDiscoveryProtocol

[37] Data Distribution Service (DDS), Version 1.4

<http://www.omg.org/spec/DDS/1.4>

[38] RPC over DDS, Version 1.0

<https://www.omg.org/spec/DDS-RPC/1.0>

[39] DDS Consolidated XML Syntax, Version 1.0

<https://www.omg.org/spec/DDS-XML>

[40] Specification of SW-C End-to-End Communication Protection Library

AUTOSAR_CP_SWS_E2ELibrary

[41] DDS Security, Version 1.1

<https://www.omg.org/spec/DDS-SECURITY/1.1>

[42] Glossary

AUTOSAR_FO_TR_Glossary

1 Introduction

This document contains the specification of the so-called the *Manifest* on the *AUTOSAR adaptive platform*. A description of the overall modeling approach can be found in [Chapter 1.1](#). A reference to the definition of the term *service* is given in [Chapter 1.2](#).

The term *Manifest* is used in this specification in the meaning of a formal specification of configuration content. Please find a more detailed description of the term and the implications for the *AUTOSAR adaptive platform* in [Chapter 2](#).

Over time, the manifest-related content in this document will be replaced step-by-step by a target configuration model based on the so-called APMC¹-Approach. Please find more details about the modeling approach implemented by APMC in the [[1](#), TPS Adaptive Platform Machine Configuration]

Please note that the content of the document (despite the name) extends to the description of design elements necessary to develop software for the *AUTOSAR adaptive platform*.

The design-related modeling mainly is focused on the development of application software on the *AUTOSAR adaptive platform* as well as the connection between application and diagnostics and is described in detail in [Chapter 3](#), [Chapter 4](#) and [Chapter 5](#).

On the *AUTOSAR adaptive platform*, these chapters represent a counterpart/extension to the [[2](#), TPS Software Component Template] and the [[3](#), TPS Diagnostic Extract Template] on the *AUTOSAR classic platform*. This means that certain parts of the mentioned documents on the *AUTOSAR classic platform* are also applicable to the *AUTOSAR adaptive platform*.

This relation is explicitly marked in the definition of imposition time of constraints defined in the mentioned documents.

[Chapter 6](#) contains a description of the concrete Machine Design, which represents a counterpart to some sections of the [[4](#), TPS System Template] on the *AUTOSAR classic platform*.

[Chapter 7](#), in particular, describes the big picture of *AUTOSAR classic platform* and *AUTOSAR adaptive platform* communicating via service-oriented communication.

[Chapter 8](#) supports the design-related section of this document with a description of how installable sub-systems are described on the design level.

[Chapter 9](#) concludes the design-related part by explaining how signal-based communication can be transformed into service-oriented communication and vice versa in order to participate in the communication between ECUs on the *AUTOSAR classic platform*.

¹Adaptive Platform Machine Configuration

[Chapter 10](#) starts the target-configuration part of the document. It represents that counterpart to [Chapter 3](#) on target-configuration level and describes the content of the so-called *execution manifest*.

[Chapter 11](#) describes the options for configuring a machine by means of a *manifest*.

[Chapter 12](#) contains a string of sub-sections that explain the manifest content of platform module functionality.

[Chapter 13](#) provides a detailed description of how service-oriented communication shall be configured on *manifest* level.

[Chapter 14](#) describes the target-configuration modeling for raw data stream communication.

[Chapter 15](#) explains the modeling of interactions among functional clusters in the AUTOSAR stack.

[Chapter 16](#) describes the idea behind and the configuration of the concept of an uploadable software package.

Finally, [Chapter 17](#) makes some remarks about the interaction of the *AUTOSAR adaptive platform* with software on the *AUTOSAR classic platform*.

1.1 Modeling Approach

1.1.1 General Considerations

The *AUTOSAR adaptive platform* has been introduced when the *AUTOSAR classic platform* was already a stable and well-established standard in the automotive domain.

And yet, the *AUTOSAR adaptive platform* is no successor of the *AUTOSAR classic platform*. Both platforms complement each other for specific use cases that can be better implemented by one or the other platform.

In this situation, two possible approaches for modeling on the *AUTOSAR adaptive platform* could have been taken:

- The *AUTOSAR adaptive platform* is based on different principles than the *AUTOSAR classic platform*, and hence the modeling approach could also **decouple from the canon of the AUTOSAR classic platform as much as possible** to advertise the fact that the two platforms have different purposes.

Consequently, even if specific model elements have clear counterparts in the respective other platform, use a different terminology to not confuse the users of both platforms.

- Despite the undeniable differences between the two platforms, there is still a significant number of striking similarities that strongly encourage the **usage of existing modeling concepts** from the *AUTOSAR classic platform*, especially

from the specification of the [2, TPS Software Component Template], as much as possible.

Consequently, the conclusion is to use the identical meta-classes for similar purposes on both platforms. It will then be necessary to extend some of the affected meta-classes platform specific where applicable and add constraints that clarify the platform-specific usage of the mentioned extensions.

Without further ado, the modeling approach for the *AUTOSAR adaptive platform* follows the second alternative.

This means, for example, that a piece of application software on the *AUTOSAR adaptive platform* shall be represented by an `SwComponentType`. This includes the definition of `CompositionSwComponentTypes` that in turn aggregate `SwComponentPrototypes` typed by e.g. (in case of the *AUTOSAR adaptive platform*) `AdaptiveApplicationSwComponentTypes`.

The reuse of existing model-elements for the definition of the meta-model for the *AUTOSAR adaptive platform* has the side effect that the descriptions of existing model elements may contain references to technical details that only make sense on the *AUTOSAR classic platform*.

After all, the model elements were created when only the *AUTOSAR classic platform* existed.

These references shall be taken with a grain of salt. It is expected that readers can abstract from those details and extract the aspects of these model elements that create relevance for the description of the *AUTOSAR adaptive platform*.

1.1.2 Modeling of Diagnostic Configuration

The configuration of the “external behavior” of the AUTOSAR diagnostic stack is done by means of the so-called `Diagnostic Extract`. The `Diagnostic Extract` in general extends to both the *AUTOSAR classic platform* and the *AUTOSAR adaptive platform*.

In particular, some parts of the `Diagnostic Extract` apply only for the *AUTOSAR classic platform*, some parts are shared between the *AUTOSAR classic platform* and the *AUTOSAR adaptive platform*, and some parts apply only for the *AUTOSAR adaptive platform*.

The parts that are specific to the *AUTOSAR classic platform*, and the parts that apply to both the *AUTOSAR classic platform* and the *AUTOSAR adaptive platform* are documented in the deliverable [3, TPS Diagnostic Extract Template].

For technical reasons, the parts that apply to the *AUTOSAR adaptive platform* cannot be included in the document [3, TPS Diagnostic Extract Template] and are consequently documented in this document, “TPS Manifest Specification”.

The parts about the configuration of Diagnostic Management, as described in this document, fit seamlessly into the same modeling framework that is used on the *AUTOSAR classic platform*. This means that the specific parts for the *AUTOSAR adaptive platform* utilize the shared parts that are described in the [3, TPS Diagnostic Extract Template].

In other words, readers who want to focus on `Diagnostic Extract` specifically for application on the *AUTOSAR classic platform* may concentrate on reading the [3, TPS Diagnostic Extract Template].

On the other hand, readers who'd like to understand how the `Diagnostic Extract` works on the *AUTOSAR adaptive platform* will have to read the diagnostics-related chapters of the "TPS Manifest Specification", plus the relevant parts of the [3, TPS Diagnostic Extract Template].

1.2 The Term Service

It is essential to keep in mind that the term *service* is frequently used within this document in particular and the *AUTOSAR adaptive platform* in general.

This usage has its reasons despite the fact that the meaning of the term *service* on the *AUTOSAR adaptive platform* collides with other meanings used within AUTOSAR.

In summary, the following meaning of the term *service* exist in the scope of AUTOSAR:

- The Term *service* is used in the [5, EXP Layered Software Architecture] to denote the highest layer of the AUTOSAR software architecture that interacts with the application. In this context, model elements like `ServiceSwComponentType`, `SwcServiceDependency`, `ServiceNeeds`, or `PortInterface.isService` have been created on the *AUTOSAR classic platform*.
- The term *service* is used to express that information is related or required in a workshop where a car is **serviced**. In this context, *service-only diagnostic trouble codes* (DTC) are defined.
- The term *service* is used to describe the handling of **diagnostic services**, e.g. UDS service *ReadDataByIdentifier*, for the communication between a diagnostic tester and a diagnostic stack on an (AUTOSAR) ECU.
- the term *service* is used in the meaning defined by the **service-oriented architecture** [6, SOA]. This meaning has the strongest relation to the usage of the term *service* on the *AUTOSAR adaptive platform*.

1.3 Document Conventions

Technical terms are typeset in mono spaced font, e.g. `PortPrototype`. As a general rule, plural forms of technical terms are created by adding "s" to the singular form, e.g.

[PortPrototypes](#). By this means the document resembles terminology used in the AUTOSAR XML Schema.

This document contains constraints in textual form that are distinguished from the rest of the text by a unique numerical constraint ID, a headline, and the actual constraint text starting after the `[` character and terminated by the `]` character.

The purpose of these constraints is to literally constrain the interpretation of the AUTOSAR meta-model such that it is possible to detect violations of the standardized behavior implemented in an instance of the meta-model (i.e. on M1 level).

Makers of AUTOSAR tools are encouraged to add the numerical ID of a constraint that corresponds to an M1 modeling issue as part of the diagnostic message issued by the tool.

The attributes of the classes introduced in this document are listed in form of class tables. They have the form shown in the example of the top-level element AUTOSAR:

Please note that constraints are not supposed to be enforceable at any given time in an AUTOSAR workflow. During the development of a model, constraints may legitimately be violated because an incomplete model will obviously show inconsistencies.

However, at specific points in the workflow, constraints shall be enforced as a safeguard against misconfiguration.

The points in the workflow where constraints shall be enforced, sometimes also known as the "binding time" of the constraint, are different for each model category, e.g. on the classic platform, the constraints defined for software-components are typically enforced prior to the generation of the RTE while the constraints against the definition of an Ecu extract shall be applied when the Ecu configuration for the Com stack is created.

For each document, possible binding times of constraints are defined and the binding times are typically mentioned in the constraint themselves to give a proper orientation for implementers of AUTOSAR authoring tools.

Let [AUTOSAR](#) be an example of a typical class table. The first rows in the table have the following meaning:

Class: The name of the class as defined in the UML model.

Package: The UML package the class is defined in. This is only listed to help locating the class in the overall meta model.

Note: The comment the modeler gave for the class (class note). Stereotypes and UML tags of the class are also denoted here.

Base Classes: If applicable, the list of direct base classes.

The headers in the table have the following meaning:

Attribute: The name of an attribute of the class. Note that AUTOSAR does not distinguish between class attributes and owned association ends.

Type: The type of an attribute of the class.

Mul.: The assigned multiplicity of the attribute, i.e. how many instances of the given data type are associated with the attribute.

Kind: Specifies, whether the attribute is aggregated in the class (`aggr` aggregation), an UML attribute in the class (`attr` primitive attribute), or just referenced by it (`ref` reference). Instance references are also indicated (`iref` instance reference) in this field.

Note: The comment the modeler gave for the class attribute (role note). Stereotypes and UML tags of the class are also denoted here.

Please note that the chapters that start with a letter instead of a numerical value represent the appendix of the document. The purpose of the appendix is to support the explanation of certain aspects of the document and does not represent binding conventions of the standard.

The verbal forms for the expression of obligation specified in [TPS_STDT_00053] shall be used to indicate requirements, see [7, Standardization Template].

Please note: By intent, TPS documents (and their traceable items) do not trace up to an RS (requirement item).

1.4 About Tables

There is a number of tables in this document that describe the applicability or multiplicity of model elements. These tables contain empty cells, which represent a “not applicable” meaning. Model elements that correspond to an empty cell shall not exist in the context described by the respective table cell.

If the value of a table cell shall indicate that that either the existence or multiplicity of the represented model element shall be ignored anyway, the table cell gets the content “d/c” for “don’t care”. This means that if the respective model element exists, it shall be ignored in the downstream processing of the model.

2 Big Picture of Manifest Definition

2.1 Design vs. Target Configuration

2.1.1 Preface

This document underwent a change in terminology. Previously, the term “Deployment” was used to identify modeling or workflow steps that relate to the creation of model elements that are mostly local to a given compute node. Therefore, these elements are usually created during integration.

In other words, the purpose of all these “deployment-related” steps and modeling elements is to create a configuration of the target on which the code is executed at run-time.

In this context, the usage of the term “deployment” is considered to broad and lacking focus on the real task. In contrast, the usage of the term “target-configuration” is considered the better and more precise alternative. To provide a service to the reader, the text in this document has been updated to reflect the new terminology wherever reasonable.

Model elements, on the other hand, have not been renamed to achieve conformance with the updated terminology. The existing M2-based target-configuration model that is described in this document is subject to be replaced by an M1-based APMC-Model anyway and therefore a costly update of the M2 model is not considered worth the hassle.

2.1.2 Overview

Despite the name, this document contains the description of model elements that are clearly bound to a *design* workflow **and** model elements that have a strong relation to the *target configuration* aspect.

Model elements discussed in this document are either related to *design* or *target configuration*, there is no overlap between the two groups, but it could happen that *design* model elements are required in a concrete model for *target configuration* mode elements to make sense.

As mentioned before, some *target configuration* model element may need one or more references to *design* model elements and the *design* model elements need to be uploaded to the target platform for the sake of completing the semantics of the *target configuration* model.

Please note that a *design* model element does not automatically become a *target configuration* model element just because it is required to be uploaded to a target platform.

2.1.3 Relation between Design and Target Configuration Models

Please note that in many cases the part of the meta-model related to *target configuration* reflects a similar modeling in the *design* domain, e.g. the definition of E2E profile parameters.

There is currently no clearly defined preference about how the relation between *design* and *target configuration* may impact a concrete development project. The following scenarios for the example of *E2E properties* might occur:

Example 2.1

An OEM delivers the description of `AdaptivePlatformServiceInstances` including the definition of *E2E properties*.

It is safe to assume that subsequent processing of the model shall take the *E2E properties* as granted and develop the software with respect to the given properties.

Example 2.2

Software exists that has defined *E2E properties* by means of `ComSpecs`. For various reasons, it may happen that the software cannot be updated and therefore takes the “lead” in terms of the definition of *E2E properties*.

The definition of `AdaptivePlatformServiceInstances` may then have to respect the existing modeling on the software side.

Example 2.3

It could also happen that existing definitions can be **partly** overwritten by engineers who **really** know what they are doing.

Some model elements described in this document that are part of the content that gets uploaded to the target platform have direct counterparts on the design level.

One example for such a relation is the definition of `ProcessDesign` and `Process`. In these cases it would be easier to draw the line between design and target configuration aspects of the model.

There are cases where the mere existence of a reference into the design model is already representing valuable information. References that expose this capability are decorated with the stereotype `<<atpUriDef>>`.

Specifically, it is possible for the software on the platform to derive the value of an `InstanceSpecifier` from the content of an `instanceRef` decorated with `<<atpUriDef>>`. This is a very important mechanism for the platform software to interact with the application layer.

Another example is the definition of the `checkpointId` in the context of the configuration of the Platform Health Manager.

The modeling of the PHM interaction on the application layer involves the definition of the value of the `PhmCheckpoint.checkpointId` and the `PortPrototype` where a

specific `PhmCheckpoint.checkpointId` is used is identified by means of a reference stereotyped as `<<atpUriDef>>`.

And because the target of the reference is not necessarily existing on the platform, the `SupervisionCheckpoint.checkpointId` is replicated in the manifest model so that the platform software has access to this important piece of information (this aspect is also explained in [Figure 12.9](#)).

2.1.4 Structure of the document

The structure of the document maps to the division between *design* and *target configuration* such that the *design* aspect is mostly described in [Chapter 3](#), [Chapter 4](#), [Chapter 5](#), [Chapter 7](#), [Chapter 8](#), and [Chapter 9](#).

In contrast, [Chapter 10](#), [Chapter 11](#), [Chapter 12](#), [Chapter 13](#), [Chapter 15](#), and [Chapter 16](#) focus on *target configuration*-related content.

2.2 About Manifest

This chapter shall clarify the definition of the term `Manifest` in the context of the *AUTOSAR adaptive platform*.

[TPS_MANI_01000] Definition of the term `Manifest` [A `Manifest` represents a piece of AUTOSAR model description that is created to support the configuration of an *AUTOSAR adaptive platform* product and which is uploaded to the *AUTOSAR adaptive platform* product, potentially in combination with other artifacts (like binary files) that contain executable code to which the `Manifest` applies.]

It is important to stress the fact that the usage of a `Manifest` is indeed strictly limited to the *AUTOSAR adaptive platform* and that there is no use case to port the concept to the *AUTOSAR classic platform*.

2.3 Serialization Format

One aspect that the definition of a `Manifest` has in common with other AUTOSAR model content is the standardized serialization format.

[TPS_MANI_01020] Serialization format of the `Manifest` in AUTOSAR [The standardized serialization format of `Manifest` content in AUTOSAR is ARXML.

Consequently, `Manifest` model content can be validated against the AUTOSAR XML Schema.]

An important consequence of [\[TPS_MANI_01020\]](#) is that there is no limitation to just one “manifest file” a.k.a. “the manifest”.

Content may be distributed among several physical files according to the rules given in the specification of the [8, TPS Generic Structure Template].

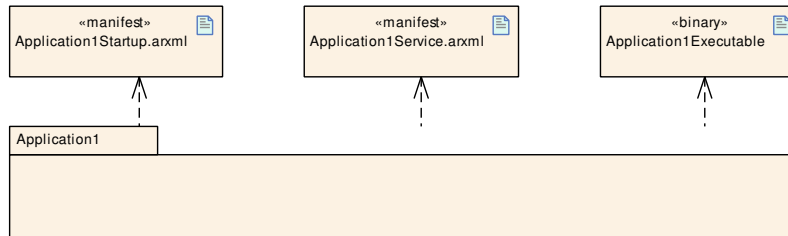


Figure 2.1: Example usage of several manifest files within one software delivery

[TPS_MANI_01021] Serialization format of *Manifest* content on a machine [The serialization format used to actually upload a manifest on a machine may be freely chosen by a platform supplier.

However, the content and semantics of the original ARXML *Manifest* needs to be **fully preserved**.]

It can be expected that in many cases the best option for the upload of the *Manifest* will still be ARXML because a custom format obviously has to support the full complexity of the *Manifest* meta-model.

Please note that the meta-model foresees the existence of references from manifest-related meta-classes to design-related meta-classes.

These references are created for the sake of clarity but it is not mandatory that the content of the reference actually needs to be resolvable.

2.4 Scope

As mentioned before, the usage of a *Manifest* is limited to the *AUTOSAR adaptive platform*. This does not mean, however, that all ARXML produced in a development project that targets the *AUTOSAR adaptive platform* is automatically considered a *Manifest*.

In fact, the *AUTOSAR adaptive platform* is usually not exclusively used in a vehicle project.

A typical vehicle will most likely be also equipped with a number of ECUs developed on the *AUTOSAR classic platform* and the system design for the entire vehicle will therefore have to cover both ECUs built on top of the *AUTOSAR classic platform* and those created on top of the *AUTOSAR adaptive platform*.

2.5 Manifests described in this Document

In principle, the term [Manifest](#) could be defined such that there is conceptually just one “manifest” and every target configuration aspect would be handled in this context.

This does not seem appropriate because it became apparent that manifest-related model-elements exist that are relevant in entirely different phases of a typical development project.

This aspect is taken as the main motivation to subdivide the definition of the term [Manifest](#) in five different partitions:

Execution Manifest This kind of [Manifest](#) is used to specify the target configuration-related information of applications running on the *AUTOSAR adaptive platform*.

An [Execution Manifest](#) is bundled with the actual executable code in order to support the integration of the executable code onto the machine.

Please find more information regarding this topic in [Chapter 10](#).

Service Instance Manifest This kind of [Manifest](#) is used to specify how service-oriented communication is configured in terms of the requirements of the underlying transport protocols.

A [Service Instance Manifest](#) is bundled with the actual executable code that implements the respective usage of service-oriented communication.

Please find more information regarding this topic in [Chapter 13](#).

Machine Manifest This kind of [Manifest](#) is supposed to describe target configuration-related content that applies to the configuration of just the underlying machine (i.e. without any applications running on the machine) that runs an *AUTOSAR adaptive platform*.

A [Machine Manifest](#) is bundled with the software taken to establish an instance of the *AUTOSAR adaptive platform*.

Please find more information regarding this topic in [Chapter 11](#) and [Chapter 12](#).

Raw Data Stream Manifest This kind of [Manifest](#) describes in [Chapter 14](#) the configuration of client and server for the purpose of communicating via raw data streams.

Software Distribution This kind of [Manifest](#) describes the packaging and logistics aspects of software on the *AUTOSAR adaptive platform*.

Please find more information regarding this topic in [Chapter 16](#).

The temporal division between the definition (and usage) of different kinds of [Manifest](#) leads to the conclusion that in most cases different physical files will be used to store the content of the different kinds of [Manifest](#).

However, as with all kinds of ARXML content, this is not a binding rule.

3 Application Design

3.1 Overview

This chapter describes all design-related modeling that applies to the creation of application software on the *AUTOSAR adaptive platform*.

There are also some extensions of existing modeling used on the *AUTOSAR classic platform* specifically for the usage on the *AUTOSAR adaptive platform*, e.g. the introduction of new values of the attribute `category`.

In particular, this section of the document focuses on the following aspects:

- Definition of application structure, consisting of `SwComponentType` for the *AUTOSAR adaptive platform* ([Chapter 3.2.1](#)), `Executable` as the design-level representation of the smallest executable unit ([Chapter 3.2.2](#)), as well as Description of how to front-load the configuration of a `Process` by means of `Process-Design`, see [Chapter 3.2.6](#).
- Definition of data types specifically for the *AUTOSAR adaptive platform* ([Chapter 3.3](#)), including the handling of optional elements in data structures, see [Chapter 3.3.5](#).
- Configuration of transformation properties ([Chapter 3.4](#)).
- Description of the design-level IAM configuration by means of the `GrantDesign`, see [Chapter 3.5](#).
- Description of the support for intrusion detection ([Chapter 3.6](#)).
- Description of the design of cryptographic solutions ([Chapter 3.7](#)).

Please note that the definition of a number of relevant relevant `PortInterfaces`, among them `ServiceInterface` as the pivotal element for service-oriented communication ([Chapter 4.2](#)), can be found in a separate top-level chapter, i.e. [Chapter 4](#).

3.2 Application Structure

3.2.1 Software Component

In principle, it would be possible to directly take over the definition of e.g. `ApplicationSwComponentType` for the usage on the *AUTOSAR adaptive platform*.

However, this would complicate the formulation of constraints regarding the existence of model elements (for example: data types, as explained in [Chapter 3.3](#)) that are exclusive to the *AUTOSAR adaptive platform*.

Therefore, the `AdaptiveApplicationSwComponentType` is defined as a representation of software-components on the *AUTOSAR adaptive platform*.

The Existence of the [AdaptiveApplicationSwComponentType](#) allows for a convenient way (see [[constr_1492](#)]) to lock out most kinds of software-component defined for the *AUTOSAR classic platform* from the usage on the *AUTOSAR adaptive platform*.

The clarification of the opposite direction (i.e. an erroneous use of an [AdaptiveApplicationSwComponentType](#)) is less obvious.

In other words, it may be possible to use an [AdaptiveApplicationSwComponentType](#) within a [System](#) as some sort of overall design model for software on both the *AUTOSAR classic platform* **and** the *AUTOSAR adaptive platform*.

This aspect, however, is not clarified so far nor is a restriction in place that prohibits [AdaptiveApplicationSwComponentType](#) to appear in the context of a [System](#).

Later versions of this specification may fix the missing regulation.

Class	AdaptiveApplicationSwComponentType			
Note	This meta-class represents the ability to support the formal modeling of application software on the AUTOSAR adaptive platform. Consequently, it shall only be used on the AUTOSAR adaptive platform. Tags: atp.recommendedPackage=AdaptiveApplicationSwComponentTypes This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , SwComponentType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
internalBehavior	AdaptiveSwcInternalBehavior	0..1	aggr	This aggregation represents the internal behavior of the AdaptiveApplicationSwComponentType for the AUTOSAR adaptive platform. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=internalBehavior.shortName, internalBehavior.variationPoint.shortLabel vh.latestBindingTime=preCompileTime

Table 3.1: AdaptiveApplicationSwComponentType

Class	AdaptiveSwcInternalBehavior			
Note	This meta-class represents the ability to define an internal behavior of an AtomicSwComponentType used on the AUTOSAR adaptive platform. Please note that the model of internal behavior in this case, in stark contrast to the situation of the AUTOSAR classic platform, is very minimal. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AdaptiveApplicationSwComponentType.internalBehavior			
Attribute	Type	Mult.	Kind	Note
service Dependency	SwcService Dependency	*	aggr	This represents the collection of SwcService Dependencies owned by AdaptiveInternalBehavior.

Table 3.2: AdaptiveSwcInternalBehavior

3.2.2 Executable

3.2.2.1 Overview

An **Executable** represents an executable program in the AUTOSAR meta-model. An explanation of the semantics of the attributes of **Executable** can be found in the following sub-sections.

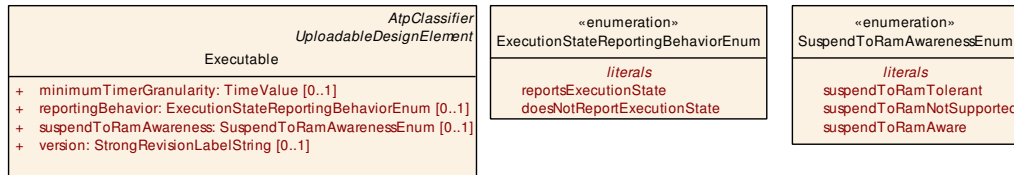


Figure 3.1: Modeling of the **Executable**

Class	Executable			
Note	This meta-class represents an executable program. Tags: atp.recommendedPackage=Executables This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpClassifier , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
implementation Props	ExecutableImplementationProps	*	aggr	This aggregation contains the collection of implementation-specific properties necessary to properly build the enclosing Executable.
minimumTimer Granularity	TimeValue	0..1	attr	This attribute describes the minimum timer resolution (TimeValue of one tick) that is required by the Executable.
reporting Behavior	ExecutionStateReportingBehaviorEnum	0..1	attr	this attribute controls the execution state reporting behavior of the enclosing Executable.
rootSw Component Prototype	RootSwComponentPrototype	0..1	aggr	This represents the root SwCompositionPrototype of the Executable. This aggregation is required (in contrast to a direct reference of a SwComponentType) in order to support the definition of instanceRefs in Executable context.
suspendToRam Awareness	SuspendToRamAwarenessEnum	0..1	attr	This attribute describes the type of awareness of the enclosing Executable to suspend-to-RAM functionality. Tags: atp.Status=candidate
version	StrongRevisionLabelString	0..1	attr	Version of the executable.

Table 3.3: Executable

[TPS_MANI_01513] Semantics of **Executable.suspendToRamAwareness**

Status: DRAFT

[The awareness for potential suspensions of a running process to RAM is subdivided into three categories:

- The **Executable** is always able to be suspended to RAM without the need of any advanced notification. This case is addressed by the enumeration value [SuspendToRamAwarenessEnum.suspendToRamTolerant](#) filled into attribute [Executable.suspendToRamAwareness](#).

In this case, a `Process` running the `Executable` will **not** be notified of the `suspend-to-RAM` cycle. The `Process` running the `Executable` will stay in state "Running" throughout the `suspend-to-RAM` cycle.

No configuration is needed to support this variant of `suspend-to-RAM` awareness.

- The `Executable` is able to respond to a request to be suspended to RAM and it needs to do some preparations until it is ready for `suspend-to-RAM`. This case is addressed by the enumeration value `SuspendToRamAwarenessEnum.suspendToRamAware` filled into attribute `Executable.suspendToRamAwareness`.

This variant of `suspend-to-RAM` awareness requires explicit configuration of the interaction with state management, as explained in [Chapter 4.16](#) and [Chapter 12.15](#).

Specifically, a `Process` running the `Executable` will be notified of the `suspend-to-RAM` cycle and can take actions. The `Process` running the `Executable` will stay in state "Running" throughout the `suspend-to-RAM` cycle.

- The `Executable` is not supporting `suspend-to-RAM` at all. This case is addressed by the enumeration value `SuspendToRamAwarenessEnum.suspendToRamNotSupported` filled into attribute `Executable.suspendToRamAwareness`.

No support means that a `Process` running the `Executable` needs to be terminated throughout the `suspend-to-RAM` cycle. This requires a switch to a `Function Group` state in which the respective `Process` is not active.

No additional configuration is needed to support this variant of `suspend-to-RAM` awareness.

]

Enumeration	SuspendToRamAwarenessEnum
Note	This enumeration provides values that describe the awareness of an Executable to suspend-to-RAM functionality. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	<code>Executable.suspendToRamAwareness</code>
Literal	Description
suspendToRamAware	The Executable is notified of suspend-to-RAM activity and can prepare accordingly. Tags: atp.EnumerationLiteralIndex=2 atp.Status=candidate
suspendToRamNotSupported	The Executable does not support suspend-to-RAM. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate





Enumeration	SuspendToRamAwarenessEnum
suspendToRam Tolerant	The Executable is not notified of suspend-to-RAM activity and seamlessly handles suspend-to-RAM activities. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate

Table 3.4: SuspendToRamAwarenessEnum

3.2.2.2 Category

[constr_1605] Standardized values of attribute **Executable.category**

Imposition time: IT_BefAraApiGen

[The following values for attribute **Executable.category** are standardized by AUTOSAR:

- PLATFORM_LEVEL: the **Executable** represents software on the platform level (i.e. conceptually located *on the level of* the middleware).
- APPLICATION_LEVEL: the **Executable** represents software on the application level (i.e. conceptually located *above* the middleware).

]

3.2.2.3 Root Software Component Prototype

[TPS_MANI_01010] Root element for a hierarchical software-component [**Executable** aggregates meta-class **RootSwComponentPrototype** in the role **rootSwComponentPrototype** to provide a root element for an arbitrarily nested hierarchy of software-components represented by the reference **RootSwComponentPrototype.applicationType**.]

Please note that the aggregation of **RootSwComponentPrototype** by **Executable** is the basis for the applicability of an «instanceRef» reference into the hierarchy of software-components that represent the functionality of the **Executable**.

This modeling approach is similar to the modeling of a **System** on the *AUTOSAR classic platform*.

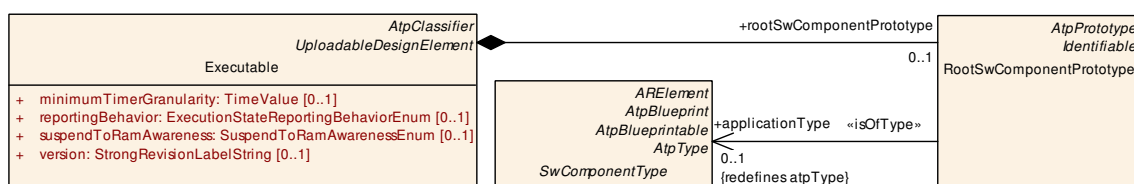


Figure 3.2: Modeling of the **RootSwComponentPrototype in the context of **Executable****

[TPS_MANI_03056] Optionality of Executable.rootSwComponentPrototype

[The aggregation Executable.rootSwComponentPrototype has been made optional in order to support the implementation of *platform modules* that do not utilize any service oriented communication and don't require any further formalization.]

[constr_1492] SwComponentType referenced in the role Executable.rootSwComponentPrototype.applicationType

Imposition time: IT_BefAraApiGen

[Any SwComponentType referenced in the role Executable.rootSwComponentPrototype.applicationType, or used to type a SwComponentPrototype nested inside the SwComponentType referenced in the role Executable.rootSwComponentPrototype.applicationType shall **only** be either a CompositionSwComponentType or an AdaptiveApplicationSwComponentType.]

Class	RootSwComponentPrototype			
Note	The RootSwCompositionPrototype represents the top-level-composition of software components within an Executable. The contained SwComponentPrototypes are fully specified by their SwComponentTypes (including Port Prototypes, PortInterfaces, VariableDataPrototypes, etc.). This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpFeature, AtpPrototype, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	AtpClassifier.atpFeature, Executable.rootSwComponentPrototype			
Attribute	Type	Mult.	Kind	Note
applicationType	SwComponentType	0..1	tref	This SwComponentType acts as the Type of the RootSwComponentPrototype. Stereotypes: isOfType

Table 3.5: RootSwComponentPrototype

The example depicted in Figure 3.3 exemplifies the statement of [constr_1492]. The example shows a component hierarchy that consists of SwComponentPrototypes that are excursively typed by either a CompositionSwComponentType or an AdaptiveApplicationSwComponentType.

Class	SwComponentType (abstract)			
Note	Base class for AUTOSAR software components.			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Subclasses	AdaptiveApplicationSwComponentType, AtomicSwComponentType, CompositionSwComponentType, ParameterSwComponentType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	SwComponentType (abstract)			
port	PortPrototype	*	aggr	The PortPrototypes through which this SwComponentType can communicate. The aggregation of PortPrototype is subject to variability with the purpose to support the conditional existence of PortPrototypes. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=port.shortName, port.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
portGroup	PortGroup	*	aggr	A port group being part of this component. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=portGroup.shortName, portGroup.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
swComponentDocumentation	SwComponentDocumentation	0..1	aggr	This adds a documentation to the SwComponentType. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=swComponentDocumentation, swComponentDocumentation.variationPoint.shortLabel vh.latestBindingTime=preCompileTime xml.sequenceOffset=-10

Table 3.6: SwComponentType

Class	CompositionSwComponentType			
Note	A CompositionSwComponentType aggregates SwComponentPrototypes (that in turn are typed by SwComponentType)s as well as SwConnectors for primarily connecting SwComponentPrototypes among each others and towards the surface of the CompositionSwComponentType. By this means, a hierarchical structures of software-components can be created. Tags: atp.recommendedPackage=SwComponentTypes			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, SwComponentType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
component	SwComponentPrototype	*	aggr	The instantiated components that are part of this composition. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=component.shortName, component.variationPoint.shortLabel vh.latestBindingTime=postBuild





Class	CompositionSwComponentType			
connector	SwConnector	*	aggr	SwConnectors have the principal ability to establish a connection among PortPrototypes. They can have many roles in the context of a CompositionSwComponentType. Details are refined by subclasses. The aggregation of SwConnectors is subject to variability with the purpose to support variant data flow. The aggregation is marked as atpSplitable in order to allow the extension of the ECU extract with AssemblySwConnectors between ApplicationSwComponentTypes and ServiceSwComponentTypes during the ECU integration. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=connector.shortName, connector.variation Point.shortLabel vh.latestBindingTime=postBuild
constantValue Mapping	ConstantSpecification MappingSet	*	ref	Reference to the ConstantSpecificationMapping to be applied for initValues of PPortComSpecs and RPortComSpec. Stereotypes: atpSplitable Tags: atp.Splitkey=constantValueMapping
dataType Mapping	DataTypeMappingSet	*	ref	Reference to the DataTypeMapping to be applied for the used ApplicationDataTypes in ServiceInterfaces. Stereotypes: atpSplitable Tags: atp.Splitkey=dataTypeMapping
physical Dimension Mapping	PhysicalDimension MappingSet	0..1	ref	This reference identifies the PhysicalDimensionMappingSet that is applicable in the context of the enclosing CompositionSwComponentType. The PhysicalDimensionMappings contained in the PhysicalDimensionMappingSet shall be taken into account for the assessment of the compatibility of PhysicalDimensions in the context of creation of a PortInterfaceMapping in the scope of the CompositionSwComponentType.

Table 3.7: CompositionSwComponentType

While the left part of Figure 3.3 resembles the modeling in the meta-model, the right part uses a simplified notation to give an idea how the nested definition of software-components could look like.

An obvious consequence of [constr_1492] is that no software-component that could be used on the AUTOSAR classic platform is allowed on the AUTOSAR adaptive platform, i.e. in the context of an Executable.rootSwComponentPrototype.applicationType.

Software-components on the AUTOSAR adaptive platform are mainly defined by their interaction with the outside world by means of PortPrototypes typed by ServiceInterfaces. The definition of an internal behavior, with a minor exception, is not foreseen.

This lack of internal structure, in combination with decisions made regarding the scope of the generation of header files, leads to a situation where the implementation of a

software component in source code is (in comparison to the situation on the *AUTOSAR classic platform*) way less subject to a strict separation.

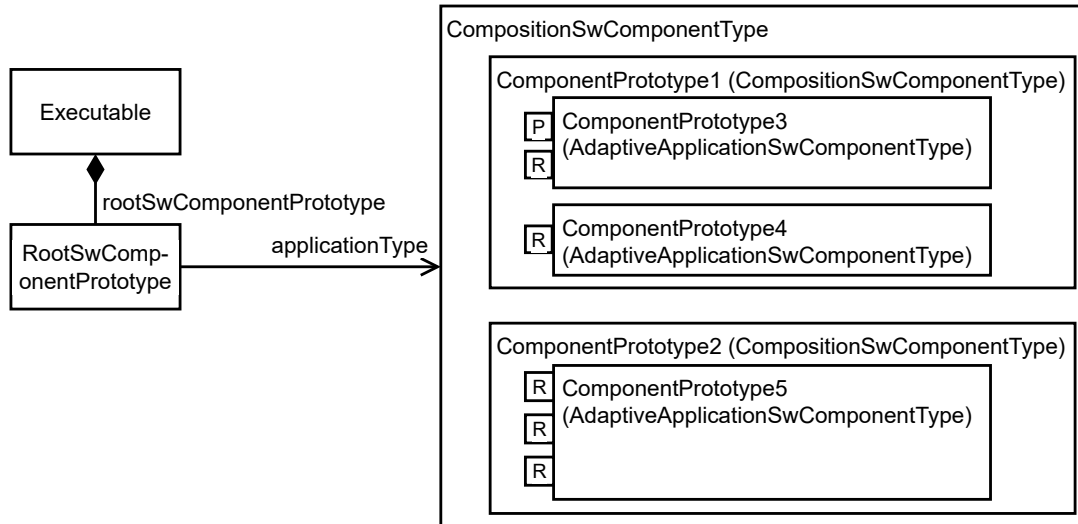


Figure 3.3: Example of the possible structure of an [Executable](#)

In other words, there is no real motivation to implement software-components separately from each other. It would be possible, although not encouraged, to implement all software-components of a given executable program directly within the `Main()` function of the program.

3.2.2.4 Reporting Behavior

[TPS_MANI_01279] Semantics of [Executable.reportingBehavior](#) [Attribute [Executable.reportingBehavior](#) shall be used to control the reporting of the execution state of the enclosing [Executable](#) to the Execution Management. If the attribute does not exist, the [Executable](#) shall report its execution state to the Execution Management.]

Enumeration	ExecutionStateReportingBehaviorEnum
Note	This enumeration provides options for controlling of how an Executable reports its execution state to the Execution Management This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	Executable.reportingBehavior
Literal	Description
doesNotReport ExecutionState	The Executable shall not report its execution state to the Execution Management. Tags: atp.EnumerationLiteralIndex=1
reportsExecution State	The Executable shall report its execution state to the Execution Management. Tags: atp.EnumerationLiteralIndex=0

Table 3.8: ExecutionStateReportingBehaviorEnum

3.2.2.5 Implementation Props

[TPS_MANI_01370] Semantics of ExecutableImplementationProps [If an Executable is built for a specific purpose inside the AUTOSAR adaptive platform, i.e. the implementation of a functional cluster, then it may be necessary to add configurations that need to be considered at compile time, e.g. whether the implementation of the logging functional cluster needs access to resources provided by the synchronized time base functional cluster.

The configuration of such implementation-specific properties can be done by means of the Executable.implementationProps, specifically by a sub-class of ExecutableImplementationProps.]

Class	ExecutableImplementationProps (abstract)			
Note	This abstract class has the ability to act as a base class for classes that detail out the implementation-specific properties of an Executable. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Describable			
Subclasses	ExecutableLoggingImplementationProps			
Aggregated by	Executable.implementationProps			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.9: ExecutableImplementationProps

As depicted in Figure 3.4, one example for the utilization of ExecutableImplementationProps is the definition of ExecutableLoggingImplementationProps (see Chapter 3.2.2.6).

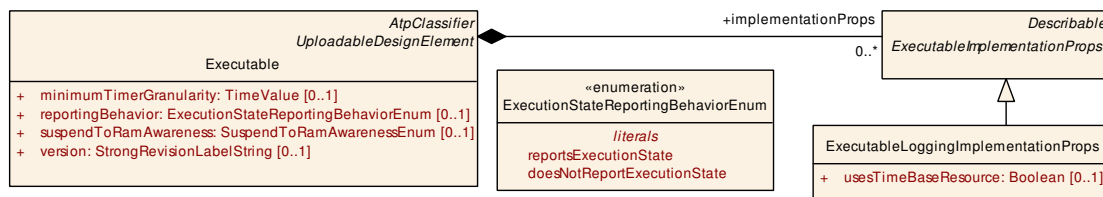


Figure 3.4: Modeling of the ExecutableImplementationProps

3.2.2.6 Logging

[TPS_MANI_01383] Semantics of ExecutableLoggingImplementationProps [The implementation properties of an Executable that is implementing (a part of) the logging functional cluster can be configured using the ExecutableLoggingImplementationProps.]

[constr_10113] Restriction for the existence of ExecutableLoggingImplementationProps

Imposition time: IT_BefAraApiGen

[The aggregation of ExecutableLoggingImplementationProps in the role Executable.implementationProps is only allowed for an Executable where attribute category is set to the value PLATFORM_LEVEL.]

Class	ExecutableLoggingImplementationProps			
Note	This meta-class contains configuration relevant for the implementation of an Executable used in the context of the LogAndTraceInstantiation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Describable, ExecutableImplementationProps			
Aggregated by	Executable.implementationProps			
Attribute	Type	Mult.	Kind	Note
usesTimeBaseResource	Boolean	0..1	attr	This attribute indicates that the implementation of the enclosing Executable is required to access resources provided by the synchronized time base functional cluster.

Table 3.10: ExecutableLoggingImplementationProps

3.2.3 TraceSwitchConfig

[TPS_MANI_03336] Semantics of TraceSwitchConfig [The TraceSwitchConfig element maps a DltMessage that is referenced in the role traceMessage in the context of an Executable to a trace switch type defined by the TraceSwitchConfig.traceSwitch attribute that in turn decides how the DltMessage is routed.]

Please note that the TraceSwitchConfig is used by the compile time configuration of ARTI trace. The TraceSwitchConfig is not required for normal logging. If TraceSwitchConfig does not exist for a dedicated DltMessage, then the DltMessage is forwarded to the logger.

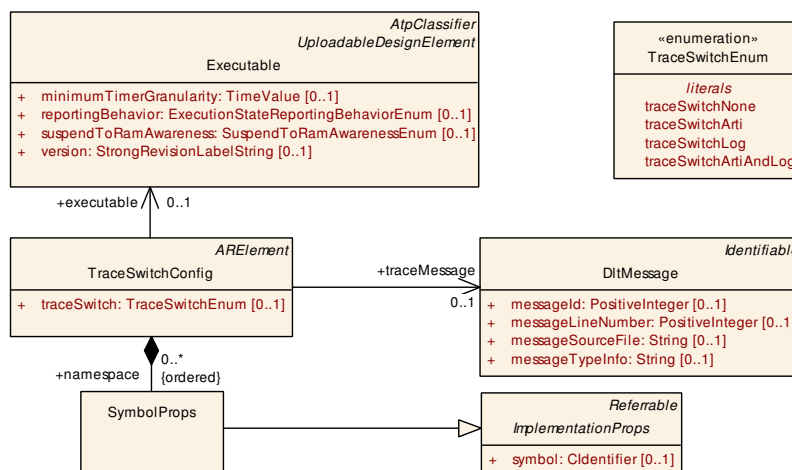


Figure 3.5: Modeling of the TraceSwitchConfig

Class	TraceSwitchConfig			
Note	This class maps a DltMessage to a trace switch type. Tags: atp.recommendedPackage=TraceSwitchConfigs This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
executable	Executable	0..1	ref	Executable that defines the context of the trace switch.
namespace (ordered)	SymbolProps	*	aggr	This represents the SymbolProps used for the definition of a hierarchical namespace applicable for the generation of code artifacts out of the definition of a TraceSwitchConfig.
traceMessage	DltMessage	0..1	ref	Reference to the DltMessage that has to be routed in the trace switch.
traceSwitch	TraceSwitchEnum	0..1	attr	Defines how the message is routed, either to • ARTI trace, • Logger (default), • ARTI trace and logger • None

Table 3.11: TraceSwitchConfig

[TPS_MANI_03337] The definition of the [namespace](#) of a [TraceSwitchConfig](#) may follow a hierarchical pattern [The [namespace](#) of a [TraceSwitchConfig](#) may follow a hierarchical pattern, as supported by many modern programming languages. The separator between the elements of the hierarchical [namespace](#) definition depends on the used programming language and is not explicitly defined in the model. The model only defines the elements of the hierarchical [namespace](#) pattern.]

[TPS_MANI_03338] Ordered definition of [TraceSwitchConfig.namespace](#) [In a hierarchical definition of [TraceSwitchConfig.namespace](#) the order of [namespace](#) fragments shall be maintained in the translation of the [namespace](#) to source code. In other words, the first [namespace](#) fragment shall appear first, followed by the second [namespace](#) fragment, and so on.]

[constr_9392] Existence of reference [TraceSwitchConfig.traceMessage](#)

Imposition time: [IT_BefAraApiGen](#)

[The reference in the role [TraceSwitchConfig.traceMessage](#) shall exist.]

[constr_9393] Existence of attribute [TraceSwitchConfig.traceSwitch](#)

Imposition time: [IT_BefAraApiGen](#)

[The attribute [TraceSwitchConfig.traceSwitch](#) shall exist.]

[constr_9394] Existence of reference [TraceSwitchConfig.executable](#)

Imposition time: [IT_BefAraApiGen](#)

[The reference in the role [TraceSwitchConfig.executable](#) shall exist.]

Enumeration	TraceSwitchEnum
Note	This enumeration provides possible trace switches for DltMessages. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	TraceSwitchConfig.traceSwitch
Literal	Description
traceSwitchArti	The message will be routed to ARTI-trace with minimal runtime influence. Tags: atp.EnumerationLiteralIndex=1
traceSwitchArtiAnd Log	The message will be routed to ARTI-trace and to the logger. Tags: atp.EnumerationLiteralIndex=3
traceSwitchLog	The message will be routed to the logger that further processes the message to different sinks (see LogMode) with different verbosities at runtime. Tags: atp.EnumerationLiteralIndex=2
traceSwitchNone	The message will not be routed. No runtime resources will be used. Tags: atp.EnumerationLiteralIndex=0

Table 3.12: TraceSwitchEnum

3.2.4 Interaction Endpoint for Application

The interaction of software-components with the outside world can take several forms, e.g. service-oriented communication or the interaction with a persistent data storage.

A formal representation of the interaction needs to be described as an anchor point for adding various additional configuration attributes that make sense in this context but would not make sense in the context of a [PortInterface](#).

There is a model element that already has a long-standing tradition in the AUTOSAR meta-model for exactly the described purpose: the [PortPrototype](#).

The following sub-chapters discuss the interaction by means of [PortPrototypes](#) with software “outside” a given software-component with the focus on different kinds of interaction that require different ways to further contribute model elements for configuration.

3.2.4.1 Service-oriented Communication

The service-oriented communication by means of [PortPrototypes](#) does **not** support the concept of a communication endpoint that is both required and provided **at the same time**. This motivates the existence of [\[constr_1473\]](#).

[constr_1473] No support for [PRPortPrototype](#)

Imposition time: [IT_BefAraApiGen](#)

[A [ServiceInterface](#) shall not be referenced by a [PRPortPrototype](#) in the role [providedRequiredInterface](#).]

[TPS_MANI_01039] Representation of provided service [A provided service shall be modeled by means of a [PPortPrototype](#) that is typed by a [ServiceInterface](#).]

[TPS_MANI_01040] Representation of required service [A **required service** shall be modeled by means of an `RPortPrototype` that is typed by a `ServiceInterface`.]

For more background regarding the rationale of [constr_1473], please refer to [2, TPS Software Component Template].

Please note that the utilization of service discovery on the *AUTOSAR adaptive platform* means that opposite communication ends **are by design not known upfront**.

As a consequence, it is in general not possible to use `AssemblySwConnectors` to model a pre-defined relation between two communication endpoints modeled as `PortPrototypes`.

Independent of the issue described above, it is still necessary to provide means for configuration of a given `PortPrototype` on different levels:

- The `PortPrototype` itself (i.e. as a whole) may need to be customized, independently of the kind or number of elements aggregated by the corresponding `ServiceInterface`. This aspect is discussed in [Chapter 3.2.4.2](#).
- The usage of elements of the corresponding `ServiceInterface` may need to be configured for a given `PortPrototype`. This aspect is discussed in [Chapter 3.2.5](#).

3.2.4.2 Port Prototype Props

As mentioned before, in some cases a qualification of the semantics of `PortPrototypes` is necessary. For this purpose, AUTOSAR typically defines a *props* class of some kind. The same approach applies in this situation as well.

In particular, `PortPrototype` aggregates the abstract meta-class `PortPrototypeProps`, that in turn starts an inheritance tree of derived meta-classes that have the ability to qualify sub-classes of `PortPrototype` accordingly.

Class	<i>PortPrototypeProps</i> (abstract)			
Note	This meta-class represents the ability to define a further qualification of semantics of sub-classes of Port Prototype. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i>			
Subclasses	RPortPrototypeProps			
Aggregated by	PortPrototype.portPrototypeProps			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.13: PortPrototypeProps

[constr_3642] Restriction of aggregation of `PortPrototypeProps` to the Adaptive Platform

Imposition time: `IT_BefAraApiGen`

[The aggregation of `PortPrototypeProps` is only supported in the context of a `SwComponentType` that is (transitively) referenced by `rootSwComponentPrototype`.]

One example for this approach is the definition of the meta-class `RPortPrototypeProps`, sketched in Figure 3.6.

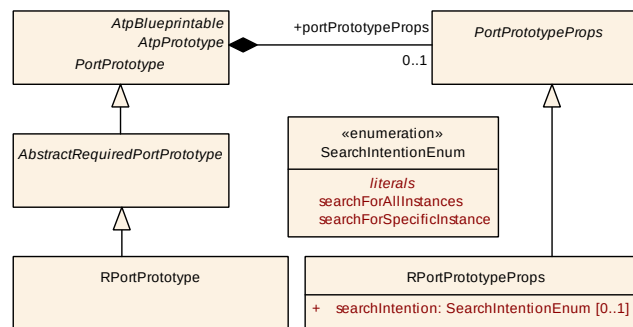


Figure 3.6: Modeling of the `RPortPrototypeProps` for `RPortPrototype`

[constr_3359] `RPortPrototypeProps` are related only to `RPortPrototypes`

Imposition time: `IT_BefAraApiGen`

[The `RPortPrototypeProps` shall be aggregated only by a `RPortPrototype` in the role `portPrototypeProps`.]

Class	RPortPrototypeProps			
Note	PortPrototypeProps for a RPort. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, PortPrototypeProps			
Aggregated by	PortPrototype.portPrototypeProps			
Attribute	Type	Mult.	Kind	Note
searchIntention	SearchIntentionEnum	0..1	attr	This attribute is used to specify the intention of the developer of the enclosing Software-component in terms of whether the respective PortPrototype shall be use to search for a specific service instance or all instances of the given service. Please note that the value of this attribute does not create a binding contract. The actual search behavior is defined as part of the service instance manifest.

Table 3.14: RPortPrototypeProps

[TPS_MANI_01057] Semantics of `RPortPrototypeProps.searchIntention`

[The value of the attribute `RPortPrototypeProps.searchIntention` clarifies whether the search for a corresponding offer shall be done as a search for all or else as a search for a specific ID.

Typically, a search for any results in a collection of offers while the search for a given id results in just a single offer.]

Enumeration	SearchIntentionEnum
Note	This meta-class allows for the definition of a dedicated search intention from the application's point of view. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	RPortPrototypeProps.searchIntention
Literal	Description
searchForAllInstances	This value represents the intention to search for all instances of the given service. Tags: atp.EnumerationLiteralIndex=0
searchForSpecificInstance	This value represents the intention to search for a specific instance of the given service. Tags: atp.EnumerationLiteralIndex=1

Table 3.15: SearchIntentionEnum

3.2.5 Port Prototype ComSpec

[TPS_MANI_01053] Usage of ComSpecs on the *AUTOSAR adaptive platform* [The aspect of further qualification of elements of the [ServiceInterface](#) used to type given [PortPrototype](#) is implemented by means of ComSpecs, i.e. specific subclasses of the abstract meta-classes [RPortComSpec](#) and [PPortComSpec](#).

However, the support for ComSpecs on the *AUTOSAR adaptive platform* only covers a **limited selection** of attributes of a specific ComSpec.]

The details about supported attributes of either a [RPortComSpec](#) or [PPortComSpec](#) are described in this chapter.

The configuration of transformation capabilities in the context of a ComSpec is possible by means of subclasses of meta-class [TransformationComSpecProps](#).

[TPS_MANI_01327] Value of [EndToEndTransformationComSpecProps.disableEndToEndCheck](#) vs. value of [EndToEndTransformationComSpecProps.disableEndToEndStateMachine](#) [If the value of attribute [EndToEndTransformationComSpecProps.disableEndToEndCheck](#) is set to `true`, then the value of attribute [EndToEndTransformationComSpecProps.disableEndToEndStateMachine](#) shall be ignored.]

Class	<i>TransformationComSpecProps</i> (abstract)			
Note	TransformationComSpecProps holds all the attributes for transformers that are port specific.			
Base	ARObject , Describable			
Subclasses	EndToEndTransformationComSpecProps , UserDefinedTransformationComSpecProps			
Aggregated by	ClientComSpec.transformationComSpecProps , ReceiverComSpec.transformationComSpecProps , ServerComSpec.transformationComSpecProps			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.16: TransformationComSpecProps

Class	UserDefinedTransformationComSpecProps			
Note	The <code>UserDefinedTransformationComSpecProps</code> is used to specify port specific configuration properties for custom transformers.			
Base	<i>ARObject</i> , <i>Describable</i> , TransformationComSpecProps			
Aggregated by	ClientComSpec.transformationComSpecProps , ReceiverComSpec.transformationComSpecProps , ServerComSpec.transformationComSpecProps			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.17: UserDefinedTransformationComSpecProps

Class	EndToEndTransformationComSpecProps			
Note	The class <code>EndToEndTransformationComSpecProps</code> specifies port specific configuration properties for <code>EndToEnd</code> transformer attributes.			
Base	<i>ARObject</i> , <i>Describable</i> , TransformationComSpecProps			
Aggregated by	ClientComSpec.transformationComSpecProps , ReceiverComSpec.transformationComSpecProps , ServerComSpec.transformationComSpecProps			
Attribute	Type	Mult.	Kind	Note
clearFromValidToInvalid	Boolean	0..1	attr	Clear monitoring window on transition from state Valid to state Invalid.
disableEndToEndCheck	Boolean	0..1	attr	Disables/Enables the E2E check. The E2Eheader is removed from the payload independent from the setting of this attribute.
disableEndToEndStateMachine	Boolean	0..1	attr	Disables the E2EStateMachine (only E2E check functionality is performed)
e2eProfileCompatibilityProps	E2EProfileCompatibilityProps	0..1	ref	Reference to additional settings for the E2E state machine.
maxDeltaCounter	PositiveInteger	0..1	attr	Maximum allowed difference between two counter values of two consecutively received valid messages. For example, if the receiver gets data with counter 1 and MaxDeltaCounter is 3, then at the next reception the receiver can accept Counters with values 2, 3 or 4.
maxErrorStateInit	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last WindowSize checks, for the state E2E_SM_INIT. The minimum value is 0.
maxErrorStateInvalid	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last WindowSize checks, for the state E2E_SM_INVALID. The minimum value is 0.
maxErrorStateValid	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last WindowSize checks, for the state E2E_SM_VALID. The minimum value is 0.
minOkStateInit	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_INIT. The minimum value is 1.
minOkStateInvalid	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_INVALID. The minimum value is 1.
minOkStateValid	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_VALID. The minimum value is 1.





Class	EndToEndTransformationComSpecProps			
windowSizeInit	PositiveInteger	0..1	attr	Size of the monitoring window of state Init for the E2E state machine.
windowSizeInvalid	PositiveInteger	0..1	attr	Size of the monitoring window of state Invalid for the E2E state machine.
windowSizeValid	PositiveInteger	0..1	attr	Size of the monitoring window of state Valid for the E2E state machine.

Table 3.18: EndToEndTransformationComSpecProps

3.2.5.1 Port Prototypes typed by Service Interfaces

3.2.5.1.1 Receiver ComSpec

The [ReceiverComSpec](#) needs an attribute that indicates whether the enclosing [AdaptiveApplicationSwComponentType](#) has an intention to actually access the referenced [dataElement](#). This attribute represents a security feature related to identity and access management [9, EXP FC Design Identity and Access Management].

Specifically, this aspect is typically summarized as a capability of the software, i.e. the [AdaptiveApplicationSwComponentType](#) expresses its capability with respect to the specific [dataElement](#). The term “capability” is an integral part of the jargon in the domain of identity and access management.

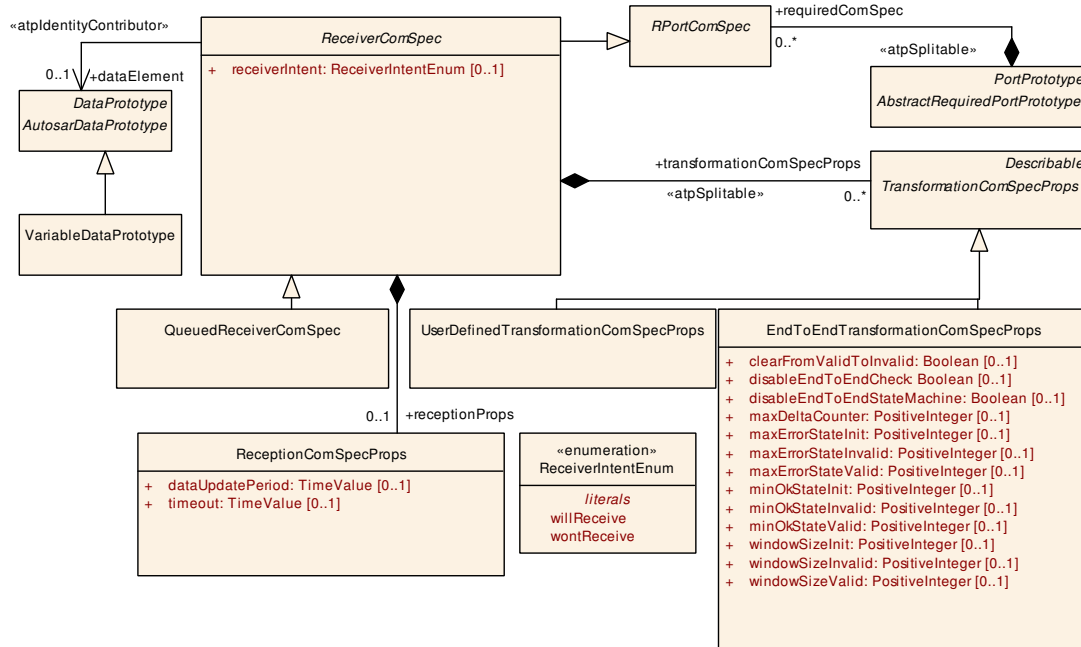


Figure 3.7: Modeling of the [ReceiverComSpec](#) on the AUTOSAR adaptive platform

However, outside the identity and access management domain, this terminology is sometimes hard to motivate. What could be motivated is that the [AdaptiveApplicationSwComponentType](#) expresses its *intent* to actually access the [dataElement](#).

From that perspective, the process of adding an event to a `ServiceInterface` adds the capability to use the `dataElement`. But whether the software that uses the `ServiceInterface` actually intends to access the `dataElement` can be expressed by an attribute in the `ReceiverComSpec` named `receiverIntent`.

Class	ReceiverComSpec (abstract)			
Note	Receiver-specific communication attributes (RPortPrototype typed by ServiceInterface) that are relevant for events and field notifiers.			
Base	ARObject, RPortComSpec			
Subclasses	NonqueuedReceiverComSpec, QueuedReceiverComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec , PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
dataElement	AutosarDataPrototype	0..1	ref	Data element these attributes belong to. Stereotypes: atpIdentityContributor
receiverIntent	ReceiverIntentEnum	0..1	attr	This attribute represents the expressed intent of the receiver. The receiver may decide to claim that existing resources of a ServiceInterface are expressly not used by this specific receiver. The conceptual background of this claim may be driven by security, safety, etc. Tags: atp.Status=candidate This Attribute is only used by the AUTOSAR Adaptive Platform.
receptionProps	ReceptionComSpecProps	0..1	aggr	"This aggregation represents the definition transmission props in the context of the enclosing ReceiverComSpec.
transformationComSpecProps	TransformationComSpecProps	*	aggr	This references the TransformationComSpecProps which define port-specific configuration for data transformation. Stereotypes: atpSplitable Tags: atp.Splitkey=transformationComSpecProps

Table 3.19: ReceiverComSpec

Class	QueuedReceiverComSpec			
Note	Communication attributes specific to queued receiving.			
Base	ARObject, RPortComSpec , ReceiverComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec , PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.20: QueuedReceiverComSpec

[TPS_MANI_01106] Specification of intentions for the receiver of `events` or `field` notifiers

Status: DRAFT

[The attribute `ReceiverComSpec.receiverIntent` can be used to specify whether the software actually intends to access the referenced `events` or `field` notifier or whether it explicitly states that it is not interested in the value.]

Enumeration	ReceiverIntentEnum
Note	This meta-class represents the intent to specify how a given ServiceInterface is used from the perspective of a given event receiver. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	ReceiverComSpec.receiverIntent
Literal	Description
willReceive	The receiver will receive the event or field notifier. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate
wontReceive	The receiver won't receive the event or field notifier. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate

Table 3.21: ReceiverIntentEnum

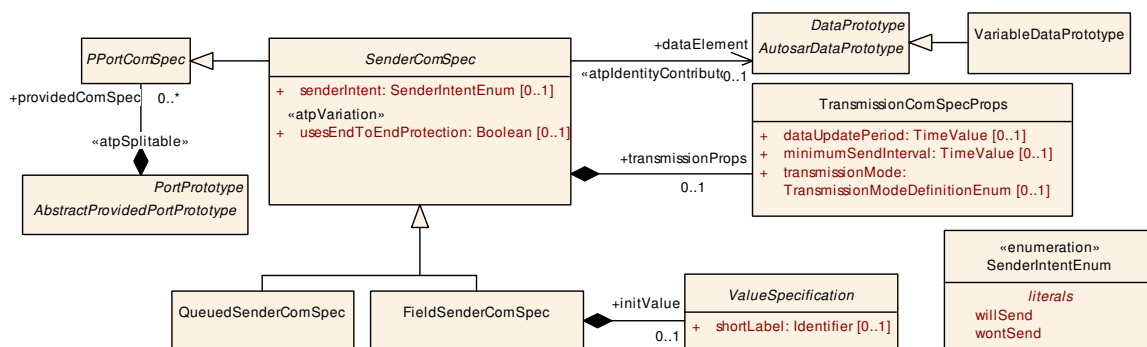
[TPS_MANI_03132] **Semantics of E2E attributes in [ReceiverComSpec](#)** [The [EndToEndTransformationComSpecProps](#) shall be used for the specification of [RPortPrototype](#)-specific configuration options related to end-to-end protection of events or field notifiers.]

3.2.5.1.2 Sender ComSpec

The [SenderComSpec](#) is modeled in the same way as described in the Software Component Template [2, TPS Software Component Template].

[TPS_MANI_03210] **Specification of [event](#) specific communication attributes** [The meta-class [QueuedSenderComSpec](#) can be used to specify communication attributes that are relevant for an [event](#) on the sender side.]

[TPS_MANI_03211] **Specification of [field](#) specific communication attributes** [The meta-class [FieldSenderComSpec](#) can be used to specify communication attributes that are relevant for a [field](#) on the sender side.]


Figure 3.8: Modeling of the [SenderComSpec](#) on the AUTOSAR adaptive platform

Class	SenderComSpec (abstract)			
Note	Communication attributes for a sender port (PPortPrototype typed by ServiceInterface) that are relevant for events and field notifiers.			
Base	ARObject , PPortComSpec			
Subclasses	FieldSenderComSpec , NonqueuedSenderComSpec , QueuedSenderComSpec			
Aggregated by	AbstractProvidedPortPrototype.providedComSpec , PortPrototypeBlueprint.providedComSpec			
Attribute	Type	Mult.	Kind	Note
dataElement	AutosarDataPrototype	0..1	ref	Data element these quality of service attributes apply to. Stereotypes: atpIdentityContributor
senderIntent	SenderIntentEnum	0..1	attr	This attribute represents the expressed intent of the sender. The sender may decide to claim that existing resources of a ServiceInterface are expressly not used by this specific sender. The conceptual background of this claim may be driven by security, safety, etc. Tags: atp.Status=candidate This Attribute is only used by the AUTOSAR Adaptive Platform.
transmission Props	TransmissionComSpec Props	0..1	aggr	This aggregation represents the definition transmission props in the context of the enclosing SenderComSpec .
usesEndToEnd Protection	Boolean	0..1	attr	This indicates whether the corresponding dataElement shall be transmitted using end-to-end protection. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime

Table 3.22: SenderComSpec

Class	QueuedSenderComSpec			
Note	Communication attributes specific to distribution of events (PPortPrototype , SenderReceiverInterface and dataElement carries an "event").			
Base	ARObject , PPortComSpec , SenderComSpec			
Aggregated by	AbstractProvidedPortPrototype.providedComSpec , PortPrototypeBlueprint.providedComSpec			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.23: QueuedSenderComSpec

Class	FieldSenderComSpec			
Note	Port specific communication attributes for a Field that is defined in a ServiceInterface . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , PPortComSpec , SenderComSpec			
Aggregated by	AbstractProvidedPortPrototype.providedComSpec , PortPrototypeBlueprint.providedComSpec			
Attribute	Type	Mult.	Kind	Note
initValue	ValueSpecification	0..1	aggr	Initial value for a Field that is set before the Service Interface is offered.

Table 3.24: FieldSenderComSpec

[constr_10152] Multiplicity of reference in the role [FieldSenderComSpec.initValue](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [FieldSenderComSpec](#), the reference in the role [initValue](#) shall exist.]

[TPS_MANI_03212] Specification of initial value for a **field** [The attribute [FieldSenderComSpec.initValue](#) can be used to specify an initial Value for a [field](#).]

A `field` has a valid value at any time as described in [Chapter 4.2.4](#). The functional cluster `ara::com` ensures that a service implementation providing a field has a field value before the field becomes visible to potential consumers.

This is explained in more detail in the [10, EXP ARA COM API] where it is defined that the initial field value shall be set at least once via `Update()` by the application code before `OfferService()` gets called.

Custom-code (e.g. component model above `ara::com`) may use the defined `init-Value` to call `Field.Update(initValue)`.

[TPS_MANI_01107] Specification of intentions for the sender of `events` or `field` notifiers

Status: DRAFT

[The attribute `SenderComSpec.senderIntent` can be used to specify whether the software actually intends to send the referenced `events` or `field` notifier.]

Enumeration	SenderIntentEnum
Note	This meta-class represents the intent to specify how a given ServiceInterface is used from the perspective of a given event sender. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SenderComSpec.senderIntent
Literal	Description
willSend	The sender will send the event or field notifier. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate
wontSend	The sender won't send the event or field notifier. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate

Table 3.25: SenderIntentEnum

3.2.5.1.3 Client ComSpec

The `ClientComSpec` undergoes extensions for the *AUTOSAR adaptive platform*, namely the ability to refer to the getter and setter method of a `field` and the definition of intentions.

[TPS_MANI_01108] Specification of intentions for the caller of a `methods` or `field` setter/getter

Status: DRAFT

[The attribute `ClientComSpec.clientIntent` can be used to specify whether the software actually intends to call the referenced `methods` or getter/setter of a referenced `field`.]

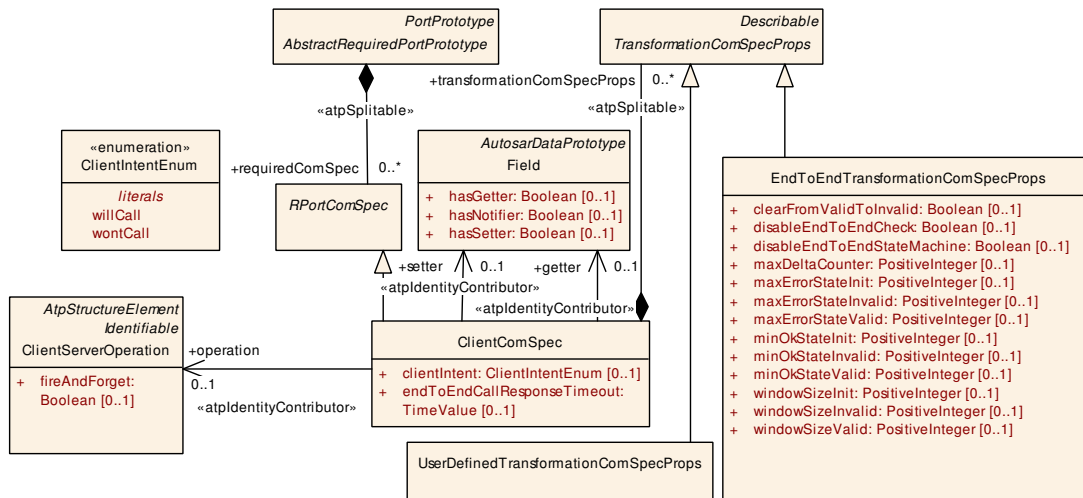


Figure 3.9: Modeling of the **ClientComSpec** on the AUTOSAR adaptive platform

[TPS_MANI_01324] Semantics of E2E attributes in **ClientComSpec** [The **EndToEndTransformationComSpecProps** shall be used for the specification of **RPortPrototype**-specific configuration options related to end-to-end protection of methods.]

Class	ClientComSpec			
Note	Client-specific communication attributes (RPortPrototype typed by ServiceInterface) that are relevant for method and field getters and setters.			
Base	ARObject, RPortComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec , PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
clientIntent	ClientIntentEnum	0..1	attr	This attribute represents the expressed intent of the client. The client may decide to claim that existing resources of a ServiceInterface are expressly not used by this specific client. The conceptual background of this claim may be driven by security, safety, etc. Tags: atp.Status=candidate This Attribute is only used by the AUTOSAR Adaptive Platform.
endToEndCallResponseTimeout	TimeValue	0..1	attr	This attribute defines the maximum time interval in which the application shall expect the servers's response (time between the sending of the call invocation until the arrival of the server's response).
getter	Field	0..1	ref	The existence of this reference indicates that the Client ComSpec refers to the getter of a Field. Stereotypes: atpIdentityContributor This Attribute is only used by the AUTOSAR Adaptive Platform.
operation	ClientServerOperation	0..1	ref	This represents the corresponding ClientServerOperation. Stereotypes: atpIdentityContributor
setter	Field	0..1	ref	The existence of this reference indicates that the Client ComSpec refers to the setter of a Field. Stereotypes: atpIdentityContributor This Attribute is only used by the AUTOSAR Adaptive Platform.





Class	ClientComSpec			
transformationComSpecProps	TransformationComSpecProps	*	aggr	This references the TransformationComSpecProps which define port-specific configuration for data transformation. Stereotypes: atpSplittable Tags: atp.Splitkey=transformationComSpecProps

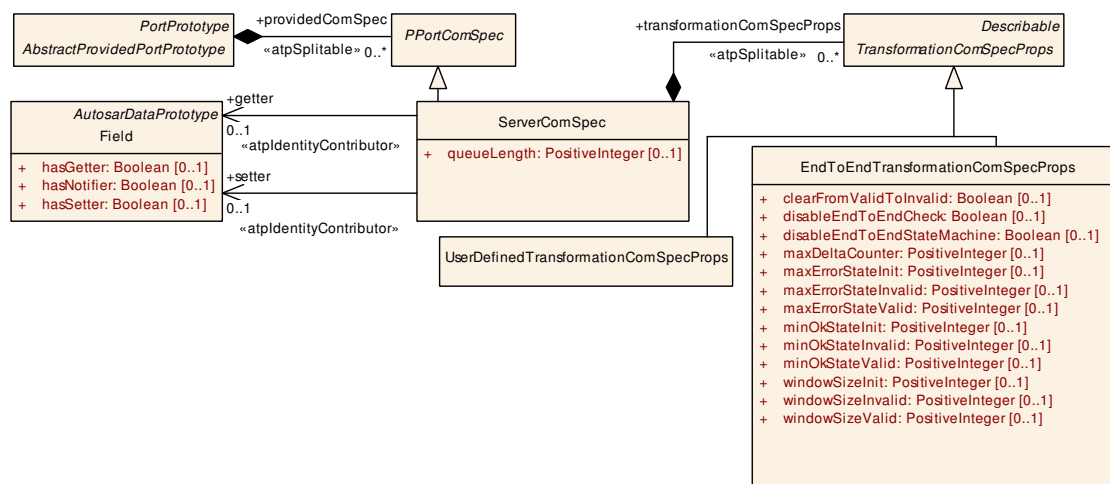
Table 3.26: ClientComSpec

Enumeration	ClientIntentEnum
Note	This meta-class represents the intent to specify how a given ServiceInterface is used from the perspective of a given client. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	ClientComSpec.clientIntent
Literal	Description
willCall	The client will call this method. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate
wontCall	The client won't call this method. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate

Table 3.27: ClientIntentEnum

3.2.5.1.4 Server ComSpec

The [ServerComSpec](#) undergoes extensions for the AUTOSAR adaptive platform, namely the ability to refer to the `getter` and `setter` [method](#) of a [field](#) and the definition of intentions.


Figure 3.10: Modeling of the [ServerComSpec](#) on the *AUTOSAR adaptive platform*

[TPS_MANI_01325] Semantics of E2E attributes in [ServerComSpec](#) [The [EndToEndTransformationComSpecProps](#) shall be used for the specification of

[PPortPrototype](#)-specific configuration options related to end-to-end protection of [methods](#).]

Class	ServerComSpec			
Note	Server-specific communication attributes (PPortPrototype typed by ServiceInterface) that are relevant for methods and field getters and setters.			
Base	ARObject , PPortComSpec			
Aggregated by	AbstractProvidedPortPrototype.providedComSpec , PortPrototypeBlueprint.providedComSpec			
Attribute	Type	Mult.	Kind	Note
getter	Field	0..1	ref	The existence of this reference indicates that the Server ComSpec refers to the getter of a Field. Stereotypes: atpIdentityContributor This Attribute is only used by the AUTOSAR Adaptive Platform.
operation	ClientServerOperation	0..1	ref	Operation these communication attributes apply to. Stereotypes: atpIdentityContributor
queueLength	PositiveInteger	0..1	attr	Length of call queue on the server side.
setter	Field	0..1	ref	The existence of this reference indicates that the Server ComSpec refers to the setter of a Field. Stereotypes: atpIdentityContributor This Attribute is only used by the AUTOSAR Adaptive Platform.
transformation ComSpecProps	TransformationComSpecProps	*	aggr	This references the TransformationComSpecProps which define port-specific configuration for data transformation. Stereotypes: atpSplitable Tags: atp.Splitkey=transformationComSpecProps

Table 3.28: ServerComSpec

3.2.5.1.5 Communication behavior to be implemented by the Application Software

3.2.5.1.5.1 Transmission ComSpec Props

In order to support periodic data transmission and reception (the main reason for this is to be able to perform periodic invocation of the EndToEnd transformation), the application software needs to implement the period in its program flow. But there may also be other reasons why the application shall take care of the periodicity.

The period of the invocation of transmission and reception APIs can be defined using the [TransmissionComSpecProps](#) and [ReceptionComSpecProps](#) available at the [SenderComSpec](#) and [ReceiverComSpec](#).

As the [TransmissionComSpecProps](#) and [ReceptionComSpecProps](#) define what the expected communication behavior is, the values can also be utilized by communication (network) measurement tools to verify whether the application code actually implements the attributes properly.

The attribute [ReceptionComSpecProps.dataUpdatePeriod](#) defines the time period in which the receiving application shall call the reception API to check for new data.

The attribute `ReceptionComSpecProps.timeout` defines the time after which the application shall assume that the to be received data reception has timed out.

The attribute `TransmissionComSpecProps.dataUpdatePeriod` defines the time period in which the sending application shall call the send API.

The attributes `TransmissionComSpecProps.minimumSendInterval` and `TransmissionComSpecProps.transmissionMode` define values which influence the transmission behavior, implemented by the application code.

The attribute `End2EndEventProtectionProps.dataUpdatePeriod` also defines an expected period to be implemented by the application software for EndToEnd protection.

More specifically, the attribute `End2EndEventProtectionProps.dataUpdatePeriod` represents a network perspective, especially when no application software is defined yet and thus no `SenderComSpec` and `ReceiverComSpec` are available.

3.2.5.1.5.2 Transmission triggered by Element of composite Data Type

If the `SenderComSpec.dataElement` is typed by a composite data type, then the “on change” transmissions (`TransmissionModeDefinitionEnum.onChange` and `TransmissionModeDefinitionEnum.cyclicAndOnChange`) AUTOSAR provides the opportunity to formally define which parts of the `dataElement` shall actually trigger the “on change” transmission.

[constr_10535] Restriction for attribute `SenderComSpec.transmissionProps.onChangeDataPrototype`

Status: DRAFT

Imposition time: IT_BefAraApiGen

[If the `SenderComSpec.dataElement` refers to an `AutosarDataPrototype` aggregated by a `ServiceInterface` in the role `event` or `field`, then a `DataPrototypeReference` aggregated in the role `SenderComSpec.transmissionProps.onChangeDataPrototype` shall only exist as

- a `DataPrototypeInPortInterfaceRef` that aggregates a `DataPrototypeInServiceInterfaceInstanceRef` in the role `dataPrototypeInServiceInterface` or
- an `ImplementationDataTypeElementInPortInterfaceRef`.

]

The reference to the “root” `AutosarDataPrototype` is already specified by the role `SenderComSpec.dataElement`. Therefore, the reference in the role `DataPrototypeInServiceInterfaceInstanceRef.rootDataPrototype` shall not be defined again to mitigate the risk of contradicting identification of the “root”.

This is the rationale for the existence of [constr_10536] and [constr_10537] (for the possible case of `ImplementationDataTypeElementInPortInterfaceRef.rootDataPrototype`).

[constr_10536] Existence of `TransmissionComSpecProps.onChangeDataPrototype.dataPrototypeInServiceInterface.rootDataPrototype`

Status: DRAFT

Imposition time: IT_BefAraApiGen

[If all of the following conditions apply:

- the `SenderComSpec.dataElement` refers to an `AutosarDataPrototype` aggregated by a `ServiceInterface` in either the role `event` or `field` and
- the aggregation in the role `TransmissionComSpecProps.onChangeDataPrototype.dataPrototypeInServiceInterface` exists,

then the aggregation in the role `TransmissionComSpecProps.onChangeDataPrototype.dataPrototypeInServiceInterface.rootDataPrototype` shall **not** exist.]

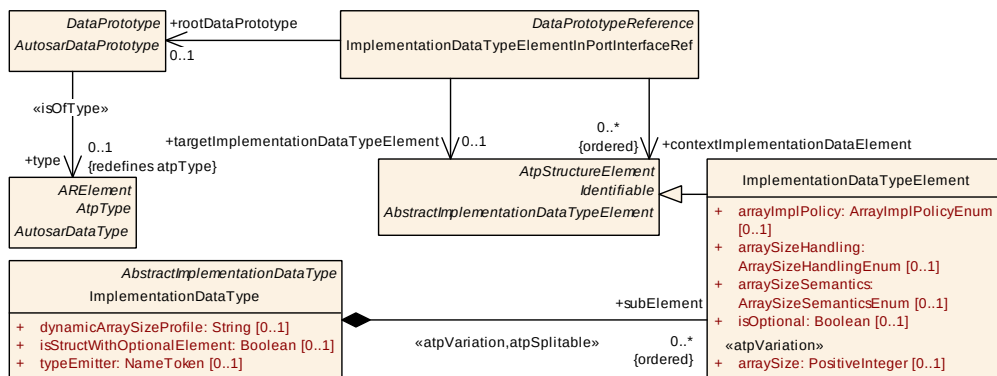


Figure 3.11: Modeling of `ImplementationDataTypeElementInPortInterfaceRef`

[constr_10537] Existence of `TransmissionComSpecProps.onChangeDataPrototype.rootDataPrototype`

Imposition time: IT_BefAraApiGen

[If all of the following conditions apply:

- the `SenderComSpec.dataElement` refers to an `AutosarDataPrototype` aggregated by a `ServiceInterface` in either the role `event` or `field` and
- the aggregation in the role `TransmissionComSpecProps.onChangeDataPrototype` exists,

then the aggregation in the role `TransmissionComSpecProps.onChangeDataPrototype.rootDataPrototype` shall **not** exist.]

Class	DataPrototypeInPortInterfaceRef			
Note	This class represents a RootDataPrototype that is typed by an ApplicationDataType or ImplementationDataType or a DataTypeElement that is aggregated within a composite application data type (record or array).			
Base	ARObject, DataPrototypeReference			
Aggregated by	DataPrototypeTransformationProps.dataPrototypeInPortInterfaceRef, SignalServiceTranslationElement Props.element, TransmissionComSpecProps.onChangeDataPrototype			
Attribute	Type	Mult.	Kind	Note
dataPrototypeInServiceInterface	DataPrototype	0..1	iref	This element defines a reference to a DataPrototype in the context of a ServiceInterface. Tags: atp.Status=draft InstanceRef implemented by: DataPrototypeInServiceInterfaceInstanceRef This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 3.29: DataPrototypeInPortInterfaceRef

Class	ImplementationDataTypeElementInPortInterfaceRef			
Note	This meta-class represents the ability to refer to the internal structure of an AutosarDataPrototype which is typed by an ImplementationDatatype in the context of a PortInterface. In other words, this meta-class shall not be used to model a reference to the AutosarDataPrototype as a target itself, even if the AutosarDataPrototype is typed by an ImplementationDataType and even if that ImplementationDataType represents a composite data type.			
Base	ARObject, DataPrototypeReference			
Aggregated by	DataPrototypeTransformationProps.dataPrototypeInPortInterfaceRef, SignalServiceTranslationElement Props.element, TransmissionComSpecProps.onChangeDataPrototype			
Attribute	Type	Mult.	Kind	Note
contextImplementationDataElement (ordered)	AbstractImplementationDataTypeElement	*	ref	This is a context in case there are subelements with explicit types. The reference has to be ordered to properly reflect the nested structure. Tags: xml.sequenceOffset=20
rootDataPrototype	AutosarDataPrototype	0..1	ref	This refers to the AutosarDataPrototype which is typed by the ImplementationDatatype. The targetDataPrototype and all defined contextDataPrototypes can be found within this rootDataPrototype. Tags: xml.sequenceOffset=10
targetImplementationDataTypeElement	AbstractImplementationDataTypeElement	0..1	ref	This is a target ImplementationDataTypeElement in case that the rootDataPrototype is composite and the target is a subElement of the rootDataPrototype. Tags: xml.sequenceOffset=30

Table 3.30: ImplementationDataTypeElementInPortInterfaceRef

3.2.5.2 Port Prototypes typed by Persistency Data Interfaces

[TPS_MANI_01314] Further qualification of properties of [RPortPrototypes](#) typed by [PersistencyKeyValueStorageInterfaces](#) [For [RPortPrototypes](#) typed by [PersistencyKeyValueStorageInterfaces](#) it is possible to define further qualifying attributes for the required side.

For this purpose meta-class [PersistencyDataRequiredComSpec](#) is provided.]

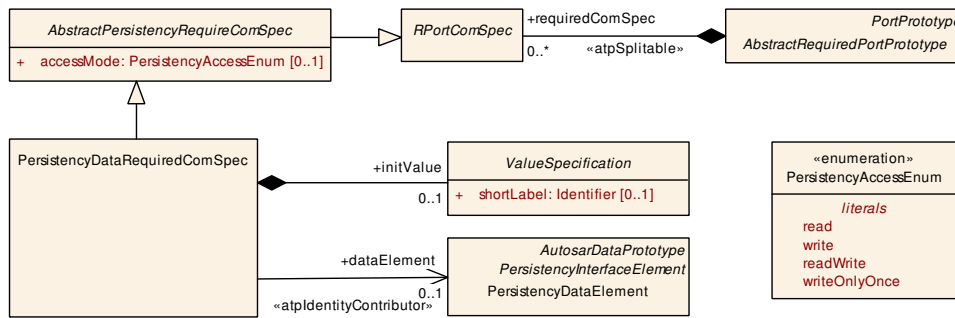


Figure 3.12: Modeling of ComSpec for persistency

[TPS_MANI_01160] Definition of initial value for **PersistenceDataElement** [The definition of an initial value for a **PersistenceDataElement** can be done on the level of a **PortPrototype** by means of **PersistenceDataRequiredComSpec.initValue**]

Class	AbstractPersistenceRequireComSpec (abstract)			
Note	This meta-class acts as a bas-class of persistency-related ComSpec classes. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, RPComSpec			
Subclasses	PersistenceDataRequiredComSpec , PersistenceFileRequiredComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec , PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
accessMode	PersistenceAccessEnum	0..1	attr	This attribute controls how persistent data can be accessed.

Table 3.31: AbstractPersistenceRequireComSpec

Class	PersistenceDataRequiredComSpec			
Note	This meta-class represents the ability to define port-specific attributes for supporting use cases of data persistency on the required side. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractPersistenceRequireComSpec , RPComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec , PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
dataElement	PersistenceDataElement	0..1	ref	This reference represents the PersistenceDataElement for which the PersistenceDataRequiredComSpec applies. Stereotypes: atpIdentityContributor
initValue	ValueSpecification	0..1	aggr	This aggregation represents the definition of an initial value for the PersistenceDataElement referenced by the enclosing PersistenceDataRequiredComSpec

Table 3.32: PersistenceDataRequiredComSpec

[constr_10654] Existence of **PersistenceFileRequiredComSpec**

Imposition time: [IT_BefAraApiGen](#)

[In the context of any given [RPortPrototype](#) typed by a [PersistenceFileStorageInterface](#), **at most** one [PersistenceFileRequiredComSpec](#) may exist.]

[constr_10081] Existence of initial values in the definition of **PersistencyDataRequiredComSpec**

Imposition time: IT_BefAraApiGen

[For each **PersistencyDataRequiredComSpec**, if the value of attribute **dataElement.updateStrategy** is set to the value **delete**, then attribute **PersistencyDataRequiredComSpec.initValue** shall not exist.]

[TPS_MANI_01456] Definition of **PersistencyDataRequiredComSpec.accessMode** [The value of attribute **PersistencyDataRequiredComSpec.accessMode** applies for the entire **RPortPrototype**, as opposed to single **dataElements**.

To indicate this specific semantics, the **accessMode** needs to be specified in a **PersistencyDataRequiredComSpec** that, at the same time, does **not** refer to a **dataElement**.]

As a consequence of [TPS_MANI_01456], [constr_10576] is defined.

[constr_10576] Existence of attribute **PersistencyDataRequiredComSpec.accessMode**

Imposition time: IT_BefAraApiGen

[Each **PersistencyDataRequiredComSpec** that defines the reference in the role **dataElement** shall **not** define the attribute **accessMode** and vice versa.]

3.2.5.2.1 Port Prototypes typed by Persistency File Interfaces

[TPS_MANI_01457] Further qualification of properties of **RPortPrototypes** typed by **PersistencyFileStorageInterfaces** [For **RPortPrototypes** typed by **PersistencyFileStorageInterfaces** it is possible to define the access mode (modelled as attribute **accessMode**) for the required side.

For this purpose meta-class **PersistencyFileRequiredComSpec** is provided.]

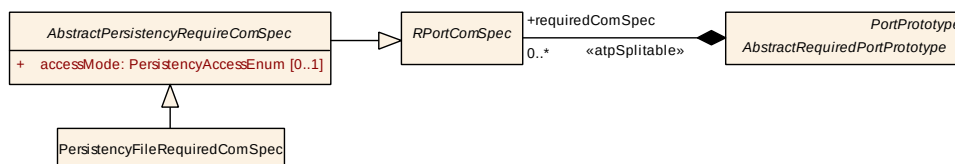


Figure 3.13: Modeling of ComSpec for file persistence

Class	PersistencyFileRequiredComSpec
Note	This meta-class represents the ability to define port-specific attributes for supporting use cases of file persistence on the required side. This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject, <i>AbstractPersistencyRequireComSpec</i> , <i>RPComSpec</i>





Class	PersistencyFileRequiredComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec, PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.33: PersistencyFileRequiredComSpec

Enumeration	PersistencyAccessEnum
Note	This enumeration provides standardized ways of how persistent data can be accessed.
Aggregated by	AbstractPersistencyRequireComSpec.accessMode
Literal	Description
read	Access to persistent data is read-only. Tags: atp.EnumerationLiteralIndex=0 This EnumerationLiteral is only used by the AUTOSAR Adaptive Platform.
readWrite	Persistent data can both be written and read. Tags: atp.EnumerationLiteralIndex=2 This EnumerationLiteral is only used by the AUTOSAR Adaptive Platform.
write	Access to persistent data is write-only. Tags: atp.EnumerationLiteralIndex=1 This EnumerationLiteral is only used by the AUTOSAR Adaptive Platform.
writeOnlyOnce	The elements of this storage are prevented from being changed after first initialization. Tags: atp.EnumerationLiteralIndex=3 This EnumerationLiteral is only used by the AUTOSAR Adaptive Platform.

Table 3.34: PersistencyAccessEnum

3.2.6 Process Design

Within the definition of e.g. a diagnostic mapping, the assignment to the `Process` is typically done in a methodological step¹ that happens when all the diagnostic mapping² is already complete.

Therefore, it would be good to implement a proxy for an actual `Process` that can stand in as the target of the relation to a `Process` at design time. This semantics is realized by meta-class `ProcessDesign`.

[TPS_MANI_01228] Semantics of meta-class `ProcessDesign` [Meta-class `ProcessDesign` shall be used whenever a design-time representation is required for a `Process` that is designed in a **later** step in the workflow as part of the target-configuration specification.]

The integrator would have to take care that an actual `Process` refers to the corresponding `ProcessDesign` such that by means of this reference an AUTOSAR software tool is able to figure out the relation between a diagnostic mapping and a process, provided that each `ProcessDesign` is **only** referenced by a single `Process`.

¹i.e. during the creation of the execution manifest

²From the methodological point of view, the creation of the diagnostic mapping is typically considered a design-time activity.

[constr_1550] Reference from **Process** to **ProcessDesign**

Imposition time: **IT_Mani**

[Each **ProcessDesign** shall only be referenced from a single **Process**.]

Note that the reference from the **Process** to the **ProcessDesign** acknowledges the fact that the **Process** is typically created later in time³.

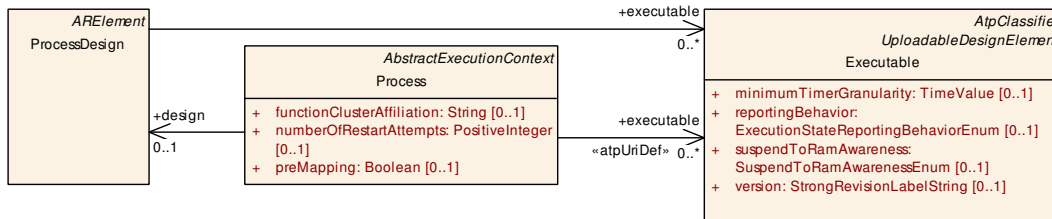


Figure 3.14: Modeling of the **ProcessDesign**

Class	ProcessDesign			
Note	This meta-class has the ability to stand in for a Process at the time when the Process does not yet exist. But its future existence already needs to be considered during design phase and for that a dedicated model element is required. Tags: atp.recommendedPackage=ProcessDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
executable	Executable	*	ref	Reference to executable that is executed in the process.

Table 3.35: ProcessDesign

[constr_3731] Upper multiplicity of reference in the role **ProcessDesign.executable**

Imposition time: **IT_SubSysDes**

[In the context of **ProcessDesign**, the reference in the role **executable** shall exist at most once.]

Conceivably, the association of diagnostic mappings with Meta-class **ProcessDesign** may still happen as a finalizing last step of the activity to create the diagnostic mappings. To accommodate for this potential modeling, the reference from a diagnostic mapping to **ProcessDesign** has been decorated by stereotype <<atpSplittable>>.

For more information concerning the semantics of this stereotype please refer to the specification of the AUTOSAR Generic Structure Template [8, TPS Generic Structure Template].

³In other words, if references are needed between design-related and target-configuration-related meta-classes then the direction of these references shall always point from target-configuration to design.

3.3 Data Type

3.3.1 Overview

The specification of data types on the *AUTOSAR adaptive platform* follows the same pattern as the counterpart on the *AUTOSAR classic platform*: data types are defined on different levels of abstraction that complement each other.

In the context of this document, the focus is on the discussion of [ApplicationDataTypes](#) and [CppImplementationDataTypes](#).

In general, most of the concepts regarding the definition of data types can be taken over from the existing specifications on the *AUTOSAR classic platform*.

However, some aspects are specific to the *AUTOSAR adaptive platform* and are consequently discussed in the scope of this document rather than the specification of the [2, TPS Software Component Template].

One of the aspects that could be taken over from the *AUTOSAR classic platform* is the definition of initial values.

Although the utility of initial values is certainly limited on the *AUTOSAR adaptive platform*, there is an opportunity to utilize the definition of initial values in the context of the so-called [Fields](#) (see [TPS_MANI_01034]).

3.3.2 ApplicationDataType

The full range of the modeling of [ApplicationDataTypes](#) that is supported on the *AUTOSAR classic platform* can directly be used on the *AUTOSAR adaptive platform* as well.

In addition to the [ApplicationDataTypes](#) supported on the *AUTOSAR classic platform*, there are further [ApplicationDataTypes](#) that – while in principle also available on the *AUTOSAR classic platform* – are primarily used on and designed for the *AUTOSAR adaptive platform*.

Class	<i>ApplicationDataType</i> (abstract)			
Note	<i>ApplicationDataType</i> defines a data type from the application point of view. Especially it should be used whenever something "physical" is at stake. An <i>ApplicationDataType</i> represents a set of values as seen in the application model, such as measurement units. It does not consider implementation details such as bit-size, endianness, etc. It should be possible to model the application level aspects of a VFB system by using <i>ApplicationDataTypes</i> only.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ApplicationCompositeDataType , ApplicationPrimitiveDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.36: ApplicationDataType

3.3.2.1 String Data Type

While the handling of data types that represent textual strings is very similar with respect to the definition of [ApplicationDataTypes](#) on the *AUTOSAR classic platform* and the *AUTOSAR adaptive platform*, special regulations apply on the level of [CppImplementationDataTypes](#) on the *AUTOSAR adaptive platform*.

For more information about the modeling of string data types on the level of [CppImplementationDataType](#) please refer to [Chapter 3.3.3.4](#).

For the sake of consistency, this chapter summarizes the modeling of [ApplicationDataTypes](#) for the modeling of data types that represent textual strings as far as the *AUTOSAR adaptive platform* is concerned.

The meta-classes used to define an [ApplicationPrimitiveDataType](#) of category [STRING](#) are summarized in [Figure 3.15](#).

Please note that thanks to the usage of programming languages with richer data types than plain C, the implementation of an [ApplicationPrimitiveDataType](#) of category [STRING](#) on the *AUTOSAR adaptive platform* is predefined for a given *language binding*.

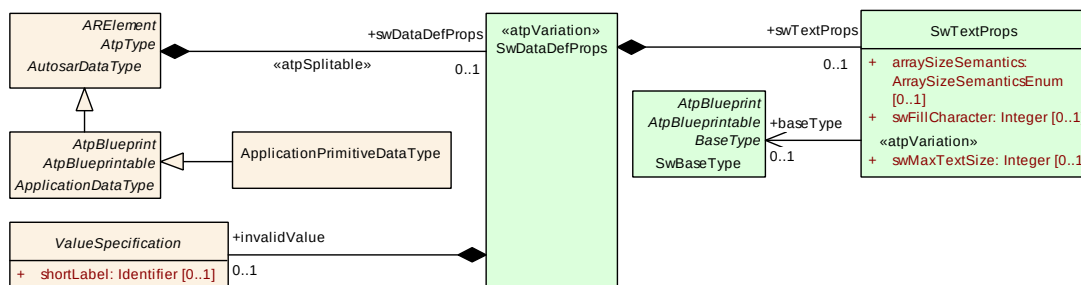


Figure 3.15: Specification of textual strings

[TPS_MANI_01047] Existence of [SwRecordLayout](#) for an [ApplicationPrimitiveDataType](#) of category [STRING](#) [For the usage of an [ApplicationPrimitiveDataType](#) of category [STRING](#) on the *AUTOSAR adaptive platform*, the existence of [ApplicationPrimitiveDataType.swDataDefProps.swRecordLayout](#) shall be ignored.]

Please note that [TPS_MANI_01047] intentionally does not forbid the existence of [SwRecordLayout](#) because the same [ApplicationPrimitiveDataType](#) of category [STRING](#) could rightfully be used **on both** the *AUTOSAR adaptive platform* and the *AUTOSAR classic platform*.

Class	ApplicationPrimitiveDataType			
Note	A primitive data type defines a set of allowed values. Tags: atp.recommendedPackage=ApplicationDataTypes			
Base	ARElement , ARObject , ApplicationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.37: ApplicationPrimitiveDataType

Class	SwTextProps			
Note	This meta-class expresses particular properties applicable to strings in variables or calibration parameters.			
Base	ARObject			
Aggregated by	SwDataDefProps.swTextProps			
Attribute	Type	Mult.	Kind	Note
arraySize Semantics	ArraySizeSemanticsEnum	0..1	attr	This attribute controls the semantics of the arraysize for the array representing the string in an ImplementationDataType . It is there to support a safe conversion between ApplicationDataType and ImplementationDataType , even for variable length strings as required e.g. for Support of SAE J1939.
baseType	SwBaseType	0..1	ref	This is the base type of one character in the string. In particular this baseType denotes the intended encoding of the characters in the string on level of ApplicationDataType . Tags: xml.sequenceOffset=30
swFillCharacter	Integer	0..1	attr	Filler character for text parameter to pad up to the maximum length swMaxTextSize . The value will be interpreted according to the encoding specified in the associated base type of the data object, e.g. 0x30 (hex) represents the ASCII character zero as filler character and 0 (dec) represents an end of string as filler character. The usage of the fill character depends on the arraySizeSemantics . Tags: xml.sequenceOffset=40
swMaxTextSize	Integer	0..1	attr	Specifies the maximum text size in characters. Note the size in bytes depends on the encoding in the corresponding baseType . Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime xml.sequenceOffset=20

Table 3.38: SwTextProps

Enumeration	ArraySizeSemanticsEnum
Note	This type controls how the information about the number of elements in an ApplicationArrayDataType is to be interpreted.
Aggregated by	ApplicationArrayElement.arraySizeSemantics , DiagnosticDataElement.arraySizeSemantics , ImplementationDataTypeElement.arraySizeSemantics , SwTextProps.arraySizeSemantics
Literal	Description





Enumeration	ArraySizeSemanticsEnum
fixedSize	This means that the ApplicationArrayDataType will always have a fixed number of elements. Tags: atp.EnumerationLiteralIndex=0
variableSize	This implies that the actual number of elements in the ApplicationArrayDataType might vary at run-time. The value of arraySize represents the maximum number of elements in the array. Tags: atp.EnumerationLiteralIndex=1

Table 3.39: ArraySizeSemanticsEnum

Class	SwBaseType			
Note	This meta-class represents a base type used within ECU software. Tags: atp.recommendedPackage=BaseTypes			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , BaseType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.40: SwBaseType

3.3.2.2 Associative Map Data Type

[TPS_MANI_01027] Semantics of [ApplicationAssocMapDataType](#) [An [ApplicationAssocMapDataType](#) represents an associative data structure, i.e. a data structure where so-called keys (formalized as [ApplicationAssocMapDataType.key](#) that are in turn typed by an [ApplicationDataType](#)) are associated with *values* (formalized as [ApplicationAssocMapDataType.value](#) that are also in turn typed by an [ApplicationDataType](#)).]

Figure 3.16 depicts an example of the structure of an [ApplicationAssocMapDataType](#).

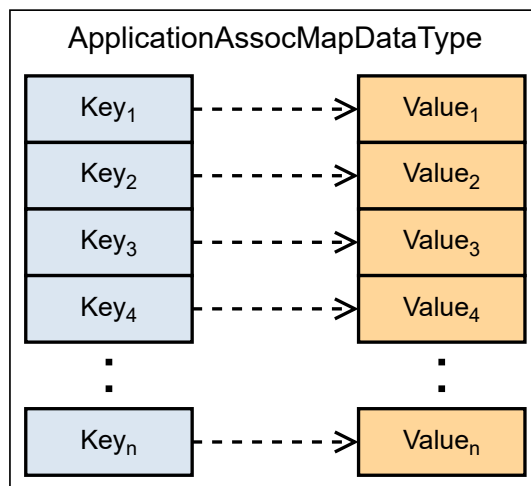


Figure 3.16: Example [ApplicationAssocMapDataType](#) on the AUTOSAR adaptive platform

[constr_3349] Usage of `ApplicationAssocMapDataType` is limited

Imposition time: `IT_BefAraApiGen`

[The usage of an `ApplicationAssocMapDataType` is limited to the context of `AdaptiveApplicationSwComponentTypes` and `CompositionSwComponentTypes` defined in the context of an `Executable`, i.e. such a data type shall not be used on the *AUTOSAR classic platform*.]

[`constr_3349`] is a formal approach to express that an `ApplicationAssocMapDataType` shall only be used on the *AUTOSAR adaptive platform*.

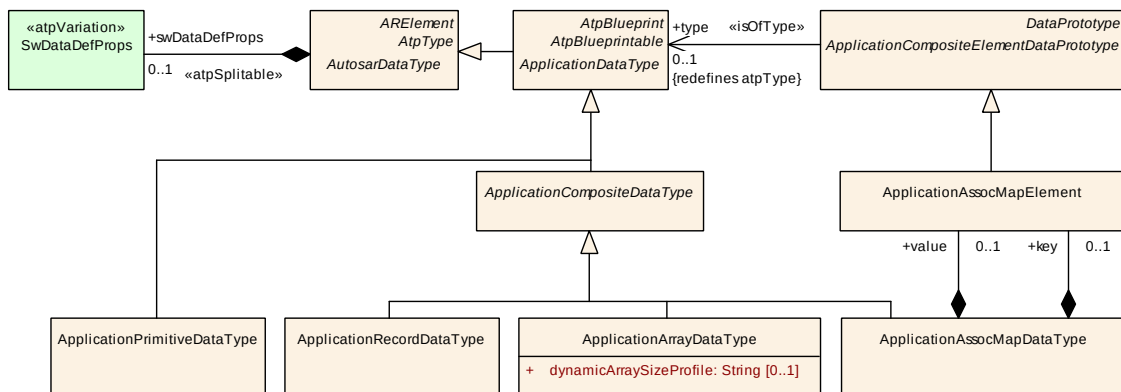


Figure 3.17: Formal model of `ApplicationAssocMapDataType`

[TPS_MANI_01016] **Category of `ApplicationAssocMapDataType`** [The value `ApplicationAssocMapDataType.category` shall be set to `ASSOCIATIVE_MAP` for attribute.]

As can be deduced from looking at Figure 3.16, the concept of an `ApplicationDataType` of `category` `MAP` shall not be confused with an `ApplicationAssocMapDataType`⁴.

There are a number of technical implications on the usage of an associative data structure at run-time, e.g. that the content of each *key* shall be unique within the context of the overall data structure.

On the other hand, it is totally no problem if content on the value-side contain duplicates, e.g. two unique *keys* are associated with *values* that have a completely identical content.

However, these aspects have no implication on the formal model of the `ApplicationAssocMapDataType` and are therefore not considered in this document.

The modeling of the `ApplicationAssocMapDataType` is somewhat minimalistic and motivated mainly by the fact that data types for both *key* and *value* need to be defined.

⁴On the other hand, both concepts of a “map” are justified in their respective “community” and choosing to name one of these very different in order so reduce overall potential confusion would probably not be applicable

There is no assumption how the structure of an implementation of an associative map may look like. For example, in C++ (which is currently the only supported language binding on the *AUTOSAR adaptive platform*) the straightforward way to use an associative map is to utilize the container `ara::core::Map` (where the implementation is opaque to the client programmer).

Class	ApplicationAssocMapDataType			
Note	An application data type which is a map and consists of a key and a value Tags: atp.recommendedPackage=ApplicationDataTypes This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , ApplicationCompositeDataType , ApplicationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
key	ApplicationAssocMapElement	0..1	aggr	Key element of the map that is used to uniquely identify the value of the map.
value	ApplicationAssocMapElement	0..1	aggr	Value element of the map that stores the content associated to a key.

Table 3.41: ApplicationAssocMapDataType

[constr_10124] Multiplicity of attribute [ApplicationAssocMapDataType.key](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [ApplicationAssocMapDataType](#), the attribute [key](#) shall exist.]

[constr_10125] Multiplicity of attribute [ApplicationAssocMapDataType.value](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [ApplicationAssocMapDataType](#), the attribute [value](#) shall exist.]

Class	ApplicationAssocMapElement			
Note	Describes the properties of the elements of an application map data type. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , ApplicationCompositeElementDataPrototype , AtpFeature , AtpPrototype , DataPrototype , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ApplicationAssocMapDataType.key , ApplicationAssocMapDataType.value , AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.42: ApplicationAssocMapElement

An example of the definition of an [ApplicationAssocMapDataType](#) can be found in [Chapter B.1.1](#) in the appendix.

The initialization of an [ApplicationAssocMapDataType](#), however, needs to be clarified because it would (using a combination of [RecordValueSpecification](#) and [ArrayValueSpecification](#)) in general be technically possible to define a number of differently structured [ValueSpecifications](#) that are semantically identical.

In order to keep this element of uncertainty out of the AUTOSAR standard, the initialization of a `DataPrototype` typed by `ApplicationAssocMapDataType` is clarified by means of [constr_1488].

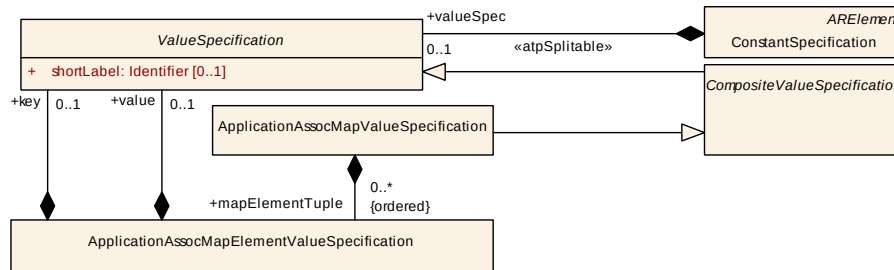


Figure 3.18: Formal model of the initialization of an `ApplicationAssocMapDataType`

```
[constr_1488] Initialization of a DataPrototype typed by an ApplicationAs-  
socMapDataType
```

Imposition time: IT_BefAraApiGen

[A `DataPrototype` typed by an `ApplicationAssocMapDataType` shall only be initialized by an `ApplicationAssocMapValueSpecification`.]

As already mentioned, there is a semantic requirement that the *key* elements of an *associative map* need to be unique in the context of one *associative map* container.

Obviously, the model has no influence on what happens at run-time. On the other hand, there is an implication onto the initialization of an `ApplicationAssocMapDataType`, see [constr_1489].

```
[constr_1489] Uniqueness of ApplicationAssocMapValueSpecification.  
mapElementTuple.key
```

Imposition time: IT_BefAraApiGen

[The value of all `mapElementTuple.key` elements in the context of a given `ApplicationAssocMapValueSpecification` shall be unique.]

Class	ApplicationAssocMapValueSpecification
Note	This meta-class represents the ability to define the initialization of an ApplicationAssocMapDataType. This Class is only used by the AUTOSAR Adaptive Platform.
Base	<i>ARObject</i> , <i>CompositeValueSpecification</i> , ValueSpecification





Class	ApplicationAssocMapValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key, ApplicationAssocMapElementValueSpecification.value, ArrayValueSpecification.element, CalibrationParameterValue.applInitValue, CalibrationParameterValue.implInitValue, CompositeRuleBasedValueSpecification.argument, ConstantSpecification.valueSpec, CryptoServiceKey.developmentValue, DiagnosticEnvDataCondition.compareValue, DiagnosticEnvDataElementCondition.compareValue, DiagnosticEnvSovdDataCondition.compareValue, FieldSenderComSpec.initValue, ISignal.initValue, ISignal.receptionDefaultValue, ISignal.timeoutSubstitutionValue, NonqueuedReceiverComSpec.initValue, NonqueuedReceiverComSpec.timeoutSubstitutionValue, NonqueuedSenderComSpec.initValue, NvProvideComSpec.ramBlockInitValue, NvProvideComSpec.romBlockInitValue, NvRequireComSpec.initValue, ParameterDataPrototype.initValue, ParameterProvideComSpec.initValue, ParameterRequireComSpec.initValue, PersistencyDataRequiredComSpec.initValue, PersistencyKeyValuePair.initValue, PortDefinedArgumentValue.value, PortPrototypeBlueprintInitValue.value, RecordValueSpecification.field, SomeipEventDeployment.eventReceptionDefaultValue, StateManagementCompareCondition.compareValue, SwDataDefProps.invalidValue, UserDefinedEventDeployment.eventReceptionDefaultValue, VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
mapElement Tuple (ordered)	ApplicationAssocMapElementValueSpecification	*	aggr	This aggregation represents the initial values for the elements of the ApplicationAssocMapValueSpecification.

Table 3.43: ApplicationAssocMapValueSpecification

Class	ApplicationAssocMapElementValueSpecification			
Note	This meta-class represents the ability to define the initialization of the elements of an ApplicationAssocMapDataType. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	ApplicationAssocMapValueSpecification.mapElementTuple			
Attribute	Type	Mult.	Kind	Note
key	ValueSpecification	0..1	aggr	This aggregation represents the initialization of the key part of an AssociativeElementValueSpecification.
value	ValueSpecification	0..1	aggr	This aggregation represents the initialization of the value part of an AssociativeElementValueSpecification.

Table 3.44: ApplicationAssocMapElementValueSpecification

[constr_10126] Multiplicity of attribute **ApplicationAssocMapElementValueSpecification.key**

Imposition time: IT_BefAraApiGen

[For each **ApplicationAssocMapElementValueSpecification**, the attribute **key** shall exist.]

[constr_10127] Multiplicity of attribute **ApplicationAssocMapElementValueSpecification.value**

Imposition time: IT_BefAraApiGen

[For each **ApplicationAssocMapElementValueSpecification**, the attribute **value** shall exist.]

3.3.2.3 Attributes of SwDataDefProps

This section provides clarification about which attributes of meta-class `SwDataDefProps` used in the context of `ApplicationDataTypes` relevant for the *AUTOSAR adaptive platform*.

A consequence of [constr_1478] is that the [constr_1478] only lists the values of `category` that are exclusive to the *AUTOSAR adaptive platform*. For all other values of `category` that are also supported on the *AUTOSAR classic platform* please refer to a similar table contained in the specification of the [2, TPS Software Component Template].

Legend for [constr_1478]

In the columns headlined *Root Element* an “x” denotes that the attribute is applicable for the respective meta-class in the table header. Empty cells indicate that the attribute is not applicable for the respective *Root Element* at all.

A multiplicity definition in one of the columns headlined *Attribute Existence per Category* indicates that the attribute is applicable to the value of `category`. Empty cells indicate that the combination of attribute and value of `category` shall not be used.

[constr_1478] `SwDataDefProps` applicable to `ApplicationDataTypes` exclusive to the *AUTOSAR adaptive platform*

Imposition time: `IT_BefAraApiGen`

[

Attributes of SwDataDefProps	Root Elem.		Attribute Existence per Category
	ApplicationAssocMapDataType	ApplicationAssocMapElement	
			ASSOCIATIVE_MAP
<code>additionalNativeTypeQualifier</code>			
<code>annotation</code>	x	x	*
<code>baseType</code>			
<code>compuMethod</code>			
<code>dataConstr</code>			
<code>displayFormat</code>	x	x	0..1
<code>implementationDataType</code>			
<code>invalidValue</code>			
<code>stepSize</code>			



△

swAddrMethod			
swAlignment			
swBitRepresentation			
swCalibrationAccess			
swCalprmAxisSet			
swComparisonVariable			
swDataDependency			
swHostVariable			
swImplPolicy			
swIntendedResolution			
swInterpolationMethod			
swIsVirtual			
swPointerTargetProps			
swRecordLayout			
swRefreshTiming			
swTextProps			
swValueBlockSize			
unit			
valueAxisDataType			

└

3.3.3 CppImplementationDataType

3.3.3.1 Overview

In the AUTOSAR standard, data types represent assets of paramount prominence for the entire development approach.

Therefore, AUTOSAR implements⁵ a multi-level approach for the modeling of data types. One of the described levels, the so-called *Implementation Data Level* aims at a modeling on a level that could be described as “language binding” in the parlor of the *AUTOSAR adaptive platform*.

For the *AUTOSAR classic platform*, the *Implementation Data Level* has been addressed by the creation of the [ImplementationDataType](#) that specifically aims at covering the data type behavior of the C programming language.

In contrast to the *AUTOSAR classic platform*, the *AUTOSAR adaptive platform* currently does not foresee the usage of the C language and instead (at least for the foreseeable future) defines language binding to the C++ language.

It is therefore necessary to provide a modeling approach on the *Implementation Data Level* with a proper support for the capabilities of the C++ language.

⁵As explained in [2, TPS Software Component Template]

While it would technically be feasible to extend the semantics of `ImplementationDataType` for a support of a C++ language binding this would significantly water down the clarity and expressiveness of `ImplementationDataType`⁶.

It therefore seems reasonable to add a system of meta-classes that specifically supports the usage of data types with an intended binding to the C++ language.

[TPS_MANI_01166] Semantics of `CppImplementationDataType` [The abstract meta-class `CppImplementationDataType` supports the modeling of data types specifically tailored towards a support for a C++ language binding.]

[TPS_MANI_03197] Semantics of `StdCppImplementationDataType` [Meta-class `StdCppImplementationDataType` supports the modeling of data types that will be mapped to C++ Standard Library features in the C++ language binding.]

Please note that Structures (`category = STRUCTURE`) and type aliases (`category = TYPE_REFERENCE`) are also modeled as `StdCppImplementationDataTypes` for simplification reasons.

[TPS_MANI_03198] Semantics of `CustomCppImplementationDataType` [Meta-class `CustomCppImplementationDataType` supports the modeling of data types that will mapped to a custom implementation in the C++ language binding that is declared in the `headerFile`.]

Please note that the `category` values for a `CustomCppImplementationDataType` are restricted by `[constr_1578]`.

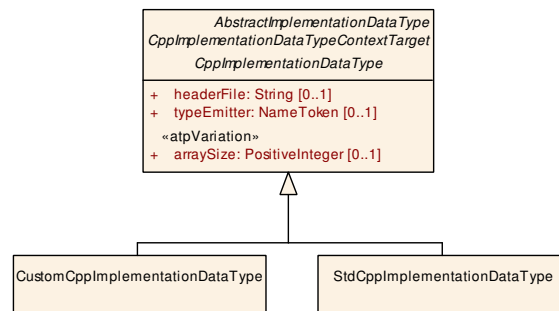


Figure 3.19: Specializations of `CppImplementationDataType`

This means that the modeling of primitive data types and strings is only possible with `StdCppImplementationDataTypes`. The reason is that the serialization rules that are defined in AUTOSAR for SOME/IP and DDS are based on the defined types of the standard library.

⁶And even if it were possible to extend `ImplementationDataType` towards a more or less clean support for C++ it may happen that further language bindings are added to the *AUTOSAR adaptive platform* for which further and further extensions of `ImplementationDataType` would be required.

[constr_1571] CppImplementationDataType is limited*Imposition time:* IT_BefAraApiGen

[The usage of a `CppImplementationDataType` is limited to the context of `AdaptiveApplicationSwComponentTypes` and `CompositionSwComponentTypes` defined in the context of an `Executable`.]

[TPS_MANI_01167] AbstractImplementationDataType [Meta-class `CppImplementationDataType` inherits from abstract base class `AbstractImplementationDataType` in order to become a valid target for specific references from other meta-classes that want to refer to “`ImplementationDataType` in general”.]

Class	CppImplementationDataType (abstract)			
Note	This meta-class represents the way to specify a reusable data type definition taken as a the basis for a C++ language binding This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractImplementationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , CppImplementationDataTypeContextTarget , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	CustomCppImplementationDataType , StdCppImplementationDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
arraySize	PositiveInteger	0..1	attr	This attribute can be used to specify the array size if the enclosing <code>CppImplementationDataType</code> has array semantics. Stereotypes: <code>atpVariation</code> Tags: <code>vh.latestBindingTime=preCompileTime</code>
headerFile	String	0..1	attr	Configuration of the Header File with the custom class declaration.
namespace (ordered)	SymbolProps	*	aggr	This aggregation allows for the definition an own namespace for the enclosing <code>CppImplementationDataType</code> .
subElement (ordered)	CppImplementationDataTypeElement	*	aggr	This represents the collection of sub-elements of the enclosing <code>CppImplementationDataType</code>
template Argument (ordered)	CppTemplateArgument	*	aggr	This aggregation allows for the specification of properties of template arguments
typeEmitter	NameToken	0..1	attr	This attribute can be taken to control how the respective <code>CppImplementationDataType</code> is contributed to the language binding.
typeReference	CppImplementationDataType	0..1	ref	This reference shall be defined to define a type reference (a.k.a. typedef).

Table 3.45: CppImplementationDataType

Class	StdCppImplementationDataType
Note	This meta-class represents the way to specify a data type definition that is taken as the basis for a C++ language binding to a C++ Standard Library feature. Tags: <code>atp.recommendedPackage=CppImplementationDataTypes</code> This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , AbstractImplementationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , CppImplementationDataType , CppImplementationDataTypeContextTarget , Identifiable , MultilanguageReferrable , PackageableElement , Referrable





Class	StdCppImplementationDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.46: StdCppImplementationDataType

Class	CustomCppImplementationDataType			
Note	This meta-class represents the way to specify a data type definition that is taken as the basis for a C++ language binding to a custom implementation that is declared in the configured header file. The Short Name of this CustomCppImplementationDataType defines the Class-Name of the custom implementation. Tags: atp.recommendedPackage=CppImplementationDataTypes This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractImplementationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , CppImplementationDataType , CppImplementationDataTypeContextTarget , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.47: CustomCppImplementationDataType

Class	AbstractImplementationDataType (abstract)			
Note	This meta-class represents an abstract base class for different flavors of ImplementationDataType.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	CppImplementationDataType , ImplementationDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.48: AbstractImplementationDataType

A prominent example for the idea of referring to “[ImplementationDataType](#) in general” can be found in meta-class [DataTypeMap](#). The intention behind the existence of [DataTypeMap](#) is to map an [ApplicationDataType](#) to either an [ImplementationDataType](#) or [CppImplementationDataType](#).

By means of modeling the reference [DataTypeMap.implementationDataType](#) as a reference to [AbstractImplementationDataType](#) both options are possible in a single role.

In contrast to the C language, C++ supports the definition of namespaces in programs. This feature is also cleared for development on the *AUTOSAR adaptive platform* and therefore needs to be represented in the modeling approach.

[TPS_MANI_01168] Specification of a namespace for a [CppImplementationDataType](#) [The ability to define a namespace for a [CppImplementationDataType](#) is expressed by means of the aggregation of [SymbolProps](#) at [CppImplementationDataType](#) in the role [namespace](#).]

[constr_3443] Specification of a namespace for a StdCppImplementationDataType

Imposition time: IT_BefAraApiGen

[The definition of a namespace for a StdCppImplementationDataType of category VALUE is not allowed.

For this value of category the std namespace is already assumed by the usage of the StdCppImplementationDataType.]

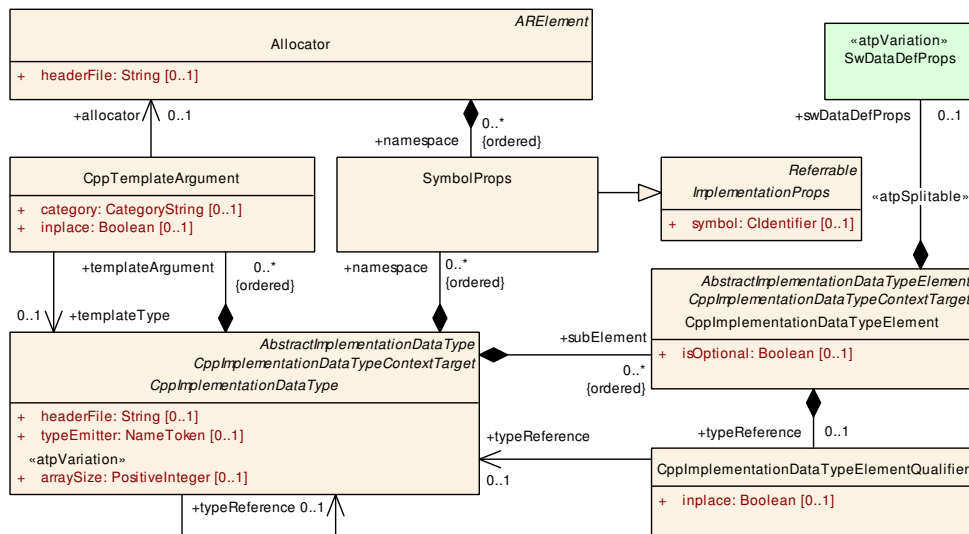


Figure 3.20: CppImplementationDataType overview

[TPS_MANI_01309] Semantics of attribute CppImplementationDataType.headerFile [The attribute CppImplementationDataType.headerFile shall be used to specify the name of the corresponding header file in two cases:

- A CustomCppImplementationDataType shall set the value of the attribute to the name of the header file that defines the C++ code for the CustomCppImplementationDataType.
- A platform data type (modeled as a StdCppImplementationDataType) shall set the attribute to the name of the applicable header file (e.g. "cstdint") from the C++ standard library.

]

[constr_1743] CppImplementationDataType.headerFile vs. CppImplementationDataType.typeEmitter

Imposition time: IT_BefAraApiGen

[The two attributes CppImplementationDataType.headerFile and CppImplementationDataType.typeEmitter shall always be used mutually exclusive.

In other words, a subclass of `CppImplementationDataType` shall either use `headerFile` or `typeEmitter`. The simultaneous usage of both attributes is not supported.]

[TPS_MANI_01176] Standardized value for attribute `CppImplementationDataType.typeEmitter` [The AUTOSAR Standard reserves the following value for attribute `CppImplementationDataType.typeEmitter`:

- `TYPE_EMITTER_ARA`
- `FUNDAMENTAL_TYPE`: this value is only applicable for the platform types `bool`, `float`, and `double`.

]

[TPS_MANI_01177] Semantics of attribute `CppImplementationDataType.typeEmitter` [The following set of rules applies for the usage of the attribute `CppImplementationDataType.typeEmitter`:

- If the attribute `typeEmitter` is set to the value `TYPE_EMITTER_ARA`, the ARA generator shall generate the corresponding data type definition.
- If the attribute `typeEmitter` is set to any value other than `TYPE_EMITTER_ARA`, the ARA generator shall silently **not** generate the corresponding data type definition.

]

In the context of [TPS_MANI_01177], [TPS_MANI_01309] and [constr_1743] apply.

[TPS_MANI_01212] Usage of attribute `typeEmitter` in the context of a `CustomCppImplementationDataType` [Attribute `typeEmitter` does not have to be used in the context of a `CustomCppImplementationDataType`. If the `typeEmitter` is used regardless then the value of the attribute shall be set to the name of the header file that contains the language binding of the respective `CustomCppImplementationDataType`.]

[TPS_MANI_01169] Support for template data types [Meta-class `CppImplementationDataType` supports the usage of templates for the definition of data types in C++ programs by means of the reference `CppImplementationDataType.templateArgument`.

The order of arguments in templates is significant, therefore `templateArgument` is modeled as an **ordered** collection.]

[TPS_MANI_01174] Semantics of reference in the role `CppTemplateArgument.templateType` [Attribute `CppTemplateArgument.templateType` specifies the data type to be filled in the respective position of the template in the language binding.]

[TPS_MANI_01175] Semantics of reference in the role `CppTemplateArgument allocator` [Attribute `CppTemplateArgument.allocator` specifies the behavior of

an allocator class to be filled in the respective position of the template in the language binding.]

[constr_1576] Existence of `CppTemplateArgument.templateType` vs. `CppTemplateArgument.allocator`

Imposition time: `IT_BefAraApiGen`

[For any given `CppTemplateArgument`, **at most one of** the references

- `CppTemplateArgument.templateType` or
- `CppTemplateArgument.allocator`

]

[TPS_MANI_01201] Standardized values for attribute `CppTemplateArgument.category` [AUTOSAR reserves the following values for attribute `CppTemplateArgument.category`:

ASSOC_MAP_KEY : the specific `CppTemplateArgument` represents the *key* data-type of an associative map.

ASSOC_MAP_VALUE : the specific `CppTemplateArgument` represents the *value* data-type of an associative map.

]

Class	CppTemplateArgument			
Note	This meta-class has the ability to define properties for template arguments. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	CppImplementationDataType.templateArgument			
Attribute	Type	Mult.	Kind	Note
allocator	Allocator	0..1	ref	This reference identifies the applicable allocator.
category	CategoryString	0..1	attr	This attribute shall be used to contribute further clarification regarding the semantics of the enclosing Cpp TemplateArgument.
inplace	Boolean	0..1	attr	This attribute specifies whether the shortName of the referenced templateType is used in the code generation and the type declaration is defined outside of the enclosing CppImplementationDataType (true) or whether the type definition is embedded inside of the enclosing CppImplementationDataType and the shortName is ignored (false).
templateType	CppImplementationDataType	0..1	ref	This reference identifies the data type of the specific template argument required for the language binding.

Table 3.49: CppTemplateArgument

[TPS_MANI_01171] Modeling of structured data types [Meta-class `CppImplementationDataType` supports the creation of nested data types by means of the aggregation of `CppImplementationDataTypeElement` in the role `subElement`.

Because the order of sub-elements in a structured data type is significant the aggregation `subElement` is modeled as an **ordered** collection.]

Please note that although the modeling of structures is formally done by way of using `CppImplementationDataType` it is actually only possible to use `StdCppImplementationDataType` for this purpose (see [constr_1578]).

Please note that there is no intention to support a “mixed” modeling of structured data types such that the resulting data type on C++ level would be composed of data types that are native to C++ and data types from the C subsystem.

While this would technically be possible on code level it would impose a huge effort on modeling level and the consensus is that there is no real use case for such a “mixed” data type.

[constr_1578] Applicable data categories

Imposition time: `IT_BefAraApiGen`

Category	Applicable to ...								Description
	<code>ApplicationArrayDataType</code>	<code>ApplicationRecordDataType</code>	<code>ApplicationPrimitiveDataType</code>	<code>ApplicationRecordElement</code>	<code>ApplicationArrayElement</code>	<code>ApplicationValueSpecification</code>	<code>StdCppImplementationDataType</code>	<code>CustomCppImplementationDataType</code>	
VALUE			x	x	x	x	x		Contains a single value. See also [TPS_MANI_03192].
TYPE_REFERENCE							x		The element is defined via reference to another data type (via <code>CppImplementationDataType.typeReference</code>).
STRUCTURE		x		x	x		x		Holds one or several further elements which can have different <code>AutosarDataTypes</code> . See also [TPS_MANI_03180].
VARIANT							x	x	Can hold values of different data types. It is similar to <code>STRUCTURE</code> except that all of its members start at the same location in memory. A <code>VARIANT</code> data prototype can contain only one of its elements at a time and represents a type-safe union. The size of the <code>VARIANT</code> is at least the size of the largest member. See also [TPS_MANI_03189].
ARRAY	x			x	x		x	x	A fixed-sized array of sub-elements of the same data type. See also [TPS_MANI_03169].
VECTOR							x	x	An array of elements of the same data type that is able to grow at run-time. See also [TPS_MANI_03174].
ASSOCIATIVE_MAP							x	x	An associative array of key-value pairs. See also [TPS_MANI_03183].
STRING			x	x	x	x	x		Contains a text string. See also [TPS_MANI_03178].





Category	Applicable to ...							Description
	ApplicationArrayDataType	ApplicationRecordDataType	ApplicationPrimitiveDataType	ApplicationRecordElement	ApplicationArrayElement	ApplicationValueSpecification	StdCppImplementationDataType	CustomCppImplementationDataType
BOOLEAN			x	x	x	x		
Contains one boolean state. Depending on the CPU direct addressing of single bits may not be available. So a byte or a word can be used to store only one logical state.								

Class	CppImplementationDataTypeElement			
Note	Declares a data object which is locally aggregated. Such an element can only be used within the scope where it is aggregated. A CppImplementationDataTypeElement is used to represent an element of a structure, defining its type. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , AbstractImplementationDataTypeElement , AtpClassifier , AtpFeature , AtpStructureElement , CppImplementationDataTypeContextTarget , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AtpClassifier.atpFeature , CppImplementationDataType.subElement			
Attribute	Type	Mult.	Kind	Note
isOptional	Boolean	0..1	attr	This attribute represents the ability to declare the enclosing CppImplementationDataTypeElement as optional. This means the that, at runtime, the Cpp ImplementationDataTypeElement may or may not have a valid value and shall therefore be ignored. The underlying runtime software provides means to set the CppImplementationDataTypeElement as not valid at the sending end of a communication and determine its validity at the receiving end.
swDataDef Props	SwDataDefProps	0..1	aggr	This aggregation allows for the definition of qualifying properties of the enclosing CppImplementationDataTypeElement. Stereotypes: atpSplittable Tags: atp.Splitkey=swDataDefProps
typeReference	CppImplementationDataTypeElementQualifier	0..1	aggr	This aggregation defines the type of the Cpp ImplementationDataTypeElement and determines whether in C++ the CppImplementationDataTypeElement is defined inside or outside of the enclosing Cpp ImplementationDataType.

Table 3.50: CppImplementationDataTypeElement

The existence of attributes of [CppImplementationDataType](#) depending on the usage of data categories eligible for [CppImplementationDataType](#) according to [constr_1578] is documented in [constr_10417].

Please note that [constr_10417] only includes the attributes of `CppImplementationDataType` that depend on the usage of `category`. All attributes of `CppImplementationDataType` that are not mentioned in [constr_10417] are applicable for all values of `category`.

The C++ data type system can, as far as the implementation of the *AUTOSAR adaptive platform* is concerned, fully replace the “legacy” C data types in C++.

On the *AUTOSAR adaptive platform*, it is not allowed to reference an `ImplementationDataType` from within `SwDataDefProps`. This aspect is expressed in a general form by [constr_1579].

As a consequence of [constr_1579], type-references have to be done differently on the *AUTOSAR adaptive platform*. For this purpose dedicated references are available.

[TPS_MANI_01172] Description of type references in the scope of `CppImplementationDataType` [The reference `CppImplementationDataType.typeReference` can be used to create a type reference from the enclosing `CppImplementationDataType` to another `CppImplementationDataType`.]

[TPS_MANI_01173] Description of type references in the scope of `CppImplementationDataTypeElement` [`CppImplementationDataTypeElement.typeReference` can be used to create a reference to the `CppImplementationDataType` that shall apply for the enclosing `CppImplementationDataTypeElement`.]

[constr_10417] Existence of attributes of `CppImplementationDataTypes` depending on the `category`

Imposition time: `IT_BefAraApiGen`

[

Attributes of <code>CppImplementationDataType</code>	Attribute Existence per Category							
	VALUE	TYPE_REFERENCE	STRUCTURE	VARIANT	ARRAY	VECTOR	ASSOCIATIVE_MAP	STRING
<code>subElement</code>			1..*					
<code>templateArgument</code>				1..*	1	1..*	2..*	0..1
<code>typeReference</code>		1						
<code>arraySize</code>					1	0..1 ⁷		

]

Please note that the `CppImplementationDataTypeElement.typeReference` is realized as an Association Class that allows to add the `inplace` attribute to the `typeReference`.

⁷This depends on the existence of an allocator, see [TPS_MANI_03186].

Class	CppImplementationDataTypeElementQualifier			
Note	This element qualifies the typeReference of the CppImplementationDataTypeElement to the CppImplementationDataType. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	CppImplementationDataTypeElement.typeReference			
Attribute	Type	Mult.	Kind	Note
inplace	Boolean	0..1	attr	This attribute defines whether the member type of the CppImplementationDataTypeElement in C++ is an embedded type element inside of the enclosing struct (true) or whether the type declaration is defined outside of the struct.
typeReference	CppImplementationDataType	0..1	ref	This reference defines a type reference.

Table 3.51: CppImplementationDataTypeElementQualifier

[constr_10128] Multiplicity of attribute CppImplementationDataTypeElementQualifier.typeReference*Imposition time:* IT_BefAraApiGen

[For each CppImplementationDataTypeElementQualifier, the attribute typeReference shall exist]

[TPS_MANI_03196] Semantics of CppImplementationDataTypeElementQualifier.inplace attribute [The CppImplementationDataTypeElementQualifier.inplace attribute defines whether the data type of the CppImplementationDataTypeElement in the C++ language binding is derived from the name or the properties of the referenced CppImplementationDataType.

Specifically, the following rules shall apply:

- if CppImplementationDataTypeElement.typeReference.inplace is set to false then the **shortName** of the CppImplementationDataType referenced in the role CppImplementationDataTypeElement.typeReference.typeReference shall be used in the C++ language binding.
- if CppImplementationDataTypeElement.typeReference.inplace is set to true then only the **properties** of the CppImplementationDataType referenced in the role CppImplementationDataTypeElement.typeReference.typeReference shall be used in the C++ language binding and the shortName is ignored.

]

Please note that Figure B.7 shows an example of a Structure where the typeReference of one subElement is classified as inplace.

[constr_1659] Restriction for the usage of `CppImplementationDataTypeElementQualifier.inplace`*Imposition time:* `IT_BefAraApiGen`

[The attribute `CppImplementationDataTypeElementQualifier.inplace` shall only exist if the target referenced in the role `CppImplementationDataTypeElementQualifier.typeReference` is an `StdCppImplementationDataType` that has the attribute `category` set to either of the values

- `ARRAY`
- `VECTOR`
- `ASSOCIATIVE_MAP`
- `VARIANT`
- `STRUCTURE`
- `STRING`
- `TYPE_REFERENCE`, if the `CppImplementationDataType` refers to a `CompuMethod` of `category` `TEXTTABLE`

]

Rationale for the existence of [constr_1659]: by application of the exclusion principle, there are three cases where attribute `CppImplementationDataTypeElementQualifier.inplace` shall not exist:

- `StdCppImplementationDataType` of `category` `VALUE`
- `CustomCppImplementationDataType`
- `CppImplementationDataType` of `category` `TYPE_REFERENCE`, unless the `CppImplementationDataType` refers to a `CompuMethod` of `category` `TEXTTABLE`

Neither of them can be used as a target of `CppImplementationDataTypeElementQualifier.typeReference` where `CppImplementationDataTypeElementQualifier.inplace` is set to `true` because in these cases there is already a valid name that is directly usable for the language binding and a possible indirection via a `using` clause would obviously require an additional name that is not available from the model.

After all, the motivation for the definition of a `TYPE_REFERENCE` is the direct opposite of the motivation behind using the attribute `CppImplementationDataTypeElementQualifier.inplace` to control the language binding.

Therefore, this case is also excluded.

[TPS_MANI_03201] Semantics of `CppTemplateArgument.inplace` attribute
[The `CppTemplateArgument.inplace` attribute defines whether the data type that

is referenced by the `templateType` in the C++ language binding is derived from the name or the properties of the referenced `CppImplementationDataType`.

Specifically, the following rules shall apply:

- if `CppTemplateArgument.inplace` is set to `false` then the **shortName** of the `CppImplementationDataType` referenced in the role `CppTemplateArgument.templateType` shall be used in the C++ language binding.
- if `CppTemplateArgument.inplace` is set to `true` then only the **properties** of the `CppImplementationDataType` referenced in the role `CppTemplateArgument.templateType` shall be used in the C++ language binding and the `shortName` is ignored.

]

[constr_1660] Restriction for the usage of `CppTemplateArgument.inplace`

Imposition time: `IT_BefAraApiGen`

[The attribute `CppTemplateArgument.inplace` shall only exist if the target referenced in the role `CppTemplateArgument.templateType` is an `StdCppImplementationDataType` that has the attribute `category` set to either of the values

- `ARRAY`
- `VECTOR`
- `ASSOCIATIVE_MAP`
- `VARIANT`
- `STRUCTURE`
- `STRING`

]

Rationale for the existence of [constr_1660]: by application of the exclusion principle, there are three cases where attribute `CppTemplateArgument.inplace` shall not exist:

- `StdCppImplementationDataType` of `category` `VALUE`
- `CustomCppImplementationDataType`
- `CppImplementationDataType` of `category` `TYPE_REFERENCE`

Neither of them can be used as a target of `CppTemplateArgument.templateType` where `CppTemplateArgument.inplace` is set to `true` because in these cases there is already a valid name that is directly usable for the language binding and a possible indirection via a `using` clause would obviously require an additional name that is not available from the model.

After all, the motivation for the definition of a `TYPE_REFERENCE` is the direct opposite of the motivation behind using the attribute `CppTypeArgument.inplace` to control the language binding. Therefore, this case is also excluded.

Please note that the question of the value of attribute `CppTypeArgument.inplace` for the case of `CppTypeArgument.templateType` referring to `StdCppTypeImplementationDataType` of category `STRUCTURE` is regulated by [constr_3462].

[constr_1708] Combination of `CppTypeImplementationDataTypeElement.isOptional` and `CppTypeImplementationDataTypeElementQualifier.inplace`

Imposition time: `IT_BefAraApiGen`

[If a `CppTypeImplementationDataTypeElement` is typed by a `CppTypeImplementationDataType` of category `STRUCTURE` then the combination of attribute `CppTypeImplementationDataTypeElement.isOptional` set to `true` and `CppTypeImplementationDataTypeElement.typeReference.inplace` set to `true` is not allowed.]

Rationale for the existence of [constr_1708]: the “optional” semantics is implemented via a template and it is not possible to pass an “inplace” structure as a template argument.

[constr_3462] `CppTypeArgument.templateType` reference to `StdCppTypeImplementationDataType` of category `STRUCTURE` and the `inplace` flag

Imposition time: `IT_BefAraApiGen`

[`CppTypeArgument.templateType` that points to a `StdCppTypeImplementationDataType` of category `STRUCTURE` shall have the `inplace` attribute set to `false`.]

The reason for [constr_3462] is that the usage of an unnamed struct as template argument is not permitted by ISO C++11/14/17.

Class	Allocator			
Note	This meta-class represents the ability to specify an optional custom C++ allocator for a C++ type which may dynamically grow beyond its initial allocated size during its lifetime. Any storage principles are defined in the implementation of the allocator itself, which should implement the ISO C++ <code>std::allocator_traits</code> interface. Tags: <code>atp.recommendedPackage=Allocators</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackageElement			
Attribute	Type	Mult.	Kind	Note
headerFile	String	0..1	attr	Configuration of the Header File with the custom class declaration
namespace (ordered)	SymbolProps	*	aggr	This aggregation allows for the definition of a namespace of an Allocator.

Table 3.52: Allocator

[constr_3446] `CppTemplateArgument` with `allocator` reference and the `inplace` flag

Imposition time: `IT_BefAraApiGen`

[A `CppTemplateArgument` that points with an `allocator` reference to an `Allocator` shall not have the `inplace` flag set to a value.]

ISO C++ permits the usage of an `Allocator` only for those `StdCppImplementationDataTypes` which may dynamically grow in size, thus, it is necessary to restrict the other `StdCppImplementationDataTypes`. This restriction ([constr_6905]) is deliberately not imposed on `CustomCppImplementationDataTypes` because of their custom nature.

[constr_6905] `CppTemplateArgument.allocator`

Imposition time: `IT_BefAraApiGen`

[The reference `CppTemplateArgument.allocator` shall only exist if the `StdCppImplementationDataType.category` is set to either of the values:

- `STRING`
- `VECTOR`
- `ASSOCIATIVE_MAP`

]

3.3.3.2 Attributes of `SwDataDefProps`

In contrast to the situation on the *AUTOSAR classic platform* (see [constr_1009]), the usage of `SwDataDefProps` plays a significantly less prominent role in the definition of `CppImplementationDataType` on the *AUTOSAR adaptive platform*.

This aspect is clarified by [constr_1579].

A consequence of [constr_1578] is that [constr_1579] shows only the values of `category` that are limited to the *AUTOSAR adaptive platform*. For all other values of `category` that are also supported on the *AUTOSAR classic platform* please refer to a similar table contained in the specification of the [2, TPS Software Component Template].

It is especially notable, that on the *AUTOSAR adaptive platform* the usage of the reference in the role `SwDataDefProps.implementationDataType` is **not** supported.

A dedicated reference in one of the following roles

- `CppImplementationDataType.typeReference`
- `CppImplementationDataTypeElement.typeReference`

shall be used instead.

[constr_1579] **SwDataDefProps** applicable to **CppImplementationDataTypes** exclusive to the **AUTOSAR adaptive platform**

Imposition time: IT_BefAraApiGen

Attributes of SwDataDefProps	Root Element		Attribute Existence per Category							
	CppImplementationDataType	CppImplementationDataTypeElement	VALUE	TYPE_REFERENCE	STRUCTURE	VARIANT	ARRAY	VECTOR	ASSOCIATIVE_MAP	STRING
additionalNativeTypeQualifier			*	*	*	*	*	*	*	*
annotation	x	x	*	*	*	*	*	*	*	*
baseType										
compuMethod	x	x		0..1						
dataConstr.dataConstrRule.physConstrs	x	x		d/c			d/c	d/c		
dataConstr.dataConstrRule.internalConstrs	x	x		0..1			0..1	0..1		
displayFormat	x	x	0..1	0..1	0..1	0..1	0..1	0..1	0..1	0..1
implementationDataType										
invalidValue	x	x		0..1						0..1
stepSize										
swAddrMethod										
swAlignment										
swBitRepresentation										
swCalibrationAccess										
swCalprmAxisSet										
swComparisonVariable										
swDataDependency										
swHostVariable										
swImplPolicy										
swIntendedResolution										
swInterpolationMethod										
swIsVirtual										
swPointerTargetProps										
swPointerTargetProps.swDataDefProps										
swRecordLayout										
swRefreshTiming	x		0..1	0..1	0..1	0..1	0..1	0..1	0..1	0..1
swTextProps										
swValueBlockSize										
unit										





Attributes of SwDataDefProps	Root Element		Attribute Existence per Category							
	CppImplementationDataType	CppImplementationDataTypeElement	VALUE	TYPE_REFERENCE	STRUCTURE	VARIANT	ARRAY	VECTOR	ASSOCIATIVE_MAP	STRING
valueAxisDataType										

Legend for [constr_1579]

In the columns headlined *Root Element* an “x” denotes that the attribute is applicable for the respective meta-class in the table header. Empty cells indicate that the attribute is not applicable for the respective *Root Element* at all.

A multiplicity definition in one of the columns headlined *Attribute Existence per Category* indicates that the attribute is applicable to the value of `category`. Empty cells indicate that the combination of attribute and value of `category` shall not be used.

The `invalidValue` is applicable to Primitive Data Types and defines one specific value (in the range of that Primitive Data Type) which indicates that the respective value is not valid.

A typical use case is a composite data type that contains the values of all 4 wheel speeds. If one of the wheel speed sensors fails, and is no longer able to provide useful data, it does still make sense to provide the other 3 wheel speed values.

In such a scenario the one wheel speed value would then be set to the `invalidValue`. The receivers are able to check for each individual element of the data composition whether the value corresponds to the `invalidValue` and take corresponding actions.

[constr_3569] Applicability of attribute `invalidValue` on `CppImplementationDataType` of category `TYPE_REFERENCE`

Imposition time: `IT_BefAraApiGen`

[If a `CppImplementationDataType` of category `TYPE_REFERENCE` has an `invalidValue` defined, then the referenced `CppImplementationDataType` (via `typeReference`) shall eventually be of `category`.]

Please note that the following rationale exists for the support of `invalidValue` for specific `category`s of data types:

- The usage of `category VALUE` on the *AUTOSAR adaptive platform* boils down to the usage of the standard types. There is no use case to define an `invalidValue` for a standard data type because **all usages** of the standard data type would be characterized by the same `invalidValue`.
- The definition of an `invalidValue` for a container (except `STRING`) is not supported because there are no known use cases for supporting an `invalidValue`.
- The definition of an `invalidValue` on a data type of `category STRING` is accepted because it is also supported on the *AUTOSAR classic platform* and it is necessary to sustain interoperability between the *AUTOSAR classic platform* and the *AUTOSAR adaptive platform*.
- The definition of an `invalidValue` on an `StdCppImplementationDataType` of `category TYPE_REFERENCE` represents the main-stream use case for the definition of an `invalidValue`.

[TPS_MANI_01450] Definition of `invalidValue` for `DataPrototype` typed by a `CppImplementationDataType` of `category STRING` [The attribute `invalidValue` in the context of a `DataPrototype` that is typed by a `CppImplementationDataType` of `category STRING` shall be (after possible redirections via `ConstantReference` are resolved) assigned to a `TextValueSpecification`.]

[TPS_MANI_01451] Definition of `invalidValue` for `DataPrototype` typed by a `CppImplementationDataType` of `category TYPE_REFERENCE` [The attribute `invalidValue` in the context of a `DataPrototype` that is typed by a `CppImplementationDataType` of `category TYPE_REFERENCE` shall be (after possible redirections via `ConstantReference` are resolved) assigned to by either

- `TextValueSpecification` if the `DataPrototype` represents an enumeration according to [TPS_MANI_03187] or
- `NumericalValueSpecification`.

]

For `CppImplementationDataType`, there are (see [constr_1579]) only two values of attribute `CompuMethod.category` allowed for the definition of a `CppImplementationDataType.swDataDefProps.compuMethod`:

- `TEXTTABLE` ([TPS_MANI_03187]) and
- `BITFIELD_TEXTTABLE` ([TPS_MANI_03202]).

This restriction motivates the existence of [constr_10566].

[constr_10566] Allowed values of attribute `CppImplementationDataType.sw-DataDefProps.compuMethod.category`

Imposition time: `IT_BefAraApiGen`

[The only allowed values for attribute `CppImplementationDataType8.sw-DataDefProps.compuMethod.category` are

- `TEXTTABLE`
- `BITFIELD_TEXTTABLE`

]

3.3.3.3 Primitive Data Types

[TPS_MANI_03192] `CppImplementationDataType` of category `VALUE` [The primitive data types like Boolean, fixed-width integer data types and floating-point data types are described as `CppImplementationDataTypes` of category `VALUE`.]

[TPS_MANI_01411] Initialization of a `DataPrototype` typed by a `StdCppImplementationDataType` of category `VALUE` that represents a Boolean [A `DataPrototype` typed by a `StdCppImplementationDataType` of category `VALUE` that represents a Boolean shall be initialized by a `NumericalValueSpecification` that contains one of the following values:

- `0`
- `1`
- `true`
- `false`

]

[TPS_MANI_03193] `CppImplementationDataType` of category `TYPE_REFERENCE` [The definition of a `CppImplementationDataType` of category `TYPE_REFERENCE` creates an alias for another `CppImplementationDataType` that is referenced by the `typeReference`.]

3.3.3.4 String Data Type

[TPS_MANI_03178] `StdCppImplementationDataType` of category `STRING` [A `StdCppImplementationDataType` of category `STRING` represents a container data type for a sequence of characters.]

⁸[[constr_1579](#)] applies

[TPS_MANI_03179] C++ language binding of StdCppImplementationDataTypes of category STRING [A CppImplementationDataType of category STRING shall be implemented as `ara::core::String`.]

The formulation of [TPS_MANI_03179] leaves room for potential later extensions towards the support for other storage formats.

Since C++ strings are not containerized types, they do not receive a containerized `typename` in the `template<>` argument list on code level. It is therefore necessary in this case to restrict the referenced `templateType` in `CppTemplateArgument`.

[constr_6815] Existence of CppTemplateArgument.templateType for CppImplementationDataType of category STRING

Imposition time: IT_BefAraApiGen

[In a CppImplementationDataType of category STRING, the reference `templateType` shall not exist.]

[TPS_MANI_03188] Usage of an Allocator for a StdCppImplementationDataType of category STRING [A StdCppImplementationDataType of category STRING is allowed to aggregate a CppTemplateArgument that refers to an Allocator with the `allocator` reference.]

An example of the definition of a string data type can be found in [Chapter B.1.2](#).

3.3.3.5 Array Data Type

[TPS_MANI_03169] CppImplementationDataType with fixed size array semantics [A CppImplementationDataType of category ARRAY represents a container data type that encapsulates fixed size arrays.]

[TPS_MANI_03170] CppImplementationDataType of category ARRAY [For a C++ binding, a CppImplementationDataType of category ARRAY can be implemented as

- an `ara::core::Array` if `StdCppImplementationDataType` subclass is used for modeling or as
- an array type in a custom namespace (e.g. `my::array`) if `CustomCppImplementationDataType` subclass is used (provided that the type in the custom namespace can be configured with the available modeling capabilities).

]

[TPS_MANI_03171] Value type of a CppImplementationDataType of category ARRAY [The type of elements contained in a CppImplementationDataType of category ARRAY is defined by the aggregated `templateArgument` and the corresponding `templateType` that defines the data type of the `CppTemplateArgument`.]

[constr_3433] Aggregation of `templateArguments` for an `ARRAY`*Imposition time:* `IT_BefAraApiGen`

[`CppImplementationDataType` of category `ARRAY` that boils down to `ara::core::Array` shall aggregate exactly one `templateArgument` that defines the type of elements contained in the `CppImplementationDataType` of category `ARRAY`.]

[TPS_MANI_03172] Size of a `CppImplementationDataType` of category `ARRAY`

[The primitive attribute `arraySize` of a `CppImplementationDataType` of category `ARRAY` shall be used to define the size of the array.]

[TPS_MANI_03173] Definition of a multidimensional Array [A multidimensional `CppImplementationDataType` of category `ARRAY` contains nested `CppImplementationDataTypes` of category `ARRAY`.

The `CppImplementationDataType` of category `ARRAY` that represents the outer array will refer to a `CppImplementationDataType` of category `ARRAY` that represents the inner array via the aggregated `templateArgument`. Such a definition describes a two-dimensional Array; consequently a type with more dimensions is described by just nesting more `CppImplementationDataTypes` of category `ARRAY`.

The array element itself is specified by the innermost `CppImplementationDataType` with category different from `ARRAY`.]

Examples of the definition of `CppImplementationDataType` of category `ARRAY` can be found in [Chapter B.1.3](#).

3.3.3.6 Vector Data Type**[TPS_MANI_03174] `CppImplementationDataType` with variable size array semantics** [A `CppImplementationDataType` of category `VECTOR` represents a container data type that encapsulates variable size arrays.]**[TPS_MANI_03175] `CppImplementationDataType` of category `VECTOR`** [For a C++ binding, a `CppImplementationDataType` of category `VECTOR` can be implemented as

- an `ara::core::Vector` if `StdCppImplementationDataType` subclass is used or as
- a vector type in a custom namespace (e.g. `my::vector`) if `CustomCppImplementationDataType` subclass is used (provided that the type in the custom namespace can be configured with the available modeling capabilities).

]

[TPS_MANI_03176] Value type of a `CppImplementationDataType` of category `VECTOR` [The type of elements contained in a `CppImplementationDataType` of

`category VECTOR` is defined by the aggregated `templateArgument` and the corresponding `templateType` that defines the data type of the `CppTemplateArgument`.]

[constr_3434] Aggregation of `templateArguments` for a `VECTOR`

Imposition time: `IT_BefAraApiGen`

[A `CppImplementationDataType` of `category VECTOR` that boils down to `ara::core::Vector` shall aggregate at least one and at most two `templateArgument` where the first one shall define the type of elements contained in the `CppImplementationDataType` of `category VECTOR` with the `templateType` reference.]

The semantics of the second `templateArgument` is described in [constr_10416].

[constr_10416] Aggregation of optional `templateArgument` that defines an `Allocator` for a `VECTOR`

Imposition time: `IT_BefAraApiGen`

[If a `CppImplementationDataType` of `category VECTOR` that boils down to `ara::core::Vector` aggregates (in addition to the `templateArgument` mentioned in [constr_3434]) one additional `templateArgument`, then this additional `templateArgument` shall reference the `Allocator` by means of the `allocator` reference.]

[TPS_MANI_03186] Usage of `arraySize` in case of a `Vector` [If the `CppImplementationDataType` of `category VECTOR` aggregates a `templateArgument` that defines the `Allocator` with the `allocator` reference then the attribute `arraySize` that defines the maximum size of the vector is allowed to be used.]

[TPS_MANI_03177] Definition of a multidimensional `Vector` [A multidimensional `CppImplementationDataType` of `category VECTOR` contains nested `CppImplementationDataTypes` of `category VECTOR`.

The `CppImplementationDataType` of `category VECTOR` that represents the outer vector will refer to a `CppImplementationDataType` of `category VECTOR` that represents the inner vector via the aggregated `templateArgument`.

Such a definition describes a two-dimensional `Vector`; consequently a type with more dimensions is described by just nesting more `CppImplementationDataTypes` of `category VECTOR`.

The vector element itself is specified by the innermost `CppImplementationDataType` with `category` different from `VECTOR`.]

Please note that the meta-model supports the creation of a reference to a specific element (identified by means of the `index`) of a `CppImplementationDataType` of `category VECTOR`.

However, this may lead to a problem at run-time if the specific element does not exist at the respective point in time. Any software using such data types needs to be prepared for the potential non-existence of vector elements.

Alternatively, it could be an option to simply avoid a situation where an element of a `CppImplementationDataType` of category `VECTOR` becomes the target of a reference in the model.

Examples of the definition of `CppImplementationDataType` of category `VECTOR` can be found in [Chapter B.1.4](#).

3.3.3.7 Struct Data Type

[TPS_MANI_03180] Definition of Structures [A `StdCppImplementationDataType` of category `STRUCTURE` represents a data type for holding an ordered collection of variables of arbitrary data types.]

[TPS_MANI_03181] Definition of members in `StdCppImplementationDataType` of category `STRUCTURE` [Members in a `StdCppImplementationDataType` of category `STRUCTURE` are defined by ordered `CppImplementationDataTypeElements` that are aggregated in the role `subElement` by the enclosing `StdCppImplementationDataType` of category `STRUCTURE`.

The name of each member is defined by the `shortName` of the `CppImplementationDataTypeElement`.

The type of each member is defined by the `typeReference` to a `CppImplementationDataType`.]

Please note that the `inplace` flag that is able to classify a `CppImplementationDataTypeElement.typeReference` is documented in [\[TPS_MANI_03196\]](#).

Examples of the definition of `CppImplementationDataType` of category `STRUCTURE` can be found in [Chapter B.1.5](#).

3.3.3.8 Enumeration Data Type

[TPS_MANI_03187] Definition of enumeration types [In the AUTOSAR meta-model, an enumeration is not implemented by means of a `CppImplementationDataType` with an own `category`.

Instead, a discrete set of integer numbers can be used as a structural description for a single fundamental `CppImplementationDataType` of category `TYPE_REFERENCE` that boils down to a `CppImplementationDataType` of category `VALUE`.

The mapping of the integer numbers to labels in the scope of the definition of an enumeration is considered part of the semantical definition via an attached `CompuMethod` with `category` `TEXTTABLE` rather than part of the structural description.]

The rules for the usage of a `CompuMethod` with `category` `TEXTTABLE` are the same as in the AUTOSAR Classic Platform and are described in the [2, TPS Software Component Template].

To summarize, an enumeration value in the `CompuMethod` with `category` `TEXTTABLE` can be provided as a text value in the `vt` of the `CompuConst`, in the `shortLabel` or `symbol` of the applicable `CompuScale` of the `CompuMethod`.

Each `CompuScale` shall be defined as `compuInternalToPhys` computation in the `CompuMethod` and shall contain an `upperLimit` and `lowerLimit`.

An example of the definition of an enumeration can be found in [Chapter B.1.6](#).

3.3.3.9 Map Data Type

[TPS_MANI_03183] `CppImplementationDataType` of `category ASSOCIATIVE_MAP` [A `CppImplementationDataType` of `category ASSOCIATIVE_MAP` represents a container that contains key-value pairs with unique keys.]

[TPS_MANI_03184] `CppImplementationDataType` of `category ASSOCIATIVE_MAP` [For a C++ binding, a `CppImplementationDataType` of `category ASSOCIATIVE_MAP` can be implemented as

- an `ara::core::Map` if `StdCppImplementationDataType` subclass is used or as
- a map type in a custom namespace (e.g. `my::map`) if `CustomCppImplementationDataType` subclass is used (provided that the type in the custom namespace can be configured with the available modeling capabilities).

]

[TPS_MANI_03185] **Structure of a `CppImplementationDataType` of `category ASSOCIATIVE_MAP`** [A `CppImplementationDataType` of `category ASSOCIATIVE_MAP` that boils down to a `ara::core::Map` shall aggregate the following `CppTemplateArguments`:

- one `CppTemplateArgument` shall have the `category` `ASSOC_MAP_KEY` and shall reference a `CppImplementationDataType` with the `templateType` reference. This `CppTemplateArgument` represents the role that corresponds to `ApplicationAssocMapDataType.key` and defines the respective data type details.

- one `CppTemplateArgument` shall have the `category` `AS-SOC_MAP_VALUE` and shall reference a `CppImplementationDataType` with the `templateType` reference. This `CppTemplateArgument` represents the role that corresponds to `ApplicationAssocMapDataType.value` and defines the respective data type details.
- one additional optional `CppTemplateArgument` is allowed to reference an `Allocator` with the `allocator` reference.

]

Examples of the definition of `CppImplementationDataType` of `category ASSOCIATIVE_MAP` can be found in [Chapter B.1.7](#).

3.3.3.10 Variant Data Type

[TPS_MANI_03189] Definition of `CppImplementationDataType` of `category VARIANT` [A `CppImplementationDataType` of `category VARIANT` represents a type safe union.]

[TPS_MANI_03190] `CppImplementationDataType` of `category VARIANT` [For a C++ binding, a `CppImplementationDataType` of `category VARIANT` can be implemented as

- an `ara::core::Variant` if `StdCppImplementationDataType` subclass is used or as
- a variant type in a custom namespace (e.g. `my::variant`) if `CustomCppImplementationDataType` subclass is used (provided that the type in the custom namespace can be configured with the available modeling capabilities).

]

[TPS_MANI_03191] Definition of type alternatives stored in a `VARIANT` [A type alternative that is stored in a `CppImplementationDataType` of `category VARIANT` is defined by the aggregated `templateArgument` and the corresponding `templateType` that defines the data type of the `CppTemplateArgument`.]

[constr_3429] No allocator usage for `CppImplementationDataTypes` of `category VARIANT`

Imposition time: `IT_BefAraApiGen`

[`CppImplementationDataType` of `category VARIANT` is not allowed to aggregate a `templateArgument` that points to an `Allocator` in the role `allocator`.]

[TPS_MANI_01393] Initialization of a data object typed by a `CppImplementationDataType` of `category VARIANT` [The initialization of a data object that is

typed by a `CppImplementationDataType` of category `VARIANT` is done by using a `RecordValueSpecification` with two `fields`:

- The first `field` identifies the index of the element inside the variant data type. The index of the first element shall be 1 and growing from there.
- The second `field` identifies the “payload” of the initialization and consists of a `ValueSpecification` that matches the data type of the element in the variant data type that is supposed to be initialized.

]

Please note the convention to let the index be 1-based is in place to achieve the same initialization semantics as on the *AUTOSAR classic platform*.

This means that – in principle – the same `RecordValueSpecification` can be used to initialize a data object typed by a variant data type (*AUTOSAR adaptive platform*) and a corresponding data object typed by a `Wrapped Union Data Type` on the *AUTOSAR classic platform*.

The conversion of the index value to a numerical value used in an expression of the language binding of the variant data type is out of scope of the TPS Manifest Specification.

In other words, if the actual initialization uses 0-based index value then the value provided in the model has to be decremented by 1 accordingly.

[constr_10399] Allowed interval of the “index” `field` according to the initialization rule for data object typed by a `CppImplementationDataType` of category `VARIANT`

Imposition time: `IT_BefAraApiGen`

[The allowed value range of the “index” `field` of a `RecordValueSpecification` according to [TPS_MANI_01393] goes from 1 to the number of `templateArguments` owned by the `CppImplementationDataType` of category `VARIANT`.]

Examples of the definition of `CppImplementationDataType` of category `VARIANT` can be found in [Chapter B.1.8](#).

3.3.3.11 Bitfield Data Type

[TPS_MANI_03202] Definition of bitfield types [In the AUTOSAR meta-model, a bitfield is not implemented by means of a `CppImplementationDataType` with an own category.

A bitfield is defined in the context of a primitive `StdCppImplementationDataType` of category `TYPE_REFERENCE` that boils down to a `StdCppImplementationDataType` of category `VALUE`.

A `CompuMethod` of `category` `BITFIELD_TEXTTABLE` is used to assign a special meaning to each bit of the primitive `StdCppImplementationDataType`.]

`CompuScales` with a `mask` inside of the `CompuMethod` of `category` `BITFIELD_TEXTTABLE` are defining isolated parts that can be independent from each other with respect to the semantics of the data that match the mask.

The rules for the usage of a `CompuMethod` with `category` `BITFIELD_TEXTTABLE` are the same as in the AUTOSAR Classic Platform and are described in the [2, TPS Software Component Template].

3.3.4 Compatibility of `ApplicationDataType` and `CppImplementationDataType`

The usage of `ApplicationDataTypes` implies that also a corresponding `CppImplementationDataType` exists at a certain point in time. The usage of `CppImplementationDataTypes` in a `ServiceInterface` is required as the basis for generating the `ara::com` proxies and skeletons and as basis for the serialization of the payload in the network binding.

[TPS_MANI_03223] Existence of `CppImplementationDataType` [The existence of `CppImplementationDataTypes` is **not** required until the methodology step of generating the Service header files for a `ServiceInterface`. Before arriving at this step in the methodology, it is perfectly feasible to use only `ApplicationDataTypes` for describing the semantics of `ServiceInterfaces`.]

As a consequence, it is necessary to define compatibility rules that unambiguously clarify the conformance of an `ApplicationDataType` with a `CppImplementationDataType` and vice versa.

Several rules depend on the `category` of the data types:

1. As a general rule, if a `CppImplementationDataType` of `category` `TYPE_REFERENCE` is targeted by a type mapping all the rules given below apply to the `CppImplementationDataType` which is finally valid after resolving all such references.

This is not repeated in all rules. For example, if the document states that a given `ApplicationDataType` can be mapped to a `CppImplementationDataType` of `category` `VALUE` this shall include the possibility of mapping to a `CppImplementationDataType` of `category` `TYPE_REFERENCE` which refers to another `CppImplementationDataType` of `category` `VALUE`.

2. [constr_5033] Compatibility of data types with `category` `VALUE`

Imposition time: `IT_BefAraApiGen`

[An `ApplicationDataType` of `category` `VALUE` can only be mapped to a `CppImplementationDataType` which also has `category` `VALUE`.]

In this case, the C++ data type resulting from the `CppImplementationDataType` shall be able to express all the numerical values required by the `ApplicationDataType`.

This condition is fulfilled if the numerical range which can be expressed by the C++ data type at least covers the range defined by the limits in `ApplicationDataType.swDataDefProps.dataConstr` (which are either internal limits or physical limits to be converted via the `CompuMethod` which also has to be provided by the `ApplicationDataType`).

The condition is also fulfilled if the C++ data type covers the range defined in the `CompuMethod` for an enumeration.

3. [constr_5034] Compatibility of data types with category **BOOLEAN**

Imposition time: `IT_BefAraApiGen`

[An `ApplicationDataType` of category **BOOLEAN** can only be mapped to a `CppImplementationDataType` of category **VALUE**.]

4. [constr_5035] Compatibility of data types with category **STRING**

Imposition time: `IT_BefAraApiGen`

[A `CppImplementationDataType` where attribute `category` is set to the value **STRING** can only be mapped to an `ApplicationDataType`

- where attribute `category` is set to the value **STRING** and
- where attribute `swDataDefProps.swTextProps.baseType.baseTypeDefinition.baseTypeEncoding` is set to the value **UTF-8**.

]

Please note that it is nonetheless possible to use a different encoding, e.g. **UTF-16** on the level of a SOME/IP message. This behavior can be configured by means of `ApSomeipTransformationProps`. As a consequence, a transcoding may have to be applied between the representation of a string on the wire and in the software.

5. [constr_5036] Compatibility of data types with category **ARRAY**

Imposition time: `IT_BefAraApiGen`

[An `ApplicationDataType` of category **ARRAY** can only be mapped to

- a `CppImplementationDataType` of category **ARRAY** or
- a `CppImplementationDataType` of category **VECTOR**.

]

In this case, the array size and the type of the array elements of the `CppImplementationDataType` shall be such that they can be mapped/transferred 1:1 by order to the corresponding application data and vice versa.

6. [constr_5037] Compatibility of data types with **category ARRAY** with **variableSize**

Imposition time: IT_BefAraApiGen

[An `ApplicationDataType` of `category ARRAY` that includes one `ApplicationArrayElement` with `arraySizeSemantics` set to `variableSize` in one of the defined dimensions shall be mapped to

- a `CppImplementationDataType` of `category VECTOR`

]

7. [constr_5038] Compatibility of data types with **category ARRAY** with **fixedSize**

Imposition time: IT_BefAraApiGen

[An `ApplicationDataType` of `category ARRAY` that includes only `ApplicationArrayElements` with `arraySizeSemantics` set to `fixedSize` in all defined dimensions shall be mapped to

- a `CppImplementationDataType` of `category ARRAY`

]

8. [constr_5039] Compatibility of data types with **category STRUCTURE**

Imposition time: IT_BefAraApiGen

[An `ApplicationDataType` of `category STRUCTURE` can only be mapped to a `CppImplementationDataType` of `category STRUCTURE`.]

This means, that the corresponding pairs of elements shall also have compatible types.

9. [constr_5040] Compatibility of **ApplicationRecordDataType** and **CppImplementationDataType** that both represent an **Optional Element Structure**

Imposition time: IT_BefAraApiGen

[An `ApplicationRecordDataType` that represents an `Optional Element Structure` can only be mapped to a `CppImplementationDataType` of `category STRUCTURE` that represents an `Optional Element Structure` if corresponding pairs of elements have the same value of the attribute `isOptional`.]

10. [constr_5041] Compatibility of data types with **category ASSOCIATIVE_MAP**

Imposition time: IT_BefAraApiGen

[An `ApplicationDataType` of `category ASSOCIATIVE_MAP` can only be mapped to a `CppImplementationDataType` of `category ASSOCIATIVE_MAP`.]

11. [constr_5042] No data type mapping for `CppImplementationDataType` of category `VARIANT`*Imposition time: IT_BefAraApiGen*

[An `ApplicationDataType` shall never be mapped to a `CppImplementationDataType` of category `VARIANT`.]

12. [constr_5043] Forbidden mappings to `CppImplementationDataType`*Imposition time: IT_BefAraApiGen*

[An `ApplicationDataType` of category `COM_AXIS`, `RES_AXIS`, `CURVE`, `MAP`, `CUBOID`, `CUBE_4`, `CUBE_5` is not supported by the Adaptive Platform and can therefore not be mapped to a `CppImplementationDataType`.]

Please note that the categories listed in [constr_5043] are not supported because there is no use case for the usage in Adaptive Platform.

On the AUTOSAR classic Platform, elements of a composite data type are not required to be considered in a `DataTypeMap`. This regulation is motivated by the fact that an element of a composite data type on the AUTOSAR classic Platform does not necessarily have a reference to an `ImplementationDataType`.

On the AUTOSAR adaptive Platform the situation is different. The `CppImplementationDataTypeElement` always requires a reference to a formalized `CppImplementationDataType`.

Since the processing of the data type definition becomes much easier if all the relevant data types are mentioned in a `DataTypeMap` the existence of [constr_5044] is motivated.

[constr_5044] `DataTypeMap` for composite data types*Imposition time: IT_BefAraApiGen*

[In the context of a given `ServiceInterface`, all pairs of `ApplicationDataType` and `CppImplementationDataType` used in the context of the definition of an `ApplicationCompositeDataType` used in the context of an `event`, `field`, `method` shall be described in a `DataTypeMap` that is contained in one of the `DataTypeMappingSets` that are referenced in a `PortInterfaceToDataTypeMapping` that also references the mentioned `ServiceInterface`.]

3.3.5 Optional Members in complex Data Structures**3.3.5.1 Background**

The *AUTOSAR adaptive platform* supports the usage of a TLV⁹ data encoding on the SOME/IP transport layer. TLV is typically used where at least a part of the transmitted data is only *optionally* existing and filled with meaningful values.

⁹This abbreviation stands for tag-length-value

In other words: an optional part of a data structure may exist and carry meaningful values in one instance of data transmission and be completely missing in another instance of the data transmission.

The receiving software needs to be able to identify whether the optional part exists and read its value accordingly.

The receiving software also needs to be able to still execute meaningfully if the optional part of such a data structure does not exist in the specific communication instance.

Consequently, it is necessary to be able to precisely identify the parts of a data structure that may become optional for specific instances of data transmission.

In terms of the AUTOSAR meta-model, the identification could - in principle - be attached at various levels of abstraction:

AutosarDataType In this case the optionality that is primarily only needed for communication purposes would still be existing in all other usages of data types. AUTOSAR still sees use cases for implementing this option, especially in the context of the *AUTOSAR classic platform*.

Admittedly, the definition of different optionality configurations for the same data type may lead to the existence of a bunch of structurally identical data types that only vary in terms of optionality. The existence of variation points may help to mitigate this effect, though.

ServiceInterface In this case the optionality is defined where it is actually required. However, different optionality could - in principle - be defined for **DataPrototypes** typed by the same **AutosarDataType**.

This would lead to an increased effort for the definition of C++ data types in the context of the same **ServiceInterface**. Additional constraints have been identified in the context of the *AUTOSAR classic platform* that finally render this option as not viable.

ComSpec In this case the definition of optionality would even be more specific in comparison to the definition of optionality on the level of **ServiceInterfaces**.

On top of that, the task to define optionality in the vast majority of cases is done by an OEM, whereas the model definition on the level of **ComSpec** requires the existence of **SwComponentTypes** and this definition is in many cases in the domain of a supplier.

As a result of this consideration, AUTOSAR has opted for implementation the concept of defining the optionality on the level of the **AutosarDataType**.

3.3.5.2 Definition of Optionality

As mentioned before, the concrete definition of optionality on the level of an [Autosar-DataType](#) is done by the indication of individual elements of the composite [Autosar-DataType](#).

More specifically, the definition of optionality needs to be supported for subclasses of [AutosarDataType](#), namely on the level of [ApplicationDataType](#) as well as on the level of [CppImplementationDataType](#).

In other words, if [ApplicationDataTypes](#) with optional elements are used to define a [ServiceInterface](#) then it is still necessary to convey the optionality down to the level of data type definition that directly affects the language binding of the AUTOSAR model.

Figure 3.21 shows the modeling of optionality on the level of [ApplicationDataType](#).

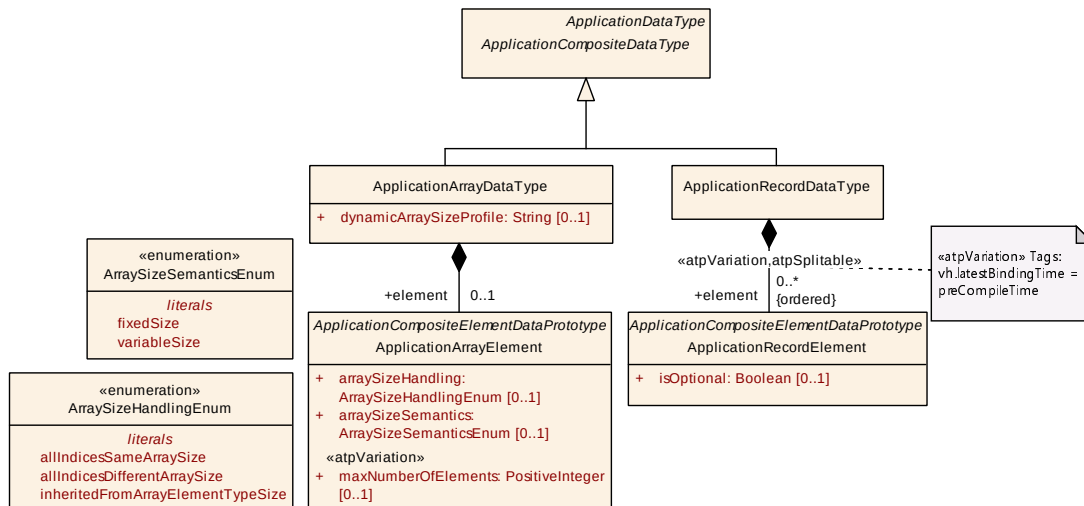


Figure 3.21: Modeling of optionality on the level of [ApplicationDataType](#)

[TPS_MANI_01184] Definition of optional elements on the level of [Application-DataType](#) [The modeling approach for the definition of optional elements on the level of [ApplicationDataType](#) is to set the attribute [ApplicationRecordElement.isOptional](#) to the value `true`.

If the attribute is not set or set to the value `false` then the respective [ApplicationRecordElement](#) **shall be considered mandatory.**]

Class	ApplicationRecordDataType
Note	An application data type which can be decomposed into prototypes of other application data types. Tags: atp.recommendedPackage=ApplicationDataTypes
Base	ARElement , ARObject , ApplicationCompositeDataType , ApplicationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable





Class	ApplicationRecordDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
element (ordered)	ApplicationRecordElement	*	aggr	Specifies an element of a record. The aggregation of <code>ApplicationRecordElement</code> is subject to variability with the purpose to support the conditional existence of elements inside a <code>ApplicationRecordData</code> Type. Stereotypes: <code>atpSplittable</code> ; <code>atpVariation</code> Tags: <code>atp.Splitkey=element.shortName</code> , <code>element.variation</code> <code>Point.shortLabel</code> <code>vh.latestBindingTime=preCompileTime</code>

Table 3.53: ApplicationRecordDataType

Class	ApplicationRecordElement			
Note	Describes the properties of one particular element of an application record data type.			
Base	ARObject, ApplicationCompositeElementDataPrototype, AtpFeature, AtpPrototype, DataPrototype, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	ApplicationRecordDataType.element, AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
isOptional	Boolean	0..1	attr	This attribute represents the ability to declare the enclosing <code>ApplicationRecordElement</code> as optional. This means the that, at runtime, the <code>ApplicationRecordElement</code> may or may not have a valid value and shall therefore be ignored. The underlying runtime software provides means to set the <code>ApplicationRecordElement</code> as not valid at the sending end of a communication and determine its validity at the receiving end.

Table 3.54: ApplicationRecordElement

On top of that, it is still possible to use `CppImplementationDataType` directly for the definition of a `ServiceInterface`.

[TPS_MANI_01185] Definition of optional elements on the level of `CppImplementationDataType` [The modeling approach for the definition of optional elements on the level of `CppImplementationDataType` is to set the attribute `CppImplementationDataTypeElement.isOptional` to the value `true`.

If the attribute is not set or set to the value `false` then the respective `CppImplementationDataTypeElement` **shall be considered mandatory**.]

The attribute `NotAvailableValueSpecification.defaultPattern` has no meaning for the initialization of `DataPrototypes` on the *AUTOSAR adaptive platform*. This aspect is covered by [TPS_MANI_01333]:

[TPS_MANI_01333] Attribute `NotAvailableValueSpecification.defaultPattern` is not applicable [The attribute `NotAvailableValueSpecification.defaultPattern` (if defined) shall be ignored by the adaptive platform.

The rationale for ignoring the `defaultPattern` is that the optional data is technically not accessible from application code in case it has not been received.]

3.4 Serialization Of Data

In Adaptive AUTOSAR, the serialization code is generated out of the service description and is compiled and executed in the application context.

The meta-class `TransformationPropsToServiceInterfaceElementMapping` defines the serialization for a `ServiceInterface` element and provides the necessary serialization settings with the `TransformationProps` element.

The existence of a `TransformationPropsToServiceInterfaceElementMapping` demands the existence of serialization code that is linked with the application component object file to an application binary.

The serialization of SOME/IP is based on the `ServiceInterface` specification. If an `AutosarDataPrototype` that is used within a `ServiceInterface` is composite like a structure, union or array then SOME/IP supports the configuration of length fields that will be put in front of the serialized data.

AUTOSAR supports the configuration of such serialization settings on two different levels:

- Modeling on `ServiceInterface` element level that is valid for all available occurrences of a `DataPrototype` in the `ServiceInterface` element. This case is described in detail in [Chapter 3.4.1](#).
- Fine granular modeling on the level of `DataPrototypes` described in this chapter. This case is described in detail in [Chapter 3.4.2](#).

[advisory_03004] Defintion of SOME/IP serialization properties via `ApSomeipTransformationProps`

Imposition time: `IT_BefAraApiGen`

[For each `ServiceInterface` element (i.e. an `event`, `field`, `method`) of a `ServiceInterface` that is referenced by the `SomeipServiceInterfaceDeployment` either a `TransformationPropsToServiceInterfaceElementMapping` should be defined or `SomeipDataPrototypeTransformationProps` should exist for the `DataPrototype` of the `ServiceInterface` element and if the `DataPrototype` of the `ServiceInterface` element is composite for each included `DataPrototype` of the `ServiceInterface` element (see [\[constr_3361\]](#) for more details).]

In other words the input for the SOME/IP serialization of a `ServiceInterface` element should be present in the design phase so that the serialization code can be created.

3.4.1 Default Values for Serialization Properties

[TPS_MANI_03101] SOME/IP serialization [The `ApSomeipTransformationProps` meta-class that is referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` provides the ability to define a SOME/IP serialization settings for `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `trigger`, `methodCall`, `methodReturn`, or `field`.]

[constr_3395] `TransformationPropsToServiceInterfaceElementMapping` is restricted to one single `ServiceInterface`

Imposition time: `IT_BefAraApiGen`

[All `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `trigger`, `methodCall`, `methodReturn`, or `field` shall be aggregated by the same `ServiceInterface` in the role `event`, `trigger`, `method` or `field`.]

[constr_9370] `ApSomeipTransformationProps` shall be defined at most once for a `ServiceInterface` element

Imposition time: `IT_BefAraApiGen`

[For each `ServiceInterface` element (i.e. an `event`, `field`, `methodCall` or `methodReturn`) at most one `TransformationPropsToServiceInterfaceElementMapping` shall be defined that references `ApSomeipTransformationProps` in the role `transformationProps`.]

[constr_9370] ensures that SOME/IP serialization rules for a `ServiceInterface` element are clearly defined and no contradicting rules exist.

[TPS_MANI_03103] Default size for all array and map length fields [The attribute `sizeOfArrayLengthField` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the size of a length field generated by SOME/IP in front of all available variable size arrays (vectors), fixed size arrays and associative_maps defined in `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[TPS_MANI_03104] Default size for all structure length fields [The attribute `sizeOfStructLengthField` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the size of a length field generated by SOME/IP in front of all available structures defined in `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

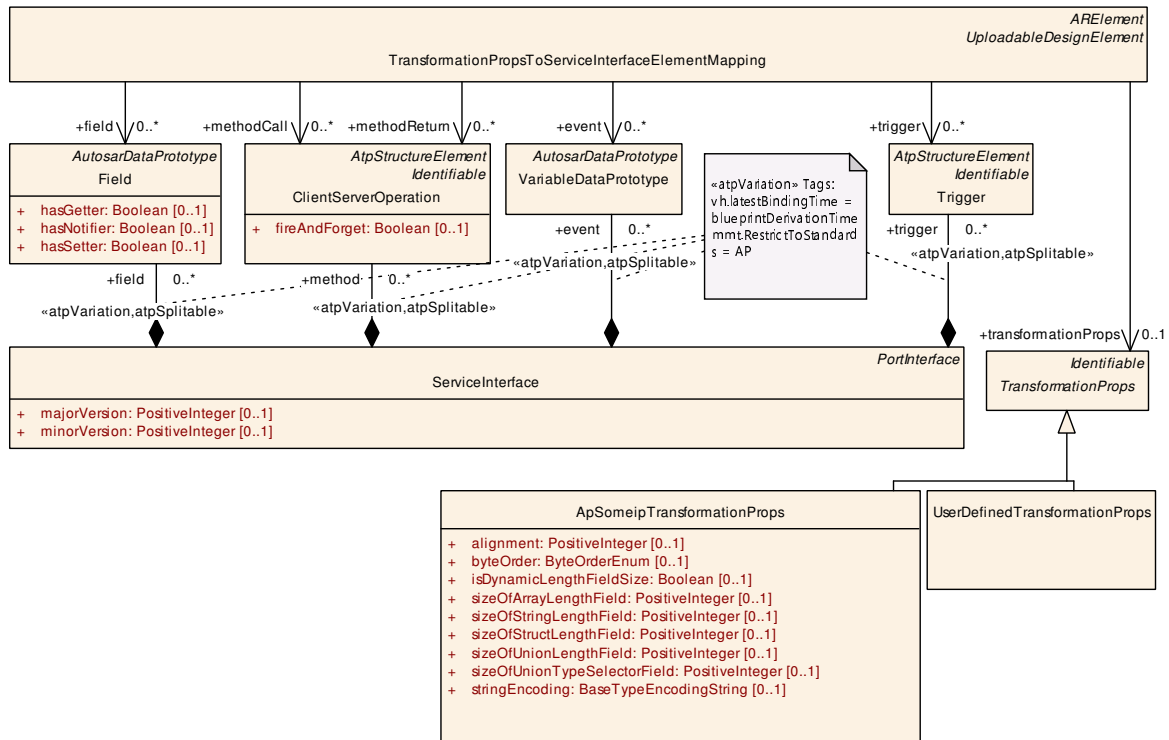


Figure 3.22: Association of serialization properties with a ServiceInterface

[TPS_MANI_03117] Default size for all string length fields [The attribute `sizeOfStringLengthField` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the size of a length field generated by SOME/IP in front of all available strings defined in `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[TPS_MANI_03105] Default size for all union length fields [The attribute `sizeOfUnionLengthField` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the size of a length field generated by SOME/IP in front of all available unions defined in `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[TPS_MANI_03106] Default size for all union type selector fields [The attribute `sizeOfUnionTypeSelectorField` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the size of a type field generated by SOME/IP in front of all available unions defined in `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[TPS_MANI_03107] Default alignment for all dynamic `DataPrototypes` [The attribute `alignment` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the padding for alignment purposes that will be added by SOME/IP after the serialized data of all variable data length data elements defined in `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[TPS_MANI_03108] Default Byte Order for all `DataPrototypes` [The attribute `byteOrder` of `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the Byte Order in the serialized data stream resulting from `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[TPS_MANI_01210] Default encoding for all `DataPrototypes` typed by `CppImplementationDataType` of category `STRING` [The attribute `stringEncoding` of a `ApSomeipTransformationProps` referenced by `TransformationPropsToServiceInterfaceElementMapping` in the role `transformationProps` defines the string encoding in the serialized data stream resulting from `ServiceInterface` elements that are referenced by the `TransformationPropsToServiceInterfaceElementMapping` in the role `event`, `methodCall`, `methodReturn`, or `field`.]

[constr_1675] Existence of attribute `ApSomeipTransformationProps.stringEncoding`

Imposition time: `IT_BefAraApiGen`

[The attribute `TransformationPropsToServiceInterfaceElementMapping.transformationProps.stringEncoding` shall only exist for a `event`, `methodCall`, `methodReturn`, or `field` (referenced by the same `TransformationPropsToServiceInterfaceElementMapping`) that consists of or contains a `DataPrototype` typed by a `CppImplementationDataType` of category `STRING`.]

Please note that more details about `ApSomeipTransformationProps` can be found in [Chapter 3.4.2](#).

[constr_1678] Allowed values for attribute `ApSomeipTransformationProps.stringEncoding`

Imposition time: `IT_BefAraApiGen`

[Imposed by technical restrictions in the definition of the SOME/IP message format [11, PRS SOME/IP Protocol], only two possible values of attribute `ApSomeipTransformationProps.stringEncoding` are allowed:

- UTF-8: UCS Transformation Format 8

- UTF-16: Character encoding for Unicode *code points* based on 16 bit *code units* [12, ISO 10646]

]

Class	ApSomeipTransformationProps			
Note	SOME/IP serialization properties. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , TransformationProps			
Aggregated by	TransformationPropsSet.transformationProps			
Attribute	Type	Mult.	Kind	Note
alignment	PositiveInteger	0..1	attr	Defines the padding for alignment purposes that will be added by the SOME/IP transformer after the serialized data of the variable data length data element. The alignment shall be specified in Bits.
byteOrder	ByteOrderEnum	0..1	attr	Specifies the byte order of data in the serialized data stream.
isDynamicLengthFieldSize	Boolean	0..1	attr	This attribute represents the ability to control the setting of the wire type for TLV encoding.
sizeOfArrayLengthField	PositiveInteger	0..1	attr	Configures the SOME/IP serialization for the referenced dataPrototype in case of a variable size Array (Vector), fixed-size Array or an Associative_Map. It describes the size of the length field (in Bytes) that will be put in front of the Array or Associative_Map in the SOME/IP message.
sizeOfStringLengthField	PositiveInteger	0..1	attr	Configures the SOME/IP serialization for the referenced dataPrototype in case of a String. It describes the size of the length field (in Bytes) that will be put in front of the String in the SOME/IP message.
sizeOfStructLengthField	PositiveInteger	0..1	attr	Configures the SOME/IP serialization for the referenced dataPrototype in case of an Struct. It describes the size of the length field (in Bytes) that will be put in front of the Struct in the SOME/IP message.
sizeOfUnionLengthField	PositiveInteger	0..1	attr	Configures the SOME/IP serialization for the referenced dataPrototype in case of a Union. It describes the size of the length field (in Bytes) that will be put in front of the Union in the SOME/IP message.
sizeOfUnionTypeSelectorField	PositiveInteger	0..1	attr	Configures the SOME/IP serialization for the referenced dataPrototype in case of a Union. It describes the size of the type selector field (in Bytes) that will be put in front of the Union in the SOME/IP message.
stringEncoding	BaseTypeEncodingString	0..1	attr	Configures the encoding for SOME/IP serialization for the referenced dataPrototype in case of an String.

Table 3.55: ApSomeipTransformationProps

Enumeration	ByteOrderEnum
Note	When more than one byte is stored in the memory the order of those bytes may differ depending on the architecture of the processing unit. If the least significant byte is stored at the lowest address, this architecture is called little endian and otherwise it is called big endian. ByteOrder is very important in case of communication between different PUs or ECUs.
Aggregated by	ApSomeipTransformationProps.byteOrder , BaseTypeDirectDefinition.byteOrder , DiagnosticCommonProps.defaultEndianness , ISignalToIPduMapping.packingByteOrder , MultiplexedIPdu.selectorFieldByteOrder , PduToFrameMapping.packingByteOrder , SegmentPosition.segmentByteOrder , SOMEIPTransformationDescription.byteOrder , System.containerIPduHeaderByteOrder
Literal	Description





Enumeration	ByteOrderEnum
mostSignificantByteFirst	Most significant byte shall come at the lowest address (also known as BigEndian or as Motorola-Format) Tags: atp.EnumerationLiteralIndex=0
mostSignificantByteLast	Most significant byte shall come highest address (also known as LittleEndian or as Intel-Format) Tags: atp.EnumerationLiteralIndex=1
opaque	For opaque data endianness conversion has to be configured to Opaque. See AUTOSAR COM Specification for more details. Tags: atp.EnumerationLiteralIndex=2

Table 3.56: ByteOrderEnum

Primitive	BaseTypeEncodingString
Note	This is the string denotation of a BaseType encoding. It may be refined by specific use-cases. Tags: xml.xsd.customType=BASE-TYPE-ENCODING-STRING xml.xsd.type=string

Table 3.57: BaseTypeEncodingString

[TPS_MANI_03102] UserDefined serialization [The [UserDefinedTransformationProps](#) meta-class that is referenced by the [TransformationPropsToServiceInterfaceElementMapping](#) in the role [transformationProps](#) provides the ability to define a User defined serialization for [ServiceInterface](#) elements that are referenced by the [TransformationPropsToServiceInterfaceElementMapping](#) in the role [event](#), [methodCall](#), [methodReturn](#), or [field](#).]

Please note that [UserDefinedTransformationProps](#) is derived from meta-class [Identifiable](#) and therefore has the ability to describe special data ([sdg](#)) by which it is possible to define custom structural extensions of an AUTOSAR model in a generic way. For more information about special data please refer to [8, TPS Generic Structure Template].

Class	TransformationPropsToServiceInterfaceElementMapping			
Note	This meta-class represents the ability to associate a ServiceInterface element with TransformationProps. The referenced elements of the Service Interface will be serialized according to the settings defined in the TransformationProps. Tags: atp.recommendedPackage=TransformationPropsToServiceInterfaceElementMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
event	VariableDataPrototype	*	ref	This represents the reference to one or several events of one ServiceInterface.
field	Field	*	ref	This represents the reference to one or several fields of one ServiceInterface.
methodCall	ClientServerOperation	*	ref	This represents the reference to one or several method calls of one ServiceInterface.
methodReturn	ClientServerOperation	*	ref	This represents the reference to one or several method return of one ServiceInterface.





Class	TransformationPropsToServiceInterfaceElementMapping			
tlvDataId Definition	TlvDataIdDefinitionSet	*	ref	This reference identifies the TlvDataIdDefinitions relevant for the enclosing TransformationPropsToServiceInterface Mapping.
transformation Props	TransformationProps	0..1	ref	This represents the reference to the applicable Serialization properties.
trigger	Trigger	*	ref	This represents the reference to one or several triggers of one ServiceInterface.

Table 3.58: TransformationPropsToServiceInterfaceElementMapping

Class	UserDefinedTransformationProps			
Note	The class UserDefinedTransformationProps specifies specific configuration properties of a user defined serializer.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , TransformationProps			
Aggregated by	TransformationPropsSet.transformationProps			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.59: UserDefinedTransformationProps

3.4.2 Individual Definition of Serialization Properties

[TPS_MANI_03109] [TransformationProps](#) on the level of [DataPrototypes](#) overwrites [TransformationProps](#) settings on the level of a [ServiceInterface](#) [The fine granular modeling of [TransformationProps](#) on the level of [DataPrototypes](#) overwrites the [TransformationProps](#) settings defined on the level of a [ServiceInterface](#) described with the [TransformationPropsToServiceInterfaceElementMapping](#).]

[constr_3361] Selective definition of serialization settings

Imposition time: [IT_BefAraApiGen](#)

[If a [SomeipDataPrototypeTransformationProps](#) is defined for a composite [DataPrototype](#) of an element of a [ServiceInterface](#) (method, field, event) and if the reference [someipTransformationProps](#) exists then [SomeipDataPrototypeTransformationProps](#) that define the reference [someipTransformationProps](#) shall be defined for all other composite [DataPrototypes](#) of the [ServiceInterface](#) element as well.]

Consider the following example to illustrate [constr_3361]: Let's assume five composite data types (e.g., [ApplicationCompositeDataTypes](#)) DT_0, DT_1, DT_2, DT_3, and DT_4 consisting of [DataPrototypes](#) (e1_0 to e1_10) which in turn are also typed by composite data types, see [Figure 3.23](#).

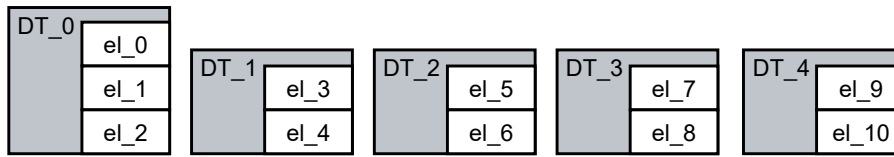


Figure 3.23: Definition of data types used in the example

Further consider a `ServiceInterface` `SI_0` consisting of two `events` `EV_0` and `EV_1` typed by `DT_0` and `DT_1` respectively.

Additionally, `SI_0` provides two `methods` `M_0` and `M_1` where `M_0` has two `arguments` `ARG_0` and `ARG_1` typed by `DT_2` and `DT_3` and `M_1` has one `argument` `ARG_2` typed by `DT_4`. This yields the following hierarchy for `SI_0`, see [Figure 3.24](#).

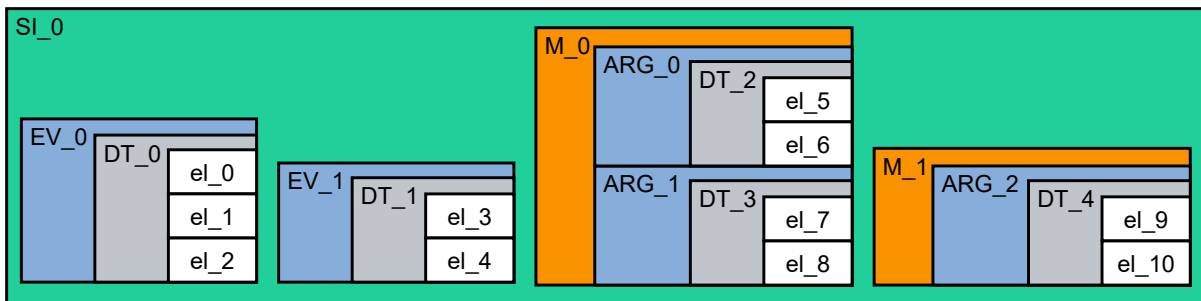


Figure 3.24: Definition of service interface used in the example

In this setup [[constr_3361](#)] would mandate that if a `SomeipDataPrototypeTransformationProps` were defined for `el_2`, then `SomeipDataPrototypeTransformationProps` have to be defined for `el_0` and `el_1` as well since `el_0` and `el_1` are composite `DataPrototypes` of the same `ServiceInterface` element `EV_0` as `el_2`.

Conversely, [[constr_3361](#)], would not mandate that if a `SomeipDataPrototypeTransformationProps` were defined for `el_2`, then `SomeipDataPrototypeTransformationProps` have to be defined for `el_3` and `el_4` as well since `el_3` and `el_4` are composite `DataPrototypes` of a different `ServiceInterface` element (`EV_1` instead of `EV_0`) than `el_2`.

Similar for `fields` (since the setter and getter methods of a field are not explicitly modeled as `ClientServerOperation` with their input and output `argument`) and thus there is only the `Field` itself (which derives from `AutosarDataPrototype`) to reason about.

As far as `methods` are concerned, [[constr_3361](#)] would mandate the following: If in the above example a `SomeipDataPrototypeTransformationProps` were defined for `el_5`, then `SomeipDataPrototypeTransformationProps` have to be defined for `el_6`, `el_7`, and `el_8` as well since `el_6`, `el_7`, and `el_8` are composite `DataPrototypes` of the same `ServiceInterface` element `M_0` as `el_5`.

Conversely, [constr_3361] would not mandate that if a [SomeipDataPrototypeTransformationProps](#) were defined for e1_5, then [SomeipDataPrototypeTransformationProps](#) have to be defined for e1_9 and e1_10 as well since e1_9 and e1_10 are composite [DataPrototypes](#) of a different [ServiceInterface](#) element M_1 (instead of M_0) than e1_5.

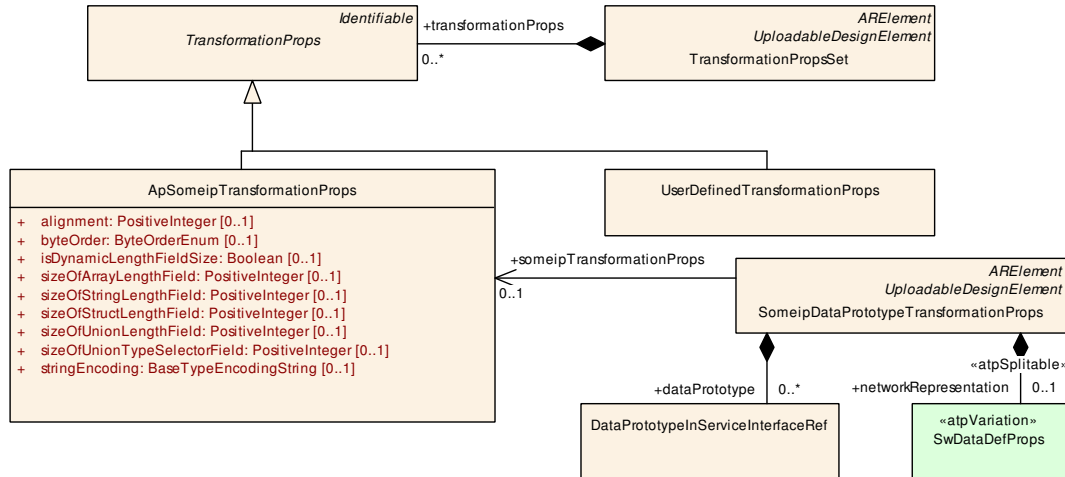


Figure 3.25: Overview about SOME/IP Serialization Properties

[TPS_MANI_03070] Size of a length field for a chosen array or map [The attribute [sizeOfArrayLengthField](#) of [ApSomeipTransformationProps](#) defines the size of a length field generated by SOME/IP in front of a variable size array (vector), fixed size array or associative_map for which the [SomeipDataPrototypeTransformationProps](#) is defined, i.e. the variable size array (vector), fixed size array or associative_map that is referenced within the aggregated [DataPrototypeInServiceInterfaceRef](#).]

Class	TransformationPropsSet			
Note	Collection of TransformationProps. Tags: atp.recommendedPackage=TransformationPropsSets			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
transformation Props	TransformationProps	*	aggr	Transformer specific configuration properties.

Table 3.60: TransformationPropsSet

[constr_3353] Restriction in usage of [ApSomeipTransformationProps.sizeOfArrayLengthField](#)

Imposition time: [IT_BefAraApiGen](#)

[The value of the attribute [sizeOfArrayLengthField](#) shall be either 0, 1, 2 or 4.]

[constr_3447] `ApSomeipTransformationProps.sizeOfArrayLengthField` that equals 0*Imposition time:* `IT_BefAraApiGen`

[The `sizeOfArrayLengthField` value of 0 is only allowed to be used if a fixed size array for which the `SomeipDataPrototypeTransformationProps` is defined is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

The setting of `sizeOfArrayLengthField` for fixed size arrays supports a backward compatible extension of such arrays with additional array elements.

[TPS_MANI_03071] Size of a length field for a chosen structure [The attribute `sizeOfStructLengthField` of `ApSomeipTransformationProps` defines the size of a length field generated by SOME/IP in front of a structure for which the `SomeipDataPrototypeTransformationProps` is defined, i.e. the structure that is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

[constr_3354] Restriction in usage of `ApSomeipTransformationProps.sizeOfStructLengthField`*Imposition time:* `IT_BefAraApiGen`

[The value of the attribute `sizeOfStructLengthField` shall be either 0, 1, 2 or 4.]

[TPS_MANI_03116] Size of a length field for a chosen string [The attribute `sizeOfStringLengthField` of `ApSomeipTransformationProps` defines the size of a length field generated by SOME/IP in front of a String for which the `SomeipDataPrototypeTransformationProps` is defined, i.e. the String that is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

[constr_3372] Restriction in usage of `ApSomeipTransformationProps.sizeOfStringLengthField`*Imposition time:* `IT_BefAraApiGen`

[The value of the attribute `sizeOfStringLengthField` shall be either 0, 1, 2 or 4.]

[TPS_MANI_03217] On-the-wire encoding for a chosen string [The attribute `stringEncoding` of `ApSomeipTransformationProps` defines the on-the-wire encoding of a String for which the `SomeipDataPrototypeTransformationProps` is defined, i.e. the String that is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

[TPS_MANI_03072] Size of a length field for a chosen union [The attribute `sizeOfUnionLengthField` of `ApSomeipTransformationProps` defines the size of a length field generated by SOME/IP in front of a union for which the `SomeipDataPrototypeTransformationProps` is defined, i.e. the union that is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

[constr_3355] Restriction in usage of `ApSomeipTransformationProps.sizeOfUnionLengthField`

Imposition time: `IT_BefAraApiGen`

[The value of the attribute `sizeOfUnionLengthField` shall be either 0, 1, 2 or 4.]

[TPS_MANI_03073] Alignment of a dynamic `DataPrototype` [The attribute `alignment` of `ApSomeipTransformationProps` defines the padding for alignment purposes that will be added by SOME/IP after the serialized data of the variable data length data element for which the `SomeipDataPrototypeTransformationProps` is defined, i.e. the variable data length `DataPrototype` that is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

[constr_3356] Restriction in usage of `ApSomeipTransformationProps.alignment`

Imposition time: `IT_BefAraApiGen`

[The value of the attribute `alignment` shall be either 8, 16, 32, 64, 128, or 256.]

[TPS_MANI_03074] Size of a type selector field for a chosen union [The attribute `sizeOfUnionTypeSelectorField` of `ApSomeipTransformationProps` defines the size of a type selector field generated by SOME/IP in front of a union for which the `SomeipDataPrototypeTransformationProps` is defined, i.e. the union that is referenced within the aggregated `DataPrototypeInServiceInterfaceRef`.]

[constr_3357] Restriction in usage of `ApSomeipTransformationProps.sizeOfUnionTypeSelectorField`

Imposition time: `IT_BefAraApiGen`

[The value of the attribute `sizeOfUnionTypeSelectorField` shall be either 1, 2 or 4.]

[TPS_MANI_03278] Usage of `ApSomeipTransformationProps.byteOrder` [The `byteOrder` attribute defined in an `ApSomeipTransformationProps` that is referenced by `SomeipDataPrototypeTransformationProps` shall be ignored for the `dataPrototypes` for which the `SomeipDataPrototypeTransformationProps` apply.]

The `byteOrder` attribute defines the byte order of the complete payload in the SOME/IP message and therefore the configuration via `TransformationPropsToServiceInterfaceElementMapping` is the only valid option to define the byte order for a `ServiceInterface` element. Please note that according to SOME/IP, the header is encoded in network byte order (Big Endian).

The modeling of the reference to a `DataPrototype` in the context of a `PortInterface` that is typed by an `ApplicationDataType` or by a `CppImplementationDataType` is depicted in Figure 13.17.

Class	SomeipDataPrototypeTransformationProps			
Note	This meta-class represents the ability to define data transformation props specifically for a SOME/IP serialization for a given DataPrototype. Tags: atp.recommendedPackage=SomeipDataPrototypeTransformationPropss This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataPrototype	DataPrototypeInServiceInterfaceRef	*	aggr	Collection of DataPrototypes for which the settings in SomeipDataPrototypeTransformationProps are valid. For reuse reasons the SomeipDataPrototypeTransformationProps is able to aggregate several DataPrototypes.
network Representation	SwDataDefProps	0..1	aggr	Optional specification of the actual network representation for the referenced primitive DataPrototype. If a network representation is provided then the baseType available in the SwDataDefProps shall be used as input for the serialization/deserialization. If the network Representation is not provided then the baseType of the AbstractImplementationDataType shall be used for the serialization/deserialization. Stereotypes: atpSplittable Tags: atp.Splitkey=networkRepresentation
someip Transformation Props	ApSomeipTransformationProps	0..1	ref	This reference represents the ability to define data transformation props specifically for a SOME/IP serialization.

Table 3.61: SomeipDataPrototypeTransformationProps

[TPS_MANI_01136] [AutosarDataPrototype](#) is the target of the [DataPrototypeInServiceInterfaceRef](#) [If the target of an [DataPrototypeInServiceInterfaceRef](#) is an [AutosarDataPrototype](#) the role [DataPrototypeInServiceInterfaceRef.dataPrototype](#) shall be used to describe the reference **independently** of whether the [AutosarDataPrototype](#) is typed by an [ApplicationDataType](#) or a [CppImplementationDataType](#) and even **independently** of whether the [AutosarDataType](#) of the [AutosarDataPrototype](#) represents a composite data type.]

[TPS_MANI_01137] Possible use cases for the usage of [DataPrototypeInServiceInterfaceRef](#) [

Use case	Role
AutosarDataPrototype typed by an ApplicationDataType	dataPrototype
DataPrototype in AutosarDataPrototype typed by an ApplicationCompositeDataType	dataPrototype
AutosarDataPrototype typed by a CppImplementationDataType	dataPrototype
DataPrototype in AutosarDataPrototype typed by a CppImplementationDataType	elementInImplDatatype

]

From a careful observation of [TPS_MANI_01137], it should be clear that there is no valid use case to simultaneously use the two roles [dataPrototype](#) and [elementInImplDatatype](#) in the context of the same [DataPrototypeInServiceInterfaceRef](#).

[constr_1551] Existence of `DataPrototypeInServiceInterfaceRef.dataPrototype` vs. `DataPrototypeInServiceInterfaceRef.elementInImplDatatype`

Imposition time: `IT_BefAraApiGen`

[For every given `DataPrototypeInServiceInterfaceRef`, either the aggregation `DataPrototypeInServiceInterfaceRef.dataPrototype` or `DataPrototypeInServiceInterfaceRef.elementInImplDatatype` shall exist.]

The usage of the `SomeipDataPrototypeTransformationProps.networkRepresentation` is explained in more detail in the System Template [4, TPS System Template] in [TPS_SYST_02136] and [TPS_SYST_02137].

3.4.3 Assignment of TLV properties

3.4.3.1 Assignment of TLV Data IDs

[TPS_MANI_01097] Assignment of TLV data IDs [The assignment of TLV data IDs is done in the context of the specification of `TransformationPropsToServiceInterfaceElementMapping`, namely by means of the attribute `TransformationPropsToServiceInterfaceElementMapping.tlvDataIdDefinition.id`.]

This approach takes benefit from the fact that the `TlvDataIdDefinition` is able to create references to relevant model elements.

The assignment of the TLV data ID is therefore done by creating such a reference and assigning a TLV data ID to it by means of the attribute `TlvDataIdDefinition.id`.

Please note that the assignment of TLV data IDs is compulsory for an entire data structure that has at least one optional member. In a nutshell, this conclusion (that is also backed by [PRS_SOMEIP_00230], see [11, PRS SOME/IP Protocol]) is the motivation for the existence of [constr_1594], and [constr_1595].

Please note further that the assignment of TLV data IDs is not restricted to data structures with optional members. There is also a use case to support sending the elements of a specific data structure in arbitrary order even if none of the elements is considered optional.

[TPS_MANI_01270] Reference from `TransformationPropsToServiceInterfaceElementMapping` to `TlvDataIdDefinitionSet` [The reference from `TransformationPropsToServiceInterfaceElementMapping` to `TlvDataIdDefinitionSet` means that it is in the hand of the creator of a model to decide whether a global scope should be assumed or whether the definition needs to be customized for a specific case.]

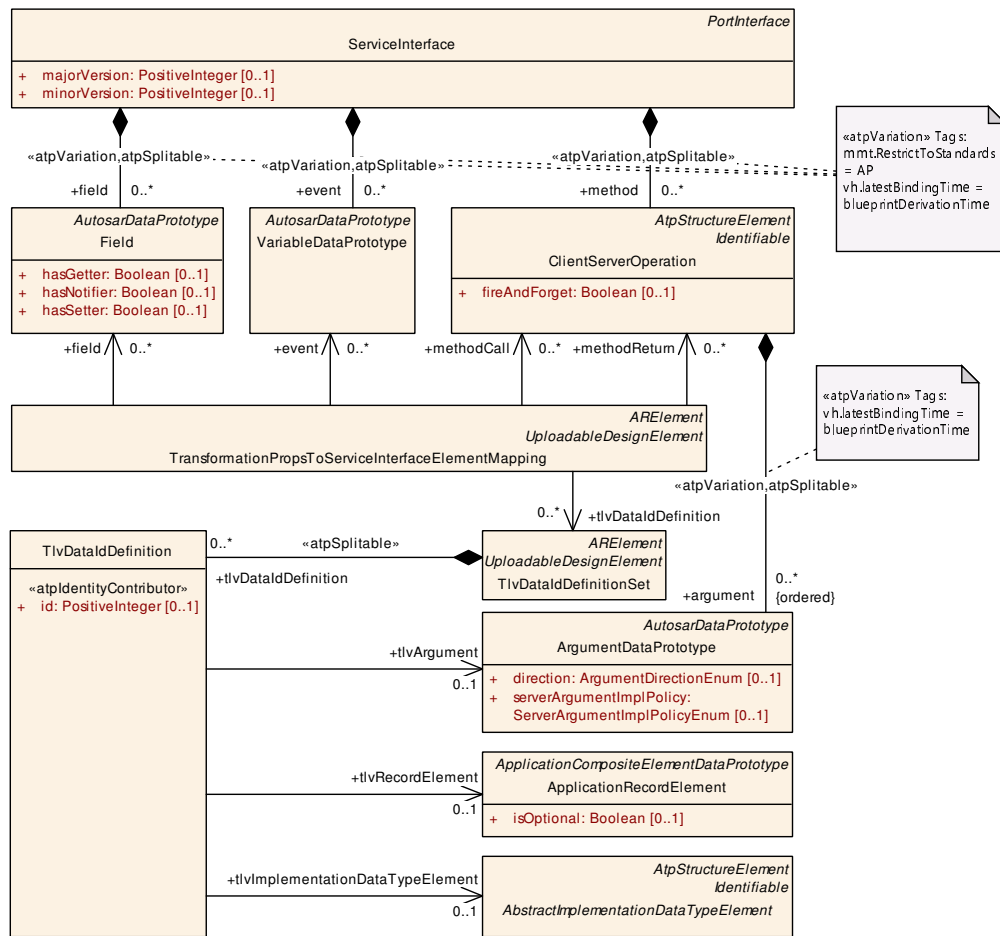


Figure 3.26: Modeling of the TLV data ID

[constr_1594] Consistent assignment of TLV data IDs to **ApplicationRecordDataType**

Imposition time: *IT_BefAraApiGen*

[For every **ApplicationRecordDataType** where direct members set the attribute **ApplicationRecordElement.isOptional** to the value `true` references to **all direct members** of this **ApplicationRecordDataType** shall be created on the basis of the definition of **TlvDataIdDefinition**.]

Class	TlvDataIdDefinitionSet				
Note	This meta-class acts as a container of TlvDataIdDefinitions to be used in a given context Tags: atp.recommendedPackage=TlvDataDefinitionSets				
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement				
Aggregated by	ARPackage.element				
Attribute	Type	Mult.	Kind	Note	





Class	TlvDataIdDefinitionSet			
tlvDataIdDefinition	TlvDataIdDefinition	*	aggr	This aggregation represents the collection of TlvDataIdDefinitions aggregated by the TlvDataIdDefinitionSet Stereotypes: atpSplitable Tags: atp.Splitkey=tlvDataIdDefinition.id

Table 3.62: TlvDataIdDefinitionSet

[constr_1595] Consistent assignment of TLV data IDs to CppImplementationDataType or CppImplementationDataTypeElement

Imposition time: IT_BefAraApiGen

[For every CppImplementationDataType of category STRUCTURE where direct members set the attribute CppImplementationDataTypeElement.isOptional to the value true references to **all direct members** of this CppImplementationDataType shall be created on the basis of the definition of TlvDataIdDefinition.]

The definition of a TlvDataIdDefinition that refers to an eligible model element is not limited to scenarios where optional elements are defined. It is also possible to define TlvDataIdDefinition for arbitrary methods or data structures.

A typical use case could be to prepare the argument list or sub-elements for future extensions. However, if one argument or sub-element is referenced then it is necessary to define references from TlvDataIdDefinitions to all other arguments or sub-elements as well.

[constr_1593] Completeness of the existence of a set of TlvDataIdDefinition.tlvArguments

Imposition time: IT_BefAraApiGen

[If the reference TlvDataIdDefinition.tlvArgument exists for one argument of a given ClientServerOperation then further TlvDataIdDefinition.tlvArgument shall exist **for all** arguments of the given ClientServerOperation and all affected TlvDataIdDefinition shall be aggregated by the same TransformationPropsToServiceInterfaceElementMapping.]

Although it would be possible to apply an optimization in the definition of the TLV configuration such that the TLV configuration could be defined direction-specific¹⁰, AUTOSAR defines that such a mixed TLV configuration shall not be used.

¹⁰For example, the usage of TLV encoding for arguments with attribute direction set to in, but not for arguments with attribute direction set to out.

[constr_1603] Completeness of the existence of a set of [TlvDataIdDefinition.tlvRecordElements](#)*Imposition time:* [IT_BefAraApiGen](#)

[If the reference [TlvDataIdDefinition.tlvRecordElement](#) exists for one element of a given [ApplicationRecordDataType](#) then further [TlvDataIdDefinition.tlvRecordElement](#) shall exist **for all** elements of the given [ApplicationRecordDataType](#) and all affected [TlvDataIdDefinition](#) shall be aggregated by the same [TransformationPropsToServiceInterfaceElementMapping](#).]

[constr_1604] Completeness of the existence of a set of [TlvDataIdDefinition.tlvImplementationDataTypeElements](#)*Imposition time:* [IT_BefAraApiGen](#)

[If the reference [TlvDataIdDefinition.tlvImplementationDataTypeElement](#) exists for one subElement of a given [CppImplementationDataType](#) or [CppImplementationDataTypeElement](#) then further [TlvDataIdDefinition.tlvImplementationDataTypeElement](#) shall exist **for all** subElements of the given [CppImplementationDataType](#) or [CppImplementationDataTypeElement](#) and all affected [TlvDataIdDefinition](#) shall be aggregated by the same [TlvDataIdDefinitionSet](#).]

The definition of a [TlvDataIdDefinition.id](#) has the purpose to provide means to unambiguously identify the argument or sub-element. For this purpose, the value of the [id](#) needs to be unique in the respective context.

Class	TlvDataIdDefinition			
Note	This meta-class represents the ability to define the tlvDataId.			
Base	ARObject			
Aggregated by	TlvDataIdDefinitionSet.tlvDataIdDefinition			
Attribute	Type	Mult.	Kind	Note
id	PositiveInteger	0..1	attr	This attribute represents the definition of the value of the TlvDataId Stereotypes: atpIdentityContributor
tlvArgument	ArgumentDataPrototype	0..1	ref	This reference assigns a tlvDataId to a given argument of a ClientServerOperation.
tlvImplementationDataTypeElement	AbstractImplementationDataTypeElement	0..1	ref	This reference associates the definition of a TLV data id with a given AbstractImplementationDataTypeElement.
tlvRecordElement	ApplicationRecordElement	0..1	ref	This reference associates the definition of a TLV data id with a given ApplicationRecordElement.

Table 3.63: TlvDataIdDefinition

[constr_1596] Scope of the uniqueness of the value of `TlvDataIdDefinition.id` for references to `ArgumentDataPrototype`

Imposition time: `IT_BefAraApiGen`

[For all `TlvDataIdDefinition` that are referencing `ArgumentDataPrototypes` of a given `ClientServerOperation` in the role `tlvArgument`, the attribute `TlvDataIdDefinition.id` **shall exist and have a unique value per communication direction**, i.e. in the context of the collection of all

- `arguments` where attribute `direction` is set to either `in` or `inout`
- `arguments` where attribute `direction` is set to either `out` or `inout`
- `arguments` where attribute `direction` is set to `inout` (if the `method` **only** has `arguments` where attribute `direction` is set to `inout`)

of the respective enclosing `ClientServerOperation`.]

Rationale for the existence of [constr_1596]: `arguments` where attribute `direction` is set to either `in` or `inout` are never sent in the same SOME/IP message as `arguments` where attribute `direction` is set to either `out` or `inout`.

[constr_1597] Scope of the uniqueness of the value of `TlvDataIdDefinition.id` for references to `ApplicationRecordElement`

Imposition time: `IT_BefAraApiGen`

[For all `TlvDataIdDefinition` that are referencing `ApplicationRecordElements` of a given `ApplicationDataType` in the role `tlvRecordElement` the attribute `TlvDataIdDefinition.id` **shall exist and have a unique value** in the context of respective enclosing `ApplicationRecordDataType`.]

[constr_1598] Scope of the uniqueness of the value of `TlvDataIdDefinition.id` for references to `CppImplementationDataTypeElement`

Imposition time: `IT_BefAraApiGen`

[For all `TlvDataIdDefinition` that are referencing `CppImplementationDataTypeElements` of a given `CppImplementationDataType/CppImplementationDataTypeElement` in the role `tlvImplementationDataTypeElement` the attribute `TlvDataIdDefinition.id` **shall exist and have a unique value** in the context of respective enclosing `CppImplementationDataType` or `CppImplementationDataTypeElement`.]

Obviously, it is necessary to avoid ambiguity with respect to the definition of TLV data ids. Each model element that can be assigned such an ID shall only be assigned one id.

[constr_1599] TlvDataIdDefinition referencing ArgumentDataPrototype*Imposition time: IT_BefAraApiGen*

[Each [ArgumentDataPrototype](#) shall be referenced **at most once** in the role [tlvArgument](#) in the context of the same [TransformationPropsToServiceInterfaceElementMapping](#).]

[constr_1600] TlvDataIdDefinition referencing ApplicationRecordElement*Imposition time: IT_BefAraApiGen*

[Each [ApplicationRecordElement](#) shall be referenced **at most once** in the role [tlvRecordElement](#) in the context of the same [TransformationPropsToServiceInterfaceElementMapping](#).]

[constr_1601] TlvDataIdDefinition referencing CppImplementationDataTypeElement*Imposition time: IT_BefAraApiGen*

[Each [CppImplementationDataTypeElement](#) shall be referenced **at most once** in the role [tlvImplementationDataTypeElement](#) in the context of the same [TransformationPropsToServiceInterfaceElementMapping](#).]

[constr_1748] Existence of references TlvDataIdDefinition.tlvArgument, TlvDataIdDefinition.tlvRecordElement, and TlvDataIdDefinition.tlvImplementationDataTypeElement*Imposition time: IT_BefAraApiGen*

[For each [TlvDataIdDefinition](#), only one out of the following references shall exist:

- reference to an [ArgumentDataPrototype](#) in the role [tlvArgument](#)
- reference to an [ApplicationRecordElement](#) in the role [tlvRecordElement](#)
- reference to an [AbstractImplementationDataTypeElement](#) in the role [tlvImplementationDataTypeElement](#).

]

Class	AbstractImplementationDataTypeElement (abstract)			
Note	This meta-class represents the ability to act as an abstract base class for specific derived meta-classes that support the modeling of ImplementationDataTypes for a particular language binding.			
Base	ARObject , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	CpplImplementationDataTypeElement , ImplementationDataTypeElement			
Aggregated by	AtpClassifier . atpFeature			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.64: AbstractImplementationDataTypeElement

[constr_1628] Definition of static length field sizes in case of TLV usage*Imposition time:* IT_BefAraApiGen

[If the aggregation `tlvDataIdDefinition` exists for a given `Transformation-PropsToServiceInterfaceElementMapping` then attributes

- `sizeofArrayLengthField`,
- `sizeofStringLengthField`,
- `sizeofStructLengthField`, and
- `sizeofUnionLengthField`

]

Rationale for the existence of [constr_1628]: The TLV serialization requires the usage of length fields:

- If `wire type` 4 is used (for more details, please refer to [TPS_MANI_01186]) then the length field size shall be statically configured.
- If `wire types` 5-7 are used (see [TPS_MANI_01186]) then the static configuration of the length field size shall also be present since not all length fields are preceded by a tag, e.g. structures contained in an array or the top-level structure contained in a SOME/IP event.

Without demanding the existence of length fields in such a case the result of a serialization could be ambiguous, i.e. make it impossible for the de-serializer to figure out the data layout¹¹.

[constr_1629] Identical sizes of length fields in case of TLV usage*Imposition time:* IT_BefAraApiGen

[If the aggregation `tlvDataIdDefinition` exists for a given `Transformation-PropsToServiceInterfaceElementMapping` then attributes

- `sizeofArrayLengthField`,
- `sizeofStringLengthField`,
- `sizeofStructLengthField`, and
- `sizeofUnionLengthField`

]

Rationale for the existence of [constr_1629]: if `wire type` 4 is used (for more details, please refer to [TPS_MANI_01186]) and if the receiver encounters a member of a structure or an `argument` with an unknown tag the de-serializer cannot determine the actual data type of the member of the structure or `argument`.

¹¹If a structure consists only of optional elements, it would be hard to detect the case where an array element carries such a structure that happens to set all elements to non-available.

[constr_1630] No definition of length field sizes on `DataPrototype` level in case of TLV usage

Imposition time: `IT_BefAraApiGen`

[If the reference in the role `tlvDataIdDefinition` exists for a given `TransformationPropsToServiceInterfaceElementMapping` then attributes

- `sizeOfArrayLengthField`,
- `sizeOfStringLengthField`,
- `sizeOfStructLengthField`, and
- `sizeOfUnionLengthField`

shall not be individually defined on the level of a `DataPrototype` (i.e. by means of the reference `SomeipDataPrototypeTransformationProps.someipTransformationProps`) but only on the level of a `ServiceInterface` (i.e. by means of the reference `TransformationPropsToServiceInterfaceElementMapping.transformationProps`).]

Rationale for the existence of `[constr_1630]`: if `wire type 4` is used (for more details, please refer to `[TPS_MANI_01186]`) and if the receiver encounters a member or argument with an unknown tag the de-serializer needs to know the size of the length field.

The most reliable way to achieve this is to demand the definition of the size of the length field on the level of the `ServiceInterface`.

3.4.3.2 Assignment of Wire Type Selection

The TLV encoding supports the definition of a so-called `wire type` that controls how the information about the length of length fields shall be interpreted.

The meaning of specific settings of the `wire type` is defined in `[11, PRS SOME/IP Protocol]`.

[TPS_MANI_01186] Definition of the applicable `wire type` [Attribute `ApSomeipTransformationProps.isDynamicLengthFieldSize` shall be used to define the applicable `wire type`.

If the value of attribute `ApSomeipTransformationProps.isDynamicLengthFieldSize` is set to `true` then `wire type 5-7` shall be used.

If the value of attribute `ApSomeipTransformationProps.isDynamicLengthFieldSize` does not exist or is set to `false` then `wire type 4` shall be used.]

3.5 Identity and Access Management

The definition of intents (for example: `ClientComSpec.clientIntent`) as described in [Chapter 3.2.5.1.3](#) is used to express the intention of the software designer to use (or refrain from using) specific APIs in the application software.

The definition of intents represents one aspect of the identity and Access Management (IAM). Another aspect of the IAM configuration is the definition of the actual permissions granted by the platform software.

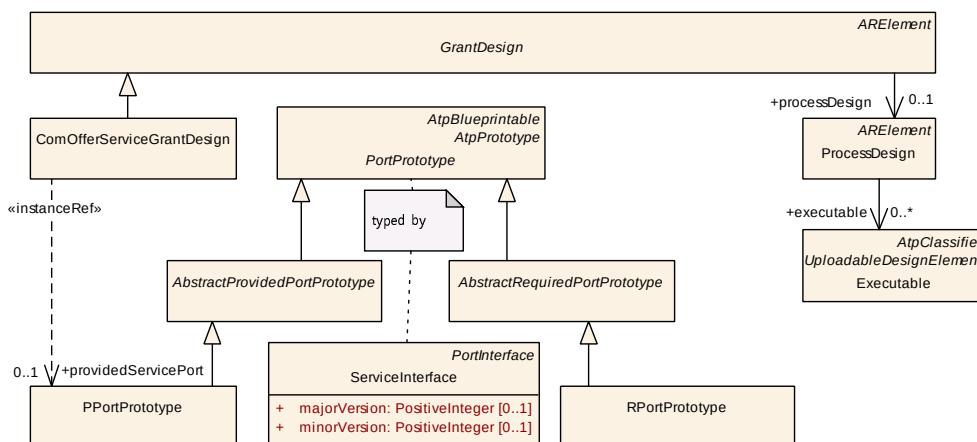


Figure 3.27: Modeling of grant designs for service discovery

The modeling of such grants is done on two levels:

- the definition of `GrantDesign` allows for the pre-specification of grants already on the design level. The modeling of `GrantDesign` is described in this chapter.
- the definition of `Grant` allows for the actual and final specification of grants from the perspective of the platform software. The modeling of `Grant` is described in [Chapter 12.9](#).

Class	<i>GrantDesign</i> (abstract)			
Note	This meta-class serves as an abstract base class for the description of grants on design level. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ComGrantDesign , ComOfferServiceGrantDesign			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
processDesign	ProcessDesign	0..1	ref	This reference identifies the corresponding Process Design that gives context to the GrantDesing. Tags: atp.Status=candidate

Table 3.65: GrantDesign

Abstract meta-class `GrantDesign` acts as the base class for the definition of grants on the design level.

Grants are specific for a given [Process](#). In other words, two [Processes](#) created from the same [Executable](#) may be assigned different sets of grants. This specific relation shall also be available on the design level.

[TPS_MANI_01231] [GrantDesign](#) references [ProcessDesign](#)

Status: DRAFT

[Meta-class [GrantDesign](#) references [ProcessDesign](#) as a means to design the set of [Grants](#) for the given [Process](#).]

3.5.1 Com Grant Design

Subclasses of [GrantDesign](#) are created to cover specific aspects of grants for communication on the *AUTOSAR adaptive Platform*.

[TPS_MANI_01232] Semantics of meta-class [ComOfferServiceGrantDesign](#)

Status: DRAFT

[The existence of a [ComOfferServiceGrantDesign](#) that references a specific [AbstractProvidedPortPrototype](#) in the role [providedServicePort](#) indicates that the design foresees that the referenced [AbstractProvidedPortPrototype](#) shall be granted rights to offer the respective service.]

Please note that there is no explicitly modeled intent that corresponds to the existence of the [ComOfferServiceGrantDesign](#). The understanding is that the mere existence of an [AbstractProvidedPortPrototype](#) typed by a [ServiceInterface](#) indicates the intent to offer a service.

The understanding is that the mere existence of an [AbstractRequiredPortPrototype](#) typed by a [ServiceInterface](#) indicates the intent to find a service.

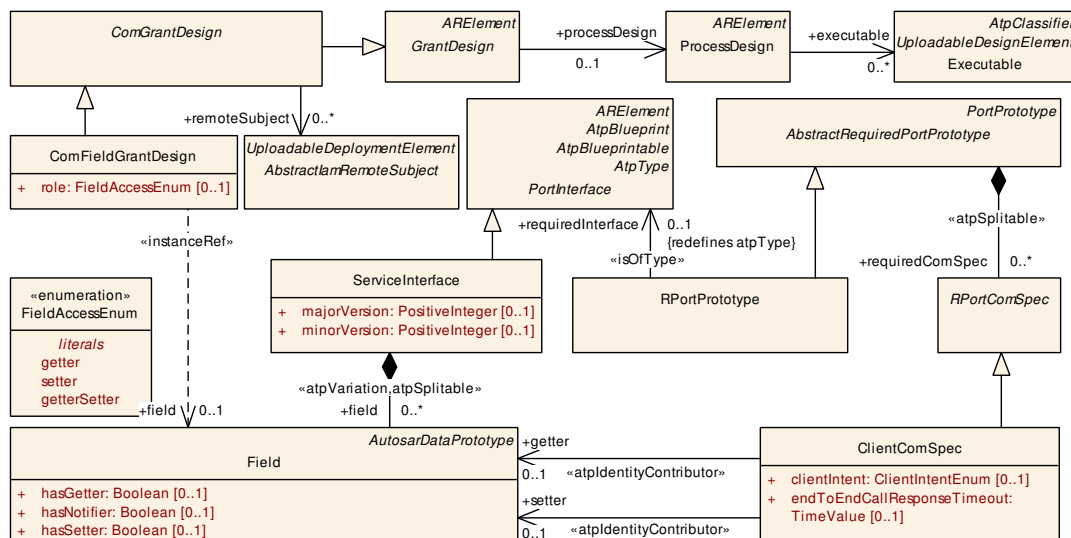


Figure 3.28: Modeling of grant designs for **field**

Class	ComOfferServiceGrantDesign			
Note	This meta-class represents the ability to define a Grant for offering a service. Tags: atp.Status=candidate atp.recommendedPackage=GrantDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , GrantDesign , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
providedServicePort	PPortPrototype	0..1	iref	This instanceRef identifies the PPortPrototype on which the service shall be offered. Tags: atp.Status=candidate InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef

Table 3.66: ComOfferServiceGrantDesign

[TPS_MANI_01234] Semantics of [ComFieldGrantDesign](#)

Status: DRAFT

[The existence of a [ComFieldGrantDesign](#) that references a specific [Field](#) in the role [field](#) indicates that the design foresees that the application software shall be granted rights to access the respective [Field](#). The nature of the access, i.e. get vs. set is specified by means of the attribute role.]

[constr_10155] Multiplicity of reference in the role [ComOfferServiceGrantDesign.providedServicePort](#)

Status: DRAFT

Imposition time: [IT_GraDes](#)

[For each [ComOfferServiceGrantDesign](#), the reference in the role [providedServicePort](#) shall exist.]

Class	ComGrantDesign (abstract)			
Note	This meta-class serves as an abstract base class for the description of com grants on design level. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , GrantDesign , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ComEventGrantDesign , ComFieldGrantDesign , ComMethodGrantDesign , ComTriggerGrantDesign			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
remoteSubject	AbstractIamRemoteSubject	*	ref	This optional reference defines the remoteSubject that is allowed to access the defined Object via the Grant. Tags: atp.Status=candidate

Table 3.67: ComGrantDesign

[constr_3720] Upper multiplicity of reference in the role **ComGrantDesign.remoteSubject**

Status: DRAFT

Imposition time: IT_GraDes

[In the context of **ComGrantDesign**, the reference in the role **remoteSubject** shall exist at most once.]

Class	ComFieldGrantDesign			
Note	This meta-class represents the ability to define a Grant for a ServiceInterface.field. Tags: atp.Status=candidate atp.recommendedPackage=GrantDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , ComGrantDesign , GrantDesign , Identifiable , Multilanguage , Referrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
field	Field	0..1	iref	Reference to the affected Field in the context of an Executable. Tags: atp.Status=candidate InstanceRef implemented by: FieldInExecutable InstanceRef
role	FieldAccessEnum	0..1	attr	This attribute provides the ability to further specify the access to the ServiceInterface.field from a design perspective. Tags: atp.Status=candidate

Table 3.68: ComFieldGrantDesign

[constr_10157] Multiplicity of reference in the role **ComFieldGrantDesign.field**

Status: DRAFT

Imposition time: IT_GraDes

[For each **ComFieldGrantDesign**, the reference in the role **field** shall exist.]

[constr_10158] Multiplicity of reference in the role **ComFieldGrantDesign.role**

Status: DRAFT

Imposition time: IT_GraDes

[For each **ComFieldGrantDesign**, the reference in the role **role** shall exist.]

Enumeration	FieldAccessEnum
Note	This meta-class provides values that qualify access to a field. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	ComFieldGrant.role , ComFieldGrantDesign.role
Literal	Description
getter	Access to the getter of the Field. Tags: atp.EnumerationLiteralIndex=0
getterSetter	Access to getter and setter of the field Tags: atp.EnumerationLiteralIndex=2
setter	Access to the setter of the Field. Tags: atp.EnumerationLiteralIndex=1

Table 3.69: FieldAccessEnum

[TPS_MANI_01235] Semantics of **ComEventGrantDesign**

Status: DRAFT

[The existence of a **ComEventGrantDesign** that references a specific **VariableDataPrototype** that is aggregated in the role **event** by the enclosing **ServiceInterface** indicates that the design foresees that the application software shall be granted rights to access the respective **event**.]

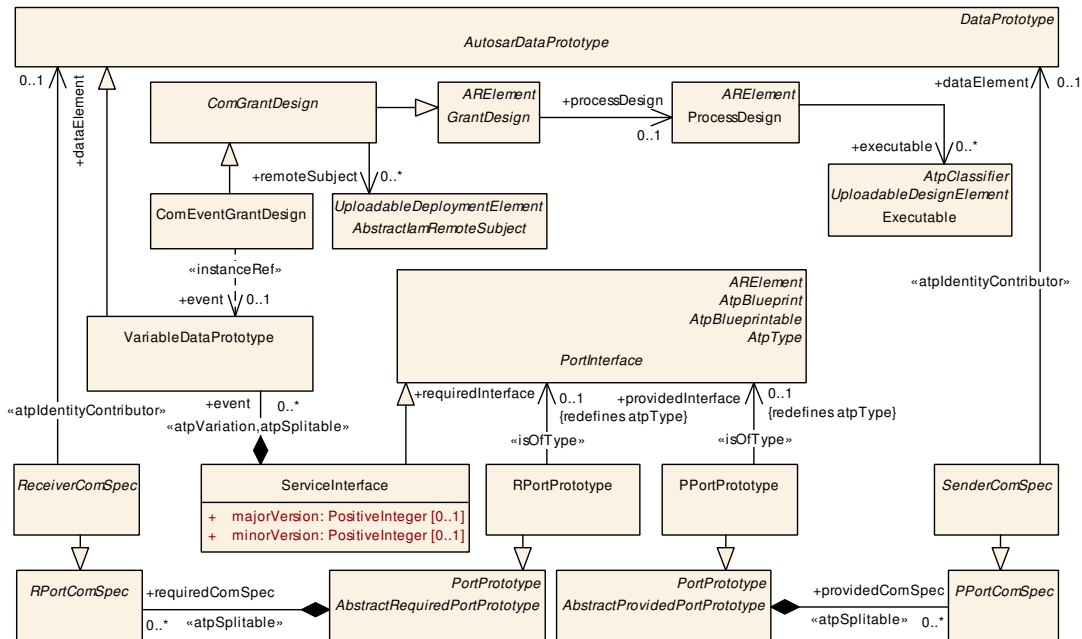


Figure 3.29: Modeling of grant designs for **event**

[TPS_MANI_03290] Semantics of **ComTriggerGrantDesign**

Status: DRAFT

[The existence of a **ComTriggerGrantDesign** that references a specific **Trigger** that is aggregated in the role **trigger** by the enclosing **ServiceInterface** indicates that the design foresees that the application software shall be granted rights to access the respective **trigger**.]

Class	ComEventGrantDesign			
Note	This meta-class represents the ability to define a Grant for a ServiceInterface.event. Tags: atp.Status=candidate atp.recommendedPackage=GrantDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , ComGrantDesign , GrantDesign , Identifiable , Multilanguage , Referrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note



Class	ComEventGrantDesign			
event	VariableDataPrototype	0..1	iref	This reference represents the affected event. Tags: atp.Status=candidate InstanceRef implemented by: EventInExecutableInstanceRef

Table 3.70: ComEventGrantDesign

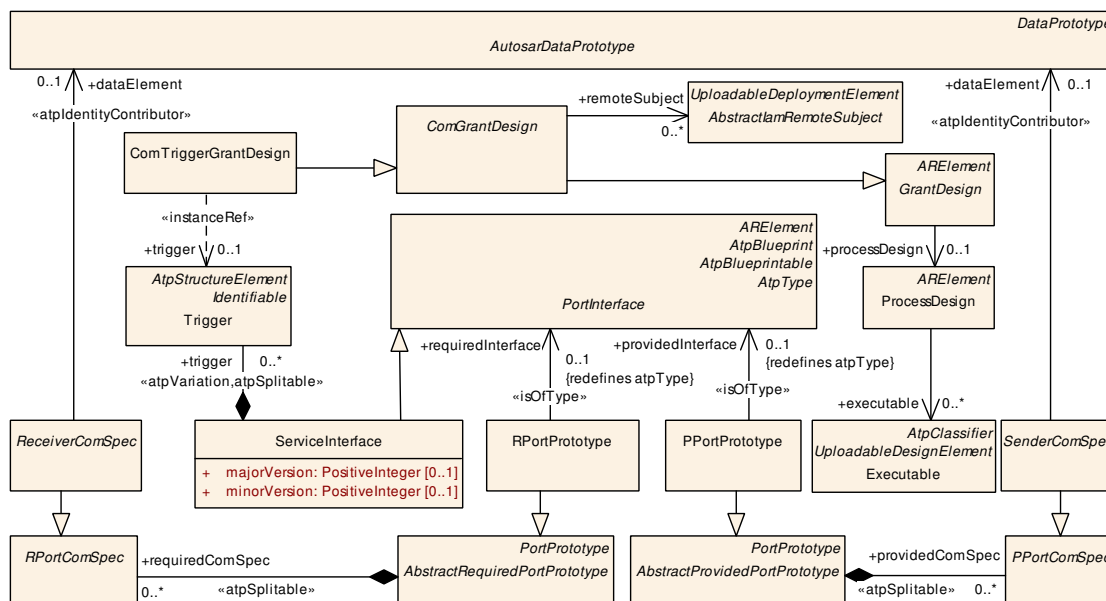


Figure 3.30: Modeling of grant designs for `trigger`

[constr_10159] Multiplicity of reference in the role ComEventGrantDesign.
event

Status: DRAFT

Imposition time: IT_GraDes

[For each `ComEventGrantDesign`, the reference in the role `event` shall exist.]

Class	ComTriggerGrantDesign			
Note	This meta-class represents the ability to define a Grant for a ServiceInterface.trigger. Tags: atp.Status=candidate atp.recommendedPackage=GrantDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARElement</i> , <i>ARObject</i> , <i>CollectableElement</i> , <i>ComGrantDesign</i> , <i>GrantDesign</i> , <i>Identifiable</i> , <i>Multilanguage</i> <i>Referrable</i> , <i>PackageableElement</i> , <i>Referrable</i>			
Aggregated by	<i>ARPackage.element</i>			
Attribute	Type	Mult.	Kind	Note
trigger	<i>Trigger</i>	0..1	iref	This reference represents the affected trigger. Tags: atp.Status=candidate InstanceRef implemented by: TriggerInExecutable InstanceRef

Table 3.71: ComTriggerGrantDesign

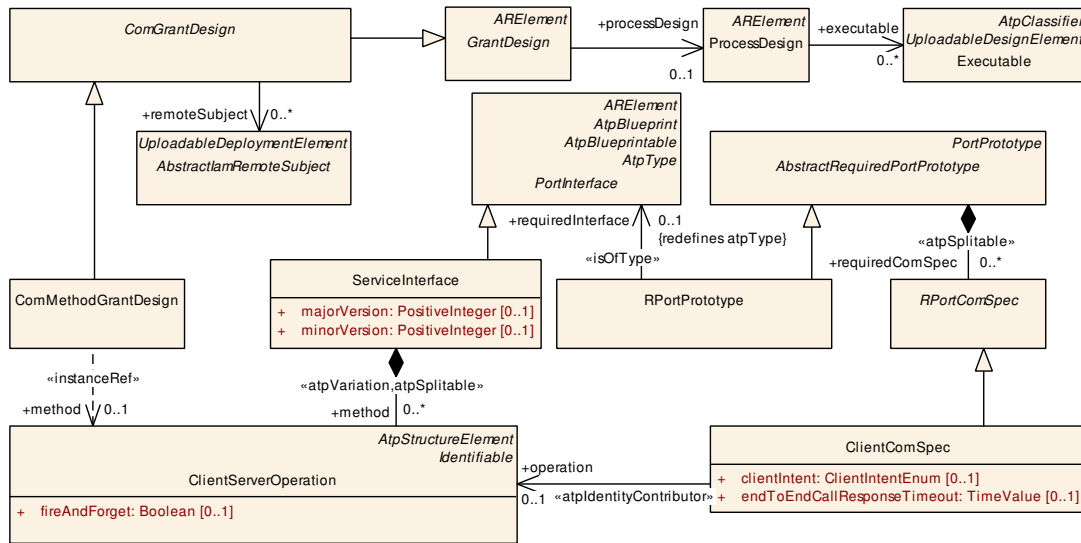


Figure 3.31: Modeling of grant designs for **method**

[constr_10160] Multiplicity of reference in the role **ComTriggerGrantDesign.trigger**

Status: DRAFT

Imposition time: IT_GraDes

[For each **ComTriggerGrantDesign**, the reference in the role **trigger** shall exist.]

[TPS_MANI_01236] Semantics of **ComMethodGrantDesign**

Status: DRAFT

[The existence of a **ComMethodGrantDesign** that references a specific **ClientServerOperation** that is aggregated in the role **method** by the enclosing **ServiceInterface** indicates that the design foresees that the application software shall be granted rights to call the respective **method**.]

Class	ComMethodGrantDesign			
Note	This meta-class represents the ability to define a Grant for a ServiceInterface.method. Tags: atp.Status=candidate atp.recommendedPackage=GrantDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, ComGrantDesign, GrantDesign, Identifiable, Multilanguage Referrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
method	ClientServerOperation	0..1	iref	This reference identifies the corresponding method. Tags: atp.Status=candidate InstanceRef implemented by: RequiredMethodIn ExecutableInstanceRef

Table 3.72: ComMethodGrantDesign

[constr_10161] Multiplicity of reference in the role `ComMethodGrantDesign.method`*Status:* DRAFT*Imposition time:* IT_GraDes[For each `ComMethodGrantDesign`, the reference in the role `method` shall exist.]**3.5.2 Remote access control**

The definition of the target-configuration for the *Identity and Access Manager* and the definition of grants relies on the local enforcement of identity and access permissions.

In other words it is possible for example to define that a particular `method` of a `ServiceInterface` is allowed to be called by a local `Process` on the local `Machine`.

But it is not possible to restrict the remote `Machines` that are allowed to call this `method`.

The fact that the `Machine` on which the service is running has no mean to make additional checks on the incoming requests enables processing of wrongly issued requests by a healthy remote `Machine` as well as escalation of privileges by an attacker via issuing arbitrary request towards services from a compromised remote `Machine`.

Most of the times it is not possible for a `Machine` to recognize that its communicating peer is compromised because the attacker has access to all the resources of that `Machine` and can run in stealth mode.

An effective way to minimize the damage of a compromised remote `Machine` is to enforce additional checks on the incoming requests at the receiver side ensuring that remote `Machine` cannot go beyond what they could request in a healthy state.

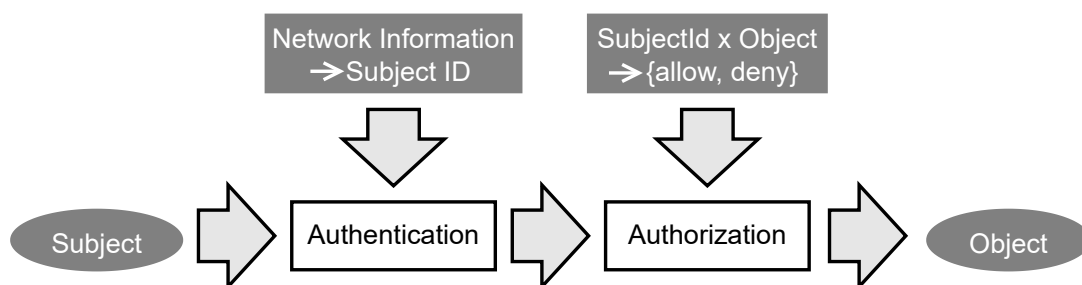


Figure 3.32: Access policy enforcement based on the Subject ID from the network binding

The access control process aims at enforcing policies on the relation between a “Subject” and an “Object”. In the example where an remote `Machine` makes calls to a service interface, the remote `Machine` is the Subject and the `method` of a `ServiceInterface` is the Object.

The access control process comprises of the two main operations, namely, Authentication and Authorization, which are mostly independent.

During the authentication process the identity of the subject is verified and an authentic identifier is resolved. Authentication is an essential part of the chain to ensure that different subjects cannot impersonate each other.

In the next step, during Authorization, the identity of the Subject is checked upon the rules and policies defined for the accessing the Object to verify if the Subject's request is legitimate. These policies shall be defined by the system or the resource owner.

The authentication of the remote subject is based on the network binding. When a secure channel is established, the remote peer has already gone through an authentication protocol.

Therefore, the identity information can be forwarded to the IAM to apply the corresponding defined policies that are defined for the requests coming from that channel as depicted in [Figure 3.32](#).

The remote subject is modeled as a specialization of [AbstractIamRemoteSubject](#). The different specializations will be presented in the following sections.

Class	AbstractIamRemoteSubject (abstract)			
Note	This abstract meta-class defines the proxy information about the remote node. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	IPSecIamRemoteSubject , IplamRemoteSubject , TlIamRemoteSubject			
Aggregated by	ARPackageElement			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 3.73: AbstractIamRemoteSubject

With the modeling of [ComGrantDesigns](#) the permissions that are granted by the platform software are defined. As an option a [ComGrantDesign](#) is able to reference the [AbstractIamRemoteSubject](#) in the role [remoteSubject](#).

[TPS_MANI_03238] Definition of [ComMethodGrantDesign.remoteSubject](#)

Status: DRAFT

[If the [ComMethodGrantDesign](#) references one or several [AbstractIamRemoteSubjects](#) in the role [remoteSubject](#) then the design foresees that only the defined [remoteSubjects](#) shall be granted rights to access the [ClientServerOperation](#) that is referenced in the role [method](#) by the same [ComMethodGrantDesign](#).]

[TPS_MANI_03239] Definition of [ComEventGrantDesign.remoteSubject](#)

Status: DRAFT

[If the [ComEventGrantDesign](#) references one or several [AbstractIamRemoteSubjects](#) in the role [remoteSubject](#) then the design foresees that only the defined [remoteSubjects](#) shall be granted rights to access the [VariableDataPrototype](#) that is referenced in the role [event](#) by the same [ComEventGrantDesign](#).]

[TPS_MANI_03251] Definition of `ComFieldGrantDesign.remoteSubject`*Status:* DRAFT

[If the `ComFieldGrantDesign` references one or several `AbstractIamRemoteSubjects` in the role `remoteSubject` then the design foresees that only the defined `remoteSubjects` shall be granted rights to access the `Field` that is referenced in the role `field` by the same `ComFieldGrantDesign`.]

3.5.2.1 Remote subject in case of TLS

This chapter defines how a `AbstractIamRemoteSubject` is modeled in case of a TLS-based secure channel.

[TPS_MANI_03240] Modeling of a remote peer in case of TLS-based secure channel*Status:* DRAFT

[In case of TLS-based secure channel the remote peer is modeled as `TlsIamRemoteSubject` that is identified either by

- a `CryptoServiceCertificate` that is referenced by the `TlsIamRemoteSubject` in the role `acceptedRemoteCertificate`,
- a Pre-shared Key that is referenced by the `TlsIamRemoteSubject` via `TlsCryptoCipherSuite` in the role `acceptedCryptoCipherSuiteWithPsk`.

]

Please note that the security of a pre-shared key as authentication in TLS protocol depends on the number of entities sharing the same key. If multiple `Machines` are using the same shared key, one cannot reliably distinguish between those `Machines` because any of them can impersonate the others.

It can only be ensured that no other `Machine` without the knowledge of the pre-shared key can establish a secure channel.

The `TlsIamRemoteSubject` may be identified by using certificates in two ways. First, it is possible to directly specify the certificates that the `TlsIamRemoteSubject` may use by referencing them and setting `derivedCertificateAccepted` to false.

This approach requires the presence of the remote certificate on the local `Machine`. Secondly, by setting `derivedCertificateAccepted` to true it is possible to specify the Common Name (as given in the X509 Certificate) of the `TlsIamRemoteSubject`.

In that case, the `acceptedRemoteCertificates` define the set of allowed root certificates for the certificate presented by the `TlsIamRemoteSubject`.

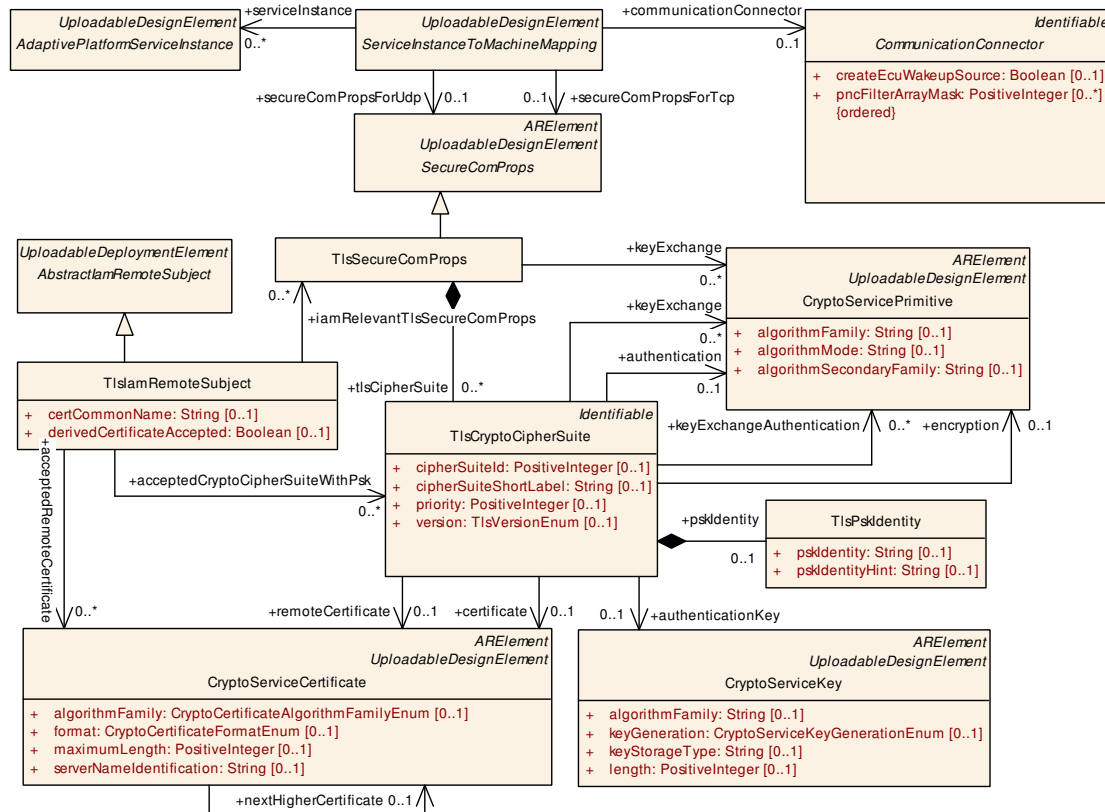


Figure 3.33: Proxy information about the remote node in case of TLS

The reason for the upper multiplicity is that the OEM may have multiple suppliers for a [Machine](#) and it shall be allowed to define that in such a case all these [Machines](#) are allowed to connect even though they have different certificate chains.

[TPS_MANI_03241] Modeling of relevant [TlsSecureComProps](#) for [TlsIamRemoteSubject](#)

Status: DRAFT

[With the [TlsIamRemoteSubject.iamRelevantTlsSecureComProps](#) reference it is possible to define all [TlsSecureComProps](#) that the [TlsIamRemoteSubject](#) supports to establish a secure channel.]

Class	TlsIamRemoteSubject			
Note	This meta-class defines the proxy information about the remote node in case of TLS. Tags: atp.Status=candidate atp.recommendedPackage=IamRemoteSubjects This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractIamRemoteSubject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	TlsIamRemoteSubject			
acceptedCryptoCipherSuiteWithPsk	TlsCryptoCipherSuite	*	ref	This reference is used to identify a remote node by means of the preshared Key. Tags: atp.Status=candidate
acceptedRemoteCertificate	CryptoServiceCertificate	*	ref	This reference is used to identify a remote node by means of the certificate. Tags: atp.Status=candidate
certCommonName	String	0..1	attr	This attribute defines the common name (CN) of the certificate of the remote peer. Tags: atp.Status=candidate
derivedCertificateAccepted	Boolean	0..1	attr	This attribute defines whether a derivedCertificate is accepted (true) or not (false). Tags: atp.Status=candidate
iamRelevantTlsSecureComProps	TlsSecureComProps	*	ref	This reference defines the local TlsSecureComProps that are relevant for IAM. Tags: atp.Status=candidate

Table 3.74: TlsIamRemoteSubject

3.5.2.2 Remote subject in case of IPsec

This chapter defines how a [AbstractIamRemoteSubject](#) is modeled in case of a IPsec-based secure channel.

[TPS_MANI_03242] Modeling of a remote peer in case of IPsec-based secure channel

Status: DRAFT

[In case of IPsec-based secure channel the remote peer is modeled as [IPSecIamRemoteSubject](#) that is identified by [IPSecRules](#) that are referenced by [localIPSecRule](#). The [IPSecRules](#) define all secure connections that the remote peer is allowed to establish.]

Class	IPSecIamRemoteSubject			
Note	This meta-class defines the proxy information about the remote node in case of IPsec. Tags: atp.Status=candidate atp.recommendedPackage=IamRemoteSubjects This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractIamRemoteSubject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackageElement			
Attribute	Type	Mult.	Kind	Note
localIPSecRule	IPSecRule	*	ref	This reference is used to describe theRemoteSubjects local IPSecRules. Tags: atp.Status=candidate

Table 3.75: IPSecIamRemoteSubject

Please note that the local IP Address of the remote peer is defined by the [NetworkEndpoint](#) that aggregates the [IPSecRules](#).

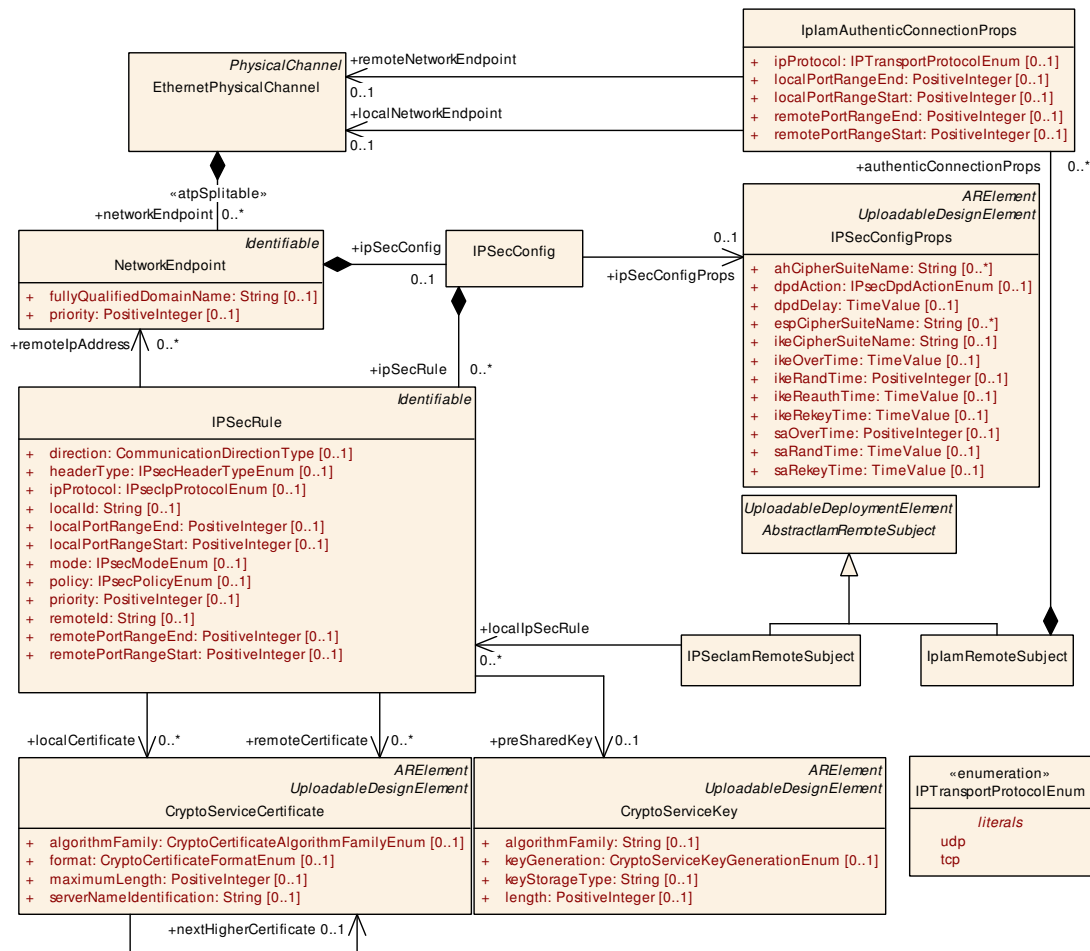


Figure 3.34: Proxy information about the remote node in case of IPsec

3.5.2.3 Remote subject in case of IP communication

Please note that it is possible to define an `AbstractIamRemoteSubject` that is based on the general IP communication. In this case no details about how the communication is secured are given and actually securing the communication is not part of the model.

Trust can be added to the IP communication , e.g., by using a secure communication layer protocol below network layer (e.g. MACsec), hardware mechanisms and/or by appropriate network and switch design.

An `IpIamRemoteSubject` is identified by a combination of a local and a remote IP address, local and remote port ranges, and a transport protocol.

[TPS_MANI_03244] Modeling of a remote peer in case of a general IP communication*Status:* DRAFT

[In case of a general IP communication the remote peer is modeled as `IpIamRemoteSubject` that is identified by the `NetworkEndpoint` that is referenced by the `localNetworkEndpoint` reference. The defined remote peer is allowed to establish IP connections to the `remoteNetworkEndpoint` over the `ipProtocol` and the defined local port range and remote port range.]

Class	IpIamRemoteSubject			
Note	This meta-class defines the proxy information about the remote node in case of general IP communication. Tags: atp.Status=candidate atp.recommendedPackage=IamRemoteSubjects This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractIamRemoteSubject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
authenticConnectionProps	IpIamAuthenticConnectionProps	*	aggr	Definition of IP rules assigned to the IpIamRemoteSubject. Tags: atp.Status=candidate

Table 3.76: IpIamRemoteSubject

Enumeration	IPTransportProtocolEnum			
Note	Transport Layer protocols in the Internet protocol suite. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.			
Aggregated by	IpIamAuthenticConnectionProps.ipProtocol			
Literal	Description			
tcp	Transmission Control Protocol (TCP) Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate			
udp	User Datagram Protocol (UDP). Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate			

Table 3.77: IPTransportProtocolEnum

Class	IpIamAuthenticConnectionProps			
Note	This meta-class defines a set of properties for IP connections in the context of IAM configuration. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	IpIamRemoteSubject.authenticConnectionProps			
Attribute	Type	Mult.	Kind	Note





Class	IplamAuthenticConnectionProps			
ipProtocol	IPTransportProtocolEnum	0..1	attr	This attribute defines the relevant IP protocol. Tags: atp.Status=candidate
localNetworkEndpoint	EthernetPhysicalChannel	0..1	ref	This reference defines an authentic local Network Endpoint in terms of IAM configuration. Tags: atp.Status=candidate
localPortRangeEnd	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines an end value for the local port range. Tags: atp.Status=candidate
localPortRangeStart	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines a start value for the local port range. Tags: atp.Status=candidate
remoteNetworkEndpoint	EthernetPhysicalChannel	0..1	ref	This reference defines an authentic remote Network Endpoint in terms of IAM configuration. Tags: atp.Status=candidate
remotePortRangeEnd	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines an end value for the remote port range. Tags: atp.Status=candidate
remotePortRangeStart	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines a start value for the remote port range. Tags: atp.Status=candidate

Table 3.78: IplamAuthenticConnectionProps

3.5.2.4 Remote subject in case of SecOC communication

The identity information in the case of SecOC depends on the group of [Machines](#) that are sharing the same cryptographic key.

In other words, if a valid SecOC message is received with a given key it is given that only remote [Machines](#) that “know the key” were able to send the message. The key is associated with a DataId and defines the “object” in the access control model. If a message received for a given DataId cannot be validated, then it will be dropped. Therefore, the access control between the remote subject and local object is taking place.

To summarize, the modeling of a Remote subject in case of SecOC cannot provide additional benefit neither by increasing the granularity of the subject identification nor providing new enforcement of rules on the object.

3.6 Intrusion Detection Design

[TPS_MANI_01338] Semantics of [SecurityEventReportToSecurityEvent-DefinitionMapping](#)

Status: DRAFT

[The modeling of the association between a specific security event and the corresponding [RPortPrototype](#) typed by a [SecurityEventReportInterface](#) is

created by means of the [SecurityEventReportToSecurityEventDefinition-Mapping](#).]

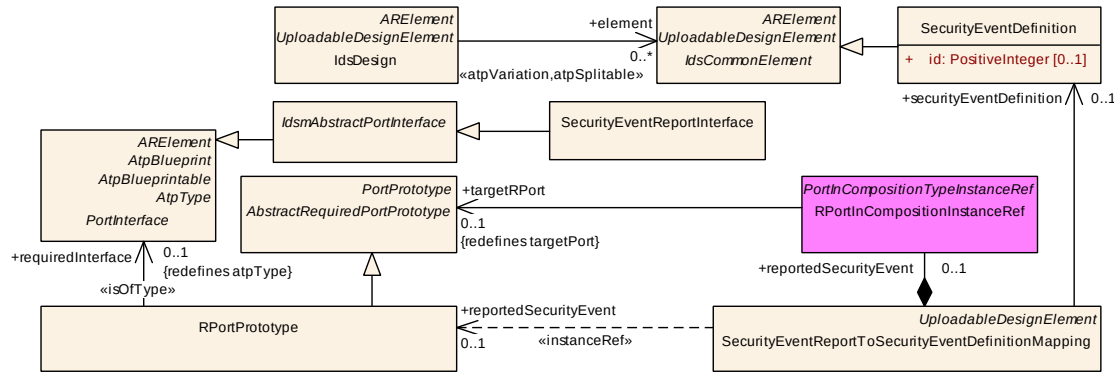


Figure 3.35: Specification of the [SecurityEventReportToSecurityEventDefinitionMapping](#)

This meta-class maps the [RPortPrototype](#) to a [SecurityEventDefinition](#) that itself is part of the so-called Security Extract.

[TPS_MANI_01339] Existence of the [SecurityEventReportToSecurityEventDefinitionMapping](#) is motivated by the AUTOSAR methodology

Status: DRAFT

[The existence of the [SecurityEventReportToSecurityEventDefinitionMapping](#) is motivated by the AUTOSAR methodology. At the point in time when a given [SecurityEventReportInterface](#) is defined it could be that the corresponding [SecurityEventDefinition](#) is not yet defined.

So it is possible to add this association later. Another reason for the existence of the mapping class is that a specific piece of application software may report different specific security events defined by different OEMs, depending on the target-configuration of the application software.

Of course, the semantics of the security event all always be either identical or at least comparable, it could still happen that the Id of a security event might change depending on the specific project or simply because different OEMs use different Ids for semantically identical security events.]

Class	SecurityEventReportToSecurityEventDefinitionMapping
Note	This meta-class represents the ability to map a PortPrototype for reporting a security event to the actual security event that shall be reported by this PortPrototype. Tags: atp.Status=candidate atp.recommendedPackage=SecurityEventReportToSecurityEventDefinitionMappings This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement
Aggregated by	ARPackage.element





Class	SecurityEventReportToSecurityEventDefinitionMapping			
Attribute	Type	Mult.	Kind	Note
reported SecurityEvent	AbstractRequiredPort Prototype	0..1	iref	This identifies the mapped security event. Tags: atp.Status=candidate InstanceRef implemented by: RPortInComposition InstanceRef
securityEvent Definition	SecurityEventDefinition	0..1	ref	This reference identifies the definition of the security event. Tags: atp.Status=candidate

Table 3.79: SecurityEventReportToSecurityEventDefinitionMapping

3.7 Relation to Crypto System Design

It is possible to define the relation of crypto-related model elements on application design level to the crypto-related model on system design level (see [Chapter 7.5](#)). For this purpose, the classes [CryptoKeySlotUserDesignMapping](#) and [CryptoKeySlotUsageDesignMapping](#) exist.

A possible workflow could be that the application-level design elements are created out of the existence of the corresponding crypto-related model on system design level.

[TPS_MANI_01468] Semantics of meta-class [CryptoKeySlotUserDesignMapping](#) [Meta-class [CryptoKeySlotUserDesignMapping](#) creates a “tracing” relation between

- an [Executable](#) as the source end of the “tracing” relation and
- a [CryptoKeySlotUserDesign](#) as the target end of the “tracing” relation.

The semantics of the “tracing” relation is that the [Executable](#) traces to the [CryptoKeySlotUserDesign](#) as the model element from which the [Executable](#) was derived.]

Class	CryptoKeySlotUserDesignMapping			
Note	This meta-class represents the ability to map a CryptoKeySlotUserDesign (on the system design level) to a Executable (on the application design level). Tags: atp.recommendedPackage=CryptoKeySlotDesignMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoKeySlot UserDesign	CryptoKeySlotUser Design	0..1	ref	This reference identifies the applicable CryptoKeySlot UserDesign on system design level.
processDesign	ProcessDesign	0..1	ref	This reference identifies the applicable ProcessDesign .

Table 3.80: CryptoKeySlotUserDesignMapping

[advisory_01011] Existence of the reference in the role `CryptoKeySlotUserDesignMapping.processDesign`

Imposition time: IT_ProDes

[For each `CryptoKeySlotUserDesignMapping`, the reference in the role `processDesign` should exist.]

[advisory_01012] Existence of the reference in the role `CryptoKeySlotUserDesignMapping.cryptoKeySlotUserDesign`

Imposition time: IT_ProDes

[For each `CryptoKeySlotUserDesignMapping`, the reference in the role `cryptoKeySlotUserDesign` should exist.]

[advisory_01013] Existence of the reference in the role `CryptoKeySlotUserDesignMapping.processDesign`

Imposition time: IT_ProDes

[For each `CryptoKeySlotUserDesignMapping`, the reference in the role `processDesign` should exist.]

[TPS_MANI_01469] Semantics of meta-class `CryptoKeySlotUsageDesignMapping` [Meta-class `CryptoKeySlotUsageDesignMapping` creates a “tracing” relation between

- an `RPortPrototype` as the source end of the “tracing” relation and
- a `CryptoKeySlotUsageDesign` as the target end of the “tracing” relation.

The semantics of the “tracing” relation is that the `RPortPrototype` traces to the `CryptoKeySlotUsageDesign` as the model element from which the `RPortPrototype` was derived.]

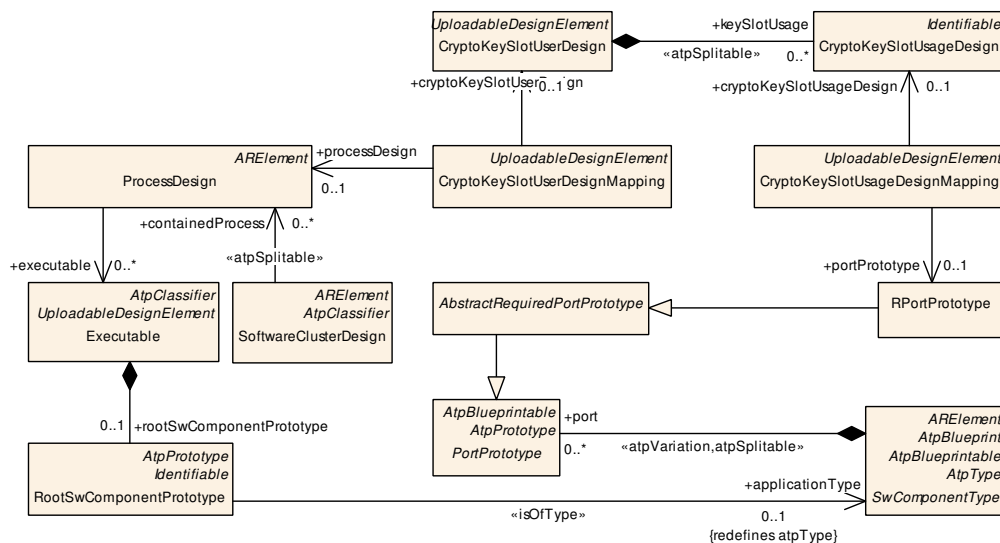


Figure 3.36: Modeling of meta-class `CryptoKeySlotUserDesign` and `CryptoKeySlotUsageDesign`

[advisory_01014] Existence of the reference in the role `CryptoKeySlotUsageDesignMapping.portPrototype`*Imposition time:* IT_ProDes

[For each `CryptoKeySlotUsageDesignMapping`, the reference in the role `port-Prototype` should exist.]

[advisory_01015] Existence of the reference in the role `CryptoKeySlotUsageDesignMapping.cryptoKeySlotUsageDesign`*Imposition time:* IT_ProDes

[For each `CryptoKeySlotUsageDesignMapping`, the reference in the role `cryptoKeySlotUsageDesign` should exist.]

4 Application Port Interface Design

4.1 Overview

This chapter contains a documentation of all relevant `PortInterfaces` used by application software on the *AUTOSAR adaptive platform*.

The description of the `ServiceInterface` ([Chapter 4.2](#)) represents the most prominent use case for `PortInterfaces` on the *AUTOSAR adaptive platform*. This prominence is also expressed by the ability to map different `ServiceInterface` onto each other. The support for this mapping is described in [Chapter 4.3](#) and [Chapter 4.4](#).

The other subclasses of `PortInterface` described in this chapter are mostly about interaction with the functional clusters on the *AUTOSAR adaptive platform*.

4.2 Service Interface

4.2.1 Overview

[TPS_MANI_01001] Meaning of `ServiceInterface` [Meta-class `ServiceInterface` inherits from `PortInterface` and allows for a heterogeneous aggregation of elements, i.e. it is possible to mix

- aggregation of `VariableDataPrototype` in the role `event` with
- aggregation of meta-class `Field` in the role `field` with
- aggregation of `ClientServerOperation` in the role `method`
- aggregation of `Trigger` in the role `trigger`

within the same `ServiceInterface`.]

The purpose of this modeling is to embrace the concept of [6, service-oriented communication] and better support this paradigm for communication on the *AUTOSAR adaptive platform*.

Please note that, in terms of semantics, the `ApApplicationError` represents a sort of second-class citizen (that only makes sense in the presence of `ClientServerOperation` in the role `method`) in the scope of the `ServiceInterface`.

More information can be found in [Chapter 4.2.8](#).

[constr_1483] Applicability of a `ServiceInterface`

Imposition time: `IT_BefAraApiGen`

[The applicability of a `ServiceInterface` shall be limited to the *AUTOSAR adaptive platform*, i.e. a `ServiceInterface` shall only be taken to type a `PortPrototype` if

the latter is aggregated by an [AdaptiveApplicationSwComponentType](#) or by a [CompositionSwComponentType](#) defined in the context of an [Executable](#).]

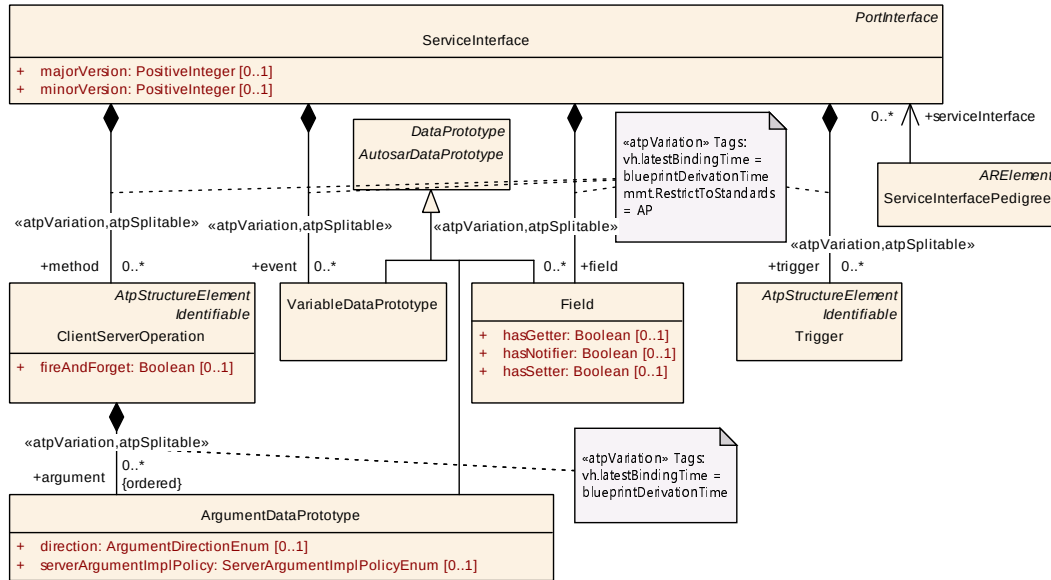


Figure 4.1: Modeling of the [ServiceInterface](#)

Please note that on the *AUTOSAR adaptive platform* there are use-cases for the utilization of a [ServiceInterface](#) **without** the existence of a corresponding [Port-Prototype](#). For more explanation, please refer to [TPS_MANI_01032].

Class	ServiceInterface			
Note	This represents the ability to define a PortInterface that consists of a heterogeneous collection of methods, events and fields. Tags: atp.recommendedPackage=ServiceInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
event	VariableDataPrototype	*	aggr	This represents the collection of events defined in the context of a ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=event.shortName, event.variationPoint.shortLabel vh.latestBindingTime=blueprintDerivationTime xml.sequenceOffset=30
field	Field	*	aggr	This represents the collection of fields defined in the context of a ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=field.shortName, field.variationPoint.shortLabel vh.latestBindingTime=blueprintDerivationTime xml.sequenceOffset=40





Class	ServiceInterface			
majorVersion	PositiveInteger	0..1	attr	Major version of the service contract. Tags: xml.sequenceOffset=10
method	ClientServerOperation	*	aggr	This represents the collection of methods defined in the context of a ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=method.shortName, method.variation Point.shortLabel vh.latestBindingTime=blueprintDerivationTime xml.sequenceOffset=50
minorVersion	PositiveInteger	0..1	attr	Minor version of the service contract. Tags: xml.sequenceOffset=20
trigger	Trigger	*	aggr	This represents the collection of triggers defined in the context of a ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=trigger.shortName, trigger.variation Point.shortLabel vh.latestBindingTime=blueprintDerivationTime xml.sequenceOffset=60

Table 4.1: ServiceInterface

As already described in [TPS_SWCT_01844], AUTOSAR does not support the existence of optional [arguments](#) in a [ClientServerOperation](#).

This restriction is motivated by the lack of support for optional arguments in the APIs of the RTE on the *AUTOSAR classic platform*. For the sake of interoperability between the *classic platform* and the *adaptive platform*, this restriction is observed on the *AUTOSAR adaptive platform* as well.

[TPS_MANI_01007] Atomic unit of service discovery [As far as the application level is concerned, the atomic unit for **service discovery** on the *AUTOSAR adaptive platform* is the [ServiceInterface](#).]

Please note that there is no obligation to have any [method](#), [event](#), [trigger](#), or [field](#) defined in the context of a given [ServiceInterface](#). In other words, the existence of a [ServiceInterface](#) by itself represents a valid semantics that has a value on its own.

For example, a use case could exist where a given service instance that corresponds to such a [ServiceInterface](#) is offered with the mere intention to signal that the ECU that provides the service instance is becoming ready for something, e.g. being diagnosed.

A tester could then take the existence of the offer as an indication to initiate a connection to the respective ECU.

4.2.2 Event

[TPS_MANI_01033] Semantics of `ServiceInterface.event` [An `event` represents an update to a piece of data. The server decides when to send this update and makes sure that the `event` has full control over the value.

The occurrence of an `event` is transmitted from a server to one or more client(s).]

[constr_1494] Initial value for `event`

Imposition time: `IT_BefAraApiGen`

[A `ServiceInterface.event` shall **not** have an `initValue`.]

For the client, the only way to get access to the value of an `event` is to receive an update of the `event` from the server.

As mentioned in [constr_1494], the Server always has full control over the value of the `event` and when it is sent to clients. Therefore, the definition of an `initValue` is not necessary.

Class	VariableDataPrototype			
Note	A <code>VariableDataPrototype</code> represents a formalized generic piece of information that is typically mutable by the application software layer. <code>VariableDataPrototype</code> is used in various contexts and the specific context gives the otherwise generic <code>VariableDataPrototype</code> a dedicated semantics.			
Base	<code>ARObject</code> , <code>AtpFeature</code> , <code>AtpPrototype</code> , <code>AutosarDataPrototype</code> , <code>DataPrototype</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>ApplicationInterface.indication</code> , <code>AtpClassifier.atpFeature</code> , <code>BswInternalBehavior.arTypedPerInstanceMemory</code> , <code>BswModuleDescription.providedData</code> , <code>BswModuleDescription.requiredData</code> , <code>BulkNvDataDescriptor.bulkNvBlock</code> , <code>DiagnosticSovdAccessArgument.contentObject</code> , <code>InternalBehavior.staticMemory</code> , <code>NvBlockDescriptor.ramBlock</code> , <code>NvDataInterface.nvData</code> , <code>SenderReceiverInterface.dataElement</code> , <code>ServiceInterface.event</code> , <code>SwcInternalBehavior.arTypedPerInstanceMemory</code> , <code>SwcInternalBehavior.explicitInterRunnableVariable</code> , <code>SwcInternalBehavior.implicitInterRunnableVariable</code>			
Attribute	Type	Mult.	Kind	Note
<code>initValue</code>	<code>ValueSpecification</code>	0..1	aggr	Specifies initial value(s) of the <code>VariableDataPrototype</code>

Table 4.2: VariableDataPrototype

4.2.3 Trigger

[TPS_MANI_03291] Semantics of `ServiceInterface.trigger` [A `trigger` represents a special kind of an event without any data that is transmitted from a server to one or more client(s) and at which occurrence the Service Consumer shall react in a particular manner.]

Class	Trigger
Note	The Trigger represents a special kind of an event (without data) at which occurrence the Service Consumer shall react in a particular manner.
Base	<code>ARObject</code> , <code>AtpClassifier</code> , <code>AtpFeature</code> , <code>AtpStructureElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>





Class	Trigger			
Aggregated by	AtpClassifier.atpFeature, BswModuleDescription.releasedTrigger, BswModuleDescription.requiredTrigger, ServiceInterface.trigger , TriggerInterface.trigger			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.3: Trigger

Please note that the [trigger](#) is processed in the queued manner, i.e. the [triggers](#) are stored in a queue and are processed in “first in first out” order.

4.2.4 Field

[TPS_MANI_01034] Semantics of [ServiceInterface.field](#) [A [field](#) represents a piece of data hosted by a server that exposes to one or more client(s) a get accessor and/or a set mutator.

Clients can optionally receive notifications of changes of the [field](#)’s value.]

In comparison to an [event](#), a [field](#) has a concrete value at any time. This conceptual difference can be explained along the following examples:

Let a traffic-sign detection be an example for the semantics of an [event](#). The detection of a traffic-sign represents a discrete event in time that would be raised by the service component any time a speed limit sign is detected.

On the other hand, let a temperature preset of the in-vehicle air-condition be an example for a [field](#) that has a concrete value at any given time. The concrete value can be set by a client, can be obtained on request of a client, and – at the same time – a change of the temperature preset represents relevant information by itself.

In summary, this means that if a [field](#) is defined with [hasNotifier](#) and a client subscribes to it then the current value of the [field](#) is sent back immediately to the subscriber in an event-like notification pattern as soon as the subscription to the field becomes effective.

Additional update notifications will be sent to subscribers whenever the value of the [field](#) gets updated.

In more technical terms, the `get()` accessor method the current field value can be retrieved by the client. By means of calling the `set()` mutator method the [field](#) value can be updated by the client.

Please note that all features that a field provides are optional, given a fulfillment of [\[constr_1673\]](#). In the [ServiceInterface.field](#) description it is defined whether the [field](#) supports the on-change-notification ([hasNotifier](#)), the `get()` accessor ([hasGetter](#)) or the `set()` mutator ([hasSetter](#)).

Admittedly, the concept of the `field` is roughly equivalent to an aggregation of an `event` with correlated `get()`/`set()` `methods`.

As far as the meta-model is concerned, the fact that a `field` shall have a concrete value at any time demands the **definition of an initial value** for the `field`. This aspect is clarified by [TPS_MANI_03212].

The existence of meta-class `field` as a first class citizen in the `ServiceInterface` expresses in addition to the existence of an individual `event` and individual `methods` that the two defined accessor/mutator methods `get()` and `set()` are applied to the **same data object** and that the defined `field` notifier reports each value change of this data object to subscribers.

In other words, the semantics of meta-class `Field` is fully determined by the attributes `hasGetter`, `hasSetter`, and `hasNotifier`.

Therefore, a `Field` where all of these attributes are set to `false` wouldn't have any useful meaning and shall therefore not exist.

[constr_1673] Existence of attributes `hasGetter`, `hasSetter`, and `hasNotifier`

Imposition time: `IT_BefAraApiGen`

[For any given `Field`, all of the attributes

- `hasGetter`
- `hasSetter`
- `hasNotifier`

shall exist and at least one of the attributes shall be set to `true`.]

Please note that [constr_1673] allows that a `Field` may be defined with a notifier but without the two defined methods `get()` and `set()`.

As described above a subscriber to a `field` notifier will get the current value of the `Field` immediately after the subscription.

This functionality makes a `Field` without `get()`/`set()` `methods` useful in some functional cases compared to the usage of an `event` where the value would only be sent after the event is triggered.

Class	Field			
Note	This meta-class represents the ability to define a piece of data that can be accessed with read and/or write semantics. It is also possible to generate a notification if the value of the data changes. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>AtpFeature</code> , <code>AtpPrototype</code> , <code>AutosarDataPrototype</code> , <code>DataPrototype</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>ApplicationInterface.attribute</code> , <code>AtpClassifier.atpFeature</code> , <code>ServiceInterface.field</code>			
Attribute	Type	Mult.	Kind	Note
<code>hasGetter</code>	Boolean	0..1	attr	This attribute controls whether read access is foreseen to this field.





Class	Field			
hasNotifier	Boolean	0..1	attr	This attribute controls whether a notification semantics is foreseen to this field.
hasSetter	Boolean	0..1	attr	This attribute controls whether write access is foreseen to this field.

Table 4.4: Field

[constr_10129] Multiplicity of attribute `Field.hasGetter`*Imposition time:* `IT_BefAraApiGen`[For each `Field`, the attribute `hasGetter` shall exist.]**[constr_10130] Multiplicity of attribute `Field.hasSetter`***Imposition time:* `IT_BefAraApiGen`[For each `Field`, the attribute `hasSetter` shall exist.]**[constr_10131] Multiplicity of attribute `Field.hasNotifier`***Imposition time:* `IT_BefAraApiGen`[For each `Field`, the attribute `hasNotifier` shall exist.]**4.2.5 Method**

[TPS_MANI_01035] Semantics of `ServiceInterface.method` [A `method` represents a function that is executed by and in the scope of a server on request of one or more client(s).]

Class	ClientServerOperation			
Note	An operation declared within the scope of a client/server interface.			
Base	<code>ARObject</code> , <code>AtpClassifier</code> , <code>AtpFeature</code> , <code>AtpStructureElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>ApplicationInterface.command</code> , <code>AtpClassifier.atpFeature</code> , <code>ClientServerInterface.operation</code> , <code>DiagnosticDataElementInterface.read</code> , <code>DiagnosticDataIdentifierInterface.read</code> , <code>DiagnosticDataIdentifierInterface.write</code> , <code>DiagnosticExtendedDataRecordInterface.provide</code> , <code>DiagnosticRoutineInterface.requestResult</code> , <code>DiagnosticRoutineInterface.start</code> , <code>DiagnosticRoutineInterface.stop</code> , <code>PhmRecoveryActionInterface.recovery</code> , <code>ServiceInterface.method</code>			
Attribute	Type	Mult.	Kind	Note
argument (ordered)	<code>ArgumentDataPrototype</code>	*	aggr	An argument of this <code>ClientServerOperation</code> . Stereotypes: <code>atpSplitable</code> ; <code>atpVariation</code> Tags: <code>atp.Splitkey=argument.shortName</code> , <code>argument.variationPoint.shortLabel</code> <code>vh.latestBindingTime=blueprintDerivationTime</code>
fireAndForget	Boolean	0..1	attr	This attribute defines whether this method is a fire&forget method (true) or not (false). This Attribute is only used by the AUTOSAR Adaptive Platform.





Class	ClientServerOperation			
possibleApError	ApApplicationError	*	ref	This reference identifies AdaptivePlatformApplication Errors as a possible error raised by the enclosing Client ServerOperation. This Attribute is only used by the AUTOSAR Adaptive Platform.
possibleApError Set	ApApplicationErrorSet	*	ref	This reference represents the ability to refer to an entire group of ApApplicationErrors as one model element instead of having to refer to all the represented Ap ApplicationErrors separately. This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 4.5: ClientServerOperation

4.2.5.1 Fire and Forget Method

A so-called “fire & forget” method represents a special form of a `method` dedicated to the sole purpose of conveying information from a client to a server.

There is no expectation that the implementation of the `method` executes any kind of algorithm other than to merely accept the incoming data.

Spun from this angle, the semantics of a “fire & forget” method is comparable to the semantics of an `event`, only reverse.

In other words, the “fire & forget” method conveys the data and the occurrence of the data **from a client to a server**. For comparison, the `event` is used to convey information in combination with the occurrence of the information from **a server to a client**.

The *occurrence* aspect of this statement has the consequence that e.g. the number of “fire & forget” calls can be counted by the implementation of the server and this meta-information could be taken to convey additional semantics on top of the actual data.

[TPS_MANI_01064] Semantics of attribute `method.fireAndForget` [The activation of the “fire & forget” semantics of a given `method` is achieved by setting the value of attribute `method.fireAndForget` to value `true`.]

[TPS_MANI_03118] Semantics of `ServiceInterface.method` with `fireAndForget` set to `true` [A `method` with `fireAndForget` set to the value `true` represents a void-return-method where the client is not expecting any kind of acknowledge or handshake from the server side.]

[constr_3374] `method` with attribute `fireAndForget` set to `true` shall not have any inout or out arguments

Imposition time: `IT_BefAraApiGen`

[A `method` that has the value of attribute `fireAndForget` set to `true` is not allowed to have any `arguments` with `direction` `inout` or `out`.]

[constr_3375] **method** with attribute **fireAndForget** set to true shall not reference an **ApApplicationError**

Imposition time: IT_BefAraApiGen

[A **method** that has the value of attribute **fireAndForget** set to true is not allowed to reference

- an **ApApplicationError** in role **possibleApError** and/or
- an **ApApplicationErrorSet** in the role **possibleApErrorSet**.

]

[TPS_MANI_03119] **Default value for the attribute **fireAndForget** of meta-class **ClientServerOperation**** [If the attribute **fireAndForget** is not defined then it shall be assumed that no “fire & forget” semantics is intended.]

4.2.6 Versioning of **ServiceInterface**s

Using multiple versions of the same **ServiceInterface** supports an independent life cycle of services and allows to change and enhance **ServiceInterfaces** without affection of existing consumers. This chapter describes how different versions of the same **ServiceInterface** can be modeled.

A version of a **ServiceInterface** may be defined for example as **ServiceInterface** with an own **shortName** (e.g. **Service_Version1**, **Service_Version2**) or as **ServiceInterface** that is located in an own **ARPackage** (e.g. **/Version1/Service**, **/Version2/Service**).

It is also allowed to assign a different *namespace* to the different **ServiceInterface** versions to influence the generated code, e.g. to generate **com::version1::Service** and **com::version2::Service**.

It is expected that if using different versions of the same **ServiceInterface** in one **Executable** then different *namespaces* shall be used for each **ServiceInterface** version.

The attributes **ServiceInterface.majorVersion** and **ServiceInterface.minorVersion** provide the possibility to define version information at the level of the **ServiceInterface**.

[TPS_MANI_03616] **Semantic versioning of **ServiceInterface.majorVersion** and **ServiceInterface.minorVersion**** [Service contract versioning rules:

- for backwards-incompatible interface or behavior changes the **majorVersion** number shall be increased and the **minorVersion** number shall be set to 0
- for backwards-compatible interface or behavior changes the **majorVersion** number shall be unchanged and the **minorVersion** number shall be increased.

]

Note that it is expected that the decision about backwards compatibility is made by the service designer. In other words AUTOSAR does not define formal criteria for the backwards compatibility of [ServiceInterfaces](#).

As for the modeling of several versions of a [ServiceInterface](#), the fully qualified [shortNames](#) of the [ServiceInterfaces](#) have to be different. The [ServiceInterfacePedigree](#) allows to collect the set of [ServiceInterfaces](#) which form the collection of different versions of the same *Service*.

Class	ServiceInterfacePedigree			
Note	Collection of ServiceInterfaces that belong to the same versioning. Tags: atp.recommendedPackage=ServiceInterfacePedigrees This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
serviceInterface	ServiceInterface	*	ref	Reference to the ServiceInterfaces which belong to the same versioning.

Table 4.6: ServiceInterfacePedigree

The other consumers of this service do not need to switch to using the latest version of this [ServiceInterface](#), but can continue to use older versions of the [ServiceInterface](#) they were designed for and tested with.

4.2.6.1 Versioning driven by transport layer

Each transport layer mechanism (e.g. SOME/IP) may define its own compatibility rules. Therefore, for each individual transport layer an own impact assessment on the compatibility needs to be performed whether the changed service interface has an incompatible representation on this transport layer.

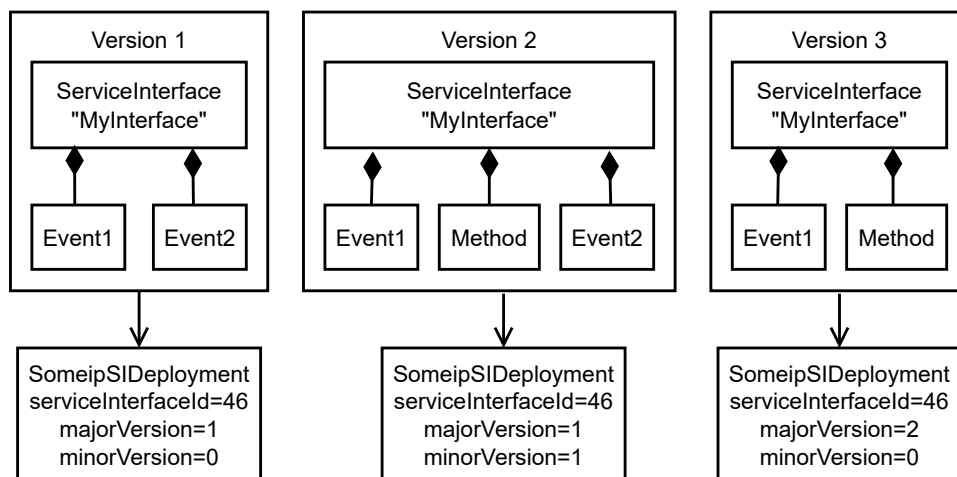


Figure 4.2: Example for different versions of the same [ServiceInterface](#)

The compatibility depends on the features that are used on the transport layer. For example, in SOME/IP a length field that is put in front of a struct allows that during deserialization unknown elements at the end of an extensible data struct are skipped.

An additional option in SOME/IP is the usage of Data IDs in front of optional struct members. With this approach the receiver can skip unknown members of the struct, i.e. where the Data ID is unknown.

Therefore, on the Application Design level, all changes of `ServiceInterfaces` shall be handled carefully since only the used transport layer and the used features on the transport layer decide whether the change is compatible or not.

If one wants to make sure that two `AutosarDataPrototypes` inside a `ServiceInterface` are compatible then both `AutosarDataPrototypes` shall be typed by an identical `AutosarDataType`.

During the `ServiceInterfaceDeployment` the `ServiceInterface` is mapped to a middleware transport layer where the necessary middleware transport layer specific configuration settings are performed, as described in [Chapter 13.2](#).

For example, it is possible to assign the same SOME/IP `serviceInterfaceId` to different versions of the same `ServiceInterface`, but a different `majorVersion` or `minorVersion`.

This approach takes into account that the compatibility of `ServiceInterfaces` is heavily influenced by the used transport binding.

Please note that the compatibility rules for SOME/IP are described in the [\[11, PRS SOME/IP Protocol\]](#).

4.2.7 Namespace

The definition of a `ServiceInterface` has a direct impact on the code of an application on the *AUTOSAR adaptive platform*.

Without going into too much detail at this point, it is necessary to support the definition of a *namespace* in the context of a `ServiceInterface`.

The namespace shall be used to encapsulate source code related to the `ServiceInterface` and thus avoid name clashes with the content of other definitions of `ServiceInterfaces`.

In principle, the definition of the namespace around a concrete `ServiceInterface` could be derived from the structure of `ARPackages` in which the definition of the `ServiceInterface` is contained. However, this approach puts some constraints of the package structure.

The same `ServiceInterface` may be used in different projects that may or may not demand the usage of a specific *different* package structure.

This placement of the same `ServiceInterface` in potentially different package hierarchies would lead to the definition of different namespaces, and thus the necessity to create or generate the code representing the `ServiceInterface` **plus** the code that uses this definition again and again.

One way to overcome this potential issue is to attach a dedicated namespace definition to the definition of the `ServiceInterface` itself.

This approach is documented in [Figure 4.3](#).

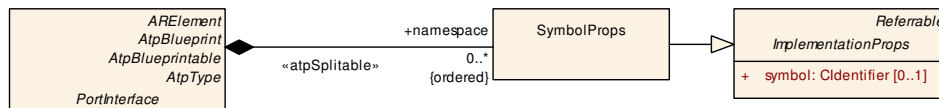


Figure 4.3: Specification of namespaces in `PortInterfaces`

[TPS_MANI_01004] Semantics of `ServiceInterface.namespace` [The aggregation `ServiceInterface.namespace` shall be used to define the namespace to be used for the source code that corresponds to the given `ServiceInterface`.]

[TPS_MANI_01005] The definition of the namespace of a `ServiceInterface` may follow a hierarchical pattern [The namespace of a `ServiceInterface` may follow a hierarchical pattern, as supported by many modern programming languages.

The separator between the elements of the hierarchical namespace definition depends on the used programming language and is not explicitly defined in the model.

The model only defines the elements of the hierarchical namespace pattern.]

```
<SERVICE-INTERFACE>
  <SHORT-NAME>MyServiceInterface</SHORT-NAME>
  <NAMESPACES>
    <SYMBOL-PROPS>
      <SHORT-NAME>first</SHORT-NAME>
      <SYMBOL>com</SYMBOL>
    </SYMBOL-PROPS>
    <SYMBOL-PROPS>
      <SHORT-NAME>second</SHORT-NAME>
      <SYMBOL>myCompany</SYMBOL>
    </SYMBOL-PROPS>
    <SYMBOL-PROPS>
      <SHORT-NAME>third</SHORT-NAME>
      <SYMBOL>software</SYMBOL>
    </SYMBOL-PROPS>
  </NAMESPACES>
</SERVICE-INTERFACE>
```

Listing 4.1: Example for the definition of a namespace for a given `ServiceInterface`

As the consequence of the ability to define a hierarchical namespace, the aggregation `ServiceInterface.namespace` is qualified as being `ordered`.

This means that the order of individual elements to the collection of `namespaces` has a semantical relevance¹.

¹This means that the definition of a namespace `a : b` is semantically different from the definition of a namespace `b : a`.

[TPS_MANI_01006] Ordered definition of **ServiceInterface.namespace** [In a hierarchical definition of **ServiceInterface.namespace** the order of **namespace** fragments shall be maintained in the translation of the namespace to source code.

In other words, the first **namespace** fragment shall appear first, followed by the second **namespace** fragment, and so on.]

Class	PortInterface (abstract)			
Note	Abstract base class for an interface that is either provided or required by a port of a software component.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	AbstractRawDataStreamInterface , AbstractSuspendToRamInterface , AbstractSynchronizedTimeBaseInterface , ClientServerInterface , CryptoInterface , DataInterface , DiagnosticPortInterface , FirewallStateSwitchInterface , IdsmAbstractPortInterface , LogAndTraceInterface , ModeSwitchInterface , NetworkManagementPortInterface , PersistencyInterface , PlatformHealthManagementInterface , ServiceInterface , StateManagementPortInterface , TriggerInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
namespace (ordered)	SymbolProps	*	aggr	This represents the SymbolProps used for the definition of a hierarchical namespace applicable for the generation of code artifacts out of the definition of a ServiceInterface. Stereotypes: atpSplitable Tags: atp.Splitkey=namespace.shortName This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 4.7: PortInterface

Class	SymbolProps			
Note	This meta-class represents the ability to contribute a part of a namespace.			
Base	ARObject , ImplementationProps , Referrable			
Aggregated by	Allocator.namespace , ApApplicationErrorDomain.namespace , AtomicSwComponentType.symbolProps , CppImplementationDataType.namespace , ImplementationDataType.symbolProps , PortInterface.namespace , SecurityEventDefinition.eventSymbolName , TraceSwitchConfig.namespace			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 4.8: SymbolProps

The Listing [Listing 4.1](#) exemplifies the statement made by [TPS_MANI_01006], i.e. the resulting name space in e.g. C++ would look like sketched in Listing [Listing 4.2](#).

```

1 namespace com {
2     namespace myCompany {
3         namespace software {
4
5         }
6     }
7 }
```

Listing 4.2: Resulting namespace for the example **ServiceInterface**

4.2.8 Error Handling

The modeling of error handling on the *AUTOSAR adaptive platform* slightly differs from the approach implemented on the *AUTOSAR classic platform*.

In particular, the formal representation of an error during the execution of a `method` is done in a global scope, i.e. such a definition can be reused arbitrarily by any `ServiceInterface`.

[TPS_MANI_01190] Semantics of `ApApplicationError` [Meta-class `ApApplicationError` represents the ability to define the existence of an error during the execution of a `method` independently of the scope of a `ServiceInterface` or `ClientServerOperation`.]

Class	ApApplicationError			
Note	This meta-class represents the ability to formally specify the semantics of an application error on the AUTOSAR adaptive platform Tags: atp.recommendedPackage=ApplicationErrors This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
errorCode	Integer	0..1	attr	This attribute has the ability to specify the error code value within the enclosing AdaptivePlatformApplication Error.
errorDomain	ApApplicationErrorDomain	0..1	ref	This reference represents the error domain of the Ap ApplicationError.

Table 4.9: ApApplicationError

[constr_10132] Multiplicity of attribute `ApApplicationError.errorCode`

Imposition time: `IT_BefAraApiGen`

[For each `ApApplicationError`, the attribute `errorCode` shall exist.]

[TPS_MANI_03674] Adaptive platform SOME/IP Service Instance interacting with a classic platform SOME/IP Service Instance [If a `ProvidedSomeipServiceInstance` / `RequiredSomeipServiceInstance` is referenced by a `SomeipServiceInstanceToMachineMapping` and a `ConsumedServiceInstance` / `ProvidedServiceInstance` (on a classic platform `EcuInstance`) exists on the same VLAN with the following matching SOME/IP credentials:

For `ProvidedSomeipServiceInstance`:

- `ProvidedSomeipServiceInstance.serviceInstanceId` equals `ConsumedServiceInstance.instanceIdentifier`
- `SomeipServiceInterfaceDeployment.serviceInterfaceId` equals `ConsumedServiceInstance.serviceIdentifier`
- `SomeipServiceVersion.majorVersion` equals `ConsumedServiceInstance.majorVersion`

For RequiredSomeipServiceInstance:

- `RequiredSomeipServiceInstance.requiredServiceInstanceId equals ProvidedServiceInstance.instanceIdentifier`
- `SomeipServiceInterfaceDeployment.serviceInterfaceId equals ProvidedServiceInstance.serviceIdentifier`
- `SomeipServiceVersion.majorVersion equals ProvidedServiceInstance.majorVersion`

then the `ProvidedSomeipServiceInstance / RequiredSomeipServiceInstance` is considered to interact with the AUTOSAR classic platform. |

[constr_3772] Range of `ApApplicationError.errorCode` for interoperability with the AUTOSAR classic platform

Imposition time: IT_SysDes

[If a SOME/IP service instance interacts with a classic platform according to [TPS_MANI_03674], then the value of attribute `ApApplicationError.errorCode` used according to [TPS_MANI_01191] shall not exceed the closed interval [1..63].]

Rationale for [constr_3772]: This restriction originates from [SWS_Std_00011] which limits the usable bits of the `Std_ReturnType` (which is the return type of `ClientServerOperations` in AUTOSAR classic platform) for encoding errors to the lower 6 bits.

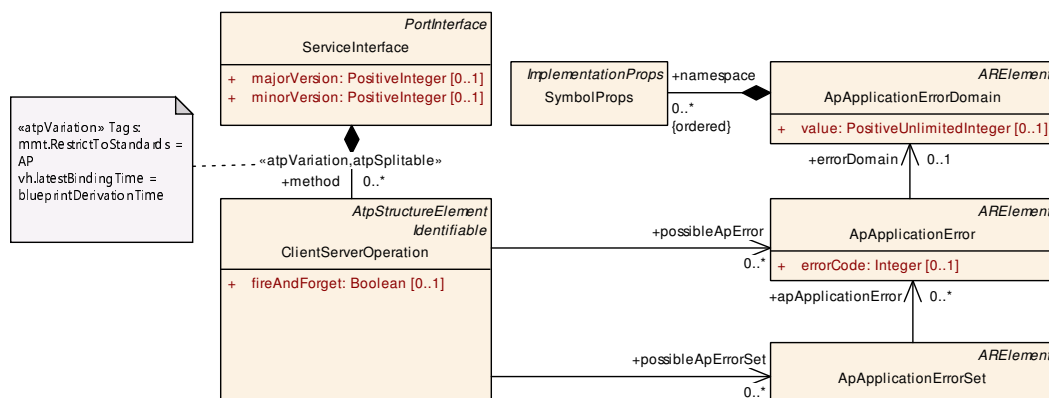


Figure 4.4: Modeling of `ApApplicationError` on the *AUTOSAR* adaptive platform

[constr 1625] Existence of reference `ApApplicationError.errorDomain`

Imposition time: IT BefAraApiGen

[For each `ApApplicationError`, the reference `errorDomain` shall exist.

In other words, the association of an `ApApplicationError` with a corresponding `ApApplicationErrorDomain` is mandatory. |

[TPS_MANI_01198] Semantics of `ApApplicationErrorSet` [Meta-class `ApApplicationErrorSet` has the ability to group references to `ApApplicationError`

and thus represents a “proxy” to this group of references towards the [ClientServerOperation](#).

The use case for this modeling ability is that some [ClientServerOperations](#) may have to reference an identical significant number of [ApApplicationErrors](#).

Letting each of the [ClientServerOperations](#) repeat the same set of references to [ApApplicationError](#) is considered unnecessary and therefore the ability to refer to a group instead of individual references is provided as an alternative.]

The decision whether an [ApApplicationErrorSet](#) is defined and referenced from specific [ClientServerOperations](#) has to be done on an individual basis. AUTOSAR just wants to make this business as straightforward as possible.

Please note that it is also positively possible to mix the usage of [ClientServerOperation.possibleApError](#) and [ClientServerOperation.possibleApErrorSet](#).

As [ApApplicationError](#) is no longer defined within the scope of a [ServiceInterface](#), there is no need to define a mapping between two [ApApplicationErrors](#) by means of a dedicated sub-class of [ServiceInterfaceElementMapping](#).

Class	ApApplicationErrorSet			
Note	This meta-class acts as a reference target that represents an entire collection of ApApplicationErrors. This takes the burden from ClientServerOperations that reference a larger number of ApApplication Errors. Tags: atp.recommendedPackage=ApplicationErrorSets This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
apApplicationError	ApApplicationError	*	ref	This reference represents the collection of ApApplicationError represented by the enclosing ApApplicationErrorSet

Table 4.10: ApApplicationErrorSet

[TPS_MANI_01191] Modeling of possible errors [A [ClientServerOperation](#) aggregated by a [ServiceInterface](#) in the role [method](#) may reference

- zero or more [ApApplicationError](#)(s) in the role [possibleApError](#) and/or
- zero or more [ApApplicationErrorSet](#)(s) in the role [possibleApErrorSet](#)

to formally specify the existence of possible errors raised by the [ClientServerOperation](#).]

[TPS_MANI_01192] Semantics of ApApplicationErrorDomain [Meta-class [ApApplicationErrorDomain](#) shall be used to define a specific error domain that can potentially be standardized by AUTOSAR.

Therefore, the definition of such an error domain is not defined in the scope of the `ApApplicationError` itself. Instead, an `ApApplicationError` identifies the applicable error domain by means of a reference in the role `errorDomain`.

It is possible to attach the definition of a `namespace` to `ApApplicationErrorDomain` because this information is relevant for the language binding.]

[TPS_MANI_01863] Supported value range for attribute `ApApplicationErrorDomain.value` [The supported value range of attribute `ApApplicationErrorDomain.value` is given by [constr_2637].]

Please note that [constr_2637] can be found in the document [8, TPS Generic Structure Template].

[constr_10574] Value of `ApApplicationErrorDomain.value` shall be unique in the context of a `ClientServerOperation`

Imposition time: `IT_BefAraApiGen`

[Within the context of one `ClientServerOperation`, no two `ApApplicationErrorDomains` referenced in the role `ClientServerOperation.possibleApError.errorDomain` or transitively referenced in the role `ClientServerOperation.possibleApErrorSet.apApplicationError.errorDomain` shall have the identical value of attribute `ApApplicationErrorDomain.value`.]

Please find more explanation for [constr_10574] in Chapter B.12.1.

[constr_10133] Multiplicity of attribute `ApApplicationErrorDomain.value`

Imposition time: `IT_BefAraApiGen`

[For each `ApApplicationErrorDomain`, the attribute `value` shall exist.]

[constr_1664] Unique `ApApplicationError.shortName`

Imposition time: `IT_BefAraApiGen`

[Within the set of all `ApApplicationErrors` that reference a given `ApApplicationErrorDomain` in the role `errorDomain` the attribute `ApApplicationError.shortName` shall have a unique value.]

[constr_1665] Unique `ApApplicationError.errorCode`

Imposition time: `IT_BefAraApiGen`

[Within the set of all `ApApplicationErrors` that reference a given `ApApplicationErrorDomain` in the role `errorDomain` the attribute `ApApplicationError.errorCode` shall have a unique value.]

Class	ApApplicationErrorDomain			
Note	This meta-class represents the ability to define a global error domain for an ApApplicationError. Tags: atp.recommendedPackage=ApplicationErrorDomains This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
namespace (ordered)	SymbolProps	*	aggr	This aggregation defines the namespace of the Ap ApplicationErrorDomain
value	PositiveUnlimitedInteger	0..1	attr	This attribute identifies the error category.

Table 4.11: ApApplicationErrorDomain

Rationale for the existence of [\[constr_1664\]](#) and [\[constr_1665\]](#): the language binding for C++ foresees the usage of attributes [ApApplicationError.shortName](#) and [ApApplicationError.errorCode](#) for the creation of an `enum` within the context of the [ApApplicationErrorDomain](#).

Duplicates in terms of labels of enumerators or values of enumerators lead to compile-time errors.

[constr_3773] Uniqueness of [ApApplicationError.errorCode](#) for interoperability with the AUTOSAR classic platform

Imposition time: [IT_BefAraApiGen](#)

[If a SOME/IP service instance interacts with a classic platform according to [\[TPS_MANI_03674\]](#), then the set of [ApApplicationErrors](#) configured for a [ClientServerOperation](#) according to [\[TPS_MANI_01191\]](#) shall all have unique [ApApplicationError.errorCode](#) values defined.]

Rationale for [\[constr_3773\]](#): For interoperability with the AUTOSAR classic platform the potential reference [ApApplicationError.errorDomain](#) is irrelevant because on the AUTOSAR classic platform the [ApApplicationErrorDomain](#) and the [ApApplicationErrorDomain.value](#) are not available. Thus [\[constr_3773\]](#) has to apply to guarantee unique [ApApplicationError.errorCode](#) value definitions in the context of a [ClientServerOperation](#).

4.2.9 Service Interface Data Type Mapping

An important step in the workflow of implementing software on the *AUTOSAR adaptive platform* is the creation of a code-based representation of a [ServiceInterface](#) to make it accessible for the application code.

This creation of a code-based representation is usually automatized and will be executed by a code generator. This code generator needs an input from the model. The main input for this purpose is obviously the definition of the [ServiceInterface](#) itself.

However, this is not sufficient. The designer of a `ServiceInterface` is free to use `ApplicationDataTypes` for the specification of the details of the `ServiceInterface`.

It is therefore necessary to provide the definition of an `AbstractImplementationDataType` for each of the used `ApplicationDataType`. In the meta-model, this correspondence is implemented by means of the meta-class `DataTypeMappingSet`².

However, from the methodological point of view it is considered inappropriate to let `ServiceInterface` directly refer to one or more `DataTypeMappingSet(s)`.

For clarification, this would mean that the mapping of `ApplicationDataType` to `AbstractImplementationDataType` becomes an integral part of the definition of the `ServiceInterface` although the mapping itself does not really contribute to the actual semantics of the `ServiceInterface`.

As a consequence, the `ServiceInterface` would have to be updated whenever the mapping between data types changes.

But since the definition of `ServiceInterfaces` are usually considered very stable a frequent update for the mere purpose of acknowledging a change in the data type mapping is not acceptable.

In this concrete case, the described problem can be circumvented by the definition of a mapping class that refers to both a `ServiceInterface` and a `DataTypeMappingSet` and therefore create the correspondence without the need to update the `ServiceInterface`.

Although the prelude into this chapter suggests the existence of a meta-class that maps a `ServiceInterface` to one or more `DataTypeMappingSet(s)` the actual meta-model is designed with a broader focus.

In the future, there could be further kinds of `PortInterfaces` beside the `ServiceInterface` that need to fulfill the same use case.

Consequently, the name of the meta-class created for this purpose is `PortInterfaceToDataTypeMapping`.

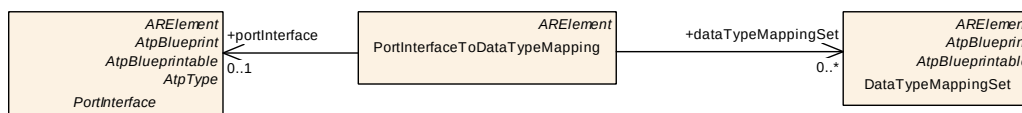


Figure 4.5: Modeling of `PortInterfaceToDataTypeMapping`

²For more background regarding the definition and use of meta-class `DataTypeMappingSet` please refer to the [2, TPS Software ComponentTemplate].

[constr_1507] **PortInterfaceToDataTypeMapping** is only applicable to **Port-Interfaces** that contain modeled data types

Imposition time: IT_BefAraApiGen

[**PortInterfaceToDataTypeMapping.portInterface** shall only refer to **any** of the following sub-classes of **PortInterface**:

- **ServiceInterface**
- **PersistencyKeyValueStorageInterface**
- **DiagnosticRoutineInterface**
- **DiagnosticDataIdentifierInterface**
- **DiagnosticDataElementInterface**
- **DiagnosticSovdContentInterface**
- **DiagnosticSovdContentElementInterface**
- **DiagnosticSovdOperationInterface**

]

Class	PortInterfaceToDataTypeMapping			
Note	This meta-class represents the ability to associate a PortInterface with a DataTypeMappingSet. This association is needed for the generation of header files in the scope of a single PortInterface. The association is intentionally made outside the scope of the PortInterface itself because the designers of a PortInterface most likely will not want to add details about the level of ImplementationDataType. Tags: atp.recommendedPackage=PortInterfaceToDataTypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataTypeMappingSet	DataTypeMappingSet	*	ref	This represents the reference to the applicable data TypemappingSet Tags: atp.StatusComment=Reserved for adaptive platform
portInterface	PortInterface	0..1	ref	This represents the reference to the applicable Port Interface Tags: atp.StatusComment=Reserved for adaptive platform

Table 4.12: PortInterfaceToDataTypeMapping

[constr_10134] Multiplicity of reference in the role **PortInterfaceTo-DataTypeMapping.dataTypeMappingSet**

Imposition time: IT_BefAraApiGen

[For each **PortInterfaceToDataTypeMapping**, the reference in the role **dataTypeMappingSet** shall exist at least once.]

[constr_10135] Multiplicity of reference in the role `PortInterfaceToDataTypeMapping.portInterface`

Imposition time: `IT_BefAraApiGen`

[For each `PortInterfaceToDataTypeMapping`, the reference in the role `portInterface` shall exist.]

Class	DataTypeMappingSet			
Note	This class represents a list of mappings between <code>ApplicationDataTypes</code> and <code>ImplementationDataTypes</code> . In addition, it can contain mappings between <code>ImplementationDataTypes</code> and <code>ModeDeclarationGroups</code> . Tags: atp.recommendedPackage=DataTypeMappingSets			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>AtpBlueprint</code> , <code>AtpBlueprintable</code> , <code>CollectableElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
dataTypeMap	<code>DataTypeMap</code>	*	aggr	This is one particular association between an <code>ApplicationDataType</code> and its <code>AbstractImplementationDataType</code> .
modeRequestTypeMap	<code>ModeRequestTypeMap</code>	*	aggr	This is one particular association between an <code>ModeDeclarationGroup</code> and its <code>AbstractImplementationDataType</code> .

Table 4.13: DataTypeMappingSet

Class	DataTypeMap			
Note	This class represents the relationship between <code>ApplicationDataType</code> and its implementing <code>AbstractImplementationDataType</code> .			
Base	<code>ARObject</code>			
Aggregated by	<code>DataTypeMappingSet.dataTypeMap</code>			
Attribute	Type	Mult.	Kind	Note
applicationDataType	<code>ApplicationDataType</code>	0..1	ref	This is the corresponding <code>ApplicationDataType</code>
implementationDataType	<code>AbstractImplementationDataType</code>	0..1	ref	This is the corresponding <code>AbstractImplementationDataType</code> .

Table 4.14: DataTypeMap

4.3 Service Interface Mapping

Please note that, according to [TPS_MANI_01007], the `ServiceInterface` becomes the single basis for both VFB-based and *external* (i.e. using communication networks) communication.

This concept is in stark contrast to the approach on the *AUTOSAR classic platform* where different model elements are used for the VFB-level (`PortInterface`) and the network-level (`SystemSignal`, `ISignal`, and `ISignalIPdu`).

The usage of different model elements optimally supports the existence of different granularity for VFB-based vs. network-based communication.

In other words, design of communication on the network level may be subject to different design restrictions, e.g. keep the bus load caused by service discovery manageable by defining coarse-grained communication packages.

Opposed to that, designers on the VFB level may want to define interface granularity to achieve maximum reusability.

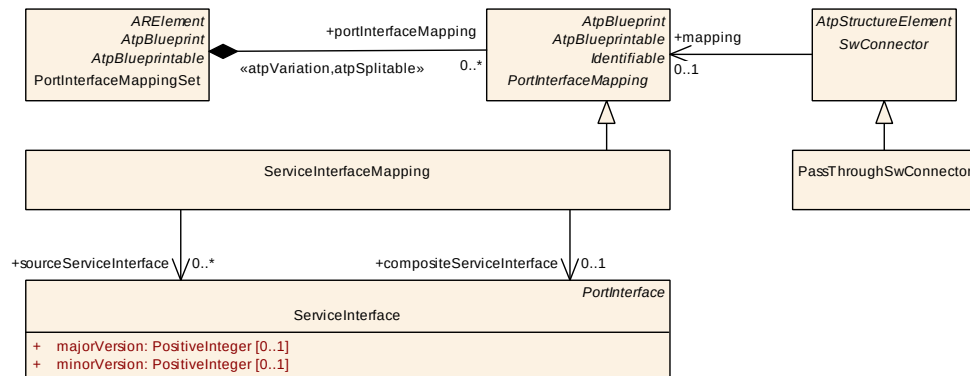


Figure 4.6: Modeling of the `ServiceInterfaceMapping`

[TPS_MANI_01002] Semantics of meta-class `ServiceInterfaceMapping` [In order to sort out a potentially different motivation between the definition of

- `ServiceInterfaces` explicitly designed for VFB-based communication and
- `ServiceInterfaces` explicitly designed for network-based communication

meta-class `ServiceInterfaceMapping` is available to map

- (fine-grained) `ServiceInterfaces` for the VFB-communication to
- (coarse-grained) `ServiceInterfaces` for network communication.

]

[TPS_MANI_01032] Usage of `ServiceInterfaceMapping` [It is possible to derive a dedicated `AdaptiveApplicationSwComponentType` that implements the mapping functionality. A `SwComponentPrototype` derived from this so-called *facade* software-component would expose `PortPrototypes` for each of the `ServiceInterfaces`.

Other `SwComponentPrototypes` could then “connect” to the `PortPrototypes` typed by `ServiceInterfaces` referenced in the role `sourceServiceInterface`.

This means that the `PortPrototype` typed by the `ServiceInterface` referenced in the role `compositeServiceInterface` is used for external communication.

`PassThroughSwConnectors` can be used to describe in the modeled *facade CompositionSwComponentType* which “fine-grained” Ports are combined to a “coarse-grained” Port that is used for network communication. The mapping of Service Interface elements of the “fine-grained” Ports to the Service Interface elements of the

“course-grained” Port is described with the [ServiceInterfaceMapping](#) or rather [ServiceInterfaceElementMapping](#).]

Please note that the modeling of a *facade* [SwComponentType](#) does not make any assumptions about the implementation and about the realization of such a *facade* functionality. The *facade* may be realized by an Adaptive Software Component/Application or it may be realized by a “Network-Daemon”. AUTOSAR does not define any instructions for the implementation of such a functionality and the decision is project specific.

The behavioral aspects of such a “facade” (e.g. timing of offering the coarse-grained service instance) are also project-specific and are not pre-defined by AUTOSAR.

[Figure 4.7](#) summarizes the idea behind the creation of a *facade* software-component. The latter is able to “bundle” the communication of different [PortPrototypes](#) owned by potentially different [SwComponentTypes](#) for external communication.

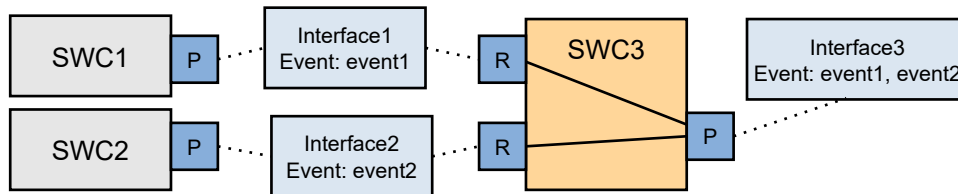


Figure 4.7: Concept of a facade software-component

In other words, elements `event1` owned by `SWC1` and `event2` owned by `SWC2` are combined into one [ServiceInterface](#) used to type one [PortPrototype](#) of the *facade* software-component.

From the communication-related outside point-of-view, `SWC3` acts like a facade to the “inner structure” created by `SWC1` and `SWC2` that is, by way of the existence of `SWC3`, abstracted away.

[constr_5056] Restriction of sub-class of [CompositionSwComponentType.connector](#)

Imposition time: `IT_BefAraApiGen`

[In the context of a [CompositionSwComponentType.connector](#) (transitively) referenced by a [Executable.rootSwComponentPrototype](#), the only supported sub-class of [SwConnector](#) is [PassThroughSwConnector](#).]

[constr_5057] [PassThroughSwConnector](#) and [ServiceInterfaceMapping](#)

Imposition time: `IT_BefAraApiGen`

[If a [PassThroughSwConnector](#) is defined between two Ports in a [CompositionSwComponentType](#) either:

- a [ServiceInterfaceMapping](#) between the [ServiceInterfaces](#) of these two Ports shall be defined and the [PassThroughSwConnector](#) shall reference the relevant [ServiceInterfaceMapping](#) in the role `mapping` or

- `ServiceInterfaceElementMappings` for elements of `ServiceInterfaces` of the two Ports shall be defined and the `PassThroughSwConnector` shall reference the relevant `ServiceInterfaceElementMappings` in the role `serviceInterfaceElementMapping`.

]

[TPS_MANI_01022] Concept behind `ServiceInterfaceMapping` [The concept behind the definition of a `ServiceInterfaceMapping` is that **all elements** of the `sourceServiceInterface` are required to have a **counterpart of the same kind** (`ServiceInterface.event`, `ServiceInterface.field`, or `ServiceInterface.method`) and with the identical `shortName`.]

The regulation stated in [TPS_MANI_01022] is exemplified in Figure 4.8.

Please note that the creation of a `ServiceInterfaceMapping` is considered an atomic step, it is unlikely that such a `ServiceInterfaceMapping` is partially created and then later finished by a different party.

After all, there are mutually exclusive ways to specify the mapping, and any creator of a partial mapping of `ServiceInterfaces` could not be sure which of the alternatives apply for a specific pairing of one `ServiceInterface` with another without already knowing the other `ServiceInterface` (in which case the mapping can already be completed).

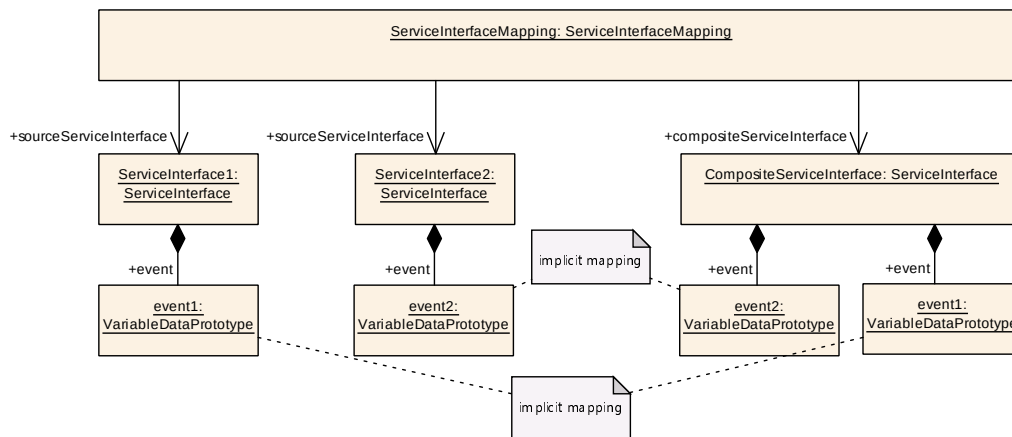


Figure 4.8: Example for the application of a `ServiceInterfaceMapping`

[TPS_MANI_01003] Limitation of the applicability of `ServiceInterfaceMapping` [The applicability of the `ServiceInterfaceMapping` is limited to cases where the `shortNames` of the elements of the `compositeServiceInterface` are **unique** in the context of the `compositeServiceInterface`.]

Class	ServiceInterfaceMapping			
Note	Specifies one ServiceInterfaceMapping that allows to define that a ServiceInterface is composite of several other ServiceInterfaces. Tags: atp.recommendedPackage=ServiceInterfaceMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpBlueprint, AtpBlueprintable, Identifiable , MultilanguageReferrable, PortInterfaceMapping, Referrable			
Aggregated by	PortInterfaceMappingSet.portInterfaceMapping			
Attribute	Type	Mult.	Kind	Note
composite ServiceInterface	ServiceInterface	0..1	ref	This represents the composite ServiceInterface.
sourceService Interface	ServiceInterface	*	ref	ServiceInterface that is mapped into the composite ServiceInterface.

Table 4.15: ServiceInterfaceMapping

[constr_10136] Multiplicity of reference in the role [ServiceInterfaceMapping.compositeServiceInterface](#)

Imposition time: IT_BefAraApiGen

[For each [ServiceInterfaceMapping](#), the reference in the role [compositeServiceInterface](#) shall exist.]

[constr_10137] Multiplicity of reference in the role [ServiceInterfaceMapping.sourceServiceInterface](#)

Imposition time: IT_BefAraApiGen

[For each [ServiceInterfaceMapping](#), the reference in the role [sourceServiceInterface](#) shall exist at least once.]

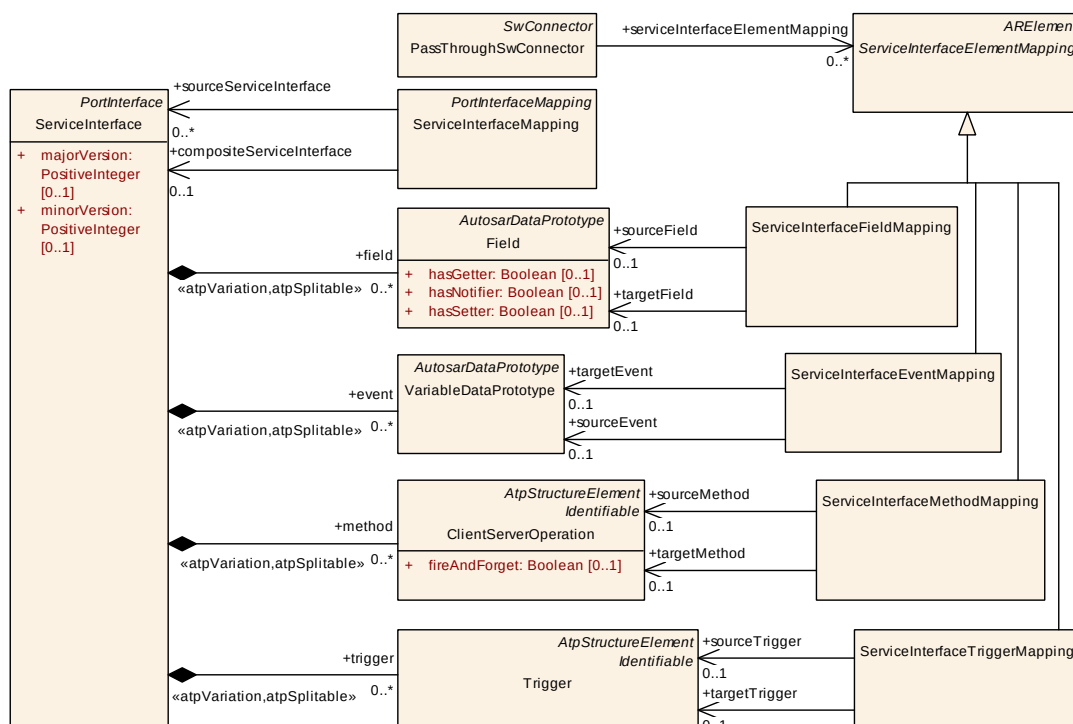


Figure 4.9: Overview of the modeling of the [ServiceInterfaceMapping](#) and [ServiceInterfaceElementMapping](#)

Note that the [ServiceInterfaceMapping](#) is not an up-front association (by means of [SwConnectors](#)) between communication ends in the sense of [Chapter 4.2.6](#).

As stated in [\[TPS_MANI_01032\]](#), the [ServiceInterfaceMapping](#) allows for the derivation of a facade software-component or a proper configuration of the communication middleware.

The compatibility between the [sourceServiceInterfaces](#) and the [composite-ServiceInterface](#) is achieved by an adequate transformation implemented in the facade software-component or the configuration of the middleware.

Thus, connecting [ServiceInterfaces](#) (or parts of them) via [ServiceInterfaceMappings](#) is not constrained by any compatibility rules apart from the ones stated in [\[TPS_MANI_01022\]](#).

Class	PassThroughSwConnector			
Note	This kind of SwConnector can be used inside a CompositionSwComponentType to connect two delegation PortPrototypes .			
Base	ARObject , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , Referrable , SwConnector			
Aggregated by	AtpClassifier.atpFeature , CompositionSwComponentType.connector			
Attribute	Type	Mult.	Kind	Note
providedOuter Port	AbstractProvidedPort Prototype	0..1	ref	This represents the provided outer delegation Port Prototype of the PassThroughSwConnector .
requiredOuter Port	AbstractRequiredPort Prototype	0..1	ref	This represents the required outer delegation Port Prototype of the PassThroughSwConnector .
serviceInterface Element Mapping	ServiceInterface ElementMapping	*	ref	Reference to a ServiceInterfaceElementMapping specifying the mapping of unequal named ServiceInterface elements of the two different ServiceInterfaces typing the two PortPrototypes which are referenced by the PassThroughSwConnector . This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 4.16: PassThroughSwConnector

4.4 Service Interface Element Mapping

4.4.1 Overview

The existence of the [ServiceInterfaceMapping](#) leaves the question about how [ServiceInterfaces](#) where elements have non-matching [shortName](#) can be mapped.

The answer to this question is provided by the ability to create an element-wise mapping of elements of the same kind.

An example of the definition of a [ServiceInterfaceEventMapping](#) can be found in [Chapter B.2.2.1](#).

[constr_1482] Mapping of service interfaces vs. mapping of service interface elements*Imposition time:* `IT_BefAraApiGen`

[In order to establish a mapping between a given pair of `ServiceInterfaces`, at most **one of** the following alternatives can exist:

- the given pair of `ServiceInterfaces` is referenced by a `ServiceInterfaceMapping`, where one `ServiceInterface` is referenced in the role `sourceServiceInterface` and the other `ServiceInterface` is referenced in the role `compositeServiceInterface`.
- an arbitrary mixture of the following options exists:
 - an `event` aggregated by one of the given `ServiceInterfaces` is referenced by a `ServiceInterfaceEventMapping` in the role `sourceEvent` and one `events` aggregated by the other given `ServiceInterface` is referenced by the same `ServiceInterfaceEventMapping` in the role `targetEvent`.
 - a `trigger` aggregated by one of the given `ServiceInterfaces` is referenced by a `ServiceInterfaceTriggerMapping` in the role `sourceTrigger` and one `trigger` aggregated by the other given `ServiceInterface` is referenced by the same `ServiceInterfaceTriggerMapping` in the role `targetTrigger`.
 - a `field` aggregated by one of the given `ServiceInterfaces` is referenced by a `ServiceInterfaceFieldMapping` in the role `sourceField` and one `fields` aggregated by the other given `ServiceInterface` is referenced by the same `ServiceInterfaceFieldMapping` in the role `targetField`.
 - a `method` aggregated by one of the given `ServiceInterfaces` is referenced by a `ServiceInterfaceMethodMapping` in the role `sourceMethod` and one `methods` aggregated by the other given `ServiceInterface` is referenced by the same `ServiceInterfaceMethodMapping` in the role `targetMethod`.

]

Of course, it is possible that the same `ServiceInterface` is referenced by mappings to elements and mappings to entire `ServiceInterfaces`. The limitation formalized in [\[constr_1482\]](#) always applies to a **pair** of `ServiceInterfaces`.

A mapping between elements of `ServiceInterfaces` is modeled by means of a subclass of the abstract meta-class `ServiceInterfaceElementMapping`.

Please note that the creation of a `ServiceInterfaceElementMapping` is considered an atomic step, i.e. it is unlikely that such a `ServiceInterfaceElementMapping` is partially created, handed over to a different party and then later finished by that different party.

After all, there are mutually exclusive ways to specify the mapping, and any creator of a partial mapping of `ServiceInterfaces` could not be sure which of the alternatives apply for a specific pairing of one `ServiceInterface` with another without already knowing the other `ServiceInterface` (in which case the mapping can already be completed).

Class	<code>ServiceInterfaceElementMapping</code> (abstract)			
Note	This abstract meta-class acts as base class for the mapping of specific elements of a <code>ServiceInterface</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ServiceInterfaceEventMapping , ServiceInterfaceFieldMapping , ServiceInterfaceMethodMapping , ServiceInterfaceTriggerMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.17: `ServiceInterfaceElementMapping`

Therefore, there is no need to set the lower multiplicity of the references to elements of the `ServiceInterface` to 0.

[TPS_MANI_03277] `ServiceInterfaceElementMappings` for a subset of elements of a single `ServiceInterface` [If elements of a source `ServiceInterface` are mapped to target `ServiceInterface` elements by `ServiceInterfaceElementMappings` it is allowed that only a subset of those source `ServiceInterface` elements are mapped to the target `ServiceInterface` elements.]

With [TPS_MANI_03277] use cases are supported as shown in Figure 4.10 where the event4 and method2 of `ServiceInterface2` that is provided by AppM1_2 are used only locally on the Machine1 and event3 of the same `ServiceInterface` is provided together with the `ServiceInterface1` elements as new SOME/IP Service over the network.

Please note that the modeling of a facade `SwComponentType` does not make any assumptions about the implementation and about the realization of such a facade functionality.

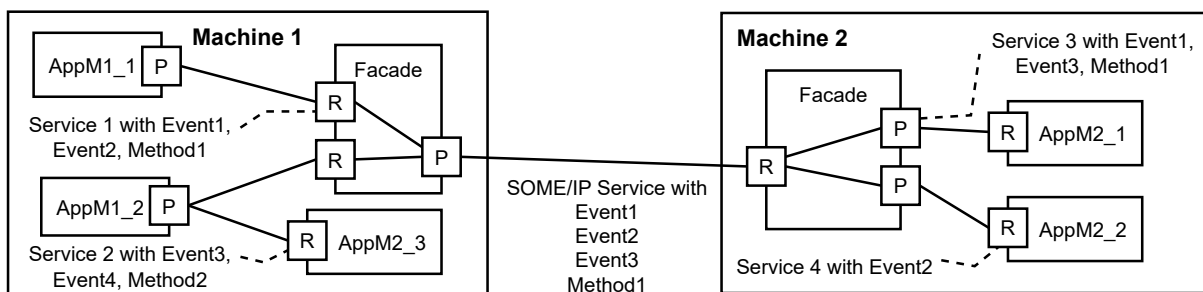


Figure 4.10: Example for `ServiceInterfaceElementMapping` for a subset of elements of a single `ServiceInterface` on the provider side

AUTOSAR does not define any instructions for the implementation of such a functionality and the decision is project specific.

The behavioral aspects of such a “facade” (e.g. when is the coarse-grained `ProvidedApServiceInstance` offered) are also project-specific and are not predefined by AUTOSAR.

Similar use cases are applicable on the Consumer side as well as shown in Figure 4.11 where the Facade component is the service consumer of a SOME/IP service with event1, event2 and event3, and method1 but only event1, event3 and method1 are used by Software that is deployed on Machine2.

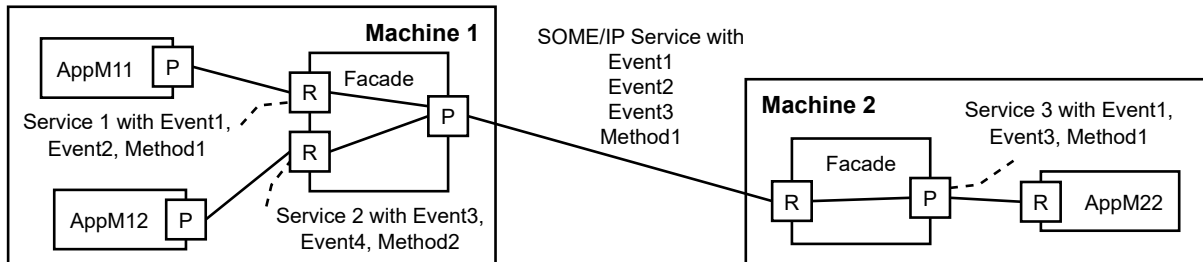


Figure 4.11: Example for `ServiceInterfaceElementMapping` for a subset of elements of a single `ServiceInterface` on the consumer side

4.4.2 Service Interface Event Mapping

[TPS_MANI_01024] Semantics of `ServiceInterfaceEventMapping` [Meta-class `ServiceInterfaceEventMapping` has the ability to map a `ServiceInterface.event` referenced in the role `sourceEvent` explicitly to another `ServiceInterface.event` referenced in the role `targetEvent`.]

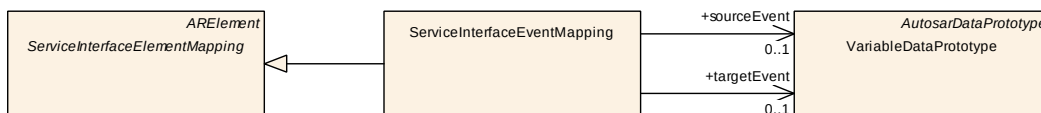


Figure 4.12: Modeling of the `ServiceInterfaceEventMapping`

Class	ServiceInterfaceEventMapping			
Note	This meta-class allows to define a mapping between events of ServiceInterfaces that are mapped to each other by the ServiceInterfaceMapping. Tags: atp.recommendedPackage=ServiceInterfaceElementMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, ServiceInterfaceElementMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sourceEvent	VariableDataPrototype	0..1	ref	Reference to an event that is contained in the source ServiceInterface.
targetEvent	VariableDataPrototype	0..1	ref	Reference to an event that is contained in the composite ServiceInterface.

Table 4.18: ServiceInterfaceEventMapping

[constr_10138] Multiplicity of reference in the role `ServiceInterfaceEventMapping.sourceEvent`

Imposition time: `IT_BefAraApiGen`

[For each `ServiceInterfaceEventMapping`, the reference in the role `sourceEvent` shall exist.]

[constr_10139] Multiplicity of reference in the role `ServiceInterfaceEventMapping.targetEvent`

Imposition time: `IT_BefAraApiGen`

[For each `ServiceInterfaceEventMapping`, the reference in the role `targetEvent` shall exist.]

The explicit mapping implemented by `ServiceInterfaceEventMapping` does **not** require equal `shortNames` on both sides of the mapping.

It is also possible to map a given `event` of a given `ServiceInterface` multiple times in different roles to the `ServiceInterface` that aggregates the `targetEvent`, as exemplified by [Figure B.17](#).

Please note that the mapping of one `sourceEvent` to different `targetEvents` does **not** represent a *fan-out* of any kind.

It only means that the `sourceEvent` will be used in different roles, as specified in the target-configuration. For more explanation, please find an example of how the role-based mapping of elements of `ServiceInterfaces` works in [Figure B.24](#).

4.4.3 Service Interface Trigger Mapping

[TPS_MANI_03289] Semantics of `ServiceInterfaceTriggerMapping` [Meta-class `ServiceInterfaceTriggerMapping` has the ability to map a `ServiceInterface.trigger` referenced in the role `sourceTrigger` explicitly to another `ServiceInterface.trigger` referenced in the role `targetTrigger`.]

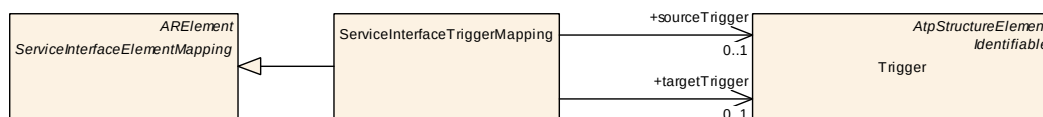


Figure 4.13: Modeling of the `ServiceInterfaceTriggerMapping`

Class	<code>ServiceInterfaceTriggerMapping</code>
Note	This meta-class allows to define a mapping between triggers of <code>ServiceInterfaces</code> that are mapped to each other by the <code>ServiceInterfaceMapping</code>. Tags: <code>atp.recommendedPackage=ServiceInterfaceElementMappings</code> This Class is only used by the AUTOSAR Adaptive Platform.





Class	ServiceInterfaceTriggerMapping			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInterfaceElementMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sourceTrigger	Trigger	0..1	ref	Reference to a trigger that is contained in the source ServiceInterface.
targetTrigger	Trigger	0..1	ref	Reference to a trigger that is contained in the target ServiceInterface.

Table 4.19: ServiceInterfaceTriggerMapping

The explicit mapping implemented by [ServiceInterfaceTriggerMapping](#) does **not** require equal [shortNames](#) on both sides of the mapping.

It is also possible to map a given [trigger](#) of a given [ServiceInterface](#) multiple times in different roles to the [ServiceInterface](#) that aggregates the [targetTrigger](#).

Please note that the mapping of one [sourceTrigger](#) to different [targetTriggers](#) does **not** represent a *fan-out* of any kind.

It only means that the [sourceTrigger](#) will be used in different roles, as specified in the target-configuration.

4.4.4 Service Interface Field Mapping

[TPS_MANI_01025] Semantics of [ServiceInterfaceFieldMapping](#) [Meta-class [ServiceInterfaceFieldMapping](#) has the ability to map a [ServiceInterface.field](#) referenced in the role [sourceField](#) explicitly to another [ServiceInterface.field](#) referenced in the role [targetField](#).]

The explicit mapping implemented by [ServiceInterfaceFieldMapping](#) does **not** require equal [shortNames](#) on both sides of the mapping.

It is also possible to map a given [field](#) of a given [ServiceInterface](#) multiple times in different roles to the [ServiceInterface](#) that aggregates the [targetField](#), as exemplified by [Figure B.18](#).

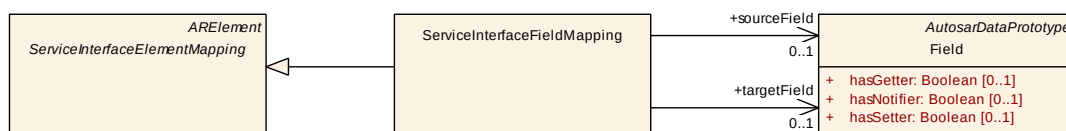


Figure 4.14: Modeling of the [ServiceInterfaceFieldMapping](#)

Class	ServiceInterfaceFieldMapping			
Note	This meta-class allows to define a mapping between fields of ServiceInterfaces that are mapped to each other by the ServiceInterfaceMapping. Tags: atp.recommendedPackage=ServiceInterfaceElementMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInterfaceElementMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sourceField	Field	0..1	ref	Reference to a field that is contained in the source ServiceInterface.
targetField	Field	0..1	ref	Reference to a field that is contained in the composite ServiceInterface.

Table 4.20: ServiceInterfaceFieldMapping

[constr_10140] Multiplicity of reference in the role [ServiceInterfaceFieldMapping.sourceField](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [ServiceInterfaceFieldMapping](#), the reference in the role [sourceField](#) shall exist.]

[constr_10141] Multiplicity of reference in the role [ServiceInterfaceFieldMapping.targetField](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [ServiceInterfaceFieldMapping](#), the reference in the role [targetField](#) shall exist.]

Please note that the mapping of one [sourceField](#) to different [targetFields](#) does **not** represent a *fan-out* of any kind.

It only means that the [sourceField](#) will be used in different roles, as specified in the target-configuration. For more explanation, please find an example of how the role-based mapping of elements of [ServiceInterfaces](#) works in [Figure B.24](#).

4.4.5 Service Interface Method Mapping

[TPS_MANI_01026] Semantics of [ServiceInterfaceMethodMapping](#) [Meta-class [ServiceInterfaceMethodMapping](#) has the ability to map a [ServiceInterface.method](#) referenced in the role [sourceMethod](#) explicitly to another [ServiceInterface.method](#) referenced in the role [targetMethod](#).]

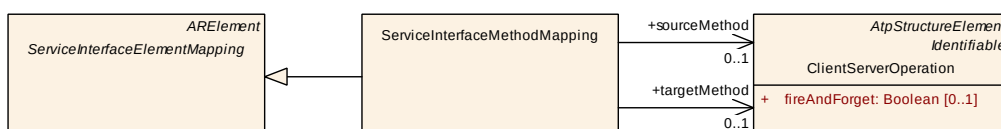


Figure 4.15: Modeling of the [ServiceInterfaceMethodMapping](#)

Class	ServiceInterfaceMethodMapping			
Note	This meta-class allows to define a mapping between methods of ServiceInterfaces that are mapped to each other by the ServiceInterfaceMapping. Tags: atp.recommendedPackage=ServiceInterfaceElementMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInterfaceElementMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sourceMethod	ClientServerOperation	0..1	ref	Reference to a method that is contained in the source ServiceInterface.
targetMethod	ClientServerOperation	0..1	ref	Reference to a method that is contained in the composite ServiceInterface.

Table 4.21: ServiceInterfaceMethodMapping

[constr_10142] Multiplicity of reference in the role [ServiceInterfaceMethodMapping.sourceMethod](#)*Imposition time:* [IT_BefAraApiGen](#)

[For each [ServiceInterfaceMethodMapping](#), the reference in the role [sourceMethod](#) shall exist.]

[constr_10143] Multiplicity of reference in the role [ServiceInterfaceMethodMapping.targetMethod](#)*Imposition time:* [IT_BefAraApiGen](#)

[For each [ServiceInterfaceMethodMapping](#), the reference in the role [targetMethod](#) shall exist.]

The explicit mapping implemented by [ServiceInterfaceMethodMapping](#) does **not** require equal [shortNames](#) on both sides of the mapping.

It is also possible to map a given [method](#) of a given [ServiceInterface](#) multiple times in different roles to the [ServiceInterface](#) that aggregates the [targetMethod](#), as exemplified by [Figure B.19](#).

Please note that the mapping of one [sourceMethod](#) to different [targetMethods](#) does **not** represent a *fan-out* of any kind.

It only means that the [sourceMethod](#) will be used in different roles, as specified in the target-configuration. For more explanation, please find an example of how the role-based mapping of elements of [ServiceInterfaces](#) works in [Figure B.24](#).

4.5 State Management Interface

4.5.1 Overview

[PortInterfaces](#) defined in the context of State Management are supposed to be used by the modeling of the State Management itself, i.e. the [PortInterfaces](#) described in this chapter shall be used to type [PortPrototypes](#) in the context of one or more [Executable\(s\)](#) that implement(s) the State Management.

There are two kinds of [PortInterfaces](#) used in the context of State Management:

- [ServiceInterface](#), see [Chapter 4.2](#)
- sub-classes of [StateManagementPortInterface](#), see [Figure 4.16](#)

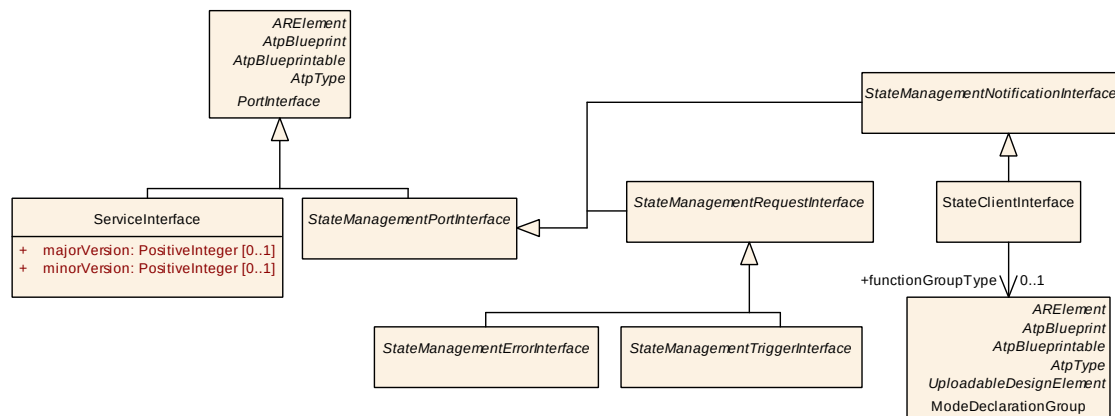


Figure 4.16: Big picture of State Management interface modeling

Furthermore, the subclasses of [StateManagementPortInterface](#) are subdivided in [PortInterfaces](#) for the processing of requests to State Management (represented by abstract class [StateManagementRequestInterface](#)) and the notification of state switches, modeled as abstract class [StateManagementNotificationInterface](#).

The “big picture” of the modeling of [PortInterfaces](#) for State Management is depicted in [Figure 4.16](#).

Class	<i>StateManagementPortInterface</i> (abstract)			
Note	This abstract class acts as a base class for PortInterfaces that are used in the context of state management on the AUTOSAR adaptive platform. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	StateManagementNotificationInterface , StateManagementRequestInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.22: StateManagementPortInterface

In terms of requests, State Management interacts with a variety of function cluster modules and the interaction patterns, as well as the underlying APIs are very diverse. Therefore, it is necessary (for the use cases that don't utilize [ServiceInterfaces](#)) to define a collection of different [PortInterfaces](#) separately for the two main request use cases:

- Processing of “triggers”, see [Chapter 4.5.3](#)
- Processing of “errors”, see [Chapter 4.5.4](#)

Class	StateManagementNotificationInterface (abstract)			
Note	This meta-class acts as an abstract base class for state management notification interfaces. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementPortInterface			
Subclasses	StateClientInterface , StateManagementFunctionGroupSwitchNotificationInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.23: StateManagementNotificationInterface

Class	StateManagementRequestInterface (abstract)			
Note	This meta-class acts as an abstract base class for state management request interfaces. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementPortInterface			
Subclasses	StateManagementErrorInterface , StateManagementTriggerInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.24: StateManagementRequestInterface

Consequently, further abstract base classes are introduced to organize the definition of [PortInterfaces](#) for the different State Management use cases:

- [StateManagementTriggerInterface](#)
- [StateManagementErrorInterface](#)

Class	StateManagementTriggerInterface (abstract)			
Note	The usage of this meta-class for typing a PortPrototype indicates that the PortPrototype is used for the trigger provision in the context of state management on the AUTOSAR adaptive platform. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			





Class	StateManagementTriggerInterface (abstract)			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementPortInterface , StateManagementRequestInterface			
Subclasses	StateManagementDiagTriggerInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.25: StateManagementTriggerInterface

Class	StateManagementErrorInterface (abstract)			
Note	The usage of this meta-class for typing a PortPrototype indicates that the PortPrototype is used for the error provision in the context of state management on the AUTOSAR adaptive platform. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementPortInterface , StateManagementRequestInterface			
Subclasses	StateManagementEmErrorInterface , StateManagementPhmErrorInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.26: StateManagementErrorInterface

4.5.2 State Management Interfaces for Notifications

As depicted by [Figure 4.17](#), there are two kinds of notification that the State Management needs to support:

- Notification of [Function Group](#) state switch. This notification is typically directed at the execution management, it is formalized as [StateManagementFunctionGroupSwitchNotificationInterface](#).
- Notification of the switch of an “internal” state, represented by a [field](#) owned by a [ServiceInterface](#).

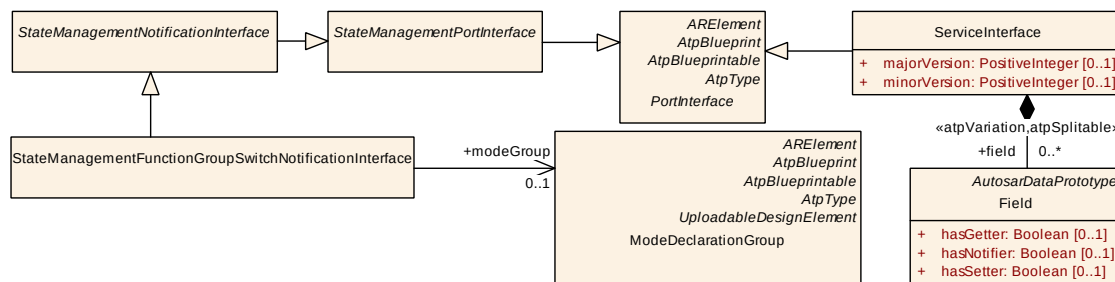


Figure 4.17: Modeling of [StateManagementPortInterfaces](#) for state switch notifications

Class	StateManagementFunctionGroupSwitchNotificationInterface			
Note	The usage of this meta-class for typing a PortPrototype indicates that the PortPrototype is used for sending out a notification of a function group state change in the context of state management on the AUTOSAR adaptive platform. Tags: atp.Status=draft atp.recommendedPackage=StateManagementPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementNotificationInterface , StateManagementPortInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
modeGroup	ModeDeclarationGroup	0..1	ref	This reference identifies the ModeDeclarationGroup that defines the individual states that that can be switched to. Tags: atp.Status=draft

Table 4.27: StateManagementFunctionGroupSwitchNotificationInterface

[constr_10389] Existence of attribute [StateManagementFunctionGroupSwitchNotificationInterface.modeGroup](#)

Status: DRAFT

Imposition time: IT_Mani

[For each [StateManagementFunctionGroupSwitchNotificationInterface](#), the aggregation in the role [modeGroup](#) shall exist.]

4.5.3 State Management Interfaces for Triggers

In the majority of cases, communication of triggers is done by means of [ServiceInterface](#). The notable exception from this rule is the diagnostics management, which uses a dedicated subclass of [StateManagementTriggerInterface](#): [StateManagementDiagTriggerInterface](#).

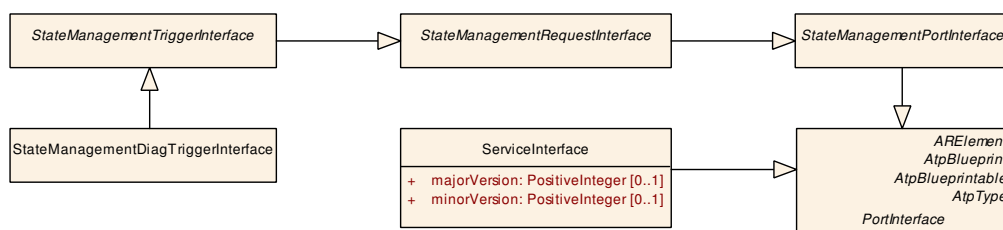


Figure 4.18: Modeling of State Management trigger interfaces

Class	StateManagementDiagTriggerInterface
Note	This meta-class indicates that the PortPrototype that references this class is used for accepting a state change trigger from the diagnostics management. Tags: atp.Status=draft atp.recommendedPackage=StateManagementPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.





Class	StateManagementDiagTriggerInterface			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementPortInterface , StateManagementRequestInterface , StateManagementTriggerInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.28: StateManagementDiagTriggerInterface

4.5.4 State Management Interfaces for Errors

In contrast to the communication of triggers, errors in the context of State Management are entirely handled by dedicated subclasses of [StateManagementErrorInterface](#), as depicted in [Figure 4.19](#).

As of the current state of interaction patterns with the State Management, two functional clusters report errors directly to State Management:

- For Execution Management (see [13, SWS Execution Management]), State Management exposes a [PortPrototype](#) typed by [StateManagementEmErrorInterface](#).
- For Platform Health Management (see [14, SWS Platform Health Management]), State Management exposes a [PortPrototype](#) typed by [StateManagementPhmErrorInterface](#).

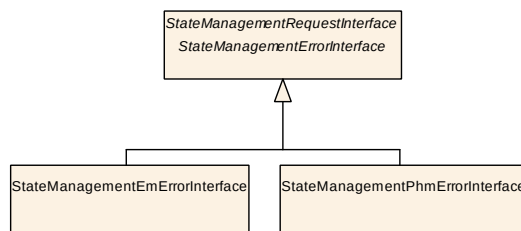


Figure 4.19: Modeling of State Management error interfaces

Class	StateManagementEmErrorInterface			
Note	This meta-class indicates that the PortPrototype that references this class is used for accepting a error submissions from the execution management. Tags: atp.Status=draft atp.recommendedPackage=StateManagementPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementErrorInterface , StateManagementPortInterface , StateManagementRequestInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.29: StateManagementEmErrorInterface

Class	StateManagementPhmErrorInterface			
Note	This meta-class indicates that the PortPrototype that references this class is used for accepting a error submissions from the platform health management. Tags: atp.Status=draft atp.recommendedPackage=StateManagementPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementErrorInterface , StateManagementPortInterface , StateManagementRequestInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.30: StateManagementPhmErrorInterface

4.5.5 State Client Interface

[TPS_MANI_01473] Semantics of [StateClientInterface](#)

Status: DRAFT

[The [StateClientInterface](#) is used to type an [RPortPrototype](#) over which function group changes are communicated from the *State Management* to the *Execution Management*.]

Please note that the [StateClientInterface](#) works on type level, i.e. [ModeDeclarationGroup](#) and [ModeDeclaration](#). The connection to a specific function group is created via the [FunctionGroupPortMapping](#) (see [Chapter 12.14.5.3](#)).

Class	StateClientInterface			
Note	This PortInterface is used communicate changes of a function group state towards the Execution Management. Tags: atp.Status=draft atp.recommendedPackage=StateManagementPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable , StateManagementNotificationInterface , StateManagementPortInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
functionGroup Type	ModeDeclarationGroup	0..1	ref	This reference identifies the ModeDeclarationGroup that shall be used in the API of the StateClientInterface. Tags: atp.Status=draft

Table 4.31: StateClientInterface

[constr_10616] Existence of the reference in the role **StateClientInterface**.
functionGroupType

Status: DRAFT

Imposition time: IT_Mani

[For each **StateClientInterface**, the reference in the role **functionGroupType** shall exist.]

4.6 Persistency Interface

4.6.1 Overview

4.6.1.1 The big Picture

The *AUTOSAR adaptive platform* foresees a support for access to persistent data by e.g. application software.

There are some similarities to the communication model in terms of the usage of **PortPrototypes**.

In contrast to the configuration of communication, however, the modeling approach is much less detailed (i.e. instead of providing access to individual elements of a key-value storage an entire key-value storage is accessible on the level of **PortPrototype**).

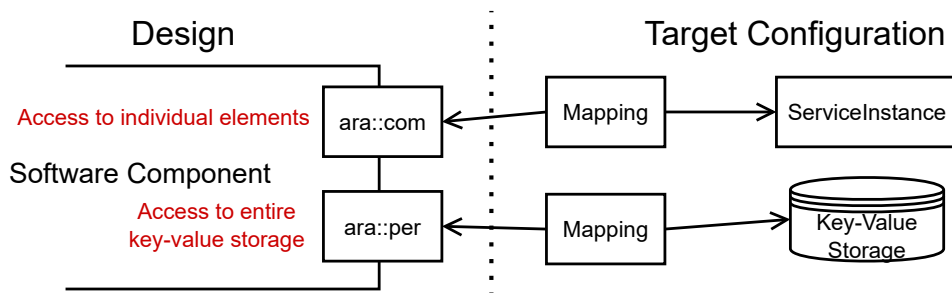


Figure 4.20: General approach for the modeling of persistency

The aspect of target-configuration for the configuration of persistent data is explained in [Figure 4.20](#).

Please note that the AUTOSAR meta-model actually defines two separate meta-classes (for more details, please refer to [Figure 4.21](#)) for the different use cases of access to persistent data (i.e. **PersistencyKeyValueStorageInterface**) and access to files on the file system, or maybe an emulation of one (by means of **PersistencyFileStorageInterface**).

4.6.1.2 Modeling of Persistency Interface

Abstract meta-class `PersistencyInterface` has been created as a means of categorization, i.e. it allows for easily referring to `PortInterfaces` dedicated to persistency in general.

As a counterpart to the abstract base class `PersistencyInterface` on interface level, meta-class `PersistencyInterfaceElement` has been defined as an abstract base class for elements of a `PersistencyInterface`.

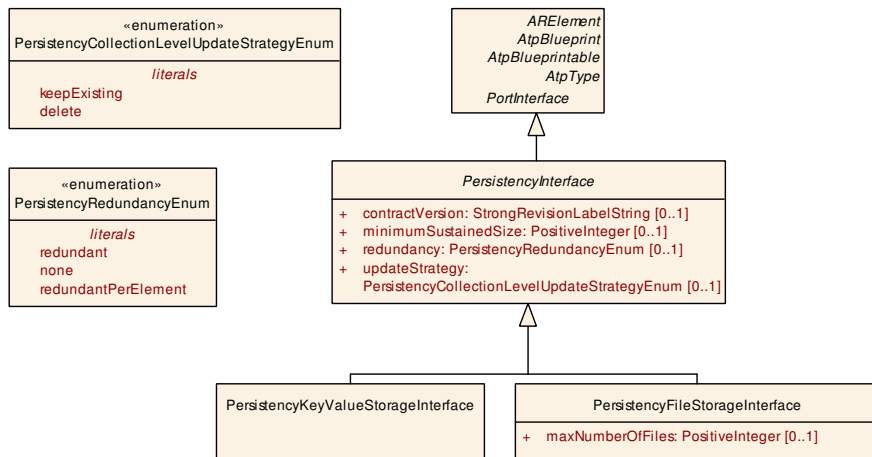


Figure 4.21: Specification of `PortInterfaces` for persistency use cases

Class	<code>PersistencyInterfaceElement</code> (abstract)			
Note	This meta-class provides the abstract ability to define an element of a <code>PortInterface</code> for the support of persistency use cases. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Subclasses	<code>PersistencyDataElement</code> , <code>PersistencyFileElement</code>			
Attribute	Type	Mult.	Kind	Note
updateStrategy	<code>PersistencyElementLevelUpdateStrategyEnum</code>	0..1	attr	This attribute can be used to specify the update strategy of the respective <code>PersistencyInterfaceElement</code> .

Table 4.32: `PersistencyInterfaceElement`

[constr_10427] Multiplicity of attribute `PersistencyInterfaceElement.updateStrategy`

Imposition time: `IT_Mani`

[For each `PersistencyInterfaceElement`, the attribute `updateStrategy` shall exist.]

[TPS_MANI_01194] **Semantics of `PersistencyInterface.minimumSustainedSize`** [Attribute `PersistencyInterface.minimumSustainedSize` can be used for the definition of a minimum amount of storage that the `PersistencyInterface` will need to allocate from the application designer's point of view.]

Class	PersistencyInterface (abstract)			
Note	This meta-class provides the abstract ability to define a PortInterface for the support of persistency use cases. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	PersistencyFileStorageInterface , PersistencyKeyValueStorageInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
contractVersion	StrongRevisionLabel String	0..1	attr	This attribute represents the contract version that is used to determine whether the Persistency configuration experienced structural changes and is also used for the check for data type compatibility.
minimum SustainedSize	PositiveInteger	0..1	attr	The value of this attribute represents the minimum size (unit: bytes) required at design time for the enclosing PersistencyInterface.
redundancy	PersistencyRedundancy Enum	0..1	attr	This attribute represents a requirement towards the redundancy of storage.
redundancy Handling	PersistencyRedundancy Handling	*	aggr	This aggregation represents the chosen approaches to handle redundancy for the various use cases implemented by subclasses Stereotypes: atpSplittable Tags: atp.Splitkey=redundancyHandling
updateStrategy	PersistencyCollection LevelUpdateStrategy Enum	0..1	attr	This attribute can be used to specify the update strategy of the respective PersistencyInterface as a whole.

Table 4.33: PersistencyInterface

[constr_10485] Existence of [PersistencyInterface.contractVersion](#)*Imposition time:* [IT_BefAraApiGen](#)

[In the context of [PersistencyInterface](#), the attribute in the role [contractVersion](#) shall exist.]

4.6.1.3 Redundancy Handling

[TPS_MANI_01204] Specification of redundancy of persistent data [The attribute [PersistencyInterface.redundancy](#) can be taken to specify whether the respective key-value storage or file storage shall store data redundantly from the perspective of the designer of the software-component.]

The details are left to an integrator who may also decide to overrule the value of [PersistencyInterface.redundancy](#) entirely if there is a use case for that.

[TPS_MANI_01319] Modeling of redundancy in the context of [PersistencyInterface](#) [As an alternative to the ability to use [PersistencyInterface.redundancy](#) for announcing the consideration of redundancy at all, the design level for persistency also provides the ability to provide a more detailed definition of redundant behavior for both key-value storage and files by means of the aggregation of [PersistencyRedundancyHandling](#) at [PersistencyInterface](#).

This modeling is attached to the abstract base class `PersistencyInterface` in order to let both aspects of persistency (i.e. key-value storage and file storage) on the AUTOSAR adaptive platform benefit from the existence of meta-class `PersistencyRedundancyHandling`.]

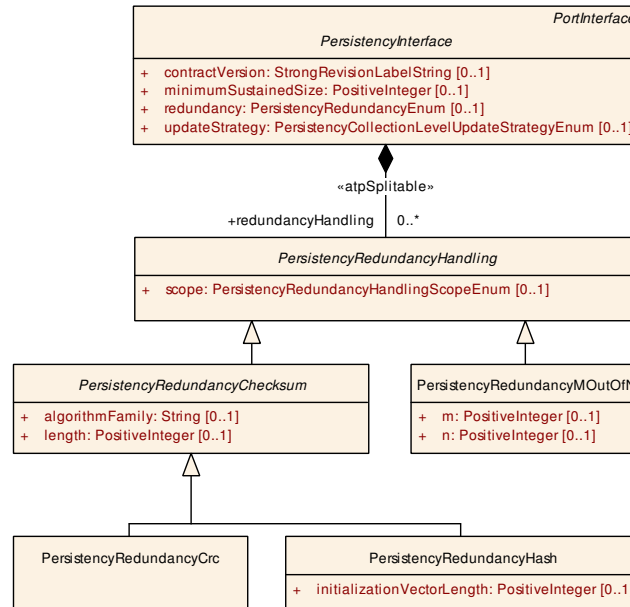


Figure 4.22: Specification of redundancy on the level of `PersistencyInterface`

Enumeration	PersistencyRedundancyEnum
Note	This meta-class provides a way to specify in which way redundancy shall be applied on collection level. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	PersistencyInterface.redundancy
Literal	Description
none	This value represents the requirement that redundancy measures are not applied on persistency storage level. Tags: atp.EnumerationLiteralIndex=1
redundant	This value represents the requirement that redundancy measures are applied on persistency storage level. The nature of the redundant persistent storage is not further qualified and subject to integrator decisions. Tags: atp.EnumerationLiteralIndex=0
redundantPer Element	This value represents the requirement that redundancy measures are applied on key-value level of a key-value storage or on file level of a file storage. The nature of the redundancy used on the persistent storage is not further qualified and subject to integrator decisions. Tags: atp.EnumerationLiteralIndex=2

Table 4.34: PersistencyRedundancyEnum

Class	PersistencyRedundancyHandling (abstract)
Note	This abstract base class represents a formal description of redundancy. This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject





Class	PersistencyRedundancyHandling (abstract)			
Subclasses	PersistencyRedundancyChecksum , PersistencyRedundancyMOutOfN			
Aggregated by	PersistencyDeployment.redundancyHandling , PersistencyInterface.redundancyHandling			
Attribute	Type	Mult.	Kind	Note
scope	PersistencyRedundancyHandlingScopeEnum	0..1	attr	This attribute controls the scope in which the redundancy handling is applied.

Table 4.35: PersistencyRedundancyHandling

[TPS_MANI_01320] Definition of redundancy on interface level may be overruled in target-configuration [The modeling of redundancy by means of [PersistencyInterface.redundancyHandling](#) represents the intention of the designer of the [PersistencyInterface](#).

While this is certainly a valuable input to the target-configuration phase, it is explicitly foreseen that an integrator may overrule the design decision regarding persistency based on superior knowledge only available at target-configuration time.]

[constr_1746] Mutual exclusive existence of [PersistencyInterface.redundancy](#) and [PersistencyInterface.redundancyHandling](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [PersistencyInterface](#), either the attribute [redundancy](#) or the aggregation of [PersistencyRedundancyHandling](#) in the role [redundancyHandling](#) may exist.]

Enumeration	PersistencyRedundancyHandlingScopeEnum
Note	This meta-class provides values to control the scope of redundancy measures in the persistency target-configuration. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	PersistencyRedundancyHandling.scope
Literal	Description
persistency Redundancy HandlingScope Element	The redundancy handling shall be applied on element level (key-value pair and file). Tags: atp.EnumerationLiteralIndex=0
persistency Redundancy HandlingScope Storage	The redundancy handling shall be applied on storage (key-value storage and file storage) level. Tags: atp.EnumerationLiteralIndex=1

Table 4.36: PersistencyRedundancyHandlingScopeEnum

[TPS_MANI_01207] Standardized values of attribute [PersistencyRedundancyChecksum.algorithmFamily](#) [The following values of attribute [PersistencyRedundancyChecksum.algorithmFamily](#) are standardized by AUTOSAR:

- **CRC_J1850**
- **CRC_CCITT_FALSE**
- **CRC_ETHERNET**

- CRC_0x42F0E1EBA9EA3693
- CRC_8H2F
- CRC_16ARC
- CRC_32P4

]

Class	PersistencyRedundancyChecksum (abstract)			
Note	Abstract class that defines the common attributes for implementations of redundancy. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, PersistencyRedundancyHandling			
Subclasses	PersistencyRedundancyCrc , PersistencyRedundancyHash			
Aggregated by	PersistencyDeployment.redundancyHandling , PersistencyInterface.redundancyHandling			
Attribute	Type	Mult.	Kind	Note
algorithmFamily	String	0..1	attr	This attribute identifies the algorithm family that is used to execute the CRC/Hash.
length	PositiveInteger	0..1	attr	This attribute describes the length of the CRC/Hash in the unit bits.

Table 4.37: PersistencyRedundancyChecksum

[constr_10144] Multiplicity of reference in the role [PersistencyRedundancyChecksum.algorithmFamily](#)

Imposition time: IT_BefAraApiGen

[For each [PersistencyRedundancyChecksum](#), the reference in the role [algorithmFamily](#) shall exist.]

[constr_10145] Multiplicity of reference in the role [PersistencyRedundancyChecksum.length](#)

Imposition time: IT_BefAraApiGen

[For each [PersistencyRedundancyChecksum](#), the reference in the role [length](#) shall exist.]

[constr_1668] Allowed combinations of [PersistencyRedundancyChecksum.length](#) and [algorithmFamily](#)

Imposition time: IT_BefAraApiGen

[

	8	16	32	64
CRC_J1850	x			
CRC_CCITT_FALSE		x		
CRC_ETHERNET			x	
CRC_0x42F0E1EBA9EA3693				x

▽



CRC_8H2F	X			
CRC_16ARC		X		
CRC_32P4			X	

]

Class	PersistencyRedundancyCrc			
Note	This meta-class formally describes the usage of a CRC for the implementation of redundancy. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, PersistencyRedundancyChecksum , PersistencyRedundancyHandling			
Aggregated by	PersistencyDeployment.redundancyHandling , PersistencyInterface.redundancyHandling			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.38: PersistencyRedundancyCrc

Class	PersistencyRedundancyHash			
Note	This meta-class formally describes the usage of a Hash for the implementation of redundancy. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, PersistencyRedundancyChecksum , PersistencyRedundancyHandling			
Aggregated by	PersistencyDeployment.redundancyHandling , PersistencyInterface.redundancyHandling			
Attribute	Type	Mult.	Kind	Note
initialization VectorLength	PositiveInteger	0..1	attr	Length of the initialization vector.

Table 4.39: PersistencyRedundancyHash

[constr_10046] Value of [PersistencyRedundancyMOutOfN.n](#)

Imposition time: [IT_BefAraApiGen](#)

[The value of attribute [PersistencyRedundancyMOutOfN.n](#) shall be set at least to 2 and at most to 255, i.e. the allowed interval is [2..255].]

[constr_1751] Value of [PersistencyRedundancyMOutOfN.m](#)

Imposition time: [IT_BefAraApiGen](#)

[The value of attribute [PersistencyRedundancyMOutOfN.m](#) shall be set at least to 1 and at most to the value of attribute [PersistencyRedundancyMOutOfN.n](#), i.e. the allowed interval is [1..[PersistencyRedundancyMOutOfN.n](#)].]

Class	PersistencyRedundancyMOutOfN			
Note	This meta-class provides the ability to describe redundancy via an "M out of N" approach. In this case N is the number of copies created and M is the minimum number of identical copies to justify a reliable read access to the data. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, PersistencyRedundancyHandling			
Aggregated by	PersistencyDeployment.redundancyHandling , PersistencyInterface.redundancyHandling			





Class	PersistencyRedundancyMOutOfN			
Attribute	Type	Mult.	Kind	Note
m	PositiveInteger	0..1	attr	This attribute represents the "M" coordinate in the "M out of N" scheme.
n	PositiveInteger	0..1	attr	This attribute represents the "N" coordinate in the "M out of N" scheme.

Table 4.40: PersistencyRedundancyMOutOfN

[constr_10146] Multiplicity of reference in the role [PersistencyRedundancyMOutOfN.m](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [PersistencyRedundancyMOutOfN](#), the reference in the role [m](#) shall exist.]

[constr_10147] Multiplicity of reference in the role [PersistencyRedundancyMOutOfN.n](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [PersistencyRedundancyMOutOfN](#), the reference in the role [n](#) shall exist.]

4.6.1.4 Update Handling

[TPS_MANI_01139] Semantics of [PersistencyInterface.updateStrategy](#)

[The attribute [PersistencyInterface.updateStrategy](#) can be used to specify the strategy for updating the actual persistent elements used in the context of the [PersistencyDeployment](#) that corresponds to [PersistencyInterface](#).

This update strategy shall be applied to the [PersistencyInterface](#) as a whole except for the explicitly modeled [PersistencyInterfaceElements](#) that define their own [updateStrategy](#).]

Enumeration	PersistencyCollectionLevelUpdateStrategyEnum
Note	This enumeration provides possible values for the update strategy on interface/storage level. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	PersistencyDeployment.updateStrategy , PersistencyInterface.updateStrategy
Literal	Description
delete	The update strategy is to delete all values on the level of the respective collection. Tags: atp.EnumerationLiteralIndex=1
keepExisting	The update strategy is to keep the existing values on the level of the respective collection. Tags: atp.EnumerationLiteralIndex=0

Table 4.41: PersistencyCollectionLevelUpdateStrategyEnum

[TPS_MANI_01140] Semantics of [PersistencyInterfaceElement.updateStrategy](#) [The attribute [PersistencyInterfaceElement.updateStrategy](#) can

be used to specify the strategy for updating the actual persistent element that corresponds to [PersistencyInterfaceElement](#).]

Enumeration	PersistencyElementLevelUpdateStrategyEnum
Note	This enumeration provides possible values for the update strategy on element level. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	PersistencyDeploymentElement.updateStrategy , PersistencyInterfaceElement.updateStrategy
Literal	Description
delete	The update strategy is to delete the value of the respective data item. Tags: atp.EnumerationLiteralIndex=2
keepExisting	The update strategy is to keep the existing value of the respective data item. Tags: atp.EnumerationLiteralIndex=1
overwrite	The update strategy is to overwrite the respective data item. Tags: atp.EnumerationLiteralIndex=0

Table 4.42: PersistencyElementLevelUpdateStrategyEnum

The behavior of the software in terms of applying an update strategy is explained in detail in the [15, SWS Persistency].

4.6.2 Persistency Key Value Storage Interface

[TPS_MANI_01065] Purpose of [PersistencyKeyValueStorageInterface](#)

[The purpose of the [PersistencyKeyValueStorageInterface](#) is to support the persistent access to data in a key-value storage.]

Class	PersistencyKeyValueStorageInterface			
Note	This meta-class provides the ability to implement a PortInterface for supporting persistency use cases for data. Tags: atp.recommendedPackage=PersistencyKeyValueStorageInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PersistencyInterface , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataElement	PersistencyDataElement	*	aggr	This aggregation represents the collection of Persistency DataElements in the context of the enclosing Persistency KeyValueStorageInterface.
dataTypeForSerialization	AbstractImplementationDataType	*	ref	This reference identifies the AbstractImplementationData Types that shall be supported for storing in a key-value storage in addition to the types already determined from the aggregation of PersistencyDataElement.
dataTypeMapping	PersistencyKeyValueDataTypeMapping	0..1	aggr	This aggregation provides a collection of replacement rules for data types used in the context of the enclosing PersistencyKeyValueStorageInterface.

Table 4.43: PersistencyKeyValueStorageInterface

[TPS_MANI_01135] Semantics of [PersistencyKeyValueStorageInterface.dataTypeForSerialization](#) [The reference [PersistencyKeyValueStorageInterface.dataTypeForSerialization](#) can be taken to get information

about data types for which a serialization algorithm has to be generated in order to support the persistent storage of objects of such data type.]

In contrast to other kinds of `PortInterfaces`, it is **not required** to define elements of a `PersistencyKeyValueStorageInterface`. If this is intended, however, the aggregation `PersistencyKeyValueStorageInterface.dataElement` shall be used for this purpose.

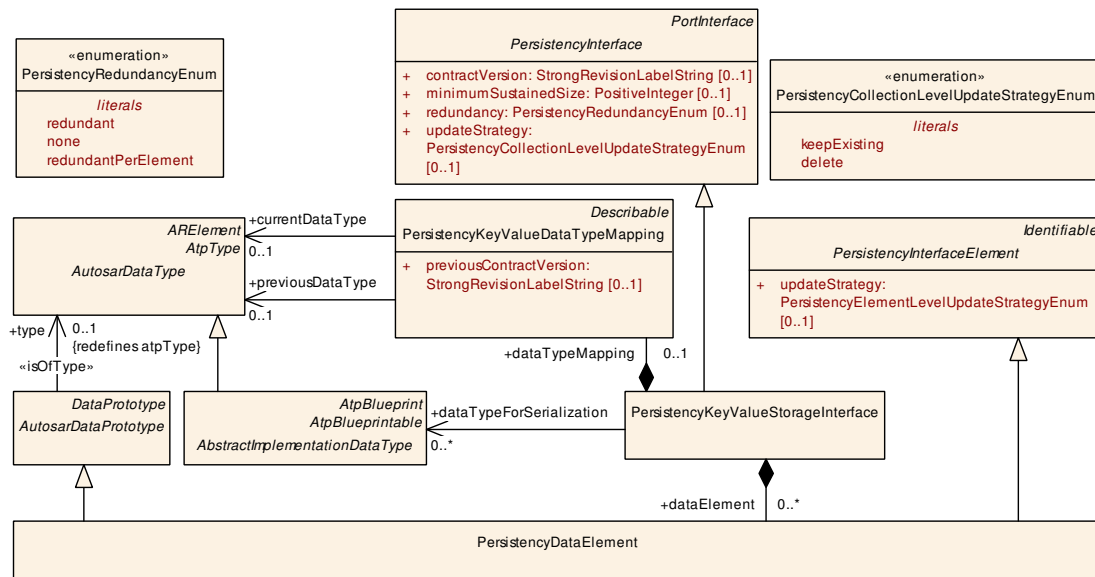


Figure 4.23: Modeling of the `PersistencyKeyValueStorageInterface`

[TPS_MANI_01138] Semantics of `PersistencyKeyValueStorageInterface`. `dataElement` [By aggregating `PersistencyDataElement` in the role `dataElement`, it is possible to explicitly model key-value pairs (and some of their properties) accessible to the application software within the context of a `PersistencyKeyValueStorageInterface`.]

[TPS_MANI_01180] Collection of data types that requires serialization support
 [The collection of data types that requires serialization support consists of

- `AbstractImplementationDataTypes` referenced in the role `PersistenceKeyValueStorageInterface.dataTypeForSerialization`
- either
 - `AbstractImplementationDataTypes` taken to type a `PersistenceKeyValueStorageInterface.dataElement` or
 - `AbstractImplementationDataTypes` mapped to `ApplicationDataTypes` taken to type a `PersistenceKeyValueStorageInterface.dataElement` by means of `PortInterfaceToDataTypeMapping.dataTypeMappingSet` that also refers to the enclosing `PersistenceKeyValueStorageInterface`.

1

Please note that a `PersistencyDataElement` can be typed by either an `ApplicationDataType` or else a `CppImplementationDataType`.

Class	PersistencyDataElement			
Note	This meta-class represents the ability to formally specify a piece of data that is subject to persistency in the context of the enclosing <code>PersistencyKeyValueStorageInterface</code> . <code>PersistencyDataElement</code> represents also a key-value pair of the deployed <code>PersistencyKeyValueStorage</code> and provides an initial value. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>AtpFeature</code> , <code>AtpPrototype</code> , <code>AutosarDataPrototype</code> , <code>DataPrototype</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PersistencyInterfaceElement</code> , <code>Referrable</code>			
Aggregated by	<code>AtpClassifier.atpFeature</code> , <code>PersistencyKeyValueStorageInterface.dataElement</code>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.44: `PersistencyDataElement`

[constr_10425] Existence of initial values for `PersistencyDataElement`

Imposition time: `IT_BefAraApiGen`

[For each `PersistencyDataElement`, if the value of attribute `PersistencyInterface.updateStrategy` is set to either

- `PersistencyElementLevelUpdateStrategyEnum.keepExisting` or
- `PersistencyElementLevelUpdateStrategyEnum.overwrite`,

then a `PersistencyDataRequiredComSpec` shall be aggregated by a `RPortPrototype` that is typed by the `PersistencyInterface` that owns the specific `PersistencyDataElement`.

The `PersistencyDataRequiredComSpec` shall

- refer to the respective `PersistencyDataElement` and
- aggregate `ValueSpecification` in the role `initValue`.

]

[constr_10420] Restriction for the existence of initial values for `PersistencyDataElement`

Imposition time: `IT_BefAraApiGen`

[For each `PersistencyKeyValuePair`, if the value of attribute `updateStrategy` is set to the value `PersistencyElementLevelUpdateStrategyEnum.delete`, then the specific `PersistencyDataElement` shall not be referenced by a `PersistencyDataRequiredComSpec` that is aggregated by a `RPortPrototype` that in turn is typed by the `PersistencyInterface` that owns the specific `PersistencyDataElement`.]

[TPS_MANI_01378] Semantics of meta-class `PersistencyKeyValueDataTypeMapping`
[Meta-class `PersistencyKeyValueDataTypeMapping` supports the porting of a previously used data type (represented by the role `previousDataType`) used in an existing key-value pair to the currently used data type

(represented by the role `currentDataType`) used in the context of the application software.

This way, application software that uses a given `AutosarDataType` can access a key-value-pair that was stored using a different (i.e. used in previous versions) data type as long as the mapping from the previous data type to the data type used currently in the key-value-pair is formally defined by means of the `PersistencyKeyValue-DataTypeMapping` such that the application software can provide a suitable conversion. The conversion will typically happen in the update callback function registered by the application.]

Class	PersistencyKeyValueDataTypeMapping			
Note	This meta-class represents the ability to define a mapping between an existing data type in a key-value-storage stored by a previous version to a new data type used on application software level in the current version. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Describable			
Aggregated by	PersistencyKeyValueStorageInterface.dataTypeMapping			
Attribute	Type	Mult.	Kind	Note
currentData Type	<code>AutosarDataType</code>	0..1	ref	This reference identifies the current data type for an existing key-value-pair in the context of the enclosing <code>PersistencyKeyValueStorageInterface</code> .
previous ContractVersion	<code>StrongRevisionLabel String</code>	0..1	attr	This attribute identifies the contract version in which the <code>previousDataType</code> was used.
previousData Type	<code>AutosarDataType</code>	0..1	ref	This reference identifies the previous data type in a key-value-pair existing in the context of the enclosing <code>PersistencyKeyValueStorageInterface</code> .

Table 4.45: PersistencyKeyValueDataTypeMapping

[constr_10486] Existence of `PersistencyKeyValueDataTypeMapping.previousContractVersion`

Imposition time: `IT_BefAraApiGen`

[In the context of `PersistencyKeyValueDataTypeMapping`, the attribute in the role `previousContractVersion` shall exist.]

Please note that a `PersistencyKeyValueDataTypeMapping` needs to be complete, i.e. for each `PersistencyKeyValueDataTypeMapping` the two references shall exist in any case.

[constr_10377] Completeness of the modeling of `PersistencyKeyValue-DataTypeMapping`

Imposition time: `IT_BefAraApiGen`

[For each `PersistencyKeyValueDataTypeMapping`, the references in the roles

- `previousDataType`
- `currentDataType`

]

It only makes sense to map types of the same data type level, which is ensured by the following two constraints:

[constr_10378] `PersistencyKeyValueDataTypeMapping` references `AbstractImplementationDataType` in the role `currentDataType`

Imposition time: `IT_BefAraApiGen`

[Each `PersistencyKeyValueDataTypeMapping` that references to an `AbstractImplementationDataType` as part of the collection in the role `currentDataType` shall also refer to an `AbstractImplementationDataType` in the role `previousDataType`.]

[constr_10379] `PersistencyKeyValueDataTypeMapping` references `ApplicationDataType` in the role `currentDataType`

Imposition time: `IT_BefAraApiGen`

[Each `PersistencyKeyValueDataTypeMapping` that references to an `ApplicationDataType` as part of the collection in the role `currentDataType` shall also refer to an `ApplicationDataType` in the role `previousDataType`.]

Of course, it does not make much sense if the modeling of `PersistencyKeyValueDataTypeMapping.currentDataType` is not even used in the context of the enclosing `PersistencyKeyValueStorageInterface` because this way a conversion to an unused data type is defined that would never be used in reality. This caveat is addressed by [advisory_01009].

[advisory_01009] `PersistencyKeyValueDataTypeMapping.currentDataType` shall refer to a data type used in the context of the `PersistencyKeyValueStorageInterface`

Imposition time: `IT_BefAraApiGen`

[All data types referenced in the role `PersistencyKeyValueDataTypeMapping.currentDataType` shall be in use in the context of the enclosing `PersistencyKeyValueStorageInterface`. This means any data type referenced in the role `currentDataType` shall also be referenced in one of the following roles:

- `PersistencyKeyValueStorageInterface.dataElement.type`
- `PersistencyKeyValueStorageInterface.dataTypeForSerialization`

]

Please note that the usage of references `previousDataType` and `currentDataType` does not make any assumptions with respect to the compatibility of a pair of `previousDataType` and `currentDataType`. It is up to the application software to sort out any potential compatibility issues.

4.6.3 Persistency File Storage Interface

[TPS_MANI_01067] **Purpose of [PersistencyFileStorageInterface](#)** [The purpose of meta-class [PersistencyFileStorageInterface](#) is to support access to an abstract representation of file storage.]

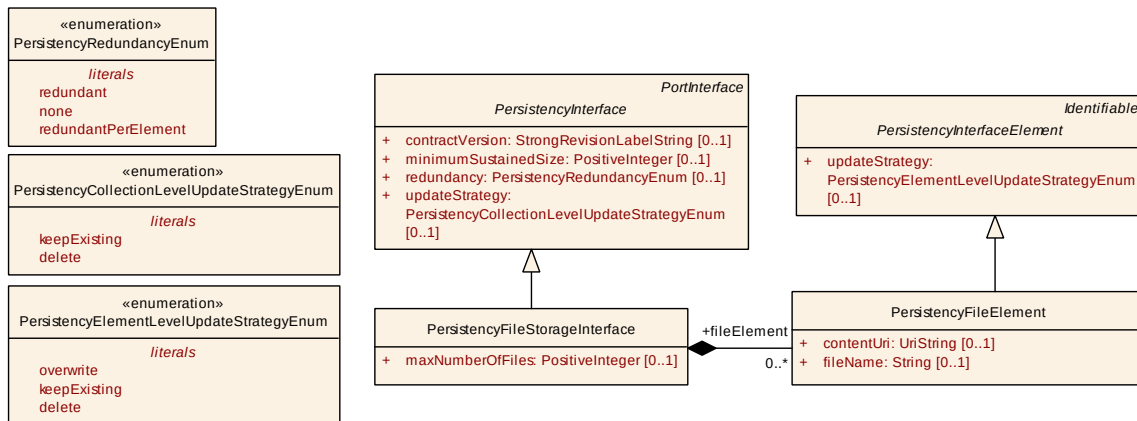


Figure 4.24: Modeling of the [PersistencyFileStorageInterface](#)

As far as AUTOSAR persistency is concerned, a file can have binary or text content. If it has text content then the content of the file is expected to be encoded as UTF-8 encoding with UNIX line endings.

[TPS_MANI_01068] **Semantics of [PersistencyFileStorageInterface](#).** [maxNumberOfFiles](#) [Any [PortPrototype](#) typed by a [PersistencyFileStorageInterface](#) has the ability to access a number of files.

The upper bound of the number of files represented by a given [PortPrototype](#) typed by a [PersistencyFileStorageInterface](#) can be configured using the attribute [PersistencyFileStorageInterface.maxNumberOfFiles](#).

The value of attribute [PersistencyFileStorageInterface.maxNumberOfFiles](#) **includes** the explicitly modeled [PersistencyFileStorageInterface.fileElements](#).]

Please note that the existence of the [PersistencyFileStorageInterface](#) does not violate the restrictions set by the POSIX subset PSE51 defined in [16, IEEE1003.13].

Class	PersistencyFileStorageInterface
Note	This meta-class provides the ability to implement a PortInterface for supporting persistency use cases for files. Tags: atp.recommendedPackage=PersistencyFileStorageInterfaces This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PersistencyInterface , PortInterface , Referrable





Class	PersistencyFileStorageInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
fileElement	PersistencyFileElement	*	aggr	This aggregation represents the collection of Persistency FileStorages in the context of the enclosing Persistency FileStorageInterface.
maxNumberOfFiles	PositiveInteger	0..1	attr	This attribute represents the definition of an upper bound for the handling of files at run-time in the context of the enclosing PersistencyFileStorageInterface.

Table 4.46: PersistencyFileStorageInterface

A `PortPrototype` typed by a `PersistencyFileStorageInterface` allows for abstracting the actual calls to the operating system away from the scope of the application software and into the modules of the *AUTOSAR adaptive platform*.

[TPS_MANI_01142] Semantics of `PersistencyFileElement` [By aggregating `PersistencyFileElement` in the role `fileElement`, it is possible to explicitly model files (and some of their properties) accessible to the application software within the context of a `PersistencyFileStorageInterface`.]

Class	PersistencyFileElement			
Note	This meta-class has the ability to represent a file at design time such that it is possible to configure the behavior for accessing the represented file at run-time. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PersistencyInterfaceElement</code> , <code>Referrable</code>			
Aggregated by	PersistencyFileStorageInterface.fileElement			
Attribute	Type	Mult.	Kind	Note
contentUri	UriString	0..1	attr	This attribute represents the URI that identifies the initial content of the PersistencyFile.
fileName	String	0..1	attr	This attribute holds the filename part of the storage location, e.g. file on the file system.

Table 4.47: PersistencyFileElement

[constr_10148] Multiplicity of reference in the role `PersistencyFileElement`. `contentUri`

Imposition time: `IT_BefAraApiGen`

[For each `PersistencyFileElement`, the reference in the role `contentUri` shall exist if the value of attribute `updateStrategy` is set to either

- `PersistencyElementLevelUpdateStrategyEnum.keepExisting` or
- `PersistencyElementLevelUpdateStrategyEnum.overwrite`.

]

[constr_10149] Multiplicity of reference in the role `PersistencyFileElement.fileName`*Imposition time: IT_BefAraApiGen*

[For each `PersistencyFileElement`, the reference in the role `fileName` shall exist.]

[constr_1581] Value of `fileElement.fileName`*Imposition time: IT_BefAraApiGen*

[Within the scope of any given `PersistencyFileStorageInterface`, the value of all `fileElement.fileName` shall be unique.]

[constr_10080] Existence of initial values for `PersistencyFileElement`*Imposition time: IT_BefAraApiGen*

[For each `PersistencyFileElement`, if the value of attribute `updateStrategy` is set to the value `delete`, then attribute `PersistencyFileElement.contentUri` shall not exist.]

4.7 Time Synchronization Interface

The Time Synchronization functional cluster within the Adaptive Platform is responsible to provide various Time-Base Resources for the application to read from or to write to.

In order to interface with the Time Synchronization foundation software an application developer needs to declare which kind of Time-Base Resource this application will interact with.

The interface towards the Time Synchronization follows the generic pattern of `Port-Prototypes` and `PortInterfaces` which are applied to many use-cases concerning the interaction of application software with platform software.

In contrast to the service based communication, the modeling of platform software interaction using `PortPrototypes` and `PortInterfaces` is less detailed. The `PortPrototype` is a placeholder for the interaction with platform software, it does not model the actually used APIs available for the interaction. The APIs to be used are formally specified in the platform software SWS document, i.e. [17, SWS Time Synchronization].

[TPS_MANI_03535] Definition of Time Synchronization interaction [The meta-class `AbstractSynchronizedTimeBaseInterface` together with its sub classes are used to define the interaction of the application software with a Time Synchronization Time Base.]

For more information, please refer to [Figure 4.25](#).

Class	AbstractSynchronizedTimeBaseInterface (abstract)			
Note	This meta-class provides the abstract ability to define a PortInterface for the interaction with Time Synchronization. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	SynchronizedTimeBaseConsumerInterface , SynchronizedTimeBaseProviderInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.48: AbstractSynchronizedTimeBaseInterface

By defining an [RPortPrototype](#) which is typed by one of the [AbstractSynchronizedTimeBaseInterface](#) sub classes the application indicates that it will access a specific Time Base.

[TPS_MANI_03549] Usage of [PortPrototype](#) for the interaction with Time Synchronization [Depending on the use-case the usage of [RPortPrototype](#) or [PPortPrototype](#) typed by one of the sub-classes of [AbstractSynchronizedTimeBaseInterface](#) shall be used for the interaction with the Time Synchronization.]

The application software may take the active or the passive role in the interaction with functional cluster, thus either a [RPortPrototype](#) or a [PPortPrototype](#) shall be used to represent this interaction from the application software point of view. The Time-Base Resource instance is identified using the [InstanceSpecifier](#) of the respective [PortPrototype](#).

[TPS_MANI_03536] Time Synchronization interaction in a provider role [The meta-class [SynchronizedTimeBaseProviderInterface](#) is used to indicate the intended interaction with a synchronized global Time Base in a *provider* role.]

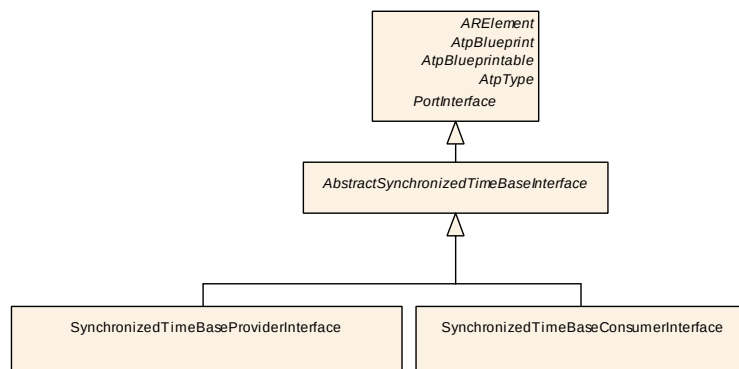


Figure 4.25: Modeling of Time Synch Interfaces

When interacting with a synchronized global Time Base in a *provider* role, the application is able to *set* (and *get*) the value of the synchronized global Time Base which is then propagated to the time value on the network.

[TPS_MANI_03537] Time Synchronization interaction in a consumer role [The meta-class [SynchronizedTimeBaseConsumerInterface](#) is used to indicate the intended interaction with a synchronized global Time Base in a *consumer* role.]

When interacting with a synchronized global Time Base in a *consumer* role, the application is able to only *get* the value of the synchronized global Time Base which is synchronized from a time value coming from the network.

Class	SynchronizedTimeBaseProviderInterface			
Note	This meta-class provides the ability to define a PortInterface for the interaction with a Time Synchronization Provider. Tags: atp.recommendedPackage=TimeSynchronizationInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractSynchronizedTimeBaseInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.49: SynchronizedTimeBaseProviderInterface

Class	SynchronizedTimeBaseConsumerInterface			
Note	This meta-class provides the ability to define a PortInterface for the interaction with a Time Synchronization Consumer. Tags: atp.recommendedPackage=TimeSynchronizationInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractSynchronizedTimeBaseInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.50: SynchronizedTimeBaseConsumerInterface

In the example in [Figure 4.26](#) the interaction of one Application with several time sync aspects are illustrated.

The interaction approach is that, for each [PortPrototype](#) typed by a sub-class of [AbstractSynchronizedTimeBaseInterface](#), the application developer gains access to the respective kind of Time-Base Resource.

In the application code, the respective Time Base class (as defined in [17, SWS Time Synchronization]) is constructed using the `InstanceSpecifier` representing the [PortPrototype](#) name.

During application target-configuration, those [PortPrototypes](#) are mapped to actual Time-Base Resources in the Time-Sync Management (see [Figure 12.24](#)).

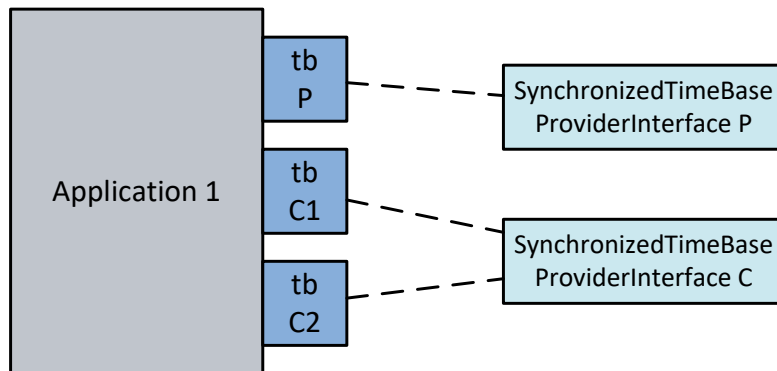


Figure 4.26: Example Application and Time Sync interaction

4.8 Platform Health Management Interface

4.8.1 Overview

Platform Health Management functional cluster within the Adaptive Platform is responsible to supervise the execution of applications and trigger the State Management for respective actions.

In order to interface with the Platform Health Management foundation software an application developer needs to declare which supervisions are provided by the application software and shall be observed by the Platform Health Management.

The interface towards the Platform Health Management follows the generic pattern of [PortPrototypes](#) and [PortInterfaces](#) which are applied to many use-cases concerning the interaction of application software with platform software.

In contrast to the service based communication, the modeling of platform software interaction using [PortPrototypes](#) and [PortInterfaces](#) is less detailed. The [PortPrototype](#) is a placeholder for the interaction with platform software, it does not model the actually used APIs available for the interaction. The APIs to be used are formally specified in the platform software SWS document [14, SWS Platform Health Management].

4.8.2 Supervised Entities and Checkpoints

The interaction of supervision with the Platform Health Management is defined by [PhmSupervisedEntityInterface](#) and [PhmCheckpoints](#).

[TPS_MANI_03500] Definition of Platform Health Management Supervision and Checkpoints [The meta-class [PhmSupervisedEntityInterface](#) together with

the aggregated [PhmCheckpoint](#) are used to define the interaction of one Supervised Entity with the Platform Health Management supervision.]

By defining an [RPortPrototype](#) which is typed by the [PhmSupervisedEntityInterface](#) the application indicates that it wants to report the [checkpoints](#) of this [PhmSupervisedEntityInterface](#).

[constr_1727] Qualified combinations of [PortPrototypes](#) and [PhmSupervisedEntityInterface](#) on application software level

Imposition time: [IT_BefAraApiGen](#)

[Within the context of an [Executable](#) of category [APPLICATION_LEVEL](#) the usage of [PhmSupervisedEntityInterface](#) is **only** supported for an [RPortPrototype](#).]

The application software takes the active role in the interaction with foundation platform software thus a [RPortPrototype](#) is used to represent this interaction from the application software point of view. The *SupervisedEntity* instance is constructed using the [InstanceSpecifier](#) of the respective [RPortPrototype](#).

An example for the relevance of the [InstanceSpecifier](#) is given in [Chapter B.5.1](#).

The application code then calls the *ReportCheckpoint* API (defined in [14, SWS Platform Health Management]) of the *SupervisedEntity* (which has been constructed in the context of the respective [RPortPrototype](#) typed by the [PhmSupervisedEntityInterface](#)) in order to notify the Platform Health Management that a specific [PhmCheckpoint](#) has been reached in the program flow.

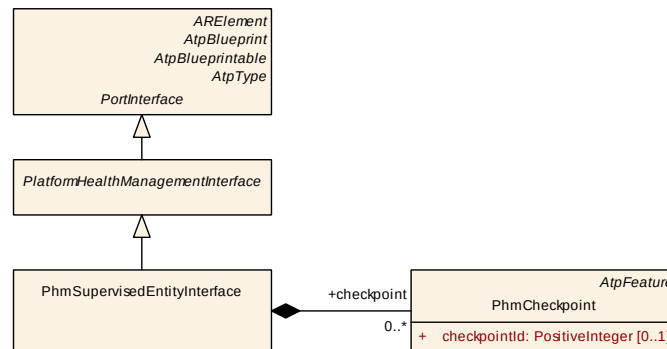


Figure 4.27: Modeling of Supervised Entities and Checkpoints

[constr_3530] Mandatory definition of [checkpointId](#)

Imposition time: [IT_BefAraApiGen](#)

[The [checkpointId](#) shall be defined for every [PhmCheckpoint](#) element.]

The [checkpointId](#) is used during the call to the *ReportCheckpoint* API as a representation of the [PhmCheckpoint](#).

Note that from the application design point of view there are no relations defined between the checkpoints (as to indicate a specific observed order in reporting). The possible transitions between the checkpoints and their timing aspects are defined in

the context of the [PlatformHealthManagementContribution](#) and described in [Chapter 12.3.3](#).

Class	PhmSupervisedEntityInterface			
Note	This meta-class provides the ability to implement a PortInterface for interaction with the Platform Health Management Supervised Entity. Tags: atp.recommendedPackage=PlatformHealthManagementInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PlatformHealthManagementInterface , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
checkpoint	PhmCheckpoint	*	aggr	Defines the set of checkpoints which can be reported on this supervised entity.

Table 4.51: PhmSupervisedEntityInterface

Class	PhmCheckpoint			
Note	This meta-class provides the ability to implement a checkpoint for interaction with the Platform Health Management Supervised Entity. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , AtpFeature , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AtpClassifier.atpFeature , PhmSupervisedEntityInterface.checkpoint			
Attribute	Type	Mult.	Kind	Note
checkpointId	PositiveInteger	0..1	attr	Defines the numeric value which is used to indicate the reporting of this Checkpoint to the Phm.

Table 4.52: PhmCheckpoint

[constr_10151] Multiplicity of reference in the role [PhmCheckpoint.checkpointId](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [PhmCheckpoint](#), the reference in the role [checkpointId](#) shall exist.]

The Platform Health Management functional cluster is only able to supervise [Executables](#) if these [Executables](#) are reporting their Execution State to the Execution Management. The reporting is defined using the attribute [Executable.reportingBehavior](#).

If an [Executable](#) has [Executable.reportingBehavior](#) set to [ExecutionStateReportingBehaviorEnum.doesNotReportExecutionState](#), then none of the [Executable SwComponentPrototypes](#) shall be involved in PHM supervision.

[constr_3795] No Platform Health Management supervision for non-reporting [Executables](#)

Imposition time: [IT_BefAraApiGen](#)

[If an [Executable](#) has [Executable.reportingBehavior](#) set to [ExecutionStateReportingBehaviorEnum.doesNotReportExecutionState](#), then none of the [SwComponentTypes](#) that are used to type [SwComponentPrototype](#) used

in the composition definition of the `rootSwComponentPrototype` shall define an `RPortPrototype` typed by a `PhmSupervisedEntityInterface`.]

4.8.3 Recovery notification to State Management

The Phm monitors the reporting of Supervised Entities and Checkpoints. In case of violations the Phm can be configured to report the violation to the State Management and let the State Management deal with the recovery activities.

The example in Figure 4.28 illustrates the reporting of Supervised Entities by Application 1 and 2.

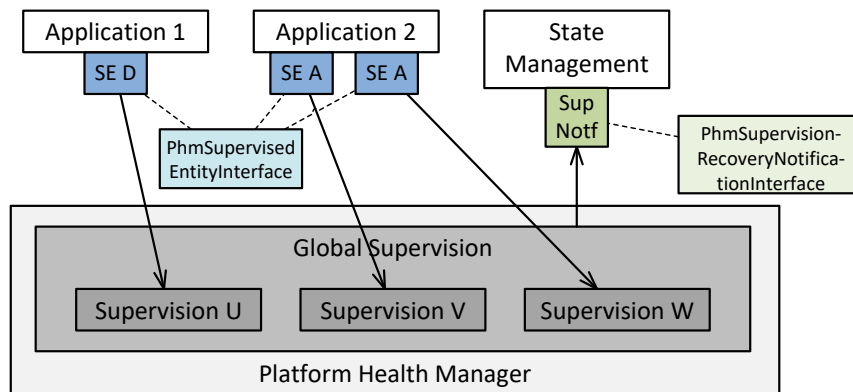


Figure 4.28: Example of a Phm monitoring and recovery setup

The Phm is configured to perform the supervision of these reported elements. In case of violations the Phm is configured to notify the State Management application to deal with the situation.

[TPS_MANI_01280] Semantics of meta-class `PhmSupervisionRecoveryNotificationInterface` [The recovery notification of a failed Supervision by PHM does issue is to call a piece of code on State Management software level.

The mechanism for activating the code on the level of State Management software is to model a `PPortPrototype` typed by a `PhmSupervisionRecoveryNotificationInterface`.]

The operation to be called by Phm in the context of [TPS_MANI_01280] is defined in the Platform Health Management specification document [14, SWS Platform Health Management].

As already mentioned, the State Management is supposed to implement the recovery actions. This implies that the `PhmSupervisionRecoveryNotificationInterface` can only be used in combination with a `PPortPrototype`. This aspect is clarified by [constr_1729].

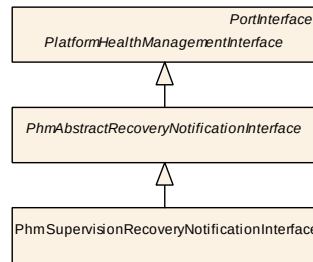


Figure 4.29: Modeling of the **PhmAbstractRecoveryNotificationInterface**

[constr_1729] Qualified combinations of PortPrototypes and PhmSupervisionRecoveryNotificationInterface on State Management software level

Imposition time: `IT_BefAraApiGen`

[Within the context of an Executable of category APPLICATION_LEVEL the usage of PhmSupervisionRecoveryNotificationInterface is **only** supported for a PPortPrototype.]

Class	PhmSupervisionRecoveryNotificationInterface			
Note	This meta-class represents a PortInterface that can be taken for implementing a PHM Supervision notification. Tags: atp.recommendedPackage=PlatformHealthManagementInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, PhmAbstractRecoveryNotificationInterface, PlatformHealthManagementInterface, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.53: PhmSupervisionRecoveryNotificationInterface

Class	PhmAbstractRecoveryNotificationInterface (abstract)			
Note	This abstract meta-class provides the abstract ability to define a PortInterface for the Recovery Notification by Platform Health Management. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, PlatformHealthManagementInterface, PortInterface, Referrable			
Subclasses	PhmSupervisionRecoveryNotificationInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.54: PhmAbstractRecoveryNotificationInterface

4.9 Diagnostic Interface

4.9.1 Overview

On the *AUTOSAR adaptive platform*, dedicated *PortInterfaces* are defined for the interaction of application-layer software with the AUTOSAR Diagnostic Manager.

In contrast to the conventions on the AUTOSAR classic Platform, these *PortInterfaces* and, by extension, the standardized `ara::diag` API **are only used on the application side** of this communication relation.

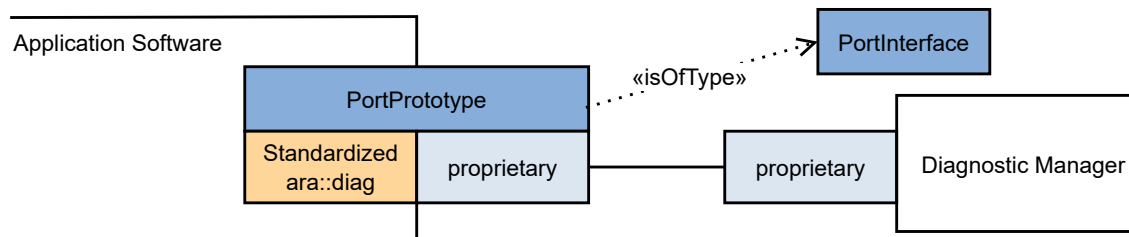


Figure 4.30: Standardized vs. proprietary parts in the implementation of `ara::diag`

The interfaces on the side of the AUTOSAR Diagnostic Manager (and thus the part of the implementation of the *PortPrototype* that faces the AUTOSAR Diagnostic Manager) are **entirely proprietary**. This aspect is depicted in [Figure 4.30](#).



Figure 4.31: Modeling of *PortInterfaces* for diagnostic purposes

This arrangement tries to provide the application programmer with the simplest possible API from the application's point of view. At the same time it hides a lot of the complexity of the interaction between application and `Diagnostic Manager` behind a solid abstraction layer.

[TPS_MANI_01242] `PortInterfaces` used for communication with the AUTOSAR Diagnostic Manager [All `PortInterfaces` used for this purpose are derived from the abstract meta-class `DiagnosticPortInterface`. A `DiagnosticPortInterface` does not implement a service-oriented communication pattern, in particular there is no explicit service discovery on the API level involved.]

The specializations of `DiagnosticPortInterface` cover the various aspects of diagnostic communication, e.g. the implementation of diagnostic routines, the reporting of diagnostic events or the access to a Diagnostic Data Identifier (DID).

Figure 4.31 depicts all meta-classes that directly inherit from `DiagnosticPortInterface`.

Class	<code>DiagnosticPortInterface</code> (abstract)			
Note	This meta-class serves as an abstract base-class for all diagnostics-related <code>PortInterfaces</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	DiagnosticAbstractDataIdentifierInterface , DiagnosticAbstractRoutineInterface , DiagnosticAuthenticationInterface , DiagnosticComControllInterface , DiagnosticConditionInterface , DiagnosticDTCInformationInterface , DiagnosticDoIPActivationLineInterface , DiagnosticDoIPEntityIdentificationInterface , DiagnosticDoIPGroupIdentificationInterface , DiagnosticDoIPPowerModelInterface , DiagnosticDoIPTriggerVehicleAnnouncementInterface , DiagnosticDownloadInterface , DiagnosticEcuResetInterface , DiagnosticEventInterface , DiagnosticExtendedDataRecordInterface , DiagnosticExternalAuthenticationInterface , DiagnosticGenericUdsInterface , DiagnosticIndicatorInterface , DiagnosticMonitorInterface , DiagnosticMultipleResourceInterface , DiagnosticOperationCycleInterface , DiagnosticRequestFileTransferInterface , DiagnosticSecurityLevelInterface , DiagnosticServiceValidationInterface , DiagnosticSovdPortInterface , DiagnosticTransmitCertificateInterface , DiagnosticUploadInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.55: `DiagnosticPortInterface`

4.9.2 Diagnostic Interfaces for UDS

4.9.2.1 Diagnostic Routine Interface

The convention for the creation of diagnostic routines is to establish at most three methods for each diagnostic routine:

- Start the execution of the routine.
- Stop the execution of the routine.
- Request the results of the routine's execution.

In response to this convention the `DiagnosticRoutineInterface` is modeled to aggregate `ClientServerOperation` in three dedicated roles: `start`, `stop`, and `requestResult`.

[constr_1696] `ClientServerOperation` aggregated by `DiagnosticRoutineInterface`

Imposition time: IT_BefAraApiGen

[Any `ClientServerOperation` aggregated by a `DiagnosticRoutineInterface` shall not define the following attributes:

- `fireAndForget`
- `possibleApError`
- `possibleApErrorSet`

]

The arguments to the diagnostic routine shall be modeled as the arguments of the respective `ClientServerOperations` aggregated in the roles `start`, `stop`, and `requestResult`.

In addition to the modeling of “typed” diagnostic routines using the `DiagnosticRoutineInterface` it is possible to use the `DiagnosticRoutineGenericInterface` to define a diagnostic routine for which no further formalization is provided.

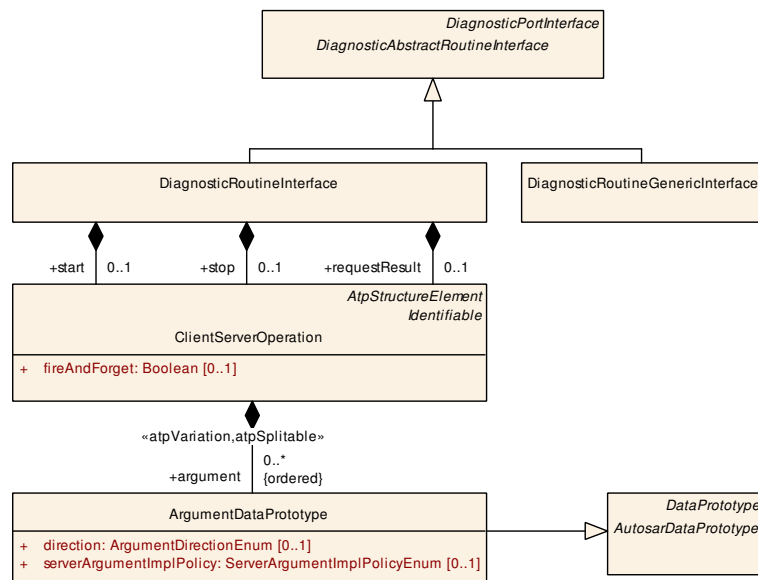


Figure 4.32: Modeling of `DiagnosticRoutineInterface`

Class	DiagnosticRoutineInterface			
Note	This meta-class represents the ability to implement a routine-focused PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractRoutineInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
requestResult	ClientServerOperation	0..1	aggr	This represents the request result method of the diagnostic routine.
start	ClientServerOperation	0..1	aggr	This represents the start method of the diagnostic routine.
stop	ClientServerOperation	0..1	aggr	This represents the stop method of the diagnostic routine.

Table 4.56: DiagnosticRoutineInterface

This means that implicitly there are still up to three methods defined for the already mentioned roles of a diagnostic routine.

However, the methods inside the context of such a generic diagnostic routine would always use plain byte arrays as the arguments and therefore a formalization within the AUTOSAR meta-model does not make sense any longer.

Class	DiagnosticRoutineGenericInterface			
Note	This meta-class represents the ability to implement a generic Routine-focused PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractRoutineInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.57: DiagnosticRoutineGenericInterface

Meta-class [DiagnosticAbstractRoutineInterface](#) serves as the abstract base class to all routine-related [DiagnosticPortInterfaces](#) on the *AUTOSAR adaptive platform*.

[constr_10031] Existence of [DiagnosticRoutineInterface.start](#)

Imposition time: [IT_BefAraApiGen](#)

[Attribute [DiagnosticRoutineInterface.start](#) shall exist.]

Class	DiagnosticAbstractRoutineInterface (abstract)
Note	This meta-class serves as the abstract base class of PortInterfaces dedicated to routine execution on the AUTOSAR adaptive platform. This Class is only used by the AUTOSAR Adaptive Platform.





Class	DiagnosticAbstractRoutineInterface (abstract)			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	DiagnosticRoutineGenericInterface , DiagnosticRoutineInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.58: DiagnosticAbstractRoutineInterface

4.9.2.2 Interface to Data Identifier and Element of Data Identifier

The ability to access diagnostic-relevant **data** in the application software is formalized in another abstract sub-class of [DiagnosticPortInterface](#): [DiagnosticAbstractDataIdentifierInterface](#).

Meta-class [DiagnosticAbstractDataIdentifierInterface](#), in turn, defines three concrete subclasses that represent the concrete abilities to access diagnostic-related data in the application software.

[TPS_MANI_01243] Semantics of [DiagnosticDataIdentifierInterface](#) [[DiagnosticDataIdentifierInterface](#) is used to access the content of an entire DID at once.

For this purpose up to two [ClientServerOperations](#) are aggregated in the roles [read](#) and [write](#), depending on the concrete use case for a specific [DiagnosticDataIdentifierInterface](#).]

[constr_10030] Existence of [DiagnosticDataIdentifierInterface.read](#)

Imposition time: [IT_BefAraApiGen](#)

[Attribute [DiagnosticDataIdentifierInterface.read](#) shall exist.]

[constr_10634] [ClientServerOperation](#) aggregated by meta-class [DiagnosticDataIdentifierInterface](#) or meta-class [DiagnosticDataElementInterface](#)

Imposition time: [IT_BefAraApiGen](#)

[Any [ClientServerOperation](#) aggregated by a [DiagnosticDataIdentifierInterface](#) or a [DiagnosticDataElementInterface](#) shall **not** define the following attributes:

- [fireAndForget](#)
- [possibleApError](#)
- [possibleApErrorSet](#)

]

Class	DiagnosticAbstractDataIdentifierInterface (abstract)			
Note	This meta-class serves as the abstract base class of PortInterfaces dedicated to the access of diagnostic data identifiers on the AUTOSAR adaptive platform. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	DiagnosticDataElementInterface , DiagnosticDataIdentifierGenericInterface , DiagnosticDataIdentifierInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.59: DiagnosticAbstractDataIdentifierInterface

Class	DiagnosticDataIdentifierInterface			
Note	This meta-class represents the ability to implement a DID-focused PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractDataIdentifierInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
read	ClientServerOperation	0..1	aggr	This represents the method to read the content of a diagnostic data identifier.
write	ClientServerOperation	0..1	aggr	This represents the method to write the contents of a diagnostic data identifier.

Table 4.60: DiagnosticDataIdentifierInterface

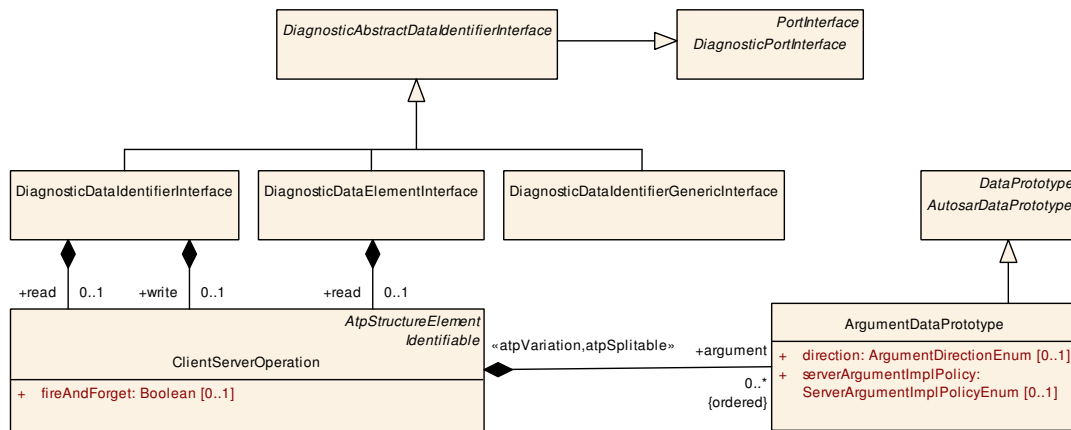


Figure 4.33: Modeling of DiagnosticDataIdentifierInterface

[TPS_MANI_01244] Semantics of [DiagnosticDataElementInterface](#) [[DiagnosticDataElementInterface](#) is used to access the content of an element within a given DID.

For this purpose, a [ClientServerOperations](#) is aggregated in the role [read](#).]

Please note that the [DiagnosticDataElementInterface](#) *intentionally* does not support a write operation because the consistency of the data in principle cannot be ensured if it is send to the application software piecemeal.

Different [Processes](#) may be configured to receive the data but it cannot be ensured that all processes are up and running when data is transmitted.

Class	DiagnosticDataElementInterface			
Note	This meta-class represents the ability to implement a element-of-DID-focused PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractDataIdentifierInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
read	ClientServerOperation	0..1	aggr	This represents the method to read the content of an element of a diagnostic data identifier.

Table 4.61: DiagnosticDataElementInterface

[TPS_MANI_01245] Semantics of [DiagnosticDataIdentifierGenericInterface](#) [[DiagnosticDataIdentifierGenericInterface](#) is used to access the content of an entire DID at once.

For this purpose methods will be defined with a read and write semantics, but these methods will always only provide arguments that are byte-arrays.

Therefore, a further formalization of these methods for reading and writing data within the context of the AUTOSAR meta-model does not make sense and is therefore omitted.]

Class	DiagnosticDataIdentifierGenericInterface			
Note	This meta-class represents the ability to implement a generic DID-focused PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractDataIdentifierInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.62: DiagnosticDataIdentifierGenericInterface

Please note that it is necessary to put some restrictions on the [argument](#) **unless** a given [DiagnosticDataIdentifierInterface](#) aggregates **only one** [ClientServerOperation](#) in **either** the role [read](#) **or** [write](#).

[constr_1697] Restriction for `ClientServerOperation` aggregated by a `DiagnosticDataIdentifierInterface`*Imposition time:* `IT_BefAraApiGen`

[If meta-class `DiagnosticDataIdentifierInterface` aggregates two `ClientServerOperations`, then

- The two `ClientServerOperations` shall have the same number of `arguments`.
- The `arguments` on the n^{th} position in the collection of `arguments` shall have identical properties, except the `direction`. In particular, the following conditions shall be fulfilled with respect to attribute `direction`:
 - Any `ArgumentDataPrototype` aggregated by a `ClientServerOperation` that is itself aggregated in the role `DiagnosticDataIdentifierInterface.read` shall set attribute `direction` to `out`.
 - Any `ArgumentDataPrototype` aggregated by a `ClientServerOperation` that is itself aggregated in the role `DiagnosticDataIdentifierInterface.write` shall set attribute `direction` to `in`.

]

4.9.2.3 Security Level Interface

[TPS_MANI_01251] Semantics of `DiagnosticSecurityLevelInterface` [The usage of the `DiagnosticSecurityLevelInterface` is foreseen for software that implements the checks for the clearance of a given security level.]

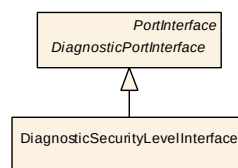


Figure 4.34: Modeling of `DiagnosticSecurityLevelInterface`

The `DiagnosticSecurityLevelInterface` does not require any further details in its formalization.

Class	DiagnosticSecurityLevelInterface
Note	This meta-class represents the ability to implement a security-level-focused <code>PortInterface</code> for diagnostics on the adaptive platform. Tags: <code>atp.recommendedPackage=DiagnosticPortInterfaces</code> This Class is only used by the AUTOSAR Adaptive Platform.





Class	DiagnosticSecurityLevelInterface			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

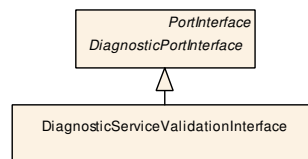
Table 4.63: DiagnosticSecurityLevelInterface

4.9.2.4 Service Validation Interface

[TPS_MANI_01252] Semantics of [DiagnosticServiceValidationInterface](#)

[The usage of the [DiagnosticServiceValidationInterface](#) is foreseen for software that implements the checks for clearance on manufacturer or supplier level.]

The [DiagnosticServiceValidationInterface](#) does not require any further details in its formalization.

Figure 4.35: Modeling of [DiagnosticServiceValidationInterface](#)

Class	DiagnosticServiceValidationInterface			
Note	This meta-class represents the ability to implement a PortInterface to process requests for service validation on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

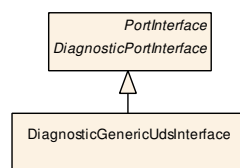
Table 4.64: DiagnosticServiceValidationInterface

4.9.2.5 Generic UDS Interface

[TPS_MANI_01254] Semantics of [DiagnosticGenericUdsInterface](#) [The AUTOSAR diagnostic communication API also foresees the existence of one [DiagnosticPortInterface](#) that support the implementation of a completely generic handler of a UDS service.]

Class	DiagnosticGenericUdsInterface			
Note	This meta-class represents the ability to implement a generic UDS PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.65: DiagnosticGenericUdsInterface

Figure 4.36: Modeling of [DiagnosticGenericUdsInterface](#)

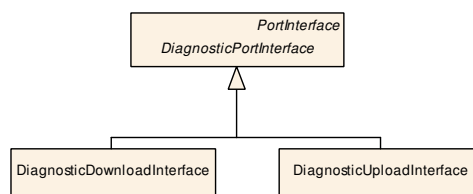
The [DiagnosticGenericUdsInterface](#) does not require any further details in its formalization.

4.9.2.6 Diagnostic Interfaces for Upload and Download

[TPS_MANI_01265] **Semantics of [DiagnosticDownloadInterface](#) and [DiagnosticUploadInterface](#)** [The AUTOSAR diagnostic communication API also foresees the existence of [DiagnosticPortInterfaces](#) to implement upload and download via diagnostic channels.

Specifically, the following concrete sub-classes of [DiagnosticPortInterface](#) are defined to support the implementation of upload and download:

- [DiagnosticUploadInterface](#)
- [DiagnosticDownloadInterface](#)

Figure 4.37: Modeling of [DiagnosticUploadInterface](#) and [DiagnosticDownloadInterface](#)

The [DiagnosticUploadInterface](#) and [DiagnosticDownloadInterface](#) do not require any further details in its formalization.

Class	DiagnosticUploadInterface			
Note	This meta-class represents the ability to implement a PortInterface to process requests for uploading data using diagnostic channels on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.66: DiagnosticUploadInterface

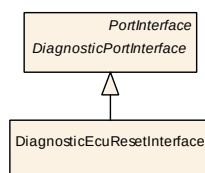
Class	DiagnosticDownloadInterface			
Note	This meta-class represents the ability to implement a PortInterface to process requests for downloading data using diagnostic channels on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.67: DiagnosticDownloadInterface

4.9.2.7 Interface to support managing the EcuReset

[TPS_MANI_01332] **Semantics of [DiagnosticEcuResetInterface](#)** [Meta-class [DiagnosticEcuResetInterface](#) represents the ability to support the handling of a request to reset the machine.

This interface will typically be used by the state manager on the AUTOSAR adaptive platform.]


Figure 4.38: Modeling of [DiagnosticEcuResetInterface](#)

Class	DiagnosticEcuResetInterface			
Note	This meta-class represents the ability to implement a focused PortInterface for handling the diagnostic service EcuReset on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			



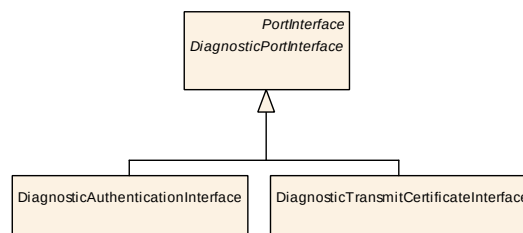


Class	DiagnosticEcuResetInterface			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.68: DiagnosticEcuResetInterface

4.9.2.8 Diagnostic Authentication Interface

[TPS_MANI_01359] Semantics of **DiagnosticAuthenticationInterface** [The ability to support the diagnostic authentication in the application software is formalized in another sub-class of [DiagnosticPortInterface](#): [DiagnosticAuthenticationInterface](#).]

Figure 4.39: Modeling of **DiagnosticAuthenticationInterface**

Class	DiagnosticAuthenticationInterface			
Note	This meta-class represents the ability to implement a focused PortInterface for handling the diagnostic service "authentication" on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.69: DiagnosticAuthenticationInterface

[TPS_MANI_01452] Semantics of **DiagnosticTransmitCertificateInterface** [The [DiagnosticTransmitCertificateInterface](#) can be taken to type a [PPortPrototype](#) over which the application software can manage the reception of new certificates.]

[constr_10526] **DiagnosticAuthenticationPortMapping** refers to a **PPortPrototype** that is typed by a **DiagnosticTransmitCertificateInterface**

Imposition time: IT_DiagDes

[If a **DiagnosticAuthenticationPortMapping** refers in the role **pPortPrototypeInExecutable** to a **PPortPrototype** that is typed by a **DiagnosticTransmitCertificateInterface**, then the **DiagnosticAuthenticationPortMapping** shall only refer in the role **diagnosticAuthentication** to a **DiagnosticAuthTransmitCertificate** (and vice versa).]

There are different ways to allow for the same **PPortPrototype** typed by a **DiagnosticTransmitCertificateInterface** to handle more than one **evaluationId**:

- One **DiagnosticAuthenticationPortMapping** exists that refers to a **DiagnosticAuthTransmitCertificate** that in turn aggregates more than one **certificateEvaluation**, each with a different setting of attribute **evaluationId**.
- Different **DiagnosticAuthenticationPortMappings** exist that each refer to the same **PPortPrototype** typed by a **DiagnosticTransmitCertificateInterface** and each refers to a different **DiagnosticAuthTransmitCertificate** that in turn aggregates only one **certificateEvaluation**.

Class	DiagnosticTransmitCertificateInterface			
Note	This meta-class represents the ability to implement the transmit-certificate functionality on application software level. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.70: DiagnosticTransmitCertificateInterface

4.9.2.9 Diagnostic External Authentication Interface

[TPS_MANI_01353] **Semantics of DiagnosticExternalAuthenticationInterface** [The ability to support the authentication of a diagnostic client in the application software is formalized in another sub-class of **DiagnosticPortInterface**: **DiagnosticExternalAuthenticationInterface**.]

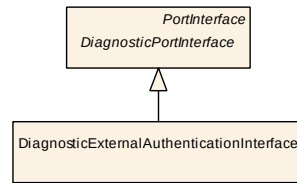


Figure 4.40: Modeling of `DiagnosticExternalAuthenticationInterface`

Class	DiagnosticExternalAuthenticationInterface			
Note	This meta-class represents the ability to implement a focused PortInterface for handling the diagnostic client authentication (i.e. convey the Authentication state to the Diagnostic Server instance of the DM) on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.71: DiagnosticExternalAuthenticationInterface

4.9.2.10 Diagnostic Communication Control Interface

[TPS_MANI_01363] **Semantics of `DiagnosticComControlInterface`** [The ability to support the activation and deactivation of communication with a diagnostic client is formalized in another sub-class of `DiagnosticPortInterface`: `DiagnosticComControlInterface`.]

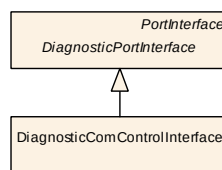


Figure 4.41: Modeling of `DiagnosticComControlInterface`

Class	DiagnosticComControlInterface			
Note	This meta-class represents the ability to implement a focused PortInterface for handling the diagnostic service communication control on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.72: DiagnosticComControlInterface

4.9.2.11 Diagnostic Request File Transfer Interface

[TPS_MANI_01373] Semantics of **DiagnosticRequestFileTransferInterface** [The usage of the **DiagnosticRequestFileTransferInterface** is foreseen for software that implements a handler for requests for file transfer.]

The **DiagnosticRequestFileTransferInterface** does not require any further details in its formalization.

Class	DiagnosticRequestFileTransferInterface			
Note	This meta-class represents the ability to implement a PortInterface to process requests for file transfer using diagnostic channels on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 4.73: DiagnosticRequestFileTransferInterface

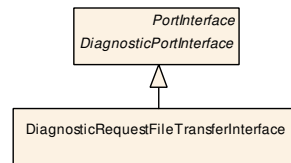


Figure 4.42: Modeling of **DiagnosticRequestFileTransferInterface**

4.9.3 Diagnostic Interfaces for Fault Memory

4.9.3.1 Interface for providing Data to Extended Data Record

The ability to contribute data for the creation of an extended data record from within the application software is provided by means of the **DiagnosticExtendedDataRecordInterface**.

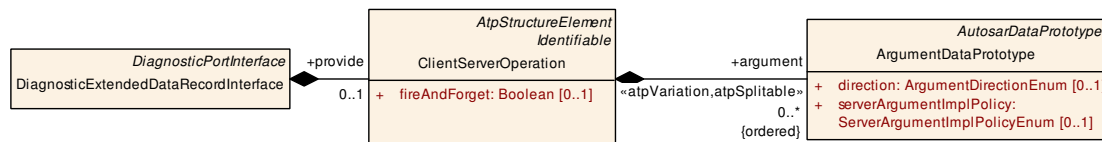


Figure 4.43: Modeling of **DiagnosticExtendedDataRecordInterface**

[constr_10682] Restriction of the multiplicity of `DiagnosticExtendedDataRecordInterface.provide.argument`*Imposition time:* `IT_BefAraApiGen`

[A `ClientServerOperation` aggregated in the role `DiagnosticExtendedDataRecordInterface.provide` shall only aggregate exactly one `argument`.]

[constr_10683] Restriction for the data type of `DiagnosticExtendedDataRecordInterface.provide.argument`*Imposition time:* `IT_BefAraApiGen`

[`DiagnosticExtendedDataRecordInterface.provide.argument` shall only be typed by **either**

- an `ApplicationPrimitiveDataType` **or**
- an `ApplicationArrayDataType` where attribute `element` is typed by an `ApplicationPrimitiveDataType` **or**
- a `CppImplementationDataType` where attribute `category` is set to the value `VALUE` **or**
- a `CppImplementationDataType` where attribute `category` is set to the value `ARRAY` that defines exactly one `subElement` where attribute `category` is set to the value `VALUE`.

]

Class	DiagnosticExtendedDataRecordInterface			
Note	This meta-class represents the ability to implement a focused PortInterface for providing values to an extended data record from within an application. Tags: <code>atp.recommendedPackage=DiagnosticMappings</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
provide	ClientServerOperation	0..1	aggr	This represents the method to provide the content of an element of a diagnostic extended data record.

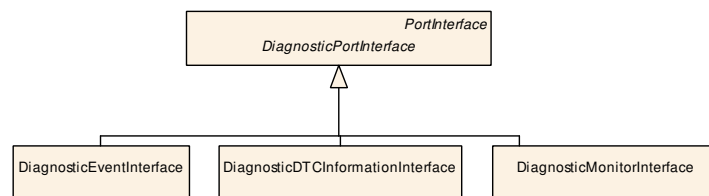
Table 4.74: DiagnosticExtendedDataRecordInterface**4.9.3.2 Interface to diagnostic Events**

AUTOSAR defines several subclasses of `DiagnosticPortInterface` that are dedicated to the handling of diagnostic events.

[TPS_MANI_01246] Semantics of `DiagnosticMonitorInterface` [Meta-class `DiagnosticMonitorInterface` represents the ability to report diagnostic events to the AUTOSAR Diagnostic Manager.]

Class	DiagnosticMonitorInterface			
Note	This meta-class represents the ability to implement a monitor-focused PortInterface for diagnostics on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.75: DiagnosticMonitorInterface

Figure 4.44: Modeling of [DiagnosticEventInterface](#)**[TPS_MANI_01247] Semantics of [DiagnosticDTCInformationInterface](#)**

[Meta-class [DiagnosticDTCInformationInterface](#) represents the ability to retrieve information about a given diagnostic trouble code.]

Class	DiagnosticDTCInformationInterface			
Note	This meta-class represents the ability to implement a PortInterface to access the properties of DTCs on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.76: DiagnosticDTCInformationInterface

[TPS_MANI_01248] Semantics of [DiagnosticEventInterface](#) [Meta-class [DiagnosticEventInterface](#) represents the ability to retrieve information about a given diagnostic event.]

Class	DiagnosticEventInterface			
Note	This meta-class represents the ability to implement a PortInterface to access the properties of diagnostic events on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			





Class	DiagnosticEventInterface			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.77: DiagnosticEventInterface

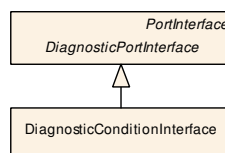
4.9.3.3 Interface to diagnostic Condition

[TPS_MANI_01249] Semantics of **DiagnosticConditionInterface** [AUTOSAR supports different diagnostic conditions, i.e. enable condition and clear condition. This aspect is represented in the definition of the **DiagnosticConditionInterface** for the *AUTOSAR adaptive platform*.]

Please note that the **DiagnosticConditionInterface** does not get specific about what the role³ of the condition would be.

This understanding of the role is in general not known to the application which just provides the status of the condition, but does not know whether the condition will be used as an enable condition or clear condition.

This is the reason why there are no dedicated **PortInterfaces** for enable condition and clear condition.

Figure 4.45: Modeling of **DiagnosticConditionInterface**

The **DiagnosticConditionInterface** does not require any further details in its formalization.

Class	DiagnosticConditionInterface
Note	This meta-class represents the ability to implement a PortInterface to process requests for diagnostic conditions on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable
Aggregated by	ARPackage.element



³enable condition vs. clear condition



Class	DiagnosticConditionInterface			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.78: DiagnosticConditionInterface

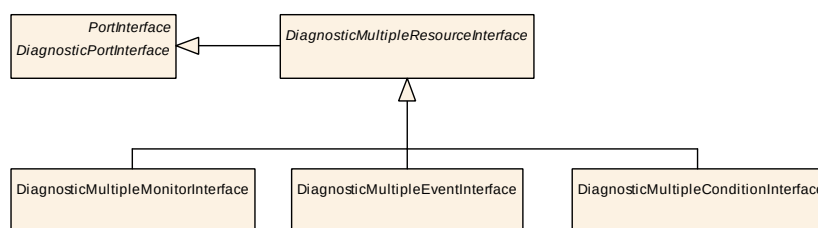
4.9.3.4 Interface for multiple diagnostic Resources

There are cases where software on application level needs to handle anonymous diagnostic resources, namely [DiagnosticEvents](#) and [DiagnosticConditions](#) in bulk and without knowing the identity of the specific resources at the time when the application is designed.

This means that the application would define a single [PortPrototype](#) (along with an appropriate [PortInterface](#)) over which e.g. the reporting of bulk diagnostic events is executed. This section defines the [PortInterfaces](#) used for the purpose of handling bulk diagnostic resources.

The definition of these [PortInterfaces](#) serves the special use case discussed above and therefore does not represent a “generic” replacement for the existing [PortInterfaces](#) over which single [DiagnosticEvents](#) or [DiagnosticConditions](#) are handled.

AUTOSAR defines an abstract subclass of [DiagnosticPortInterface](#) named [DiagnosticMultipleResourceInterface](#) that is acting as a base class for [DiagnosticPortInterfaces](#) that affect multiple diagnostic resources (e.g. diagnostic events) at the same time.

Figure 4.46: Modeling of [DiagnosticMultipleResourceInterface](#)

Class	DiagnosticMultipleResourceInterface (abstract)
Note	This meta-class acts as an abstract base class for diagnostic port interfaces that affect multiple diagnostic resources (e.g. multiple events in one port interface). This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable
Subclasses	DiagnosticMultipleConditionInterface , DiagnosticMultipleEventInterface , DiagnosticMultipleMonitorInterface
Aggregated by	ARPackage.element





Class	DiagnosticMultipleResourceInterface (abstract)			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.79: DiagnosticMultipleResourceInterface

4.9.3.4.1 Interface for multiple diagnostic Events

Two subclasses of [DiagnosticMultipleResourceInterface](#) are dedicated to the handling of diagnostic events:

- [DiagnosticMultipleMonitorInterface](#) provides the ability to report the status of multiple diagnostic monitors in the context of one [PortInterface](#).
- [DiagnosticMultipleEventInterface](#) provides the ability to retrieve the status of multiple diagnostic events in the context of one [PortInterface](#).

Class	DiagnosticMultipleMonitorInterface			
Note	This meta-class represents the ability to implement a monitor-focused PortInterface for diagnostics on the adaptive platform. In contrast to the DiagnosticMonitorInterface, the DiagnosticMultipleMonitorInterface allows for handling more than one event in the scope of a single PortPrototype. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticMultipleResourceInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.80: DiagnosticMultipleMonitorInterface

Class	DiagnosticMultipleEventInterface			
Note	This meta-class represents the ability to implement a event-focused PortInterface for diagnostics on the adaptive platform. In contrast to the DiagnosticEventInterface, the DiagnosticMultipleMonitorInterface allows for handling more than one event in the scope of a single PortPrototype. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticMultipleResourceInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.81: DiagnosticMultipleEventInterface

4.9.3.4.2 Interface for multiple diagnostic Conditions

As documented in Figure 4.46, another subclass of [DiagnosticMultipleResourceInterface](#), the [DiagnosticMultipleConditionInterface](#) is dedicated to the ability to handle multiple diagnostic conditions in the context of one [PortInterface](#).

Class	DiagnosticMultipleConditionInterface			
Note	This meta-class represents the ability to implement a condition-focused PortInterface for diagnostics on the adaptive platform. In contrast to the DiagnosticConditionInterface, the DiagnosticMultipleConditionInterface allows for handling more than one condition in the scope of a single PortPrototype. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticMultipleResourceInterface , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.82: DiagnosticMultipleConditionInterface

4.9.3.5 Indicator Interface

[TPS_MANI_01250] Semantics of [DiagnosticIndicatorInterface](#) [The usage of the [DiagnosticIndicatorInterface](#) is foreseen for software that implements a diagnostic indicator (i.e. a warning light on the dashboard).]

Class	DiagnosticIndicatorInterface			
Note	This meta-class represents the ability to implement a PortInterface to implement indicator functionality on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.83: DiagnosticIndicatorInterface

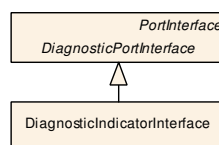


Figure 4.47: Modeling of [DiagnosticIndicatorInterface](#)

The [DiagnosticIndicatorInterface](#) does not require any further details in its formalization.

4.9.3.6 Operation Cycle Interface

[TPS_MANI_01253] Semantics of [DiagnosticOperationCycleInterface](#) [The usage of the [DiagnosticOperationCycleInterface](#) is foreseen for software that implements the manages the operation cycles.]

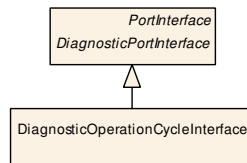


Figure 4.48: Modeling of [DiagnosticOperationCycleInterface](#)

Class	DiagnosticOperationCycleInterface			
Note	This meta-class represents the ability to implement a PortInterface to process requests for operation cycles on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

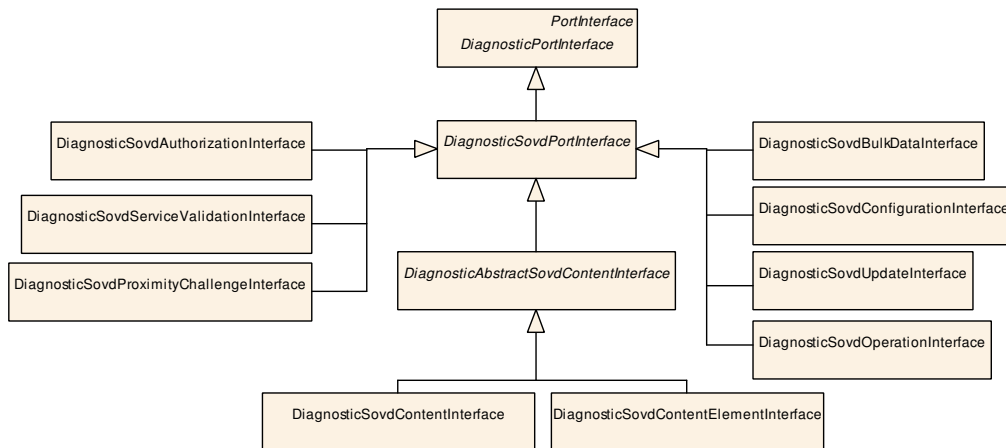
Table 4.84: DiagnosticOperationCycleInterface

The [DiagnosticOperationCycleInterface](#) does not require any further details in its formalization.

4.9.4 Diagnostic Interfaces for SOVD

4.9.4.1 Overview

The support for SOVD requires the definition of a number of [PortInterfaces](#). These are entirely modeled as sub-classes to the abstract base-class [DiagnosticSovd-PortInterface](#).

Figure 4.49: Modeling of sub-classes of **DiagnosticSovdPortInterface**

Class	DiagnosticSovdPortInterface (abstract)			
Note	This abstract meta-class acts as a base class for all diagnostics-related PortInterfaces used in the context of SOVD. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	DiagnosticAbstractSovdContentInterface , DiagnosticSovdAuthorizationInterface , DiagnosticSovdBulkDataInterface , DiagnosticSovdConfigurationInterface , DiagnosticSovdOperationInterface , DiagnosticSovdProximityChallengeInterface , DiagnosticSovdServiceValidationInterface , DiagnosticSovdUpdateInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.85: DiagnosticSovdPortInterface

The various sub-classes of **DiagnosticSovdPortInterface** are explained in the following sub-chapters.

4.9.4.2 Port Interface for SOVD Client Authorization

[TPS_MANI_01394] Support for the authorization of SOVD clients [The ability to support the authorization of SOVD clients is formalized in meta-class **DiagnosticSovdAuthorizationInterface**, modeled as a sub-class of abstract base class **DiagnosticSovdPortInterface**. Application Software exposes a **PPortPrototype** for the support of authorization.]

Class	DiagnosticSovdAuthorizationInterface
Note	This meta-class is used to type a PPortPrototype for implementing the SOVD authorization. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.





Class	DiagnosticSovdAuthorizationInterface			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, DiagnosticSovdPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.86: DiagnosticSovdAuthorizationInterface

4.9.4.3 Port Interface for SOVD Proximity Challenge

[TPS_MANI_01395] Support for the proximity challenge in the context of SOVD
 [The ability to support the proximity challenge in the context of SOVD is formalized in meta-class [DiagnosticSovdProximityChallengeInterface](#), modeled as a sub-class of abstract base class [DiagnosticSovdPortInterface](#). Application Software exposes a [PPortPrototype](#) for the proximity challenge.]

Class	DiagnosticSovdProximityChallengeInterface			
Note	This meta-class is used to type a PPortPrototype for implementing the SOVD proximity challenge. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, DiagnosticSovdPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.87: DiagnosticSovdProximityChallengeInterface

4.9.4.4 Port Interface for SOVD Bulk Data

[TPS_MANI_01420] Support for the transport of bulk data in the context of SOVD
 [The ability to transport bulk data in the context of SOVD is formalized in meta-class [DiagnosticSovdBulkDataInterface](#), modeled as a sub-class of abstract base class [DiagnosticSovdPortInterface](#). Application Software exposes a [PPortPrototype](#) for the bulk data transport.]

Class	DiagnosticSovdBulkDataInterface			
Note	This meta-class is used to type a PPortPrototype for implementing the SOVD bulk data transmission. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			





Class	DiagnosticSovdBulkDataInterface			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, DiagnosticSovdPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.88: DiagnosticSovdBulkDataInterface

4.9.4.5 Port Interface for SOVD Service Validation

[TPS_MANI_01421] Support for service validation in the context of SOVD [The ability to execute a service validation in the context of SOVD is formalized in meta-class [DiagnosticSovdServiceValidationInterface](#), modeled as a sub-class of abstract base class [DiagnosticSovdPortInterface](#). Application Software exposes a [PPortPrototype](#) for the service validation.]

Class	DiagnosticSovdServiceValidationInterface			
Note	This meta-class is used to type a PPortPrototype for implementing the SOVD service validation. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, DiagnosticSovdPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.89: DiagnosticSovdServiceValidationInterface

4.9.4.6 Port Interface for SOVD Update

[TPS_MANI_01422] Support for update procedures in the context of SOVD [The ability to execute update procedures in the context of SOVD is formalized in meta-class [DiagnosticSovdUpdateInterface](#), modeled as a sub-class of abstract base class [DiagnosticSovdPortInterface](#). Application Software exposes a [PPortPrototype](#) for the update procedure.]

Class	DiagnosticSovdUpdateInterface			
Note	This meta-class is used to type a PPortPrototype for implementing the SOVD update procedure. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			





Class	DiagnosticSovdUpdateInterface			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, DiagnosticSovdPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.90: DiagnosticSovdUpdateInterface

4.9.4.7 Port Interface for SOVD Configuration

[TPS_MANI_01423] **Support for configuration in the context of SOVD** [The ability to execute update procedures in the context of SOVD is formalized in meta-class `DiagnosticSovdConfigurationInterface`, modeled as a sub-class of abstract base class `DiagnosticSovdPortInterface`. Application Software exposes a `PPort-Prototype` for configuration purposes.]

Class	DiagnosticSovdConfigurationInterface			
Note	This meta-class is used to configure a PortInterface for the exchange of configuration content. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, DiagnosticPortInterface, DiagnosticSovdPortInterface, Identifiable, MultilanguageReferrable, PackageableElement, PortInterface, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.91: DiagnosticSovdConfigurationInterface

4.9.4.8 Port Interface for SOVD Operation

[TPS_MANI_01487] **Support for the execution of operations in the context of SOVD** [The ability to execute operations in the context of SOVD is formalized in meta-class `DiagnosticSovdOperationInterface`, modeled as a sub-class of abstract base class `DiagnosticSovdPortInterface`. The application Software exposes a `PPortPrototype` for operation execution purposes.]

[TPS_MANI_01488] **Modeling of the `DiagnosticSovdOperationInterface`** [Meta-class `DiagnosticSovdOperationInterface` aggregates `DiagnosticSovdAccessOperation` in three roles:

- `start` represents the ability to **start** the execution of the operation represented by the enclosing `DiagnosticSovdOperationInterface`. This aggregation is always needed in each `DiagnosticSovdOperationInterface`.

- `terminate` represents the ability to **terminate** the execution of the operation represented by the enclosing `DiagnosticSovdOperationInterface`.
- `readStatus` represents the ability to **query the status** of the execution of the operation represented by the enclosing `DiagnosticSovdOperationInterface`.

]

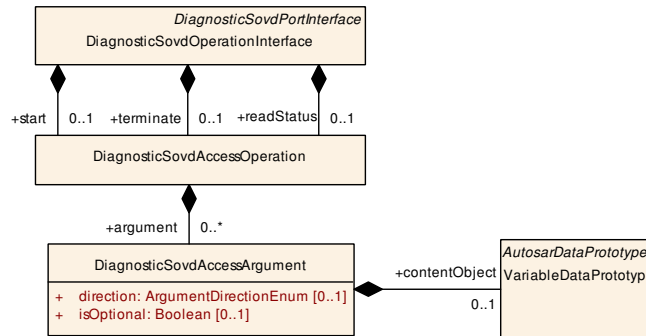


Figure 4.50: Modeling of sub-classes of `DiagnosticSovdOperationInterface`

Class	DiagnosticSovdOperationInterface			
Note	This meta-class is used to type a PPortPrototype for implementing the SOVD operation. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , DiagnosticSovdPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
readStatus	DiagnosticSovdAccessOperation	0..1	aggr	This role represents the "readStatus" primitive within an "SOVD operation" in the context of the enclosing <code>DiagnosticSovdOperationInterface</code> . Tags: xml.sequenceOffset=120
start	DiagnosticSovdAccessOperation	0..1	aggr	This role represents the "start" primitive within an "SOVD operation" in the context of the enclosing <code>DiagnosticSovdOperationInterface</code> . Tags: xml.sequenceOffset=100
terminate	DiagnosticSovdAccessOperation	0..1	aggr	This role represents the "terminate" primitive within an "SOVD operation" in the context of the enclosing <code>DiagnosticSovdOperationInterface</code> . Tags: xml.sequenceOffset=110

Table 4.92: `DiagnosticSovdOperationInterface`

[constr_10692] Existence of aggregation in the role `DiagnosticSovdOperationInterface.start`

Imposition time: `IT_BefAraApiGen`

[For each `DiagnosticSovdOperationInterface`, the aggregation in the role `start` shall exist.]

Class	DiagnosticSovdAccessOperation			
Note	This meta-class represents a directional access to data for SOVD. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	DiagnosticSovdContentElementInterface.read, DiagnosticSovdContentInterface.read, DiagnosticSovdContentInterface.write, DiagnosticSovdOperationInterface.readStatus, DiagnosticSovdOperationInterface.start, DiagnosticSovdOperationInterface.terminate			
Attribute	Type	Mult.	Kind	Note
argument	DiagnosticSovdAccessArgument	*	aggr	This role represents a specific data element used for reading or writing with SOVD.

Table 4.93: DiagnosticSovdAccessOperation

Class	DiagnosticSovdAccessArgument			
Note	This meta-class represents a single data element used in the context of reading or writing data using SOVD This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	DiagnosticSovdAccessOperation.argument			
Attribute	Type	Mult.	Kind	Note
contentObject	VariableDataPrototype	0..1	aggr	This aggregation represents the ability to specify further information about the argument.
direction	ArgumentDirectionEnum	0..1	attr	This attribute specifies the direction of the argument.
isOptional	Boolean	0..1	attr	This attribute defines whether the enclosing DiagnosticSovdAccessArgument is considered optional in the context of reading or writing data using SOVD.

Table 4.94: DiagnosticSovdAccessArgument

[constr_10693] Existence of reference in the role [DiagnosticSovdAccessArgument.contentObject](#)

Imposition time: [IT_BefAraApiGen](#)

[For each [DiagnosticSovdAccessArgument](#), the reference in the role [contentObject](#) shall exist.]

4.9.4.9 Port Interface for SOVD Content Access

[TPS_MANI_01489] Support for data access in the context of [SOVD](#) [The ability to access data in the context of [SOVD](#) is formalized in meta-class [DiagnosticSovdContentInterface](#) and [DiagnosticSovdContentElementInterface](#), modeled as a sub-class of abstract base class [DiagnosticAbstractSovdContentInterface](#). The application Software exposes a [PPortPrototype](#) for data access purposes.]

Please note that it is necessary to put some restrictions on the [argument](#) **unless** a given [DiagnosticSovdContentInterface](#) aggregates **only one** [DiagnosticSovdAccessOperation](#) in **either** the role [read](#) **or** [write](#).

[constr_10694] Restriction for `DiagnosticSovdAccessOperation` aggregated by a `DiagnosticSovdContentInterface`

Imposition time: `IT_BefAraApiGen`

[If the meta-class `DiagnosticSovdContentInterface` aggregates the two supported roles of `DiagnosticSovdAccessOperations` then

- The two `DiagnosticSovdAccessOperations` shall have the same number of `arguments`.
- The `arguments` on the n^{th} position in the collection of `arguments` shall have identical properties, except the `direction`. In particular, the following conditions shall be fulfilled with respect to attribute `direction`:
 - Any `DiagnosticSovdAccessArgument` aggregated by a `DiagnosticSovdAccessOperation` that is itself aggregated in the role `DiagnosticSovdContentInterface.read` shall set attribute `direction` to `out`.
 - Any `DiagnosticSovdAccessArgument` aggregated by a `DiagnosticSovdAccessOperation` that is itself aggregated in the role `DiagnosticSovdContentInterface.write` shall set attribute `direction` to `in`.

]

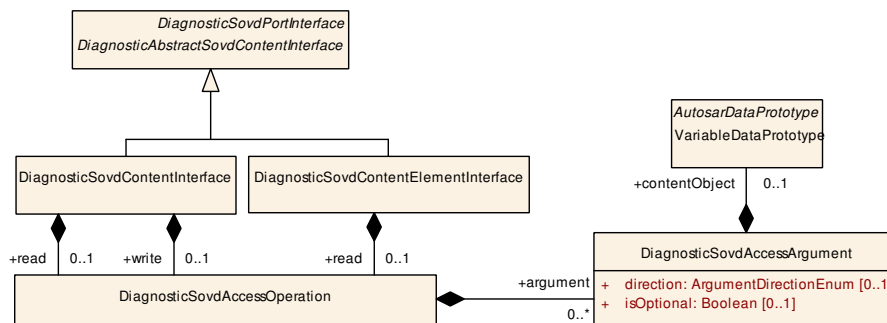


Figure 4.51: Modeling of sub-classes of `DiagnosticAbstractSovdContentInterface`

[constr_10695] Existence of `DiagnosticSovdAccessOperation.argument` if `DiagnosticSovdAccessOperation` that is aggregated in the role `DiagnosticSovdContentElementInterface.read`

Imposition time: `IT_BefAraApiGen`

[For each `DiagnosticSovdAccessOperation` is aggregated in the role `DiagnosticSovdContentElementInterface.read`, the role `DiagnosticSovdAccessOperation.argument` shall exist exactly once and the attribute `argument.direction` shall be set to `ArgumentDirectionEnum.out`.]

Class	DiagnosticAbstractSovdContentInterface (abstract)			
Note	This abstract meta-class acts as a base class for all data-related PortInterfaces used in the context of SOVD. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , DiagnosticSovdPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	DiagnosticSovdContentElementInterface , DiagnosticSovdContentInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.95: DiagnosticAbstractSovdContentInterface

Class	DiagnosticSovdContentInterface			
Note	This meta-class is used to type a PPortPrototype for reading and/or writing data using SOVD. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractSovdContentInterface , DiagnosticPortInterface , DiagnosticSovdPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
read	DiagnosticSovdAccess Operation	0..1	aggr	This role represents the read access to "SOVD data" in the context of the enclosing DiagnosticSovdContent Interface.
write	DiagnosticSovdAccess Operation	0..1	aggr	This role represents the write access to "SOVD data" in the context of the enclosing DiagnosticSovdContent Interface.

Table 4.96: DiagnosticSovdContentInterface

Class	DiagnosticSovdContentElementInterface			
Note	This meta-class is used to type a PPortPrototype for reading and/or writing a single data element as part of a bigger data packet using SOVD. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticAbstractSovdContentInterface , DiagnosticPortInterface , DiagnosticSovdPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
read	DiagnosticSovdAccess Operation	0..1	aggr	This role represents the read access to content elements in the context of the enclosing DiagnosticSovdContent ElementInterface.

Table 4.97: DiagnosticSovdContentElementInterface

4.9.5 Diagnostic Interfaces for DoIP

[TPS_MANI_01255] **Semantics of DoIP** [DiagnosticPortInterfaces](#) [The AUTOSAR diagnostic communication API also foresees the existence of [DiagnosticPortInterfaces](#) to implement functionalities in the context of DoIP operation.

Specifically, the following concrete sub-classes of [DiagnosticPortInterface](#) are defined to support the implementation of functionalities in the context of DoIP:

- [DiagnosticDoIPGroupIdentificationInterface](#)
- [DiagnosticDoIPPowerModeInterface](#)
- [DiagnosticDoIPActivationLineInterface](#)
- [DiagnosticDoIPTriggerVehicleAnnouncementInterface](#)
- [DiagnosticDoIPEntityIdentificationInterface](#)

]

Class	DiagnosticDoIPGroupIdentificationInterface			
Note	This meta-class represents the ability to implement a PortInterface to implement the DoIP Group Identification on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.98: DiagnosticDoIPGroupIdentificationInterface

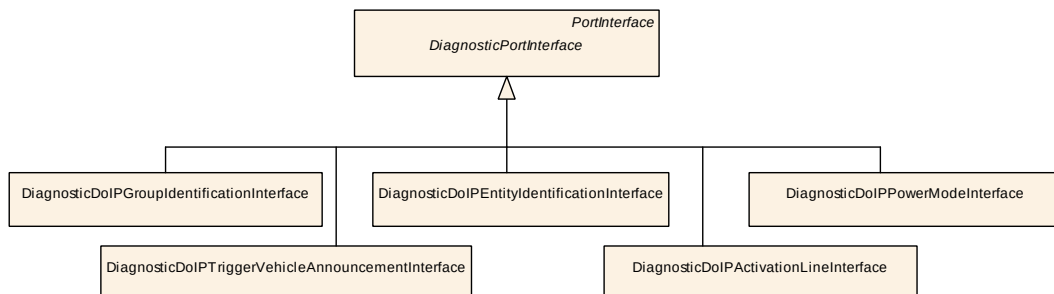


Figure 4.52: Modeling of DoIP [DiagnosticPortInterfaces](#)

Class	DiagnosticDoIPPowerModeInterface			
Note	This meta-class represents the ability to implement a PortInterface to implement the DoIP Power Mode on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.99: DiagnosticDoIPPowerModeInterface

Class	DiagnosticDoIPActivationLineInterface			
Note	This meta-class represents the ability to implement a PortInterface to implement the DoIPActivationLine on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.100: DiagnosticDoIPActivationLineInterface

Class	DiagnosticDoIPTriggerVehicleAnnouncementInterface			
Note	This meta-class represents the ability to implement a PortInterface to implement the DoIPTriggerVehicle Announcement on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.101: DiagnosticDoIPTriggerVehicleAnnouncementInterface

Class	DiagnosticDoIPEntityIdentificationInterface			
Note	This meta-class represents the ability to implement a PortInterface to implement the DoIP Entity Identification on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DiagnosticPortInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.102: DiagnosticDoIPEntityIdentificationInterface

The [DiagnosticDoIPGroupIdentificationInterface](#), [DiagnosticDoIPPowerModeInterface](#), [DiagnosticDoIPActivationLineInterface](#), [DiagnosticDoIPEntityIdentificationInterface](#) and [DiagnosticDoIPTriggerVehicleAnnouncementInterface](#) do not require any further details in its formalization.

4.10 Crypto Interfaces

4.10.1 Interaction with Crypto Software

[TPS_MANI_03253] Interaction with crypto software

Status: DRAFT

[Interaction with crypto software on an instance of the application software shall be modeled on the basis of the existence of `RPortPrototypes` typed by a `PortInterface` that is derived from the abstract meta-class `CryptoInterface`.]

In contrast to the conventions on the AUTOSAR classic Platform, these `CryptoInterfaces` are only used on the application side of this communication relation.

The Crypto API is described in [18, SWS Cryptography]. The model-path to an `RPortPrototype` that is referencing a `CryptoInterface` is provided by the `ara::core::InstanceSpecifier` that defines the logical local name used by the application developer in the API call.

This local `ara::core::InstanceSpecifier` is translated at runtime with the information from the target-configuration model to a specific crypto object, e.g. `CryptoKeySlot` in a `CryptoKeyStorage`.

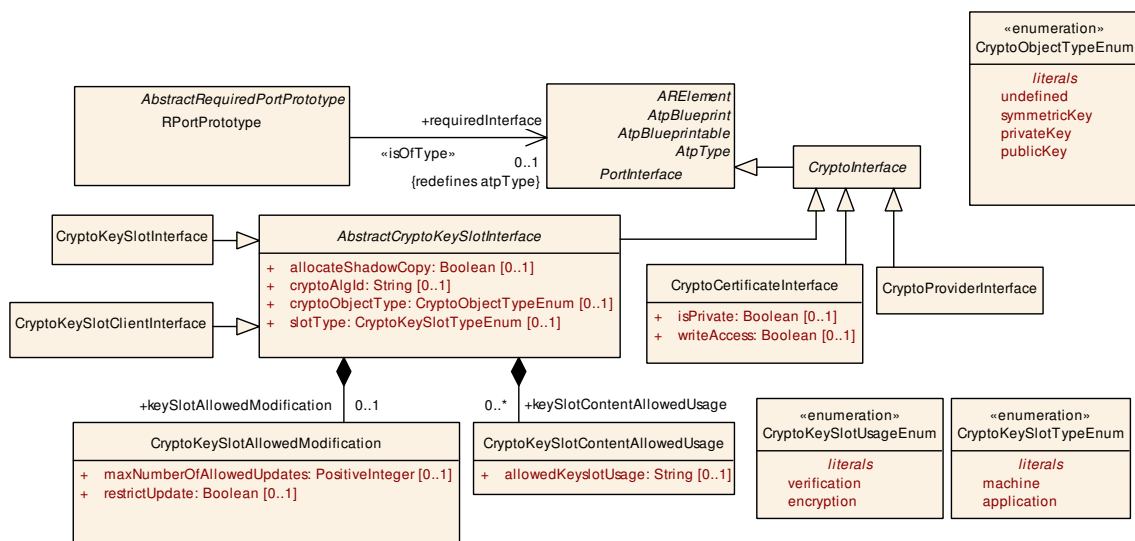


Figure 4.53: `CryptoInterfaces` for modeling of the interaction of the Application with the Crypto software

Class	<code>CryptoInterface</code> (abstract)
Note	This meta-class provides the abstract ability to define a <code>PortInterface</code> for the support of crypto use cases. Tags: <code>atp.Status=candidate</code> This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable





Class	CryptoInterface (abstract)			
Subclasses	AbstractCryptoKeySlotInterface , CryptoCertificateGroupInterface , CryptoCertificateInterface , CryptoProviderInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.103: CryptoInterface

Figure 4.53 depicts all meta-classes that directly inherit from [CryptoInterface](#).

4.10.2 Crypto Key Slot Interface

[TPS_MANI_01466] Two ways to interact with crypto key slots

Status: DRAFT

[There are two ways in which the application software can interact with a [CryptoKeySlot](#):

- The application software acts as the **owner** of the [CryptoKeySlot](#). In this case an [RPortPrototype](#) typed by a [CryptoKeySlotInterface](#) is used.
- The application software is just the **user** (or client) of the [CryptoKeySlot](#). In this case an [RPortPrototype](#) typed by a [CryptoKeySlotClientInterface](#) is used.

]

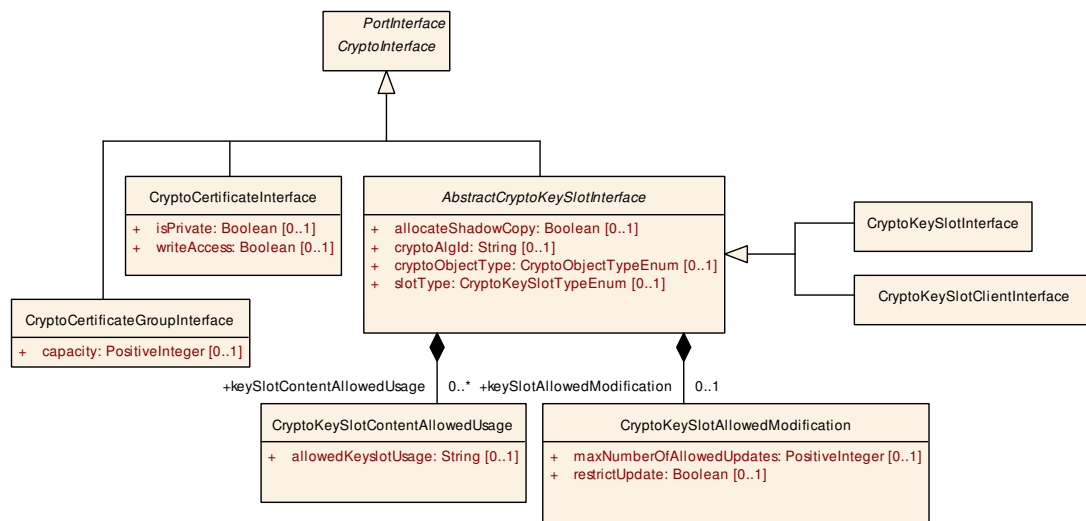


Figure 4.54: [CryptoInterfaces](#) for modeling of the interaction of the Application with the Crypto key slots and crypto certificates

[TPS_MANI_03254] Modeling of application that uses and modifies a Crypto Key

Status: DRAFT

[Application software that uses and modifies a Crypto Key is modeled as a [AdaptiveApplicationSwComponentType](#) with an [RPortPrototype](#) that is typed by a [CryptoKeySlotInterface](#) that has the [slotType](#) value set to [application](#).]

[TPS_MANI_01467] Modeling of application that uses a Crypto Key

Status: DRAFT

[Application software that is limited to **using** a Crypto Key is modeled as a [AdaptiveApplicationSwComponentType](#) with an [RPortPrototype](#) that is typed by a [CryptoKeySlotClientInterface](#) that has the attribute [slotType](#) set to the value [application](#).]

[TPS_MANI_03255] Modeling of Key Manager application that manages a Crypto Key that is used by Stack Services

Status: DRAFT

[An Key Manager Application that manages a Crypto Key that is used by Stack Services like COM, Persistency or Diagnostic is modeled as a [AdaptiveApplicationSwComponentType](#) with an [RPortPrototype](#) that is typed by a [CryptoKeySlotInterface](#) that has the [slotType](#) value set to [machine](#).]

Class	AbstractCryptoKeySlotInterface (abstract)			
Note	This abstract meta-class acts as a base class for crypto key slot port interfaces. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , CryptoInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	CryptoKeySlotClientInterface , CryptoKeySlotInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
allocateShadowCopy	Boolean	0..1	attr	This attribute defines whether a shadow copy of this Key Slot shall be allocated to enable rollback of a failed Key Slot update campaign (see interface BeginTransaction). Tags: atp.Status=candidate
cryptoAlgId	String	0..1	attr	This attribute defines a crypto algorithm restriction (kAlgId Any means without restriction). The algorithm can be specified partially: family & length, mode, padding. Future Crypto Providers can support some crypto algorithms that are not well known/ standardized today, therefore AUTOSAR doesn't provide a concrete list of crypto algorithms' identifiers and doesn't suppose usage of numerical identifiers. Instead of this a provider supplier should provide string names of supported algorithms in accompanying documentation. The name of a crypto algorithm shall follow the rules defined in the specification of cryptography for Adaptive Platform. Tags: atp.Status=candidate





Class	AbstractCryptoKeySlotInterface (abstract)			
cryptoObject Type	CryptoObjectTypeEnum	0..1	attr	Object type that can be stored in the slot. If this field contains "Undefined" then mSlotCapacity must be provided and larger then 0 Tags: atp.Status=candidate
keySlotAllowed Modification	CryptoKeySlotAllowed Modification	0..1	aggr	Restricts how this keySlot may be used Tags: atp.Status=candidate
keySlotContent AllowedUsage	CryptoKeySlotContent AllowedUsage	*	aggr	Restriction of allowed usage of a key stored to the slot. Tags: atp.Status=candidate
slotType	CryptoKeySlotType Enum	0..1	attr	This attribute defines whether the keySlot is exclusively used by the Application; or whether it is used by Stack Services and managed by a Key Manager Application. Tags: atp.Status=candidate

Table 4.104: AbstractCryptoKeySlotInterface

Class	CryptoKeySlotClientInterface			
Note	This meta-class provides the ability to define a PortInterface restricted to using Crypto Key Slots. Tags: atp.Status=candidate atp.recommendedPackage=CryptoInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractCryptoKeySlotInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , CryptoInterface , Identifiable , MultilanguageReferrable , Packageable Element , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 4.105: CryptoKeySlotClientInterface

Class	CryptoKeySlotInterface			
Note	This meta-class provides the ability to define a PortInterface for using and modifying Crypto Key Slots. Tags: atp.Status=candidate atp.recommendedPackage=CryptoInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractCryptoKeySlotInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , CryptoInterface , Identifiable , MultilanguageReferrable , Packageable Element , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 4.106: CryptoKeySlotInterface

Enumeration	CryptoKeySlotTypeEnum			
Note	This enumeration defines the options for the usage of a Key Slot in the platform. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.			
Aggregated by	AbstractCryptoKeySlotInterface.slotType , CryptoKeySlot.slotType			
Literal	Description			





Enumeration	CryptoKeySlotTypeEnum
application	KeySlot is used and modified exclusively by the Application. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate
machine	Key slot is used by platform modules only. The application manages the key but is not able to use the key. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate

Table 4.107: CryptoKeySlotTypeEnum

Enumeration	CryptoObjectTypeEnum
Note	Enumeration of all types of crypto objects, i.e. types of content that can be stored to a key slot. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	AbstractCryptoKeySlotInterface.cryptoObjectType , CryptoKeySlot.cryptoObjectType
Literal	Description
privateKey	cryp::PrivateKey object Tags: atp.EnumerationLiteralIndex=2 atp.Status=candidate
publicKey	cryp::PublicKey object Tags: atp.EnumerationLiteralIndex=3 atp.Status=candidate
symmetricKey	cryp::SymmetricKey object Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate
undefined	Object type unknown Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate

Table 4.108: CryptoObjectTypeEnum

Please note that the assignment of a [CryptoKeySlot](#) to a [CryptoProvider](#) is described in the target-configuration model (Machine Manifest). With this mapping also the assignment of the [CryptoKeySlot](#) to a [CryptoPrimitive](#) of a [CryptoProvider](#) is established.

But the application developer is able to restrict the usage of the [CryptoKeySlot](#) to a specific cryptographic algorithm with the attribute [cryptoAlgId](#).

To support crypto algorithms that are not well known/ standardized today, AUTOSAR doesn't provide a concrete list of crypto algorithm's identifiers and doesn't suppose usage of numerical identifiers.

Instead of this a provider supplier should provide string names of supported algorithms in accompanying documentation. The name of a crypto algorithm shall follow the rules defined in the specification of cryptography for Adaptive Platform.

In addition the application developer is able to define further requirements for the usage of the `CryptoKeySlot`. With the attribute `cryptoObjectType` the crypto objects that are allowed to be stored in the key slot can be specified.

The allowed modifications of the key slot can be specified by `keySlotAllowedModification`. The allowed usage of the key slot content can be specified by `keySlotContentAllowedUsage`.

The Integrator needs to take the defined settings in the Application Design model into account if the assignment to the `CryptoKeySlot` in the Crypto Storage is performed. Please note that the Application Design model settings are transferred into the target-configuration model and are therefore also available at run-time as described in [Chapter 12.10.2](#).

Class	CryptoKeySlotAllowedModification			
Note	This meta-class restricts the allowed modification of a key stored in the key slot. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	AbstractCryptoKeySlotInterface.keySlotAllowedModification , CryptoKeySlot.keySlotAllowedModification			
Attribute	Type	Mult.	Kind	Note
maxNumberOfAllowedUpdates	PositiveInteger	0..1	attr	This attribute describes the maximum updates that are allowed to the slot. Tags: atp.Status=candidate
restrictUpdate	Boolean	0..1	attr	This attribute defines whether restrictions on the number of updates are defined or not. • false: no restriction is placed on the number of updates. • true: restrictions are placed on the number of updates with the attribute maxNumberOfAllowedUpdates. Tags: atp.Status=candidate

Table 4.109: CryptoKeySlotAllowedModification

Class	CryptoKeySlotContentAllowedUsage			
Note	This meta-class restricts the allowed usage of a key stored in the key slot. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	AbstractCryptoKeySlotInterface.keySlotContentAllowedUsage , CryptoKeySlot.keySlotContentAllowedUsage			
Attribute	Type	Mult.	Kind	Note
allowedKeyslotUsage	String	0..1	attr	This attribute defines for which operations the KeySlot may be used. Tags: atp.Status=candidate

Table 4.110: CryptoKeySlotContentAllowedUsage

[constr_5238] `CryptoKeySlotAllowedModification.restrictUpdate` and the relationship to `maxNumberOfAllowedUpdates`*Status:* DRAFT*Imposition time:* IT_BefAraApiGen

[If the `CryptoKeySlotAllowedModification.restrictUpdate` is set to true then `CryptoKeySlotAllowedModification.maxNumberOfAllowedUpdates` shall be set to a value.]

[constr_5239] Predefined values for `CryptoKeySlotContentAllowedUsage.allowedKeyslotUsage`*Status:* DRAFT*Imposition time:* IT_BefAraApiGen

[The following values for `CryptoKeySlotContentAllowedUsage.allowedKeyslotUsage` are predefined by AUTOSAR:

- ALLOW-DATA-ENCRYPTION,
- ALLOW-DATA-DECRYPTION,
- ALLOW-MAC
- ALLOW-SIGNATURE-GENERATION
- ALLOW-SIGNATURE-VERIFICATION
- ALLOW-KEY-AGREEMENT
- ALLOW-KEY-DERIVATION
- ALLOW-KEY-WRAPPING
- ALLOW-KEY-UNWRAPPING
- ALLOW-PERSIST
- ALLOW-SECURED-EXPORT
- ALLOW-PLAINTEXT-EXPORT
- ALLOW-DERIVED-PLAINTEXT-EXPORT
- ALLOW-RNG-INIT
- ALLOW-HASH-CALCULATION

]

4.10.3 Crypto Certificate Interface

[TPS_MANI_03256] Modeling of application that accesses a Crypto Certificate

Status: DRAFT

[Application software that accesses a Crypto Certificate is modeled as a [AdaptiveApplicationSwComponentType](#) with an [RPortPrototype](#) that is typed by a [CryptoCertificateInterface](#).]

Class	CryptoCertificateInterface			
Note	This meta-class provides the ability to define a PortInterface for a CryptoCertificate. Tags: atp.Status=candidate atp.recommendedPackage=CryptoInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , CryptoInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
isPrivate	Boolean	0..1	attr	This attribute controls the possibility to access the content of the CryptoCertificateSlot by Find() interfaces of the X509 Provider. Tags: atp.Status=candidate
writeAccess	Boolean	0..1	attr	This attribute defines whether the application has write-access to the CryptoCertificate (true) or only read-access (false). Tags: atp.Status=candidate

Table 4.111: CryptoCertificateInterface

4.10.4 Crypto Certificate Group Interface

[TPS_MANI_01486] Modeling of application that accesses a Crypto Certificate Group

Status: DRAFT

[Application software that accesses a Crypto Certificate Group is modeled as a [AdaptiveApplicationSwComponentType](#) with an [RPortPrototype](#) that is typed by a [CryptoCertificateGroupInterface](#).]

Class	CryptoCertificateGroupInterface			
Note	This meta-class provides the ability to define a PortInterface for a group of CryptoCertificates. Tags: atp.Status=candidate atp.recommendedPackage=CryptoInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , CryptoInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	CryptoCertificateGroupInterface			
capacity	PositiveInteger	0..1	attr	Capacity of the certificate group in bytes of DER serialized certificates. Tags: atp.Status=candidate

Table 4.112: CryptoCertificateGroupInterface

4.10.5 Crypto Provider Interface

[TPS_MANI_03257] Modeling of application that accesses a Crypto Provider

Status: DRAFT

[Application software that accesses a Crypto Provider is modeled as a [AdaptiveApplicationSwComponentType](#) with an [RPortPrototype](#) that is typed by a [CryptoProviderInterface](#).]

Please note that the [CryptoProviderInterface](#) shall be used if the Application needs to access a Crypto Provider to execute keyless operations, e.g. Hashing, Random Number Generation. For cryptographic transformations that require keys the [CryptoKeySlotInterface](#) may be used.

Class	CryptoProviderInterface			
Note	This meta-class provides the ability to define a PortInterface for a CryptoProvider. Tags: atp.Status=candidate atp.recommendedPackage=CryptoInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , CryptoInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.113: CryptoProviderInterface

4.10.6 Linking of Crypto Certificate to a Crypto Key Slot

It is possible to model a link between a Crypto Certificate and a Crypto KeySlot in the Application Design with the meta-class [SwcServiceDependency](#) that aggregates [CryptoCertificateKeySlotNeeds](#) in the role [serviceNeeds](#) and [RoleBasedPortAssignments](#) that refer to an [RPortPrototype](#) that is typed by a [CryptoCertificateInterface](#) and an [RPortPrototype](#) that is typed by a [CryptoKeySlotInterface](#).

[TPS_MANI_03259] Linking of Crypto Certificate to a Crypto Key Slot

Status: DRAFT

[

ServiceNeeds kind [CryptoCertificateKeySlotNeeds](#)

RoleBasedPortAssignment valid roles:

- [CryptoKeySlotInterface](#) [1]
- [CryptoCertificateInterface](#) [1]

RoleBasedDataAssignment

N/A

RepresentedPortGroups

N/A

]

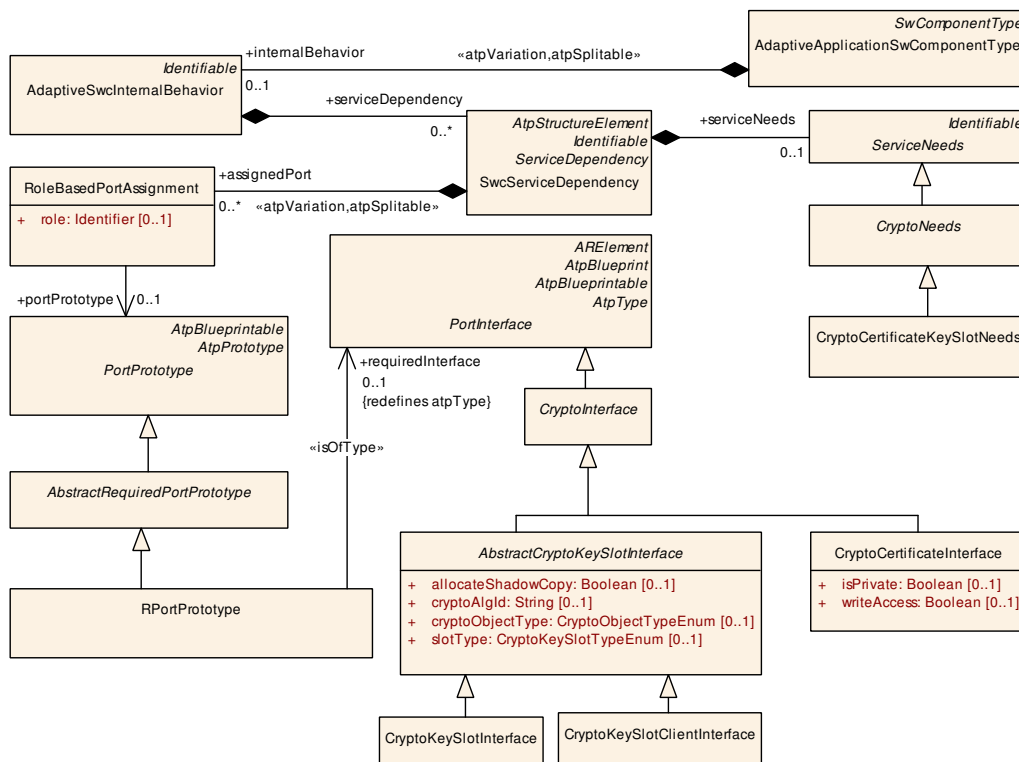


Figure 4.55: Linking of Crypto Certificate with Crypto Key Slot in Application Design

Class	CryptoNeeds (abstract)
Note	Specifies the abstract needs on the configuration of Crypto. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , ServiceNeeds





Class	CryptoNeeds (abstract)			
Subclasses	CryptoCertificateKeySlotNeeds			
Aggregated by	BswServiceDependency.serviceNeeds, SwcServiceDependency.serviceNeeds			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.114: CryptoNeeds

Class	CryptoCertificateKeySlotNeeds			
Note	This meta-class shall be taken to indicate that the SwcServiceDependency modeled with this kind of ServiceNeeds defines a relationship between a CryptoKeySlot and a CryptoCertificate. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, CryptoNeeds , Identifiable , MultilanguageReferrable , Referrable , ServiceNeeds			
Aggregated by	BswServiceDependency.serviceNeeds, SwcServiceDependency.serviceNeeds			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.115: CryptoCertificateKeySlotNeeds

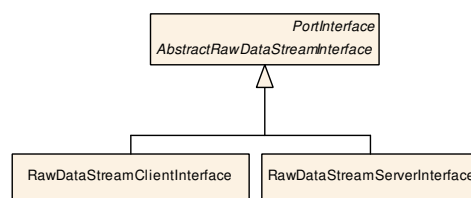
An example how the [SwcServiceDependency](#) is used to create a relation between a Crypto Certificate and a Crypto KeySlot can be found in [Chapter B.7.1](#).

4.11 Raw Data Stream Interface

In some cases it is necessary for the application software to be able to process raw binary data streams sent over a communication channel. Obviously, SOME/IP serialization does not make sense in such a scenario, as would the modeling of [Autosar-DataTypes](#), i.e. the creation of a [ServiceInterface](#).

Therefore, a different mechanism that actively supports the requirements of raw data streaming is available on the *AUTOSAR adaptive platform*.

As far as the application software is concerned, the interaction with a raw data stream is based on the usage of an [RPortPrototype](#) typed by either a [RawDataStream-ClientInterface](#) or a [RawDataStreamServerInterface](#).

Figure 4.56: Modeling of [PortInterfaces](#) for raw data stream

This kind of [PortInterface](#) does neither support nor require any elements with a modeled data type, i.e. an [AutosarDataType](#).

The [RawDataStreamClientInterface](#) and [RawDataStreamServerInterface](#) do not expect any further knowledge on the underlying data transport. The associated APIs handle the connection and are able to send and receive any payload data.

If detailed protocol information and transport knowledge is required, further specialized derivations of meta-class [AbstractRawDataStreamInterface](#), e.g. meta-classes [IEEE1722RawDataStreamConsumerInterface](#) and [IEEE1722RawDataStreamProducerInterface](#) are available.

One aspect of this refinement is that more specialized APIs can be used for the interaction with the specific protocol details. Another aspect is that [RPortPrototype](#) typed by a specialized [AbstractRawDataStreamInterface](#) may required specific [RawDataStreamMappings](#) (see section 14.2).

Class	AbstractRawDataStreamInterface (abstract)			
Note	This meta-class serves as an abstract base class for PortInterfaces related to raw data streams. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	MacLayerRawDataStreamInterface , RawDataStreamClientInterface , RawDataStreamServerInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.116: AbstractRawDataStreamInterface

Class	RawDataStreamClientInterface			
Note	This meta-class represents the necessary capabilities for raw data streaming on the client side, i.e. the streaming of data that do not undergo any serialization. Each RawDataStreamClientInterface supports the following capabilities without further modeling: • connect: set up the communication channel • shutdown: close the communication channel • write: send data down the communication channel • read: access incoming data on the communication channel Tags: atp.recommendedPackage= RawDataStreamInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractRawDataStreamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.117: RawDataStreamClientInterface

Class	RawDataStreamServerInterface			
Note	This meta-class represents the necessary capabilities for raw data streaming on the server side, i.e. the streaming of data that do not undergo any serialization. Each RawDataStreamServerInterface supports the following capabilities without further modeling: • waitForConnection: wait until a communication channel is set up. • shutdown: close the communication channel • write: send data down the communication channel • read: access incoming data on the communication channel Tags: atp.recommendedPackage=RawDataStreamInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractRawDataStreamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.118: RawDataStreamServerInterface

Class	MacLayerRawDataStreamInterface (abstract)			
Note	This meta-class serves as an abstract base class for PortInterfaces related to MAC layer raw data streams. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractRawDataStreamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	IEEE1722RawDataStreamConsumerInterface , IEEE1722RawDataStreamProducerInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.119: MacLayerRawDataStreamInterface

The meta-classes [IEEE1722RawDataStreamConsumerInterface](#) and [IEEE1722RawDataStreamProducerInterface](#) refine the abstract base class [AbstractRawDataStreamInterface](#) with specific focus on [19, IEEE1722] stream transport.

The specific APIs and handling of the IEEE1722 subtypes are defined in [20, SWS Raw Data Stream].

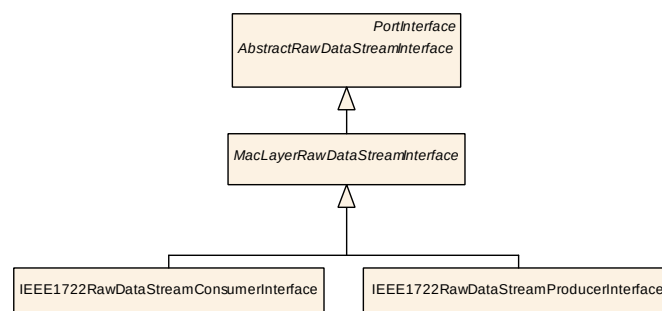


Figure 4.57: Modeling of PortInterfaces for IEEE1722 raw data stream

Class	IEEE1722RawDataStreamConsumerInterface			
Note	This meta-class represents the necessary capabilities for IEEE1722 raw data streaming on the consumer side, i.e. the streaming of data that do not undergo any serialization. Tags: atp.Status=candidate atp.recommendedPackage=RawDataStreamInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractRawDataStreamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MacLayerRawDataStreamInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

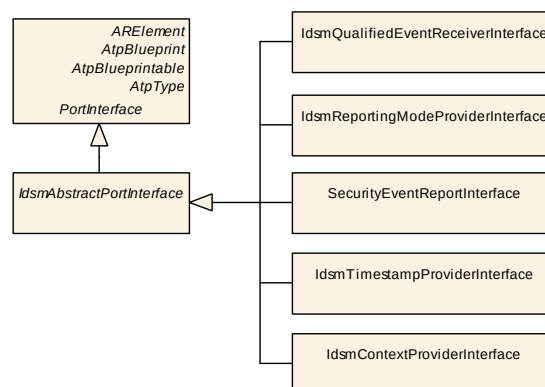
Table 4.120: IEEE1722RawDataStreamConsumerInterface

Class	IEEE1722RawDataStreamProducerInterface			
Note	This meta-class represents the necessary capabilities for IEEE1722 raw data streaming on the producer side, i.e. the streaming of data that do not undergo any serialization. Tags: atp.Status=candidate atp.recommendedPackage=RawDataStreamInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractRawDataStreamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MacLayerRawDataStreamInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.121: IEEE1722RawDataStreamProducerInterface

4.12 Intrusion Detection Interface

This section provides documentation for [PortInterfaces](#) used in the context of intrusion detection. These [PortInterfaces](#) are modeled as sub-classes of the abstract base class [IdsmAbstractPortInterface](#).


Figure 4.58: Abstract base-class [IdsmAbstractPortInterface](#)

Class	IdsmAbstractPortInterface (abstract)			
Note	This abstract meta-class acts as a base class for all kinds of PortInterfaces related to security event handling. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	IdsmContextProviderInterface , IdsmQualifiedEventReceiverInterface , IdsmReportingModeProviderInterface , IdsmTimestampProviderInterface , SecurityEventReportInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.122: IdsmAbstractPortInterface

4.12.1 Security Event Report Interface

On the *AUTOSAR adaptive platform*, a dedicated [PortInterface](#) for the interaction of application-layer software with the AUTOSAR [Intrusion Detection System Manager](#) is defined.

The name of this sub-class of abstract meta-class [PortInterface](#) is [SecurityEventReportInterface](#).

Class	SecurityEventReportInterface			
Note	This meta-class provides the ability to define a PortInterface for the reporting of security events in the context of the intrusion detection system. Tags: atp.Status=candidate atp.recommendedPackage=SecurityEventReportInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , IdsmAbstractPortInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.123: SecurityEventReportInterface

[TPS_MANI_01340] Semantics of [SecurityEventReportInterface](#)

Status: DRAFT

[Each [RPortPrototype](#) typed by a [SecurityEventReportInterface](#) is able to report exactly one security event.]

4.12.2 Intrusion Detection Timestamp Provider Interface

[TPS_MANI_01439] Semantics of meta-class [IdsmTimestampProviderInterface](#) [A [PPortPrototype](#) that is typed by a [IdsmTimestampProviderInterface](#) implements a *time-stamp provider* for the *Intrusion Detection System Management*.]

Class	IdsmTimestampProviderInterface			
Note	This meta-class provides the ability to define a PortInterface for providing a timestamp for security events in the context of the intrusion detection system. Tags: atp.recommendedPackage=IdsmPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , IdsmAbstractPortInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.124: IdsmTimestampProviderInterface

4.12.3 Intrusion Detection Context Provider Interface

[TPS_MANI_01442] Semantics of meta-class [IdsmContextProviderInterface](#) [A [PPortPrototype](#) that is typed by a [IdsmContextProviderInterface](#) implements a *context provider* for the *Intrusion Detection System Management*.]

Class	IdsmContextProviderInterface			
Note	This meta-class provides the ability to define a PortInterface for providing a Context for security events in the context of the intrusion detection system. Tags: atp.recommendedPackage=IdsmPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , IdsmAbstractPortInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.125: IdsmContextProviderInterface

4.12.4 Intrusion Detection Reporting Mode Provider Interface

[TPS_MANI_01454] Semantics of meta-class [IdsmReportingModeProviderInterface](#) [Each [RPortPrototype](#) typed by a [IdsmReportingModeProviderInterface](#) is able to set and get the reporting mode for security events.]

Class	IdsmReportingModeProviderInterface			
Note	This meta-class provides the ability to define a PortInterface for setting and getting the reporting mode for security events in the context of the intrusion detection system. Tags: atp.recommendedPackage=IdsmPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , IdsmAbstractPortInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.126: IdsmReportingModeProviderInterface

4.12.5 Intrusion Detection Qualified Events Receiver Interface

[TPS_MANI_01475] Semantics of meta-class [IdsmQualifiedEventReceiverInterface](#) [Each [RPortPrototype](#) typed by a [IdsmQualifiedEventReceiverInterface](#) is able to receive qualified security events.]

Class	IdsmQualifiedEventReceiverInterface			
Note	This meta-class provides the ability to define a PortInterface for receiving qualified security events in the context of the intrusion detection system. Tags: atp.recommendedPackage=IdsmPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , IdsmAbstractPortInterface , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.127: IdsmQualifiedEventReceiverInterface

4.13 Log And Trace Interface

On the *AUTOSAR adaptive platform*, a dedicated [PortInterface](#) named [LogAndTraceInterface](#) is defined for the interaction of application-layer software with the AUTOSAR Logging and Tracing Functional Cluster.

Class	LogAndTraceInterface			
Note	This meta-class provides the ability to implement a PortInterface for support of Logging or Tracing. Tags: atp.recommendedPackage=PortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			





Class	LogAndTraceInterface			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.128: LogAndTraceInterface

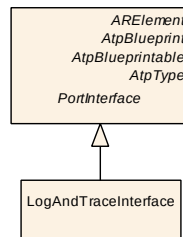


Figure 4.59: Specification of the LogAndTraceInterface

[TPS_MANI_03284] **Semantics of LogAndTraceInterface** [Each RPortPrototype typed by a LogAndTraceInterface is able to forward logging information onto the external Dlt Log Viewer.]

[constr_5290] **PPortPrototype is not allowed to be typed by LogAndTraceInterface**

Imposition time: IT_BefAraApiGen

[A PPortPrototype is not allowed to reference a LogAndTraceInterface in the role providedInterface.]

Please note that the mapping of an RPortPrototype typed by a LogAndTraceInterface to a DltLogSink is described in the target configuration model in Chapter 12.6.2.

Class	LTMessageCollectionToPortPrototypeMapping			
Note	This mapping element assigns a collection of Log or Trace messages to a PortPrototype of an application. Tags: atp.recommendedPackage=LTMessageCollectionToPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
logAndTraceMessageCollectionSet	LogAndTraceMessageCollectionSet	0..1	ref	Reference to a Collection of Log or Trace messages
rPort	RPortPrototype	0..1	iref	Reference to the RPortPrototype to which Log or Trace messages are assigned. InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 4.129: LTMessageCollectionToPortPrototypeMapping

Class	LogAndTraceMessageCollectionSet			
Note	Collection of DltMessages Tags: atp.recommendedPackage=LogAndTraceMessageCollectionSets			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dltMessage	DltMessage	*	aggr	Collection of DltMessages in the DltMessageCollection Set. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=dltMessage.shortName, dlt Message.variationPoint.shortLabel vh.latestBindingTime=systemDesignTime

Table 4.130: LogAndTraceMessageCollectionSet

[constr_5291] Allowed usage of [LTMessageCollectionToPortPrototypeMapping.rPort](#)

Imposition time: [IT_BefAraApiGen](#)

[An [LTMessageCollectionToPortPrototypeMapping](#) shall (in the role [rPort](#)) only refer to a [RPortPrototype](#) that is typed by a [LogAndTraceInterface](#).]

[TPS_MANI_03285] **Semantics of meta-class [LTMessageCollectionToPortPrototypeMapping](#)** [With the [LTMessageCollectionToPortPrototypeMapping](#) it is possible to describe at application design time a collection of Log or Trace messages that will be used by the application.]

4.14 Firewall Interface

On the *AUTOSAR adaptive platform*, a dedicated [PortInterface](#) named [FirewallStateSwitchInterface](#) is defined for the interaction of application-layer software with the Firewall Cluster.

Class	FirewallStateSwitchInterface			
Note	This meta-class provides the ability to implement a PortInterface for interaction with the Firewall mode. Tags: atp.Status=candidate atp.recommendedPackage=FirewallStateSwitchPortInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
firewallState Machine	ModeDeclarationGroupPrototype	*	aggr	The state machine of this firewall interface. Tags: atp.Status=candidate

Table 4.131: FirewallStateSwitchInterface

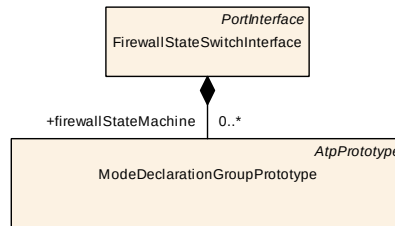


Figure 4.60: Specification of the **FirewallStateSwitchInterface**

[TPS_MANI_03321] Semantics of **FirewallStateSwitchInterface**

Status: DRAFT

[The **RPortPrototype** typed by a **FirewallStateSwitchInterface** provides the functionality to switch the firewall state.]

[TPS_MANI_03295] Semantics of **FirewallStateSwitchInterface.firewallStateMachine**

Status: DRAFT

[The **ModeDeclarationGroupPrototype** aggregated in the **FirewallStateSwitchInterface** in the role **firewallStateMachine** defines the state machine of the Firewall Cluster.]

[constr_10528] Existence of **FirewallStateSwitchInterface.firewallStateMachine**

Status: DRAFT

Imposition time: **IT_BefAraApiGen**

[For any given **FirewallStateSwitchInterface**, attribute **firewallStateMachine** shall exist at most once.]

4.15 Network Management Interface

[TPS_MANI_01419] Semantics of **NetworkManagementPortInterface**

Status: DRAFT

[The **NetworkManagementPortInterface** is supposed to be used by state management to interact with the network management for cases that are intentionally (e.g. because of the complexity of the rules to be applied for a specific case) not modeled in the context of **StateManagementModuleInstantiation**.]

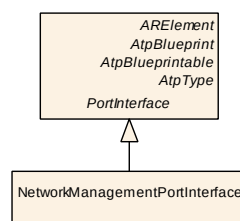


Figure 4.61: Specification of the **NetworkManagementPortInterface**

Class	NetworkManagementPortInterface			
Note	This PortInterface shall be used to submit triggers to the state management Tags: atp.recommendedPackage=NetworkManagementInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.132: NetworkManagementPortInterface

4.16 Suspend to RAM Interface

[TPS_MANI_01507] Semantics of [AbstractSuspendToRamInterface](#)

Status: DRAFT

[Subclasses of the [AbstractSuspendToRamInterface](#) are supposed to be used by state management to interact with the [suspend-to-RAM](#) functionality.]

[TPS_MANI_01509] Semantics of [SuspendToRamSatelliteInterface](#)

Status: DRAFT

[The [SuspendToRamSatelliteInterface](#) is used to type [PPortPrototypes](#) in the application software in order to provide an endpoint for [suspend-to-RAM](#) related interaction with state management.]

[TPS_MANI_01511] Semantics of [SuspendToRamHubInterface](#)

Status: DRAFT

[The [SuspendToRamHubInterface](#) is used to type [PPortPrototypes](#) in the state management to provide an endpoint for [suspend-to-RAM](#) related interaction with application software.]

A sketch of the interaction between “hub” and “satellite” is depicted in [Figure 12.83](#).

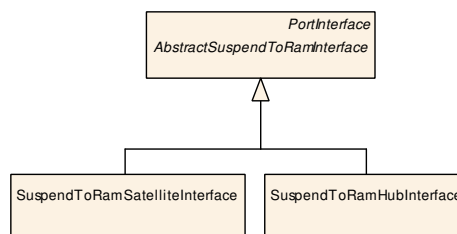


Figure 4.62: Specification of the [AbstractSuspendToRamInterface](#)

Class	AbstractSuspendToRamInterface (abstract)			
Note	This meta-class provides an abstract base class for all sub-classes related to suspend-to-RAM functionality. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Subclasses	SuspendToRamHubInterface , SuspendToRamSatelliteInterface			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.133: AbstractSuspendToRamInterface

Class	SuspendToRamSatelliteInterface			
Note	This meta-class represents a satellite-side PortInterface for the implementation of suspend-to-RAM functionality. Tags: atp.Status=candidate atp.recommendedPackage=SuspendToRamInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractSuspendToRamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.134: SuspendToRamSatelliteInterface

Class	SuspendToRamHubInterface			
Note	This meta-class represents a hub-side PortInterface for the implementation of suspend-to-RAM functionality. Tags: atp.Status=candidate atp.recommendedPackage=SuspendToRamInterfaces This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractSuspendToRamInterface , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 4.135: SuspendToRamHubInterface

5 Diagnostic Design

The configuration of diagnostics on the *AUTOSAR adaptive platform* will typically be done by creating a Diagnostic Extract documented within the specification of the [3, TPS Diagnostic Extract Template] that is also used on the *AUTOSAR classic platform*.

Therefore, concepts within the Diagnostic Extract should be similarly applicable to models on both platforms uniformly.

It can even be safely expected that a given Diagnostic Extract can be divided into parts that apply for ECUs build on top of the *AUTOSAR classic platform* and parts that apply to ECUs built on top of the *AUTOSAR adaptive platform* that all belong to the same vehicle.

The [PortInterfaces](#) used for diagnostic purposes are documented in [Chapter 4.9](#).

5.1 Extensions to the Diagnostic Common Props

The definition of the [DiagnosticCommonProps](#) is extended exclusively for the use on the *AUTOSAR adaptive platform*. The extension improves the description of authentication of diagnostic clients as well as the specification of diagnostic addresses.

Class	«atpVariation» DiagnosticCommonProps			
Note	This meta-class aggregates a number of common properties that are shared among a diagnostic extract. Tags: vh.latestBindingTime=codeGenerationTime			
Base	<i>ARObject</i>			
Aggregated by	DiagnosticContributionSet.commonProperties			
Attribute	Type	Mult.	Kind	Note
authentication Timeout	TimeValue	0..1	attr	This attribute defines the time (in seconds) that the authentication state is maintained in default-session if there is no communication from the authenticated client.
debounce AlgorithmProps	DiagnosticDebounce AlgorithmProps	*	aggr	Defines the used debounce algorithms relevant in the context of the enclosing DiagnosticCommonProps. Usually, there is a variety of debouncing algorithms to take into account and therefore the multiplicity of this aggregation is set to 0..*. Note: This atpSplitable property has no atp.Splitkey due to atpVariation (PropertySetPattern). Stereotypes: atpSplitable; atpVariation Tags: vh.latestBindingTime=postBuild
default Endianness	ByteOrderEnum	0..1	attr	Defines the default endianness of the data belonging to a DID or RID which is applicable if the DiagnosticData Element does not define the endianness via the swData DefProps.baseType attribute.





Class	«atpVariation» DiagnosticCommonProps			
diagnostic Address	SoftwareClusterDiagnosticAddress	*	aggr	"This aggregation represents the collection of diagnostic addresses that apply for the SoftwareClusterDesign. Note: This atpSplitable property has no atp.Splitkey due to atpVariation (PropertySetPattern). Stereotypes: atpSplitable Tags: xml.namePlural=DIAGNOSTIC-ADDRESSES This Attribute is only used by the AUTOSAR Adaptive Platform.
event Combination Reporting Behavior	DiagnosticEventCombinationReportingBehaviorEnum	0..1	attr	In case of EventCombination on Retrieval, this attribute specifies if a specific order of reporting is to be maintained.
external Authentication	DiagnosticExternalAuthenticationIdentification	*	aggr	This aggregation supports the configuration of the authentication of diagnostic clients. Note: This atpSplitable property has no atp.Splitkey due to atpVariation (PropertySetPattern). Stereotypes: atpSplitable This Attribute is only used by the AUTOSAR Adaptive Platform.
maxNumberOf Request Correctly Received Response Pending	PositiveInteger	0..1	attr	Maximum number of negative responses with response code 0x78 (requestCorrectlyReceived-ResponsePending) allowed per request. DCM will send a negative response with response code 0x10 (generalReject), in case the limit value gets reached. Value 0xFF means that no limit number of NRC 0x78 response apply.
occurrence Counter Processing	DiagnosticOccurrenceCounterProcessingEnum	0..1	attr	This attribute defines the consideration of the fault confirmation process for the occurrence counter.
resetConfirmed BitOnOverflow	Boolean	0..1	attr	This attribute defines, whether the confirmed bit is reset or not while an event memory entry will be displaced.
resetPendingBit OnOverflow	Boolean	0..1	attr	This attribute defines, whether the pending bit is reset or not while an event memory entry will be displaced. In order to be compliant to ISO 14229-1 [1], this parameter needs to be set to "false".
responseOnAll RequestSids	Boolean	0..1	attr	If set to FALSE the DCM will not respond to diagnostic request that contains a service ID which is in the range from 0x40 to 0x7F or in the range from 0xC0 to 0xFF (Response IDs).
responseOn Second Declined Request	Boolean	0..1	attr	Defines the reaction upon a second request (ClientB) that can not be processed (e.g. due to priority assessment). TRUE: when the second request (Client B) can not be processed, it shall be answered with NRC21 BusyRepeat Request. FALSE: when the second request (Client B) can not be processed, it shall not be responded.
sovdProperties	DiagnosticSovdProps	1	aggr	This aggregation contains the definition of common properties that are specific for SOVD. This Attribute is only used by the AUTOSAR Adaptive Platform.
typeOfEvent Combination Supported	DiagnosticEventCombinationBehaviorEnum	0..1	attr	Select type of Event Combination support.

Table 5.1: DiagnosticCommonProps

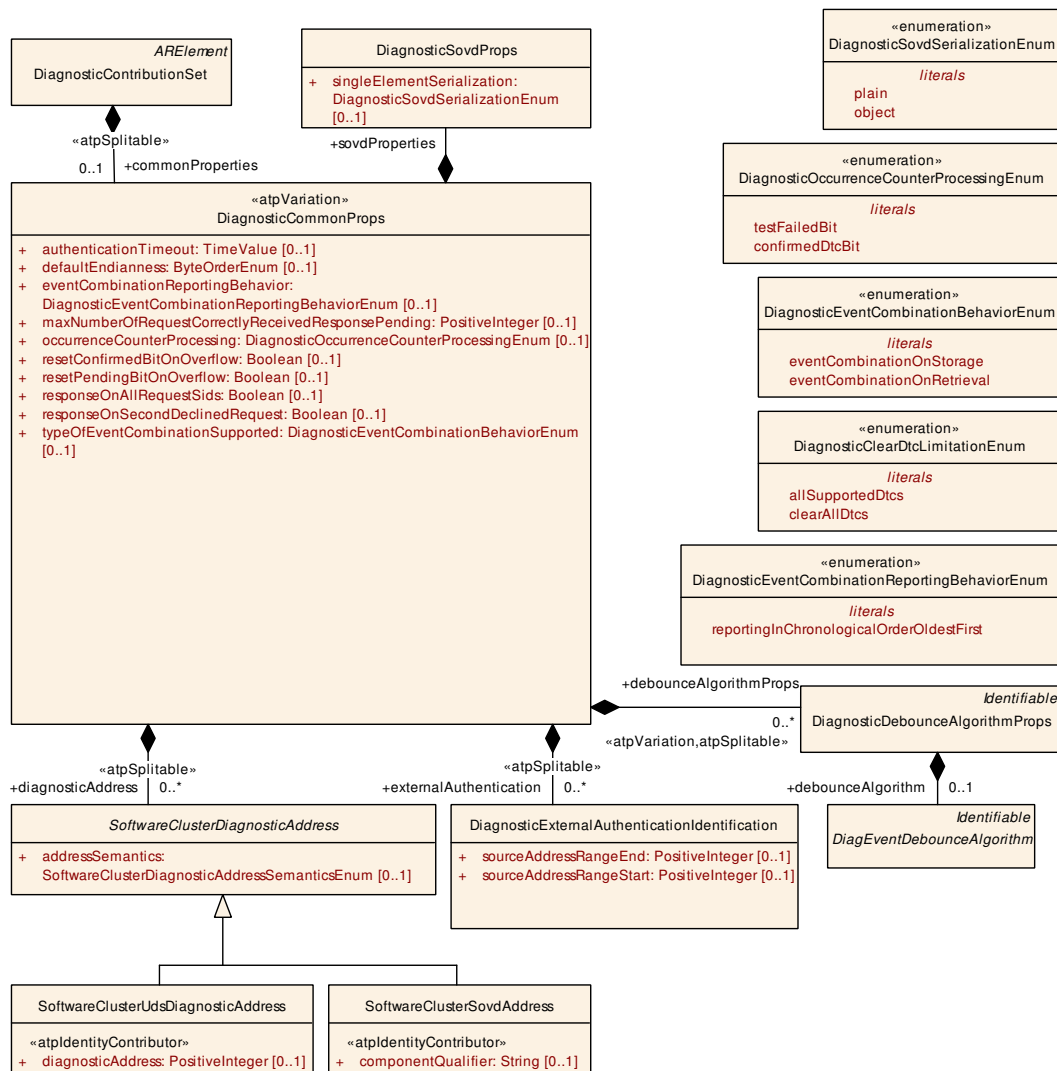
Class	DiagnosticDebounceAlgorithmProps			
Note	Defines properties for the debounce algorithm class.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DiagnosticCommonProps.debounceAlgorithmProps			
Attribute	Type	Mult.	Kind	Note
debounce Algorithm	DiagEventDebounce Algorithm	0..1	aggr	This represents the actual debounce algorithm.

Table 5.2: DiagnosticDebounceAlgorithmProps

[constr_10663] Existence of attribute [DiagnosticCommonProps.authenticationTimeout](#)

Imposition time: IT_DiagDes

[If a [DiagnosticContributionSet](#) that aggregates the [DiagnosticCommonProps](#) also references a [DiagnosticAuthenticationPortMapping](#) or [DiagnosticExternalAuthenticationPortMapping](#), then attribute [DiagnosticCommonProps.authenticationTimeout](#) shall exist.]


Figure 5.1: Modeling of [DiagnosticCommonProps](#) on the *AUTOSAR adaptive platform*

5.1.1 Diagnostic SOVD Props

Meta-class `DiagnosticSovdProps` collects all global-level attributes that have an impact on the configuration of SOVD.

[TPS_MANI_01514] Semantics of `DiagnosticSovdProps.singleElementSerialization` [Attribute `DiagnosticSovdProps.singleElementSerialization` controls the behavior of the serialization (and, by extension, deserialization) of SOVD content for the case that only a single `DiagnosticSovdContent.element` exists. This degree of freedom is officially supported by the [21, ISO-17978-3].

In principle, there are two different approaches for the serialization, as formalized in the definition of `DiagnosticSovdSerializationEnum`:

- The value `DiagnosticSovdSerializationEnum.plain` means that the value is provided “as is”. i.e. without wrapping it in curly braces. Example: “data”: 42
- The value `DiagnosticSovdSerializationEnum.object` means that the value is wrapped it in curly braces. Example: “data”: {42}

]

Class	DiagnosticSovdProps			
Note	This meta-class collects common attributes that are specific for SOVD. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code>			
Aggregated by	<code>DiagnosticCommonProps.sovdProperties</code>			
Attribute	Type	Mult.	Kind	Note
singleElement Serialization	<code>DiagnosticSovd SerializationEnum</code>	0..1	attr	This attribute defines the serialization strategy that is valid if and only if the content consists of a single element.

Table 5.3: DiagnosticSovdProps

Enumeration	DiagnosticSovdSerializationEnum
Note	This enumeration provides possible values for the serialization approach in SOVD. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	<code>DiagnosticSovdProps.singleElementSerialization</code>
Literal	Description
object	The content is serialized as an object. Tags: atp.EnumerationLiteralIndex=1
plain	The content is serialized as a plain element. Tags: atp.EnumerationLiteralIndex=0

Table 5.4: DiagnosticSovdSerializationEnum

5.1.2 Diagnostic Address

[TPS_MANI_01434] Diagnostic Address defined in the context of a [DiagnosticCommonProps](#) [It is possible to front-load the definition of diagnostic addressed as part of the the configuration of diagnostic management.

Therefore, the definition of the [DiagnosticCommonProps](#) needs to provide information about the diagnostic address(es) to which the contained diagnostic management component shall respond.

This information is formalized by means of the attribute [DiagnosticCommonProps.diagnosticAddress](#).

A [DiagnosticCommonProps](#) may be required to respond to multiple (i.e. several functional plus one physical) diagnostic addresses, thus the multiplicity of [diagnosticAddress](#) is set to 0..*.]

The goal of the specific modeling decision described in [\[TPS_MANI_01434\]](#) has been to make the modeling of the diagnostic address extensible such that the idiomatic ways to define diagnostic addresses can also be supported by adding respective subclasses of [SoftwareClusterDiagnosticAddress](#).

Class	SoftwareClusterDiagnosticAddress (abstract)			
Note	This meta-class represents the ability to define a diagnostic address in an abstract form. Sub-classes are supposed to clarify how the diagnostic address shall be defined according to the applicable addressing scheme (DoIP vs. CAN TP vs. ...). This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Subclasses	SoftwareClusterSovdAddress , SoftwareClusterUdsDiagnosticAddress			
Aggregated by	DiagnosticCommonProps.diagnosticAddress			
Attribute	Type	Mult.	Kind	Note
address Semantics	SoftwareClusterDiagnosticAddressSemanticsEnum	0..1	attr	This attribute clarifies whether the address value shall be interpreted as a physical or a functional address.

Table 5.5: SoftwareClusterDiagnosticAddress

[constr_10487] Only one physical address per [DiagnosticCommonProps](#)

Imposition time: [IT_DiagDes](#)

[Each [DiagnosticCommonProps](#) shall only aggregate one [SoftwareClusterDiagnosticAddress](#) where the value of attribute [addressSemantics](#) is set to [SoftwareClusterDiagnosticAddressSemanticsEnum.physicalAddress](#).]

[TPS_MANI_01405] Semantics of sub-classes of [SoftwareClusterDiagnosticAddress](#) [The definition of the actual diagnostic address is done by means of the applicable sub-class of the abstract base-class [SoftwareClusterDiagnosticAddress](#):

- If the diagnostic session is executed on the basis of **UDS**, then the diagnostic address shall be specified by means of [SoftwareClusterUdsDiagnosticAddress.diagnosticAddress](#).

- If the diagnostic session is executed on the basis of **SOVD**, then the diagnostic address shall be specified by means of `SoftwareClusterSovdAddress.componentQualifier`.

]

Class	SoftwareClusterSovdAddress			
Note	This meta-class represents the ability to define a diagnostic address specifically for the SOVD case. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, SoftwareClusterDiagnosticAddress			
Aggregated by	DiagnosticCommonProps.diagnosticAddress			
Attribute	Type	Mult.	Kind	Note
componentQualifier	String	0..1	attr	This attribute is used to specify the component qualifier for the usage in an SOVD query. Stereotypes: atpIdentityContributor Tags: atp.Status=candidate

Table 5.6: SoftwareClusterSovdAddress

[constr_10404] Existence of [SoftwareClusterSovdAddress.componentQualifier](#)

Imposition time: `IT_Mani`

[For each [SoftwareClusterSovdAddress](#), attribute `componentQualifier` shall exist.]

[constr_10236] Multiplicity of attribute [SoftwareClusterDiagnosticAddress.addressSemantics](#)

Imposition time: `IT_Mani`

[For each [SoftwareClusterDiagnosticAddress](#), the attribute `addressSemantics` shall exist.]

Enumeration	SoftwareClusterDiagnosticAddressSemanticsEnum
Note	This meta-class defines a list of semantics for the interpretation of diagnostic addresses in the context of a SoftwareCluster. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SoftwareClusterDiagnosticAddress.addressSemantics
Literal	Description
functionalAddress	This address represents a functional address. Tags: atp.EnumerationLiteralIndex=1
physicalAddress	This address represents a physical address. Tags: atp.EnumerationLiteralIndex=0

Table 5.7: SoftwareClusterDiagnosticAddressSemanticsEnum

Class	SoftwareClusterUdsDiagnosticAddress			
Note	This meta-class represents the ability to define a diagnostic address specifically for the UDS case This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, SoftwareClusterDiagnosticAddress			
Aggregated by	DiagnosticCommonProps.diagnosticAddress			
Attribute	Type	Mult.	Kind	Note
diagnostic Address	PositiveInteger	0..1	attr	This attribute represents the collection of diagnostic addresses the SoftwareCluster occupies. Stereotypes: atpIdentityContributor

Table 5.8: SoftwareClusterUdsDiagnosticAddress

5.1.3 Diagnostic Authentication Configuration

[TPS_MANI_01435] Semantics of meta-class [DiagnosticExternalAuthenticationIdentification](#) [Meta-class [DiagnosticExternalAuthenticationIdentification](#) is used to define source address information for the authentication of diagnostic clients.]

Please note that it is possible to support diagnostic clients with a fixed source address or with a range of source addresses by means of the aggregation of [DiagnosticExternalAuthenticationIdentification](#) at [DiagnosticCommonProps](#) with a multiplicity of 0..*.

Class	DiagnosticExternalAuthenticationIdentification			
Note	This meta-class represents the ability to support the authentication of diagnostic clients. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	DiagnosticCommonProps.externalAuthentication			
Attribute	Type	Mult.	Kind	Note
sourceAddress RangeEnd	PositiveInteger	0..1	attr	The source address defines the logical address of the tester that starts the communication. This element is able to define a source address range (without gaps) with the two attributes sourceAddressRangeStart and sourceAddressRangeEnd. This attribute defines the end of the range.
sourceAddress RangeStart	PositiveInteger	0..1	attr	The source address defines the logical address of the tester that starts the communication. This element is able to define a source address range (without gaps) with the two attributes sourceAddressRangeStart and sourceAddressRangeEnd. This attribute defines the start of the range.

Table 5.9: DiagnosticExternalAuthenticationIdentification

5.2 Diagnostic Mapping

5.2.1 Overview

In terms of applicability to this document, one specific part of the Diagnostic Extract that is relevant in this context is the mapping between the definition of information related to diagnostic protocol content and the application software.

In order to exemplify the approach, the diagram depicted in [Figure 5.2](#) describes a very simplistic situation where two different `PPortPrototypes` typed by possibly two different `DiagnosticDataIdentifierInterface` exposed by an `AdaptiveApplicationSwComponentType` is accessed by the AUTOSAR Adaptive Diagnostic Management on the *AUTOSAR adaptive platform* with the purpose of accessing an entire DID.

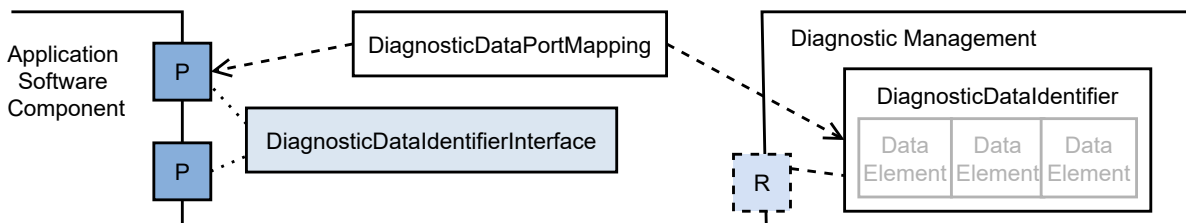


Figure 5.2: Example data exchange for diagnostic purpose

In particular, a subclass of `DiagnosticSwMapping` (in this specific case: `DiagnosticDataPortMapping`) formalizes the “connection” between both ends of the communication.

Class	<i>DiagnosticSwMapping</i> (abstract)			
Note	This represents the ability to define a mapping between a diagnostic information (at this point there is no way to become more specific about the semantics) to a software-component.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	AbstractDolpPortMapping , DiagnosticAuthenticationPortMapping , DiagnosticClearConditionPortMapping , DiagnosticDataPortMapping , DiagnosticEdrSenderPortMapping , DiagnosticEdrServerPortMapping , DiagnosticEnableConditionPortMapping , DiagnosticEventPortMapping , DiagnosticExtendedDataRecordClientPortMapping , DiagnosticExternalAuthenticationPortMapping , DiagnosticFimFunctionMapping , DiagnosticIndicatorPortMapping , DiagnosticMemoryDestinationPortMapping , DiagnosticMonitorPortMapping , DiagnosticMultipleResourcePortMapping , DiagnosticOperationCyclePortMapping , DiagnosticSecurityLevelPortMapping , DiagnosticServiceDataMapping , DiagnosticServiceGenericMapping , DiagnosticServiceSwMapping , DiagnosticServiceValidationMapping , DiagnosticSovdAuthorizationPortMapping , DiagnosticSovdBulkDataPortMapping , DiagnosticSovdConfigurationPortMapping , DiagnosticSovdContentPortMapping , DiagnosticSovdOperationPortMapping , DiagnosticSovdProximityChallengePortMapping , DiagnosticSovdServiceValidationPortMapping , DiagnosticSovdUpdatePortMapping , ISignalPortToDiagnosticEventMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.10: DiagnosticSwMapping

A further kind of mapping that is necessary to enable diagnostics on the *AUTOSAR adaptive platform* comes with slightly more complexity.

In this case use-cases are implemented that may or may not involve several communication ends (in the form of [PortPrototypes](#)).

Class	DiagnosticDataIdentifier			
Note	This meta-class represents the ability to model a diagnostic data identifier (DID) that is fully specified regarding the payload at configuration-time. Tags: atp.recommendedPackage=DiagnosticDataIdentifiers			
Base	ARElement , ARObject , CollectableElement , DiagnosticAbstractDataIdentifier , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataElement	DiagnosticParameter	*	aggr	This is the dataElement associated with the Diagnostic DataIdentifier. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=dataElement.bitOffset, dataElement.ident.shortName, dataElement.variation Point.shortLabel vh.latestBindingTime=postBuild
didSize	PositiveInteger	0..1	attr	This attribute indicates the size in bytes of the Diagnostic DataIdentifier.
representsVin	Boolean	0..1	attr	This attributes indicates whether the specific Diagnostic DataIdentifier represents the vehicle identification.
supportInfoByte	DiagnosticSupportInfoByte	0..1	aggr	This attribute represents the supported information associated with the DiagnosticDataIdentifier.

Table 5.11: DiagnosticDataIdentifier

Class	DiagnosticSupportInfoByte			
Note	This meta-class defines the support information (typically byte A) to declare the usability of the Data Elements within the so-called packeted PIDs (e.g. PID\$68).			
Base	ARObject			
Aggregated by	DiagnosticDataIdentifier.supportInfoByte , DiagnosticParameterIdentifier.supportInfoByte			
Attribute	Type	Mult.	Kind	Note
position	PositiveInteger	0..1	attr	This represents the position of the supportInfo in the PID. Unit: byte.
size	PositiveInteger	0..1	attr	This represents the size of the supportInfo within the PID. Unit: byte.

Table 5.12: DiagnosticSupportInfoByte

The response to this situation on the *AUTOSAR classic platform* has been the definition of the [SwcServiceDependency](#) that allows for associating several [PortPrototypes](#) in specific roles to a given use-case.

On the other hand, there is a clear difference between the design of [PortInterfaces](#) for diagnostic usage on the *AUTOSAR classic platform* (where generic [ClientServerInterfaces](#), [SenderReceiverInterfaces](#), and [ModeSwitchInterfaces](#) are used) and the *AUTOSAR adaptive platform* (where the [PortInterfaces](#) are specifically tailored to the respective diagnostic use case).

In other words, it specifically tailored [PortInterfaces](#) were used, the need for an “umbrella” that defines the scope of the modeling of a given service use case would be drastically reduced.

On top of that, the usage of the `InstanceSpecifier` as the element of identification is strictly bound to the `PortPrototype` rather than the `SwcServiceDependency`. In other words, the diagnostic management uses `<<instanceRef>>`s to identify the “endpoint” in the application software.

The `<<instanceRef>>` and the corresponding `InstanceSpecifier` are strongly related to each other. If one is known the other can be deduced. The consequence of this conclusion is that it would be possible to configure the diagnostic management in the presence of mappings to the application software model that itself does not have to be accessible at the time of creating the configuration of diagnostic management.

This means that an `<<instanceRef>>` originating from a subclass of `DiagnosticSwMapping` needs to have an additional decoration in the form of the stereotype `<<atpUriDef>>`.

Please note that the mapping targets¹ within a set of diagnostic mappings may exist in several instances at run-time.

This kind of multiple instantiation is formalized by the existence of meta-class `Process` (which in turn is represented by meta-class `ProcessDesign` on design level), see [Chapter 3.2.6](#).

It is very typical that different instances of a piece of application software could require a different diagnostic mapping and the modeling needs to accommodate to this requirement, i.e. a relation between a diagnostic mapping and the `ProcessDesign` needs to be established.

[constr_10002] Only one mapping per `PortPrototype`

Imposition time: `IT_DiagDes`

[If one instance of the following sub-classes of `DiagnosticSwMapping` – that refers to a given `ProcessDesign` – refers to a `PortPrototype`, then no other instance of `DiagnosticSwMapping` that refers to the same `ProcessDesign` shall refer to the same `PortPrototype`:

- `DiagnosticEventPortMapping` that is associated with a `RPortPrototype` typed by a `DiagnosticMonitorInterface` or a `DiagnosticEventInterface`.
- `DiagnosticOperationCyclePortMapping` that is associated with a `RPortPrototype` typed by a `DiagnosticOperationCycleInterface`.
- `DiagnosticEnableConditionPortMapping` that is associated with a `RPortPrototype` typed by a `DiagnosticConditionInterface`.
- `DiagnosticClearConditionPortMapping` that is associated with a `RPortPrototype` typed by a `DiagnosticConditionInterface`.
- `DiagnosticIndicatorPortMapping` that is associated with a `RPortPrototype` typed by a `DiagnosticIndicatorInterface`.

¹on the end of the application software

- `DiagnosticMemoryDestinationPortMapping` that is associated with an `RPortPrototype` typed by a `DiagnosticDTCInformationInterface`.
- `DiagnosticSecurityLevelPortMapping` that is associated with a `PPortPrototype` typed by a `DiagnosticSecurityLevelInterface`.
- `DiagnosticDataPortMapping` that is associated with a `PPortPrototype` typed by a `DiagnosticDataIdentifierInterface`.
- `DiagnosticSecurityLevelPortMapping` that is associated with a `PPortPrototype` typed by a `DiagnosticSecurityLevelInterface`.
- `DiagnosticServiceValidationMapping` that is associated with a `PPortPrototype` typed by a `DiagnosticServiceValidationInterface`.

]

The rationale for the existence of `[constr_10002]` is that the respective `PortPrototype` has a clearly defined functionality. For example, it can only provide the content of one DID, but it cannot provide the content of an arbitrary number of DIDs.

For such a case, the `DiagnosticServiceGenericMapping` (see [Chapter 5.2.3.3.1](#)) shall be applied.

Please note the `[constr_10002]` does not apply to the `DiagnosticServiceGenericMapping`, i.e. a `PortPrototype` that is not subject to `[constr_10002]` can be referenced by multiple `DiagnosticServiceGenericMapping`.

In other words, the ability for several `DiagnosticServiceGenericMappings` to refer to the same `PortPrototype` is what makes the `DiagnosticServiceGenericMapping` *generic*.

In addition, `[constr_10002]` is intentionally not applied for `PPortPrototypes` typed by `DiagnosticDataElementInterface` because the operations executed in such context are stateless and can therefore be called from several clients without restrictions.

5.2.1.1 Mapping of multiple Diagnostic Resources to a PortPrototype

The “regular” mapping of diagnostic resources foresees a 1:1 mapping of a specific diagnostic resource to a `PortPrototype`.

There are, however, use cases where the intention is to map multiple diagnostic resources to a single `PortPrototype`. The following use cases exist:

- The software wants to report the status of multiple events to the DM.
- The software wants to retrieve the status of multiple events from the DM.
- The software wants to set multiple diagnostic conditions.

Using the “regular” mapping approach, the software would need to define a dedicated `PortPrototype` for, e.g. reporting the status of each event. This could mean that a large number of `PortPrototypes` has to be defined in such a case.

If the `PortPrototype` is typed by a `DiagnosticMultipleResourceInterface`, then the `PortPrototype` can become the target of references from multiple `DiagnosticMultipleResourcePortMappings`.

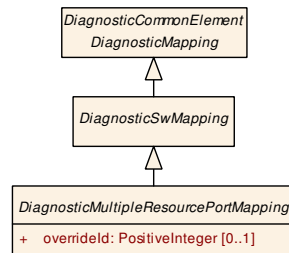


Figure 5.3: Modeling of `DiagnosticMultipleResourcePortMapping`

Class	<code>DiagnosticMultipleResourcePortMapping</code> (abstract)			
Note	This abstract base class enables the mapping of diagnostic <code>PortInterfaces</code> that deal with multiple diagnostic resources. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticMultipleConditionPortMapping , DiagnosticMultipleEventPortMapping , DiagnosticMultipleMonitorPortMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
overrideId	PositiveInteger	0..1	attr	This attribute shall be used to define the value of a manually override of the automatic generated handle Id value.

Table 5.13: `DiagnosticMultipleResourcePortMapping`

This means, for example, that for each `DiagnosticEvent` that shall have its status reported to the DM, a single `DiagnosticMultipleMonitorPortMapping` (please refer to [Chapter 5.2.2.3](#)) shall be defined.

In other words, this approach minimizes the number of `PortPrototypes` that have to be defined, but has no impact on the overall number of diagnostic mappings.

Please note that each `DiagnosticMultipleResourcePortMapping` can only map **one** `PortPrototype` to **one** diagnostic resource (e.g. a `DiagnosticEvent`).

But it is possible to define multiple `DiagnosticMultipleResourcePortMapping` that refer to the **same** `PortPrototype` and a **different** diagnostic resources of the same kind. Thereby the multiple resource mapping semantics is achieved.

[TPS_MANI_01415] Semantics of attribute `DiagnosticMultipleResourcePortMapping.overrideId` [The DM will assign an ID for each diagnostic resource mapped to a `PortPrototype` that is typed by a `DiagnosticMultipleResourceInterface`.

If the user prefers to override the algorithm applied for the assignment of the ID, it is possible to assign a dedicated ID by means of setting the optional attribute `overrideId` to the intended value. The DM will respect this setting for the assignment of the ID.]

5.2.2 Fault-Memory-related Diagnostic Mapping

This section contains a documentation of `DiagnosticMappings` in the context of fault memory configuration.

5.2.2.1 Diagnostic Monitor to Port Mapping

[TPS_MANI_01351] Reporting the status of a `DiagnosticEvent` on the *AUTOSAR adaptive platform* [For the purpose of reporting the status of a diagnostic event on the *AUTOSAR adaptive platform*, the relation between a `DiagnosticEvent` and one `RPortPrototypes` is created by using the `DiagnosticMonitorPortMapping` that refers to

- a `DiagnosticEvent` in the role `diagnosticEvent`,
- a `ProcessDesign` in the role `process`, and
- an `RPortPrototype` typed by a `DiagnosticMonitorInterface` in the role `rPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` will use at run-time.

]

Class	DiagnosticMonitorPortMapping			
Note	Defines to which SWC service port the Diagnostic Monitor is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnosticEvent	DiagnosticEvent	0..1	ref	Reference to the DiagnosticEvent that is assigned to SWC service ports.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atp.Splitable Tags: atp.Splitkey=process





Class	DiagnosticMonitorPortMapping			
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic MonitorPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.14: DiagnosticMonitorPortMapping

The use case that supports the reporting of a diagnostic event is depicted in [Figure 5.4](#).

[constr_10047] Restriction for the applicability of DiagnosticMonitorPortMapping

Imposition time: IT_DiagDes

[If an RPortPrototype is referenced by a DiagnosticMonitorPortMapping, then the RPortPrototype shall be typed by a DiagnosticMonitorInterface.]

[constr_10048] Existence of reference from DiagnosticMonitorPortMapping to DiagnosticEvent

Imposition time: IT_DiagDes

[Each DiagnosticEvent shall only be referenced by exactly one DiagnosticMonitorPortMapping or DiagnosticMultipleMonitorPortMapping.]

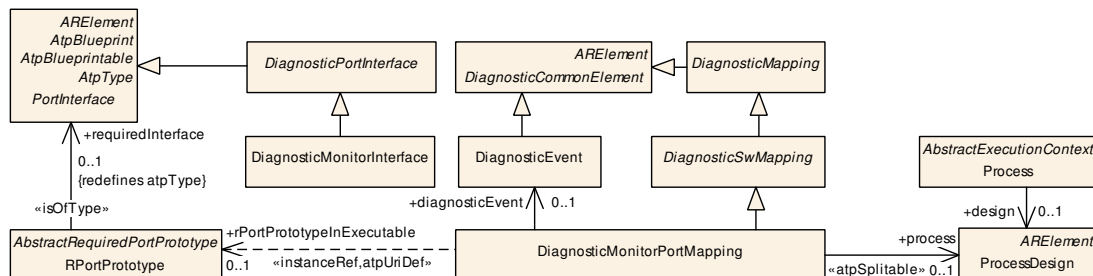


Figure 5.4: Modeling of DiagnosticMonitorPortMapping for reporting the status of diagnostic events on the AUTOSAR adaptive platform

Class	DiagnosticEvent			
Note	This element is used to configure DiagnosticEvents. Tags: atp.recommendedPackage=DiagnosticEvents			
Base	ARElement, ARObjct, CollectableElement, DiagnosticCommonElement, Identifiable, Multilanguage Referrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticEvent			
associated Event Identification	PositiveInteger	0..1	attr	This attribute represents the identification number that is associated with the enclosing DiagnosticEvent and allows to identify it when placed into a snapshot record or extended data record storage. This value can be reported as internal data element in snapshot records or extended data records.
clearEvent Allowed Behavior	DiagnosticClearEventAllowedBehaviorEnum	0..1	attr	This attribute defines the resulting UDS status byte for the related event, which shall not be cleared according to the ClearEventAllowed callback
confirmation Threshold	PositiveInteger	0..1	attr	This attribute defines the number of operation cycles with a failed result before a confirmed DTC is set to 1. The semantic of this attribute is a by "1" increased value compared to the confirmation threshold of the "trip counter" mentioned in ISO 14229-1 in figure D.4. A value of "1" defines the immediate confirmation of the DTC along with the first reported failed. This is also sometimes called "zero trip DTC". A value of "2" defines a DTC confirmation in the operation cycle after the first occurred failed. A value of "2" is typically used in the US for OBD DTC confirmation. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
connected Indicator	DiagnosticConnectedIndicator	*	aggr	Event specific description of Indicators. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=connectedIndicator.shortName, connectedIndicator.variationPoint.shortLabel vh.latestBindingTime=postBuild
prestorage FreezeFrame	Boolean	0..1	attr	This attribute describes whether the Prestorage of Freeze Frames is supported by the assigned event or not. true: Prestorage of FreezeFrames is supported false: Prestorage of FreezeFrames is not supported
prestored FreezeFrame StoredInNvm	Boolean	0..1	attr	If the Event uses a prestored freeze-frame (using the operations PrestoreFreezeFrame and ClearPrestoredFreezeFrame of the service interface DiagnosticMonitor) this attribute indicates if the Event requires the data to be stored in non-volatile memory. TRUE = Dem shall store the prestored data in non-volatile memory, FALSE = Data can be lost at shutdown (not stored in Nvm)
recoverableIn SameOperation Cycle	Boolean	0..1	attr	If the attribute is set to true then reporting PASSED will reset the indication of a failed test in the current operation cycle. If the attribute is set to false then reporting PASSED will be ignored and not lead to a reset of the indication of a failed test.

Table 5.15: DiagnosticEvent

Enumeration	DiagnosticClearEventAllowedBehaviorEnum
Note	This enumeration defines the possible behavior for clear event allowed
Aggregated by	DiagnosticEvent.clearEventAllowedBehavior
Literal	Description
noStatusByte Change	The event status byte keeps unchanged. Tags: atp.EnumerationLiteralIndex=0
onlyThisCycleAnd Readiness	The OperationCycle and readiness bits of the event status byte are reset. Tags: atp.EnumerationLiteralIndex=1

Table 5.16: DiagnosticClearEventAllowedBehaviorEnum

Class	DiagnosticConnectedIndicator			
Note	Description of indicators that are defined per DiagnosticEvent.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DiagnosticEvent.connectedIndicator			
Attribute	Type	Mult.	Kind	Note
behavior	DiagnosticConnectedIndicatorBehaviorEnum	0..1	attr	Behavior of the linked indicator.
healingCycleCounterThreshold	PositiveInteger	0..1	attr	This attribute defines the number of healing cycles for the WarningIndicatorOffCriteria Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
indicator	DiagnosticIndicator	0..1	ref	Reference to the used indicator.
indicatorFailureCycleCounterThreshold	PositiveInteger	0..1	attr	This attribute defines the number of failure cycles for the WarningIndicatorOnCriteria. Please note that this attribute is not relevant for the Adaptive Platform.

Table 5.17: DiagnosticConnectedIndicator

5.2.2.1.1 Multiple Diagnostic Monitor to Port Mapping

[TPS_MANI_01416] Reporting the status of multiple [DiagnosticEvents](#) in the context of one [PortInterface](#) on the *AUTOSAR adaptive platform* [For the purpose of reporting the status of multiple diagnostic events on the *AUTOSAR adaptive platform*, the relation between a collection of [DiagnosticEvents](#) and one [RPortPrototype](#) is created by using the [DiagnosticMultipleMonitorPortMapping](#) that refers to

- a [DiagnosticEvent](#) in the role `diagnosticEvent`,
- a [ProcessDesign](#) in the role `process`, and
- an [RPortPrototype](#) typed by a [DiagnosticMultipleMonitorInterface](#) in the role `rPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the [PortPrototype](#) will use at run-time.

]

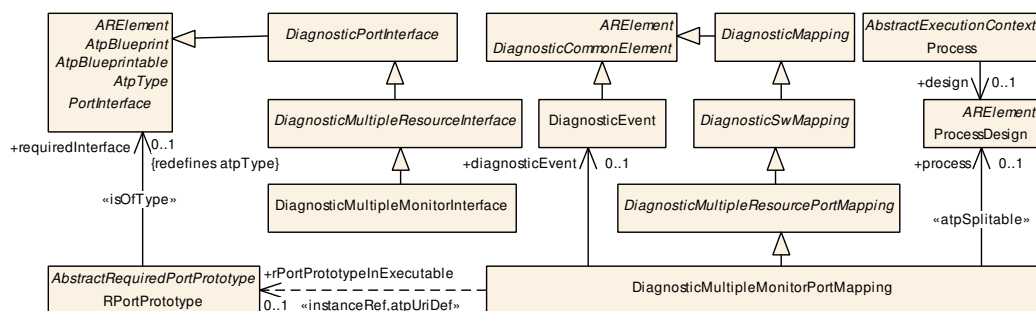


Figure 5.5: Modeling of [DiagnosticMultipleMonitorPortMapping](#) for reporting the status of multiple diagnostic events on the *AUTOSAR adaptive platform*

Class	DiagnosticMultipleMonitorPortMapping			
Note	Defines to which SWC service port that can handle a collection of monitors the specific event is mapped Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticMultipleResourcePortMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnosticEvent	DiagnosticEvent	0..1	ref	Reference to the DiagnosticEvent that is assigned to a SWC service port.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process
rPortPrototypeInExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic MonitorMultipleMonitorPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.18: DiagnosticMultipleMonitorPortMapping

[constr_10436] Restriction for the applicability of [DiagnosticMultipleMonitorPortMapping](#)

Imposition time: [IT_DiagDes](#)

[If an [RPortPrototype](#) is referenced by a [DiagnosticMultipleMonitorPortMapping](#), then the [RPortPrototype](#) shall be typed by a [DiagnosticMultipleMonitorInterface](#).]

5.2.2.2 Diagnostic Event to Port Mapping

[TPS_MANI_01048] Retrieving the status of a [DiagnosticEvent](#) to [PortPrototype\(s\)](#) on the *AUTOSAR adaptive platform* [For the purpose of reporting the status of a diagnostic event on the *AUTOSAR adaptive platform*, the relation between a [DiagnosticEvent](#) and one [RPortPrototype](#) is created by using the [DiagnosticEventPortMapping](#) that refers to

- a [DiagnosticEvent](#) in the role [diagnosticEvent](#),
- a [ProcessDesign](#) in the role [process](#), and
- an [RPortPrototype](#) typed by a [DiagnosticEventInterface](#) in the role [rPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding [InstanceSpecifier](#) that the [PortPrototype](#) will use at run-time.

]

[constr_10049] Restriction for the applicability of **DiagnosticEventPortMapping**

Imposition time: *IT_DiagDes*

[If an **RPortPrototype** is referenced by a **DiagnosticEventPortMapping**, then the **RPortPrototype** shall be typed by a **DiagnosticEventInterface**.]

The use case that supports the retrieval of information about a diagnostic event is depicted in [Figure 5.6](#).

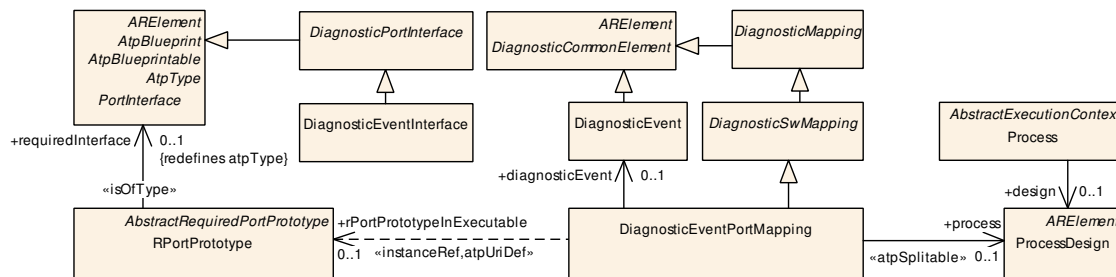


Figure 5.6: Modeling of **DiagnosticEventPortMapping to retrieve information about a diagnostic event on the *AUTOSAR adaptive platform***

Class	DiagnosticEventPortMapping			
Note	Defines to which SWC service ports the DiagnosticEvent is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnosticEvent	DiagnosticEvent	0..1	ref	Reference to the DiagnosticEvent that is assigned to SWC service ports.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplittable Tags: atp.Splitkey=process This Attribute is only used by the AUTOSAR Adaptive Platform.
rPortPrototypeInExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic EventPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 5.19: DiagnosticEventPortMapping

5.2.2.3 Multiple Diagnostic Event to Port Mapping

[TPS_MANI_01417] Retrieving the status of multiple **DiagnosticEvents** to **PortPrototype(s)** on the *AUTOSAR adaptive platform* [For the purpose of retrieving the status of a collection of diagnostic events on the *AUTOSAR adaptive platform*,

the relation between the collection of [DiagnosticEvents](#) and one [RPortPrototype](#) is created by using the [DiagnosticMultipleEventPortMapping](#) that refers to

- a [DiagnosticEvent](#) in the role [diagnosticEvent](#),
- a [ProcessDesign](#) in the role [process](#), and
- an [RPortPrototype](#) typed by a [DiagnosticEventInterface](#) in the role [rPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding [InstanceSpecifier](#) that the [PortPrototype](#) will use at run-time.

]

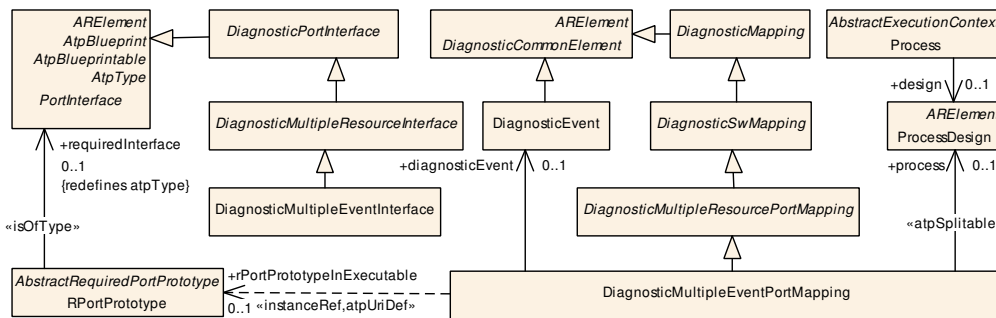


Figure 5.7: Modeling of [DiagnosticMultipleEventPortMapping](#) for retrieving the status of multiple diagnostic events on the *AUTOSAR adaptive platform*

Class	DiagnosticMultipleEventPortMapping			
Note	Defines to which SWC service port that can handle a collection of event status the specific event is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticMultipleResourcePortMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnosticEvent	DiagnosticEvent	0..1	ref	Reference to the DiagnosticEvent that is assigned to a SWC service port.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplittable Tags: atp.Splitkey=process
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticMonitorMultipleEventPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.20: DiagnosticMultipleEventPortMapping

[constr_10437] Restriction for the applicability of **DiagnosticMultipleEventPortMapping**

Imposition time: IT_DiagDes

[If an **RPortPrototype** is referenced by a **DiagnosticMultipleEventPortMapping**, then the **RPortPrototype** shall be typed by a **DiagnosticMultipleEventInterface**.]

5.2.2.4 Diagnostic Operation Cycle to Port Mapping

[TPS_MANI_01049] Mapping of **DiagnosticOperationCycle** to **PortPrototype(s)** on the **AUTOSAR adaptive platform** [On the **AUTOSAR adaptive platform**, the relation between a **DiagnosticOperationCycle** and one **RPortPrototype** is created by using the **DiagnosticOperationCyclePortMapping** that refers to

- a **DiagnosticOperationCycle** in the role **operationCycle**,
- a **ProcessDesign** in the role **process**, and
- an **RPortPrototype** typed by a **DiagnosticOperationCycleInterface** in the role **rPortPrototypeInExecutable**. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding **InstanceSpecifier** that the **PortPrototype** will use at run-time.

]

[constr_10050] Restriction for the applicability of **DiagnosticOperationCyclePortMapping**

Imposition time: IT_DiagDes

[If an **RPortPrototype** is referenced by a **DiagnosticOperationCyclePortMapping**, then the **RPortPrototype** shall be typed by a **DiagnosticOperationCycleInterface**.]

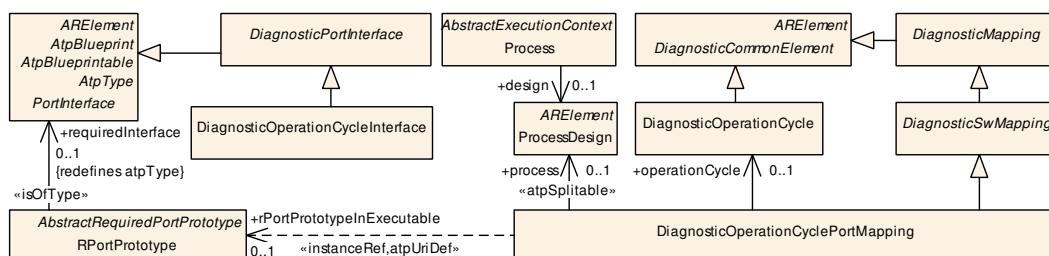


Figure 5.8: Modeling of **DiagnosticOperationCyclePortMapping for the usage on the **AUTOSAR adaptive platform****

[constr_10051] Existence of reference from [DiagnosticOperationCyclePortMapping](#) to [DiagnosticOperationCycle](#)

Imposition time: [IT_DiagDes](#)

[Each [DiagnosticOperationCycle](#) shall only be referenced by exactly one [DiagnosticOperationCyclePortMapping](#).]

Class	DiagnosticOperationCycle			
Note	Definition of an operation cycle that is the base of the event qualifying and for Dem scheduling. Tags: atp.recommendedPackage=DiagnosticOperationCycles			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
type	DiagnosticOperationCycleTypeEnum	0..1	attr	Operation cycles types for the Dem.

Table 5.21: DiagnosticOperationCycle

Enumeration	DiagnosticOperationCycleTypeEnum
Note	Operation cycles types used to identify certain Operation cycles with a certain semantics.
Aggregated by	DiagnosticOperationCycle.type
Literal	Description
ignition	Ignition ON / OFF cycle Tags: atp.EnumerationLiteralIndex=0
obdDrivingCycle	OBD Driving cycle Tags: atp.EnumerationLiteralIndex=1
other	further operation cycle Tags: atp.EnumerationLiteralIndex=2
warmup	OBD Warm up cycle Tags: atp.EnumerationLiteralIndex=5

Table 5.22: DiagnosticOperationCycleTypeEnum

Class	DiagnosticOperationCyclePortMapping			
Note	Defines to which SWC service ports the DiagnosticOperationCycle is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
operationCycle	DiagnosticOperationCycle	0..1	ref	Reference to the DiagnosticOperationCycle that is assigned to SWC service ports.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atp.Splitable Tags: atp.Splitkey=process This Attribute is only used by the AUTOSAR Adaptive Platform.





Class	DiagnosticOperationCyclePortMapping			
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic OperationCyclePortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 5.23: DiagnosticOperationCyclePortMapping

5.2.2.5 Diagnostic Enable Condition to Port Mapping

[TPS_MANI_01050] Mapping of **DiagnosticEnableCondition** to **PortPrototype(s)** on the **AUTOSAR adaptive platform** [On the *AUTOSAR adaptive platform*, the relation between a **DiagnosticEnableCondition** and one **RPortPrototype** is created by using the **DiagnosticEnableConditionPortMapping** that refers to

- a **DiagnosticEnableCondition** in the role **enableCondition**,
- a **ProcessDesign** in the role **process**, and
- an **RPortPrototype** typed by a **DiagnosticConditionInterface** in the role **rPortPrototypeInExecutable**. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding **InstanceSpecifier** that the **PortPrototype** will use at run-time.

]

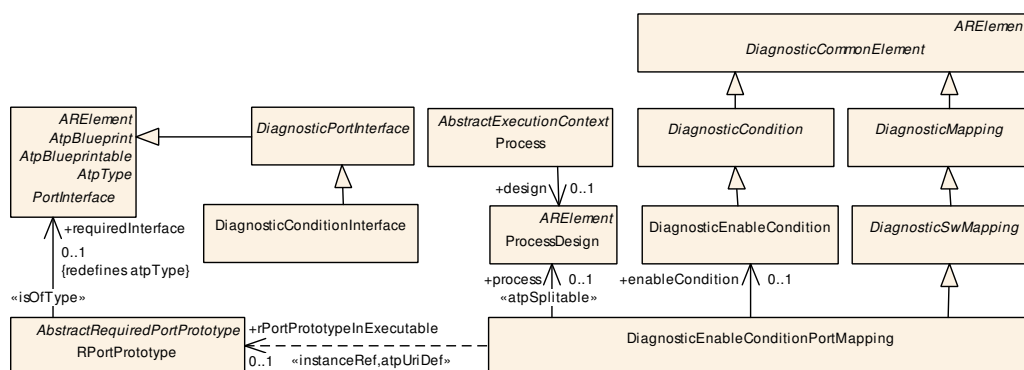


Figure 5.9: Modeling of **DiagnosticEnableConditionPortMapping for the usage on the **AUTOSAR adaptive platform****

[constr_10052] Restriction for the applicability of [DiagnosticEnableConditionPortMapping](#)

Imposition time: IT_DiagDes

[If an [RPortPrototype](#) is referenced by a [DiagnosticEnableConditionPortMapping](#), then the [RPortPrototype](#) shall be typed by a [DiagnosticConditionInterface](#).]

[constr_10053] Existence of reference from [DiagnosticEnableConditionPortMapping](#) to [DiagnosticEnableCondition](#)

Imposition time: IT_DiagDes

[Each [DiagnosticEnableCondition](#) shall only be referenced by at most one [DiagnosticEnableConditionPortMapping](#).]

Class	DiagnosticEnableCondition			
Note	Specification of an enable condition. Tags: atp.recommendedPackage=DiagnosticConditions			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticCondition , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.24: DiagnosticEnableCondition

Class	DiagnosticEnableConditionPortMapping			
Note	Defines to which SWC service ports the DiagnosticEnableCondition is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
enableCondition	DiagnosticEnableCondition	0..1	ref	Reference to the EnableCondition which is mapped to a SWC service port.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable . Stereotypes: atp.Splitable Tags: atp.Splitkey=process This Attribute is only used by the AUTOSAR Adaptive Platform.
rPortPrototypeInExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticEnableConditionPortMapping on the AUTOSAR adaptive platform. Stereotypes: atp.UriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 5.25: DiagnosticEnableConditionPortMapping

5.2.2.6 Diagnostic Clear Condition to Port Mapping

[TPS_MANI_01259] Mapping of **DiagnosticClearCondition** to **PortPrototype(s)** on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a **DiagnosticClearCondition** and one **RPortPrototype** is created by using the **DiagnosticClearConditionPortMapping** that refers to

- a **DiagnosticClearCondition** in the role **clearCondition**,
- a **ProcessDesign** in the role **process**, and
- an **RPortPrototype** typed by a **DiagnosticConditionInterface** in the role **rPortPrototypeInExecutable**. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding **InstanceSpecifier** that the **PortPrototype** will use at run-time.

]

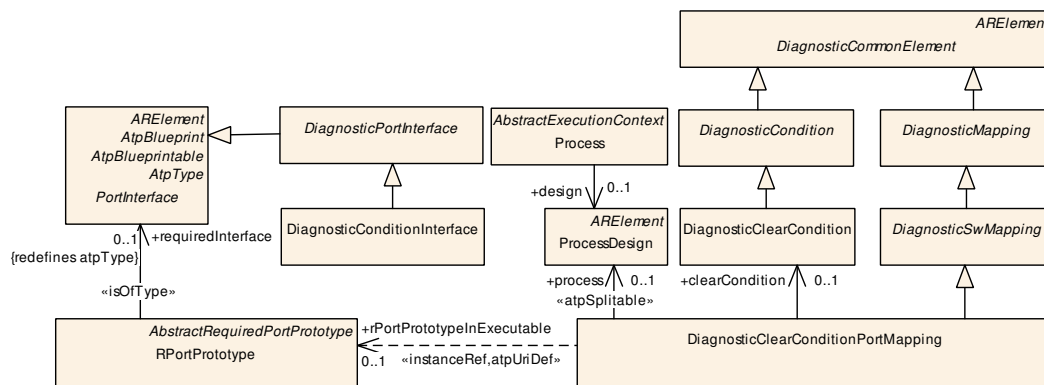


Figure 5.10: Modeling of **DiagnosticClearConditionPortMapping for the usage on the *AUTOSAR adaptive platform***

[constr_10054] Restriction for the applicability of **DiagnosticClearConditionPortMapping**

Imposition time: IT_DiagDes

[If an **RPortPrototype** is referenced by a **DiagnosticClearConditionPortMapping**, then the **RPortPrototype** shall be typed by a **DiagnosticConditionInterface**.]

[constr_10055] Existence of reference from **DiagnosticClearConditionPortMapping** to **DiagnosticClearCondition**

Imposition time: IT_DiagDes

[Each **DiagnosticClearCondition** shall only be referenced by at most one **DiagnosticClearConditionPortMapping**.]

Class	DiagnosticClearConditionPortMapping			
Note	Defines to which SWC service ports the DiagnosticClearCondition is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
clearCondition	DiagnosticClearCondition	0..1	ref	Reference to the ClearCondition which is mapped to a SWC service port.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplittable Tags: atp.Splitkey=process
rPortPrototypeInExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic ClearConditionMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.26: DiagnosticClearConditionPortMapping

[constr_10162] Multiplicity of reference in the role [DiagnosticClearConditionPortMapping.clearCondition](#)

Imposition time: [IT_DiagDes](#)

[For each [DiagnosticClearConditionPortMapping](#), the reference in the role [clearCondition](#) shall exist.]

5.2.2.7 Multiple Diagnostic Condition to Port Mapping

[TPS_MANI_01418] Mapping of multiple [DiagnosticConditions](#) to a [PortPrototype](#) on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a [DiagnosticCondition](#) and one [RPortPrototype](#) is created by using the [DiagnosticMultipleConditionPortMapping](#) that refers to

- a [DiagnosticConditions](#) in the role [diagnosticCondition](#),
- a [ProcessDesign](#) in the role [process](#), and
- an [RPortPrototype](#) typed by a [DiagnosticMultipleConditionInterface](#) in the role [rPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding *Instance-Specifier* that the [PortPrototype](#) will use at run-time.

]

Please note that the nature of the reference [DiagnosticMultipleConditionPortMapping.diagnosticCondition](#) allows for referencing a mixed collection of enable conditions and clear conditions, if applicable.

But since the concrete reference only points to the concrete sub-classes of [DiagnosticCondition](#), the semantics of each individual reference can easily be determined.

Class	DiagnosticMultipleConditionPortMapping			
Note	Defines to which SWC service port that can handle a collection of diagnostic conditions the specific condition is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticMultipleResourcePortMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnostic Condition	DiagnosticCondition	0..1	ref	Reference to the DiagnosticCondition which is mapped to a SWC service port.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atp.Splitable Tags: atp.Splitkey=process
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticConditionPortMapping on the AUTOSAR adaptive platform. Stereotypes: atp.UriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.27: DiagnosticMultipleConditionPortMapping

[constr_10438] Restriction for the applicability of [DiagnosticMultipleConditionPortMapping](#)

Imposition time: IT_DiagDes

[If an [RPortPrototype](#) is referenced by a [DiagnosticMultipleConditionPortMapping](#), then the [RPortPrototype](#) shall be typed by a [DiagnosticMultipleConditionInterface](#).]

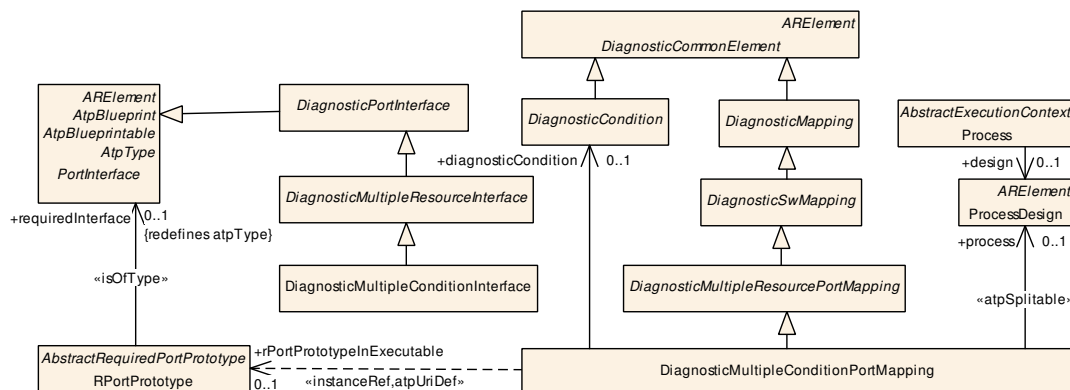


Figure 5.11: Modeling of [DiagnosticMultipleConditionPortMapping](#) for reporting the status of multiple diagnostic events on the *AUTOSAR adaptive platform*

5.2.2.8 Diagnostic Indicator to Port Mapping

[TPS_MANI_01260] Mapping of **DiagnosticIndicator** to **PortPrototype(s)** on the **AUTOSAR adaptive platform** [On the **AUTOSAR adaptive platform**, the relation between a **DiagnosticIndicator** and one **RPortPrototype** is created by using the **DiagnosticIndicatorPortMapping** that refers to

- a **DiagnosticIndicator** in the role **indicator**,
- a **ProcessDesign** in the role **process**, and
- an **RPortPrototype** typed by a **DiagnosticIndicatorInterface** in the role **rPortPrototypeInExecutable**. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding **InstanceSpecifier** that the **PortPrototype** will use at run-time.

]

[constr_10056] Restriction for the applicability of **DiagnosticIndicatorPortMapping**

Imposition time: IT_DiagDes

[If an **RPortPrototype** is referenced by a **DiagnosticIndicatorPortMapping**, then the **RPortPrototype** shall be typed by a **DiagnosticIndicatorInterface**.]

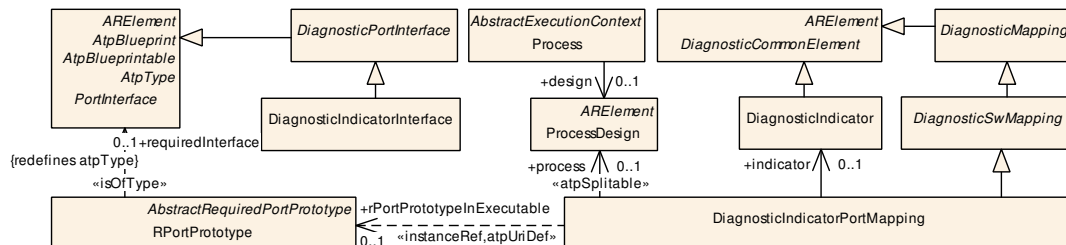


Figure 5.12: Modeling of **DiagnosticIndicatorPortMapping for the usage on the **AUTOSAR adaptive platform****

Class	DiagnosticIndicatorPortMapping			
Note	Defines to which SWC service ports the DiagnosticIndicator is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, DiagnosticSwMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
indicator	DiagnosticIndicator	0..1	ref	Reference to the DiagnosticIndicator which is mapped to a SWC service port.





Class	DiagnosticIndicatorPortMapping			
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic IndicatorMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.28: DiagnosticIndicatorPortMapping

[constr_10163] Multiplicity of reference in the role DiagnosticIndicator-PortMapping.indicator

Imposition time: IT_DiagDes

[For each `DiagnosticIndicatorPortMapping`, the reference in the role `indicator` shall exist.]

5.2.2.9 Diagnostic Memory Destination to Port Mapping

[TPS_MANI_01261] Mapping of `DiagnosticMemoryDestination` to `PortPrototype(s)` on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a `DiagnosticMemoryDestination` and one `RPortPrototype` is created by using the `DiagnosticMemoryDestinationPortMapping` that refers to

- a `DiagnosticMemoryDestination` in the role `memoryDestination`,
- a `ProcessDesign` in the role `process`, and
- an `RPortPrototype` typed by a `DiagnosticDTCInformationInterface` in the role `rPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` will use at run-time.

1

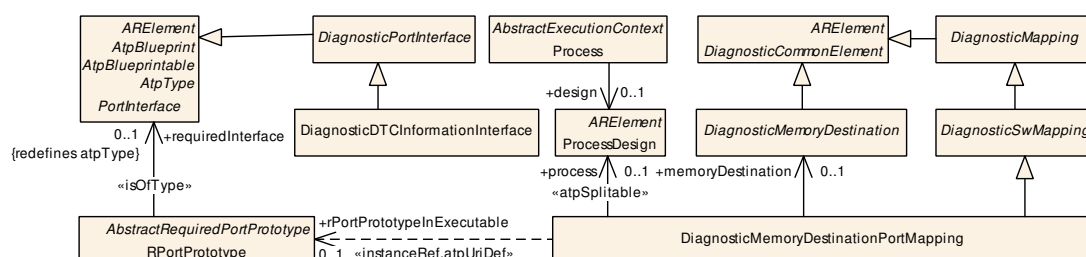


Figure 5.13: Modeling of `DiagnosticMemoryDestinationPortMapping` for the usage on the *AUTOSAR adaptive platform*

[constr_10057] Restriction for the applicability of [DiagnosticMemoryDestinationPortMapping](#)*Imposition time:* IT_DiagDes

[If an [RPortPrototype](#) is referenced by a [DiagnosticMemoryDestinationPortMapping](#), then the [RPortPrototype](#) shall be typed by a [DiagnosticDTCInformationInterface](#).]

Class	DiagnosticMemoryDestinationPortMapping			
Note	Defines to which SWC service ports the DiagnosticMemoryDestination. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
memory Destination	DiagnosticMemoryDestination	0..1	ref	Reference to the MemoryDestination which is mapped to a SWC service port.
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atp.Splitable Tags: atp.Splitkey=process
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticMemoryDestinationMapping on the AUTOSAR adaptive platform. Stereotypes: atp.UriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.29: DiagnosticMemoryDestinationPortMapping**[constr_10164] Multiplicity of reference in the role [DiagnosticMemoryDestinationPortMapping.memoryDestination](#)***Imposition time:* IT_DiagDes

[For each [DiagnosticMemoryDestinationPortMapping](#), the reference in the role [memoryDestination](#) shall exist.]

Class	DiagnosticMemoryDestination (abstract)			
Note	This abstract meta-class represents a possible memory destination for a diagnostic event.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticMemoryDestinationPrimary , DiagnosticMemoryDestinationUserDefined			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticMemoryDestination (abstract)			
agingRequiresTestedCycle	Boolean	0..1	attr	Defines whether the aging cycle counter is processed every aging cycles or else only tested aging cycle are considered. If the attribute is set to TRUE: only tested aging cycle are considered for aging cycle counter. If the attribute is set to FALSE: aging cycle counter is processed every aging cycle. On the adaptive platform, the value of this attribute can be different for each DiagnosticMemoryDestination.
clearDtcLimitation	DiagnosticClearDtcLimitationEnum	0..1	attr	Defines the scope of the DEM_ClearDTC Api. On the adaptive platform, the value of this attribute can be different for each DiagnosticMemoryDestination.
dtcStatusAvailabilityMask	PositiveInteger	0..1	attr	Mask for the supported DTC status bits by the Dem.
eventDisplacementStrategy	DiagnosticEventDisplacementStrategyEnum	0..1	attr	This attribute defines, whether support for event displacement is enabled or not, and which displacement strategy is followed.
maxNumberOfEventEntries	PositiveInteger	0..1	attr	This attribute fixes the maximum number of event entries in the fault memory.
memoryEntryStorageTrigger	DiagnosticMemoryEntryStorageTriggerEnum	0..1	attr	Describes the trigger to allocate an event memory entry.
statusBitHandlingTestFailedSinceLastClear	DiagnosticStatusBitHandlingTestFailedSinceLastClearEnum	0..1	attr	This attribute defines, whether the aging and displacement mechanism shall be applied to the "Test FailedSinceLastClear" status bits. On the adaptive platform, the value of this attribute can be different for each DiagnosticMemoryDestination.
typeOfFreezeFrameRecordNumeration	DiagnosticTypeOfFreezeFrameRecordNumerationEnum	0..1	attr	This attribute defines the type of assigning freeze frame record numbers for event-specific freeze frame records.

Table 5.30: DiagnosticMemoryDestination

Enumeration	DiagnosticClearDtcLimitationEnum
Note	Scope of the DEM_ClearDTC Api.
Aggregated by	DiagnosticMemoryDestination.clearDtcLimitation
Literal	Description
allSupportedDtc	DEM_ClearDtc API accepts all supported DTC values. Tags: atp.EnumerationLiteralIndex=0
clearAllDtc	DEM_ClearDtc API accepts ClearAllDTCs only. Tags: atp.EnumerationLiteralIndex=1

Table 5.31: DiagnosticClearDtcLimitationEnum

Enumeration	DiagnosticEventDisplacementStrategyEnum
Note	Defines the displacement strategy.
Aggregated by	DiagnosticMemoryDestination.eventDisplacementStrategy
Literal	Description
full	Event memory entry displacement is enabled, by consideration of priority active/passive status, and occurrence. Tags: atp.EnumerationLiteralIndex=0
none	Event memory entry displacement is disabled. Tags: atp.EnumerationLiteralIndex=1





Enumeration	DiagnosticEventDisplacementStrategyEnum
prioOcc	Event memory entry displacement is enabled, by consideration of priority and occurrence (but without active/passive status). Tags: atp.EnumerationLiteralIndex=2

Table 5.32: DiagnosticEventDisplacementStrategyEnum

Enumeration	DiagnosticMemoryEntryStorageTriggerEnum
Note	Trigger types to allocate an event memory entry.
Aggregated by	DiagnosticMemoryDestination.memoryEntryStorageTrigger
Literal	Description
confirmed	Status information of UDS DTC status bit 3 Tags: atp.EnumerationLiteralIndex=0
fdcThreshold	Threshold to allocate an event memory entry and to capture the Freeze Frame. Tags: atp.EnumerationLiteralIndex=1
testFailed	Status information of UDS DTC status bit 0. Tags: atp.EnumerationLiteralIndex=3

Table 5.33: DiagnosticMemoryEntryStorageTriggerEnum

Enumeration	DiagnosticStatusBitHandlingTestFailedSinceLastClearEnum
Note	This enumeration controls whether the aging and displacement mechanism shall be applied to the 'TestFailedSinceLastClear' status bits.
Aggregated by	DiagnosticMemoryDestination.statusBitHandlingTestFailedSinceLastClear
Literal	Description
statusBitAgingAndDisplacement	The "TestFailedSinceLastClear" status bits are reset to 0, if aging or displacement applies. Tags: atp.EnumerationLiteralIndex=0
statusBitNormal	Aging and displacement has no impact on the "TestFailedSinceLastClear" status bits. Tags: atp.EnumerationLiteralIndex=1

Table 5.34: DiagnosticStatusBitHandlingTestFailedSinceLastClearEnum

Enumeration	DiagnosticTypeOfFreezeFrameRecordNumerationEnum
Note	FreezeFrame record numeration type
Aggregated by	DiagnosticMemoryDestination.typeOfFreezeFrameRecordNumeration
Literal	Description
calculated	Freeze frame records will be numbered consecutive starting by 1 in their chronological order. Tags: atp.EnumerationLiteralIndex=0
configured	Freeze frame records will be numbered based on the given configuration in their chronological order. Tags: atp.EnumerationLiteralIndex=1

Table 5.35: DiagnosticTypeOfFreezeFrameRecordNumerationEnum

5.2.2.10 Diagnostic Extended Data Record Port Mapping

[TPS_MANI_01484] Mapping of [DiagnosticExtendedDataRecordElement](#) to [PortPrototype\(s\)](#) on the *AUTOSAR adaptive platform* [On the *AUTOSAR*

adaptive platform, the relation between a `DiagnosticExtendedDataRecordElement` and one `RPortPrototype` is created by using the `DiagnosticExtendedDataRecordClientPortMapping` that refers to

- a `DiagnosticExtendedDataRecordElement` in the role `recordElement`,
- a `ProcessDesign` in the role `process`, and
- an `RPortPrototype` typed by a `DiagnosticExtendedDataRecordInterface` in the role `rPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` will use at run-time.

]

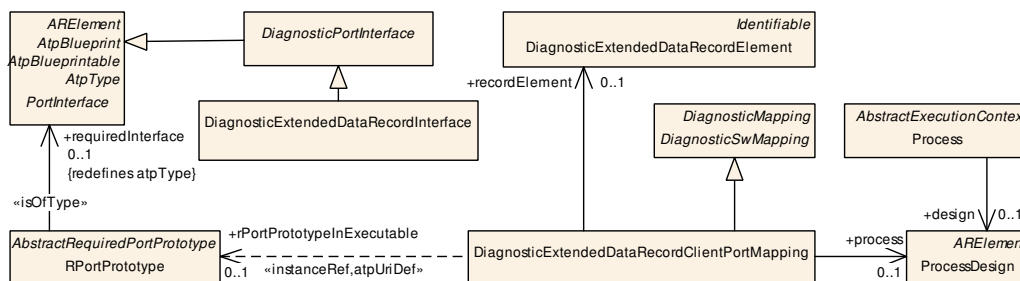


Figure 5.14: Modeling of `DiagnosticExtendedDataRecordClientPortMapping` for the usage on the AUTOSAR adaptive platform

[constr_10684] Restriction for the applicability of `DiagnosticExtendedDataRecordClientPortMapping`

Imposition time: IT_DiagDes

[If an `RPortPrototype` is referenced by a `DiagnosticExtendedDataRecordClientPortMapping`, then the `RPortPrototype` shall be typed by a `DiagnosticExtendedDataRecordInterface`.]

There is no other use case for a `RPortPrototype` that is typed by a `DiagnosticExtendedDataRecordInterface`, apart from becoming the target of a `DiagnosticExtendedDataRecordClientPortMapping`. This restriction is formulated in [constr_10685].

[constr_10685] Restriction for the reference to an `RPortPrototype` typed by a `DiagnosticExtendedDataRecordInterface`

Imposition time: IT_DiagDes

[If an `RPortPrototype` is typed by a `DiagnosticExtendedDataRecordInterface`, it shall only be referenced in the role `rPortPrototypeInExecutable` by a `DiagnosticExtendedDataRecordClientPortMapping`.]

Class	DiagnosticExtendedDataRecordClientPortMapping			
Note	This mapping class identifies a PortPrototype in the application software that provides data to an external data record. Tags: atp.recommendedPackage=DiagnosticPortMapppings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable.
recordElement	DiagnosticExtendedDataRecordElement	0..1	ref	This reference identifies the mapped element of an extended data record.
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This reference identifies the applicable RPortPrototype from which that data is obtained. The reference has the ability to point into the component hierarchy (under possible consideration of the rootSoftwareComposition). Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.36: DiagnosticExtendedDataRecordClientPortMapping

[constr_10686] Multiplicity of reference in the role [DiagnosticExtendedDataRecordClientPortMapping.recordElement](#)

Imposition time: IT_DiagDes

[For each [DiagnosticExtendedDataRecordClientPortMapping](#), the reference in the role [recordElement](#) shall exist.]

[constr_10732] Existence of attributes [DiagnosticExtendedDataRecord.trigger](#) and [update](#) on the AUTOSAR adaptive platform

Imposition time: AP: IT_DiagDes

[For each [DiagnosticExtendedDataRecord](#), attributes [trigger](#) and [update](#) shall only exist if at least one [DiagnosticExtendedDataRecordElement](#) is aggregated by a [DiagnosticExtendedDataRecord](#) in the role [element](#) that is referenced in the role [DiagnosticExtendedDataRecordClientPortMapping.recordElement](#).]

Please note that [\[constr_10732\]](#) is the equivalent of [\[constr_1756\]](#), see [\[3, TPS Diagnostic Extract Template\] Chapter 4.4.4](#).

5.2.3 UDS-related Diagnostic Mapping

This section contains a documentation of [DiagnosticMappings](#) in the context of UDS service configuration.

5.2.3.1 Diagnostic Security to Port Mapping

[TPS_MANI_01262] Mapping of **DiagnosticSecurityLevel** to **PortPrototype(s)** on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a **DiagnosticSecurityLevel** and one **PPortPrototype** is created by using the **DiagnosticSecurityLevelPortMapping** that refers to

- a **DiagnosticSecurityLevel** in the role **securityLevel**,
- a **ProcessDesign** in the role **process**, and
- a **PPortPrototype** typed by a **DiagnosticSecurityLevelInterface** in the role **pPortPrototypeInExecutable**. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding **InstanceSpecifier** that the **PortPrototype** on the application layer will use at run-time.

]

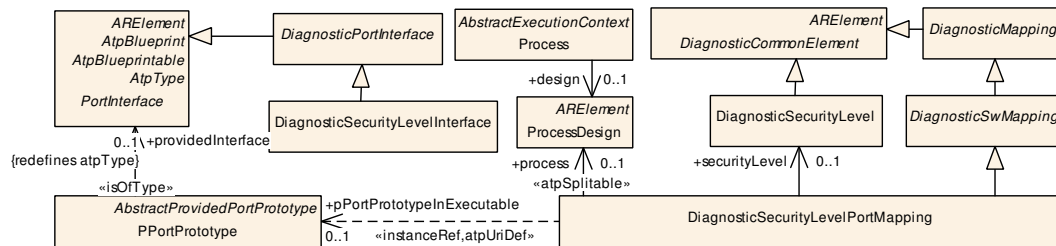


Figure 5.15: Modeling of **DiagnosticSecurityLevelPortMapping for the usage on the *AUTOSAR adaptive platform***

[constr_10058] Restriction for the applicability of **DiagnosticSecurityLevel-PortMapping**

Imposition time: IT_DiagDes

[If a **PPortPrototype** is referenced by a **DiagnosticSecurityLevelPortMapping**, then the **PPortPrototype** shall be typed by a **DiagnosticSecurityLevelInterface**.]

[constr_10059] Existence of reference from **DiagnosticSecurityLevel-PortMapping** to **DiagnosticSecurityLevel**

Imposition time: IT_DiagDes

[Each **DiagnosticSecurityLevel** shall only be referenced by exactly one **DiagnosticSecurityLevelPortMapping**.]

Class	DiagnosticSecurityLevelPortMapping
Note	Defines to which SWC service ports the DiagnosticSecurityLevel is mapped. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.





Class	DiagnosticSecurityLevelPortMapping			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, DiagnosticSwMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic SecurityLevelMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process
securityLevel	DiagnosticSecurityLevel	0..1	ref	Reference to the SecurityLevel which is mapped to a SWC service port.

Table 5.37: DiagnosticSecurityLevelPortMapping

Class	DiagnosticSecurityLevel			
Note	This meta-class represents the ability to define a security level considered for diagnostic purposes. Tags: atp.recommendedPackage=DiagnosticSecurityLevels			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
accessDataRecordSize	PositiveInteger	0..1	attr	This represents the size of the AccessDataRecord used in GetSeed. Unit:byte.
keySize	PositiveInteger	0..1	attr	This represents the size of the security key. Unit: byte.
numFailedSecurityAccess	PositiveInteger	0..1	attr	This represents the number of failed security accesses after which the delay time is activated.
securityDelayTime	TimeValue	0..1	attr	This represents the delay time after a failed security access. Unit: second.
seedSize	PositiveInteger	0..1	attr	This represents the size of the security seed. Unit: byte.

Table 5.38: DiagnosticSecurityLevel

5.2.3.2 Diagnostic Data Identifier to Port Mapping

The DM on the *AUTOSAR adaptive platform* has the ability to access entire [DiagnosticDataIdentifiers](#) at once. For supporting this ability, a dedicated mapping class named [DiagnosticDataPortMapping](#) is introduced.

[TPS_MANI_01263] Mapping of [DiagnosticDataIdentifier](#) or [DiagnosticDataElement](#) to [PortPrototype\(s\)](#) on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a [DiagnosticDataIdentifier](#) resp. [DiagnosticDataElement](#) and one [PPortPrototype](#) is created by using the [DiagnosticDataPortMapping](#) that refers to either

- a [DiagnosticDataIdentifier](#) in the role [diagnosticDataIdentifier](#) or

- a [DiagnosticDataElement](#) in the role [diagnosticDataElement](#).

]

Class	DiagnosticDataElement			
Note	This meta-class represents the ability to describe a concrete piece of data to be taken into account for diagnostic purposes.			
Base	ARObject , DiagnosticServiceMappingDiagTarget , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DiagnosticAbstractParameter.dataElement			
Attribute	Type	Mult.	Kind	Note
arraySize Semantics	ArraySizeSemantics Enum	0..1	attr	This attribute controls the meaning of the value of the array size.
maxNumberOf Elements	PositiveInteger	0..1	attr	The existence of this attribute turns the data instance into an array of data. The attribute determines the size of the array in terms of how many elements the array can take.
scalingInfoSize	PositiveInteger	0..1	attr	Size in bytes of scaling information for the DiagnosticData Element if used with DiagnosticReadScalingDataBy Identifier
swDataDef Props	SwDataDefProps	0..1	aggr	This property allows to specify data definition properties in order to support the definition of e.g. computation formulae and data constraints. Stereotypes: atpSplittable Tags: atp.Splitkey=swDataDefProps

Table 5.39: DiagnosticDataElement

As depicted in [Figure 5.16](#), [DiagnosticDataPortMapping](#) has the ability to handle access to **either** an entire DID **or** to just an element of a DID.

Therefore, the existence of [[constr_10003](#)] is required to enforce that just one of the references is actually used for any given [DiagnosticDataPortMapping](#).

[constr_10003] Restriction for the existence of [DiagnosticDataPortMapping.diagnosticDataIdentifier](#) vs. [DiagnosticDataPortMapping.diagnosticDataElement](#)

Imposition time: [IT_DiagDes](#)

[For each [DiagnosticDataPortMapping](#), **either** the reference in the role [diagnosticDataIdentifier](#) **or** [diagnosticDataElement](#) shall exist.]

[constr_10060] [PortInterface](#) of [PPortPrototype](#) referenced by [DiagnosticDataPortMapping](#)

Imposition time: [IT_DiagDes](#)

[Any particular [PPortPrototype](#) that is referenced in the role [DiagnosticDataPortMapping.pPortPrototypeInExecutable](#) shall be typed by either of

- [DiagnosticDataIdentifierInterface](#)
- [DiagnosticDataElementInterface](#)
- [DiagnosticDataIdentifierGenericInterface](#)

]

[constr_10061] Mapping to [DiagnosticDataIdentifierInterface](#), [DiagnosticDataElementInterface](#), or [DiagnosticDataIdentifierGenericInterface](#)

Imposition time: [IT_DiagDes](#)

[All [PPortPrototypes](#) typed by either

- [DiagnosticDataIdentifierInterface](#)
- [DiagnosticDataElementInterface](#)
- [DiagnosticDataIdentifierGenericInterface](#)

shall **only** be referenced by a [DiagnosticDataPortMapping](#). No other subclass of [DiagnosticSwMapping](#) is eligible for this purpose.]

[TPS_MANI_01347] Definition of a [DiagnosticDataElement](#) used in the context of a DID obtained from a [PPortPrototype](#) typed by a [DiagnosticDataElementInterface](#) [If a [DiagnosticDataElement](#) is aggregated by a [DiagnosticParameter](#) that in turn is aggregated by a [DiagnosticDataIdentifier](#) and the [DiagnosticDataElement](#) is also referenced by a [DiagnosticDataPortMapping](#) then the referenced [DiagnosticDataElement](#) (by way of [SwDataDefProps](#)) shall refer to a [SwBaseType](#) with attribute [baseTypeSize](#) set to either of the values

- 8,
- 16,
- 32, or
- 64

The usage of attribute [baseTypeEncoding](#) is regulated by [\[constr_10483\]](#).

In the case addressed by this spec item, it is only possible to define the [DiagnosticDataElement](#) as a scalar or an array (see [\[TPS_DEXT_01001\]](#), [\[TPS_DEXT_01002\]](#)). The ability to define a [Variable-Size Array](#) shall only be used for the last element of the DID.]

[TPS_MANI_01348] Definition of a [DiagnosticDataElement](#) used in the context of a DID obtained from a [PPortPrototype](#) typed by a [DiagnosticDataIdentifierInterface](#) [If a [DiagnosticDataIdentifier](#) is referenced by a [DiagnosticDataPortMapping](#) then the aggregated [DiagnosticDataIdentifier.dataElement.dataElement](#) (by way of [SwDataDefProps](#)) shall refer to a [SwBaseType](#) with attribute [baseTypeSize](#) set to either

- 8,
- 16,
- 32, or
- 64

The usage of attribute `baseTypeEncoding` is regulated by [constr_10483].

In the case addressed by this spec item, it is only possible to define the `DiagnosticDataElement` as a scalar or an array (see [TPS_DEXT_01001], [TPS_DEXT_01002]). The ability to define a Variable-Size Array shall only be used for the last element of the DID.]

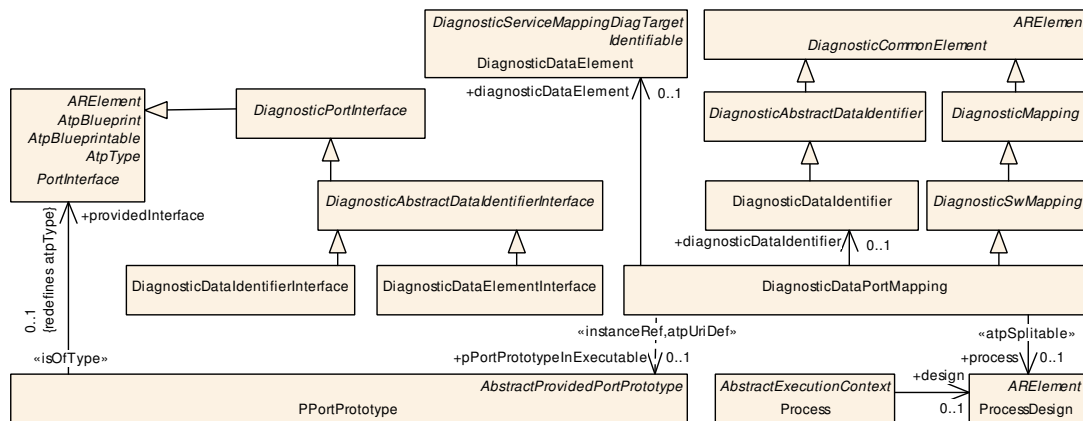


Figure 5.16: Modeling of `DiagnosticDataPortMapping` for the usage on the AUTOSAR adaptive platform

[constr_10165] Multiplicity of reference in the role `DiagnosticDataPortMapping.process`

Imposition time: `IT_DiagDes`

[For each `DiagnosticDataPortMapping`, the reference in the role `process` shall exist.]

Class	DiagnosticDataPortMapping			
Note	This meta-class provides the ability to define a diagnostic access to an entire DID. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, DiagnosticSwMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnosticDataElement	DiagnosticDataElement	0..1	ref	This reference represents the applicable DiagnosticDataElement.
diagnosticDataIdentifier	DiagnosticDataIdentifier	0..1	ref	This reference represents the applicable DiagnosticDataIdentifier.
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This reference identifies the applicable PPortPrototype from which that data is obtained. The reference has the ability to point into the component hierarchy (under possible consideration of the rootSoftwareComposition). Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef





Class	DiagnosticDataPortMapping			
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process

Table 5.40: DiagnosticDataPortMapping

[constr_10490] DiagnosticDataElement shall be directly or indirectly the target of a reference owned by a subclass of DiagnosticMapping

Imposition time: IT_DiagDes

[Each DiagnosticDataElement shall be directly or indirectly considered by a DiagnosticMapping. Therefore, exactly one of the following conditions shall be fulfilled:

- A DiagnosticDataPortMapping exists that refers to the respective DiagnosticDataElement in the role diagnosticDataElement.
- A DiagnosticDataPortMapping exists that refers in the role diagnosticDataIdentifier to the DiagnosticDataIdentifier that aggregates the respective DiagnosticDataElement in the role dataElement.dataElement.

]

As also explained by [TPS_MANI_01263], Meta-class DiagnosticDataPortMapping fulfills two purposes at once:

- map a PPortPrototype that is typed by a DiagnosticDataIdentifierInterface to a DiagnosticDataIdentifier.
- map a PPortPrototype that is typed by a DiagnosticDataElementInterface to a DiagnosticDataElement.

Mixing the two cases explained above is not supported, thus [constr_10630] and [constr_10631] exist.

[constr_10630] PPortPrototype that is typed by a DiagnosticDataIdentifierInterface shall be mapped to a DiagnosticDataIdentifier

Imposition time: IT_DiagDes

[Any DiagnosticDataPortMapping that refers to a PPortPrototype that is typed by a DiagnosticDataIdentifierInterface shall only refer to a DiagnosticDataIdentifier in the role diagnosticDataIdentifier.

In this case, the existence of the reference in the role DiagnosticDataPortMapping.diagnosticDataElement is not permitted.]

[constr_10631] `PPortPrototype` that is typed by a `DiagnosticDataElementInterface` shall be mapped to a `DiagnosticDataElement`

Imposition time: `IT_DiagDes`

[Any `DiagnosticDataPortMapping` that refers to a `PPortPrototype` that is typed by a `DiagnosticDataElementInterface` shall only refer to a `DiagnosticDataElement` in the role `diagnosticDataElement`.]

In this case, the existence of the reference in the role `DiagnosticDataPortMapping.diagnosticDataIdentifier` is not permitted.]

5.2.3.3 Diagnostic Generic UDS Service Handler to Port Mapping

It is possible to associate a collection of UDS services to a given `PPortPrototype` with the intention that the `PPortPrototype` can handle the associated services.

By creating a dedicated association between generic UDS handlers and the services they can take it is possible to use multiple generic UDS handlers and let each take only the associated services.

Technically, a possible alternative to the documented modeling of generic UDS handling would be to avoid the mapping at all and foresee the existence of a catch-all generic UDS handler.

This, to a large extent, contradicts the idea of having modular software installations on the basis of the definition of `SoftwareClusters` (see [Chapter 16.3](#)).

5.2.3.3.1 Diagnostic Generic Mapping

[TPS_MANI_01326] Generic Mapping to a `DiagnosticServiceInstance` on the AUTOSAR Adaptive Platform [On the AUTOSAR adaptive platform, the relation between a `DiagnosticServiceInstance` and one `PPortPrototype` for select diagnostic services is created by using the meta-class `DiagnosticServiceGenericMapping` that refers to

- a `DiagnosticServiceInstance` in the role `diagnosticServiceInstance`,
- the `PPortPrototype` in the role `pPortPrototypeInExecutable`, and
- a `ProcessDesign` in the role `process`.

]

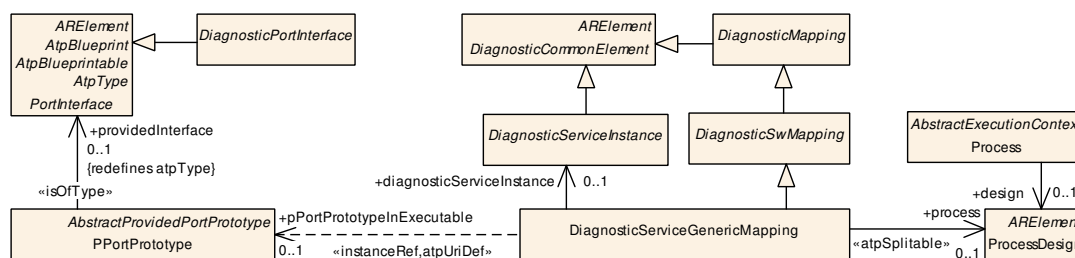


Figure 5.17: Modeling of the diagnostic generic mapping

[TPS_MANI_01453] **DiagnosticServiceInstances** that can be mapped by a **DiagnosticServiceGenericMapping** [DiagnosticServiceGenericMapping shall always be used for the following list of **DiagnosticServiceInstances**:

- DiagnosticEcuReset
- DiagnosticComControl
- DiagnosticRoutineControl
- DiagnosticRequestUpload
- DiagnosticRequestDownload
- DiagnosticDataTransfer
- DiagnosticTransferExit
- DiagnosticRequestFileTransfer

1

[constr_10546] **PortPrototype** typed by **DiagnosticGenericUdsInterface**
shall only be referenced by **DiagnosticServiceGenericMapping**

Imposition time: IT DiagDes

[A `PPortPrototype` that is typed by `DiagnosticGenericUdsInterface` shall **only** be referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticServiceGenericMapping`.]

Please note that services `DiagnosticDataTransfer` and `DiagnosticTransfer-Exit` are mapped dynamically according to the UDS request sequence for upload and download.

Class	DiagnosticEcuReset			
Note	This represents an instance of the "ECU Reset" diagnostic service. Tags: atp.recommendedPackage=DiagnosticEcuResets			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticEcuReset			
customSubFunctionNumber	PositiveInteger	0..1	attr	This attribute shall be used to define a custom sub-function number if none of the standardized values of category shall be used.
ecuResetClass	DiagnosticEcuResetClass	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticEcuReset in the given context.

Table 5.41: DiagnosticEcuReset

Class	DiagnosticEcuResetClass			
Note	This meta-class contains attributes shared by all instances of the "Ecu Reset" diagnostic service. Tags: atp.recommendedPackage=DiagnosticEcuResets			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
respondToReset	DiagnosticResponseToEcuResetEnum	0..1	attr	This attribute defines whether the response to the Ecu Reset service shall be transmitted before or after the actual reset.

Table 5.42: DiagnosticEcuResetClass

Class	DiagnosticComControl			
Note	This represents an instance of the "Communication Control" diagnostic service. Tags: atp.recommendedPackage=DiagnosticCommunicationControls			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
comControlClass	DiagnosticComControlClass	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticComControl in the given context.
customSubFunctionNumber	PositiveInteger	0..1	attr	This attribute shall be used to define a custom sub-function number if none of the standardized values of category shall be used.

Table 5.43: DiagnosticComControl

Class	DiagnosticComControlClass			
Note	This meta-class contains attributes shared by all instances of the "Communication Control" diagnostic service. Tags: atp.recommendedPackage=DiagnosticCommunicationControls			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticComControlClass			
allChannels	CommunicationCluster	*	ref	This reference represents the semantics that all available channels shall be affected. It is still necessary to refer to individual CommunicationClusters because there could be private CommunicationClusters in the System Extract that are not subject to the service "communication control". By referring to the applicable CommunicationClusters it can be made sure that only the affected Communication Clusters are accessed.
allPhysical Channels	EthernetPhysical Channel	*	ref	This reference represents the semantics that all available channels shall be affected. It is still necessary to refer to individual EthernetPhysicalChannels because there could be private VLANs (and thus private EthernetPhysical Channels) in the System Extract that are not subject to the service "communication control". By referring to the applicable EthernetPhysicalChannels it can be made sure that only the affected EthernetPhysical Channels are accessed. Tags: xml.namePlural=ALL-PHYSICAL-CHANNELS
specificChannel	DiagnosticComControl SpecificChannel	*	aggr	This represents the ability to add additional attributes to the case that only specific channels are supposed to be considered,
subNode Channel	DiagnosticComControl SubNodeChannel	*	aggr	This attribute represents the ability to add further attributes to the definition of a specific sub-node channel that is subject to the diagnostic service "communication control".

Table 5.44: DiagnosticComControlClass

Class	DiagnosticRoutineControl			
Note	This represents an instance of the "Routine Control" diagnostic service. Tags: atp.recommendedPackage=DiagnosticRoutineControls			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
routine	DiagnosticRoutine	0..1	ref	This refers to the applicable DiagnosticRoutine.
routineControl Class	DiagnosticRoutine ControlClass	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticRoutineControl in the given context.

Table 5.45: DiagnosticRoutineControl

Class	DiagnosticRoutineControlClass			
Note	This meta-class contains attributes shared by all instances of the "Routine Control" diagnostic service. Tags: atp.recommendedPackage=DiagnosticRoutineControls			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.46: DiagnosticRoutineControlClass

Class	DiagnosticCustomServiceInstance			
Note	This meta-class has the ability to define an instance of a custom diagnostic service. Tags: atp.recommendedPackage=DiagnosticCustomInstances			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
customServiceClass	DiagnosticCustomServiceClass	0..1	ref	Reference to the corresponding DiagnosticCustomServiceClass.

Table 5.47: DiagnosticCustomServiceInstance

Class	DiagnosticCustomServiceClass			
Note	This represents the ability to define a custom diagnostic service class and assign an ID to it. Further configuration is not foreseen from the point of view of the diagnostic extract and consequently needs to be done on the level of ECUC. Tags: atp.recommendedPackage=DiagnosticCustomServiceClasses			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
customServiceId	PositiveInteger	0..1	attr	This attribute may only be used for the definition of custom services. The values shall not overlap with existing standardized service IDs.

Table 5.48: DiagnosticCustomServiceClass

Class	DiagnosticRequestUpload			
Note	This represents an instance of the "Request Upload" diagnostic service. Tags: atp.recommendedPackage=DiagnosticMemoryByAdresss			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMemoryAddressableRangeAccess , DiagnosticMemoryByAddress , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
requestUploadClass	DiagnosticRequestUploadClass	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticRequestUpload in the given context.

Table 5.49: DiagnosticRequestUpload

Class	DiagnosticRequestUploadClass			
Note	This meta-class contains attributes shared by all instances of the "Request Upload" diagnostic service. Tags: atp.recommendedPackage=DiagnosticMemoryByAdresss			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.50: DiagnosticRequestUploadClass

Class	DiagnosticRequestDownload			
Note	This represents an instance of the "Request Download" diagnostic service. Tags: atp.recommendedPackage=DiagnosticMemoryByAdresss			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMemoryAddressableRangeAccess , DiagnosticMemoryByAddress , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
request DownloadClass	DiagnosticRequestDownloadClass	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticRequestDownload in the given context.

Table 5.51: DiagnosticRequestDownload

Class	DiagnosticRequestDownloadClass			
Note	This meta-class contains attributes shared by all instances of the "Request Download" diagnostic service. Tags: atp.recommendedPackage=DiagnosticMemoryByAdresss			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.52: DiagnosticRequestDownloadClass

Class	DiagnosticServiceGenericMapping			
Note	This meta-class represents the ability to implement a generic generic mapping for select diagnostics services on the adaptive platform. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnostic ServiceInstance	DiagnosticServiceInstance	0..1	ref	Reference to the ServiceInstance mapped to a SWC service port.
pPortPrototype InExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic ServiceGenericMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process

Table 5.53: DiagnosticServiceGenericMapping

Class	DiagnosticRequestFileTransfer			
Note	This diagnostic service instance implements the UDS service 0x38. Tags: atp.recommendedPackage=DiagnosticRequestFileTransfers			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
requestFileTransferClass	DiagnosticRequestFileTransferClass	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticRequestFileTransfer in the given context.

Table 5.54: DiagnosticRequestFileTransfer

Class	DiagnosticRequestFileTransferClass			
Note	This meta-class contains attributes shared by all instances of the "Request File transfer" diagnostic service. Tags: atp.recommendedPackage=DiagnosticRequestFileTransfers			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.55: DiagnosticRequestFileTransferClass

5.2.3.4 Diagnostic Service Validation Mapping

[TPS_MANI_01352] Definition of DiagnosticServiceValidationMapping [On the *AUTOSAR adaptive platform*, meta-class `DiagnosticServiceValidationMapping` exists to indicate that the referenced `PPortPrototype` is used for the execution of a manufacturer-specific or supplier-specific check prior to the execution of a diagnostic service.

The number of `PPortPrototypes` that implement such a checking routine is arbitrary and the order in which the individual checks are executed is subject to a decision made on target-configuration level.

This is the main reason why the `DiagnosticServiceValidationMapping` (beside the reference to the `ProcessDesign`) has no reference into another design object in the context of the DEXT.

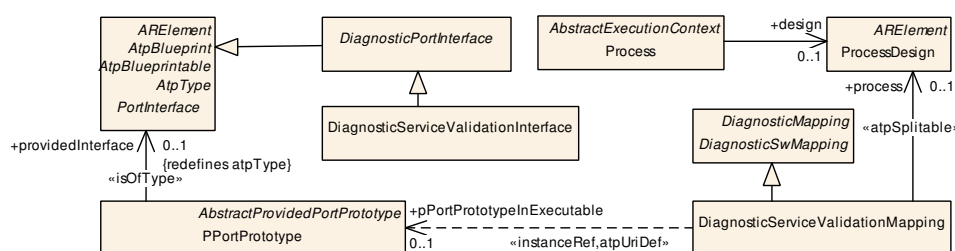


Figure 5.18: Modeling of the diagnostic validation mapping

[constr_10063] Possible values for [DiagnosticServiceValidationMapping.category](#)*Imposition time:* [IT_DiagDes](#)

[The value of attribute [DiagnosticServiceValidationMapping.category](#) is restricted to the following values:

MANUFACTURER_VALIDATION The enclosing [DiagnosticServiceValidationMapping](#) represents a validation defined by the manufacturer.

SUPPLIER_VALIDATION The enclosing [DiagnosticServiceValidationMapping](#) represents a validation defined by the supplier.

]

[constr_10064] Existence of [DiagnosticServiceValidationMapping.pPortPrototypeInExecutable](#)*Imposition time:* [IT_DiagDes](#)

[A [PPortPrototype](#) referenced in the role [DiagnosticServiceValidationMapping.pPortPrototypeInExecutable](#) shall be typed by a [DiagnosticServiceValidationInterface](#).]

Please note that the final decision about the order in which the validations are executed is decided in the target-configuration phase, see [Chapter 16.3.2.3](#).

Class	DiagnosticServiceValidationMapping			
Note	This meta-class provides the ability to specify manufacturer/supplier checks to be executed before diagnostic services can be processed. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This mapping identifies a PortPrototype typed by a DiagnosticValidationInterface in which a manufacturer/supplier-specific check is executed. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypelnExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplittable Tags: atp.Splitkey=process

Table 5.56: DiagnosticServiceValidationMapping**5.2.3.5 Diagnostic Authentication Mapping**

[TPS_MANI_01360] Creation of two diagnostic mappings the fulfill different roles in the context of authenticating a diagnostic client [The support for the diagnostic

service Authentication (0x29) on the *AUTOSAR adaptive platform* requires the creation of two diagnostic mappings the fulfill different roles in the context of authenticating a diagnostic client:

- The meta-class [DiagnosticAuthenticationPortMapping](#) (described in this section) is used to configure the forwarding of the request for authentication from the DM to some application software that acts as an authentication manager.
- The meta-class [DiagnosticExternalAuthenticationPortMapping](#) is used to convey the authentication state of a diagnostic client to the diagnostic server instance of DM.

]

Class	DiagnosticAuthenticationPortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the client authentication. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnostic Authentication	Diagnostic Authentication	0..1	ref	Reference to the DiagnosticAuthentication that is assigned to a SWC service port.
pPortPrototype InExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic AuthenticationPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process

Table 5.57: DiagnosticAuthenticationPortMapping

Please note that meta-class [DiagnosticExternalAuthenticationPortMapping](#) is described in [Chapter 5.2.3.6](#).

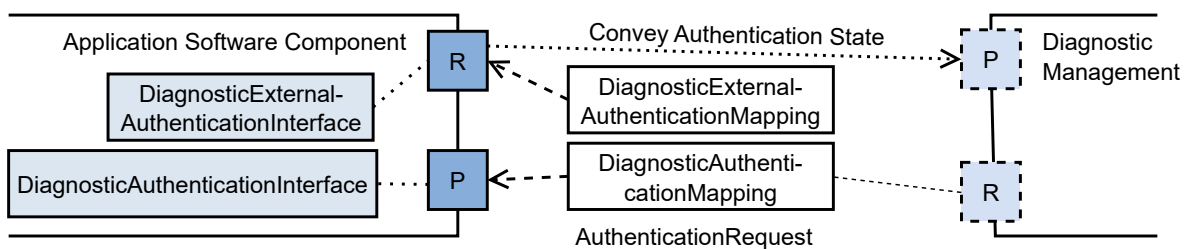


Figure 5.19: Example data exchange for diagnostic authentication

The two different roles mentioned in [\[TPS_MANI_01360\]](#) for the authentication of a diagnostic client are depicted in [Figure 5.19](#).

[TPS_MANI_01361] Support the authentication request of a diagnostic client
 [For the purpose of supporting the authentication request of a diagnostic client on the *AUTOSAR adaptive platform*, the relation between a [DiagnosticAuthentication](#) and one [PPortPrototype](#) is created by using the [DiagnosticAuthentication-PortMapping](#) that refers to

- a [DiagnosticAuthentication](#) in the role [diagnosticAuthentication](#),
- a [ProcessDesign](#) in the role [process](#), and
- a [PPortPrototype](#) typed by a [DiagnosticAuthenticationInterface](#) in the role [pPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding [InstanceSpecifier](#) that the [PortPrototype](#) will use at run-time.

]

[constr_10093] Existence of reference from [DiagnosticAuthentication-PortMapping](#) to [DiagnosticAuthentication](#)

Imposition time: [IT_DiagDes](#)

[Each [DiagnosticAuthentication](#) shall only be referenced by exactly one [DiagnosticAuthenticationPortMapping](#).]

Class	DiagnosticAuthentication (abstract)			
Note	This meta-class represents the ability to configure the usage of the UDS service Authentication in the Diagnostic extract.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticAuthTransmitCertificate , DiagnosticAuthenticationConfiguration , DiagnosticDeAuthentication , DiagnosticProofOfOwnership , DiagnosticVerifyCertificateBidirectional , DiagnosticVerifyCertificateUnidirectional			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
authentication Class	DiagnosticAuthenticationClass	0..1	ref	This represents the corresponding "class", i.e. this meta-class provides properties that are shared among all instances of applicable sub-classes of DiagnosticServiceInstance . The subclasses that affected by this pattern implement references to the applicable "class"-role that substantiate this abstract reference.

Table 5.58: DiagnosticAuthentication

Class	DiagnosticAuthenticationClass			
Note	This meta-class contains configuration shared by all instances of the Authentication diagnostic service. Tags: atp.recommendedPackage=DiagnosticAuthentications			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.59: DiagnosticAuthenticationClass

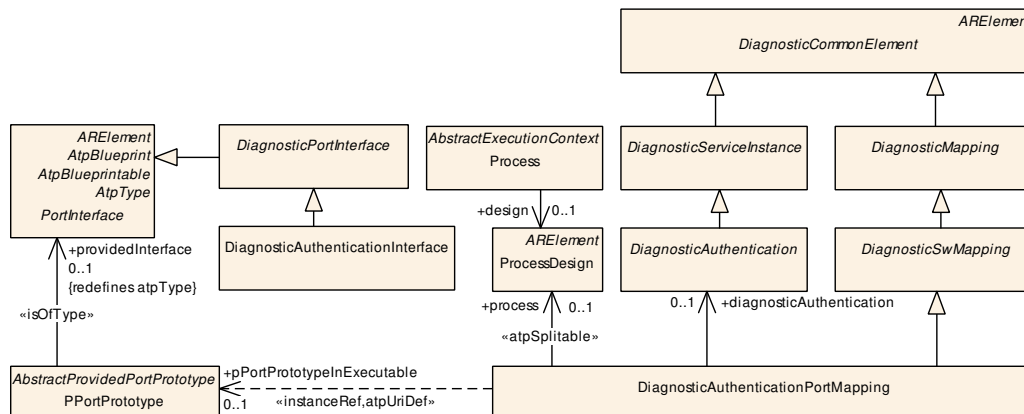


Figure 5.20: Modeling of `DiagnosticAuthenticationPortMapping` to forward the authentication request of a diagnostic client to an authentication manager

[constr_10092] Restriction for the applicability of `DiagnosticAuthenticationPortMapping`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is referenced by a `DiagnosticAuthenticationPortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticAuthenticationInterface`.]

5.2.3.6 Diagnostic External Authentication Mapping

[TPS_MANI_01362] Convey the Authentication state of a diagnostic client to the diagnostic server instance [For the purpose of conveying the authentication state of a diagnostic client to the diagnostic server instance of DM of a diagnostic client on the *AUTOSAR adaptive platform*, the relation between a `ProcessDesign` and one `RPortPrototype` is created by using the `DiagnosticExternalAuthenticationPortMapping` that refers to

- a `ProcessDesign` in the role process, and
- an `RPortPrototype` typed by a `DiagnosticExternalAuthenticationInterface` in the role `rPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` will use at run-time.

There is no model element in the context of the `Diagnostic Extract` to which the `DiagnosticExternalAuthenticationPortMapping` could reliably refer to (external authentication is not bound to the existence of UDS service 0x29).

This is the reason why the `DiagnosticExternalAuthenticationPortMapping` is restricted to references to `RPortPrototype` and `ProcessDesign`.]

[constr_10094] Restriction for the applicability of **DiagnosticExternalAuthenticationPortMapping**

Imposition time: IT_DiagDes

[If an **RPortPrototype** is referenced by a **DiagnosticExternalAuthenticationPortMapping**, then the **RPortPrototype** shall be typed by a **DiagnosticExternalAuthenticationInterface**.]

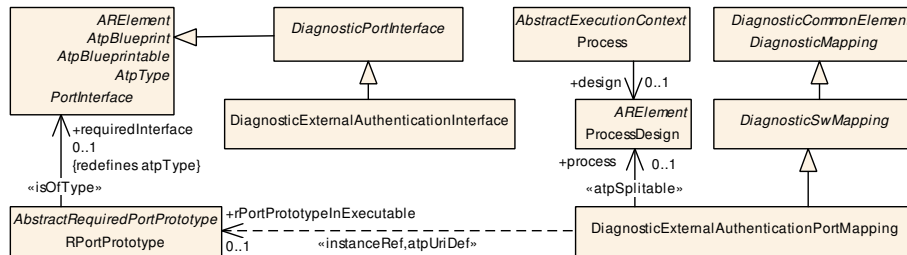


Figure 5.21: Modeling of **DiagnosticExternalAuthenticationPortMapping** to transmit the response to an authentication request back to the DM

Class	DiagnosticExternalAuthenticationPortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the external authentication. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process
rPortPrototypeInExecutable	RPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic ClientAuthenticationPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.60: DiagnosticExternalAuthenticationPortMapping

5.2.4 SOVD-related Diagnostic Mapping

This chapter contains a documentation of some **DiagnosticMappings** that are specific for the context of Service-Oriented Vehicle Diagnostics (SOVD).

5.2.4.1 Diagnostic SOVD Proximity Challenge Mapping

[TPS_MANI_01424] **Semantics of DiagnosticSovdProximityChallengePortMapping** [On the *AUTOSAR adaptive platform*, the relation between a *PPortPrototype* and a *ProcessDesign* is created by using the *DiagnosticSovdProximityChallengePortMapping* that refers to

- a *ProcessDesign* in the role *process*, and
- a *PPortPrototype* typed by a *DiagnosticSovdProximityChallengeInterface* in the role *pPortPrototypeInExecutable*. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding *InstanceSpecifier* that the *PortPrototype* on the application layer will use at run-time.

]

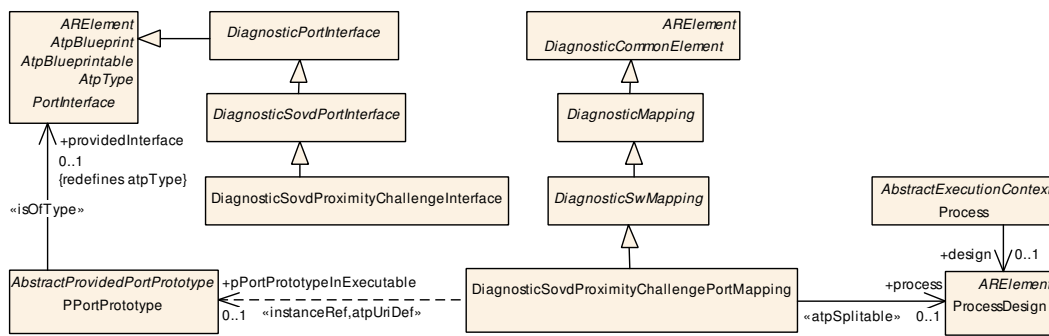


Figure 5.22: Modeling of the *DiagnosticSovdProximityChallengePortMapping*

[constr_10442] Restriction for the applicability of *DiagnosticSovdProximityChallengePortMapping*

Imposition time: IT_DiagDes

[If a *PPortPrototype* is referenced by a *DiagnosticSovdProximityChallengePortMapping* in the role *pPortPrototypeInExecutable*, then the *PPortPrototype* shall be typed by a *DiagnosticSovdProximityChallengeInterface*.]

[constr_10443] Restriction for the applicability of *DiagnosticSovdProximityChallengeInterface*

Imposition time: IT_DiagDes

[If a *PPortPrototype* is typed by a *DiagnosticSovdProximityChallengeInterface*, then the *PortPrototype* shall only be referenced in the role *pPortPrototypeInExecutable* by a *DiagnosticSovdProximityChallengePortMapping*.]

Only one implementation of an [SOVD](#) proximity challenge is allowed in the context of a [DiagnosticContributionSet](#). This restriction is formalized by means of [[constr_10444](#)].

[[constr_10444](#)] Existence of [DiagnosticSovdProximityChallengePortMapping](#)

Imposition time: [IT_DiagDes](#)

[Each [DiagnosticContributionSet](#) shall only reference at most one [DiagnosticSovdProximityChallengePortMapping](#) in the role [element](#).]

Class	DiagnosticSovdProximityChallengePortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the SOVD proximity challenge. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticSovdProximityChallengePortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process

Table 5.61: [DiagnosticSovdProximityChallengePortMapping](#)

[[constr_10445](#)] Existence of the reference in the role [DiagnosticSovdProximityChallengePortMapping.pPortPrototypeInExecutable](#)

Imposition time: [IT_DiagDes](#)

[For each [DiagnosticSovdProximityChallengePortMapping](#), the reference in the role [DiagnosticSovdProximityChallengePortMapping.pPortPrototypeInExecutable](#) shall exist.]

[[constr_10446](#)] Existence of the reference in the role [DiagnosticSovdProximityChallengePortMapping.process](#)

Imposition time: [IT_DiagDes](#)

[For each [DiagnosticSovdProximityChallengePortMapping](#), the reference in the role [DiagnosticSovdProximityChallengePortMapping.process](#) shall exist.]

5.2.4.2 Diagnostic SOVD Authorization Port Mapping

[TPS_MANI_01425] Semantics of **DiagnosticSovdAuthorizationPortMapping** [On the *AUTOSAR adaptive platform*, the relation between a **PPortPrototype** and a **ProcessDesign** is created by using the **DiagnosticSovdAuthorizationPortMapping** that refers to

- a **ProcessDesign** in the role **process**, and
- a **PPortPrototype** typed by a **DiagnosticSovdAuthorizationInterface** in the role **pPortPrototypeInExecutable**. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding **InstanceSpecifier** that the **PortPrototype** on the application layer will use at run-time.

]

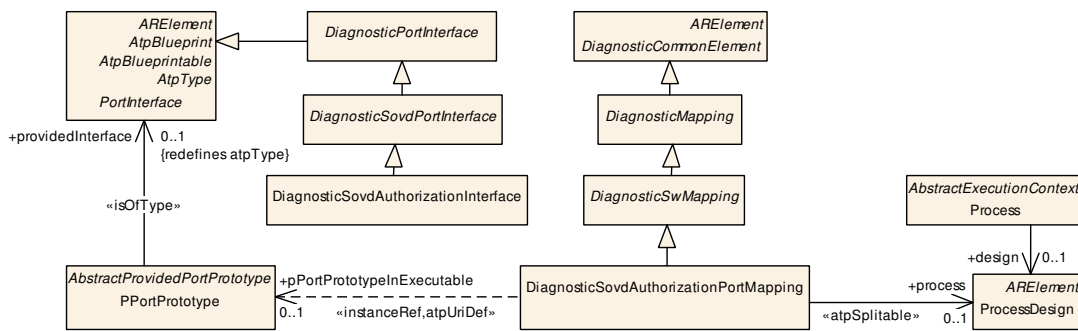


Figure 5.23: Modeling of the **DiagnosticSovdAuthorizationPortMapping**

[constr_10447] Restriction for the applicability of **DiagnosticSovdAuthorizationPortMapping**

Imposition time: *IT_DiagDes*

[If a **PPortPrototype** is referenced in the role **pPortPrototypeInExecutable** by a **DiagnosticSovdAuthorizationPortMapping**, then the **PPortPrototype** shall be typed by a **DiagnosticSovdAuthorizationInterface**.]

[constr_10448] Restriction for the applicability of **DiagnosticSovdAuthorizationInterface**

Imposition time: *IT_DiagDes*

[If a **PPortPrototype** is typed by a **DiagnosticSovdAuthorizationInterface**, then the **PortPrototype** shall only be referenced in the role **pPortPrototypeInExecutable** by a **DiagnosticSovdAuthorizationPortMapping**.]

Only one implementation of an **SOVD** authorization is allowed in the context of a **DiagnosticContributionSet**. This restriction is formalized by means of [constr_10449].

[constr_10449] Existence of DiagnosticSovdAuthorizationPortMapping*Imposition time:* IT_DiagDes

[Each DiagnosticContributionSet shall only reference in the role `element` at most one DiagnosticSovdAuthorizationPortMapping.]

Class	DiagnosticSovdAuthorizationPortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the SOVD authorization. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, DiagnosticSwMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic SovdAuthorizationPortMapping on the AUTOSAR adaptive platform. Stereotypes: atp.UriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atp.Splitable Tags: atp.Splitkey=process

Table 5.62: DiagnosticSovdAuthorizationPortMapping**[constr_10450] Existence of the reference in the role DiagnosticSovdAuthorizationPortMapping.pPortPrototypeInExecutable***Imposition time:* IT_DiagDes

[For each DiagnosticSovdAuthorizationPortMapping, the reference in the role DiagnosticSovdAuthorizationPortMapping.pPortPrototypeInExecutable shall exist.]

[constr_10451] Existence of the reference in the role DiagnosticSovdAuthorizationPortMapping.process*Imposition time:* IT_DiagDes

[For each DiagnosticSovdAuthorizationPortMapping, the reference in the role DiagnosticSovdAuthorizationPortMapping.process shall exist.]

5.2.4.3 Diagnostic SOVD Bulk Data Port Mapping

[TPS_MANI_01426] Mapping of DiagnosticSovdBulkData to PortPrototype on the AUTOSAR adaptive platform [On the AUTOSAR adaptive platform, the relation between a DiagnosticSovdBulkData and one PPortPrototype is created by using the DiagnosticSovdBulkDataPortMapping that refers to

- a DiagnosticSovdBulkData in the role `serviceInstance`,

- a `ProcessDesign` in the role `process`, and
- a `PPortPrototype` typed by a `DiagnosticSovdBulkDataInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

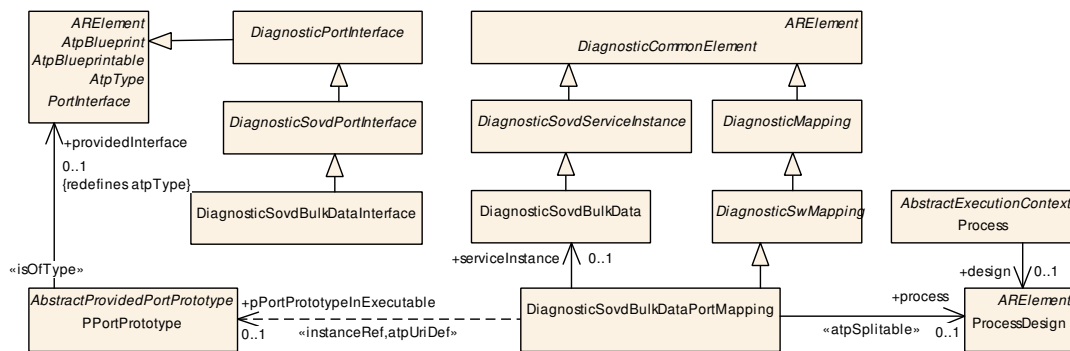


Figure 5.24: Modeling of the `DiagnosticSovdBulkDataPortMapping`

[constr_10452] Restriction for the applicability of `DiagnosticSovdBulkDataPortMapping`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdBulkDataPortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticSovdBulkDataInterface`.]

[constr_10453] Restriction for the applicability of `DiagnosticSovdBulkDataInterface`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is typed by a `DiagnosticSovdBulkDataInterface`, then the `PortPrototype` shall only be referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdBulkDataPortMapping`.]

[constr_10454] Uniqueness of reference from `DiagnosticSovdBulkDataPortMapping` to `DiagnosticSovdBulkData`

Imposition time: `IT_DiagDes`

[Each instance `DiagnosticSovdBulkData` shall only be referenced in the role `serviceInstance` by exactly one `DiagnosticSovdBulkDataPortMapping`.]

Class	DiagnosticSovdBulkDataPortMapping			
Note	This mapping associates a PPortPrototype typed by a DiagnosticSovdBulkDataInterface to the corresponding SOVD service instance that is modeled as DiagnosticSovdBulkData. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticSovdBulkDataPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplittable Tags: atp.Splitkey=process
serviceInstance	DiagnosticSovdBulkData	0..1	ref	This reference identifies the applicable diagnostic SOVD service instance.

Table 5.63: DiagnosticSovdBulkDataPortMapping

[constr_10455] Existence of the reference in the role [DiagnosticSovdBulkDataPortMapping.serviceInstance](#)

Imposition time: IT_DiagDes

[For each [DiagnosticSovdBulkDataPortMapping](#), the reference in the role [DiagnosticSovdBulkDataPortMapping.serviceInstance](#) shall exist.]

[constr_10456] Existence of the reference in the role [DiagnosticSovdBulkDataPortMapping.pPortPrototypeInExecutable](#)

Imposition time: IT_DiagDes

[For each [DiagnosticSovdBulkDataPortMapping](#), the reference in the role [DiagnosticSovdBulkDataPortMapping.pPortPrototypeInExecutable](#) shall exist.]

[constr_10457] Existence of the reference in the role [DiagnosticSovdBulkDataPortMapping.process](#)

Imposition time: IT_DiagDes

[For each [DiagnosticSovdBulkDataPortMapping](#), the reference in the role [DiagnosticSovdBulkDataPortMapping.process](#) shall exist.]

5.2.4.4 Diagnostic SOVD Update Port Mapping

[TPS_MANI_01427] Mapping of [DiagnosticSovdUpdate](#) to [PortPrototype](#) on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation

between a `DiagnosticSovdUpdate` and one `PPortPrototype` is created by using the `DiagnosticSovdUpdatePortMapping` that refers to

- a `DiagnosticSovdUpdate` in the role `serviceInstance`,
- a `ProcessDesign` in the role `process`, and
- a `PPortPrototype` typed by a `DiagnosticSovdUpdateInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

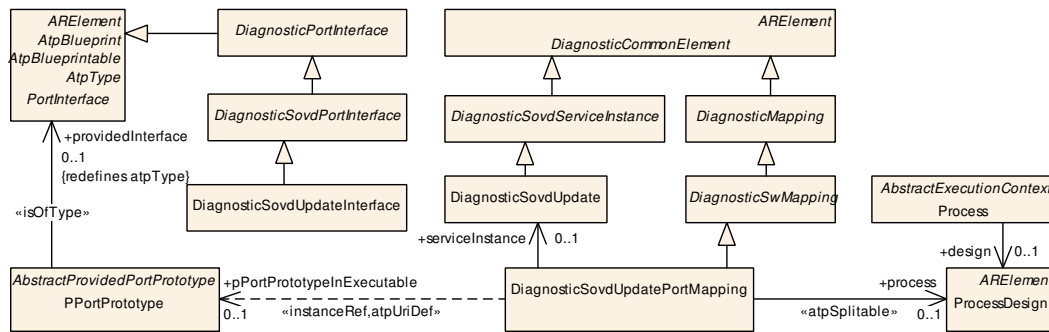


Figure 5.25: Modeling of the `DiagnosticSovdUpdatePortMapping`

[constr_10458] Restriction for the applicability of `DiagnosticSovdUpdatePortMapping`

Imposition time: IT_DiagDes

[If a `PPortPrototype` is referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdUpdatePortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticSovdUpdateInterface`.]

[constr_10459] Restriction for the applicability of `DiagnosticSovdUpdateInterface`

Imposition time: IT_DiagDes

[If a `PPortPrototype` is typed by a `DiagnosticSovdUpdateInterface`, then the `PortPrototype` shall only be referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdUpdatePortMapping`.]

[constr_10460] Uniqueness of reference from `DiagnosticSovdUpdatePortMapping` to `DiagnosticSovdUpdate`

Imposition time: IT_DiagDes

[Each instance of `DiagnosticSovdUpdate` shall only be referenced in the role `serviceInstance` by exactly one `DiagnosticSovdUpdatePortMapping`.]

Class	DiagnosticSovdUpdatePortMapping			
Note	This mapping associates a PPortPrototype typed by an DiagnosticSovdUpdateInterface with the corresponding SOVD service instance that is modeled as a DiagnosticSovdUpdate. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticSovdUpdatePortMapping on the AUTOSAR adaptive platform. Stereotypes: atp.UriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atp.Splitable Tags: atp.Splitkey=process
serviceInstance	DiagnosticSovdUpdate	0..1	ref	This reference identifies the applicable diagnostic SOVD service instance. Tags: atp.Status=candidate

Table 5.64: DiagnosticSovdUpdatePortMapping

[constr_10461] Existence of the reference in the role [DiagnosticSovdUpdatePortMapping.serviceInstance](#)*Imposition time:* IT_DiagDes[For each [DiagnosticSovdUpdatePortMapping](#), the reference in the role [DiagnosticSovdUpdatePortMapping.serviceInstance](#) shall exist.]**[constr_10462] Existence of the reference in the role [DiagnosticSovdUpdatePortMapping.pPortPrototypeInExecutable](#)***Imposition time:* IT_DiagDes[For each [DiagnosticSovdUpdatePortMapping](#), the reference in the role [DiagnosticSovdUpdatePortMapping.pPortPrototypeInExecutable](#) shall exist.]**[constr_10463] Existence of the reference in the role [DiagnosticSovdUpdatePortMapping.process](#)***Imposition time:* IT_DiagDes[For each [DiagnosticSovdUpdatePortMapping](#), the reference in the role [DiagnosticSovdUpdatePortMapping.process](#) shall exist.]**5.2.4.5 Diagnostic SOVD Service Validation Port Mapping**

[TPS_MANI_01428] Mapping of [DiagnosticSovdServiceInstance](#) to [Port-Prototype](#) on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a [PPortPrototype](#) and a [ProcessDesign](#) is created by using the [DiagnosticSovdServiceValidationPortMapping](#) that refers to

- a `ProcessDesign` in the role `process`, and
- a `PPortPrototype` typed by a `DiagnosticSovdServiceValidationInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

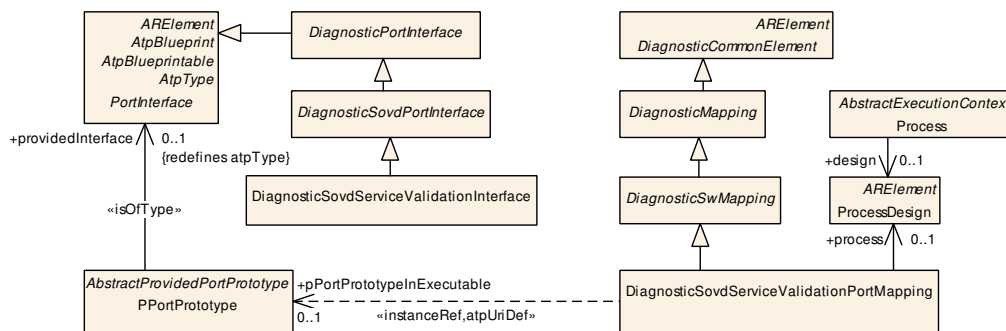


Figure 5.26: Modeling of the `DiagnosticSovdServiceValidationPortMapping`

[constr_10464] Restriction for the applicability of `DiagnosticSovdServiceValidationPortMapping`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdServiceValidationPortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticSovdServiceValidationInterface`.]

[constr_10465] Restriction for the applicability of `DiagnosticSovdServiceValidationInterface`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is typed by a `DiagnosticSovdServiceValidationInterface`, then the `PortPrototype` shall only be referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdServiceValidationPortMapping`.]

Class	DiagnosticSovdServiceValidationPortMapping
Note	This mapping class identifies the PortPrototype in the application software that handles the SOVD service validation. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>DiagnosticCommonElement</code> , <code>DiagnosticMapping</code> , <code>DiagnosticSwMapping</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code>
Aggregated by	<code>ARPackage.element</code>





Class	DiagnosticSovdServiceValidationPortMapping			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic SovdValidationPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable.

Table 5.65: DiagnosticSovdServiceValidationPortMapping

[constr_10466] Existence of the reference in the role `DiagnosticSovdServiceValidationPortMapping.pPortPrototypeInExecutable`

Imposition time: IT_DiagDes

[For each `DiagnosticSovdServiceValidationPortMapping`, the reference in the role `DiagnosticSovdServiceValidationPortMapping.pPortPrototypeInExecutable` shall exist.]

[constr_10467] Existence of the reference in the role `DiagnosticSovdServiceValidationPortMapping.process`

Imposition time: IT_DiagDes

[For each `DiagnosticSovdServiceValidationPortMapping`, the reference in the role `DiagnosticSovdServiceValidationPortMapping.process` shall exist.]

5.2.4.6 Diagnostic SOVD Configuration Port Mapping

[TPS_MANI_01429] Mapping of `DiagnosticSovdConfiguration` to `PortPrototype` on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a `DiagnosticSovdConfiguration` and one `PPortPrototype` is created by using the `DiagnosticSovdConfigurationPortMapping` that refers to

- a `DiagnosticSovdConfiguration` in the role `serviceInstance`,
- a `ProcessDesign` in the role `process`, and
- a `PPortPrototype` typed by a `DiagnosticSovdConfigurationInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

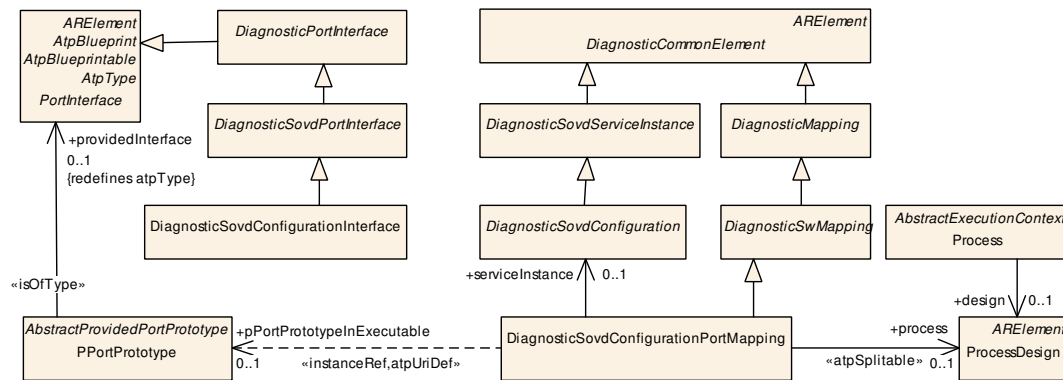


Figure 5.27: Modeling of the `DiagnosticSovdConfigurationPortMapping`

[constr_10468] Restriction for the applicability of DiagnosticSovdConfigurationPortMapping

Imposition time: IT_DiagDes

[If a `PPortPrototype` is referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdConfigurationPortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticSovdConfigurationInterface`.]

[constr_10469] Restriction for the applicability of `DiagnosticSovdConfigurationInterface`

Imposition time: IT_DiagDes

[If a `PPortPrototype` is typed by a `DiagnosticSovdConfigurationInterface`, then the `PortPrototype` shall only be referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticSovdConfigurationPortMapping`.]

[constr_10470] Uniqueness of reference from DiagnosticSovdConfigurationPortMapping to DiagnosticSovdConfiguration

Imposition time: IT_DiagDes

[Each instance of a sub-class of `DiagnosticSovdConfiguration` shall only be referenced in the role `serviceInstance` by exactly one `DiagnosticSovdConfigurationPortMapping`.]

Class	DiagnosticSovdConfigurationPortMapping			
Note	This mapping associates a PPortPrototype typed by a DiagnosticSovdConfigurationInterface to the corresponding SOVD service instance that is modeled as DiagnosticSovdConfiguration. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticSovdConfigurationPortMapping			
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the Diagnostic SovdConfigurationPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplitable Tags: atp.Splitkey=process
serviceInstance	DiagnosticSovdConfiguration	0..1	ref	This reference identifies the applicable diagnostic SOVD service instance.

Table 5.66: DiagnosticSovdConfigurationPortMapping

[constr_10471] Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.serviceInstance*Imposition time: IT_DiagDes*

[For each DiagnosticSovdConfigurationPortMapping, the reference in the role DiagnosticSovdConfigurationPortMapping.serviceInstance shall exist.]

[constr_10472] Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.pPortPrototypeInExecutable*Imposition time: IT_DiagDes*

[For each DiagnosticSovdConfigurationPortMapping, the reference in the role DiagnosticSovdConfigurationPortMapping.pPortPrototypeInExecutable shall exist.]

[constr_10473] Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.process*Imposition time: IT_DiagDes*

[For each DiagnosticSovdConfigurationPortMapping, the reference in the role DiagnosticSovdConfigurationPortMapping.process shall exist.]

5.2.4.7 Diagnostic SOVD Data Port Mapping

Mapping a PPortPrototype for the purpose of defining the exchange of both SOVD Data or SOVD Data Element can be done by means of meta-class DiagnosticSovdContentPortMapping.

From the technical perspective, this is achieved by defining abstract meta-classes for the applicable PortInterface (in the form of the DiagnosticAbstractSovdContentInterface) and also for the “diagnostic content” (in the form of DiagnosticAbstractSovdContent).

Nevertheless, constraints are necessary to make sure that on both ends matching sub-classes of the mentioned abstract meta-classes become actual targets of a `DiagnosticSovdContentPortMapping`.

[TPS_MANI_01490] Mapping of `DiagnosticAbstractSovdContent` to `Port-Prototype` on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a `DiagnosticSovdContent` and one `PPortPrototype` is created by using the `DiagnosticSovdContentPortMapping` that refers to

- a `DiagnosticAbstractSovdContent` in the role `content`,
- a `ProcessDesign` in the role `process`, and
- an `PPortPrototype` typed by a `DiagnosticAbstractSovdContentInterface` in the role `pPortPrototypeInExecutable`.

The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

[constr_10696] Target of the reference `DiagnosticSovdContentPortMapping`. `pPortPrototypeInExecutable`

Imposition time: `IT_DiagDes`

[Any `DiagnosticSovdContentPortMapping` shall **only** reference in the role `pPortPrototypeInExecutable` a `PPortPrototype` that is typed by either

- a `DiagnosticSovdContentInterface` or
- a `DiagnosticSovdContentElementInterface`.

]

[constr_10697] `DiagnosticSovdContentPortMapping` maps on the level of `SOVD Data`

Imposition time: `IT_DiagDes`

[If a `DiagnosticSovdContentPortMapping` references in the role `pPortPrototypeInExecutable` a `PPortPrototype` that is typed by a `DiagnosticSovdContentInterface`, then the `DiagnosticSovdContentPortMapping` shall also refer in the role `content` to a `DiagnosticSovdContent`, and vice versa.]

[constr_10698] `DiagnosticSovdContentPortMapping` maps on the level of `SOVD Data Element`

Imposition time: `IT_DiagDes`

[If a `DiagnosticSovdContentPortMapping` references in the role `pPortPrototypeInExecutable` a `PPortPrototype` that is typed by a `DiagnosticSovdContentElementInterface`, then the `DiagnosticSovdContentPortMapping` shall

also refer in the role `content` to a `DiagnosticSovdContentElement`, and vice versa.]

Please note that, for the time being, there are no formal constraints regarding a match between the elements of a `PPortPrototype` typed by either a `DiagnosticSovdContentInterface` or a `DiagnosticSovdContentElementInterface` and the `DiagnosticAbstractSovdContent` referenced in the role `DiagnosticSovdContentPortMapping.content`.

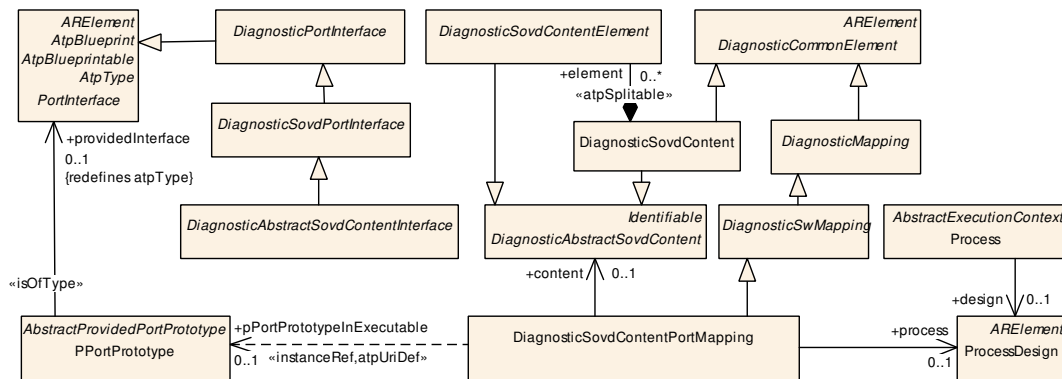


Figure 5.28: Modeling of the `DiagnosticSovdContentPortMapping`

Class	DiagnosticSovdContentPortMapping			
Note	This mapping associates a PPortPrototype typed by either a DiagnosticSovdContentInterface or a DiagnosticSovdContentElementInterface to the corresponding SOVD content that is modeled as DiagnosticAbstractSovdContent. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, DiagnosticSwMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
content	DiagnosticAbstractSovdContent	0..1	ref	This reference identifies the applicable content for the mapping.
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This aggregation allows for the usage of the DiagnosticSovdContentPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypelnExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable.

Table 5.67: DiagnosticSovdContentPortMapping

[constr_10699] Existence of the Reference in the role `DiagnosticSovdContentPortMapping.pPortPrototypeInExecutable`

Imposition time: IT_DiagDes

[For each `DiagnosticSovdContentPortMapping`, the reference in the role `DiagnosticSovdContentPortMapping.pPortPrototypeInExecutable` shall exist.]

[constr_10700] Existence of the Reference in the role `DiagnosticSovdContentPortMapping.content`*Imposition time:* IT_DiagDes

[For each `DiagnosticSovdContentPortMapping`, the reference in the role `DiagnosticSovdContentPortMapping.content` shall exist.]

[constr_10701] Existence of the Reference in the role `DiagnosticSovdContentPortMapping.process`*Imposition time:* IT_DiagDes

[For each `DiagnosticSovdContentPortMapping`, the reference in the role `DiagnosticSovdContentPortMapping.process` shall exist.]

5.2.4.8 Diagnostic SOVD Operation Port Mapping

[TPS_MANI_01491] Mapping of `DiagnosticSovdOperation` to a `PPortPrototype` on the *AUTOSAR adaptive platform* [On the *AUTOSAR adaptive platform*, the relation between a `DiagnosticSovdOperation` and one `PPortPrototype` is created by using the `DiagnosticSovdOperationPortMapping` that refers to

- a `DiagnosticSovdOperation` in the role `sovOperation`,
- a `ProcessDesign` in the role `process`, and
- an `PPortPrototype` typed by a `DiagnosticSovdOperationInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

[constr_10713] Target of the reference `DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable`*Imposition time:* IT_DiagDes

[Any `DiagnosticSovdOperationPortMapping` shall **only** reference in the role `DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable` a `PPortPrototype` that is typed by a `DiagnosticSovdOperationInterface`.]

[constr_10714] `PPortPrototype` that is typed by a `DiagnosticSovdOperationInterface` as a mapping target*Imposition time:* IT_DiagDes

[Any `PPortPrototype` that is typed by a `DiagnosticSovdOperationInterface` shall only be referenced in the role `PPortPrototype` that is typed by a `DiagnosticSovdOperationInterface` by `DiagnosticSovdOperationPortMapping`.]

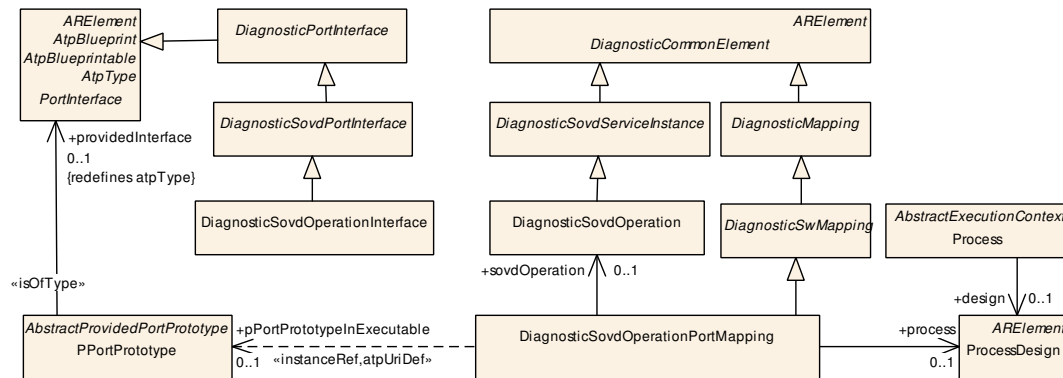


Figure 5.29: Modeling of the `DiagnosticSovdOperationPortMapping`

Class	DiagnosticSovdOperationPortMapping			
Note	This mapping associates a PPortPrototype typed by a DiagnosticSovdOperationInterface to the corresponding SOVD operation. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototype InExecutable	PPortPrototype	0..1	irref	This aggregation allows for the usage of the Diagnostic SovdOperationPortMapping on the AUTOSAR adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable.
sovdOperation	DiagnosticSovdOperation	0..1	ref	This reference identifies the applicable DiagnosticSovdOperation.

Table 5.68: DiagnosticSovdOperationPortMapping

[constr_10702] Existence of the Reference in the role `DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable`

Imposition time: IT_DiagDes

[For each `DiagnosticSovdOperationPortMapping`, the reference in the role `DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable` shall exist.]

[constr_10703] Existence of the Reference in the role `DiagnosticSovdOperationPortMapping.sovdOperation`

Imposition time: IT_DiagDes

[For each `DiagnosticSovdOperationPortMapping`, the reference in the role `DiagnosticSovdOperationPortMapping.sovdOperation` shall exist.]

[constr_10704] Existence of the Reference in the role **DiagnosticSovdOperationPortMapping.process**

Imposition time: IT_DiagDes

[For each **DiagnosticSovdOperationPortMapping**, the reference in the role **DiagnosticSovdOperationPortMapping.process** shall exist.]

5.2.4.9 Diagnostic SOVD Configuration to SOVD Content Mapping

[TPS_MANI_01515] Mapping of **DiagnosticSovdConfigurationParameter** to **DiagnosticSovdContent** on the **AUTOSAR adaptive platform** [On the **AUTOSAR adaptive platform**, the relation between a **DiagnosticSovdConfigurationParameter** and one **DiagnosticSovdContent** is created by using the **DiagnosticSovdConfigContentMapping** that refers to

- a **DiagnosticSovdConfigurationParameter** in the role **serviceInstance** and
- a **DiagnosticSovdContent** in the role **content**.

]

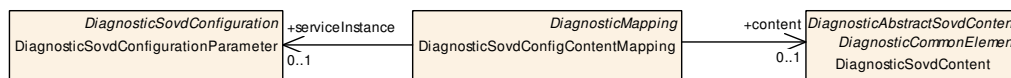


Figure 5.30: Modeling of the **DiagnosticSovdConfigContentMapping**

[constr_10733] Uniqueness of reference from **DiagnosticSovdConfigContentMapping** to **DiagnosticSovdConfigurationParameter**

Imposition time: IT_DiagDes

[Each instance of a sub-class of **DiagnosticSovdConfigurationParameter** shall only be referenced by exactly one **DiagnosticSovdConfigContentMapping**.]

Class	DiagnosticSovdConfigContentMapping			
Note	This mapping associates an SOVD configuration parameter service instance to an SOVD content. Tags: atp.recommendedPackage=DiagnosticMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
content	DiagnosticSovdContent	0..1	ref	This reference identifies the applicable SOVD content.
serviceInstance	DiagnosticSovdConfigurationParameter	0..1	ref	This reference identifies the applicable service instance.

Table 5.69: **DiagnosticSovdConfigContentMapping**

[constr_10734] Existence of the reference in the role **DiagnosticSovdConfigContentMapping.serviceInstance**

Imposition time: `IT_DiagDes`

[For each `DiagnosticSovdConfigContentMapping`, the reference in the role `DiagnosticSovdConfigContentMapping.serviceInstance` shall exist.]

[constr_10735] Existence of the reference in the role **DiagnosticSovdConfigContentMapping.content**

Imposition time: `IT_DiagDes`

[For each `DiagnosticSovdConfigContentMapping`, the reference in the role `DiagnosticSovdConfigContentMapping.content` shall exist.]

5.2.5 DoIP-related Diagnostic Mapping

5.2.5.1 Diagnostic DoIP Mapping

This section contains a description of the available diagnostic mappings that are applicable to DoIP communication. Please note that the mappings do not fully follow the pattern defined by other diagnostic mappings described in this document.

The difference is that the DoIP-related mapping classes (beyond referencing a `PortPrototype` and a `ProcessDesign`) do not reference any model element in the context of the diagnostic extract.

The only reason why this works is based on the behavior of the *Diagnostic Management* that searches for the existence of these mappings.

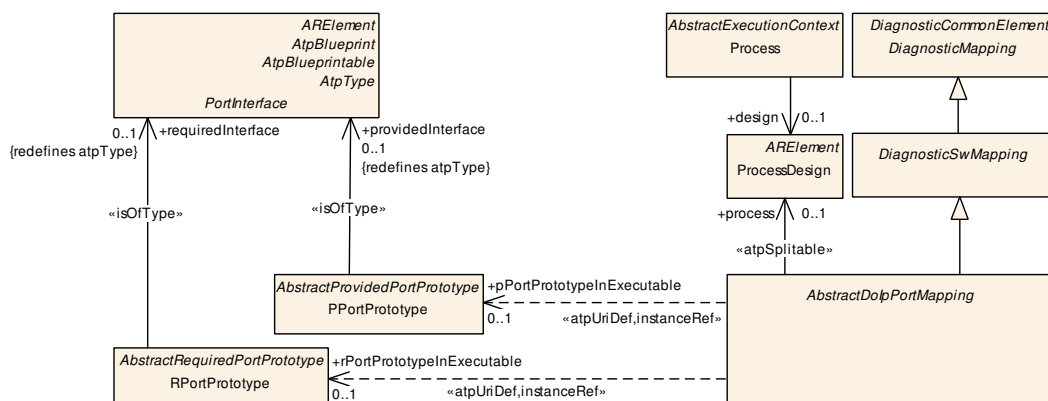


Figure 5.31: Modeling of `AbstractDoIpPortMapping` as an abstract base class for DoIP-related mappings

And because every of the mappings described in this section is supposed to exist **only once** in the context of the enclosing `DiagnosticContributionSet`, the *Diagnostic Management* is able to figure out the underlying semantics **based on the mere existence** of the respective mappings.

The DoIP-related diagnostic mapping is supported by the existence of the abstract base class `AbstractDoIpPortMapping`, that implements the heavy-lifting parts of the mapping relationship.

Class	<code>AbstractDoIpPortMapping</code> (abstract)			
Note	This meta-class acts as an abstract base class for DoIP-related mappings. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticDoIpActivationLinePortMapping , DiagnosticDoIpEntityIdentificationPortMapping , DiagnosticDoIpGroupIdentificationPortMapping , DiagnosticDoIpPowerModePortMapping , DiagnosticDoIpTriggerVehicleAnnouncementPortMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This identifies the PPortPrototype for which the Abstract DoIpPortMapping is applicable. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	ProcessDesign	0..1	ref	Reference to the representation of a Process that is required because the mapping could be different for different Processes referring to a specific Executable. Stereotypes: atpSplittable Tags: atp.Splitkey=process
rPortPrototypeInExecutable	RPortPrototype	0..1	iref	This identifies the RPortPrototype for which the Abstract DoIpPortMapping is applicable. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 5.70: AbstractDoIpPortMapping

[constr_10609] Existence of references in the role `AbstractDoIpPortMapping.rPortPrototypeInExecutable` and `AbstractDoIpPortMapping.pPortPrototypeInExecutable`

Imposition time: `IT_DiagDes`

[For each `AbstractDoIpPortMapping`, only one of the references in the role

- `AbstractDoIpPortMapping.rPortPrototypeInExecutable`
- `AbstractDoIpPortMapping.pPortPrototypeInExecutable`

shall exist.]

5.2.5.2 Diagnostic DoIP Group Identification Mapping

[TPS_MANI_01460] Retrieve the status of the DoIP group identification to the diagnostic server instance [For the purpose of retrieving the status of the DoIP group identification to the diagnostic server instance on the *AUTOSAR adaptive platform*, the relation between a `ProcessDesign` and one `PPortPrototype` is created by using the `DiagnosticDoIpGroupIdentificationPortMapping` that refers to

- a `ProcessDesign` in the role process, and

- a `PPortPrototype` typed by a `DiagnosticDoIPGroupIdentificationInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` will use at run-time.

There is no model element in the context of the `Diagnostic Extract` to which the `DiagnosticDoIpGroupIdentificationPortMapping` could reliably refer to.

This is the reason why the `DiagnosticDoIpGroupIdentificationPortMapping` is restricted to references to `PPortPrototype` and `ProcessDesign`.]

[constr_10586] Restriction for the applicability of `DiagnosticDoIpGroupIdentificationPortMapping`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is referenced by a `DiagnosticDoIpGroupIdentificationPortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticDoIPGroupIdentificationInterface`.]

[constr_10587] Restriction for the applicability of `DiagnosticDoIPGroupIdentificationInterface`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is typed by a `DiagnosticDoIPGroupIdentificationInterface`, then the reference in the role `pPortPrototypeInExecutable` to the `PPortPrototype` shall only originate from a `DiagnosticDoIpGroupIdentificationPortMapping`.]

For more information, please refer to [SWS_DM_00813].

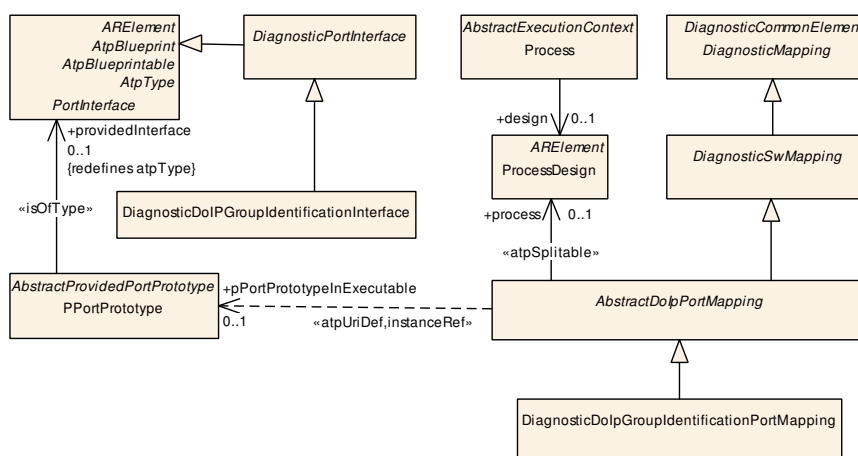


Figure 5.32: Modeling of `DiagnosticDoIpGroupIdentificationPortMapping` to indicate the existence of a handler for the DoIP group identification

Class	DiagnosticDoIpGroupIdentificationPortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the DoIP group identification. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractDoIpPortMapping , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.71: DiagnosticDoIpGroupIdentificationPortMapping

[constr_10588] Existence of [DiagnosticDoIpGroupIdentificationPortMapping.pPortPrototypeInExecutable](#)*Imposition time:* [IT_DiagDes](#)

[For each [DiagnosticDoIpGroupIdentificationPortMapping](#), attribute [pPortPrototypeInExecutable](#) shall exist.]

[constr_10589] Existence of [DiagnosticDoIpGroupIdentificationPortMapping.process](#)*Imposition time:* [IT_DiagDes](#)

[For each [DiagnosticDoIpGroupIdentificationPortMapping](#), attribute [process](#) shall exist.]

5.2.5.3 Diagnostic DoIP Activation Line Mapping

[TPS_MANI_01461] Retrieve the status of the DoIP activation line to the diagnostic server instance [For the purpose of retrieving the status of the DoIP activation line by the diagnostic server instance on the *AUTOSAR adaptive platform*, the relation between a [ProcessDesign](#), a [DoIpNetworkConfigurationDesign](#), and one [PPortPrototype](#) is created by using the [DiagnosticDoIpActivationLinePortMapping](#) that refers to

- a [ProcessDesign](#) in the role [process](#),
- a [DoIpNetworkConfigurationDesign](#) in the role [networkConfigurationDesign](#), and
- a [PPortPrototype](#) typed by a [DiagnosticDoIPActivationLineInterface](#) in the role [pPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding *Instance-Specifier* that the [PortPrototype](#) will use at run-time.

]

Class	DiagnosticDolpActivationLinePortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the DoIP activation line. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractDolpPortMapping , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
network Configuration Design	DolpNetwork ConfigurationDesign	0..1	ref	This reference identifies the applicable DolpNetwork ConfigurationDesign.

Table 5.72: DiagnosticDolpActivationLinePortMapping

[constr_10592] Existence of [DiagnosticDoIpActivationLinePortMapping.pPortPrototypeInExecutable](#)*Imposition time:* [IT_DiagDes](#)

[For each [DiagnosticDoIpActivationLinePortMapping](#), attribute [pPortPrototypeInExecutable](#) shall exist.]

[constr_10593] Existence of [DiagnosticDoIpActivationLinePortMapping.process](#)*Imposition time:* [IT_DiagDes](#)

[For each [DiagnosticDoIpActivationLinePortMapping](#), attribute [process](#) shall exist.]

5.2.5.4 Diagnostic DoIP Trigger Vehicle Announcement Mapping

[TPS_MANI_01462] Trigger the DoIP vehicle announcement at the diagnostic server instance [For the purpose of triggering the DoIP vehicle announcement line at the diagnostic server instance on the *AUTOSAR adaptive platform*, the relation between a [ProcessDesign](#) a [DoIpNetworkConfigurationDesign](#), and one [RPortPrototype](#) is created by using the [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping](#) that refers to

- a [ProcessDesign](#) in the role process,
- a [DoIpNetworkConfigurationDesign](#) in the role [networkConfigurationDesign](#), and
- an [RPortPrototype](#) typed by a [DiagnosticDoIPTriggerVehicleAnnouncementInterface](#) in the role [rPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding [InstanceSpecifier](#) that the [RPortPrototype](#) will use at run-time.

]

Class	DiagnosticDolpTriggerVehicleAnnouncementPortMapping			
Note	This mapping class identifies the PortPrototype in the application software that triggers the DoIP vehicle announcement. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractDolpPortMapping , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
network Configuration Design	DolpNetwork ConfigurationDesign	0..1	ref	This reference identifies the applicable DolpNetwork ConfigurationDesign.

Table 5.73: DiagnosticDolpTriggerVehicleAnnouncementPortMapping

[constr_10596] Existence of [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.rPortPrototypeInExecutable](#)*Imposition time:* IT_DiagDes

[For each [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping](#), attribute [rPortPrototypeInExecutable](#) shall exist.]

[constr_10597] Existence of [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.process](#)*Imposition time:* IT_DiagDes

[For each [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping](#), attribute [process](#) shall exist.]

[constr_10594] Restriction for the applicability of [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping](#)*Imposition time:* IT_DiagDes

[If an [RPortPrototype](#) is referenced in the role [rPortPrototypeInExecutable](#) by a [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping](#), then the [RPortPrototype](#) shall be typed by a [DiagnosticDoIPTriggerVehicleAnnouncementInterface](#).]

[constr_10595] Restriction for the applicability of [DiagnosticDoIPTriggerVehicleAnnouncementInterface](#)*Imposition time:* IT_DiagDes

[If an [RPortPrototype](#) is typed by a [DiagnosticDoIPTriggerVehicleAnnouncementInterface](#), then the reference in the role [rPortPrototypeInExecutable](#) to the [PPortPrototype](#) shall only originate from a [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping](#).]

[constr_10650] Target of the reference in the role [DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.networkConfigurationDesign](#)

Imposition time: IT_DiagDes

[A `DoIpNetworkConfiguration` shall only be referenced at most once in the role `DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.network-ConfigurationDesign` .]

[constr_10651] Existence of reference in the role `DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.networkConfigurationDesign`

Imposition time: IT_DiagDes

[If a `DoIpNetworkConfiguration` exists where attribute `isActivationLineDependent` exists and is set to `false`, then a `DiagnosticDoIpTriggerVehicleAnnouncementPortMapping` shall exist that references the `DoIpNetworkConfiguration` in the role `networkConfigurationDesign`.]

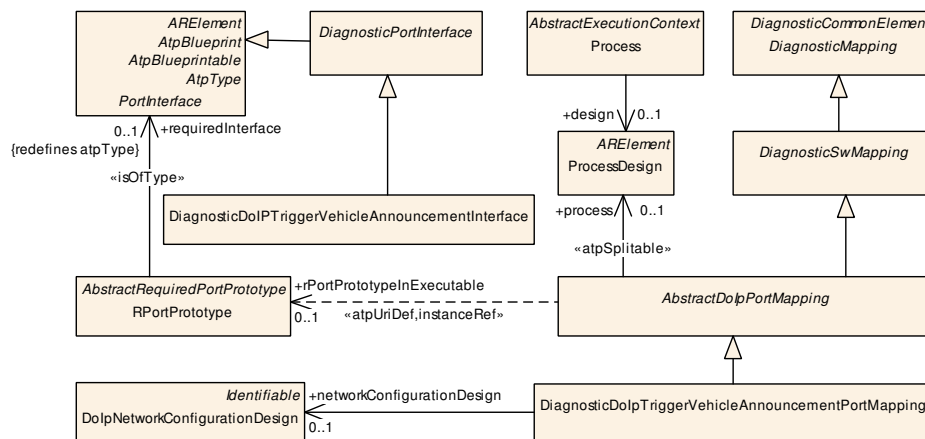


Figure 5.34: Modeling of `DiagnosticDoIpTriggerVehicleAnnouncementPortMapping` to indicate the existence of a handler to trigger the DoIP Vehicle Announcement

For more information, please refer to [SWS DM 00815].

5.2.5.5 Diagnostic DoIP Entity Identification Mapping

[TPS_MANI_01463] Retrieving the DoIP entity identification (EID) to the diagnostic server instance [For the purpose of retrieving the DoIP entity identification (EID) to the diagnostic server instance on the *AUTOSAR adaptive platform*, the relation between a [ProcessDesign](#) and one [PPortPrototype](#) is created by using the [DiagnosticDoIpEntityIdentificationPortMapping](#) that refers to

- a `ProcessDesign` in the role `process`, and
- a `PPortPrototype` typed by a `DiagnosticDoIPEntityIdentificationInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the

DM. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` will use at run-time.

There is no model element in the context of the `Diagnostic Extract` to which the `DiagnosticDoIpEntityIdentificationPortMapping` could reliably refer to (external authentication is not bound to the existence of UDS service 0x29).

This is the reason why the `DiagnosticDoIpEntityIdentificationPortMapping` is restricted to references to `PPortPrototype` and `ProcessDesign`.]

[constr_10598] Restriction for the applicability of `DiagnosticDoIpEntityIdentificationPortMapping`

Imposition time: `IT_DiagDes`

[If a `PPortPrototype` is referenced in the role `pPortPrototypeInExecutable` by a `DiagnosticDoIpEntityIdentificationPortMapping`, then the `PPortPrototype` shall be typed by a `DiagnosticDoIpEntityIdentificationInterface`.]

[constr_10599] Restriction for the applicability of `DiagnosticDoIpEntityIdentificationInterface`

Imposition time: `IT_DiagDes`

[If a `RPortPrototype` is typed by a `DiagnosticDoIpEntityIdentificationInterface`, then the reference in the role `pPortPrototypeInExecutable` to the `PPortPrototype` shall only originate from a `DiagnosticDoIpEntityIdentificationPortMapping`.]

For more information, please refer to [SWS_DM_01361].

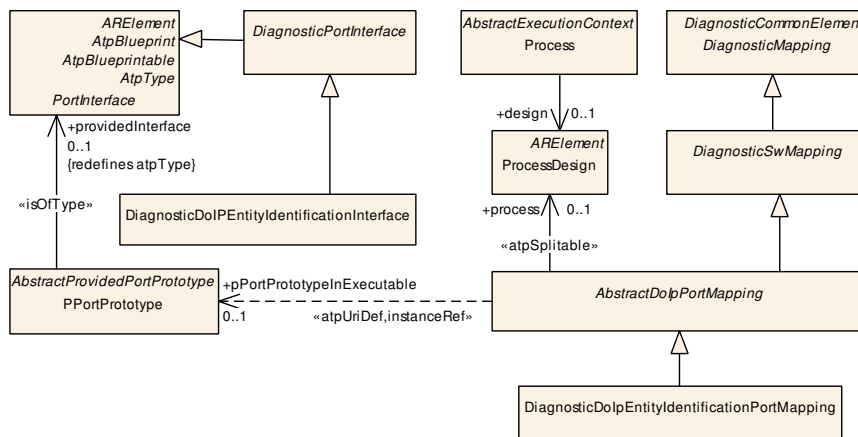


Figure 5.35: Modeling of `DiagnosticDoIpEntityIdentificationPortMapping` to indicate the existence of a handler for the DoIP entity identification

Class	DiagnosticDoIpEntityIdentificationPortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the DoIP identity identification. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractDoIpPortMapping , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , DiagnosticSwMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.74: DiagnosticDoIpEntityIdentificationPortMapping

[constr_10600] Existence of [DiagnosticDoIpEntityIdentificationPortMapping.pPortPrototypeInExecutable](#)*Imposition time:* [IT_DiagDes](#)

[For each [DiagnosticDoIpEntityIdentificationPortMapping](#), attribute [pPortPrototypeInExecutable](#) shall exist.]

[constr_10601] Existence of [DiagnosticDoIpEntityIdentificationPortMapping.process](#)*Imposition time:* [IT_DiagDes](#)

[For each [DiagnosticDoIpEntityIdentificationPortMapping](#), attribute [process](#) shall exist.]

5.2.5.6 Diagnostic DoIP Power Mode Mapping

[TPS_MANI_01464] Retrieving the status of the vehicle's power mode to the diagnostic server instance [For the purpose of retrieving the DoIP power mode to the diagnostic server instance on the *AUTOSAR adaptive platform*, the relation between a [ProcessDesign](#) and one [PPortPrototype](#) is created by using the [DiagnosticDoIpPowerModePortMapping](#) that refers to

- a [ProcessDesign](#) in the role process, and
- a [PPortPrototype](#) typed by a [DiagnosticDoIPPowerModeInterface](#) in the role [pPortPrototypeInExecutable](#). The target of this reference does not necessarily have to exist at the time of configuration of the DM. The reference itself, however, is required for constructing the corresponding [InstanceSpecifier](#) that the [PortPrototype](#) will use at run-time.

There is no model element in the context of the [Diagnostic](#) Extract to which the [DiagnosticDoIpPowerModePortMapping](#) could reliably refer to (external authentication is not bound to the existence of UDS service 0x29).

This is the reason why the [DiagnosticDoIpPowerModePortMapping](#) is restricted to references to [PPortPrototype](#) and [ProcessDesign](#).]

[constr_10602] Restriction for the applicability of **DiagnosticDoIpPowerModePortMapping**

Imposition time: IT_DiagDes

[If a **PPortPrototype** is referenced in the role **pPortPrototypeInExecutable** by a **DiagnosticDoIpPowerModePortMapping**, then the **PPortPrototype** shall be typed by a **DiagnosticDoIPPowerModeInterface**.]

[constr_10603] Restriction for the applicability of **DiagnosticDoIPPowerModeInterface**

Imposition time: IT_DiagDes

[If a **RPortPrototype** is typed by a **DiagnosticDoIPPowerModeInterface**, then the reference in the role **pPortPrototypeInExecutable** to the **PPortPrototype** shall only originate from a **DiagnosticDoIpPowerModePortMapping**.]

For more information, please refer to [SWS_DM_00814].

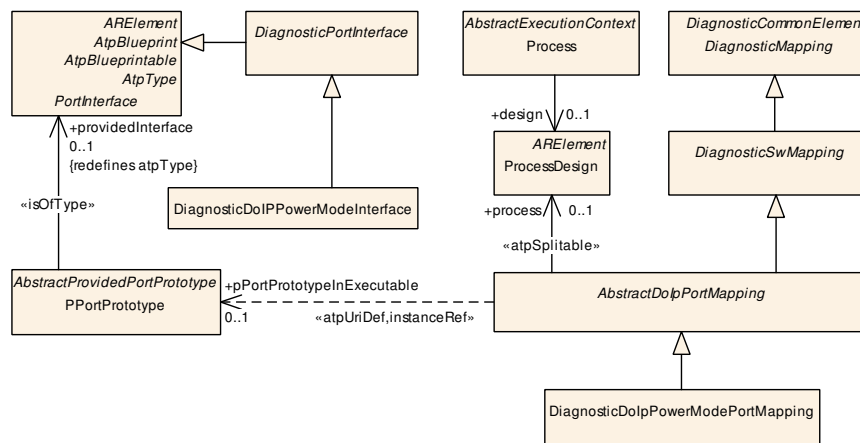


Figure 5.36: Modeling of **DiagnosticDoIpPowerModePortMapping to indicate the existence of a handler for the DoIP entity identification**

Class	DiagnosticDoIpPowerModePortMapping			
Note	This mapping class identifies the PortPrototype in the application software that handles the DoIP power mode. Tags: atp.recommendedPackage=DiagnosticPortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AbstractDoIpPortMapping, CollectableElement, DiagnosticCommonElement, DiagnosticMapping, DiagnosticSwMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.75: DiagnosticDoIpPowerModePortMapping

[constr_10604] Existence of `DiagnosticDoIpPowerModePortMapping.pPortPrototypeInExecutable`

Imposition time: `IT_DiagDes`

[For each `DiagnosticDoIpPowerModePortMapping`, attribute `pPortPrototypeInExecutable` shall exist.]

[constr_10605] Existence of `DiagnosticDoIpPowerModePortMapping.process`

Imposition time: `IT_DiagDes`

[For each `DiagnosticDoIpPowerModePortMapping`, attribute `process` shall exist.]

5.3 Diagnostic Clear Condition

On the *AUTOSAR adaptive platform*, a new model element similar `DiagnosticEnableCondition` is introduced: `DiagnosticClearCondition`.

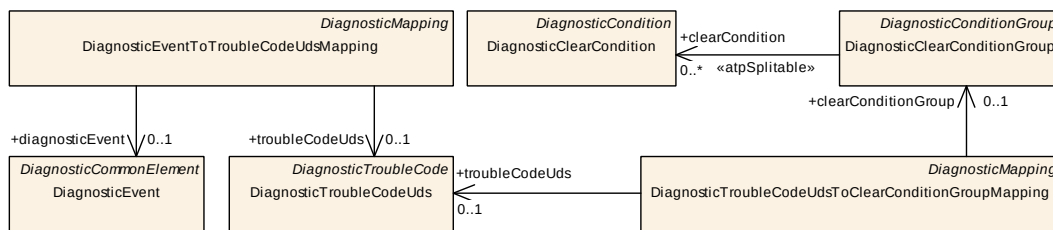


Figure 5.37: Modeling of the diagnostic clear condition

In contrast to `DiagnosticEnableCondition`, `DiagnosticClearCondition` is not mapped to a `DiagnosticEvent` but (via the aggregation by `DiagnosticClearConditionGroup`) to a `DiagnosticTroubleCodeUds`.

For this purpose, meta-class `DiagnosticTroubleCodeUdsToClearConditionGroupMapping` has been defined.

Class	DiagnosticClearCondition			
Note	This meta-class describes a clear condition for diagnostic purposes. Tags: atp.recommendedPackage=DiagnosticConditions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticCondition, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.76: DiagnosticClearCondition

Class	DiagnosticClearConditionGroup			
Note	Clear condition group which includes one or several clear conditions. Tags: atp.recommendedPackage=DiagnosticClearConditionGroups This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticConditionGroup , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
clearCondition	DiagnosticClearCondition	*	ref	This aggregation represents the collection of Diagnostic ClearConditions that belong to the DiagnosticClearConditionGroup. Stereotypes: atp.Splitable Tags: atp.Splitkey=clearCondition

Table 5.77: DiagnosticClearConditionGroup

Class	DiagnosticTroubleCodeUdsToClearConditionGroupMapping			
Note	This meta-class provides the ability to map a DiagnosticClearConditionGroup to a collection of Diagnostic TroubleCodeUds. Tags: atp.recommendedPackage=DiagnosticMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
clearConditionGroup	DiagnosticClearConditionGroup	0..1	ref	This reference identifies the applicable DiagnosticClearConditionGroup.
troubleCodeUds	DiagnosticTroubleCodeUds	0..1	ref	This reference identifies the DiagnosticTroubleCodeUds that are relevant for the mapping.

Table 5.78: DiagnosticTroubleCodeUdsToClearConditionGroupMapping

[constr_1658] Number of [DiagnosticTroubleCodeUdsToClearConditionGroupMapping](#) elements per [DiagnosticTroubleCodeUds](#)

Imposition time: [IT_DiagDes](#)

[The mapping element [DiagnosticTroubleCodeUdsToClearConditionGroupMapping](#) shall be created no more than once per [DiagnosticTroubleCodeUds](#).

If several [DiagnosticTroubleCodeUdsToClearConditionGroupMapping](#) elements referring to the same [DiagnosticTroubleCodeUds](#) are defined, then the Clear Condition Group mapping shall be regarded as defective.]

5.4 Security Access

the implementation of the diagnostics manager on the adaptive platform requires a refined modeling of meta-class [DiagnosticSecurityAccessClass](#).

A new attribute named [sharedTimer](#) is introduced that controls whether a single timer is used for all security access levels or whether the individual levels utilize separate timers respectively.

Class	DiagnosticSecurityAccessClass			
Note	This meta-class contains attributes shared by all instances of the "Security Access" diagnostic service. Tags: atp.recommendedPackage=DiagnosticSecurityAccessss			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticServiceClass , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sharedTimer	Boolean	0..1	attr	Switch between separate or single shared timer instance and timer value. • true: use shared timer instance and timer value for all security access levels combined. • false: use separate timer instance and timer values for each security level. This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 5.79: DiagnosticSecurityAccessClass

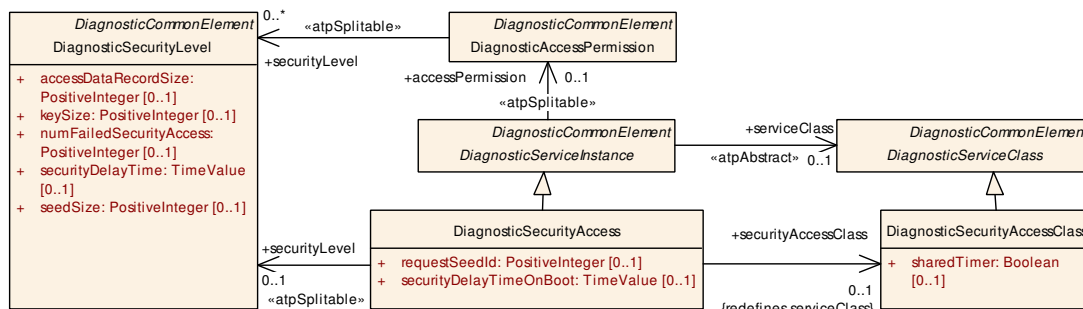


Figure 5.38: Refined modeling of the diagnostic security access

5.5 Diagnostic Provided Data Mapping

[TPS_MANI_01230] Semantics of [DiagnosticProvidedDataMapping](#) [The purpose of the [DiagnosticProvidedDataMapping](#) is to provide internal values of the diagnostic stack to specific [DiagnosticDataElements](#).

This is the reason why [DiagnosticProvidedDataMapping](#) does not seem to fulfill the condition for representing a mapping class because it only has one reference to a [DiagnosticDataElement](#) in the role `dataElement`.

Obviously, the specific nature of this mapping is that the second element (the [DiagnosticProvidedDataMapping.dataProvider](#)) that is supposed to take place in the mapping (by being an internal value of the diagnostic stack) cannot precisely be modeled as a meta-class at all.

Therefore, there is no better way than to model the [DiagnosticProvidedDataMapping.dataProvider](#) by a [NameToken](#).]

Please note that the [DiagnosticProvidedDataMapping](#) is not to be confused with the [DiagnosticEdrDataProviderMapping](#). The former delivers values to [DiagnosticDataElements](#) for access by the UDS service "ReadDataByIdentifier", while the latter delivers data to the content of an extended data record.

Please note further that the list of standardized values of attribute [DiagnosticProvidedDataMapping.dataProvider](#) is defined in the [22, SWS Diagnostics].

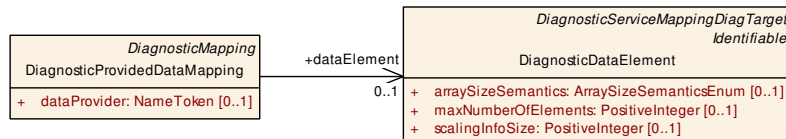


Figure 5.39: Modeling of [DiagnosticProvidedDataMapping](#)

Class	DiagnosticProvidedDataMapping			
Note	This represents the ability to define the nature of a data access for a DiagnosticDataElement based on a data provider that cannot be modeled explicitly. Tags: atp.recommendedPackage=DiagnosticMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataElement	DiagnosticDataElement	0..1	ref	This represents the DiagnosticDataElement to which the internal data is mapped, further qualified by the DiagnosticProvidedDataMapping.dataProvider.
dataProvider	NameToken	0..1	attr	This represents the ability to further specify the data provider.

Table 5.80: DiagnosticProvidedDataMapping

[constr_10166] Multiplicity of attribute [DiagnosticProvidedDataMapping.dataProvider](#)

Imposition time: IT_DiagDes

[For each [DiagnosticProvidedDataMapping](#), the attribute [dataProvider](#) shall exist.]

5.6 Usage of Diagnostic Environmental Data Element Condition

The definition of environmental conditions is explained in the document [3, TPS Diagnostic Extract Template].

Specifically for the *AUTOSAR adaptive platform*, it is possible to obtain data from application software (fetched from a [PPortPrototype](#) typed by a [DiagnosticDataElementInterface](#)) as a reference value for the computation of the environmental condition.

Please note that the reference [DiagnosticEnvDataElementCondition.pPortPrototype](#) is decorated with stereotype «atpUriDef» because the model of the

application software does not necessarily have to exist when the diagnostic design is created.

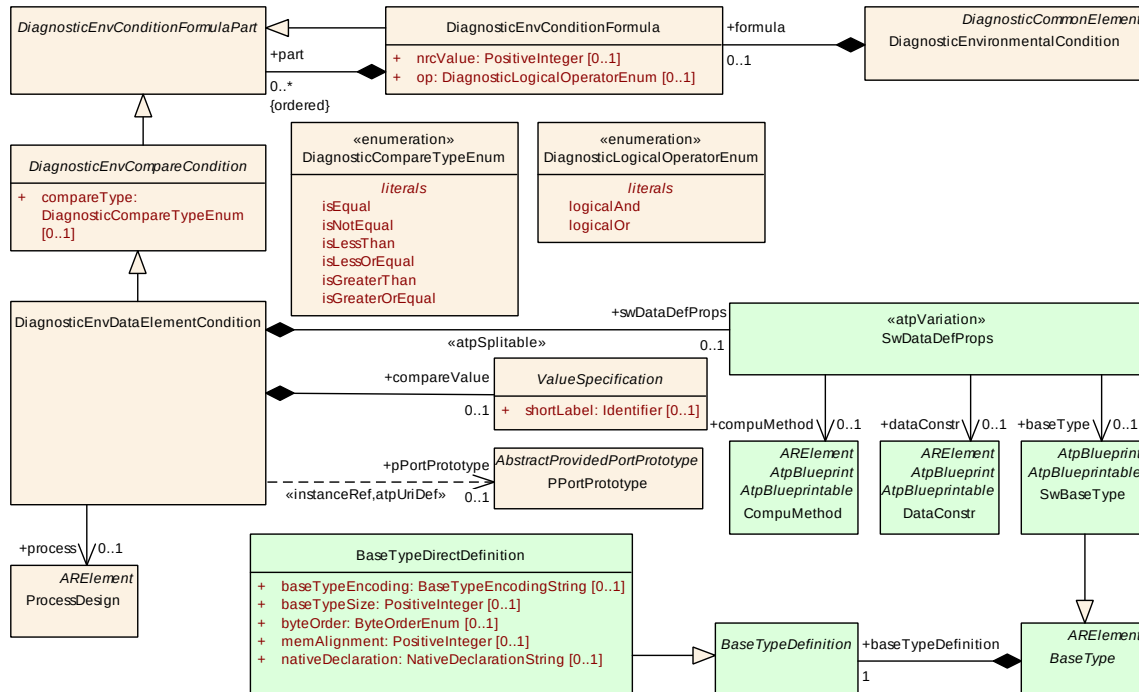


Figure 5.40: Leverage of `DiagnosticEnvironmentalCondition` on the *AUTOSAR adaptive platform*

[TPS_MANI_01372] Properties of data obtained from the application software

[The properties of the data obtained from the application software can be configured in the context of `DiagnosticEnvDataElementCondition`, namely by means of the aggregation of `SwDataDefProps` in the role `swDataDefProps`.]

[constr_10114] Existence of attributes of `DiagnosticEnvDataElementCondition` if the reference in the role `pPortPrototype` exists

Imposition time: `IT_DiagDes`

[If the reference in the role `DiagnosticEnvDataElementCondition.pPortPrototype` exists, then the aggregations in the roles `compareValue`, `process`, and `swDataDefProps` shall exist.]

Class	DiagnosticEnvironmentalCondition			
Note	The meta-class <code>DiagnosticEnvironmentalCondition</code> formalizes the idea of a condition which is evaluated during runtime of the ECU by looking at "environmental" states (e.g. one such condition is that the vehicle is not driving, i.e. vehicle speed == 0). Tags: <code>atp.recommendedPackage=DiagnosticEnvironmentalConditions</code>			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , Multilanguage , Referrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticEnvironmentalCondition			
formula	DiagnosticEnvConditionFormula	0..1	aggr	This attribute represents the formula part of the DiagnosticEnvironmentalCondition.
modeElement	DiagnosticEnvModeElement	*	aggr	This aggregation contains a representation of Mode Declarations in the context of a DiagnosticEnvironmentalCondition.

Table 5.81: DiagnosticEnvironmentalCondition

Class	DiagnosticEnvDataElementCondition			
Note	This meta-class represents the ability to formulate a diagnostic environment condition based on the value of a data element owned by the application software.			
Base	ARObject, DiagnosticEnvCompareCondition , DiagnosticEnvConditionFormulaPart			
Aggregated by	DiagnosticEnvConditionFormula.part			
Attribute	Type	Mult.	Kind	Note
compareValue	ValueSpecification	0..1	aggr	This aggregation represents the definition of the compare value against which the value taken from the application software shall be compared.
dataPrototype	DataPrototype	0..1	iref	This instanceRef represent the ability to access a data element owned by the application software on the AUTOSAR classic platform. InstanceRef implemented by: DataPrototypeInSystem InstanceRef
pPortPrototype	PPortPrototype	0..1	iref	This instanceRef identifies the PortPrototype from which the relevant information for the environment condition can be obtained. This InstanceRef is only relevant for the adaptive platform. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef This Attribute is only used by the AUTOSAR Adaptive Platform.
process	ProcessDesign	0..1	ref	This reference identifies the applicable ProcessDesign. This Attribute is only used by the AUTOSAR Adaptive Platform.
swDataDef Props	SwDataDefProps	0..1	aggr	Via this aggregation it is possible to describe the properties of the data that is obtained from the application for the environmental condition. Stereotypes: atpSplitable Tags: atp.Splitkey=swDataDefProps

Table 5.82: DiagnosticEnvDataElementCondition

Class	DiagnosticEnvCompareCondition (abstract)			
Note	DiagnosticCompareConditions are atomic conditions. They are based on the idea of a comparison at runtime of some variable data with something constant. The type of the comparison (==, !=, <, <=, ...) is specified in DiagnosticCompareCondition.compareType.			
Base	ARObject, DiagnosticEnvConditionFormulaPart			
Subclasses	DiagnosticEnvDataCondition, DiagnosticEnvDataElementCondition , DiagnosticEnvModeCondition, DiagnosticEnvSovdDataCondition			
Aggregated by	DiagnosticEnvConditionFormula.part			
Attribute	Type	Mult.	Kind	Note
compareType	DiagnosticCompareTypeEnum	0..1	attr	This attributes represents the concrete type of the comparison.

Table 5.83: DiagnosticEnvCompareCondition

Class	DiagnosticEnvConditionFormula			
Note	A DiagnosticEnvConditionFormula embodies the computation instruction that is to be evaluated at runtime to determine if the DiagnosticEnvironmentalCondition is currently present (i.e. the formula is evaluated to true) or not (otherwise). The formula itself consists of parts which are combined by the logical operations specified by DiagnosticEnvConditionFormula.op. If a diagnostic functionality cannot be executed because an environmental condition fails then the diagnostic stack shall send a negative response code (NRC) back to the client. The value of the NRC is directly related to the specific formula and is therefore formalized in the attribute DiagnosticEnvConditionFormula.nrcValue.			
Base	ARObject, DiagnosticEnvConditionFormulaPart			
Aggregated by	DiagnosticEnvConditionFormulaPart , DiagnosticEnvironmentalCondition.formula			
Attribute	Type	Mult.	Kind	Note
nrcValue	PositiveInteger	0..1	attr	This attribute represents the concrete NRC value that shall be returned if the condition fails.
op	DiagnosticLogicalOperatorEnum	0..1	attr	This attribute represents the concrete operator (supported operators: and, or) of the condition formula.
part (ordered)	DiagnosticEnvConditionFormulaPart	*	aggr	This aggregation represents the collection of formula parts that can be combined by logical operators.

Table 5.84: DiagnosticEnvConditionFormula

Class	DiagnosticEnvConditionFormulaPart (abstract)			
Note	A DiagnosticEnvConditionFormulaPart can either be a atomic condition, e.g. a DiagnosticEnvCompareCondition, or a DiagnosticEnvConditionFormula, again, which allows arbitrary nesting.			
Base	ARObject			
Subclasses	DiagnosticEnvCompareCondition , DiagnosticEnvConditionFormula			
Aggregated by	DiagnosticEnvConditionFormulaPart			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.85: DiagnosticEnvConditionFormulaPart

Class	DiagnosticEnvModeElement (abstract)			
Note	All ModeDeclarations that are referenced in a DiagnosticEnvModeCondition shall be defined as a DiagnosticEnvModeElement of this DiagnosticEnvironmentalCondition. This concept keeps the ARXML clean: It avoids that the DiagnosticEnvConditionFormula is cluttered by lengthy InstanceRef definitions. Furthermore, it allows that an InstanceRef only needs to be defined once and can be used multiple times in the different DiagnosticEnvModeConditions.			
Base	ARObject, Referrable			
Subclasses	DiagnosticEnvBswModeElement, DiagnosticEnvSwcModeElement			
Aggregated by	DiagnosticEnvironmentalCondition.modeElement			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.86: DiagnosticEnvModeElement

Enumeration	DiagnosticCompareTypeEnum
Note	Enumeration for the type of a comparison of values usually expressed by the following operators: ==, !=, <, <=, >, >=
Aggregated by	DiagnosticEnvCompareCondition.compareType
Literal	Description





Enumeration	DiagnosticCompareTypeEnum
isEqual	equal Tags: atp.EnumerationLiteralIndex=0
isGreaterOrEqual	greater than or equal Tags: atp.EnumerationLiteralIndex=5
isGreaterThan	greater than Tags: atp.EnumerationLiteralIndex=4
isLessOrEqual	less than or equal Tags: atp.EnumerationLiteralIndex=3
isLessThan	less than Tags: atp.EnumerationLiteralIndex=2
isNotEqual	not equal Tags: atp.EnumerationLiteralIndex=1

Table 5.87: DiagnosticCompareTypeEnum

Enumeration	DiagnosticLogicalOperatorEnum
Note	Logical AND and OR operation (&,)
Aggregated by	DiagnosticEnvConditionFormula.op
Literal	Description
logicalAnd	Logical AND Tags: atp.EnumerationLiteralIndex=0
logicalOr	Logical OR Tags: atp.EnumerationLiteralIndex=1

Table 5.88: DiagnosticLogicalOperatorEnum

5.7 SOVD Configuration Elements

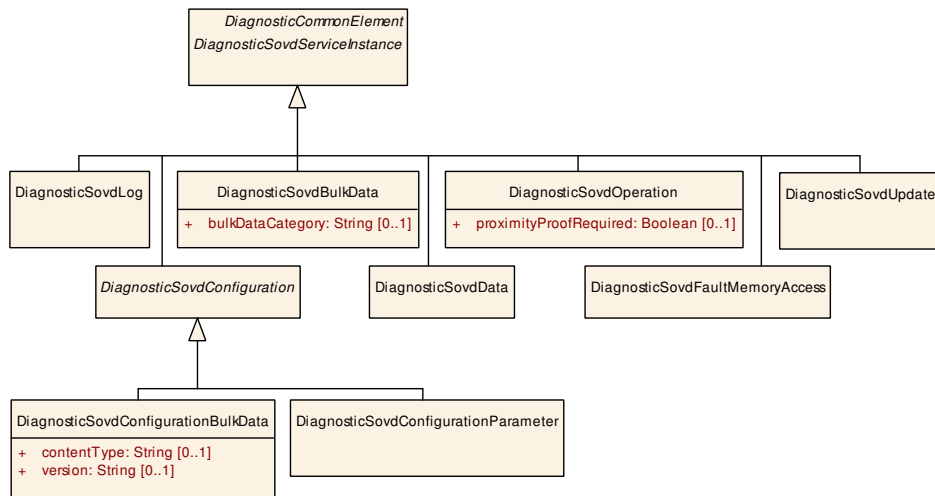
This chapter documents that meaning of a number of meta-classes that are specific to the usage of Service-Oriented Vehicle Diagnostics (SOVD).

5.7.1 SOVD Service Instance

5.7.1.1 Overview

[TPS_MANI_01431] **Definition of SOVD service instance** [Similar to UDS, SOVD supports the concept of a *service instance*. The SOVD service instance is formalized by means of abstract meta-class [DiagnosticSovdServiceInstance](#).]

Concrete SOVD services are modeled as concrete sub-classes of [DiagnosticSovdServiceInstance](#). The “big picture” of the modeling of SOVD service instances is sketched in [Figure 5.41](#).

Figure 5.41: Modeling of **DiagnosticSovdServiceInstance**

Class	DiagnosticSovdBulkData			
Note	This meta-class represents a "Bulk Data" SOVD service instance. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
bulkData Category	String	0..1	attr	This attribute provides a categorization of the bulk data.

Table 5.89: DiagnosticSovdBulkData

Class	DiagnosticSovdConfiguration (abstract)			
Note	This abstract meta-class represents a "configuration" SOVD service instance. The concrete nature of the service instance is defined by sub-classes. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticSovdConfigurationBulkData , DiagnosticSovdConfigurationParameter			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.90: DiagnosticSovdConfiguration

Class	DiagnosticSovdConfigurationParameter			
Note	This meta-class represents a "Configuration Parameter" SOVD service instance. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdConfiguration , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			





Class	DiagnosticSovdConfigurationParameter			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.91: DiagnosticSovdConfigurationParameter

Class	DiagnosticSovdConfigurationBulkData			
Note	This meta-class represents a "Configuration Bulk Data" SOVD service instance. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdConfiguration , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
contentType	String	0..1	attr	This attribute represents the setting of the content (i.e. MIME) type of the bulk data. Please note that the number of supported content types is not restricted by the ASAM SOVD standard and therefore it is unfortunately not possible to constrain the possible settings of this attribute.
version	String	0..1	attr	This attribute represents a version information. Please note that the structure of the version information is not restricted by the ASAM SOVD standard and therefore the structure of the content of this attribute cannot be constrained further in the scope of AUTOSAR.

Table 5.92: DiagnosticSovdConfigurationBulkData

5.7.1.2 SOVD Log

The [SOVD](#) log service is based on the existence of just a single instance of [DiagnosticSovdLog](#) for which no matching subclass of [DiagnosticSovdPortInterface](#) is defined.

This means that the application software does not have access to the log service² and therefore access to [SOVD](#) logging is restricted to diagnostic management (DM) is using the logging service internally.

The restriction to just a single instance of [DiagnosticSovdLog](#) is formalized by means of [[constr_10479](#)].

Class	DiagnosticSovdServiceInstance (abstract)
Note	This abstract class serves as the base class for the configuration of SOVD service instances. This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable
Subclasses	DiagnosticSovdBulkData , DiagnosticSovdConfiguration , DiagnosticSovdData , DiagnosticSovdFaultMemoryAccess , DiagnosticSovdLog , DiagnosticSovdOperation , DiagnosticSovdUpdate



²This also explains why there is no mapping class defined for the [SOVD](#) logging.



Class	DiagnosticSovdServiceInstance (abstract)			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
method	DiagnosticSovdMethod	0..1	ref	This reference identifies the applicable SOVD method.

Table 5.93: DiagnosticSovdServiceInstance

[constr_10477] Existence of [DiagnosticSovdLog](#)*Imposition time:* [IT_DiagDes](#)

[Each [DiagnosticContributionSet](#) shall at most reference a single [DiagnosticSovdLog](#) in the role [element](#).]

Class	DiagnosticSovdLog			
Note	This meta-class represents a "Log" SOVD service instance. Tags: <code>atp.recommendedPackage=DiagnosticSovdServiceInstances</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.94: DiagnosticSovdLog

5.7.1.3 SOVD Update

A similar restriction is in place for the existence of [DiagnosticSovdUpdate](#), see [\[constr_10480\]](#).

[constr_10478] Existence of [DiagnosticSovdUpdate](#)*Imposition time:* [IT_DiagDes](#)

[Each [DiagnosticContributionSet](#) shall at most reference a single [DiagnosticSovdUpdate](#) in the role [element](#).]

The meta-class [DiagnosticSovdFaultMemoryAccess](#) can be used to access the fault memory. Please note that access to the primary memory is protected by the access permission associated with the [DiagnosticSovdMethod.get](#) and [deleteDiagnosticSovdMethodPrimitives](#).

In addition, access to user-defined fault memories may require diagnostic authentication.

Class	DiagnosticSovdUpdate			
Note	This meta-class represents a "Update" SOVD service instance. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.95: DiagnosticSovdUpdate

5.7.1.4 SOVD Fault Memory Access

The meta-class [DiagnosticSovdFaultMemoryAccess](#) can be used to access the fault memory. Please note that access to the primary memory is protected by the access permission associated with the [DiagnosticSovdMethod.get](#) and [deleteDiagnosticSovdMethodPrimitives](#).

In addition, access to user-defined fault memories may require diagnostic authentication.

Class	DiagnosticSovdFaultMemoryAccess			
Note	This meta-class represents the ability to access (read/get and delete) the fault memory. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.96: DiagnosticSovdFaultMemoryAccess

5.7.1.5 Diagnostic SOVD Data

The usage of the [SOVD](#) Data service is connected with the **mandatory** definition of a so-called [SOVD data category](#) as well as the definition of an optional collection so-called [SOVD groups](#).

The latter is not representing a group in the literal sense, i.e that a grouping of model elements is intended. The semantics is more like a secondary filter criterion, where the primary filter criterion is represented by the [SOVD data category](#), which is required to exist for each [DiagnosticSovdData](#), see [[constr_10706](#)].

For explanation, the tester can query data from the diagnostic server using the [SOVD data category](#) as a filter criterion. The query can be further refined by specifying a collection of [SOVD groups](#).

The relation between the *SOVD service instance*, the *SOVD data category* and the *SOVD groups* is a formal one, therefore the relation is modeled in the form of meta-classes

- *DiagnosticSovdData*
- *DiagnosticSovdDataCategory*
- *DiagnosticSovdGroup*

constraints apply, see below.

The semantics of the *DiagnosticSovdDataCategory* is standardized by AUTOSAR by defining standardized values for attribute *DiagnosticSovdDataCategory.category*.

In other words, the *shortName* is not relevant. This aspect is covered by the spec item [TPS_MANI_01492].

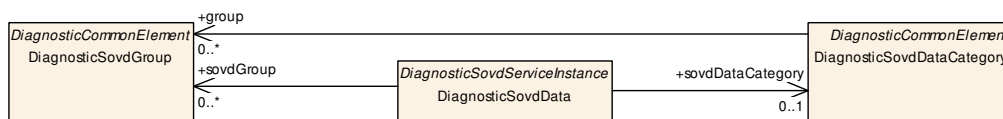


Figure 5.42: Modeling of *DiagnosticSovdData*

[TPS_MANI_01492] **Standardized values for attribute *DiagnosticSovdDataCategory.category*** [The following values of attribute *DiagnosticSovdDataCategory.category* are standardized by AUTOSAR:

IDENT_DATA - Read access to fixed parameters that identify entities within an *extended vehicle* (ExVe), e.g., part number or VIN.

CURRENT_DATA - Read access to dynamically changing values, e.g., battery voltage.

STORED_DATA - Read and write access to parameters in the ExVe.

SYS_INFO - Read access to dynamically changing system resources, e.g., CPU load.

It is possible to define further values for attribute *DiagnosticSovdDataCategory.category*, provided that a custom prefix is used to avoid potential name clashes with further extensions of the AUTOSAR standard.]

The possible values of the *SOVD groups* are not standardized and therefore the intended semantics is carried by the *shortName*. There are, however, restrictions in place.

In particular, the *DiagnosticSovdGroups* referenced from the *DiagnosticSovdData* shall be a subset of the *DiagnosticSovdGroups* referenced from the *DiagnosticSovdDataCategory* that is also referenced from the . This restriction is formalized in [constr_10705].

[constr_10705] Restriction regarding references in the roles `DiagnosticSovdDataCategory.group` and `DiagnosticSovdData.sovdGroup`

Imposition time: `IT_DiagDes`

[In the scope of any given `DiagnosticSovdData`, every `DiagnosticSovdGroup` that is referenced in the role `DiagnosticSovdData.sovdGroup` shall also be referenced in the role `DiagnosticSovdDataCategory.group` from the `DiagnosticSovdDataCategory` that is referenced in the role `sovldataCategory` from the enclosing `DiagnosticSovdData`.]

Class	DiagnosticSovdData			
Note	This meta-class represents a "Data" SOVD service instance. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sovldataCategory	DiagnosticSovdDataCategory	0..1	ref	This reference identifies the SOVD category that applies to the enclosing SOVD data. Tags: atp.Status=candidate
sovldGroup	DiagnosticSovdGroup	*	ref	This reference identifies the collection of SOVD groups in which the enclosing SOVD data is a "member". Tags: atp.Status=candidate
target	DiagnosticSovdContent	0..1	ref	This reference identifies the content that the Diagnostic SovdData service instance is responsible for.

Table 5.97: DiagnosticSovdData

[constr_10706] Existence of reference in the role `DiagnosticSovdData.sovdDataCategory`

Imposition time: `IT_DiagDes`

[For each `DiagnosticSovdData`, the reference in the role `sovldataCategory` shall exist.]

Class	DiagnosticSovdDataCategory			
Note	This meta-class represents the primary filter criterion for the access to SOVD data. Tags: atp.Status=candidate atp.recommendedPackage=DiagnosticDataCategorys This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
group	DiagnosticSovdGroup	*	ref	This reference identifies the SOVD groups in which the SOVD category is a "member". Tags: atp.Status=candidate

Table 5.98: DiagnosticSovdDataCategory

Class	DiagnosticSovdGroup			
Note	This meta-class represents the secondary filter criterion for the access to SOVD data Tags: atp.Status=candidate atp.recommendedPackage=DiagnosticSovdGroups This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , Multilanguage Referrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.99: DiagnosticSovdGroup

5.7.1.6 SOVD Operation

An [SOVD](#) operation (formalized by meta-class [DiagnosticSovdOperation](#)) can be used to execute arbitrary diagnostic-related code in the context of the application software.

The modeling of the [DiagnosticSovdOperation](#) and related meta-classes is depicted in [Figure 5.43](#).

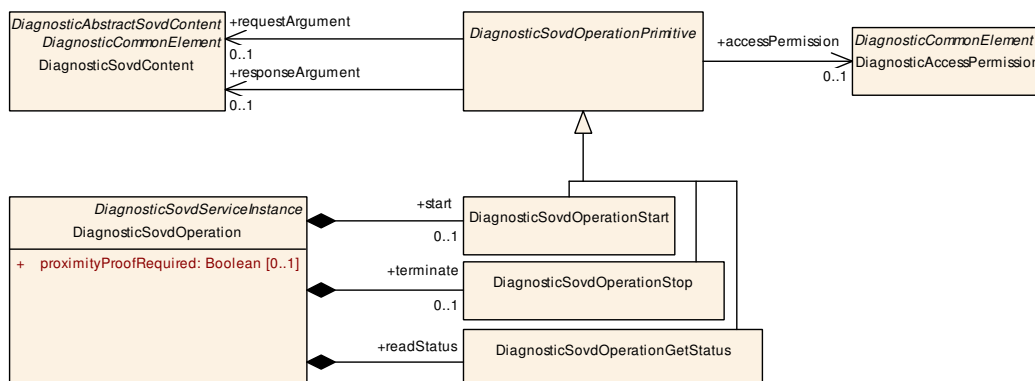


Figure 5.43: Modeling of [DiagnosticSovdOperation](#) and [DiagnosticSovdOperationPrimitive](#)

The details of other [DiagnosticSovdServiceInstance](#) are typically modeled by means of [DiagnosticSovdMethod](#) and aggregated classes.

This pattern does not apply to [DiagnosticSovdOperation](#) because the implementation of the latter (in terms of what otherwise would be clarified by [DiagnosticSovdMethodPrimitives](#)) is fixed and cannot be modified. As a consequence of this observation, [\[constr_10715\]](#) exists.

[constr_10715] [DiagnosticSovdOperation](#) shall not refer to [DiagnosticSovdMethod](#)

Imposition time: IT_DiagDes

[Any [DiagnosticSovdOperation](#) shall not refer to [DiagnosticSovdMethod](#).]

Because the usage of [DiagnosticSovdMethod](#) (see [Chapter 5.7.2](#)) is not applicable for the definition of an [DiagnosticSovdOperation](#), the specification of [DiagnosticAccessPermission](#) for the execution of [DiagnosticSovdOperation](#) is connected to the definition of a [DiagnosticSovdOperationPrimitive](#).

This means that different [DiagnosticSovdOperationPrimitives](#) may be associated with different [DiagnosticAccessPermission](#). Specifically, it is very typical that a specific [DiagnosticAccessPermission](#) is required to terminate a running [DiagnosticSovdOperation](#).

Please note that the relation between [DiagnosticSovdOperationPrimitive](#) and [DiagnosticAccessPermission](#) (as defined by [\[TPS_MANI_01502\]](#)) is very similar to the configuration of UDS diagnostic routines, as explained in [\[3, TPS Diagnostic Extract Template\]](#) [Chapter 4.3.8.9](#).

[TPS_MANI_01502] Definition of [DiagnosticAccessPermission](#) for [DiagnosticSovdOperation](#) [The usage of [DiagnosticSovdOperationPrimitives](#) is also used to define a reference to [DiagnosticAccessPermissions](#).]

Class	DiagnosticSovdOperation			
Note	This meta-class represents a "Operation" SOVD service instance. Tags: atp.recommendedPackage=DiagnosticSovdServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticSovdServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
proximityProofRequired	Boolean	0..1	attr	If true, the execution of the operation requires proof of co-location, and the offline capability description includes the attribute x-sovd-proximity-proof-required in the Path Item object. An SOVD client can use this information to filter operations in advance if a co-location proof cannot be provided. Tags: atp.Status=candidate
readStatus	DiagnosticSovdOperationGetStatus	1	aggr	This aggregation identifies the "read status" operation primitive.
start	DiagnosticSovdOperationStart	0..1	aggr	This aggregation identifies the "start" operation primitive.
terminate	DiagnosticSovdOperationStop	0..1	aggr	This aggregation identifies the "terminate" operation primitive.

Table 5.100: DiagnosticSovdOperation

[constr_10716] Existence of [DiagnosticSovdOperation.start](#)

Imposition time: [IT_DiagDes](#)

[The aggregation in the role [DiagnosticSovdOperation.start](#) shall always exist.]

[constr_10717] Existence of `DiagnosticSovdOperation.proximityProofRequired`*Imposition time:* `IT_DiagDes`

[The aggregation in the role `DiagnosticSovdOperation.proximityProofRequired` shall always exist.]

[TPS_MANI_01503] Semantics of `DiagnosticSovdOperationPrimitive`

[Abstract meta-class `DiagnosticSovdOperationPrimitive` has been defined to provide the references in the roles

- `requestArgument`
- `responseArgument`

to sub-classes of `DiagnosticSovdOperationPrimitive`.]

Class	<code>DiagnosticSovdOperationPrimitive</code> (abstract)			
Note	This meta-class represents a primitive of an SOVD operation. The class is modeled as an abstract class to be able to contribute its properties to the concrete subclasses. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code>			
Subclasses	<code>DiagnosticSovdOperationGetStatus</code> , <code>DiagnosticSovdOperationStart</code> , <code>DiagnosticSovdOperationStop</code>			
Attribute	Type	Mult.	Kind	Note
access Permission	<code>DiagnosticAccessPermission</code>	0..1	ref	This reference identifies the applicable access permission. Tags: xml.sequenceOffset=100
request Argument	<code>DiagnosticSovdContent</code>	0..1	ref	This reference identifies the arguments applicable for the operation request. Tags: xml.sequenceOffset=50
response Argument	<code>DiagnosticSovdContent</code>	0..1	ref	This reference identifies the arguments applicable for the operation response. Tags: xml.sequenceOffset=60

Table 5.101: `DiagnosticSovdOperationPrimitive`

Class	<code>DiagnosticSovdOperationStart</code>			
Note	This class represents the "start" primitive of an SOVD operation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticSovdOperationPrimitive</code>			
Aggregated by	<code>DiagnosticSovdOperation.start</code>			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.102: `DiagnosticSovdOperationStart`

Class	<code>DiagnosticSovdOperationStop</code>			
Note	This class represents the "stop" primitive of an SOVD operation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticSovdOperationPrimitive</code>			
Aggregated by	<code>DiagnosticSovdOperation.terminate</code>			





Class	DiagnosticSovdOperationStop			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.103: DiagnosticSovdOperationStop

Class	DiagnosticSovdOperationGetStatus			
Note	This class represents the "get status" primitive of an SOVD operation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, DiagnosticSovdOperationPrimitive			
Aggregated by	DiagnosticSovdOperation.readStatus			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.104: DiagnosticSovdOperationGetStatus

5.7.2 SOVD Method

As sketched in [Figure 5.44](#), the modeling of the behavior of a [DiagnosticSovdServiceInstance](#) by means of meta-class [DiagnosticSovdMethod](#) follows a pattern similar to the modeling of a diagnostic routine [3, TPS Diagnostic Extract Template] in that primitive actions are defined that represent atomic activities in the execution of the SOVD service.

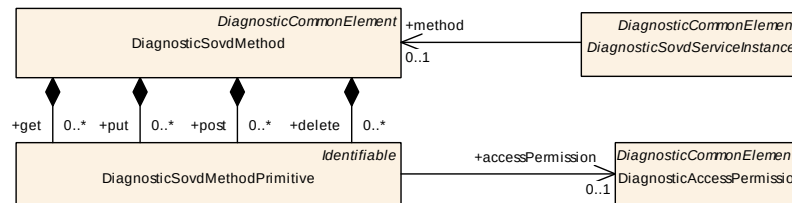


Figure 5.44: Modeling of [DiagnosticSovdMethod](#) and the relation to [DiagnosticAccessPermission](#)

[TPS_MANI_01432] **Semantics of [DiagnosticSovdMethodPrimitive](#)** [Each of the primitive activities, modeled as [DiagnosticSovdMethodPrimitive](#) has a reference to [DiagnosticAccessPermission](#). The basic semantics implemented in the context of a [DiagnosticSovdMethod](#) is modeled by mean of the aggregation roles

- [get](#)
- [put](#)
- [post](#)
- [delete](#)

The [DiagnosticSovdMethodPrimitive](#) are the building blocks out of which the semantics **and access permissions** of each SOVD service can be defined.]

[constr_10479] Restriction on values of attribute `DiagnosticSovdMethodPrimitive.category` aggregated in the role `put` in the context of SOVD Update*Imposition time: IT_DiagDes*

[If a `DiagnosticSovdMethod` is referenced from a `DiagnosticSovdUpdate` and the attribute `put.category` exists, then the value of the attribute `category` within any `DiagnosticSovdMethodPrimitive` aggregated in the role `put` is restricted to the following values:

- PREPARE
- EXECUTE
- AUTOMATED

]

Please find more information about the meaning of the values of `DiagnosticSovdMethodPrimitive.category` in [22, SWS Diagnostics].

[constr_10480] Restriction on value of attribute `DiagnosticSovdMethodPrimitive.category` aggregated in the role `get` in the context of SOVD Update*Imposition time: IT_DiagDes*

[If a `DiagnosticSovdMethod` is referenced from a `DiagnosticSovdUpdate` and the attribute `get.category` exists, then the value of the attribute `category` within any `DiagnosticSovdMethodPrimitive` aggregated in the role `get` is restricted to the value STATUS.]

[constr_10481] Restriction on values of attribute `DiagnosticSovdMethodPrimitive.category` aggregated in the role `get` in the context of SOVD Log*Imposition time: IT_DiagDes*

[If a `DiagnosticSovdMethod` is referenced from a `DiagnosticSovdLog` and the attribute `get` exists, then the value of the attribute `category` within any `DiagnosticSovdMethodPrimitive` aggregated in the role `get` is restricted to the values

- CONFIG
- ENTRIES

]

[constr_10482] Restriction on values of attribute `DiagnosticSovdMethodPrimitive.category` aggregated in the roles `put` and `delete` in the context of SOVD Log*Imposition time: IT_DiagDes*

[If a `DiagnosticSovdMethod` is referenced from a `DiagnosticSovdLog` and the attributes

- `put`

- `delete`

exist, then the value of the attribute `category` within any `DiagnosticSovdMethodPrimitive` aggregated in the role

- `put`
- `delete`

is restricted to the value `CONFIG.`]

[constr_10567] Existence of `DiagnosticSovdMethod.get` resp. `delete` in the context of `DiagnosticSovdFaultMemoryAccess`

Imposition time: `IT_DiagDes`

[If a `DiagnosticSovdMethod` is referenced from a `DiagnosticSovdFaultMemoryAccess`, then the following restriction for the existence and multiplicity of the attributes of the `DiagnosticSovdMethod` exist:

- `put` [0]
- `post` [0]
- `get` [0..1]
- `delete` [0..1]

]

Class	DiagnosticSovdMethod			
Note	A DiagnosticSovdMethod represents a re-usable complex operation (that consists of primitive operations) in the context of the communication of an SOVD server. Tags: <code>atp.recommendedPackage=DiagnosticSovdMethods</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
<code>delete</code>	DiagnosticSovdMethodPrimitive	*	aggr	This represents the "delete" method primitive.
<code>get</code>	DiagnosticSovdMethodPrimitive	*	aggr	This represents the "get" method primitive.
<code>post</code>	DiagnosticSovdMethodPrimitive	*	aggr	This represents the "post" method primitive.
<code>put</code>	DiagnosticSovdMethodPrimitive	*	aggr	This represents the "delete" method primitive.

Table 5.105: DiagnosticSovdMethod

Class	DiagnosticSovdMethodPrimitive
Note	This meta-class represents a primitive operation inside a DiagnosticSovdMethod. This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable





Class	DiagnosticSovdMethodPrimitive			
Aggregated by	DiagnosticSovdMethod.delete, DiagnosticSovdMethod.get, DiagnosticSovdMethod.post, DiagnosticSovdMethod.put			
Attribute	Type	Mult.	Kind	Note
access Permission	DiagnosticAccessPermission	0..1	ref	This reference identifies the applicable access permission.

Table 5.106: DiagnosticSovdMethodPrimitive

5.7.3 SOVD Lock

[TPS_MANI_01396] Semantics of meta-class **DiagnosticSovdLock** [SOVD does not integrate with the existing UDS-based session handling. But nevertheless, it is necessary to provide the ability to lock the access for one SOVD client such that no other SOVD or UDS client can access the software that is subject to the diagnostic activity.

For this purpose, meta-class **DiagnosticSovdLock** has been defined. It is referenced by **DiagnosticAccessPermission** as an additional criterion for computing the access permission for a diagnostic client.]

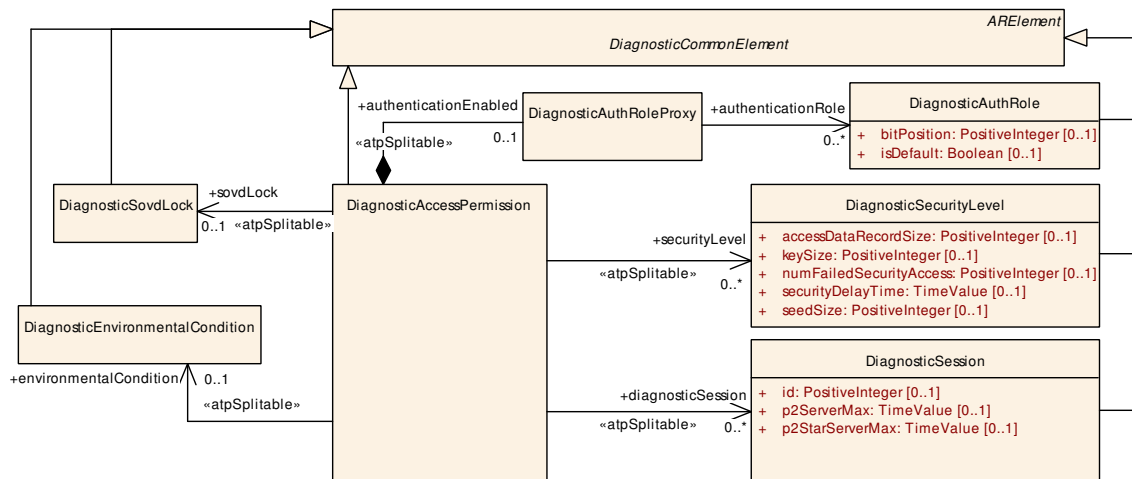


Figure 5.45: Modeling of SovdLock in the context of **DiagnosticAccessPermission**

Class	DiagnosticSovdLock			
Note	This meta-class represents the ability to define an SOVD lock to be considered for the computation of a diagnostic access permission. Tags: atp.recommendedPackage=DiagnosticSovdLocks This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, Identifiable, Multilanguage Referrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.107: DiagnosticSovdLock

5.7.4 SOVD Content

5.7.4.1 Overview

Data Access via SOVD needs a detailed definition about the content of a data package exchanged between an SOVD client and the corresponding server (and vice versa). In other words, something like the established [DiagnosticDataIdentifier](#) is needed, but without the UDS-specific characteristic.

Unfortunately, there is no technical term (like “DID” in the UDS case) defined in the context of SOVD for this purpose that is more specific than “data”.

But using the generic term “data” specifically for this use case within SOVD can very easily end up in misunderstandings because (without further qualification) it takes a lot of context for the reader to unambiguously distinguish “data” in the SOVD meaning of the word from “data” used as a generic concept.

Therefore, it is necessary to define the technical term `SOVD Data` that unambiguously clarifies that the specific meaning of “data in the SOVD meaning” without depending on a more or less obvious context.

A direct usage of existing UDS concepts for the purpose of describing “SOVD data” is considered confusing for the audience and there is also a significant risk that any overlapping between UDS and SOVD may break (and cause significant effort for fixing) as the two approaches evolve.

This means that analog to a [DiagnosticDataIdentifier](#) as the representation of a UDS DID, `SOVD Data` is represented by the [DiagnosticAbstractSovdContent](#) and its subclasses: [DiagnosticSovdContent](#) and [DiagnosticSovdContentElement](#).

The elements of a UDS [DiagnosticDataIdentifier](#) are modeled as a combination of [DiagnosticParameter](#) and [DiagnosticDataElement](#). The equivalent concept on the side of SOVD shall be referred to as a `SOVD Data Element`.

[TPS_MANI_01493] Semantics of meta-class [DiagnosticSovdContent](#) [Meta-class [DiagnosticSovdContent](#) represents the definition of the payload of a data-defined SOVD message that is transmitted between an SOVD Client and an SOVD server (or vice versa).

One example for the usage of [DiagnosticSovdContent](#) would be for the purpose of configuring a [DiagnosticSovdData](#) diagnostic service, comparable to a DID ([DiagnosticDataIdentifier](#)) on UDS.

Another example could be the configuration of the primitives of an [DiagnosticSovdOperation](#), comparable to a RID on UDS.]

[TPS_MANI_01494] Semantics of meta-class [DiagnosticSovdContentElement](#) [Meta-class [DiagnosticSovdContentElement](#) represents a `SOVD Data Element`, comparable to a DID Element ([DiagnosticDataElement](#)) on UDS.]

Please note that the order inside a DID, as established by a [DiagnosticParameter](#) in the UDS case, is not required on SOVD because elements of the data package are identified by name instead of by something like a [bitOffset](#).

Further note that the ability to define deeply nested data structures inside a DID, as available in the UDS case, is also available in the SOVD case, albeit using a different modeling approach³.

In particular, the approach is that [SOVD Data Element](#) is contained in either [SOVD Data](#) or in another [SOVD Data Element](#). Please find a more detailed explanation in [\[TPS_MANI_01495\]](#) and in [Figure 5.46](#).

[TPS_MANI_01495] Modeling of hierarchical data structures using [DiagnosticSovdContentElement](#) [The modeling approach for defining hierarchical data structures in the context of [DiagnosticSovdContent](#) is based on the definition of [DiagnosticSovdContentElement](#) as an abstract base class, from which two other meta-classes inherit:

- [DiagnosticSovdCompositeContentElement](#) is again an abstract base class (representing one hierarchy level in a nested data structure), from which the following meta-classes inherit:
 - [DiagnosticSovdRecordContentElement](#) represents a structure that contains a collection of elements (represented by the role [element](#) with multiplicity 0..*) that in turn can be modeled as an aggregation of arbitrary subclasses of [DiagnosticSovdContentElement](#).
 - [DiagnosticSovdArrayContentElement](#) represents an array of elements defined by the aggregation in the role [element](#). This role has the multiplicity 0..1 to indicate that it just represents a definition of the nature of the elements of the array instead of an actual array element.
- [DiagnosticSovdPrimitiveContentElement](#) represents an atomic leaf element of the data structure. This means that [DiagnosticSovdPrimitiveContentElement](#) could be aggregated either
 - directly in the role [DiagnosticSovdContent.element](#) or
 - somewhere deep in the hierarchical structure, i.e. in either of the roles
 - * [DiagnosticSovdRecordContentElement.element](#)
 - * [DiagnosticSovdArrayContentElement.element](#)

]

An overview of the modeling of [DiagnosticSovdContent](#) and its sub-structures is provided by [Figure 5.46](#).

³The ability for the creation of nested data structures was added later to the UDS modeling, which could only be done while observing a number of structural constraints to keep the backwards-compatibility of the AUTOSAR XML Schema

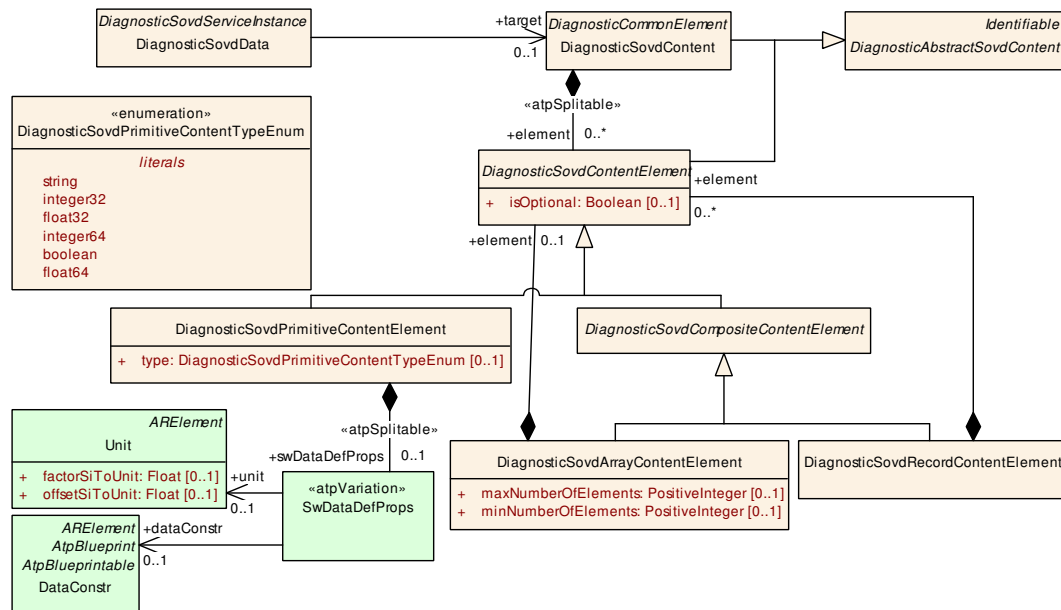


Figure 5.46: Modeling of `DiagnosticSovdContent` and `DiagnosticSovdContentElement`

Class	<i>DiagnosticAbstractSovdContent</i> (abstract)			
Note	This class acts as an abstract base class of it subclasses so that the modeling of references to all subclasses can be simplified. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	DiagnosticSovdContent , DiagnosticSovdContentElement			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 5.108: DiagnosticAbstractSovdContent

Class	DiagnosticSovdContent			
Note	This meta-class represents a data packet exchanged between am SOVD Tester and an SOVD server. The semantics is very close to the semantics of a UDS DID, with some extensions. Tags: atp.recommendedPackage=DiagnosticSovdContents This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticAbstractSovdContent , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
element	DiagnosticSovdContentElement	*	aggr	This aggregation identifies the collection of elements of the enclosing DiagnosticSovdContent. Stereotypes: atpSplittable Tags: atp.Splitkey=element.shortName

Table 5.109: DiagnosticSovdContent

Class	DiagnosticSovdContentElement (abstract)			
Note	This meta-class represents an element of a DiagnosticSovdContent. When compared to the modeling of a UDS DID, this class would correspond to a mixture of DiagnosticParameter and DiagnosticData Element. The concrete semantics of a DiagnosticSovdContentElement is defined by its subclasses. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, DiagnosticAbstractSovdContent , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	DiagnosticSovdCompositeContentElement , DiagnosticSovdPrimitiveContentElement			
Aggregated by	DiagnosticSovdArrayContentElement.element , DiagnosticSovdContent.element , DiagnosticSovdRecordContentElement.element			
Attribute	Type	Mult.	Kind	Note
isOptional	Boolean	0..1	attr	This attribute defines whether the enclosing DiagnosticSovdContentElement is considered optional. Note that array elements cannot be declared optional.

Table 5.110: DiagnosticSovdContentElement

5.7.4.2 SOVD Composite Content

[constr_10707] Relation of the values of attributes [minNumberOfElements](#) and [maxNumberOfElements](#)

Imposition time: [IT_DiagDes](#)

[The value of attribute [DiagnosticSovdArrayContentElement.minNumberOfElements](#) shall be **smaller or equal** to the value of [DiagnosticSovdArrayContentElement.maxNumberOfElements](#).]

[TPS_MANI_01496] [DiagnosticSovdArrayContentElement](#) can have **fixed or variable size** [The content of a [DiagnosticSovdArrayContentElement](#) may consist of either

- a fixed number of elements or
- a number of elements that may range between a configured lower bound and upper bound.

If the value of [minNumberOfElements](#) and [maxNumberOfElements](#) is identical, the enclosing [DiagnosticSovdArrayContentElement](#) is intended to be of **fixed size**.

If the value of [minNumberOfElements](#) and [maxNumberOfElements](#) is different while fulfilling [constr_10708], the enclosing [DiagnosticSovdArrayContentElement](#) is intended to be of **variable size**.]

[TPS_MANI_01497] [DiagnosticSovdContentElement](#) can be declared **optional** [It is possible to declare [DiagnosticSovdContentElements](#) as *optional* on nearly (see [constr_10707]) every level of the hierarchy by means of the attribute [isOptional](#).

As long as [constr_10707] is fulfilled, it is possible to place non-optional [DiagnosticSovdContentElements](#) inside an optional [DiagnosticSovdContentElement](#).]

Of course, it does not make sense to declare the definition of the nature of an array element as optional. The mechanism to define “optional” array elements is to specify that the array shall have a variant number of elements, see [TPS_MANI_01495].

[constr_10708] `DiagnosticSovdContentElement` aggregated in the role `DiagnosticSovdArrayContentElement.element` shall not be declared *optional*

Imposition time: IT_DiagDes

[Any `DiagnosticSovdContentElement` aggregated in the role `DiagnosticSovdArrayContentElement.element` shall not set the value of attribute `isOptional` to `true`.]

Class	<code>DiagnosticSovdCompositeContentElement</code> (abstract)			
Note	This abstract class represents the ability to define a hierarchical structure within a <code>DiagnosticSovdContent</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticAbstractSovdContent</code> , <code>DiagnosticSovdContentElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Subclasses	<code>DiagnosticSovdArrayContentElement</code> , <code>DiagnosticSovdRecordContentElement</code>			
Aggregated by	<code>DiagnosticSovdArrayContentElement.element</code> , <code>DiagnosticSovdContent.element</code> , <code>DiagnosticSovdRecordContentElement.element</code>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 5.111: `DiagnosticSovdCompositeContentElement`

Class	<code>DiagnosticSovdArrayContentElement</code>			
Note	This meta-class represents the ability to define a <code>DiagnosticSovdCompositeContentElement</code> with array semantics. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticAbstractSovdContent</code> , <code>DiagnosticSovdCompositeContentElement</code> , <code>DiagnosticSovdContentElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>DiagnosticSovdArrayContentElement.element</code> , <code>DiagnosticSovdContent.element</code> , <code>DiagnosticSovdRecordContentElement.element</code>			
Attribute	Type	Mult.	Kind	Note
element	<code>DiagnosticSovdContentElement</code>	0..1	aggr	This aggregation represents the specification of the nature of an element of an enclosing <code>DiagnosticSovdArrayContentElement</code> . It is only necessary to aggregate one element because the array semantics requires that all elements of the array have the same nature. Tags: <code>xml.sequenceOffset=100</code>
maxNumberOfElements	PositiveInteger	0..1	attr	This attribute specifies the maximum number of elements expected in the array. Tags: <code>xml.sequenceOffset=20</code>
minNumberOfElements	PositiveInteger	0..1	attr	This attribute specifies the minimum number of elements expected in the array. Tags: <code>xml.sequenceOffset=10</code>

Table 5.112: `DiagnosticSovdArrayContentElement`

[advisory_01019] Existence of attribute `DiagnosticSovdArrayContentElement.element` [For each `DiagnosticSovdArrayContentElement`, attribute `element` should exist.]

[advisory_01020] Existence of attribute `DiagnosticSovdArrayContentElement.minNumberOfElements`*Imposition time:* `IT_DiagDes`

[For each `DiagnosticSovdArrayContentElement`, attribute `minNumberOfElements` should exist.]

[constr_10711] Existence of attribute `DiagnosticSovdArrayContentElement.maxNumberOfElements`*Imposition time:* `IT_DiagDes`

[For each `DiagnosticSovdArrayContentElement`, attribute `maxNumberOfElements` shall exist.]

Class	DiagnosticSovdRecordContentElement			
Note	This meta-class represents the ability to define a <code>DiagnosticSovdCompositeContentElement</code> with record semantics. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticAbstractSovdContent</code> , <code>DiagnosticSovdCompositeContentElement</code> , <code>DiagnosticSovdContentElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>DiagnosticSovdArrayContentElement.element</code> , <code>DiagnosticSovdContent.element</code> , <code>DiagnosticSovdRecordContentElement.element</code>			
Attribute	Type	Mult.	Kind	Note
element	<code>DiagnosticSovdContentElement</code>	*	aggr	This aggregation represents the collection of record elements.

Table 5.113: DiagnosticSovdRecordContentElement**[advisory_01021] Existence of attribute `DiagnosticSovdRecordContentElement.element`***Imposition time:* `IT_DiagDes`

[For each `DiagnosticSovdRecordContentElement`, attribute `element` shall exist.]

5.7.4.3 SOVD Primitive Content

It is important to understand that the serialization approach of SOVD (a JSON object, backed by a JSON schema) is entirely different from the serialization approach for UDS (binary data). This means that the representation of SOVD content on the network does not need to be defined by means of an `SwBaseType`.

In particular, SOVD conveys the content in physical form such that no conversion rule from a binary representation to physical values is required. Obviously, the definition of physical properties of the content on the network is still an important part of the design of the SOVD content.

This is the reason why `DiagnosticSovdPrimitiveContentElement` aggregates `swDataDefProps` that it turns references `Unit` and `DataConstr`.

[TPS_MANI_01498] **Semantics of attribute `DiagnosticSovdPrimitiveContentElement.dataConstr.dataConstrRule.physConstrs`** [For the transport of SOVD content over the network, attribute `DiagnosticSovdPrimitiveContentElement.dataConstr.dataConstrRule.physConstrs` is used to provide information regarding the upper and lower bound of the values in the physical domain of the enclosing `DiagnosticSovdPrimitiveContentElement`.]

[TPS_MANI_01499] **`InternalConstrs` is not supported in the context of a `DiagnosticSovdPrimitiveContentElement`** [As a consequence of [TPS_MANI_01498], `DiagnosticSovdPrimitiveContentElement.dataConstr.dataConstrRule` shall ignore the existence of a potential aggregation in the role `internalConstrs`.]

[TPS_MANI_01500] **Semantics of attribute `DiagnosticSovdPrimitiveContentElement.swDataDefProps.unit`** [For the transport of SOVD content over the network, attribute `DiagnosticSovdPrimitiveContentElement.swDataDefProps.unit` is used to provide information regarding the physical unit of the enclosing `DiagnosticSovdPrimitiveContentElement`.]

[constr_10712] **Allowed roles within `SwDataDefProps` in the context of `DiagnosticSovdPrimitiveContentElement`**

Imposition time: `IT_DiagDes`

[Only the following roles within `SwDataDefProps` in the context of `DiagnosticSovdPrimitiveContentElement` are allowed:

- `dataConstr`
- `unit`

Any role that is not mentioned in the table above shall **not** be used.]

[TPS_MANI_01501] **Semantics of `DiagnosticSovdPrimitiveContentElement.type`** [Attribute `DiagnosticSovdPrimitiveContentElement.type` is used to convey the type of the content in terms of an abstract description of the data type in which the content from the JSON payload is expected to be de-serialized.]

Class	DiagnosticSovdPrimitiveContentElement			
Note	This meta-class represents a primitive leaf element of a <code>DiagnosticSovdContent</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticAbstractSovdContent</code> , <code>DiagnosticSovdContentElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>DiagnosticSovdArrayContentElement.element</code> , <code>DiagnosticSovdContent.element</code> , <code>DiagnosticSovdRecordContentElement.element</code>			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticSovdPrimitiveContentElement			
swDataDef Props	SwDataDefProps	0..1	aggr	This aggregation represents the applicable data definition properties. Stereotypes: atpSplittable Tags: atp.Splitkey=swDataDefProps xml.sequenceOffset=100
type	DiagnosticSovdPrimitiveContentTypeEnum	0..1	attr	This attribute denotes the type of the primitive content element. Tags: xml.sequenceOffset=10

Table 5.114: DiagnosticSovdPrimitiveContentElement

Enumeration	DiagnosticSovdPrimitiveContentTypeEnum
Note	This enumeration defines the possible content type on primitive level.
Aggregated by	DiagnosticSovdPrimitiveContentElement.type
Literal	Description
boolean	The primitive content represents a boolean value. Tags: atp.EnumerationLiteralIndex=4
float32	The primitive content represents a 32 bit floating-point number. Tags: atp.EnumerationLiteralIndex=2
float64	The primitive content represents a 64 bit floating-point number. Tags: atp.EnumerationLiteralIndex=5
integer32	The primitive content represents a 32 bit integer value. Tags: atp.EnumerationLiteralIndex=1
integer64	The primitive content represents a 64 bit integer number. Tags: atp.EnumerationLiteralIndex=3
string	The primitive content represents a string. Tags: atp.EnumerationLiteralIndex=0

Table 5.115: DiagnosticSovdPrimitiveContentTypeEnum

5.7.5 Environmental Data Condition to SOVD Content Element

Similar to the obtainment of values from a [DiagnosticDataElement](#), as described in [3] Chapter 4.3.7.2.1, it is possible to refer to a [DiagnosticSovdContentElement](#) to evaluate an environmental condition.

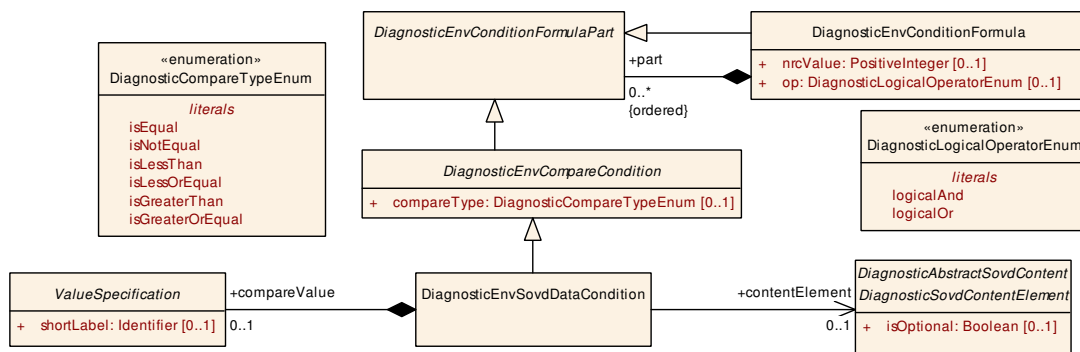


Figure 5.47: Diagnostic environmental condition with reference to a [DiagnosticSovdContentElement](#)

[TPS_MANI_01504] Semantics of `DiagnosticEnvSovdDataCondition` [The meta-class `DiagnosticEnvSovdDataCondition` represents an atomic condition that compares the current value of the referenced `DiagnosticSovdContentElement` with a constant value defined by the `ValueSpecification` aggregated in the role `compareValue`.]

Class	DiagnosticEnvSovdDataCondition			
Note	A <code>DiagnosticEnvSovdDataCondition</code> is an atomic condition that compares the current value of the referenced <code>DiagnosticSovdContentElement</code> with a constant value defined by the <code>ValueSpecification</code> . All <code>compareTypes</code> are supported. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>DiagnosticEnvCompareCondition</code> , <code>DiagnosticEnvConditionFormulaPart</code>			
Aggregated by	<code>DiagnosticEnvConditionFormulaPart</code>			
Attribute	Type	Mult.	Kind	Note
<code>compareValue</code>	<code>ValueSpecification</code>	0..1	aggr	This attribute represents a fixed compare value taken to evaluate the compare condition. Tags: atp.Status=candidate
<code>contentElement</code>	<code>DiagnosticSovdContentElement</code>	0..1	ref	This reference represents the related diagnostic SOVD content element. Tags: atp.Status=candidate

Table 5.116: DiagnosticEnvSovdDataCondition

[constr_10718] Existence of `DiagnosticEnvSovdDataCondition.compareValue`

Imposition time: `IT_DiagDes`

[For each `DiagnosticEnvSovdDataCondition`, that attribute `compareValue` shall exist.]

[constr_10719] Existence of `DiagnosticEnvSovdDataCondition.contentElement`

Imposition time: `IT_DiagDes`

[For each `DiagnosticEnvSovdDataCondition`, that attribute `contentElement` shall exist.]

5.7.6 SOVD Snapshots

[TPS_MANI_01505] Semantics of `DiagnosticTroubleCodeProps.sovdSnapshotContent` [The reference in the role `DiagnosticTroubleCodeProps.sovdSnapshotContent` identifies the SOVD-related snapshot content that is not related to legislation.]

[TPS_MANI_01506] Semantics of `DiagnosticTroubleCodeProps.legislatedSovdFreezeFrameContent` [The reference in the role `DiagnosticTroubleCodeProps.legislatedSovdFreezeFrameContent` identifies the SOVD-related snapshot content that is positively related to legislation.]

Please note that it is possible to configure snapshots for the UDS transport and snapshots for the SOVD transport for the same DTC, at the same time.

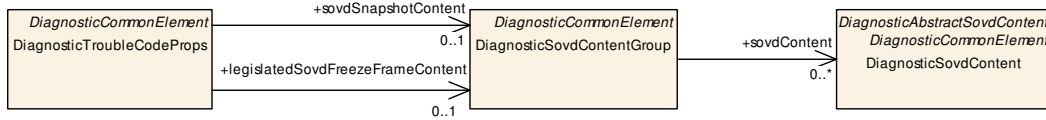


Figure 5.48: Modeling of `DiagnosticSovdContentGroup`

Class	DiagnosticSovdContentGroup			
Note	This meta-class represents a collection of SOVD content for the purpose of defining a DTC snapshot for the usage in SOVD. Tags: atp.recommendedPackage=SovdContentGroups This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , Multilanguage , Referrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sovdContent	DiagnosticSovdContent	*	ref	Reference to a collection of SOVD Content.

Table 5.117: DiagnosticSovdContentGroup

5.8 Diagnostic Miscellanea

[TPS_MANI_01358] Restriction for the configuration of diagnostic debouncing
 [The restriction for the configuration of the diagnostic debouncing, as formulated in [TPS_DEXT_03004], shall **not** apply on *the AUTOSAR adaptive platform*.]

[constr_10483] Applicable values of `baseTypeEncoding` in the context of the definition of a `DiagnosticDataElement`

Imposition time: `IT_DiagDes`

[Any `SwBaseType` referenced in the role `DiagnosticDataElement.swDataDef-Props.baseType` shall only set one of the following values for attribute `SwBaseType.baseTypeDefinition.baseTypeEncoding`:

- **BOOLEAN** (for `baseTypeSize` = 8)
- **NONE** (for `baseTypeSize` = 8, 16, 32, or 64)
- **2C** (for `baseTypeSize` = 8, 16, 32, or 64)
- **BCD-P** (for `baseTypeSize` = 8)
- **BCD-UP** (for `baseTypeSize` = 8)
- **IEEE754** (for `baseTypeSize` = 32 or 64)
- **UTF-8** (for `baseTypeSize` = 8)

]

A description of the standardized values mentioned in [constr_10483] can be found in the specification of the [2, TPS Software Component Template].

The relation between the possible values of `baseTypeEncoding` and the minimum value of `baseTypeSize` is documented in [TPS_SWCT_01876].

6 Machine Design

6.1 Overview

On the *AUTOSAR classic platform*, the design of communication-related aspects is attached to the existence of meta-class `EcuInstance`. A similar approach to support the definition of communication-related aspects early in the workflow (and definitely before the manifest configuration starts) is also needed on the *AUTOSAR adaptive platform*.

Therefore, `MachineDesign` has been introduced in order to allow the communication system designer to define a placeholder for an adaptive ECU in the scope of the `System` (the `MachineDesign` corresponds to the `EcuInstance` of AUTOSAR classic).

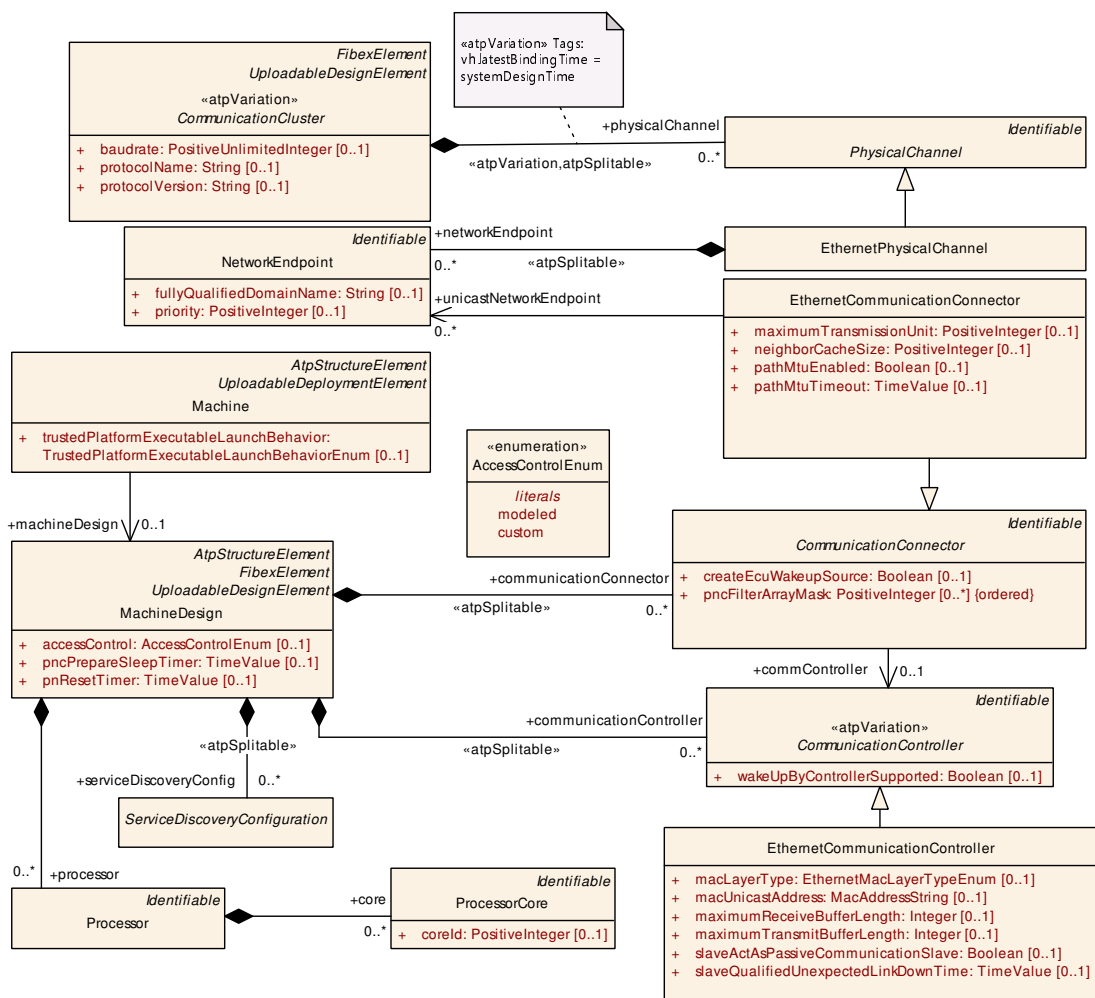


Figure 6.1: MachineDesign

As the *AUTOSAR adaptive platform* focuses on the usage of Ethernet for communication, the task of creating the communication design in the context of the [MachineDesign](#) boils down to the specification of IP addresses (see [Chapter 6.4](#)) and the configuration of service discovery, see [Chapter 6.5](#).

6.2 Processor

6.2.1 Overview

The `MachineDesign` is able to aggregate one or several `Processors`, as depicted by [Figure 11.1](#). Each `Processor` consists of one or several `ProcessorCores`.

Meta-class `ProcessorCore` provides attribute `coreId` that can be used e.g. in a bit-mask to better control the utilization of processing resources.

[constr_1549] Value of `ProcessorCore.coreId`

Imposition time: `IT_SysDes`

[The value of `ProcessorCore.coreId` shall be unique in the context of the enclosing `Processor`.]

Class	Processor			
Note	This represents a processor for the execution of an AUTOSAR adaptive platform This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	Machine.processor , MachineDesign.processor			
Attribute	Type	Mult.	Kind	Note
core	ProcessorCore	*	aggr	This represents the collection of cores owned by the enclosing processor.

Table 6.1: Processor

[constr_10172] Multiplicity of attribute `Processor.core`

Imposition time: `IT_SysDes`

[For each `Processor`, the attribute `core` shall exist.]

Class	ProcessorCore			
Note	This meta-class represents the ability to model a processor core for the execution of an AUTOSAR adaptive platform. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	Processor.core			
Attribute	Type	Mult.	Kind	Note
coreId	PositiveInteger	0..1	attr	This attribute represents a numerical value assigned to the specific core. The value can be taken e.g. for use in a bitmask.

Table 6.2: ProcessorCore

[constr_10173] Multiplicity of attribute `ProcessorCore.coreId`

Imposition time: `IT_SysDes`

[For each `ProcessorCore`, the attribute `coreId` shall exist.]

6.2.2 Core Affinity

There are two ways to define the core affinity of a `Process`:

- On *design level*, the references `ProcessDesignToMachineDesignMapping.shallRunOn` and `ProcessDesignToMachineDesignMapping.shallNotRunOn` can be used.

This is a way to define core affinity in the early stages of a project, in the context of an overall system design.

- On *target configuration level*, the references `ProcessToMachineMapping.shallRunOn` and `ProcessToMachineMapping.shallNotRunOn` can be used.

From the standard's perspective, it is in principle possible to override the definition of core affinity on the design level in this step. Projects need to decide whether this capability shall be available.

[TPS_MANI_01477] Description of Core affinity [The meta-class `ProcessDesignToMachineDesignMapping` provides the ability to restrict the assignment of processes to selected `ProcessorCores` with the two references `shallRunOn` and `shallNotRunOn`.]

[constr_10659] Consistency of references in the roles `ProcessDesignToMachineDesignMapping.machineDesign` and `shallRunOn` resp. `shallNotRunOn`

Imposition time: `IT_SysDes`

[Any `ProcessorCore` that is referenced in the roles `shallRunOn` and `shallNotRunOn` shall be aggregated (via `MachineDesign.processor`) by the `MachineDesign` referenced in the role `ProcessDesignToMachineDesignMapping.machineDesign`.]

[constr_10660] Usage of `shallRunOn` and `shallNotRunOn` references

Imposition time: `IT_SysDes`

[The `ProcessorCore` that is referenced by a `ProcessDesignToMachineDesignMapping` in the role `shallRunOn` or `shallNotRunOn` shall be aggregated by the `MachineDesign` that is referenced in the role `machineDesign` by the same `ProcessDesignToMachineDesignMapping`.]

[constr_10661] Consistency of references `shallRunOn` and `shallNotRunOn`

Imposition time: `IT_SysDes`

[Within the context of one `ProcessDesignToMachineDesignMapping`, all `ProcessorCores` referenced in the role `shallRunOn` or `shallNotRunOn` shall be aggregated by the same `Processor`.]

If a model defines that a given `ProcessDesign` shall run on a select set of `ProcessorCores` then there is hardly a use case to (in addition) also specify the opposite, i.e. that the `ProcessDesign` shall not run on another set of `ProcessorCores`, and vice versa.

In other words, either there is a motivation to identify the `ProcessorCores` on which a `ProcessDesign` is supposed to run or there is a motivation to do the exact opposite and specify the `ProcessorCores` where the `Process` is not supposed to run.

This conclusion provides the motivation for the existence of `[constr_10662]`.

[constr_10662] Mutual exclusive existence of references `shallRunOn` and `shallNotRunOn`

Imposition time: `IT_SysDes`

[For any given `ProcessDesignToMachineDesignMapping`, either the reference in the role `shallRunOn` or the reference in the role `shallNotRunOn` may exist.]

6.3 Functional Cluster Design

This chapter defines configuration aspects for Functional Clusters on the design level.

Class	<code>AbstractFunctionalClusterDesign</code> (abstract)			
Note	The concrete subclasses of this meta-class are defining configuration settings for Functional Clusters on the machine design level. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Subclasses	<code>DoIpFunctionalClusterDesign</code>			
Aggregated by	<code>MachineDesign.functionalClusterDesign</code>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 6.3: `AbstractFunctionalClusterDesign`

6.3.1 DoIp Functional Cluster Design

[TPS_MANI_03326] MachineDesign-specific configuration settings for DoIP [The meta-class `DoIpFunctionalClusterDesign` allows to configure the DoIp Functional Cluster on the `MachineDesign` level.]

Please note that for methodological reasons many DoIp attributes are defined on the design level in the `DoIpFunctionalClusterDesign` and `DoIpNetworkConfigurationDesign` elements and, at the same time, in the target configuration model as well (in the `DoIpInstantiation` and `DoIpNetworkConfiguration` elements).

This allows a flexible development of the configuration of the `Machine` where settings may be chosen early in the development (Design phase) or later during the integration

(deployment phase). The configuration settings in the design need to be respected in the Deployment.

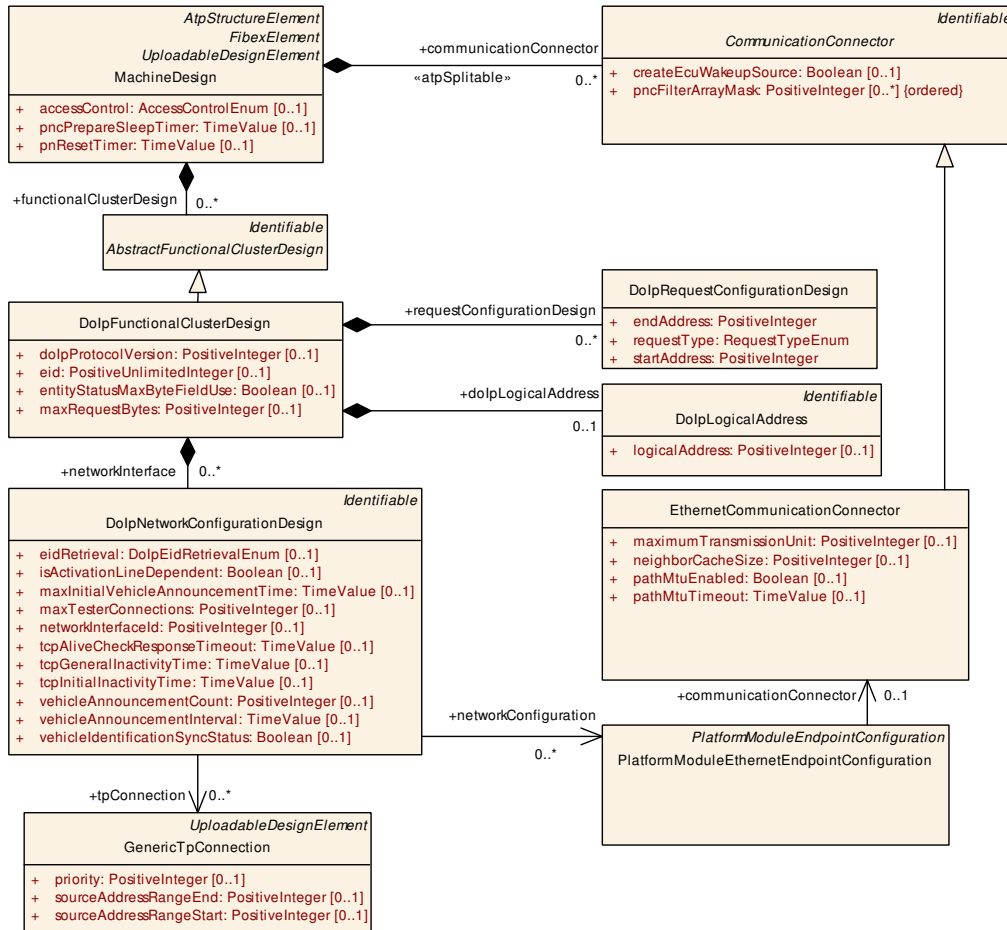


Figure 6.2: DoIP FunctionalCluster Design

Please note that the target configuration of [DoIpInstantiation](#) is described in [Chapter 12.5](#).

[TPS_MANI_03327] Network Interface configuration for DoIP [The [DoIpNetworkConfigurationDesign](#) contains all configuration settings that are specific for a configured network connection. The network connection is configured with the [PlatformModuleEthernetEndpointConfiguration](#) that is referenced by the [DoIpNetworkConfigurationDesign](#) in the role [networkConfiguration](#).

The [tcpPort](#) and [udpPort](#) references to the [ApApplicationEndpoint](#) are used to configure the Transport Protocol (Udp or Tcp) and the used Port number. The IP Address is configured in the [NetworkEndpoint](#) that is referenced by the [PlatformModuleEthernetEndpointConfiguration](#) via the [EthernetCommunicationConnector](#).]

Class	DolpFunctionalClusterDesign			
Note	This meta-class defines the attributes for the DoIP configuration settings in the MachineDesign. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractFunctionalClusterDesign , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	MachineDesign.functionalClusterDesign			
Attribute	Type	Mult.	Kind	Note
dolpLogicalAddress	DolpLogicalAddress	0..1	aggr	This aggregation contains information about the DoIP logical address.
dolpProtocolVersion	PositiveInteger	0..1	attr	Configures the DoIP protocol version used in the generic DoIP header. The valid range of this parameter is defined by the always latest release of ISO 13400-2 and can be extended with every new release of the ISO document. As example a value of 0x03 defines the ISO 13400-2:2019 release.
eid	PositiveUnlimitedInteger	0..1	attr	Configured EID (Entity ID) used for VehicleIdentification Request.
entityStatusMaxByteFieldUse	Boolean	0..1	attr	This attribute is used to distinguish the optional support of the Max data size element of a diagnostic entity status response.
maxRequestBytes	PositiveInteger	0..1	attr	Specifies the maximum allowed bytes of a DoIP message request without the DoIP header.
networkInterface	DolpNetworkConfigurationDesign	*	aggr	This element collects DoIP properties that are network interface specific.
requestConfigurationDesign	DolpRequestConfigurationDesign	*	aggr	Request configuration that is used to determine whether an incoming DiagnosticMessage request needs to be interpreted as PHYSICAL or FUNCTIONAL. Any request with target address not within the configured target address range will be rejected.

Table 6.4: DolpFunctionalClusterDesign

[constr_10611] Existence of attribute [DoIpLogicalAddress.logicalAddress](#)

Imposition time: [IT_SysDes](#)

[For each [DoIpLogicalAddress](#), attribute [logicalAddress](#) shall exist.]

Class	DolpNetworkConfigurationDesign			
Note	This element collects DoIP properties that are network interface specific. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DolpFunctionalClusterDesign.networkInterface			
Attribute	Type	Mult.	Kind	Note
eidRetrieval	DolpEidRetrievalEnum	0..1	attr	This attribute defines how Dolp Entity Identification is retrieved.
isActivationLineDependent	Boolean	0..1	attr	This attribute defines whether the network interface • is started "on-demand" when an activation line is sensed or • is always available.
maxInitialVehicleAnnouncementTime	TimeValue	0..1	attr	Upper bound for the time to wait in [s] for sending first vehicle announcement message after IP address assignment. Represents parameter A_DoIP_Announce_Wait of ISO 13400-2:2019. The value of this timing shall be determined randomly in the closed interval [0..maxInitialVehicleAnnouncementTime].





Class	DoIpNetworkConfigurationDesign			
maxTesterConnections	PositiveInteger	0..1	attr	Maximum amount of tester connections that shall be maintained at one time before alive check is performed.
networkConfiguration	PlatformModuleEthernetEndpointConfiguration	*	ref	Network configuration (Protocol, Port, IP Address) for transmission of DoIP messages on a specific VLAN.
networkInterfaceId	PositiveInteger	0..1	attr	This attribute defines the identifier for the DoIPInterface.
tcpAliveCheckResponseTimeout	TimeValue	0..1	attr	Timeout in [s] for waiting for a response to an Alive Check request before the connection is considered to be disconnected. Represents parameter T_TCP_AliveCheck of ISO 13400-2:2019.
tcpGeneralInactivityTime	TimeValue	0..1	attr	Timeout in [s] for maximum inactivity of a TCP socket connection before the DoIP module will close the according socket connection. Represents parameter T_TCP_General_Inactivity of ISO 13400-2:2019.
tcpInitialInactivityTime	TimeValue	0..1	attr	Timeout in [s] used for initial inactivity of a connected TCP socket connection directly after socket connection. Represents parameter T_TCP_Initial_Inactivity of ISO 13400-2:2019.
tpConnection	GenericTpConnection	*	ref	Reference to a TpConnection that identifies the receiver(s) of a particular communication
vehicleAnnouncementCount	PositiveInteger	0..1	attr	Number of vehicle announcement messages on IP address assignment. Represents parameter A_DoIP_Announce_Num of ISO 13400-2:2019.
vehicleAnnouncementInterval	TimeValue	0..1	attr	Time to wait in [s] for sending subsequent vehicle announcement messages. Represents parameter A_DoIP_Announce_Interval of ISO 13400-2:2019.
vehicleIdentificationSyncStatus	Boolean	0..1	attr	Defines if the optional VIN/GID synchronization status is used additionally in the vehicle identification/announcement.

Table 6.5: DoIpNetworkConfigurationDesign

[constr_9323] Restriction of [DoIpFunctionalClusterDesign](#) on a [MachineDesign](#)*Imposition time:* IT_SysDes

[Each [MachineDesign](#) shall aggregate at most one [DoIpFunctionalClusterDesign](#) in the role [functionalClusterDesign](#).]

[constr_9324] Allowed [PlatformModuleEthernetEndpointConfiguration](#).[communicationConnector](#) references*Imposition time:* IT_SysDes

[The [PlatformModuleEthernetEndpointConfiguration](#) that is referenced by a [DoIpNetworkConfigurationDesign](#) shall only reference [EthernetCommunicationConnectors](#) that are aggregated by the [MachineDesign](#) that is also aggregating the [DoIpNetworkConfigurationDesign](#) via the [DoIpFunctionalClusterDesign](#).]

[constr_9325] DoIpFunctionalClusterDesign.doIpLogicalAddress.logicalAddress shall be within the physical address boundaries defined by **DoIpRequestConfiguration**

Imposition time: IT_SysDes

[The value of `DoIpFunctionalClusterDesign.doIpLogicalAddress.logicalAddress` shall be within the physical address boundaries defined by `DoIpRequestConfiguration` that is aggregated by the `DoIpFunctionalClusterDesign` in the role `requestConfigurationDesign`.]

[constr_9344] Supported value range for attribute DoIpFunctionalClusterDesign.doIpProtocolVersion

Imposition time: IT_SysDes

[The supported value range of attribute `DoIpFunctionalClusterDesign.doIpProtocolVersion` is limited to the interval [2..4].]

[constr_10186] Multiplicity of attribute DoIpFunctionalClusterDesign.entityStatusMaxByteFieldUse

Imposition time: IT_SysDes

[For each `DoIpFunctionalClusterDesign`, the attribute `entityStatusMaxByteFieldUse` shall exist.]

[constr_10189] Multiplicity of attribute DoIpFunctionalClusterDesign.maxRequestBytes

Imposition time: IT_SysDes

[For each `DoIpFunctionalClusterDesign`, the attribute `maxRequestBytes` shall exist.]

[constr_3495] Supported value range for attribute DoIpFunctionalClusterDesign.eid

Imposition time: IT_SysDes

[The supported value range of attribute `DoIpFunctionalClusterDesign.eid` is limited to the interval [0..281474976710655].]

[constr_3497] Supported value range for attribute DoIpFunctionalClusterDesign.maxRequestBytes

Imposition time: IT_SysDes

[The supported value range of attribute `DoIpFunctionalClusterDesign.maxRequestBytes` is limited to the interval [0..4294967295].]

[constr_9356] Upper multiplicity of reference in the role `DoIpNetworkConfigurationDesign.networkConfiguration`

Imposition time: `IT_SysDes`

[In the context of `DoIpNetworkConfigurationDesign`, the reference in the role `networkConfiguration` shall exist at most once.]

[TPS_MANI_03333] Semantics of `DoIpNetworkConfigurationDesign.tpConnection` [The purpose of `DoIpNetworkConfigurationDesign.tpConnection` is to define a DoIP communication connection between the DoIP entity that is defined by the `DoIpFunctionalClusterDesign.doIpLogicalAddress` and between one or several testers that are defined by the source address range (defined by `sourceAddressRangeStart` and `sourceAddressRangeEnd`).]

Class	DolpRequestConfigurationDesign			
Note	This meta-class specifies a range of target addresses and its interpretation as either physical or functional request. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code>			
Aggregated by	<code>DolpFunctionalClusterDesign.requestConfigurationDesign</code>			
Attribute	Type	Mult.	Kind	Note
endAddress	PositiveInteger	1	attr	End address for range of target-addresses (including this address).
requestType	RequestTypeEnum	1	attr	Determines the type of request.
startAddress	PositiveInteger	1	attr	Start address for range of target-addresses (including this address).

Table 6.6: DolpRequestConfigurationDesign

Class	GenericTpConnection			
Note	A TpConnection that defines a communication between the logical target address of the DoIP Entity and the source address range. Tags: <code>atp.recommendedPackage=GenericTpConnections</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code> , <code>UploadableDesignElement</code> , <code>UploadablePackageElement</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
priority	PositiveInteger	0..1	attr	This attribute defines the priority for a particular communication connection. For more details see the SWS Diagnostics specification.
sourceAddressRangeEnd	PositiveInteger	0..1	attr	The DoIP source address defines the logical address of the tester that starts the communication. The GenericTp Connection is able to define a source address range (without gaps) with the two attributes <code>sourceAddressRangeStart</code> and <code>sourceAddressRangeEnd</code> . This attribute defines the end of the range.





Class	GenericTpConnection			
sourceAddressRangeStart	PositiveInteger	0..1	attr	The DoIP source address defines the logical address of the tester that starts the communication. The GenericTpConnection is able to define a source address range (without gaps) with the two attributes sourceAddressRangeStart and sourceAddressRangeEnd. This attribute defines the start of the range.

Table 6.7: GenericTpConnection

[constr_9334] Supported value range for attribute [GenericTpConnection.sourceAddressRangeStart](#)

Imposition time: [IT_Mani](#)

[The supported value range of attribute [GenericTpConnection.sourceAddressRangeStart](#) is limited to the interval 0..65535.]

[constr_9335] Supported value range for attribute [GenericTpConnection.sourceAddressRangeEnd](#)

Imposition time: [IT_Mani](#)

[The supported value range of attribute [GenericTpConnection.sourceAddressRangeEnd](#) is limited to the interval 0..65535.]

[constr_9338] [GenericTpConnection.sourceAddressRangeStart](#) shall be less or equal of [GenericTpConnection.sourceAddressRangeEnd](#)

Imposition time: [IT_Mani](#)

[The value of [GenericTpConnection.sourceAddressRangeStart](#) shall be less or equal the value of [GenericTpConnection.sourceAddressRangeEnd](#).]

[constr_9336] [DoIpNetworkConfigurationDesign](#) shall reference a [GenericTpConnection](#)

Imposition time: [IT_SysDes](#)

[Each [DoIpNetworkConfigurationDesign](#) element shall reference at least one [GenericTpConnection](#) in the role [tpConnection](#).]

[constr_9337] Same [priority](#) for overlapping address ranges in the context of the same [MachineDesign](#)

Imposition time: [IT_SysDes](#)

[All [GenericTpConnections](#) referenced in the scope of the same [MachineDesign](#) that have an overlapping range defined by [sourceAddressRangeStart](#) and [sourceAddressRangeEnd](#) shall also define the identical values of attribute [priority](#).]

6.4 Network Design aspects of Machine Design

The basic definition of the connectivity of a [MachineDesign](#) is created by aggregating the abstract base-class [CommunicationConnector](#) in the role [communication-Connector](#). The specific subclass of [CommunicationConnector](#) that is used in this context is the [EthernetCommunicationConnector](#).

The [EthernetCommunicationConnector](#) is used to connect the [MachineDesign](#) with a [VLAN](#) that is represented in AUTOSAR by a [EthernetPhysicalChannel](#) that is part of an [EthernetCluster](#). Please find more information about the details of [EthernetCluster](#) in [Chapter 7.2.1](#).

Class	MachineDesign			
Note	This meta-class represents the ability to define requirements on a Machine in the context of designing a system. Tags: atp.recommendedPackage=MachineDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpClassifier , AtpFeature , AtpStructureElement , CollectableElement , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element , AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
accessControl	AccessControlEnum	0..1	attr	This attribute defines how the access restriction to the Service Instance is defined.
communicationConnector	CommunicationConnector	*	aggr	This aggregation defines the network connection of the machine. Stereotypes: atpSplitable Tags: atp.Splitkey=communicationConnector.shortName
communicationController	CommunicationController	*	aggr	CommunicationControllers of the Machine that are used for description of 10-Base-T1S topologies Stereotypes: atpSplitable Tags: atp.Splitkey=communicationController.shortName
cryptoKeySlot	CryptoKeySlotDesign	*	aggr	This aggregation represents the key slots for which a key slot design is created in the context of the enclosing machine design. Stereotypes: atpSplitable Tags: atp.Splitkey=cryptoKeySlot.shortName
ethlpProps	EthlpProps	*	ref	Machine specific IP attributes.
functionalClusterDesign	AbstractFunctionalClusterDesign	*	aggr	Configuration settings for Functional Clusters on the machine design level.
pncPrepareSleepTimer	TimeValue	0..1	attr	Time in seconds the PNC state machine shall wait in PNC_PREPARE_SLEEP.
pnResetTimer	TimeValue	0..1	attr	Specifies the runtime of the reset timer in seconds. This reset time is valid for the reset of PN requests.
processor	Processor	*	aggr	This represents the collection of processors owned by the enclosing MachineDesign.
serviceDiscoveryConfig	ServiceDiscoveryConfiguration	*	aggr	Set of service discovery configuration settings that are defined on the machine for individual Communication Connectors. Stereotypes: atpSplitable Tags: atp.Splitkey=serviceDiscoveryConfig
tcplplcmpProps	EthTcplplcmpProps	*	ref	Machine specific ICMP (Internet Control Message Protocol) attributes
tcplpProps	EthTcplpProps	*	ref	Machine specific Tcplp Stack attributes.

Table 6.8: MachineDesign

Class	«atpVariation» CommunicationController (abstract)			
Note	The communication controller is a dedicated hardware device by means of which hosts are sending frames to and receiving frames from the communication medium. Tags: vh.latestBindingTime=postBuild			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	AbstractCanCommunicationController, EthernetCommunicationController , FlexrayCommunicationController, UserDefinedCommunicationController			
Aggregated by	EcuInstance.commController , MachineDesign.communicationController			
Attribute	Type	Mult.	Kind	Note
wakeUpByControllerSupported	Boolean	0..1	attr	Defines whether the ECU shall be woken up by this CommunicationController. TRUE: wake up is possible FALSE: wake up is not supported Note: If wakeUpByControllerSupported is set to TRUE the feature shall be supported by both hardware and basic software.

Table 6.9: CommunicationController

[constr_3723] Upper multiplicity of reference in the role [MachineDesign.tcpIpProps](#)

Imposition time: [IT_SysDes](#)

[In the context of [MachineDesign](#), the reference in the role [tcpIpProps](#) shall exist at most once.]

[constr_3724] Upper multiplicity of reference in the role [MachineDesign.tcpIpIcmpProps](#)

Imposition time: [IT_SysDes](#)

[In the context of [MachineDesign](#), the reference in the role [tcpIpIcmpProps](#) shall exist at most once.]

[constr_3725] Upper multiplicity of reference in the role [MachineDesign.ethIpProps](#)

Imposition time: [IT_SysDes](#)

[In the context of [MachineDesign](#), the reference in the role [ethIpProps](#) shall exist at most once.]

Class	PhysicalChannel (abstract)			
Note	This element represents a physical connection (in case of CAN, FlexRay, LIN) or a logical connection (VLAN in case of Ethernet) between communicating devices.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	AbstractCanPhysicalChannel, EthernetPhysicalChannel , FlexrayPhysicalChannel, UserDefinedPhysicalChannel			
Aggregated by	CommunicationCluster.physicalChannel			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 6.10: PhysicalChannel

Class	«atpVariation» EthernetCluster			
Note	Ethernet-specific cluster attributes. Tags: atp.recommendedPackage=CommunicationClusters			
Base	ARElement , ARObject , CollectableElement , CommunicationCluster , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
couplingPort Connection	CouplingPort Connection	*	aggr	Specification of connections between CouplingElements and EcuInstances. Note: This atpSplittable property has no atp.Splitkey due to atpVariation (PropertySetPattern). Stereotypes: atpSplittable; atpVariation Tags: vh.latestBindingTime=postBuild
couplingPort StartupActive Time	TimeValue	0..1	attr	The attribute specifies the time in second a coupling port is switched on to enable the host ECU (ECU that maintains an Ethernet switch) to listen to the network for potential network management requests.
couplingPort SwitchoffDelay	TimeValue	0..1	attr	Switch off delay for CouplingPorts in seconds. It denotes the delay of switching off couplingPorts after the request to switch off a couplingPort was issued. (e.g. switch off of Ethernet switch ports).
macMulticast Group	MacMulticastGroup	*	aggr	MacMulticastGroup that is defined for the Subnet (EthernetCluster).

Table 6.11: EthernetCluster

Class	MacMulticastGroup			
Note	Per EthernetCluster globally defined MacMulticastGroup. One sender can handle many receivers simultaneously if the receivers have all the same macMulticastAddress. The addresses need to be unique for the particular EthernetCluster.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	EthernetCluster.macMulticastGroup			
Attribute	Type	Mult.	Kind	Note
macMulticast Address	MacAddressString	0..1	attr	A multicast MAC address (Media Access Control address) is a identifier for a group of hosts in a network.

Table 6.12: MacMulticastGroup

[TPS_MANI_03209] The meaning of [MachineDesign.accessControl](#)

Status: DRAFT

[The [MachineDesign.accessControl](#) defines whether the access control is defined by AUTOSAR means in the Application Design with [receiverIntent](#) (see [TPS_MANI_01106]) and [senderIntent](#) (see [TPS_MANI_01107]) or by a custom lists that are created by a non-AUTOSAR process.]

Enumeration	AccessControlEnum
Note	This enumeration describes the options for the definition of access restriction to resources. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	MachineDesign.accessControl
Literal	Description





Enumeration	AccessControlEnum
custom	The access restriction to the resource is defined by a non-AUTOSAR process. Tags: atp.EnumerationLiteralIndex=1
modeled	The access restriction to the resource is modeled in the AUTOSAR Application Design model or the AUTOSAR target-configuration model. Tags: atp.EnumerationLiteralIndex=0

Table 6.13: AccessControlEnum

[constr_3320] Aggregation of CommunicationConnector by MachineDesign*Imposition time:* IT_MachDes

[Meta-Class MachineDesign shall only aggregate EthernetCommunicationConnectors in the role communicationConnector. No other subclass of CommunicationConnector shall appear in this aggregation.]

[constr_5324] MachineDesign.communicationController aggregation restriction*Imposition time:* IT_MachDes

[MachineDesign is only allowed to aggregate an EthernetCommunicationController in the role communicationController.]

6.5 Service Discovery Configuration

Service Discovery messages are exchanged between network nodes to announce and to discover available service instances. This chapter describes the configuration that is necessary to exchange service discovery messages for supported middleware transport layers.

Class	ServiceDiscoveryConfiguration (abstract)			
Note	Service Discovery configuration settings for the middleware transport layer. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Subclasses	SomeipServiceDiscovery			
Aggregated by	MachineDesign.serviceDiscoveryConfig			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 6.14: ServiceDiscoveryConfiguration

6.5.1 SOME/IP Service Discovery Configuration

[TPS_MANI_03064] SOME/IP Service Discovery message exchange configuration [ProvidedServiceInstances are announced in SOME/IP by the server

with multicast addressing on a [VLAN](#) to a specifically designated IP multicast address ([SomeipServiceDiscovery.multicastSdIpAddress](#)) at a specific UDP port number ([SomeipServiceDiscovery.someipServiceDiscoveryPort](#)).]

[constr_5045] Only one [SomeipServiceDiscovery](#) configuration per VLAN is allowed

Imposition time: IT_SysDes

[Only a single [NetworkEndpoint](#) on an [EthernetPhysicalChannel](#) (VLAN) is allowed to be referenced by a [SomeipServiceDiscovery](#) element in the role [multicastSdIpAddress](#).]

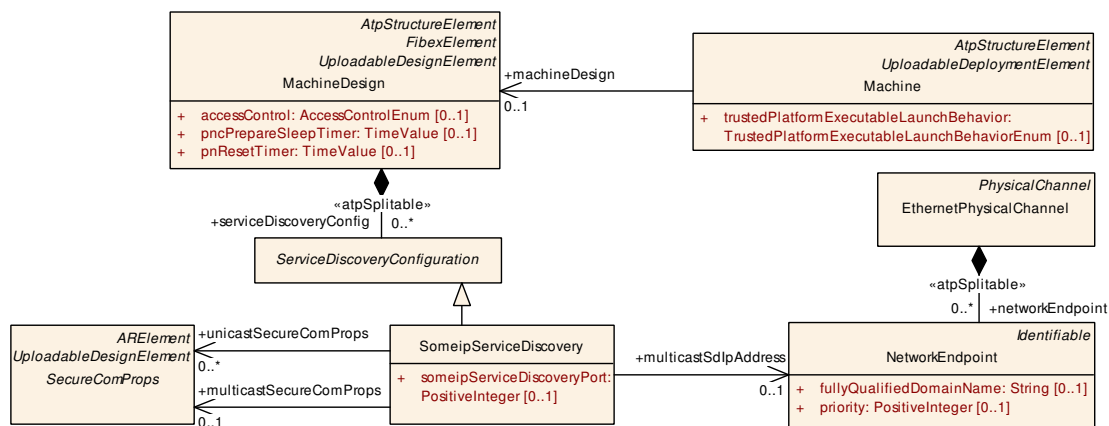


Figure 6.3: SOME/IP Service Discovery Configuration

The [SomeipServiceDiscovery](#) is able to reference [SecureComProps](#) to define and to configure a security protocol that will provide communication security for Service Discovery messages.

For Service Discovery messages that will be transmitted to a designated multicast IP address the protection is defined by the [SecureComProps](#) that is referenced in the role [multicastSecureComProps](#). For unicast Service Discovery messages different credentials may be used for the different ECU pairs.

Therefore, a list of [SecureComProps](#) is aggregated in the role [unicastSecureComProps](#).

Class	SomeipServiceDiscovery			
Note	This meta-class represents a specialization of the generic service discovery for the SOME/IP case. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, ServiceDiscoveryConfiguration			
Aggregated by	MachineDesign.serviceDiscoveryConfig			
Attribute	Type	Mult.	Kind	Note
multicastSdIp Address	NetworkEndpoint	0..1	ref	This reference identifies the multicast IP address used for service discovery.





Class	SomeipServiceDiscovery			
multicastSecureComProps	SecureComProps	0..1	ref	Reference to a communication security protocol and its configuration settings that will provide communication security for Service Discovery messages that are transmitted using multicast, e.g. FindService message.
someipServiceDiscoveryPort	PositiveInteger	0..1	attr	This attribute represents the port number reserved for service discovery.
unicastSecureComProps	SecureComProps	*	ref	Reference to a communication security protocol and its configuration settings that will provide communication security for Service Discovery messages that are transmitted using unicast, e.g. OfferService as answer to a FindService message.

Table 6.15: SomeipServiceDiscovery

[constr_10167] Multiplicity of attribute `SomeipServiceDiscovery.someipServiceDiscoveryPort`

Imposition time: IT_SysDes

[For each `SomeipServiceDiscovery`, the attribute `someipServiceDiscoveryPort` shall exist.]

6.6 Tcplp stack configuration properties

The `MachineDesign` references the following elements and allows to set Machine specific Tcplp stack configuration options in the System Design:

- `EthIpProps` - used to configure IPv4 and IPv6
- `EthTcpIpProps` - used to configure TCP and UDP
- `EthTcpIpIcmpProps` - used to configure ICMP

Please note that the [4, TPS System Template] defines constraints for the usage of `EthIpProps`, `EthTcpIpProps`, `EthTcpIpIcmpProps`. These constraints are also valid if the `MachineDesign` references these elements.

7 System Design

7.1 Overview

A typical vehicle will most likely be equipped with `ECUs` developed on the AUTOSAR classic platform and `Machines` developed on the AUTOSAR adaptive platform. The system design for the entire vehicle has therefore to cover both platform target-configuration types.

AUTOSAR supports System design descriptions with the possibility to describe Software Components of both AUTOSAR Platforms that will be used in a System and even allows to indicate the service oriented communication between them if possible.

Especially when it comes to the description of the communication behavior of AUTOSAR classic and adaptive ECUs in a harmonized way, the notion of a System Design becomes a special focus point.

All the system design aspects have in common is that they have to cope with both AUTOSAR classic `ECUs` and adaptive `Machines`. The basic design aspects of such inter-disciplinary systems have to be already available in the AUTOSAR classic modeling approach otherwise they would not be available to both platforms.

Thus, it is straight forward to take the existing meta-class `System` as the starting point for the modeling of such mixed systems.

There are use cases to exchange parts of such a `SYSTEM_DESIGN_DESCRIPTION` in different methodology stages and between different development parties, therefore further system categories are supported by AUTOSAR.

[TPS_MANI_01274] Standardized System Category Definitions for the Adaptive Platform [

Category	Meaning
<code>SYSTEM_DESIGN_DESCRIPTION</code>	The <code>System</code> description that contains design artifacts that are relevant for the Adaptive Platform and Classic Platform.
<code>MACHINE_DESIGN_EXTRACT</code>	The <code>System</code> description that contains design artifacts that are relevant for a single Adaptive Platform <code>Machine</code> .

]

A common approach is for example that the `OEM` provides a basis for designing an ECU, which is later advanced by the supplier. Therefore Classic AUTOSAR supports `System` categories like `ECU_EXTRACT` or `ECU_SYSTEM_DESCRIPTION` that have only a single ECU in scope. Classic Platform `System.categories` are defined in [TPS_SYST_01003].

The AUTOSAR adaptive platform is using the same approach. If an `OEM` wants to provide design artifacts that are relevant for the configuration of a single `Machine`

all unnecessary information is stripped from the `System` with category `SYSTEM_DESIGN_DESCRIPTION` and a definition of the subsystem is provided.

[constr_3421] Fibex elements applicable for a `System` of category `MACHINE_DESIGN_EXTRACT`

Imposition time: `IT_SysDes`

[A `System` with the category `MACHINE_DESIGN_EXTRACT` is allowed to reference the following `fibexElements`:

- `CommunicationCluster`
- `MachineDesign`
- `GlobalTimeDomain`
- `NmConfig`

]

[constr_10652] `SystemMappings` applicable for a `System` of category `MACHINE_DESIGN_EXTRACT`

Imposition time: `IT_SysDes`

[A `System` with the category `MACHINE_DESIGN_EXTRACT` is only allowed to aggregate a `SystemMapping` in the role `mapping` that in turn only aggregates one or more `PncMappings` in the role `pncMapping`.

The aggregation of **anything beside** `PncMapping` shall be ignored.]

Class	System			
Note	The top level element of the System Description. Tags: <code>atp.recommendedPackage=Systems</code>			
Base	ARElement , ARObject , AtpClassifier , AtpFeature , AtpStructureElement , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element , AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
<code>fibexElement</code>	<code>FibexElement</code>	*	ref	Reference to ASAM FIBEX elements specifying Communication and Topology. All Fibex Elements used within a System Description shall be referenced from the System Element. <code>atpVariation</code> : In order to describe a product-line, all Fibex Elements can be optional. Stereotypes: <code>atpSplitable</code> ; <code>atpVariation</code> Tags: <code>atp.Splitkey=fibexElement.fibexElement</code> , <code>fibexElement.variationPoint.shortLabel</code> <code>vh.latestBindingTime=postBuild</code>





Class	System			
mapping	SystemMapping	*	aggr	Aggregation of all mapping aspects relevant in the System Description. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=mapping.shortName, mapping.variation Point.shortLabel vh.latestBindingTime=postBuild
pncVectorLength	PositiveInteger	0..1	attr	Length of the partial networking request release information vector (in bytes).
pncVectorOffset	PositiveInteger	0..1	attr	Absolute offset (with respect to the NM-PDU) of the partial networking request release information vector that is defined in bytes as an index starting with 0.
systemComSpecDefinition	SystemComSpecDefinitionSet	*	ref	Reference to the set of ComSpec definitions that are used for inter-ECU communication in the System.
systemVersion	RevisionLabelString	0..1	attr	Version number of the System Description.

Table 7.1: System

7.2 Specification of Communication System Structure

When the communication interaction is designed for a vehicle system the focus is put on the network and the connected ECUs. Whether a specific ECU connected to the network is implemented using AUTOSAR classic or AUTOSAR adaptive does not influence the major communication design.

But of course, it is essential from a car manufacturer point of view whether a specific ECU will be implemented using AUTOSAR classic or adaptive. Thus, already on system design level there is a need to specify the AUTOSAR Platform kind which shall be used to implement an ECU.

On the *AUTOSAR classic platform*, the element [EcuInstance](#) is used to define one ECU in the system design.

On the *AUTOSAR adaptive platform*, the element [MachineDesign](#) is an entity which represents a specific ECU design with dedicated configurations for e.g. [Processors](#), [ProcessorCoreS](#).

Please note that meta-class [Machine](#) represents a model entity which is not in the focus of communication designers and should not be used during system design.

In response to this restriction, meta-class [MachineDesign](#) has been introduced, see [Chapter 6](#).

7.2.1 Network connection

The canonical way to specify an IP address is the modeling of a [NetworkEndpoint](#), referenced from an [EthernetCommunicationConnector](#) that is aggregated by [MachineDesign](#) in the role [communicationConnector](#).

In addition to the IP address, the [NetworkEndpoint](#) may have a *Fully Qualified Domain Name* and a priority.

[constr_3798] Applicable attributes for an Ethernet node on the adaptive platform

Imposition time: [IT_SysDes](#)

[If a [CouplingPort](#) is aggregated by an [EthernetCommunicationController](#) and that [EthernetCommunicationController](#) is in turn aggregated by a [MachineDesign](#), then the attributes defined in the column "Endpoint" of [TPS_SYST_02422] are applicable.]

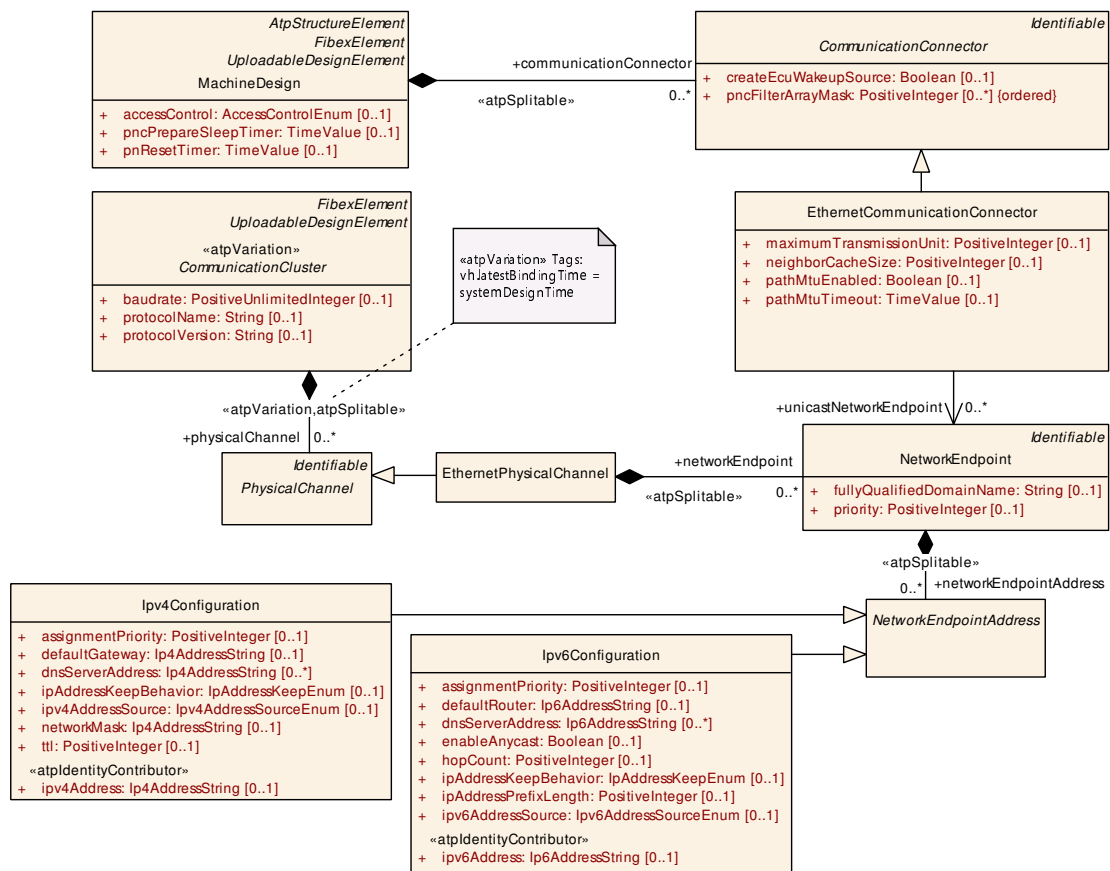


Figure 7.1: Network connection of a MachineDesign

Class	NetworkEndpoint			
Note	The network endpoint defines the network addressing (e.g. IP-Address or MAC multicast address).			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	EthernetPhysicalChannel.networkEndpoint			
Attribute	Type	Mult.	Kind	Note
fullyQualifiedDomainName	String	0..1	attr	Defines the fully qualified domain name (FQDN) e.g. some.example.host.
ipSecConfig	IPSecConfig	0..1	aggr	Optional IPSec configuration that provides security services for IP packets.





Class	NetworkEndpoint			
network Endpoint Address	NetworkEndpoint Address	*	aggr	Definition of a Network Address. Stereotypes: atpSplittable Tags: atp.Splitkey=networkEndpointAddress.ipv4Address, networkEndpointAddress.ipv6Address, networkEndpoint Address.macMulticastGroup xml.namePlural=NETWORK-ENDPOINT-ADDRESSES
priority	PositiveInteger	0..1	attr	Defines the frame priority where values from 0 (best effort) to 7 (highest) are allowed.

Table 7.2: NetworkEndpoint

More precisely, the particular IP address is configured by means of the aggregation of [Ipv4Configuration](#) or [Ipv6Configuration](#) in the role [networkEndpointAd-
dress](#).

The [NetworkEndpoint](#) is aggregated by the [EthernetPhysicalChannel](#) that in turn is aggregated by the [EthernetCluster](#).

[TPS_MANI_03052] Static IPv4 configuration [If the value of attribute [ipv4AddressSource](#) of meta-class [Ipv4Configuration](#) is set to [Ipv4AddressSourceEnum.fixed](#) then the [ipv4Address](#) defines the static IPv4 Address.]

Class	Ipv4Configuration			
Note	Internet Protocol version 4 (IPv4) configuration.			
Base	ARObject , NetworkEndpointAddress			
Aggregated by	NetworkEndpoint.networkEndpointAddress			
Attribute	Type	Mult.	Kind	Note
assignment Priority	PositiveInteger	0..1	attr	Priority of assignment (1 is highest). If a new address from an assignment method with a higher priority is available, it overwrites the IP address previously assigned by an assignment method with a lower priority.
defaultGateway	Ip4AddressString	0..1	attr	IP address of the default gateway.
dnsServer Address	Ip4AddressString	*	attr	IP addresses of preconfigured DNS servers. Tags: xml.namePlural=DNS-SERVER-ADDRESSES
ipAddressKeep Behavior	IpAddressKeepEnum	0..1	attr	Defines the lifetime of a dynamically fetched IP address.
ipv4Address	Ip4AddressString	0..1	attr	IPv4 Address. Notation: 255.255.255.255. The IP Address shall be declared in case the ipv4AddressSource is FIXED and thus no auto-configuration mechanism is used. Stereotypes: atpIdentityContributor
ipv4Address Source	Ipv4AddressSource Enum	0..1	attr	Defines how the node obtains its IP address.
networkMask	Ip4AddressString	0..1	attr	Network mask. Notation 255.255.255.255
ttl	PositiveInteger	0..1	attr	Lifespan of data (0..255). The purpose of the TimeToLive field is to avoid a situation in which an undeliverable datagram keeps circulating on a system.

Table 7.3: Ipv4Configuration

Primitive	Ip4AddressString
Note	This is used to specify an IP4 address. Notation: 255.255.255.255 Tags: xml.xsd.customType=IP4-ADDRESS-STRING xml.xsd.pattern=(25[0-5] 2[0-4][0-9] [01]?[0-9][0-9]?)\.(25[0-5] 2[0-4][0-9] [01]?[0-9][0-9]?)\.(25[0-5] 2[0-4][0-9] [01]?[0-9][0-9]?)\.(25[0-5] 2[0-4][0-9] [01]?[0-9][0-9]?) ANY xml.xsd.type=string

Table 7.4: Ip4AddressString

Enumeration	Ipv4AddressSourceEnum
Note	Defines how the node obtains its IPv4-Address.
Aggregated by	Ipv4Configuration.ipv4AddressSource
Literal	Description
autolp	AutoIP is used to dynamically assign IP addresses at device startup. Tags: atp.EnumerationLiteralIndex=0
autolp_doip	Linklocal IPv4 Address Assignment using DoIP Parameters Tags: atp.EnumerationLiteralIndex=2 xml.name=AUTO-IP--DOIP
dhcpv4	DHCP is a service for the automatic IP configuration of a client. Tags: atp.EnumerationLiteralIndex=3
fixed	The IP Address shall be declared manually. Tags: atp.EnumerationLiteralIndex=4

Table 7.5: Ipv4AddressSourceEnum

[TPS_MANI_03053] Static IPv6 configuration [If the value of attribute [ipv6AddressSource](#) of meta-class [Ipv6Configuration](#) is set to [Ipv6AddressSourceEnum.fixed](#) then the [ipv6Address](#) defines the static IPv6 Address.]

Class	Ipv6Configuration			
Note	Internet Protocol version 6 (IPv6) configuration.			
Base	ARObject , NetworkEndpointAddress			
Aggregated by	NetworkEndpoint.networkEndpointAddress			
Attribute	Type	Mult.	Kind	Note
assignment Priority	PositiveInteger	0..1	attr	Priority of assignment (1 is highest). If a new address from an assignment method with a higher priority is available, it overwrites the IP address previously assigned by an assignment method with a lower priority.
defaultRouter	Ip6AddressString	0..1	attr	IP address of the default router.
dnsServer Address	Ip6AddressString	*	attr	IP addresses of pre configured DNS servers. Tags: xml.namePlural=DNS-SERVER-ADDRESSES
enableAnycast	Boolean	0..1	attr	This attribute is used to enable anycast addressing (i.e. to one of multiple receivers).
hopCount	PositiveInteger	0..1	attr	The distance between two hosts. The hop count n means that n gateways separate the source host from the destination host (Range 0..255)
ipAddressKeep Behavior	IpAddressKeepEnum	0..1	attr	Defines the lifetime of a dynamically fetched IP address.
ipAddressPrefix Length	PositiveInteger	0..1	attr	IPv6 prefix length defines the part of the IPv6 address that is the network prefix.





Class	Ipv6Configuration			
ipv6Address	Ip6AddressString	0..1	attr	IPv6 Address. Notation: FFFF:....:FFFF. The IP Address shall be declared in case the ipv6AddressSource is FIXED and thus no auto-configuration mechanism is used. Stereotypes: atpIdentityContributor
ipv6AddressSource	Ip6AddressSourceEnum	0..1	attr	Defines how the node obtains its IP address.

Table 7.6: Ipv6Configuration

Primitive	Ip6AddressString
Note	This is used to specify an IP6 address. Notation: FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF Alternative notations, short-cuts with duplicate colons like ::, etc. or mixtures using colons and dots, are not allowed. Tags: xml.xsd.customType=IP6-ADDRESS-STRING xml.xsd.pattern=[0-9A-Fa-f]{1,4}(:[0-9A-Fa-f]{1,4}){7,7} ANY xml.xsd.type=string

Table 7.7: Ip6AddressString

Enumeration	Ip6AddressSourceEnum
Note	Defines how the node obtains its IPv6-Address.
Aggregated by	Ipv6Configuration.ipv6AddressSource
Literal	Description
dhcpv6	DHCP is a service for the automatic IP configuration of a client. Tags: atp.EnumerationLiteralIndex=0
fixed	The IP Address shall be declared manually. Tags: atp.EnumerationLiteralIndex=1
linkLocal	LinkLocal is intended only for communications within the segment of a local network (a link) or a point-to-point connection that a host is connected to. Tags: atp.EnumerationLiteralIndex=2
linkLocal_doip	Linklocal IPv6 Address Assignment using DoIP Parameters Tags: atp.EnumerationLiteralIndex=3 xml.name=LINK-LOCAL--DOIP
router Advertisement	IPv6 Stateless Autoconfiguration. Tags: atp.EnumerationLiteralIndex=4

Table 7.8: Ip6AddressSourceEnum

Enumeration	IpAddressKeepEnum
Note	Defines the behavior after a dynamic IP address has been assigned.
Aggregated by	Ipv4Configuration.ipAddressKeepBehavior , Ipv6Configuration.ipAddressKeepBehavior
Literal	Description
forget	After a dynamic IP address has been assigned just use it for this session. Tags: atp.EnumerationLiteralIndex=0
storePersistently	After a dynamic IP address has been assigned store the address persistently. Tags: atp.EnumerationLiteralIndex=1

Table 7.9: IpAddressKeepEnum

Please note that there is also the possibility to describe a [MacMulticastConfiguration](#) as [NetworkEndpointAddress](#) in addition to [Ipv4Configuration](#) and [Ipv6Configuration](#) in a system topology description.

This may be useful for description of endpoints that are not based on IP, e.g. for streaming protocols like AVB (Audio Video Bridging). But please note that there is no foundation software or ara::com support for such [MacMulticastConfiguration NetworkEndpoints](#) on the *AUTOSAR adaptive platform*. For SOME/IP communication such [NetworkEndpoints](#) are excluded by [\[constr_3288\]](#).

7.2.1.1 Support of 10BASE-T1S Network Topologies

Please note that 10BASE-T1S network topology description is supported in the System Design with a [CouplingPortConnection](#) that points with the [nodePort](#) reference to [CouplingPorts](#) that represent the 10Base-T1S PHYs connected to the network.

More details about the modeling of 10BASE-T1S networks can be found in the [4, TPS System Template]. Since the same modeling approach is used in the Classic Platform and the Adaptive Platform the detailed description of the meta-model available in the System Template is not repeated in this specification.

7.2.1.2 Support of Ethernet tunneling through CAN XL

On AUTOSAR AP, CAN XL supports only the “mapped tunneling” of Ethernet frames through the physical CAN XL network (i.e. SDU Type 0x05h as specified by the *CiA* standardization of CAN XL). Configuration of this tunneling is done in a similar way as in CP by using the category [CAN_XL](#) for [EthernetCommunicationConnector](#).

[TPS_MANI_03668] Supported type of Ethernet tunneling through CAN XL on Adaptive Platform [On the Adaptive Platform, CAN XL only supports SDU Type 0x05h (Ethernet mapped tunneling). If an AP machine receives a CAN XL frame containing an SDU Type other than 0x05h, it shall discard this frame without processing its content.]

In other words, CAN XL frames containing (native or tunneled) Classical CAN, CAN FD or CAN XL payload cannot be meaningfully processed by an AP machine as it does not contain a CAN communication stack.

[TPS_MANI_03669] Ethernet tunneling through CAN XL [If an Ethernet connection of a [MachineDesign](#) shall be realized by Ethernet frames tunneled through a CAN XL network, the [EthernetCommunicationConnector](#) aggregated by the [MachineDesign](#) shall set the value of attribute [category](#) to [CAN_XL](#) and additionally have a reference in the role [canXlProps](#) to meta-class [CanXlProps](#) which contains the required CAN XL specific configuration parameters, i.e. [CanControllerXlConfiguration](#) and [CanControllerXlConfigurationRequirements](#).]

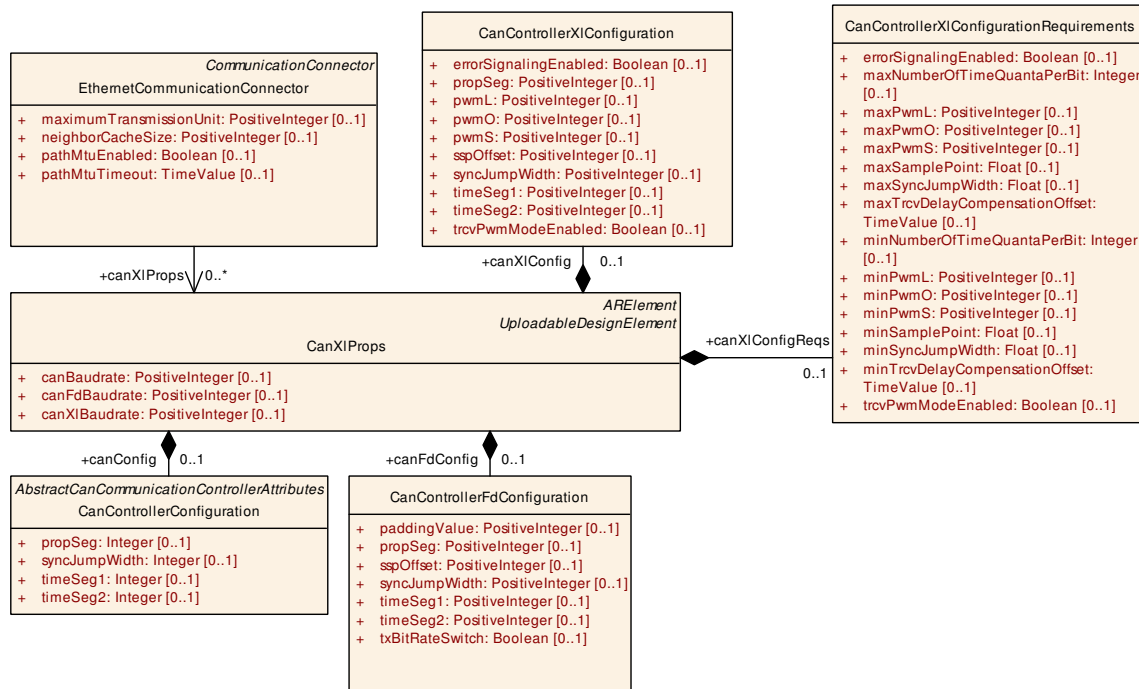


Figure 7.2: Modeling of CanXIProps

Class	CanXIProps			
Note	This meta-class is used to configure Machine specific CAN XL attributes. Tags: atp.recommendedPackage=CanXIProps This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
canBaudrate	PositiveInteger	0..1	attr	Specifies the data segment CAN 2.0 baud rate of the CAN XL controller in bits/s.
canConfig	CanController Configuration	0..1	aggr	CAN 2.0 configuration parameters for the CAN XL controller.
canFdBaudrate	PositiveInteger	0..1	attr	Specifies the data segment CAN FD baud rate of the CAN XL controller in bits/s.
canFdConfig	CanControllerFd Configuration	0..1	aggr	CAN FD configuration parameters for the CAN XL controller.
canXIBaudrate	PositiveInteger	0..1	attr	Specifies the data segment CAN XL baud rate of the CAN XL controller in bits/s.
canXIConfig	CanControllerXI Configuration	0..1	aggr	CAN XL configuration parameters for the CAN XL controller.
canXIConfig Reqs	CanControllerXI Configuration Requirements	0..1	aggr	CAN XL configuration parameter requirements for the CAN XL controller.

Table 7.10: CanXIProps

[constr_3693] EthernetCommunicationConnector.category is set to CAN_XL

Imposition time: IT_SysDes

[If a EthernetCommunicationConnector is aggregated by the MachineDesign where attribute category is set to CAN_XL, then a reference from the EthernetCommunicationConnector to a CanXlProps in the role canXlProps shall exist.]

[constr_3694] Existence of canXlConfig vs. canXlConfigReqs

Imposition time: IT_SysDes

[For each CanXlProps, one of

- canXlConfig or
- canXlConfigReqs

shall exist.]

7.2.1.3 IP configuration properties

This chapter introduces meta-classes and attributes that can be used to configure the TCP/IP Stack in the Adaptive Platform.

The Internet Protocol (IP) is the main protocol of the TCP/IP stack and is responsible for delivering datagrams from a source host identified by the source address to one or multiple destination hosts identified by the destination address.

AUTOSAR supports the configuration of

- Internet Protocol of version 4 with Ipv4Props. This includes the configuration of
 - ARP (Address Resolution Protocol) with Ipv4ArpProps
 - Auto IP with Ipv4AutoIpProps
 - Packet fragmentation and reassembly with Ipv4FragmentationProps
- Internet Protocol of version 6 with Ipv6Props. This includes the configuration of
 - NDP (Neighbor Discovery Protocol) with Ipv6NdpProps
 - DHCP (Dynamic Host Configuration Protocol) with Dhcpv6Props
 - Packet fragmentation and reassembly with Ipv6FragmentationProps

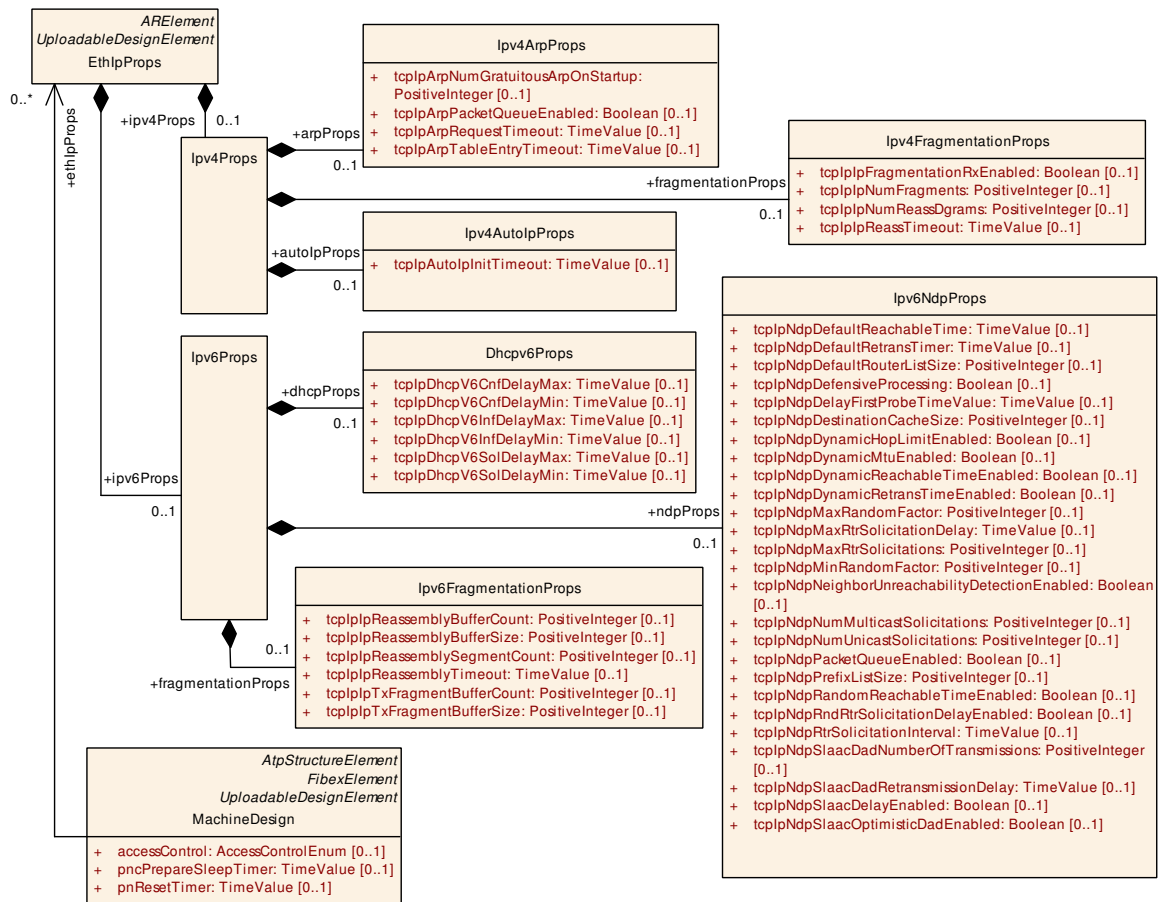


Figure 7.3: Machine specific IP configuration options

Please note that for the configuration of the Internet Protocol the same modeling approach is used as in the Classic Platform (see [4, TPS System Template]). Therefore, the following constraints defined in the [4, TPS System Template] are valid for this specification as well:

- [constr_5126]
- [constr_5127]
- [constr_5128]
- [constr_5129]
- [constr_5130]
- [constr_5131]
- [constr_5132]
- [constr_5133]
- [constr_5134]
- [constr_5135]

- [constr_5136]
- [constr_5137]
- [constr_5138]
- [constr_5139]
- [constr_5140]
- [constr_5141]
- [constr_5142]
- [constr_5143]
- [constr_5144]
- [constr_5145]
- [constr_5146]
- [constr_5147]
- [constr_5148]
- [constr_5149]
- [constr_5151]
- [constr_5152]
- [constr_5153]

Note that in the context of the *AUTOSAR adaptive platform*, the imposition time for these constraints shall be IT_SysDes.

Class	EthIpProps			
Note	This meta-class is used to configure the Machine specific IP attributes. Tags: atp.recommendedPackage=EthIpProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
ipv4Props	Ipv4Props	0..1	aggr	Configuration options for IPv4.
ipv6Props	Ipv6Props	0..1	aggr	Configuration options for IPv6.

Table 7.11: EthIpProps

Class	Ipv4Props			
Note	This meta-class specifies the configuration options for IPv4.			
Base	ARObject			
Aggregated by	EthIpProps.ipv4Props			
Attribute	Type	Mult.	Kind	Note





Class	Ipv4Props			
arpProps	Ipv4ArpProps	0..1	aggr	Configuration properties for the ARP (Address Resolution Protocol).
autolpProps	Ipv4AutolpProps	0..1	aggr	Configuration options for Auto-IP (automatic private IP addressing).
fragmentation Props	Ipv4Fragmentation Props	0..1	aggr	Configuration options for IPv4 packet fragmentation/reassembly.

Table 7.12: Ipv4Props

Class	Ipv4ArpProps			
Note	Specifies the configuration options for the ARP (Address Resolution Protocol).			
Base	ARObject			
Aggregated by	Ipv4Props.arpProps			
Attribute	Type	Mult.	Kind	Note
tcplpArpNum GratuitousArp OnStartup	PositiveInteger	0..1	attr	This attribute specifies the number of gratuitous ARP replies which shall be sent on assignment of a new IP address.
tcplpArpPacket QueueEnabled	Boolean	0..1	attr	This attribute enables (TRUE) or disables (FALSE) support of the ARP Packet Queue according to IETF RFC 1122, section 2.3.2.2.
tcplpArp Request Timeout	TimeValue	0..1	attr	This attribute specifies a timeout in seconds for the validity of ARP requests. After the transmission of an ARP request the Tcplp shall skip the transmission of any further ARP requests to the same destination within a duration of tcplpArpRequestTimeout seconds. (IETF RFC 1122, section 2.3.2.1).
tcplpArpTable EntryTimeout	TimeValue	0..1	attr	This attribute specifies the timeout in seconds after which an unused ARP entry is removed.

Table 7.13: Ipv4ArpProps

Class	Ipv4AutolpProps			
Note	Specifies the configuration options for Auto-IP (automatic private IP addressing).			
Base	ARObject			
Aggregated by	Ipv4Props.autolpProps			
Attribute	Type	Mult.	Kind	Note
tcplpAutolpInit Timeout	TimeValue	0..1	attr	This attribute specifies the time in seconds Auto-IP waits at startup, before beginning with ARP probing. This delay is used to give DHCP time to acquire a lease in case a DHCP server is present.

Table 7.14: Ipv4AutolpProps

Class	Ipv4FragmentationProps			
Note	Specifies the configuration options for IPv4 packet fragmentation/reassembly.			
Base	ARObject			
Aggregated by	Ipv4Props.fragmentationProps			
Attribute	Type	Mult.	Kind	Note





Class	Ipv4FragmentationProps			
tcpIplp Fragmentation RxEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support for reassembling of incoming datagrams that are fragmented according to IETF RFC 815 (IP Datagram Reassembly Algorithms).
tcpIplpNum Fragments	PositiveInteger	0..1	attr	Specifies the maximum number of IP fragments per datagram.
tcpIplpNum ReassDgrams	PositiveInteger	0..1	attr	Specifies the maximum number of fragmented IP datagrams that can be reassembled in parallel.
tcpIplpReass Timeout	TimeValue	0..1	attr	Specifies the timeout in [s] after which an incomplete datagram gets discarded.

Table 7.15: Ipv4FragmentationProps

Class	Ipv6Props			
Note	This meta-class specifies the configuration options for IPv6.			
Base	ARObject			
Aggregated by	EthIplpProps.ipv6Props			
Attribute	Type	Mult.	Kind	Note
dhcpProps	Dhcpv6Props	0..1	aggr	Configuration properties for DHCPv6.
fragmentation Props	Ipv6Fragmentation Props	0..1	aggr	Configuration properties for IPv6 packet fragmentation/ reassembly.
ndpProps	Ipv6NdpProps	0..1	aggr	Configuration properties for the Neighbor Discovery Protocol for IPv6.

Table 7.16: Ipv6Props

Class	Ipv6FragmentationProps			
Note	This meta-class specifies the configuration options for IPv6 packet fragmentation/reassembly.			
Base	ARObject			
Aggregated by	Ipv6Props.fragmentationProps			
Attribute	Type	Mult.	Kind	Note
tcpIplp Reassembly BufferCount	PositiveInteger	0..1	attr	Number of buffers that can be used for fragment reassembly. In case of a reassembly error or if not all fragments are received in time this buffer will be blocked until the specified "Fragment Reassembly Timeout" has been exceeded. A value of 0 disables fragment reassembly.
tcpIplp Reassembly BufferSize	PositiveInteger	0..1	attr	Size of each fragment tx buffer in bytes.
tcpIplp Reassembly SegmentCount	PositiveInteger	0..1	attr	Specifies the maximum number of consecutive data segments that can be managed in each reassembly buffer. If all fragments are received in order, only one segment will be needed. To deal with fragments received out of order this value should be configured bigger than 1.
tcpIplp Reassembly Timeout	TimeValue	0..1	attr	Specifies the timeout in seconds after which an incomplete datagram gets discarded.





Class	Ipv6FragmentationProps			
tcpIpTxFragmentBufferCount	PositiveInteger	0..1	attr	These buffers will be used if the IpV6 receives packets from the upper layer that do not fit into the MTU and thus must be fragmented. A value of 0 disables tx fragmentation.
tcpIpTxFragmentBufferSize	PositiveInteger	0..1	attr	Size of each fragment tx buffer in bytes.

Table 7.17: Ipv6FragmentationProps

Class	Dhcpv6Props			
Note	This meta-class specifies the configuration options for DHCPv6.			
Base	ARObject			
Aggregated by	Ipv6Props.dhcpProps			
Attribute	Type	Mult.	Kind	Note
tcpIpDhcpV6CnfDelayMax	TimeValue	0..1	attr	Maximum delay in seconds before sending the first Confirm message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.
tcpIpDhcpV6CnfDelayMin	TimeValue	0..1	attr	Minimum delay in seconds before the first Confirm message will be sent.
tcpIpDhcpV6InfDelayMax	TimeValue	0..1	attr	Maximum delay in seconds before sending the first Information Request message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.
tcpIpDhcpV6InfDelayMin	TimeValue	0..1	attr	Minimum delay (s) before the first Information Request message will be sent.
tcpIpDhcpV6SolDelayMax	TimeValue	0..1	attr	Maximum delay in seconds before sending the first Solicit message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.
tcpIpDhcpV6SolDelayMin	TimeValue	0..1	attr	Minimum delay (s) before the first Solicit message will be sent.

Table 7.18: Dhcpv6Props

Class	Ipv6NdpProps			
Note	This meta-class specifies the configuration options for the Neighbor Discovery Protocol for IPv6.			
Base	ARObject			
Aggregated by	Ipv6Props.ndpProps			
Attribute	Type	Mult.	Kind	Note
tcpIpNdpDefaultReachableTime	TimeValue	0..1	attr	Configuration of the ReachableTime (s) specified in [RFC4861 6.3.2. Host Variables].
tcpIpNdpDefaultRetransTimer	TimeValue	0..1	attr	Configures the default value (s) for the RetransTimer variable specified in [RFC4861 6.3.2. Host Variables].
tcpIpNdpDefaultRouterListSize	PositiveInteger	0..1	attr	Maximum number of default router entries.





Class	Ipv6NdpProps			
tcplpNdpDefensiveProcessing	Boolean	0..1	attr	If enabled the NDP shall only process Neighbor Advertisements which are received in reaction to a previously transmitted Neighbor Solicitation as well as skipping updates to the Neighbor Cache based on received Neighbor Solicitations. If disabled all Neighbor Advertisements and Solicitations shall be processed as specified in RFC4861.
tcplpNdpDelayFirstProbeTimeValue	TimeValue	0..1	attr	Delay before sending the first NUD probe in (s).
tcplpNdpDestinationCacheSize	PositiveInteger	0..1	attr	Maximum number of entries in the destination cache.
tcplpNdpDynamicHopLimitEnabled	Boolean	0..1	attr	If enabled the default hop limit may be reconfigured based on received Router Advertisements.
tcplpNdpDynamicMtuEnabled	Boolean	0..1	attr	Allow dynamic reconfiguration of link MTU via Router Advertisements.
tcplpNdpDynamicReachableTimeEnabled	Boolean	0..1	attr	If enabled the default Reachable Time value may be reconfigured based on received Router Advertisements.
tcplpNdpDynamicRetransTimeEnabled	Boolean	0..1	attr	If enabled the default Retransmit Timer value may be reconfigured based on received Router Advertisements.
tcplpNdpMaxRandomFactor	PositiveInteger	0..1	attr	Maximum random factor used for randomization
tcplpNdpMaxRtrSolicitationDelay	TimeValue	0..1	attr	Maximum delay before the first Router Solicitation will be sent after interface initialization in (s).
tcplpNdpMaxRtrSolicitations	PositiveInteger	0..1	attr	Maximum number of Router Solicitations that will be sent before the first Router Advertisement has been received.
tcplpNdpMinRandomFactor	PositiveInteger	0..1	attr	Minimum random factor used for randomization
tcplpNdpNeighborUnreachabilityDetectionEnabled	Boolean	0..1	attr	Neighbor Unreachability Detection is used to remove unused entries from the neighbor cache. This feature is a basic feature of NDP and should be turned on.
tcplpNdpNumMulticastSolicitations	PositiveInteger	0..1	attr	Maximum number of multicast solicitations that will be sent when performing address resolution.
tcplpNdpNumUnicastSolicitations	PositiveInteger	0..1	attr	Maximum number of unicast solicitations that will be sent when performing Neighbor Unreachability Detection.
tcplpNdpPacketQueueEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of a NDP Packet Queue according to IETF RFC 4861, section 7.2.2.
tcplpNdpPrefixListSize	PositiveInteger	0..1	attr	Maximum number of entries in the on-link prefix list.
tcplpNdpRandomReachableTimeEnabled	Boolean	0..1	attr	If enabled the value of ReachableTime will be multiplied with a random value between MIN_RANDOM_FACTOR and MAX_RANDOM_FACTOR in order to prevent multiple nodes from transmitting at exactly the same time.





Class	Ipv6NdpProps			
tcpIpNdpRndRtrSolicitationDelayEnabled	Boolean	0..1	attr	If enabled the first router solicitation will be delayed randomly from [0...MAX_RTR_SOLICITATION_DELAY]. Otherwise the first router solicitation will be sent after exactly MAX_RTR_SOLICITATION_DELAY milliseconds.
tcpIpNdpRtrSolicitationInterval	TimeValue	0..1	attr	Interval between consecutive Router Solicitations in (s).
tcpIpNdpSlaacDadNumberOfTransmissions	PositiveInteger	0..1	attr	Number of Neighbor Solicitations that have to be unanswered in order to set an autoconfigured address to PREFERRED (usable) state.
tcpIpNdpSlaacDadRetransmissionDelay	TimeValue	0..1	attr	Sets the maximum value for the address configuration delay (s).
tcpIpNdpSlaacDelayEnabled	Boolean	0..1	attr	If enabled transmission of the first DAD Neighbor Solicitation will be delayed by a random value from [0...MAX_DAD_DELAY].
tcpIpNdpSlaacOptimisticDadEnabled	Boolean	0..1	attr	Enable Optimistic Duplicate Address Detection (DAD) according to RFC4429.

Table 7.19: Ipv6NdpProps

7.2.1.4 TCP and UDP configuration properties

The Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) are transport protocols that are based on the Internet Protocol (IP) that is located on the network layer in the OSI model.

The Transport Protocol configuration is supported with the [EthTcpIpProps](#) meta-class and the two aggregated classes:

- [UdpProps](#) - used for configuration of Udp
- [TcpProps](#) - used for configuration of Tcp

Please note that for the configuration of TCP and UDP the same modeling approach is used as in the Classic Platform (see [4, TPS System Template]). Therefore, the following constraints defined in the [4, TPS System Template] are valid for this specification as well:

- [constr_5118]
- [constr_5119]
- [constr_5120]
- [constr_5121]
- [constr_5122]
- [constr_5123]
- [constr_5124]

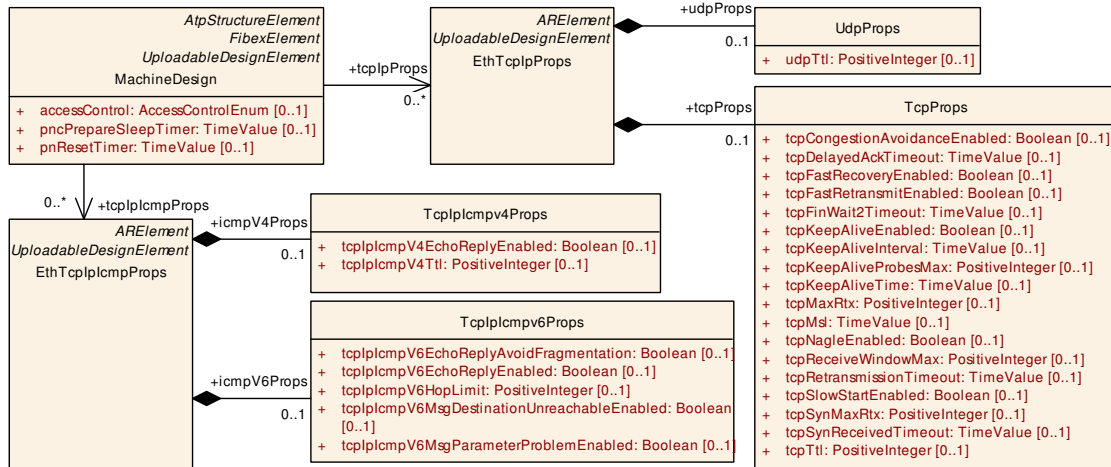


Figure 7.4: Machine specific TCP/UDP and ICMP configuration options

Note that in the context of the *AUTOSAR adaptive platform*, the imposition time for these constraints shall be IT_SysDes.

Class	EthTcplpProps			
Note	This meta-class is used to configure the Machine specific Tcplp Stack attributes. Tags: atp.recommendedPackage=EthTcplpProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
tcpProps	TcpProps	0..1	aggr	TCP configuration properties
udpProps	UdpProps	0..1	aggr	UDP configuration properties

Table 7.20: EthTcplpProps

Class	UdpProps			
Note	This meta-class specifies the configuration options for UDP (User Datagram Protocol).			
Base	ARObject			
Aggregated by	EthTcplpProps.udpProps			
Attribute	Type	Mult.	Kind	Note
udpTtl	PositiveInteger	0..1	attr	Default Time-to-live value of outgoing UDP packets.

Table 7.21: UdpProps

Class	TcpProps			
Note	This meta-class specifies the configuration options for TCP (Transmission Control Protocol).			
Base	ARObject			
Aggregated by	EthTcplpProps.tcpProps			
Attribute	Type	Mult.	Kind	Note
tcpCongestionAvoidanceEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP congestion avoidance algorithm according to IETF RFC 5681.





Class	TcpProps			
tcpDelayedAckTimeout	TimeValue	0..1	attr	The maximal time an acknowledgement is delayed for transmission in seconds.
tcpFastRecoveryEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP Fast Recovery according to IETF RFC 5681.
tcpFastRetransmitEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP Fast Retransmission according to IETF RFC 5681.
tcpFinWait2Timeout	TimeValue	0..1	attr	Timeout in [s] to receive a FIN from the remote node (after this node has initiated connection termination), i.e. maximum time waiting in FINWAIT-2 for a connection termination request from the remote TCP.
tcpKeepAliveEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) TCP Keep Alive Probes according to IETF RFC 1122 chapter 4.2.3.6.
tcpKeepAliveInterval	TimeValue	0..1	attr	Specifies the interval in seconds between subsequent keepalive probes.
tcpKeepAliveProbesMax	PositiveInteger	0..1	attr	Maximum number of times that a TCP Keep Alive is retransmitted before the connection is closed.
tcpKeepAliveTime	TimeValue	0..1	attr	Specifies the time in [s] between the last data packet sent (simple ACKs are not considered data) and the first keepalive probe.
tcpMaxRtx	PositiveInteger	0..1	attr	Maximum number of times that a TCP segment is retransmitted before the TCP connection is closed. This parameter is only valid if tcpRetransmissionTimeout is configured. Note: This parameter also applies for FIN retransmissions.
tcpMsl	TimeValue	0..1	attr	Maximum segment lifetime in [s].
tcpNagleEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of Nagle's algorithm according to IETF RFC 1122 (chapter 4.2.3.4 When to Send Data). If enabled the Nagle's algorithm is activated per default for all TCP sockets, but can be deactivated per Socket (with the attribute TcpTp.nagleAlgorithm).
tcpReceiveWindowMax	PositiveInteger	0..1	attr	Default value of maximum receive window in bytes.
tcpRetransmissionTimeout	TimeValue	0..1	attr	Timeout in [s] before an unacknowledged TCP segment is sent again. If the timeout is disabled, no TCP segments shall be retransmitted.
tcpSlowStartEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP slow start algorithm according to IETF RFC 5681.
tcpSynMaxRtx	PositiveInteger	0..1	attr	Maximum number of times that a TCP SYN is retransmitted.
tcpSynReceivedTimeout	TimeValue	0..1	attr	Timeout in [s] to complete a remotely initiated TCP connection establishment, i.e. maximum time waiting in SYN-RECEIVED for a confirming connection request acknowledgement after having both received and sent a connection request.
tcpTtl	PositiveInteger	0..1	attr	Default Time-to-live value of outgoing TCP packets.

Table 7.22: TcpProps

7.2.1.5 ICMP configuration properties

Internet Control Message Protocol (ICMP) is located in the network layer in the OSI model and is used by network devices to diagnose network communication issues,

e.g. it is used to determine whether the data is reaching its intended destination in a timely manner.

AUTOSAR supports the configuration of

- the Internet Control Message Protocol Version 4 for the Internet Protocol Version 4 (IPv4) with [TcpIpIcmpv4Props](#)
- the Internet Control Message Protocol Version 6 for the Internet Protocol Version 6 (IPv6) with [TcpIpIcmpv6Props](#)

Please note that for the configuration of ICMP the same modeling approach is used as in the Classic Platform (see [4, TPS Ssystem Template]). Therefore the following constraints defined in the [4, TPS System Template] are valid for this specification as well:

- [constr_5125]
- [constr_5154]

Note that in the context of the *AUTOSAR adaptive platform*, the imposition time for these constraints shall be IT_SysDes.

Class	EthTcplIcmpProps			
Note	This meta-class is used to configure the Machine specific ICMP (Internet Control Message Protocol) attributes Tags: atp.recommendedPackage=EthTcplIcmpProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
icmpV4Props	TcpIplIcmpv4Props	0..1	aggr	ICMPv4 configuration properties
icmpV6Props	TcpIplIcmpv6Props	0..1	aggr	ICMPv6 configuration properties

Table 7.23: EthTcplIcmpProps

Class	TcplIcmpv4Props			
Note	This meta-class specifies the configuration options for ICMPv4 (Internet Control Message Protocol).			
Base	ARObject			
Aggregated by	EthTcplIcmpProps.icmpV4Props			
Attribute	Type	Mult.	Kind	Note
tcplIcmpV4EchoReplyEnabled	Boolean	0..1	attr	This attribute enables or disables transmission of ICMP echo reply message in case of a ICMP echo reception.
tcplIcmpV4Ttl	PositiveInteger	0..1	attr	This attribute is only relevant in case that ICMP (Internet Control Message Protocol) is used. It specifies the default Time-to-live value of outgoing ICMP packets.

Table 7.24: TcplIcmpv4Props

Class	Tcplplcmpv6Props			
Note	This meta-class specifies the configuration options for ICMPv6 (Internet Control Message Protocol).			
Base	<i>ARObject</i>			
Aggregated by	EthTcplplcmpProps.icmpV6Props			
Attribute	Type	Mult.	Kind	Note
tcplplcmpV6 EchoReply Avoid Fragmentation	Boolean	0..1	attr	This attribute defines whether the echo reply is only transmitted in case that the incoming ICMPv6 Echo Request (Pings) fits the MTU of the respective interface, i.e. can be transmitted without IPv6 fragmentation.
tcplplcmpV6 EchoReply Enabled	Boolean	0..1	attr	This attribute enables or disables transmission of ICMP echo reply message in case of a ICMP echo reception.
tcplplcmpV6 HopLimit	PositiveInteger	0..1	attr	Default Hop-Limit value of outgoing ICMPv6 packets.
tcplplcmpV6 MsgDestination Unreachable Enabled	Boolean	0..1	attr	This attribute Enables/Disables the transmission of Destination Unreachable Messages.
tcplplcmpV6 MsgParameter Problem Enabled	Boolean	0..1	attr	If enabled an ICMPv6 parameter problem message will be sent if a received packet has been dropped due to unknown options or headers that are found in the packet.

Table 7.25: Tcplplcmpv6Props

7.2.2 Securing Communication with IPsec

IPsec is a protocol suite that provides cryptographic protection for IP datagrams in IPv4 and IPv6 network packets.

IPsec uses a security association to specify security properties that are shared between the communicating parties. The security association defines a relationship between two or more parties and determines which security services will be used to communicate securely. In other words the security association serves as a “contract” between the different devices.

A single security association protects data in one communication direction. Two security associations shall be present to secure traffic in both directions. Each security association can provide encryption, data integrity and data authentication.

In addition, the senders and receivers of IP datagrams can determine the required protection for an IP packet according to IPsec security policies. These are rules that define how datagrams are processed that are received by a device. For example, security policies are used to decide if a particular packet needs to be dropped or needs to be processed by IPsec.

[TPS_MANI_03203] Configuration of IPsec [The [IPSecConfig](#) meta-class that is aggregated by a [NetworkEndpoint](#) in the role [ipSecConfig](#) provides the ability to define IPsec settings that are necessary to configure IPsec security associations and IPsec security policies.]

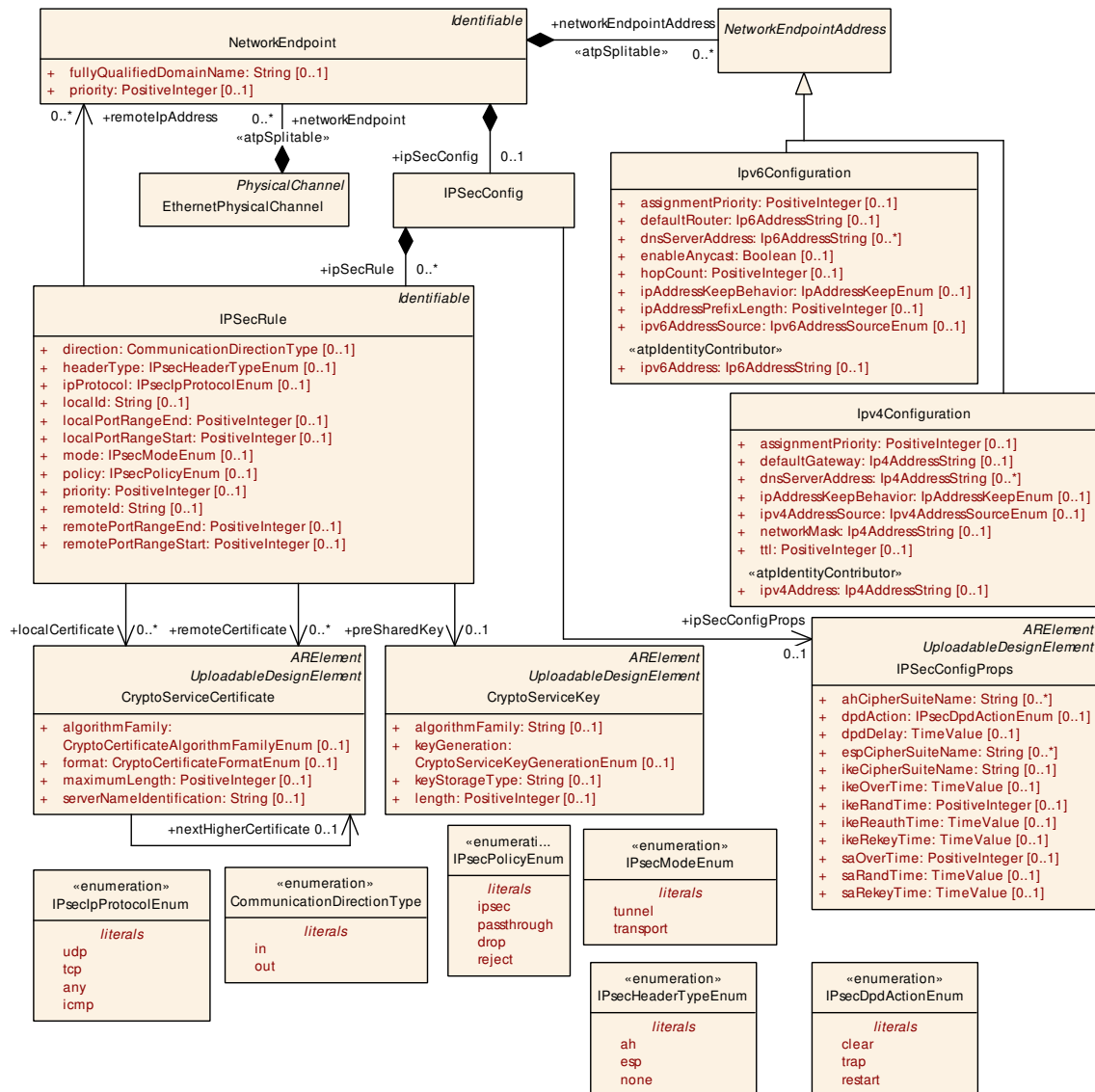


Figure 7.5: IPsec configuration model

[TPS_MANI_03204] **Definition of `IPSecRules`** [The `IPSecConfig` meta-class may contain one or several `IPSecRules`. Each `IPSecRule` defines the network connection that is monitored by IPsec by defining the local endpoint and the remote endpoint. Each endpoint is defined by the IP Address and the Tcp/Udp Port. The communication direction for which the `IPSecRule` is valid is defined by the `direction` attribute.]

Class	IPSecConfig			
Note	IPsec is a protocol that is designed to provide "end-to-end" cryptographically-based security for IP network connections.			
Base	ARObject			
Aggregated by	NetworkEndpoint.ipSecConfig			
Attribute	Type	Mult.	Kind	Note





Class	IPSecConfig			
ipSecConfig Props	IPSecConfigProps	0..1	ref	Global IPsec configuration settings that are valid for all IPSecRules that are defined on the NetworkEndpoint.
ipSecRule	IPSecRule	*	aggr	IPSec rules and filters that are defined in the IPSecConfig for a specific NetworkEndpoint.

Table 7.26: IPSecConfig

Class	IPSecRule			
Note	This element defines an IPsec rule that describes communication traffic that is monitored, protected and filtered.			
Base	<i>ARObject</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	IPSecConfig.ipSecRule			
Attribute	Type	Mult.	Kind	Note
direction	Communication DirectionType	0..1	attr	This attribute defines the direction in which the traffic is monitored. If this attribute is not set a bidirectional traffic monitoring is assumed.
headerType	IPsecHeaderTypeEnum	0..1	attr	Header type specifying the IPsec security mechanism.
ipProtocol	IPsecIpProtocolEnum	0..1	attr	This attribute defines the relevant IP protocol used in the Security Policy Database (SPD) entry.
localCertificate	CryptoService Certificate	*	ref	This reference identifies the applicable certificate used for a local authentication.
localId	String	0..1	attr	This attribute defines how the local participant should be identified for authentication.
localPortRange End	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines an end value for the local port range. If this attribute is not set then this rule shall be effective for all local ports. Please note that port ranges are currently not supported in the AUTOSAR AP's operating system backend. If AP systems are involved, each IPsec rule may only contain a single port.
localPortRange Start	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines a start value for the local port range. If this attribute is not set then this rule shall be effective for all local ports. Please note that port ranges are currently not supported in the AUTOSAR AP's operating system backend. If AP systems are involved, each IPsec rule may only contain a single port.
mode	IPsecModeEnum	0..1	attr	This attribute defines the type of the connection.
policy	IPsecPolicyEnum	0..1	attr	An IPsec policy defines the rules that determine which type of IP traffic needs to be secured using IPsec and how that traffic is secured.
preSharedKey	CryptoServiceKey	0..1	ref	This reference identifies the applicable cryptographic key used for authentication.
priority	PositiveInteger	0..1	attr	This attribute defines the priority of the IPSecRule (SPD entry). The processing of entries is based on priority, starting with the highest priority "0".
remote Certificate	CryptoService Certificate	*	ref	This reference identifies the applicable certificate used for a remote authentication.
remoteId	String	0..1	attr	This attribute defines how the remote participant should be identified for authentication.





Class	IPSecRule			
remoteIp Address	NetworkEndpoint	*	ref	Definition of the remote NetworkEndpoint. With this reference the connection between the local Network Endpoint and the remote NetworkEndpoint is described on which the traffic is monitored.
remotePort RangeEnd	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines an end value for the remote port range. If this attribute is not set then this rule shall be effective for all local ports. Please note that port ranges are currently not supported in the AUTOSAR AP's operating system backend. If AP systems are involved, each IPsec rule may only contain a single port.
remotePort RangeStart	PositiveInteger	0..1	attr	This attribute restricts the traffic monitoring and defines a start value for the remote port range. If this attribute is not set then this rule shall be effective for all local ports. Please note that port ranges are currently not supported in the AUTOSAR AP's operating system backend. If AP systems are involved, each IPsec rule may only contain a single port.

Table 7.27: IPSecRule

Class	IPSecConfigProps			
Note	This element holds all the attributes for configuration of IPsec that are independent of specific IPsec rules. Tags: atp.recommendedPackage=IPSecConfigProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
ahCipherSuite Name	String	*	attr	AH (Authentication Header) algorithm to be used for the connection, e.g. HMAC/SHA2-256
dpdAction	IPsecDpdActionEnum	0..1	attr	This attribute defines what to do if the peer is considered dead. If not configured "restart" shall be assumed.
dpdDelay	TimeValue	0..1	attr	This attribute describes the interval to check the liveness of a peer actively using IKEv2 INFORMATIONAL exchanges. Active DPD checking is only enforced if no IKE or ESP/AH packet has been received for the configured DPD delay. In not configured the value "5 minutes" shall be assumed.
espCipherSuite Name	String	*	attr	ESP (Encapsulating Security Payload) algorithm that provides encryption and optional authentication for the connection, e.g. AES-128+SHA2-256.
ikeCipherSuite Name	String	0..1	attr	IKE encryption/authentication algorithms to be used for the connection.
ikeOverTime	TimeValue	0..1	attr	This attribute describes the hard deadline when an SA becomes invalid in percentage. Example: ikeOverTime of max(ikeReauthTime, ikeRekeyTime). Default: 10 %
ikeRandTime	PositiveInteger	0..1	attr	This attribute defines in percentage by how long before the expiration of ikeReauthTime and ikeRekeyTime will be rekeyed/reauthenticated. Default: 10%





Class	IPSecConfigProps			
ikeReauthTime	TimeValue	0..1	attr	This attribute defines the absolute time after which an IKE SA will be reauthenticated. 0 means reauthentication is disabled.
ikeRekeyTime	TimeValue	0..1	attr	This attribute defines the absolute time after which an IKE SA will be rekeyed. 0 means rekey is disabled.
saOverTime	PositiveInteger	0..1	attr	This attribute describes the hard deadline when an IPsec SA becomes invalid in percentage. Example: saOverTime * saRekeyTime. Default: 110%
saRandTime	TimeValue	0..1	attr	This attribute defines by how long before the expiration of saRekeyTime will be rekeyed.
saRekeyTime	TimeValue	0..1	attr	This attribute defines the absolute time after which an IPsec SA will be rekeyed. 0 means rekey is disabled.

Table 7.28: IPSecConfigProps

Enumeration	IPSecIpProtocolEnum
Note	Definition of supported TcpIp protocols that are supported in Security Policy Database (SPD) entries in IPSec configurations.
Aggregated by	IPSecRule.ipProtocol
Literal	Description
any	ANY protocol Tags: atp.EnumerationLiteralIndex=3
icmp	Internet Control Message Protocol (ICMP) Tags: atp.EnumerationLiteralIndex=2
tcp	TCP Protocol Tags: atp.EnumerationLiteralIndex=1
udp	UDP Protocol Tags: atp.EnumerationLiteralIndex=0

Table 7.29: IPSecIpProtocolEnum

[constr_5102] Usage of remote port ranges in [IPSecRule](#) is not allowed*Imposition time:* [IT_SysDes](#)

[[IPSecRule.remotePortRangeStart](#) and [IPSecRule.remotePortRangeEnd](#) shall always be set to the same value.]

[constr_5103] Usage of local port ranges in [IPSecRule](#) is not allowed*Imposition time:* [IT_SysDes](#)

[[IPSecRule.localPortRangeStart](#) and [IPSecRule.localPortRangeEnd](#) shall always be set to the same value.]

The reason for [[constr_5102](#)] and [[constr_5103](#)] is that port ranges are currently not supported by the AUTOSAR Adaptive Platform operating system backend and each [IPSecRule](#) is allowed to define only a single local Port and a single remote Port.

[TPS_MANI_03232] Definition of general IPsec configuration settings [General configuration properties that are independent of particular [IPSecRules](#) are collected

in the [IPSecConfigProps](#) element that is referenced from the [IPSecConfig](#) in the role [ipSecConfigProps](#).]

[TPS_MANI_03205] IPsec policy [The [IPSecRule.policy](#) attribute defines how IP packets are handled that are going over the network connection defined by the [IPSecRule](#). In detail, it defines whether the IP packet is processed by IPsec or not.]

Enumeration	IPsecPolicyEnum
Note	Defines the filter actions that are supported by IPsec.
Aggregated by	IPSecRule.policy
Literal	Description
drop	Signifying that packets should be discarded Tags: atp.EnumerationLiteralIndex=3
ipsec	Signifying that packets should be protected. Tags: atp.EnumerationLiteralIndex=1
passthrough	Signifying that no IPsec processing should be done at all. Tags: atp.EnumerationLiteralIndex=2
reject	Signifying that packets should be discarded and a diagnostic ICMP returned. Tags: atp.EnumerationLiteralIndex=4

Table 7.30: IPsecPolicyEnum

IPsec can be configured to operate in two different modes, Tunnel and Transport mode. With tunnel mode, the entire IP packet is protected by IPsec. IPsec wraps the original packet, encrypts it and adds a new IP header to it.

The tunnel mode is most commonly used between VPN gateways and the IP addresses of the newly added outer IP header are that of the VPN Gateways. In other words the traffic between the two VPN Gateways is protected and each gateway acts as a proxy for the hosts behind it.

The transport mode provides the protection of the Data Payload of the IP datagram with an AH or ESP header. The IP Header remains the same and IPsec inserts its header between the IP header and the upper level headers.

The IPsec transport mode can be used when securing traffic between two hosts or between a host and a VPN gateway.

[TPS_MANI_03233] IPsec mode [The [IPSecRule.mode](#) attribute defines whether the IP packet is processed in the [transport](#) or [tunnel](#) mode.]

Please note that AUTOSAR currently supports only the [transport mode](#) as configuration option.

Enumeration	IPsecModeEnum
Note	This enumeration describes the supported IPsec modes.
Aggregated by	IPSecRule.mode
Literal	Description





Enumeration	IPsecModeEnum
transport	Signifying that the IPsec transport mode is used. With the transport mode the original IP header is retained and only the IP payload and ESP trailer is encrypted. Tags: atp.EnumerationLiteralIndex=1
tunnel	Signifying that the IPsec tunnel mode is used. With tunnel mode, the entire original IP packet is protected by IPsec. This means IPsec wraps the original packet, encrypts it, adds a new IP header and sends it to the other side. Tags: atp.EnumerationLiteralIndex=0

Table 7.31: IPsecModeEnum

IPsec uses two protocols:

- AH - Authentication Header
- ESP - Encapsulating Security Payload

The AH protocol provides a mechanism for authentication only and authenticates the entire IP packet, including the outer IP header.

The ESP protocol provides data confidentiality (encryption) and/or authentication (data integrity, data origin authentication, and replay protection).

When ESP is used in transport mode, the IP payload is encrypted and the original IP header is moved to the front of the message. The ESP header is inserted after the IP header and is signed together with the IP payload. The original IP header remains unprotected.

When ESP is used in tunnel mode a new IP Header is created and the ESP header is added in front of the original IP Packet. The entire original IP packet is encrypted and signed in this mode.

[TPS_MANI_03206] IPsec AH and ESP protocol configuration [In the [IPSecRule](#) it is possible to define the IPsec protocol that shall be used to protect IP packets that are going over the defined network connection. The attribute [headerType](#) defines whether AH, ESP or neither one is used.]

Enumeration	IPsecHeaderTypeEnum
Note	IPsec Header Type options
Aggregated by	IPSecRule.headerType
Literal	Description
ah	Authentication Header (AH) Tags: atp.EnumerationLiteralIndex=0
esp	Encapsulating Security Payloads (ESP) Tags: atp.EnumerationLiteralIndex=1
none	No header Tags: atp.EnumerationLiteralIndex=2

Table 7.32: IPsecHeaderTypeEnum

[TPS_MANI_03234] IPsec AH and ESP CipherSuites [The attributes [ahCipherSuiteName](#) and [espCipherSuiteName](#) define the supported AH and ESP algorithms.]

The naming convention for [ahCipherSuiteName](#), [espCipherSuiteName](#) and [IPSecConfigProps.ikeCipherSuiteName](#) shall follow the naming convention for cryptographic primitives that is defined in [18, SWS Cryptography].

[TPS_MANI_03207] IPsec Internet Key Exchange protocol configuration [In the [IPSecRule](#) it is possible to define how IKE protocol authenticates the remote party and how the local party authenticates itself to the remote party. In other words both sides use the same method.

The usage of the [IPSecRule.localCertificate](#) and [IPSecRule.remoteCertificate](#) defines that Digital Signature Authentication is used.]

Please note that the supported IKE CipherSuites are configured with the [IPSecConfigProps.ikeCipherSuiteName](#). The [IPSecConfigProps](#) contains additional IKE specific configuration settings.

Enumeration	IPsecDpdActionEnum
Note	Potential Dead Peer Detection (Dpd) Actions
Aggregated by	IPSecConfigProps.dpdAction
Literal	Description
clear	Deletes the SA. Tags: atp.EnumerationLiteralIndex=0
restart	Immediately tries to establish the connection. Tags: atp.EnumerationLiteralIndex=2
trap	tries to establish the connection after traffic is sent to the peer. Tags: atp.EnumerationLiteralIndex=1

Table 7.33: IPsecDpdActionEnum

[TPS_MANI_03208] Protection of [AdaptivePlatformServiceInstance](#) by IPsec [To describe the protection of an [AdaptivePlatformServiceInstance](#) by IPsec the [AdaptivePlatformServiceInstance](#) needs to be mapped by a [ServiceInstanceToMachineMapping](#) to an [EthernetCommunicationConnector](#) that points with the [unicastNetworkEndpoint](#) to a [NetworkEndpoint](#) that aggregates the [IPSecConfig](#) that in turn describes IPsec Security Associations.]

Please note that IP Multicast protection by IPsec is not supported. It is by intention not possible to model the IPsec protection of IP Multicast communication since the IP Multicast address is defined in the [SomeipProvidedEventGroup](#) by the two attributes [ipv4MulticastIpAddress](#) and [ipv6MulticastIpAddress](#).

The [NetworkEndpoint](#) element is used for description of IP Unicast Endpoints only. This means that only the IP Unicast communication of an [AdaptivePlatformServiceInstance](#) that is described according to [TPS_MANI_03208] will be protected by IPsec.

7.2.3 MACsec

MACsec (Media Access Control security) is defined by IEEE standard 802.1AE and operates at the medium access control layer and defines connectionless data confidentiality and integrity for media access independent protocols.

The MACsec standard specifies a set of protocols to meet the security requirements for protecting data traversing Ethernet LANs.

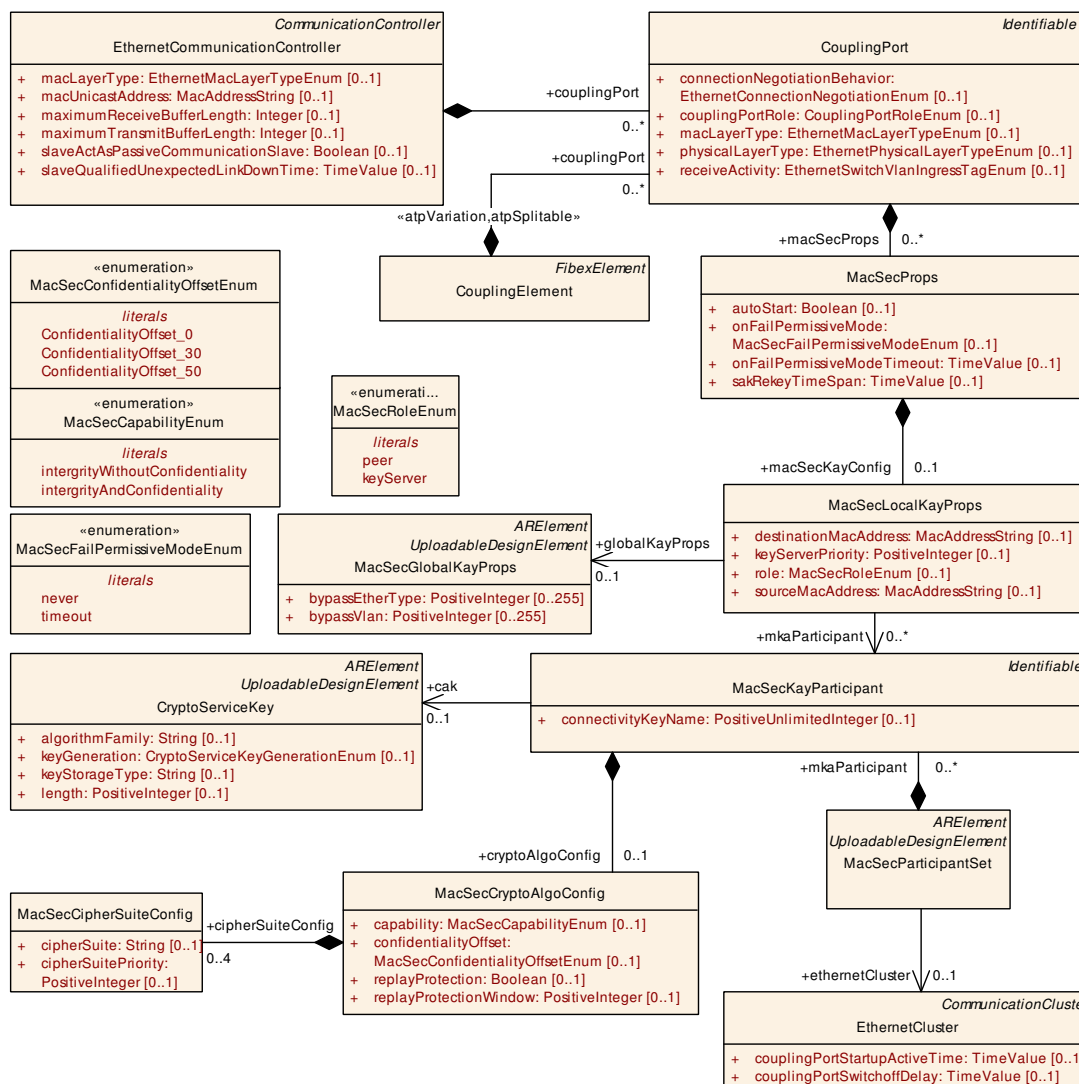


Figure 7.6: MACsec configuration

MACsec allows unauthorized LAN connections to be identified and excluded from communication within the network. In common with IPsec and TLS, MACsec defines a security infrastructure to provide data confidentiality, data integrity and data origin authentication.

With security on the MAC layer, protocols not based on IP as well as protocols using multicast can be protected by MACsec.

The MACsec standard relies on the usage of authentic partners, which are called MAC Security Entities (SecYs). The standard organizes this by MACsec Protocol Data Units (MPDU), which resides in the MAC layer (ISO/OSI layer 2).

The MAC Security Key Agreement Entity (KaY) will take care of properly configuring and managing of the MAC Security Entities to enable the secure communication channel.

In the System Design model the configuration of MACsec is supported on [CouplingPorts](#) that in turn are aggregated either by a [CouplingElement](#) or by an [EthernetCommunicationController](#).

This allows the configuration of MACsec on a switch port or on an [EthernetCommunicationController](#) of a [MachineDesign](#). Please note that the same modeling approach is used in the Classic Platform System Template as well.

[TPS_MANI_03317] MACsec configuration

Status: DRAFT

[A [CouplingPort](#) that aggregates the [MacSecProps](#) in the role [macSecProps](#) defines a MAC Security Entity.]

Please note that constraint [constr_5361] from the System Template is also valid in the System Design model of the Adaptive Platform.

Please note that constraint [constr_3726] from the System Template is also valid in the System Design model of the Adaptive Platform.

[TPS_MANI_03318] MAC Security Key Agreement Entity configuration

Status: DRAFT

[The [MacSecLocalKayProps](#) element that is referenced by the [MacSecProps](#) in the role [macSecKeyConfig](#) in combination with [MacSecGlobalKayProps](#) that is referenced by [MacSecLocalKayProps](#) in the role [globalKayProps](#) defines the configuration settings for the MACsec Key Agreement that is responsible for the peer discovery and key negotiation to secure the Ethernet link.]

Class	MacSecProps			
Note	This meta-class allows to configure MACsec (Media access control security) and the MKA (MACsec Key Agreement) for the CouplingPort (PHY). Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	CouplingPort.macSecProps			
Attribute	Type	Mult.	Kind	Note





Class	MacSecProps			
autoStart	Boolean	0..1	attr	This attribute defines how the Port Access Entity (PAE) is started: • true := Autostart • false := Manual Start Tags: atp.Status=candidate
macSecKey Config	MacSecLocalKayProps	0..1	aggr	Properties to configure the MKA instance (KaY) for a controlled CouplingPort (PaE). Tags: atp.Status=candidate
onFail Permissive Mode	MacSecFailPermissive ModeEnum	0..1	attr	This attribute sets the behavior of the Port Access Entity in case MACsec does not succeed. Tags: atp.Status=candidate
onFail Permissive ModeTimeout	TimeValue	0..1	attr	Timeout in seconds to enable the controlled port in case onFailPermissiveMode is set to Timeout. Tags: atp.Status=candidate
sakRekeyTime Span	TimeValue	0..1	attr	Time in seconds to trigger the rekey of an in use SAK (Static Secure Association key). If set to 0, the rekey will not be triggered after a time span. Tags: atp.Status=candidate

Table 7.34: MacSecProps

Class	MacSecLocalKayProps			
Note	Configuration of the MAC Security Key Agreement Entity (KaY). Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	MacSecProps.macSecKeyConfig			
Attribute	Type	Mult.	Kind	Note
destinationMac Address	MacAddressString	0..1	attr	This attribute defines the destination MAC Address that is used to calculate the ICV (Integrity Check Value). Tags: atp.Status=candidate
globalKayProps	MacSecGlobalKay Props	0..1	ref	Reference to properties that are shared between MAC Security Key Agreement Entities. Tags: atp.Status=candidate
keyServer Priority	PositiveInteger	0..1	attr	This attribute defines the key-server priority. Tags: atp.Status=candidate
mkaParticipant	MacSecKayParticipant	*	ref	Reference to MKA participant settings supported on the CouplingPort. Tags: atp.Status=candidate
role	MacSecRoleEnum	0..1	attr	Role of the MAC Security Key Agreement Entity Tags: atp.Status=candidate
sourceMac Address	MacAddressString	0..1	attr	This attribute defines the source MAC Address that is used to calculate the ICV (Integrity Check Value). Tags: atp.Status=candidate

Table 7.35: MacSecLocalKayProps

Class	MacSecGlobalKayProps
Note	Configuration of the MAC Security Key Agreement Entity properties that are shared by different KaY configurations. Tags: atp.Status=candidate atp.recommendedPackage=MacSecGlobalKayProps





Class	MacSecGlobalKayProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
bypassEtherType	PositiveInteger	0..255	attr	This attribute is used to define EtherTypes that are bypassed by MACsec. The providedEtherType will not be MACsec protected. Tags: atp.Status=candidate
bypassVlan	PositiveInteger	0..255	attr	This attribute is used to define VLAN-IDs that are bypassed by MACsec. The provided VLAN-IDs will not be MACsec protected. (VLAN-ID 0 is interpreted as no-VLAN --> Bypass untagged traffic) Tags: atp.Status=candidate

Table 7.36: MacSecGlobalKayProps

Class	MacSecParticipantSet			
Note	Collection of MACsec Kay Participants on an Ethernet Link. Tags: atp.Status=candidate atp.recommendedPackage=MacSecKayParticipantSets			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
ethernetCluster	EthernetCluster	0..1	ref	Reference to the EthernetCluster (Link) on which the KaY participants are located Tags: atp.Status=candidate
mkaParticipant	MacSecKayParticipant	*	aggr	Configuration of a MKA Participant. Tags: atp.Status=candidate

Table 7.37: MacSecParticipantSet

Class	MacSecKayParticipant			
Note	This meta-class configures a MKA participant. Tags: atp.Status=candidate atp.recommendedPackage=MacSecKayParticipants			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	MacSecParticipantSet.mkaParticipant			
Attribute	Type	Mult.	Kind	Note
cak	CryptoServiceKey	0..1	ref	Reference to the Connectivity Association Key (CAK)
connectivityKeyName	PositiveUnlimitedInteger	0..1	attr	Connectivity Key Name (CKN) defined as a hexadecimal number
cryptoAlgoConfig	MacSecCryptoAlgoConfig	0..1	aggr	Cryptography that is used by the MKA Participant. Tags: atp.Status=candidate

Table 7.38: MacSecKayParticipant

Class	MacSecCryptoAlgoConfig			
Note	This meta-class defines the cryptography configuration for MACsec. Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	MacSecKayParticipant.cryptoAlgoConfig			
Attribute	Type	Mult.	Kind	Note
capability	MacSecCapabilityEnum	0..1	attr	This attribute defines the MACsec capability. Tags: atp.Status=candidate
cipherSuite Config	MacSecCipherSuite Config	0..4	aggr	Cipher suite configuration to use with MACsec. Tags: atp.Status=candidate
confidentiality Offset	MacSecConfidentiality OffsetEnum	0..1	attr	The MACsec confidentiality offset specifies the number of bytes starting from the frame header. MACsec encrypts only the bytes after the offset in a frame. Tags: atp.Status=candidate
replayProtection	Boolean	0..1	attr	This attribute is used to configure the MACsec replay protection. Tags: atp.Status=candidate
replayProtection Window	PositiveInteger	0..1	attr	In case replay protection is active, this attribute defines the replay protection window. Tags: atp.Status=candidate

Table 7.39: MacSecCryptoAlgoConfig

Class	MacSecCipherSuiteConfig			
Note	This meta-class defines the cipher suite configuration to use with MACsec. cipherSuitePriority is present in case the MKA instance acts as a Key Server to select the cipher suite to use for MACsec. Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	MacSecCryptoAlgoConfig.cipherSuiteConfig			
Attribute	Type	Mult.	Kind	Note
cipherSuite	String	0..1	attr	Cipher Suite to use for MACsec. Tags: atp.Status=candidate
cipherSuite Priority	PositiveInteger	0..1	attr	In case the MKA instance acts as a Key Server, the priority is used to select the Cipher Suite to use with MACsec from the supported Ciphers. Tags: atp.Status=candidate

Table 7.40: MacSecCipherSuiteConfig

[TPS_MANI_03319] Standardized values for the attribute **cipherSuite** of meta-class **MacSecCipherSuiteConfig**

Status: DRAFT

[The following values for **MacSecCipherSuiteConfig.cipherSuite** are reserved by the AUTOSAR standard:

- GCM-AES-128
- GCM-AES-256
- GCM-AES-XPB-128
- GCM-AES-XPB-256

]

[TPS_MANI_03320] Semantics of `MacSecCipherSuiteConfig.cipherSuitePriority`

Status: DRAFT

[The `MacSecCryptoAlgoConfig` can define up to four `MacSecCipherSuiteConfigs`. If more then one `MacSecCipherSuiteConfig` is defined then the `cipherSuitePriority` decides about the chosen cipher. The `cipherSuitePriority` of value 1 means the highest priority and 4 means the lowest priority.]

Enumeration	MacSecConfidentialityOffsetEnum
Note	This enum defines the MACsec capability options. Tags: atp.Status=candidate
Aggregated by	MacSecCryptoAlgoConfig.confidentialityOffset
Literal	Description
Confidentiality Offset_0	confidentiality offset of 0. Tags: atp.EnumerationLiteralIndex=0 xml.name=CONFIDENTIALITY-OFFSET-0
Confidentiality Offset_30	confidentiality offset of 30. Tags: atp.EnumerationLiteralIndex=1 xml.name=CONFIDENTIALITY-OFFSET-30
Confidentiality Offset_50	confidentiality offset of 50. Tags: atp.EnumerationLiteralIndex=2 xml.name=CONFIDENTIALITY-OFFSET-50

Table 7.41: MacSecConfidentialityOffsetEnum

Enumeration	MacSecCapabilityEnum
Note	This enum defines the MACsec capability options. Tags: atp.Status=candidate
Aggregated by	MacSecCryptoAlgoConfig.capability
Literal	Description
intergrityAnd Confidentiality	Option that ensures confidentiality and integrity Tags: atp.EnumerationLiteralIndex=1
intergrityWithout Confidentiality	Option that ensures integrity without confidentiality Tags: atp.EnumerationLiteralIndex=0

Table 7.42: MacSecCapabilityEnum

Enumeration	MacSecRoleEnum
Note	This enum defines the MACsec Role options. Tags: atp.Status=candidate
Aggregated by	MacSecLocalKayProps.role
Literal	Description
keyServer	Port acts in the KeyServer role Tags: atp.EnumerationLiteralIndex=1
peer	Port acts in the peer role Tags: atp.EnumerationLiteralIndex=0

Table 7.43: MacSecRoleEnum

Enumeration	MacSecFailPermissiveModeEnum
Note	Behavior options of the Port Access Entity in case MACsec does not succeed. Tags: atp.Status=candidate
Aggregated by	MacSecProps.onFailPermissiveMode
Literal	Description
never	The controlled port will never be set to enabled if the participants cannot establish and successfully use a MACsec Secure Channel. Tags: atp.EnumerationLiteralIndex=0
timeout	The controlled port will be set to enabled and MACsec will not be used in the port if the timeout value (onFailPermissiveModeTimeout) is reached and the following conditions apply: - A participant belonging to the same CA was recognized and authenticated. - A secure channel could be established. - Both participants can transmit and receive MACsec protected traffic through the SC. Tags: atp.EnumerationLiteralIndex=1

Table 7.44: MacSecFailPermissiveModeEnum

For MACsec to start up, a key distribution based according to the MAC Security Key Agreement (MKA) protocol runs first. The Connectivity Association Key (CAK) used for MKA is referenced as [MacSecKeyParticipant.cak](#). The Connectivity Key Name (CKN), which identifies the CAK, is described by the parameter [MacSecKeyParticipant.connectivityKeyName](#) (CKN). The CAK and the CKN must match on both ends of a link to create a MACsec-secured link.

In addition, user may choose to allow additional Ethernet frames unprotected, e.g., for installing keys into ECUs. These frames can be selected via so-called bypass rules based on e.g., EtherType or VLAN-ID defined in [MacSecGlobalKayProps](#).

Each [MacSecKeyParticipant](#) that is referenced by [MacSecLocalKayProps](#) in the role [mkaParticipant](#) defines the Connectivity Association Key and the [MacSecCryptoAlgoConfig](#). The [MacSecKeyParticipant](#) settings in the connectivity association need to match on both [CouplingPorts](#) of the link to enable MACsec.

For better control and predictability, the MAC Security Key Agreement participant that will get the KeyServer role (the node generating the MACsec Key for this link) can be configured by [role](#).

7.2.4 Partial Network

AUTOSAR supports power saving during vehicle operation time with the partial networking mechanism. This mechanism allows shutting down and starting up the bus communication interfaces of groups of ECUs (Partial Network Cluster) during normal bus communication.

On the VFB Level Partial Networks are represented by Virtual Function Clusters and are described with [PortGroups](#). The Virtual Function Cluster groups the communication necessary to realize one or more vehicle functions that can become activated/deactivated during normal vehicle operation. The Virtual Function Clusters are mapped onto Partial Network Clusters.

[TPS_MANI_03224] **Modeling of a Partial Network Cluster** [A Partial Network Cluster is modeled with the `PncMapping` element and is identified by the `pncIdentifier`. The `PncMapping` defines the collection of `AdaptivePlatformServiceInstances` that are participating in the partial network with the `PncMapping.serviceInstance` reference.]

[TPS_MANI_03225] **References to VLANs in `PncMapping`** [There are two ways for a `PncMapping` to relate to a VLAN or an untagged channel:

- via the reference from `PncMapping` to `PhysicalChannel` in the role `physicalChannel`,
- via a `ServiceInstanceToMachineMapping` that maps the `AdaptivePlatformServiceInstance` and that also refers an `EthernetCommunicationConnector` that in turn is connected to an `EthernetPhysicalChannel` via the `unicastNetworkEndpoint`.

The two options are not mutually exclusive, they can exist at the same time.]

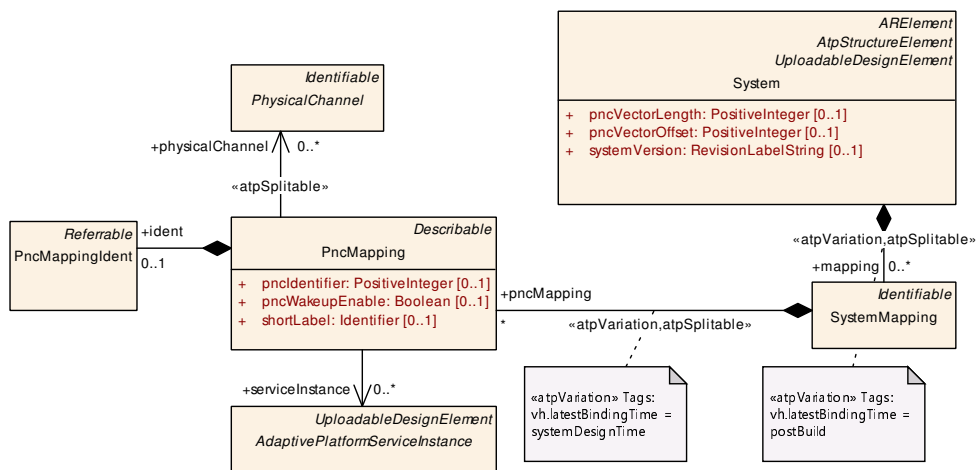


Figure 7.7: PncMapping with collection of ServiceInstances that are participating in the Partial Network Cluster

Class	SystemMapping			
Note	The system mapping aggregates all mapping aspects that are relevant in the System Description.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	System.mapping			
Attribute	Type	Mult.	Kind	Note
pncMapping	PncMapping	*	aggr	Mappings between Virtual Function Clusters and Partial Network Clusters. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=pncMapping, pncMapping.variation Point.shortLabel vh.latestBindingTime=systemDesignTime

Table 7.45: SystemMapping

Class	PncMapping			
Note	Describes a mapping between one or several Virtual Function Clusters onto Partial Network Clusters. A Virtual Function Cluster is realized by a PortGroup. A Partial Network Cluster is realized by one or more ServiceInstances.			
Base	ARObject, Describable			
Aggregated by	SystemMapping.pncMapping			
Attribute	Type	Mult.	Kind	Note
ident	PncMappingIdent	0..1	aggr	This adds the ability to become referable to PncMapping.
physical Channel	PhysicalChannel	*	ref	This reference maps the partial network to a communication channel. Stereotypes: atpSplitable Tags: atp.Splitkey=physicalChannel
pncConsumed Provided ServiceInstance Group	ConsumedProvided ServiceInstanceGroup	*	ref	ConsumedProvidedServiceInstanceGroup used in a Partial Network Cluster. This reference is optional, since this could be used for starting and stopping Consumed ProvidedServiceInstanceGroup according to the requested partial network, but is not necessarily needed. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=pncConsumedProvidedServiceInstanceGroup.consumedProvidedServiceInstanceGroup, pnc ConsumedProvidedServiceInstanceGroup.variation Point.shortLabel vh.latestBindingTime=postBuild
pncIdentifier	PositiveInteger	0..1	attr	Identifier of the Partial Network Cluster. This number represents the absolute bit position of this Partial Network Cluster in the NM Pdu.
pncWakeup Enable	Boolean	0..1	attr	If this parameter is available and set to true then this PNC will be woken up as soon as a channel wakeup occurs on a channel where this PNC is assigned to. This is ensured by adding this PNC to the corresponding channel wakeup sources during upstream mapping. Tags: atp.Status=obsolete
serviceInstance	AdaptivePlatform ServiceInstance	*	ref	Reference to ServiceInstances that are participating in a Partial Network Cluster. This Attribute is only used by the AUTOSAR Adaptive Platform.
shortLabel	Identifier	0..1	attr	This attribute specifies an identifying shortName for the PncMapping. It shall be unique in the System scope.
vfc	PortGroup	*	iref	Virtual Function Cluster to be mapped onto a Partial Network Cluster. This reference is optional in case that the System Description doesn't use a complete Software Component Description (VFB View). This supports the inclusion of legacy systems. InstanceRef implemented by: PortGroupInSystem InstanceRef

Table 7.46: PncMapping

7.3 Specification of Application Software System Structure

The root element of a System Design model is the [System](#) element that is already known from the AUTOSAR classic platform. The [System](#) aggregates the [RootSwCompositionPrototype](#) that represents the top-level-composition of all software components that are available in a given system.

[TPS_MANI_03110] Allowed components in system description with [category SYSTEM DESIGN DESCRIPTION](#). [[SwComponentPrototypes](#) nested inside the

`CompositionSwComponentType` that is referenced by the `RootSwComposition-Prototype` of a `System` with category `SYSTEM_DESIGN_DESCRIPTION` are allowed to be of any `SwComponentType` that is supported by Classic or by Adaptive AUTOSAR.]

Class	RootSwCompositionPrototype			
Note	The <code>RootSwCompositionPrototype</code> represents the top-level-composition of software components within a given System. According to the use case of the System, this may for example be a more or less complete VFB description, the software of a System Extract or the software of a flat ECU Extract with only atomic SWCs. Therefore the <code>RootSwComposition</code> will only occasionally contain all atomic software components that are used in a complete VFB System. The OEM is primarily interested in the required functionality and the interfaces defining the integration of the Software Component into the System. The internal structure of such a component contains often substantial intellectual property of a supplier. Therefore a top-level software composition will often contain empty compositions which represent subsystems. The contained <code>SwComponentPrototypes</code> are fully specified by their <code>SwComponentTypes</code> (including <code>PortPrototypes</code>, <code>PortInterfaces</code>, <code>VariableDataPrototypes</code>, <code>SwcInternalBehavior</code> etc.), and their ports are interconnected using <code>SwConnectorPrototypes</code>.			
Base	<code>ARObject</code> , <code>AtpFeature</code> , <code>AtpPrototype</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>AtpClassifier.atpFeature</code> , <code>System.rootSoftwareComposition</code>			
Attribute	Type	Mult.	Kind	Note
software Composition	<code>CompositionSwComponentType</code>	0..1	tref	We assume that there is exactly one top-level composition that includes all Component instances of the system. Stereotypes: <code>isOfType</code>

Table 7.47: RootSwCompositionPrototype

If a Software Component communicates over the service oriented communication and provides or requires a `ServiceInterface` the opposite communication end is not always known upfront. In the `System` with category `SYSTEM_DESIGN_DESCRIPTION` a System Designer may want to indicate the service oriented communication between endpoints if it is already known at the System Design time.

[TPS_MANI_03114] Usage of `AssemblySwConnectors` in the System Design model [In the `System` with category `SYSTEM_DESIGN_DESCRIPTION` it is allowed to indicate the service oriented communication between two communication endpoints by `AssemblySwConnectors` if the required `RPortPrototype` is searching for a specific service instance, i.e. if the `RPortPrototypeProps.searchIntention` is set to `searchForSpecificInstance`.

If the `searchIntention` is set to `searchForAllInstances`, the `AssemblySwConnector` shall not be used to connect this `RPortPrototype`.]

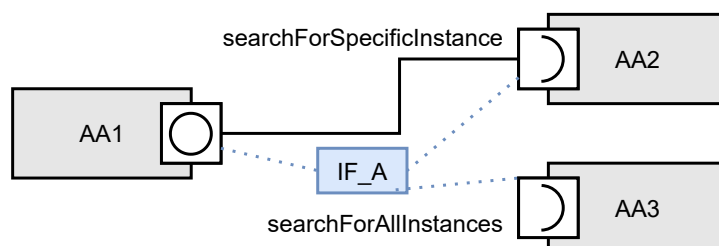


Figure 7.8: Example for Assembly connectors in System Design model

7.4 Modeling of service oriented communication between Classic and Adaptive platform

AUTOSAR classic platform does not support [ServiceInterfaces](#) yet but provides the possibility to communicate in a service oriented way over SOME/IP. To mimic a [ServiceInterface](#) in the classic platform any combination of [ClientServerInterfaces](#), [SenderReceiverInterfaces](#) or [TriggerInterfaces](#) may be used to describe a service to which later a SOME/IP Service ID is assigned.

To simplify the description of the service oriented communication between Classic and Adaptive Software components in a System design model the [InterfaceMapping](#) was introduced that allows to map elements of [PortInterfaces](#) of the Classic Platform to a single [ServiceInterface](#) of the Adaptive Platform.

Class	InterfaceMapping			
Note	This meta-class collects the mappings of elements of a single ServiceInterface to PortInterface elements of the AUTOSAR Classic Platform. Tags: atp.recommendedPackage=InterfaceMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
eventMapping	EventMapping	*	aggr	Mapping of a VariableDataPrototype in a SenderReceiver Interface to an Event in a ServiceInterface.
fieldMapping	FieldMapping	*	aggr	Mapping of a Field in a ServiceInterface to ClientServer Operations that represent the getter and setter methods and to a VariableDataPrototype that represents the notifier in the Field.
fireAndForget MethodMapping	FireAndForgetMethodMapping	*	aggr	Mapping of a Fire&Forget Method that is located in a ServiceInterface to a VariableDataPrototype in a Sender ReceiverInterface or to a Trigger in a TriggerInterface.
methodMapping	MethodMapping	*	aggr	Mapping of a ClientServerOperation in a ClientServer Interface to a Method in a ServiceInterface.

Table 7.48: InterfaceMapping

[constr_3370] [InterfaceMapping](#) shall map all elements of a single [ServiceInterface](#)

Imposition time: IT_SysDes

[The mappings that are included in an [InterfaceMapping](#) shall map all elements of a single [ServiceInterface](#) (i.e. [fields](#), [events](#), [methods](#)) to [PortInterface](#) elements of the classic platform.]

[Figure 7.10](#) shows a possible System Design modeling approach where an a piece of application software is communicating in a service oriented way over SOME/IP with classic Software Components. SWC_1 requires a [ClientServerInterface](#) IF_Y with a [ClientServerOperation](#) and a [SenderReceiverInterface](#) IF_X with a [VariableDataPrototype](#). SWC_2 requires a [SenderReceiverInterface](#) IF_X with a [VariableDataPrototype](#).

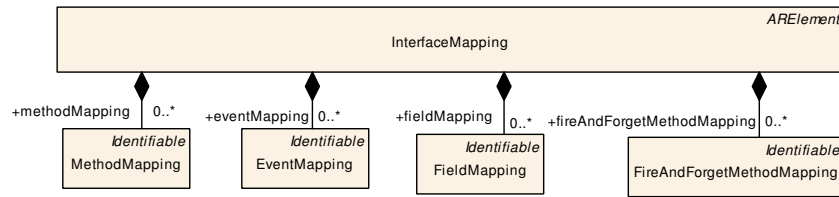


Figure 7.9: InterfaceMapping Overview

The two [PortInterfaces](#) IF_X and IF_Y are mapped to a single [ServiceInterface](#) IF_A using an [InterfaceMapping](#).

On the other side the application software AA1 provides the [ServiceInterface](#) IF_A.

Note that this is a mapping on [PortInterface](#) level. If each [PortInterface](#) is only used once in a network the actual communication can be directly derived out of the [InterfaceMapping](#).

If [PortInterfaces](#) are used several times on a network there is the need to take the network configuration into account in order to be able to emulate how the service discovery will behave on the network. From this information the actual communication relations on software level can be deduced.

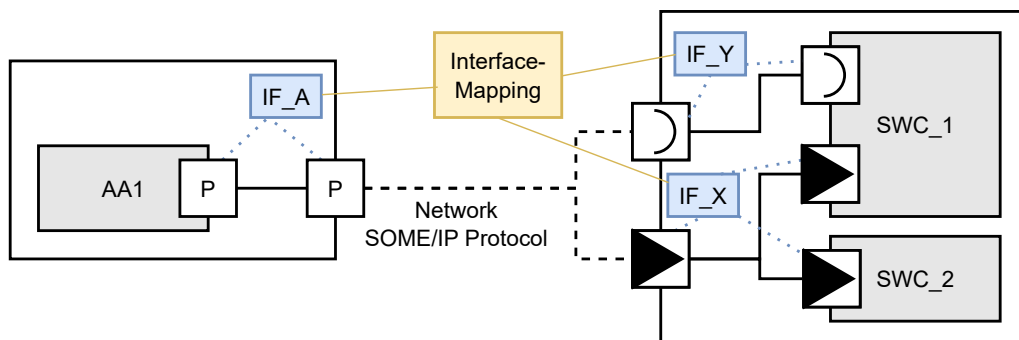


Figure 7.10: Example for a modeling of Service Oriented communication between application software on the *AUTOSAR adaptive platform* and Software Components of the Classic Platform

7.4.1 MethodMapping

[TPS_MANI_03111] Mapping between [method](#) and [operation](#) located in a [ClientServerInterface](#) [The mapping between a [method](#) located in a [ServiceInterface](#) and a [operation](#) located in a [ClientServerInterface](#) is provided by the class [MethodMapping](#).]

Class	MethodMapping			
Note	Mapping of a ClientServerOperation that is located in a ClientServerInterface to a Method that is located in a ServiceInterface. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	InterfaceMapping.methodMapping			
Attribute	Type	Mult.	Kind	Note
clientServerOperation	ClientServerOperation	0..1	ref	Reference to a ClientSeverOperation that is located in a ClientSeverInterface.
method	ClientServerOperation	0..1	ref	Reference to a Method that is located in a Service Interface.

Table 7.49: MethodMapping

[advisory_01000] Existence of the reference [MethodMapping.clientServerOperation](#)

Imposition time: [IT_SysDes](#)

[For each [MethodMapping](#), the reference in the role [MethodMapping.clientServerOperation](#) should exist.]

[advisory_01001] Existence of reference [MethodMapping.method](#)

Imposition time: [IT_SysDes](#)

[For each [MethodMapping](#), the reference in the role [MethodMapping.method](#) should exist.]

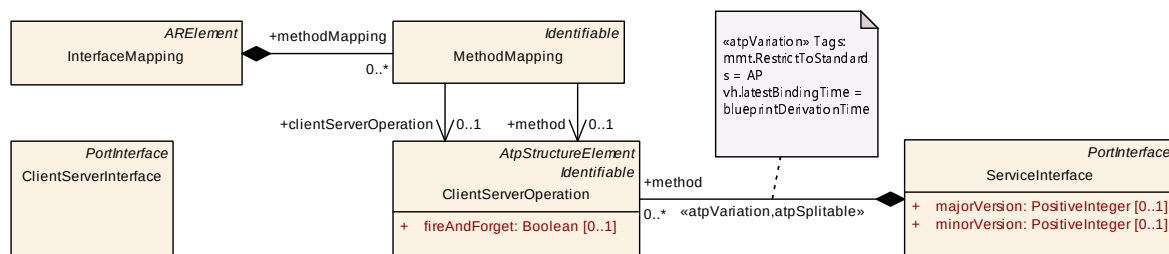


Figure 7.11: Mapping of a Method to a ClientServerOperation

7.4.2 EventMapping

[TPS_MANI_03112] Mapping between an [event](#) and a [dataElement](#) [The mapping between an [event](#) located in a [ServiceInterface](#) and a [dataElement](#) located in a [SenderReceiverInterface](#) is provided by the class [EventMapping](#).]

Class	EventMapping
Note	Mapping of a VariableDataPrototype that is located in a SenderReceiverInterface to an Event that is located in a ServiceInterface. This Class is only used by the AUTOSAR Adaptive Platform.





Class	EventMapping			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	InterfaceMapping.eventMapping			
Attribute	Type	Mult.	Kind	Note
dataElement	VariableDataPrototype	0..1	ref	Reference to a VariableDataPrototype that is located in a SenderReceiverInterface .
event	VariableDataPrototype	0..1	ref	Reference to an Event that is located in a Service Interface .

Table 7.50: EventMapping

[advisory_01002] Existence of reference [EventMapping.dataElement](#)

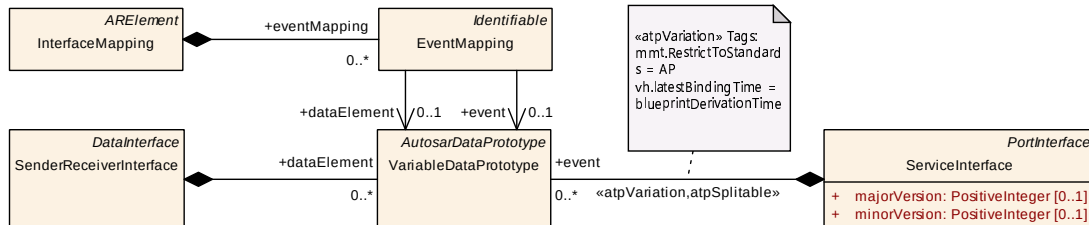
Imposition time: [IT_SysDes](#)

[For each [EventMapping](#), the reference in the role [EventMapping.dataElement](#) should exist.]

[advisory_01003] Existence of reference [EventMapping.event](#)

Imposition time: [IT_SysDes](#)

[For each [EventMapping](#), the reference in the role [EventMapping.event](#) should exist.]


Figure 7.12: Mapping between an [event](#) and a [dataElement](#)

7.4.3 FieldMapping

[TPS_MANI_03113] Mapping between a [field](#) and elements of Classic Platform [PortInterfaces](#) [The mapping between a [field](#) located in a [ServiceInterface](#) and elements of Classic Platform [PortInterfaces](#) is provided by the class [FieldMapping](#). The field notifier in the classic platform is represented by a [dataElement](#) that is located in a [SenderReceiverInterface](#). The getter and setter methods in the classic platform are represented by [operations](#) that are located in a [ClientServerInterface](#).]

[constr_3367] [FieldMapping.notifierDataElement](#) reference

Imposition time: [IT_SysDes](#)

[The [FieldMapping](#) shall only contain the [notifierDataElement](#) reference if the [hasNotifier](#) attribute in the referenced [field](#) is set to true.]

[constr_3368] **FieldMapping**.getterOperation reference

Imposition time: IT_SysDes

[The **FieldMapping** shall only contain the **getterOperation** reference if the **has-Getter** attribute in the referenced **field** is set to true.]

[constr_3369] **FieldMapping**.setterOperation reference

Imposition time: IT_SysDes

[The **FieldMapping** shall only contain the **setterOperation** reference if the **has-Setter** attribute in the referenced **field** is set to true.]

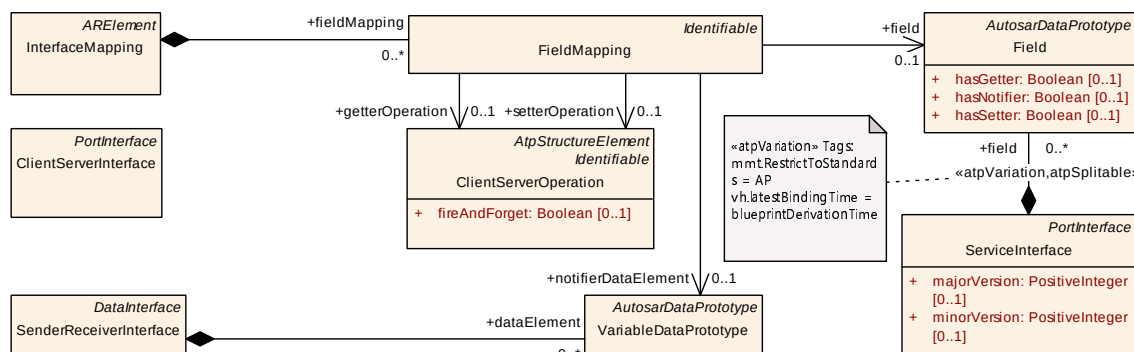


Figure 7.13: Mapping between a **field and elements of Classic Platform **PortInterfaces****

Class	FieldMapping			
Note	Mapping of a Field that is located in a ServiceInterface to ClientServerOperations that represent the getter and setter methods and to a VariableDataPrototype that represents the notifier in the Field. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	InterfaceMapping.fieldMapping			
Attribute	Type	Mult.	Kind	Note
field	Field	0..1	ref	Reference to a field that is located in a ServiceInterface.
getterOperation	ClientServerOperation	0..1	ref	Reference to a ClientServerOperation that represents the getter Method in the Field.
notifierData Element	VariableDataPrototype	0..1	ref	Reference to a VariableDataPrototype that represents the notifier in the Field.
setterOperation	ClientServerOperation	0..1	ref	Reference to a ClientServerOperation that represents the setter Method in the Field.

Table 7.51: FieldMapping

[advisory_01004] Existence of reference **FieldMapping**.field

Imposition time: IT_SysDes

[For each **FieldMapping**, the reference in the role **FieldMapping**.field should exist.]

[advisory_01005] Existence of references `FieldMapping.getterOperation`, `setterOperation`, and `notifierDataElement`

Imposition time: `IT_SysDes`

[For each `FieldMapping`, at least one of the references in the role

- `FieldMapping.getterOperation`
- `FieldMapping.setterOperation`
- `FieldMapping.notifierDataElement`

should exist.]

7.4.4 FireAndForgetMethodMapping

In a fire and forget Message Exchange Pattern the consumer sends a message to a provider with no expectation of a response as described in [Chapter 4.2.5.1](#).

On the *AUTOSAR adaptive platform*, the fire and forget method is described with a `method` where the value of attribute `method.fireAndForget` is set to `true` as defined by [\[TPS_MANI_01064\]](#).

On the *AUTOSAR classic platform*, a fire and forget method can not be described with a `ClientServerOperation` since a client-server call always has a response. Therefore, a `VariableDataPrototype` is used if the fire and forget method contains input arguments.

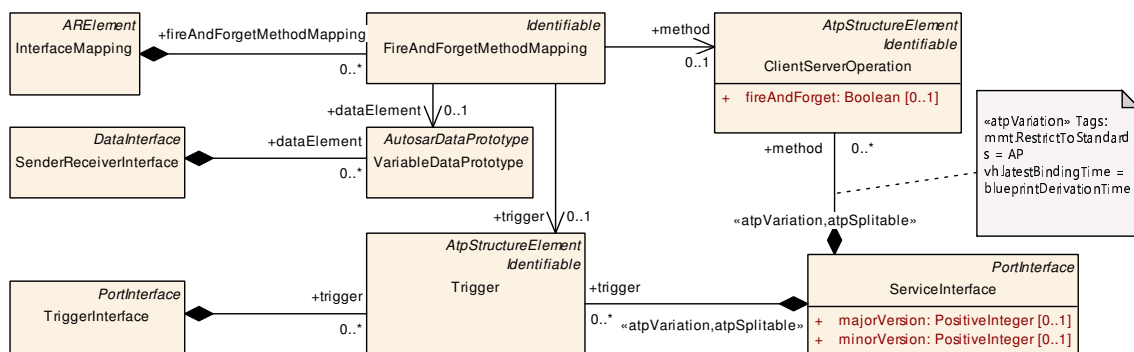


Figure 7.14: Mapping between a fire and forget `method` and elements of Classic Platform `PortInterfaces`

If the fire and forget method contains several input arguments then the `VariableDataPrototype` needs to be of type `Structure` that hosts one element for each argument of the fire and forget method. It is important that the order of elements in the `Structure` is the same as the order of `ArgumentDataPrototypes` within the `ClientServerOperation`.

This representation ensures that the SOME/IP serialization results in the same byte stream as in the Adaptive Platform where all `arguments` which have the `direction`

in are serialized according to the order of the `ArgumentDataPrototypes` within the `ClientServerOperation`.

If the fire and forget method is without any parameters a `Trigger` is used to describe such a method on the *AUTOSAR classic platform*.

It is important that the SOME/IP MessageType is set to REQUEST_NO_RETURN if a fire and forget method is transmitted over SOME/IP.

[TPS_MANI_03115] Mapping between a fire and forget `method` and elements of Classic Platform `PortInterfaces` [The mapping between a `method` for which the value of attribute `method.fireAndForget` is set to `true` and elements of Classic Platform `PortInterfaces` is provided by the class `FireAndForgetMethodMapping`.

If the fire and forget method is represented on the *AUTOSAR classic platform* by a `VariableDataPrototype` then this `dataElement` is mapped to a `method` located in a `ServiceInterface`. If the fire and forget method is represented on the *AUTOSAR classic platform* by a `Trigger` then this `trigger` is mapped to a `method` located in a `ServiceInterface`.]

[constr_3371] Mutually exclusive existence of `FireAndForgetMethodMapping.dataElement` reference and `FireAndForgetMethodMapping.trigger` reference

Imposition time: `IT_SysDes`

[A `FireAndForgetMethodMapping` shall never reference a `dataElement` and a `trigger` at the same time.]

[constr_3376] `FireAndForgetMethodMapping` shall reference only fire and forget `methods`

Imposition time: `IT_SysDes`

[A `FireAndForgetMethodMapping` is only allowed to reference a `ClientServerOperation` in role `method` for which the value of attribute `method.fireAndForget` is set to `true`.]

Class	FireAndForgetMethodMapping			
Note	Mapping of a Fire&Forget Method that is located in a ServiceInterface to a VariableDataPrototype in a SenderReceiverInterface or to a Trigger in a TriggerInterface. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	InterfaceMapping.fireAndForgetMethodMapping			
Attribute	Type	Mult.	Kind	Note
dataElement	<code>VariableDataPrototype</code>	0..1	ref	Reference to a VariableDataPrototype that is located in a SenderReceiverInterface in case that the Fire&Forget Method is represented by this VariableDataPrototype.





Class	FireAndForgetMethodMapping			
method	ClientServerOperation	0..1	ref	Reference to a Fire&Forget Method that is located in a ServiceInterface.
trigger	Trigger	0..1	ref	Reference to a Trigger that is located in a TriggerInterface in case that the Fire&Forget Method is represented by this Trigger.

Table 7.52: FireAndForgetMethodMapping

[advisory_01006] Existence of reference [FireAndForgetMethodMapping.method](#)

Imposition time: IT_SysDes

[For each [FireAndForgetMethodMapping](#), the reference in the role [FireAndForgetMethodMapping.method](#) should exist.]

[advisory_01007] Existence of references [FireAndForgetMethodMapping.dataElement](#) and [FireAndForgetMethodMapping.trigger](#)

Imposition time: IT_SysDes

[For each [FireAndForgetMethodMapping](#), at least one of the references in the role

- [FireAndForgetMethodMapping.dataElement](#)
- [FireAndForgetMethodMapping.trigger](#)

should exist.]

7.5 Crypto System Design

A cryptographic key is being used in different roles, as sketched in [Figure 7.15](#):

1. Code that accesses the cryptographic key can be one of several **owners** of the cryptographic key and therefore assume read and write access to the cryptographic key.
2. Code that accesses the cryptographic key may be restricted to read access, without the permission to change. This code would be one of several **users** of the cryptographic key.

The benefit of formally describing the relation between cryptographic keys (represented by meta-class [CryptoKeySlotDesign](#)) and the users of these keys (represented by meta-class [CryptoKeySlotUserDesign](#)) via the [CryptoKeySlotUsageDesign](#) is that a formal check for completeness and consistency becomes possible.

Another aspect is that the modeling of these relations can be taken as the recipe for handling cryptographic keys in a further design step, in which [CryptoKeySlotUserDesign](#) corresponds to meta-class [Executable](#) and [CryptoKeySlotUsageDesign](#) corresponds to [RPortPrototype](#).

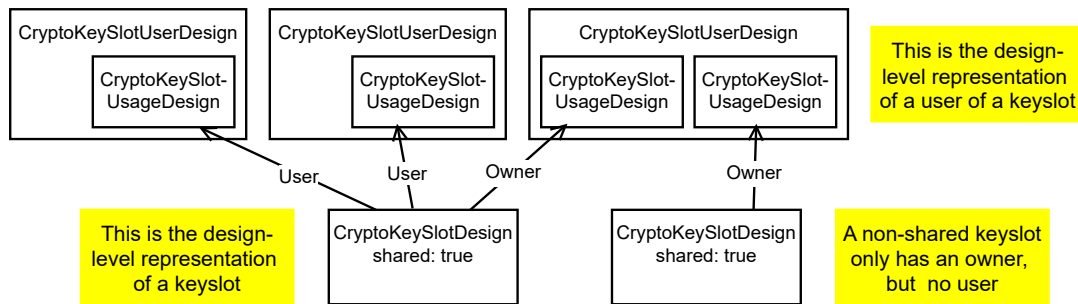


Figure 7.15: Example for a high-level crypto design as part of the System Design model

[constr_10612] Standardized values for attribute `CryptoKeySlotDesignDescription.cryptoObjectType`

Imposition time: `IT_SysDes`

[In the context of `CryptoKeySlotDesignDescription.cryptoObjectType`, only the following values shall be used:

- `PUBLIC_KEY`
- `PRIVATE_KEY`
- `SYMMETRIC_KEY`

]

The correspondence between `CryptoKeySlotDesign` and meta-class `CryptoKeySlot` can be tracked even further down to the *target configuration phase*.

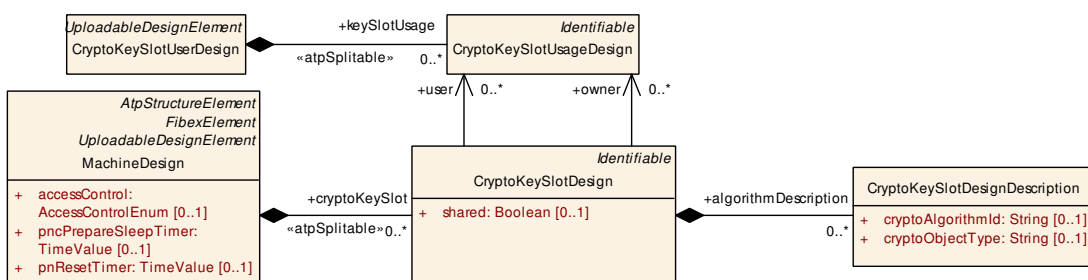


Figure 7.16: High-level crypto system design

The values for attribute `CryptoKeySlotDesignDescription.cryptoAlgorithmId` listed in [TPS_MANI_01470] are **standardized** by AUTOSAR.

The list of crypto algorithms contained in [TPS_MANI_01470] represents an open list. This means that it is possible to use a custom value in attribute `CryptoKeySlotDesignDescription.cryptoAlgorithmId`, provided that the custom value is guaranteed to not clash with future extensions of the standard.

This protection against a future name clash can be achieved by adding a name fragment (e.g. a company name) to the custom value that is highly unlikely to appear in a future extension of the standard.

[TPS_MANI_01470] Standardized values of attribute **CryptoKeySlotDesignDescription.cryptoAlgorithmId** [

Algorithm ID	Description
<i>Symmetric Algorithms</i>	
AES_128	AES-128
AES_256	AES-256
CHACHA	ChaCha
SM4	SM4
HMAC_128	HMAC/128
HMAC_256	HMAC/256
<i>Asymmetric Algorithms</i>	
RSA_2048	RSA-2048
RSA_4096	RSA-4096
ED25519	ed25519
ED448	ed448
SECP256R1	secp256r1
SECP384R1	secp384r1
SECP521R1	secp521r1
<i>Key Exchange</i>	
X25519	x25519
X448	x448
<i>PQC</i>	
ML_DSA_44	ML-DSA/44
ML_DSA_65	ML-DSA/65
ML_DSA_87	ML-DSA/87
SLH_DSA_128	SLH-DSA/128
SLH_DSA_192	SLH-DSA/192
SLH_DSA_256	SLH-DSA/256
ML_KEM_512	ML-KEM/512
ML_KEM_768	ML-KEM/768
ML_KEM_1024	ML-KEM/1024

]

[constr_10613] **CryptoKeySlotDesign** where attribute **shared** is set to **false**

Imposition time: IT_SysDes

[A **CryptoKeySlotDesign** where attribute **shared** is set to **false** shall not refer to a **CryptoKeySlotUsageDesign** in the role **user**.]

Class	CryptoKeySlotDesign			
Note	This meta-class represents a key slot on the design level. This class is used to create a model of the usage of key slots so that owners and users of the key slot can be described, as the basis for consistency checking of the overall design. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	MachineDesign.cryptoKeySlot			
Attribute	Type	Mult.	Kind	Note
algorithm Description	CryptoKeySlotDesign Description	*	aggr	This aggregation contains the collection of crypto algorithm descriptions that can be used in the context of the enclosing crypto key slot design.
owner	CryptoKeySlotUsage Design	*	ref	This reference attributes an owner of the enclosing crypto key slot design.
shared	Boolean	0..1	attr	This attribute controls whether the cryptographic key is shared with at least one user.
user	CryptoKeySlotUsage Design	*	ref	This reference attributes a user of the enclosing crypto key slot design.

Table 7.53: CryptoKeySlotDesign

[constr_10614] Existence of attribute [CryptoKeySlotDesign.shared](#)

Imposition time: [IT_SysDes](#)

[For each [CryptoKeySlotDesign](#), the attribute [shared](#) shall exist.]

Class	CryptoKeySlotUserDesign			
Note	This meta-class represents an abstracted user (application) of a crypto key slot on design level. Tags: atp.recommendedPackage=CryptoKeySlotDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , Packageable Element , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
keySlotUsage	CryptoKeySlotUsage Design	*	aggr	This aggregation represents the collection of key slot usages in the context of the enclosing CryptoKeySlotUser Design. Stereotypes: atp.Splitable Tags: atp.Splitkey=keySlotUsage.shortName

Table 7.54: CryptoKeySlotUserDesign

[advisory_01016] Existence of the aggregation in the role [CryptoKeySlotUserDesign.keySlotUsage](#)

Imposition time: [IT_SysDes](#)

[For each [CryptoKeySlotUserDesign](#), the aggregation in the role [keySlotUsage](#) should exist.]

Class	CryptoKeySlotDesignDescription			
Note	This meta-class is used to provide properties of the crypto algorithm on design level. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	CryptoKeySlotDesign.algorithmDescription			
Attribute	Type	Mult.	Kind	Note
cryptoAlgorithmId	String	0..1	attr	This attribute describes the identity of the crypto algorithm.
cryptoObjectType	String	0..1	attr	This attribute describes the type of the crypto algorithm.

Table 7.55: CryptoKeySlotDesignDescription

Class	CryptoKeySlotUsageDesign			
Note	This meta-class represents the concrete usage (on design level) of a cryptographic key. Tags: atp.recommendedPackage=CryptoKeySlotDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	CryptoKeySlotUserDesign.keySlotUsage			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 7.56: CryptoKeySlotUsageDesign

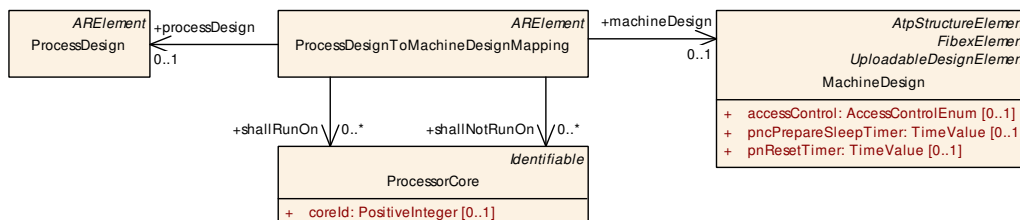
7.6 Process Design to Machine Design Mapping

[TPS_MANI_01229] Pre-allocation of a given **ProcessDesign** on a specific **MachineDesign** [It is possible to pre-allocate a given **ProcessDesign** on a specific **MachineDesign**. For this purpose meta-class **ProcessDesignToMachineDesignMapping** exists.]

[constr_1693] Relation of **Executable**, **ProcessDesign**, and **Process**

Imposition time: *IT_SysDes*

[Any **Executable** that is referenced by a **ProcessDesign** shall also be referenced by every **Process** that references the **ProcessDesign**.]


Figure 7.17: Modeling of the **ProcessDesignToMachineDesignMapping**

Class	ProcessDesignToMachineDesignMapping			
Note	This element is used in the design phase to predefine a mapping of a process to a machine. Such a mapping may be overruled in the target-configuration phase. Tags: atp.recommendedPackage=ProcessDesignToMachineDesignMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
machineDesign	MachineDesign	0..1	ref	This reference identifies the MachineDesign in the context of the ProcessDesignToMachineDesignMapping.
processDesign	ProcessDesign	0..1	ref	This reference identifies the ProcessDesign in the context of the ProcessDesignToMachineDesignMapping.
shallNotRunOn	ProcessorCore	*	ref	This reference indicates a collection of cores onto which the mapped process shall not be executing.
shallRunOn	ProcessorCore	*	ref	This reference indicates a collection of cores onto which the mapped process shall be executing.

Table 7.57: ProcessDesignToMachineDesignMapping**[constr_10154] Multiplicity of reference in the role [ProcessDesignToMachineDesignMapping.processDesign](#)***Imposition time:* IT_SysDes

[For each [ProcessDesignToMachineDesignMapping](#), the reference in the role [processDesign](#) shall exist.]

[constr_10657] Multiplicity of reference in the role [ProcessDesignToMachineDesignMapping.machineDesign](#)*Imposition time:* IT_SysDes

[For each [ProcessDesignToMachineDesignMapping](#), the reference in the role [machineDesign](#) shall exist.]

Please note that an intended [ProcessDesignToMachineDesignMapping](#) may not be possible for utilization of the target machine and therefore a different [ProcessToMachineMapping](#) may be created in the target-configuration phase.

8 Sub-System Design

8.1 Overview

The nature of the *AUTOSAR adaptive platform* as a platform for deploying software units in the field implies that the software units that can be installed in the field need some design-support upfront.

More specifically, the software units that can be deployed in the field typically represent some sort of more or less self-contained driving function.

In other words, the design support for this purpose need to be tailored to facilitate the design of application-level software that communicates with other application level software.

It is assumed that one of the first steps in such a design is the definition of services that are provided and services that are required by the driving function under development.

Such a definition of required and provided services can be used as an input into the design of other such driving functions and, over time, a view of the communication on the level of driving functions is rendered.

It is further assumed that the communication view of the driving functions is mostly of interest for an OEM and the individual driving functions may be sub-contracted to tier-1 suppliers.

This means that for the tier-1 supplier the list of provided and required services of the driving function represents a technical contract against which the function shall be developed.

On design level, meta-class `SoftwareClusterDesign` is used for the formalization of software that might represent such a driving function. In other words, it is assumed that a workflow exists where the design of a certain functionality on the AUTOSAR adaptive platform starts with the creation of a `SoftwareClusterDesign`.

In this case, it is further assumed that the definition of the required and provided service instances for the respective functionality is a good starting point for the development.

8.2 Software Cluster Design

The creation of a `SoftwareCluster` (see [Chapter 16.3](#)) represents a complex workflow that has to be done in the target-configuration phase of the overall methodology for the *AUTOSAR adaptive platform*.

In order to reduce the complexity of this step in the workflow, AUTOSAR supports a front-loading approach for the definition of a `SoftwareCluster`, the modeling of `SoftwareClusterDesign`. In this context, the term “front-loading” means that some model elements defined in the context of a `SoftwareClusterDesign` can be (directly) taken over for the creation of a corresponding `SoftwareCluster`.

The membership of model elements to a given `SoftwareClusterDesign` is expressed by means of references to the respective model elements. The referenced model elements are “claimed” by the referencing `SoftwareClusterDesign`.

The pattern established by these references is very similar to the pattern established by means of the modeling of `System.fibexElement` or `DiagnosticContributionSet.element`.

Please note that the modeling of `SoftwareClusterDesign` prioritizes the usage of references over the usage of aggregations because the migration from `SoftwareClusterDesign` to `SoftwareCluster` is much facilitated no actual copying of model elements is required, only the content of references have to be taken over in the migration.

[TPS_MANI_01112] Semantics of `SoftwareClusterDesign` [The existence of a `SoftwareClusterDesign` represents the formalized response to requirements that have initially been formulated by an OEM and that may be enriched as the development of the software progresses.

Finally, the `SoftwareClusterDesign` shall be taken by the integration as a further input to the definition of the result of the integration step: the definition of the `SoftwareCluster`.

On the other hand, the `SoftwareClusterDesign` also imposes a contract with respect to certain model elements. In other words, the requirements imposed by an OEM shall be subject to fulfillment in the downstream processing.]

As an example for the contractual relevance of a `SoftwareClusterDesign`, if a `SoftwareCluster` that references a given `SoftwareClusterDesign` in the role `design`, then any `Process` that is referenced by the `SoftwareCluster` in the role `containedProcess` shall also refer to a `ProcessDesign` that is aggregated by the referenced `SoftwareClusterDesign`.

[constr_1560] Usage of `SoftwareClusterDesign.requiredARElement`

Imposition time: `IT_SubSysDes`

[The reference `SoftwareClusterDesign.requiredARElement` shall not be used to refer to another `SoftwareClusterDesign` or even `SoftwareCluster`.]

[TPS_MANI_01369] Semantics of reference `SoftwareClusterDesign.requiredARElement` [The reference `SoftwareClusterDesign.requiredARElement` is used to identify all model elements that are typed by a sub-class of meta-class `ARElement`. This way, it is possible to express which model elements belong to the enclosing `SoftwareClusterDesign`.]

[TPS_MANI_01211] Specification of executable software within `SoftwareClusterDesign` [One of the most prominent contents of an uploadable software package is the reference to the executable software.

Within the definition of a `SoftwareClusterDesign`, this reference is implicitly given by means of the reference `SoftwareClusterDesign.containedProcess`.

The target of `SoftwareClusterDesign.containedProcess` is a `ProcessDesign` that represents the design-level representation of an instance (formalized as `Process`) of the corresponding executable program (the software image), formalized as `Executable`]

[TPS_MANI_01331] Standardized values of attribute `SoftwareClusterDesign.category` and `SoftwareCluster.category` [AUTOSAR standardizes the following values of attribute `SoftwareClusterDesign.category` and `SoftwareCluster.category`.

- **PLATFORM_CORE:** a `SoftwareClusterDesign/SoftwareCluster` of this `category` typically represents any kind of platform software, e.g. bootloader, hypervisor, OS, adaptive platform module.

Such a `SoftwareClusterDesign/SoftwareCluster` cannot be removed by a UCM, but updates are possible. Please note that it is not forbidden that such a `SoftwareClusterDesign/SoftwareCluster` contains application level software.

- **PLATFORM:** a `SoftwareClusterDesign/SoftwareCluster` of this `category` represents the parts of the platform software (e.g. configuration of functional clusters) that could be installed, removed, and updated.
- **APPLICATION_LAYER:** a `SoftwareClusterDesign/SoftwareCluster` of this `category` represents a driving-relevant function on application level, e.g. a lane keeping assistant, window lift controller, seat positioning. Such a `SoftwareClusterDesign/SoftwareCluster` can be installed, removed, and updated.

]

[TPS_MANI_01410] Semantics of attribute `SoftwareClusterDesign.installationBehavior` [Attribute `SoftwareClusterDesign.installationBehavior` determines the behavior of a derived `SoftwareCluster` in terms of whether it will be allowed to remove a derived `SoftwareCluster` from the target machine.

Of course, the attribute `SoftwareClusterDesign.installationBehavior` actually applies to a derived `SoftwareCluster`. But the definition of the installation behavior is considered an important design decision (and is thus made during the creation of a `SoftwareClusterDesign`) that cannot be left to the considerations on target configuration level (where actual `SoftwareClusters` are made).

The decision to declare a `SoftwareClusterDesign` non-removable is most likely limited to `SoftwareClusterDesigns` that correspond to `SoftwareClusters` with a significant share of platform-level software.]

[constr_10410] Value of `SoftwareClusterDesign.installationBehavior` for a `SoftwareClusterDesign` of category `PLATFORM_CORE`

Imposition time: `IT_Mani`

[In a `SoftwareClusterDesign` of category `PLATFORM_CORE`, the attribute `installationBehavior` shall exist and its value shall be set to `cannotBeRemoved`.]

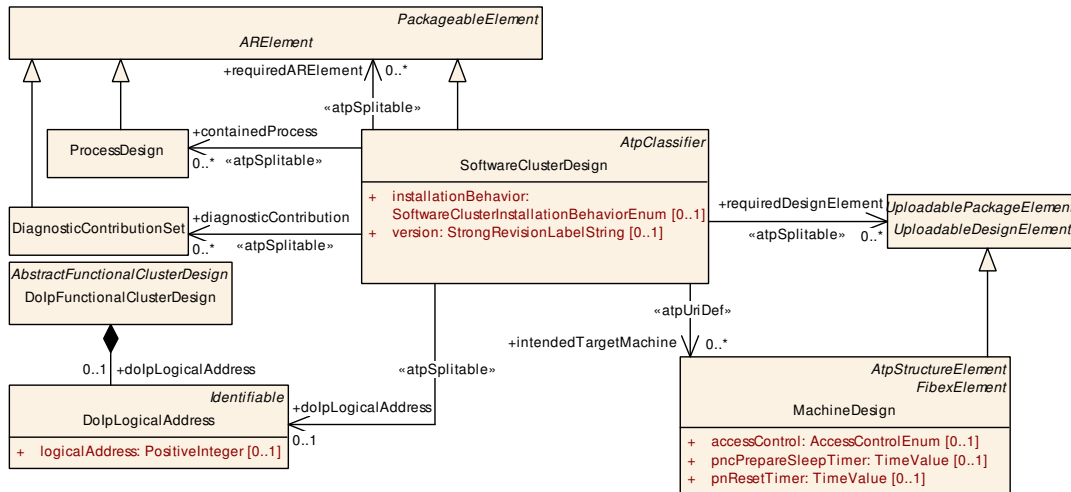


Figure 8.1: Modeling of `SoftwareClusterDesign`

Class	SoftwareClusterDesign			
Note	This meta-class represents the ability for the OEM to design the grouping of software uploadable to a specific target Machine. Tags: atp.recommendedPackage=SoftwareClusterDesigns This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpClassifier, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
conflictsTo	SoftwareClusterDependencyFormula	0..1	aggr	This aggregation handles conflicts. If it yields true then the SoftwareClusterDesign shall not be installed. Stereotypes: atpSplittable Tags: atp.Splitkey=conflictsTo
contained Process	ProcessDesign	*	ref	This reference represent the ProcessDesigns contained in the enclosing SoftwareCluster. Stereotypes: atpSplittable Tags: atp.Splitkey=containedProcess
dependsOn	SoftwareClusterDependencyFormula	0..1	aggr	This aggregation can be taken to identify a dependency for the enclosing SoftwareClusterDesign. Stereotypes: atpSplittable Tags: atp.Splitkey=dependsOn
diagnostic Contribution	DiagnosticContributionSet	*	ref	This reference identifies the corresponding collection of DiagnosticContributionSet. Stereotypes: atpSplittable Tags: atp.Splitkey=diagnosticContribution





Class	SoftwareClusterDesign			
dolpLogicalAddress	DolpLogicalAddress	0..1	ref	This reference identifies the Dolp logical address that shall be used to contact the diagnostic management in the SoftwareCluster derived from the enclosing SoftwareClusterDesign. Stereotypes: atpSplitable Tags: atp.Splitkey=dolpLogicalAddress
installationBehavior	SoftwareClusterInstallationBehaviorEnum	0..1	attr	This attribute controls the behavior of the SoftwareCluster in terms of installation.
intendedTargetMachine	MachineDesign	*	ref	This reference can be taken to identify the Machine Design for which the final SoftwareCluster shall be developed. Stereotypes: atpUriDef
requiredARElement	ARElement	*	ref	This reference represents the collection of ARElements that are required for the completeness of the definition of the SoftwareCluster. Stereotypes: atpSplitable Tags: atp.Splitkey=requiredARElement
requiredDesignElement	UploadableDesignElement	*	ref	This reference points to uploadable design elements that have been identified as relevant in the context of the enclosing SoftwareClusterDesign. Stereotypes: atpSplitable Tags: atp.Splitkey=requiredDesignElement
rootComposition	RootSwClusterDesignComponentPrototype	0..1	aggr	This aggregation represents the design of the software inside the SwClusterDesign terms of the communication endpoints.
version	StrongRevisionLabelString	0..1	attr	This attribute can be used to describe a version information for the enclosing SoftwareClusterDesign.

Table 8.1: SoftwareClusterDesign

Enumeration	SoftwareClusterInstallationBehaviorEnum
Note	This enumeration defines possible approaches for the installation behavior of a SoftwareCluster. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SoftwareClusterDesign.installationBehavior
Literal	Description
canBeRemoved	The enclosing SoftwareCluster can be removed from the target Machine or updated with a newer version. Tags: atp.EnumerationLiteralIndex=0
cannotBeRemoved	The enclosing SoftwareCluster cannot be removed from the target Machine. It can only be updated with a newer version. Tags: atp.EnumerationLiteralIndex=1

Table 8.2: SoftwareClusterInstallationBehaviorEnum

[constr_3727] Upper multiplicity of reference in the role [SoftwareClusterDesign.intendedTargetMachine](#)

Imposition time: IT_SubSysDes

[In the context of [SoftwareClusterDesign](#), the reference in the role [intendedTargetMachine](#) shall exist at most once.]

[TPS_MANI_01117] Semantics of `SoftwareClusterDesign.intendedTargetMachine` [The specification of `SoftwareClusterDesign.intendedTargetMachine` allows for focusing the specification of an uploadable software package to a specific `MachineDesign` from early phases of a development project.]

Please note that `SoftwareCluster` doesn't have a dedicated reference to the target `Machine`.

This relation is expressed by means of a reference to `Process` that in turn can be mapped to a dedicated `Machine` by means of a `ProcessToMachineMapping`. In this context, [constr_1536] applies.

[TPS_MANI_01118] Relation between `SoftwareClusterDesign` and `DiagnosticContributionSet` [An important aspect of the definition of a `SoftwareClusterDesign` is the question what diagnostic extract shall be associated with the `SoftwareClusterDesign`.

For this purpose, a reference from `SoftwareClusterDesign` to `DiagnosticContributionSet` in the role `diagnosticContribution` is provided.

In an early stage of the development process, it is intentionally made possible to reference multiple `DiagnosticContributionSets` in order to support the decentralized (e.g. partly done by OEM and partly done by supplier) configuration of the diagnostics stack.]

[TPS_MANI_01189] Software Cluster and `DiagnosticContributionSet.category` [A `DiagnosticContributionSet` used in the context of a `SoftwareCluster` shall set the value of attribute `category` to `DIAGNOSTICS_SWCL_EXTRACT`.]

Please mind the intentionally introduced difference between `SoftwareCluster` and `SoftwareClusterDesign` in terms of the relation to `DiagnosticContributionSet`.

In other words, the multiplicity of the references to `DiagnosticContributionSet` intentionally differ.

As already explained, the `SoftwareClusterDesign` shall support the decentralized configuration of the `DiagnosticContributionSet` while the `SoftwareCluster` requires the existence of a final (merged) `DiagnosticContributionSet`.

[TPS_MANI_01119] Reference to model elements from `SoftwareClusterDesign` [`SoftwareClusterDesign` has the ability to define the following references to model elements relevant for the definition of an uploadable software package:

- references to meta-classes derived from `UploadableDesignElement` are formalized by way of `SoftwareClusterDesign.requiredDesignElement`.
- references to meta-classes derived from `ARElement` are formalized by way of `SoftwareClusterDesign.requiredARElement`.

]

Please note that the conversion of a [SoftwareClusterDesign](#) to a [SoftwareCluster](#) is not formalized by AUTOSAR. This step can be done by a tool at the discretion of the integrator.

In other words, in some cases it may be applicable to do this conversion relatively early in the development project while other projects may require to keep the [SoftwareClusterDesign](#) around for a longer period in time.

8.3 Relevance of Software Cluster Design for Diagnostics

It is possible to define several diagnostics-related configuration elements on design level and within the scope of the [SoftwareClusterDesign](#). One example for this aspect is the definition of the logical address used by the DoIP communication.

[TPS_MANI_01465] Semantics of reference [SoftwareClusterDesign.doIpLogicalAddress](#) [The definition of the logical address of the *Diagnostic Management* associated with a given [SoftwareClusterDesign](#) needs to be clarified in an early stage of the project workflow and represents information that is typically defined in an OEM-role.

In the meta-model, this relation is established by the role [SoftwareClusterDesign.doIpLogicalAddress](#).]

8.4 Software Cluster Dependency

8.4.1 Overview

The installation or update of a given [SoftwareCluster](#) (see [Chapter 16.3](#)) may be subject to dependencies on other [SoftwareClusters](#). This means that the installation or update may only be permitted if dedicated version requirements are fulfilled.

The definition of dependencies among [SoftwareClusters](#) is exclusively done on the design level, i.e. attached to [SoftwareClusterDesign](#). The latter is in general not mandatory, i.e. [SoftwareClusters](#) positively can be created without a necessary reference to [SoftwareClusterDesign](#).

But if dependencies among [SoftwareClusters](#) are needed, then the definition of related [SoftwareClusterDesigns](#) cannot be avoided.

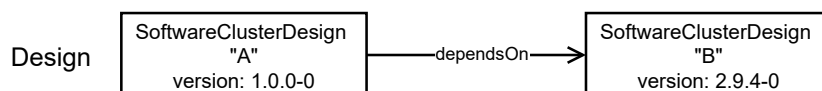


Figure 8.2: Definition of dependencies among [SoftwareClusterDesign](#)

This could even mean that [SoftwareClusterDesigns](#) are created for the sole purpose of expressing dependencies. This might look like an overshoot, but the ability to

analyze and understand the dependencies among `SoftwareClusters` on the design level is considered an important asset that cannot be delayed to the target configuration phase.

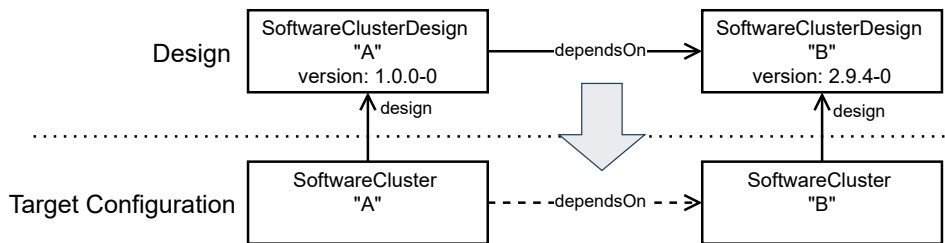


Figure 8.3: Dependencies on the level of `SoftwareClusterDesign` are reflected on the level of `SoftwareClusters`

The dashed arrow indicates that the dependency is “inherited” rather than explicitly modeled on the target configuration level.

8.4.2 Modeling of a Software Cluster Dependency

The modeling of a dependency among `SoftwareClusterDesigns` is formulated by meta-class `SoftwareClusterDependencyFormula`.

[TPS_MANI_01479] Semantics of meta-class `SoftwareClusterDependencyFormula` [Meta-class `SoftwareClusterDependencyFormula` allows for the definition of a formal condition that can be taken to decide about the dependency to or the conflict with a `SoftwareCluster`.

The modeling of `SoftwareClusterDependencyFormula` allows for the definition of nested conditions. The attribute `operator` is applied on the results of the evaluation of the `parts`.]

Class	SoftwareClusterDependencyFormula			
Note	This meta-class represents the ability to define a dependency among SoftwareClusters. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, SoftwareClusterDependencyFormulaPart			
Aggregated by	SoftwareClusterDependencyFormula.part, SoftwareClusterDesign.conflictsTo, SoftwareClusterDesign.dependsOn			
Attribute	Type	Mult.	Kind	Note
operator	SoftwareClusterDependencyLogicalOperatorEnum	0..1	attr	This logical operator can be used to relate the results of different SoftwareClusterDependencyParts.
part (ordered)	SoftwareClusterDependencyFormulaPart	*	aggr	This aggregation represents the ordered collection of the parts of the SoftwareClusterDependencyFormula.

Table 8.3: SoftwareClusterDependencyFormula

Enumeration	SoftwareClusterDependencyLogicalOperatorEnum
Note	This enumeration provides a set of operators to be used in a SoftwareClusterDependencyFormula. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SoftwareClusterDependencyFormula.operator
Literal	Description
logicalAnd	logical and Tags: atp.EnumerationLiteralIndex=0
logicalOr	logical or Tags: atp.EnumerationLiteralIndex=1

Table 8.4: SoftwareClusterDependencyLogicalOperatorEnum

[TPS_MANI_01216] Semantics of meta-class **SoftwareClusterDependencyFormulaPart** [Meta-class **SoftwareClusterDependencyFormulaPart** represents a part of a **SoftwareClusterDependencyFormula**. The order of the parts of a **SoftwareClusterDependencyFormula** is significant.]

Class	SoftwareClusterDependencyFormulaPart (abstract)			
Note	This meta-class represents an abstract base class for the definition of different formula parts of a SoftwareClusterDependencyFormula. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Subclasses	SoftwareClusterDependencyCompareCondition, SoftwareClusterDependencyFormula			
Aggregated by	SoftwareClusterDependencyFormula.part			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 8.5: SoftwareClusterDependencyFormulaPart

At the same time, **SoftwareClusterDependencyFormulaPart** is the base class of **SoftwareClusterDependencyFormula**.

This means that the **SoftwareClusterDependencyFormula** can aggregate all subclasses of **SoftwareClusterDependencyFormulaPart**, i.e. **SoftwareClusterDependencyFormula** and **SoftwareClusterDependencyCompareCondition**.

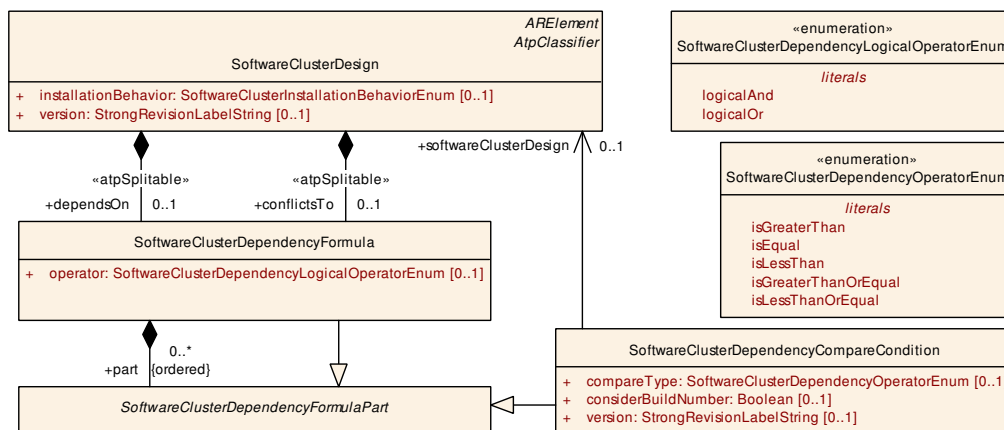


Figure 8.4: Modeling of dependencies in the context of a SoftwareCluster

[TPS_MANI_01480] **Semantics of `SoftwareClusterDesign.dependsOn`** [A `SoftwareClusterDesign` has the ability to express a dependency to other `SoftwareClusters` in the role `dependsOn`. The semantics is to express that the functionality of the `SoftwareCluster` that references (in the role `design`) the enclosing `SoftwareClusterDesign` **depends on** the installation of the `SoftwareCluster` that references (in the role `design`) the `SoftwareClusterDesign` referenced in the role `SoftwareClusterDependencyCompareCondition.softwareClusterDesign`.

Attribute `SoftwareClusterDesign.dependsOn` allows for the definition of a **formal** (potentially nested) dependency condition. The dependency shall be applicable only if the condition defined by `dependsOn` yields `true`.]

[TPS_MANI_01481] **Semantics of meta-class `SoftwareClusterDependencyCompareCondition`** [Meta-class `SoftwareClusterDependencyCompareCondition` allows for the definition of a formal condition to compare against the version of the referenced `softwareClusterDesign` using a given `compareType`.

The ability to specifically decide about whether to consider the build number in the comparison is implemented by means of attribute `considerBuildNumber`.]

Class	SoftwareClusterDependencyCompareCondition			
Note	This meta-class represents the ability to specify a concrete dependency condition in the context of a <code>SoftwareClusterDependencyFormula</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, <code>SoftwareClusterDependencyFormulaPart</code>			
Aggregated by	<code>SoftwareClusterDependencyFormula.part</code>			
Attribute	Type	Mult.	Kind	Note
<code>compareType</code>	<code>SoftwareClusterDependencyOperatorEnum</code>	0..1	attr	This attribute identifies the semantics of the compare operator.
<code>considerBuildNumber</code>	Boolean	0..1	attr	If this attribute is set to true then the build number shall be taken into account for the comparison. Build numbers don't have to be consecutive but could be created by some kind of hashing algorithm. In such a case it might make sense to include the build number in a test for equality but it is probably not reasonable to apply e.g. a less-than comparison.
<code>softwareClusterDesign</code>	<code>SoftwareClusterDesign</code>	0..1	ref	This reference identifies the <code>SoftwareClusterDesign</code> to which the dependency/conflict applies.
<code>version</code>	<code>StrongRevisionLabelString</code>	0..1	attr	This attribute represents the value of a version against which the comparison shall be executed.

Table 8.6: SoftwareClusterDependencyCompareCondition

[constr_10237] Multiplicity of attribute `SoftwareClusterDependencyCompareCondition.compareType`

Imposition time: IT_Mani

[For each `SoftwareClusterDependencyCompareCondition`, the attribute `compareType` shall exist.]

[constr_10253] Multiplicity of attribute `SoftwareClusterDependencyCompareCondition.considerBuildNumber`*Imposition time:* IT_Mani

[For each `SoftwareClusterDependencyCompareCondition`, the attribute `considerBuildNumber` shall exist.]

[constr_10254] Multiplicity of attribute `SoftwareClusterDependencyCompareCondition.version`*Imposition time:* IT_Mani

[For each `SoftwareClusterDependencyCompareCondition`, the attribute `version` shall exist.]

Enumeration	SoftwareClusterDependencyOperatorEnum
Note	This enumeration provides a choice of operators for comparison within a <code>SoftwareClusterDependencyCompareCondition</code> . This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	<code>SoftwareClusterDependencyCompareCondition.compareType</code>
Literal	Description
isEqual	equal Tags: atp.EnumerationLiteralIndex=1
isGreaterThan	greater than Tags: atp.EnumerationLiteralIndex=0
isGreaterThanOrEqual	greater than or equal Tags: atp.EnumerationLiteralIndex=3
isLessThan	less than Tags: atp.EnumerationLiteralIndex=2
isLessThanOrEqual	less than or equal Tags: atp.EnumerationLiteralIndex=4

Table 8.7: SoftwareClusterDependencyOperatorEnum

[TPS_MANI_01482] Semantics of `SoftwareClusterDesign.conflictsTo` [A `SoftwareClusterDesign` has the ability to express a conflict to other `SoftwareClusters` in the role `conflictsTo`. The semantics is to express that the functionality of the `SoftwareCluster` that references (in the role `design`) the enclosing `SoftwareClusterDesign` **inhibits** the installation of the `SoftwareCluster` that references (in the role `design`) the `SoftwareClusterDesign` referenced in the role `SoftwareClusterDependencyCompareCondition.softwareClusterDesign`.

Attribute `SoftwareClusterDesign.conflictsTo` allows for the definition of a **formal** (potentially nested) dependency condition. The dependency shall be applicable only if the condition defined by `conflictsTo` yields `false`.]

An example definition of dependencies among `SoftwareClusters` can be found in [Chapter B.11.1](#).

8.5 Provided and required Services of Software Cluster Design

In order to support the definition of required and provided services early in the design of a [SoftwareCluster](#)¹, AUTOSAR supports the definition of a [RootSwClusterDesignComponentPrototype](#) in the context of a given [SoftwareClusterDesign](#).

The [RootSwClusterDesignComponentPrototype](#) itself refers to a [SwComponentType](#) that in turn exposes [PortPrototypes](#) to the outside world.

Note that for the specific case of the [RootSwClusterDesignComponentPrototype](#) it is expected that the referenced [SwComponentType](#) represents a [Composition-SwComponentType](#) without any further detailing. A detailing is obviously unnecessary because the only purpose is the exposure of [PortPrototypes](#) to which [AdaptivePlatformServiceInstances](#) can be mapped.

A dedicated mapping class, [ServiceInstanceToSwClusterDesignPortPrototypeMapping](#), is defined to support the creation of the described relation between [PortPrototype](#) and [AdaptivePlatformServiceInstance](#).

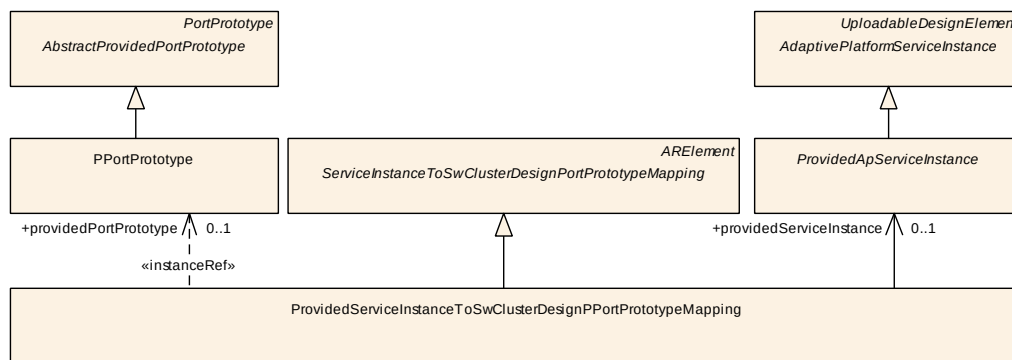


Figure 8.5: Modeling of the [ProvidedServiceInstanceToSwClusterDesignPPort-PrototypeMapping](#)

[TPS_MANI_01275] Semantics of meta-class [ServiceInstanceToSwClusterDesignPortPrototypeMapping](#) [The software-component used to type the [RootSwClusterDesignComponentPrototype](#) typically exposes a set of [PortPrototypes](#) to the outside world.

These [PortPrototypes](#) could be used for the specification of required and provided service instances. For this purpose, meta-class [ServiceInstanceToSwClusterDesignPortPrototypeMapping](#) is used.]

¹For more information, please refer to [Chapter 16.3](#).

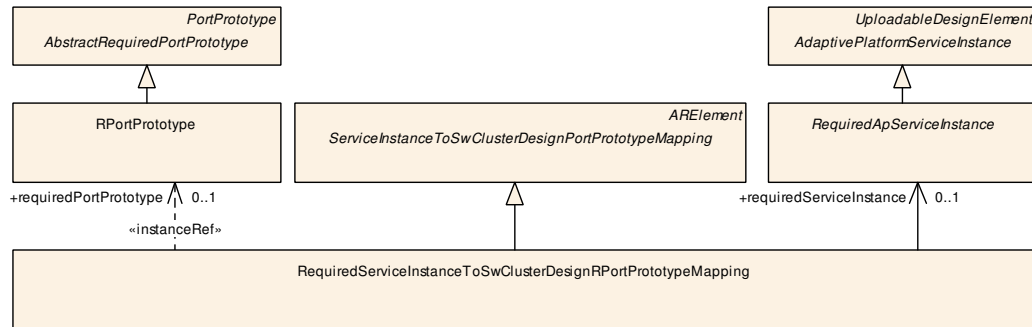


Figure 8.6: Modeling of the [RequiredServiceInstanceToSwClusterDesignRPort-PrototypeMapping](#)

In [Figure 8.7](#), the [ServiceInstanceToSwClusterDesignPortPrototypeMapping](#) is represented by a block labeled “mapping” with a circled 1. The block labeled “mapping” with a circled 2 represents the [CompositionPortToExecutable-PortMapping](#), as described in [Chapter 8.6](#).

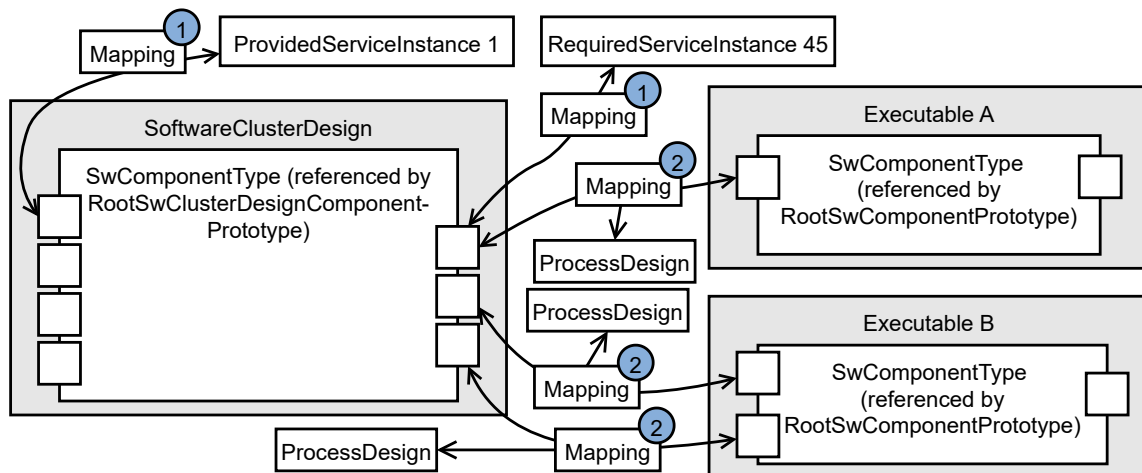


Figure 8.7: Modeling of mappings in the context of [SoftwareClusterDesign](#)

Class	RootSwClusterDesignComponentPrototype			
Note	This meta-class represents the ability to define the service endpoints in the scope of a SwClusterDesign. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpFeature, AtpPrototype, Identifiable , MultilanguageReferrable, Referrable			
Aggregated by	AtpClassifier.atpFeature, SoftwareClusterDesign.rootComposition			
Attribute	Type	Mult.	Kind	Note
applicationType	SwComponentType	0..1	tref	This SwComponentType acts as the Type of the RootSw ClusterDesignComponentPrototype. Stereotypes: isOfType

Table 8.8: RootSwClusterDesignComponentPrototype

[advisory_01008] Multiplicity of reference in the role `RootSwClusterDesign-ComponentPrototype.applicationType`*Imposition time:* `IT_SubSysDes`[For each `RootSwClusterDesignComponentPrototype`, the reference in the role `applicationType` should exist.]

Class	ServiceInstanceToSwClusterDesignPortPrototypeMapping (abstract)			
Note	This abstract meta-class represents the ability to assign a transport-layer-dependent ServiceInstance to a PortPrototype in the context of the SoftwareClusterDesign. With this mapping it is possible to define the list of provided and required AdaptivePlatformServiceInstances in the scope of the SoftwareCluster Design. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ProvidedServiceInstanceToSwClusterDesignPPortPrototypeMapping , RequiredServiceInstanceToSwClusterDesignRPortPrototypeMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 8.9: ServiceInstanceToSwClusterDesignPortPrototypeMapping

Class	RequiredServiceInstanceToSwClusterDesignRPortPrototypeMapping			
Note	This concrete meta-class represents the ability to assign a transport-layer-dependent RequiredService Instance to an RPortPrototype in the context of the SoftwareClusterDesign. With this mapping it is possible to define the list of provided and required AdaptivePlatformServiceInstances in the scope of the SoftwareClusterDesign. Tags: atp.recommendedPackage=ServiceInstanceToSwClusterDesignPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInstanceToSwClusterDesignPortPrototypeMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
requiredPort Prototype	RPortPrototype	0..1	iref	This reference identifies the applicable PortPrototype in the scope of the SwClusterDesign. InstanceRef implemented by: RPortPrototypeInSoftwareClusterDesignInstanceRef
requiredService Instance	RequiredApService Instance	0..1	ref	Reference to a RequiredServiceInstance mapped to a given RPortPrototype in the scope of the SwCluster Design.

Table 8.10: RequiredServiceInstanceToSwClusterDesignRPortPrototypeMapping

Class	ProvidedServiceInstanceToSwClusterDesignPPortPrototypeMapping			
Note	This concrete meta-class represents the ability to assign a transport-layer-dependent ProvidedService Instance to a PPortPrototype in the context of the SoftwareClusterDesign. With this mapping it is possible to define the list of provided and required AdaptivePlatformServiceInstances in the scope of the Software ClusterDesign. Tags: atp.recommendedPackage=ServiceInstanceToSwClusterDesignPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInstanceToSwClusterDesignPortPrototypeMapping			
Aggregated by	ARPackage.element			





Class	ProvidedServiceInstanceToSwClusterDesignPPortPrototypeMapping			
Attribute	Type	Mult.	Kind	Note
providedPort Prototype	PPortPrototype	0..1	iref	This reference identifies the applicable PortPrototype in the scope of the SwClusterDesign. InstanceRef implemented by: PPortPrototypeInSoftwareClusterDesignInstanceRef
providedService Instance	ProvidedApService Instance	0..1	ref	Reference to a ProvidedServiceInstance mapped to a given PPortPrototype in the scope of the SwCluster Design.

Table 8.11: ProvidedServiceInstanceToSwClusterDesignPPortPrototypeMapping

8.6 Mapping of Services to Executables

A typical next step in the design workflow could be to decide about the modeling of [Executables](#) inside the [SoftwareClusterDesign](#). The [PortPrototypes](#) used in the modeling of an [Executable](#) actually implement the endpoints to which required and provided service instances shall be mapped.

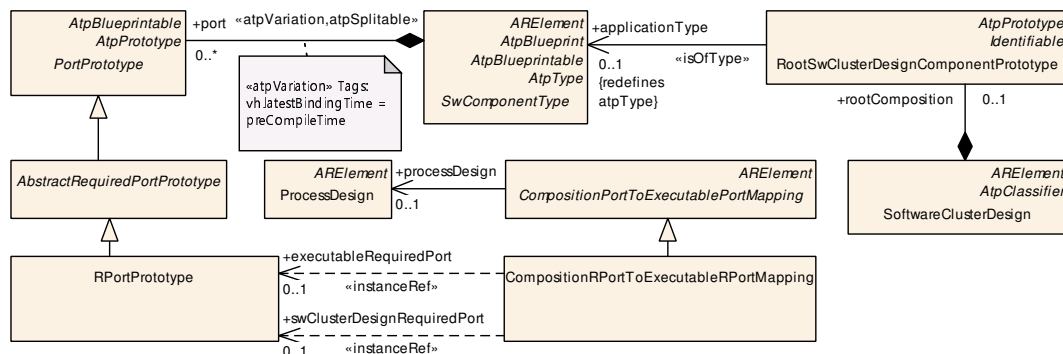


Figure 8.8: Modeling of the [RootSwClusterDesignComponentPrototype](#) and the [CompositionRPortToExecutableRPortMapping](#)

[TPS_MANI_01276] Semantics of [CompositionRPortToExecutableRPortMapping](#) and [CompositionPPortToExecutablePPortMapping](#) [In the context of the creation of an [SoftwareClusterDesign](#), it is not possible to already define the actual mapping of [PortPrototypes](#) to [AdaptivePlatformServiceInstances](#).

To counter this issue, and as an additional guidance for the later creation of the actual [ServiceInstanceToPortPrototypeMappings](#) it is possible to create another mapping inside the scope of the [SoftwareClusterDesign](#) that maps the [PortPrototypes](#) defined in the context of the [RootSwClusterDesignComponentPrototype](#) to the refined [PortPrototypes](#) defined in the context of [Executables](#).]

This way, it is possible to retrace the design decisions on the level of the [RootSwClusterDesignComponentPrototype](#) one level deeper and provide a guidance for the creation of the [ServiceInstanceToPortPrototypeMapping](#), as described in [Chapter 13.3](#).

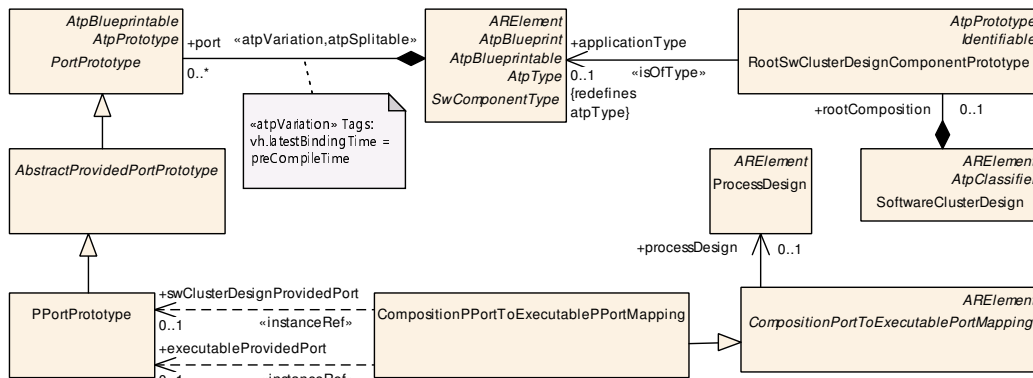


Figure 8.9: Modeling of the `RootSwClusterDesignComponentPrototype` and the `CompositionPPortToExecutablePPortMapping`

[TPS_MANI_01282] Semantics of reference `CompositionPortToExecutablePortMapping.processDesign` [The reference `CompositionPortToExecutablePortMapping.processDesign` identifies the applicable `ProcessDesign` for the mapping. This reference therefore disambiguates the existence of multiple `CompositionPortToExecutablePortMapping` that refer to the exact same `PortPrototype` in the context of an `Executable`.]

The statement made by [TPS_MANI_01282] is further explained in Figure 8.7. Two `CompositionPortToExecutablePortMapping` refer to the same `PortPrototype` on the surface of the `Executable B`.

It is important to understand that each of these `CompositionPortToExecutablePortMappings` refer to a different `ProcessDesign`.

This means that, at run-time, the two `CompositionPortToExecutablePortMappings` apply to different instances of the `Executable B` launched as different `Processes` (that each, in turn, refer to one of the `ProcessDesigns` referenced by the `Executable B`).

Class	<i>CompositionPortToExecutablePortMapping</i> (abstract)			
Note	This abstract meta-class acts as a base class for the specification of a mapping between a <code>PortPrototype</code> owned by a <code>RootSwClusterDesignComponentPrototype</code> to a <code>PortPrototype</code> owned by a <code>ComponentPrototype</code> inside an <code>Executable.rootSwComponentType</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	CompositionPPortToExecutablePPortMapping , CompositionRPortToExecutableRPortMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
processDesign	ProcessDesign	0..1	ref	This reference identifies the impacted <code>ProcessDesign</code> for this mapping. This allows for mapping multiple services to the same <code>PortPrototype</code> on an <code>Executable</code> by also referencing different <code>ProcessDesigns</code> .

Table 8.12: `CompositionPortToExecutablePortMapping`

Class	CompositionRPortToExecutableRPortMapping			
Note	This meta-class has the ability to associate an RPortPrototype defined in the context of a SwCluster Design to an RPortPrototype in the context of an Executable. Tags: atp.recommendedPackage=CompositionPortToExecutablePortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , CompositionPortToExecutablePortMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
executable RequiredPort	RPortPrototype	0..1	iref	This reference identifies the applicable PortPrototype in the context on an Executable. InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef
swCluster DesignRequired Port	RPortPrototype	0..1	iref	This reference identifies the applicable RPortPrototype in the context of the SwClusterDesign. InstanceRef implemented by: RPortPrototypeInSoftwareClusterDesignInstanceRef

Table 8.13: CompositionRPortToExecutableRPortMapping

Class	CompositionPPortToExecutablePPortMapping			
Note	This meta-class has the ability to associate a PPortPrototype defined in the context of a SwClusterDesign to a PPortPrototype in the context of an Executable. Tags: atp.recommendedPackage=CompositionPortToExecutablePortMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , CompositionPortToExecutablePortMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
executable ProvidedPort	PPortPrototype	0..1	iref	This reference identifies the applicable PortPrototype in the context on an Executable. InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
swCluster DesignProvided Port	PPortPrototype	0..1	iref	This reference identifies the applicable PPortPrototype in the context of the SwClusterDesign. InstanceRef implemented by: PPortPrototypeInSoftwareClusterDesignInstanceRef

Table 8.14: CompositionPPortToExecutablePPortMapping

9 Signal-based communication

9.1 Overview

The applications on the adaptive platform communicate with each other in a service-oriented manner. But there is also a use case where applications on the *AUTOSAR adaptive platform* need to communicate with software-components running on the *AUTOSAR classic platform*.

If the remote ECU on the *AUTOSAR classic platform* communicates via SOME/IP in a service-oriented manner and uses the SOME/IP transformer to serialize its data, then the communication with the *Machine* on the *AUTOSAR adaptive platform* can be established directly without any adaptations of neither the ECU nor the *Machine*.

If the counterpart on the *AUTOSAR classic platform* ECU communicates using signal-based communication over, e.g., CAN or FlexRay, the translation of the signal-based content into *ServiceInterfaces* needs to be established. The preconditions for this use-case are defined in [Chapter 9.2](#).

Such a *signal/service translation* may happen in a Gateway that is implemented on an ECU on the *AUTOSAR classic platform*. Such a solution is out of scope of this document since it is handled using the *AUTOSAR classic platform* configuration means. This approach is defined in the [4, TPS System Template] for the Classic platform.

It is up to the vehicle architecture design to choose whether the *signal/service translation* shall be implemented on a Classic platform ECU or on an Adaptive platform Machine.

Another alternative for this translation is to happen directly on the *Machine* on the *AUTOSAR adaptive platform* by an Application that is running in the Process, as sketched in [Figure 9.1](#).

This Application communicates with other applications on the *AUTOSAR adaptive platform* in the service-oriented way over *ara::com*; but it is also able to transmit and receive *ISignals* as well as communicate signal-based with remote ECUs on the *AUTOSAR classic platform*.

In order to make this possible, software that conforms to the specification of the COM stack on the *AUTOSAR classic platform* needs to be executed on the *Machine* on the *AUTOSAR adaptive platform*.

For the configuration of this software, the System Description based on the System Template on the *AUTOSAR classic platform* is used that contains a communication matrix description with *Pdus* and *ISignals*.

This chapter introduces a modeling that creates a bridge between the service-oriented communication based on *ServiceInterfaces* of the *AUTOSAR adaptive platform* and the signal-based communication involving the definition of *Pdus* and *ISignals* that are used on the *AUTOSAR classic platform*.

The [signal/service translation](#) mapping, together with the *AUTOSAR classic platform* System Description, allows to configure the communication between a *Machine* on the *AUTOSAR adaptive platform* and an ECU on the *AUTOSAR classic platform*. Please note that in a setup like the one sketched in [Figure 9.1](#), the *AUTOSAR classic platform* System Description would also contain a Pdu or Signal Gateway configuration between the Ethernet and the CAN network to forward the PDUs between the networks.

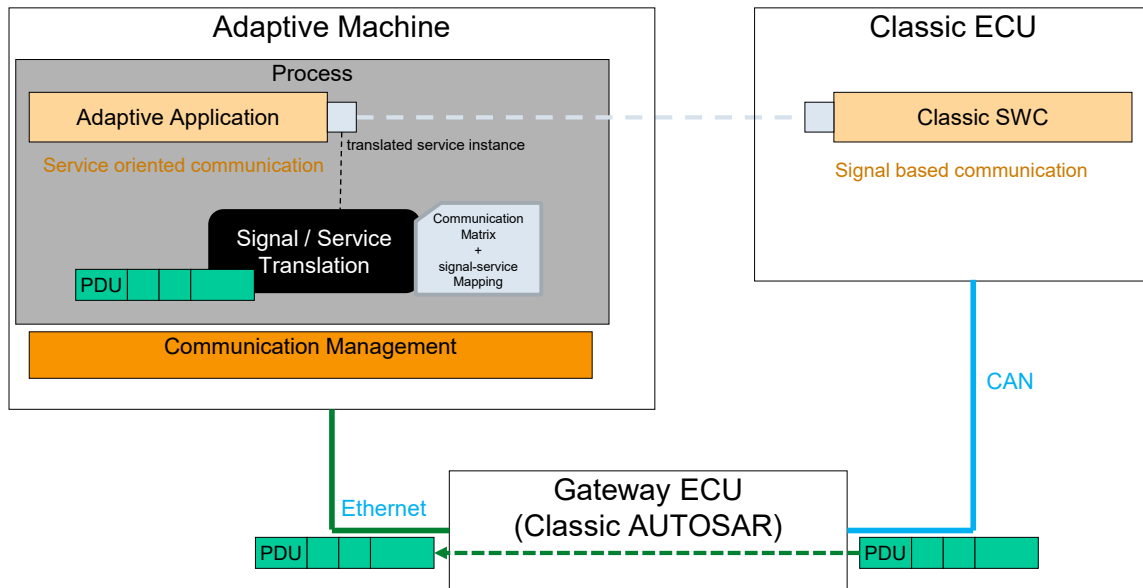


Figure 9.1: Signal-service-translation in Application on Adaptive Machine

The *translated service instance* is accessed from the application software using the `ara::com` API. The translation is designed as a `network binding` similar to the binding of `SOME/IP`. So the communication direction is

- if the signal-based payload is received by the *Machine* then the application software has a `RPortPrototype`
- if the signal-based payload is sent by the *Machine* then the application software has a `PPortPrototype`.

Further, the transport of the signal-based information via an `IEEE1722 stream` encapsulated as `IEEE1722 ACF messages` is supported. In this case, the *Machine* receives or sends an `IEEE1722 stream` of subtype `TSCF` or `NTSCF` according to [19, IEEE 1722-2016]. CAN or LIN frames which may contain signal-based `ISignalIPdus` are encapsulated in `IEEE1722 ACF messages`. Using this information, it is possible for the [signal/service translation](#) to gain access to the included signals.

An example setup for an `IEEE1722 stream` which transport a bus frame encapsulated as `IEEE1722 ACF message` is illustrated in figure 9.2. In this sketch, a *CAN frame* is sent by a *Classic ECU* and received at the *IEEE1722 Stream Data Producer*. The *IEEE1722 Stream Data Producer* transfers the *CAN frame* to an `IEEE1722 ACF message` and puts it inside an `IEEE1722 Stream`.

The *Adaptive Machine* consumes the *IEEE1722 Stream* with an *IEEE1722 ACF message*, fetches the *CAN frame*, and performs the *signal/service translation* on the contained *ISignalIPdu*.

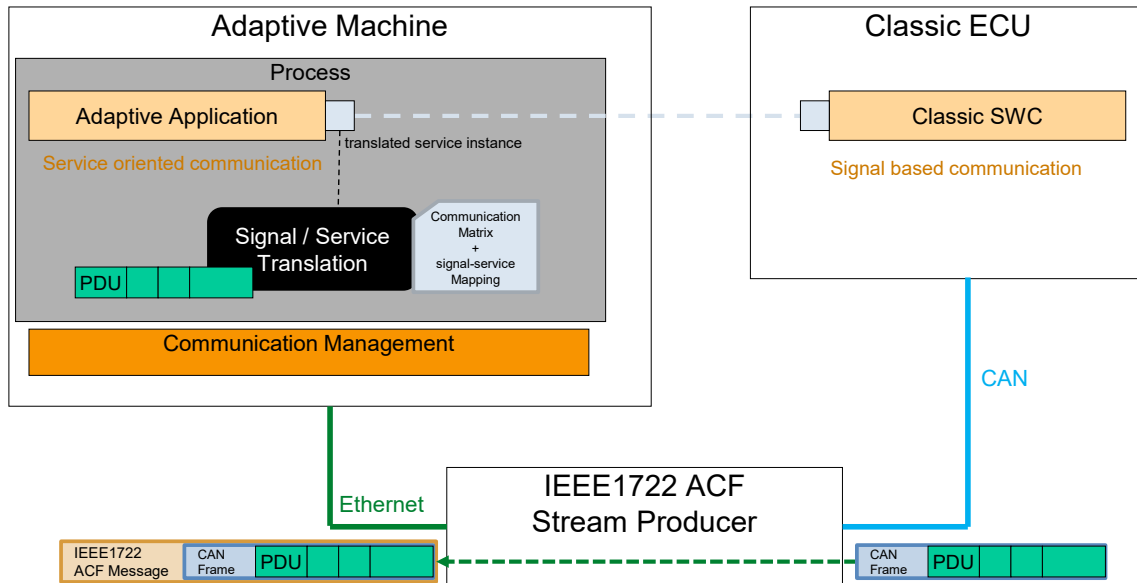


Figure 9.2: Signal-service-translation transport of a CAN frame as encapsulated IEEE1722 ACF message within an IEEE1722 stream

Another approach for the usage of *signal/service translation* is the interaction of a Classic AUTOSAR Instance and an Adaptive AUTOSAR Instance running on the same virtualization technology.

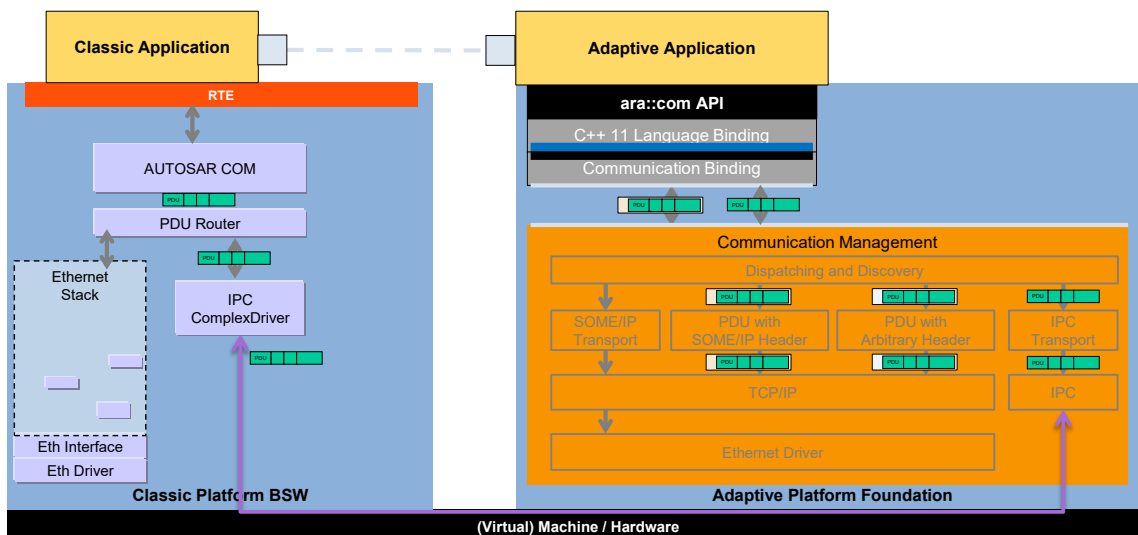


Figure 9.3: Signal/service translation using IPC technology

In such a setup, the IPC technology is able to transport *ISignalIPdu*s between the two platform instances. It is not defined whether the IPC technology requires any Message Header (according to [Chapter 9.2.1](#)) being part of the payload.

Thus, no dedicated configuration for this Message Header (specifically the configuration of the Header ID) is required in case this information can already be derived from the protocol information of the underlying IPC technology (e.g. dedicated IPC channels for different messages).

Figure 9.3 sketches an example setup where a virtualization technology enables the transport of messages between a Classic and an Adaptive Platform instance.

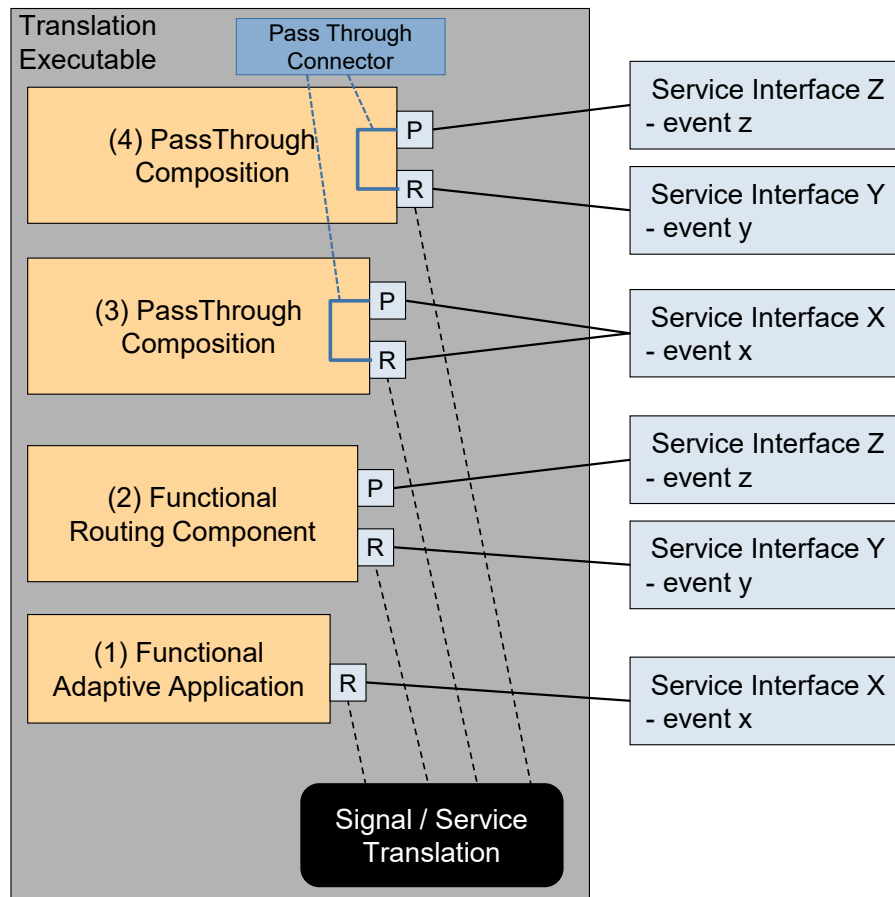


Figure 9.4: Signal/service translation and PassThroughConnector

Based on the [signal/service translation](#) network binding there are several approaches for further processing the translated information (illustrated in [Figure 9.4](#)):

- The application software on the *AUTOSAR adaptive platform* directly consumes/produces¹ the translated service (1)
This is the typical approach if there is only one piece of application software on the *AUTOSAR adaptive platform* interested in the translated data.
- The application software on the *AUTOSAR adaptive platform* manages and performs a functional routing (2)
This is the approach if the translated data shall be available as a service again

¹In the explanations the direction [signal-service-translation](#) is usually used, the [service-signal-translation](#) direction is supported as well. For simplicity this is only mentioned explicitly if the mapping behavior is not symmetrical.

for further processing. Here it is up to the implementation of the application software on the *AUTOSAR adaptive platform* how the translated data is routed to the secondary service, especially whether data combination and data conversion are applied.

- **Pass Through Connectors:** The translated service is passed through to be available to further application software on the *AUTOSAR adaptive platform*. This is the approach if there exist several further application software on the *AUTOSAR adaptive platform* which are using the translated service. In this case the translation only has to be performed once. Two cases can be distinguished:
 - The translated service and the secondary service use the same `ServiceInterface` (3)
 - The translated service and the secondary service use different (but compatible) `ServiceInterfaces` (4)

The methodological approach is that out of the `signal/service translation` mapping descriptions it is possible to automatically generate the network binding code for the `signal/service translation`.

If there is a `CompositionSwComponentType` defined with `PassThroughSwConnectors` then also the `AdaptiveApplicationSwComponentType` implementing the pass through behavior can be generated (see [Chapter 9.7](#)).

Please note that the configuration of such signal-based communication on an adaptive machine may be solved in two different ways:

1. The communication matrix definition (ARXML System Description) and the `signal/service translation` mapping is available on the target machine and is interpreted at run-time (like the manifest approach).
2. The communication matrix definition (ARXML System Description) and the `signal/service translation` mapping is built off-board and the application executable gets uploaded to the target `Machine` in response to changes in the communication matrix.

The `Executable` utilizing the `signal/service translation` and/or implementing the `PassThroughSwConnectors` is considered to belong to the `APPLICATION_LEVEL` domain as defined in [constr_1605]. This also applies to cases where the code implementing the `PassThroughSwConnectors` has been generated automatically by some tooling.

[TPS_MANI_03643] Translation-Executable category [The `category` value of the `Executable` utilizing the `signal/service translation` and/or implementing the `PassThroughSwConnectors` shall be set to `APPLICATION_LEVEL`.]

The following terminology is used in the context of `signal/service translation`:

Signal/service translation defines the feature this chapter is concerned with. It does not prescribe a specific translation direction.

Signal-service-translation defines the translation direction from a signal-based to a service oriented representation.

Service-signal-translation defines the translation direction from a service oriented to a signal-based representation.

9.2 Signal-based prerequisites

The identification of the received and sent messages and their actual length needs to be determined for each individual **Pdu**. Depending on the transport technology and configuration, a Message Header might be required. If the transport technology can determine the kind of **Pdu** and the length out of its protocol information, then the Message Header may be omitted.

It depends on the specific transport technology whether a dedicated Message Header and Message Length information is required or not. The SOME/IP header already provides enough information to identify the contained payload. The IEEE1722 ACF stream as well is capable to identify each transported CAN and LIN frame. If a custom transport technology is used (e.g. IPC between a Classic Platform instance and an Adaptive Platform instance), it depends on that specific transport technology whether a Message Header and length information is required or not.

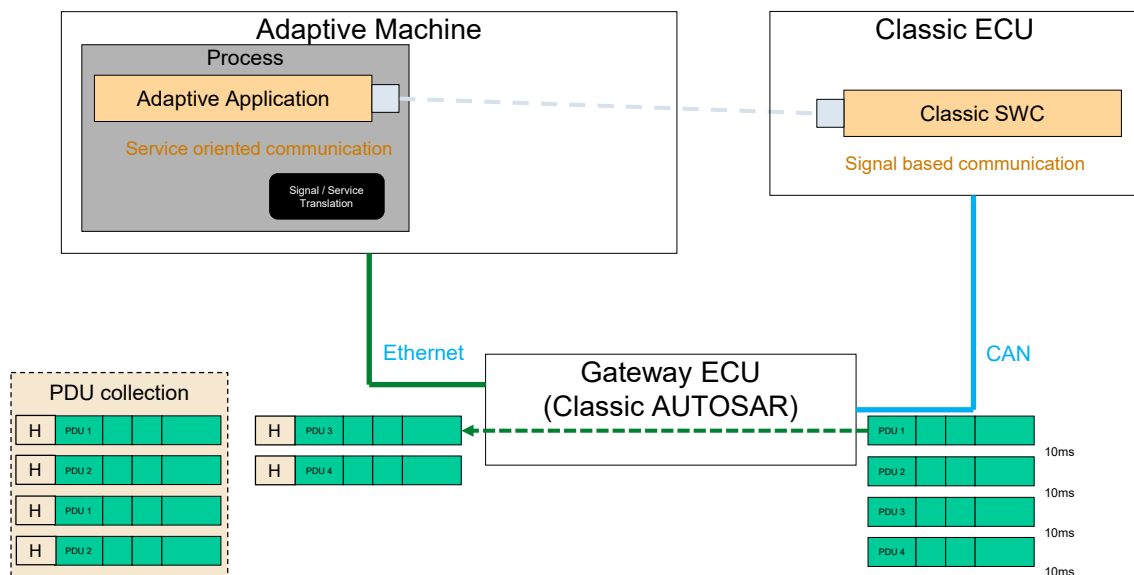


Figure 9.5: Network architecture for signal-service-translation

As the sole communication network currently supported is Ethernet, the **Pdus** have to be transported on that network.

Although there is in theory the possibility to directly put the **Pdu** on the Ethernet, this approach would require an individual **Socket** per **Pdu**. This is an approach where

especially Classic platform ECUs do not have enough resources available to allow individual Sockets per Pdu. Nevertheless, there is also support by the [signal/service translation](#) to have no Message Header defined for Ethernet transport.

In case of Ethernet transport and the approach of several Pdus sharing a Socket, there is a need to use a dedicated Message Header per Pdu. This is illustrated in [Figure 9.5](#). The Classic Platform ECU routes the Pdus from a CAN network to the Ethernet.

In order to have efficient transport of many Pdus on Ethernet additionally the SOME/IP collection mechanism may be used (i.e. definition of [pduCollectionTrigger](#), [pduCollectionSemantics](#), [pduCollectionPduTimeout](#)).

9.2.1 Message Header for IP based transport

In case of Ethernet IP based transport and the approach of several Pdus sharing a Socket, the identification of the received and sent messages is done using a 64 bit wide Message Header. This Message Header is composed of a 32 bit wide Message ID and a 32 bit wide Message Length field.

[TPS_MANI_03652] [Signal/service translation header format](#) [If a Message Header is used then the message-transporting signal-based Pdus shall have a 32 bit wide Message ID field and a 32 bit wide Message Length field.]

[TPS_MANI_03653] [Signal/service translation header endianness](#) [The header of a message-transporting signal-based Pdus shall be encoded in big endian.]

There are three variants supported by the [signal/service translation](#) approach how the Message Header is interpreted:

Partial SOME/IP Header : 32 bit wide Message ID field and 32 bit wide Length field (just Message ID and Length, then signal-based payload. Message ID according to the rules of SOME/IP: ServiceId and MethodId [PRS_SOMEIP_00245])

Arbitrary Message Header : 32 bit wide Message ID field and 32 bit wide Length field (e.g. CAN-Id taken as Message Id) with signal-based payload

No Message Header : No standardized Message Header is defined.

In [Figure 9.6](#), the *Full SOME/IP Header* is shown for illustration purposes. In the context of [signal/service translation](#) the *Full SOME/IP Header* is not used. The *Signal-Based Header* can either be configured according to the [Partial SOME/IP Header](#), the [Arbitrary Message Header](#), or the [No Message Header](#) approach.

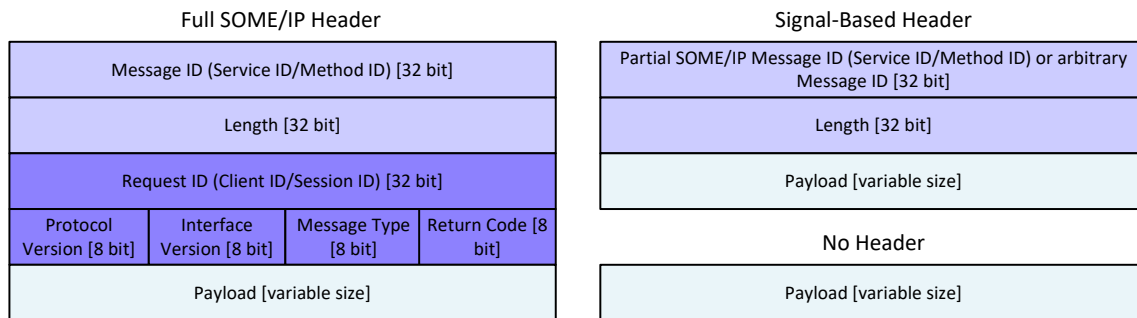


Figure 9.6: SOME/IP Message Header Format

Which Message Header variant is used for a dedicated message is defined according to the input configuration:

[TPS_MANI_03654] Definition of [Partial SOME/IP Header ID](#) [If there is a [RequiredSomeipServiceInstance](#) of category `SIGNALBASED_WITH_HEADER` defined for the `signal-service-translation` (resp. [ProvidedSomeipServiceInstance](#) for the `service-signal-translation`), then the Message ID shall be interpreted according to the SOME/IP Message ID rules [PRS_SOMEIP_00245]. Namely the Message ID is composed of the [SomeipServiceInterfaceDeployment.serviceInterfaceId](#) and the [SomeipEventDeployment.eventId](#) + 0x8000.]

[TPS_MANI_03577] Definition of [Arbitrary Message Header ID](#)

Status: DRAFT

[If there is a [RequiredUserDefinedServiceInstance](#) of category `SIGNALBASED_WITH_HEADER` defined for the `signal-service-translation` (resp. [ProvidedUserDefinedServiceInstance](#) for the `service-signal-translation`), then the Message ID shall be taken from the [SoConIPduIdentifier.headerId](#) attribute.]

[constr_3650] [headerId](#) required in case of Arbitrary Message Header

Status: DRAFT

Imposition time: `IT_Mani`

[If [TPS_MANI_03577] applies, then the respective [SoConIPduIdentifier.headerId](#) shall be defined.]

There is also the possibility to define the [No Message Header](#) option:

[TPS_MANI_03655] Definition of No Message Header - implicit SOME/IP Message Identification*Status: DRAFT*

[If there is a `RequiredSomeipServiceInstance` of category `SIGNAL-BASED_NO_HEADER` defined for the `signal-service-translation` (resp. `ProvidedSomeipServiceInstance` for the `service-signal-translation`), then no Message Header shall be used.

In this case it is either possible to derive the Message identification from the assignment to unambiguous communication channels or the Message identification is derived from protocol information of the underlying IPC technology.]

[TPS_MANI_03656] Definition of No Message Header - implicit Arbitrary Message Identification*Status: DRAFT*

[If there is a `RequiredUserDefinedServiceInstance` of category `SIGNAL-BASED_NO_HEADER` defined for the `signal-service-translation` (resp. `ProvidedUserDefinedServiceInstance` for the `service-signal-translation`), then no Message Header shall be used.

In this case it is either possible to derive the Message identification from the assignment to unambiguous communication channels or the Message identification is derived from protocol information of the underlying IPC technology.]

9.2.2 Message Identification for IEEE1722 ACF based transport

If the signal based `ISignalIPdu` is transported using an IEEE1722 ACF stream according to [19, IEEE 1722-2016] (as depicted in figure 9.2), then the message identification is fully provided by the IEEE1722 ACF stream and the corresponding modeling in the `IEEE1722TpAcfConnection`. Details on the `IEEE1722TpAcfConnection` are provided in the [4, TPS System Template].

[TPS_MANI_03682] `IEEE1722TpAcfConnection` contributes to `signal/service translation`*Status: DRAFT*

[If

- an `ISignalTriggering` is referenced by an `SignalBasedEventElementToISignalTriggeringMapping` in the role `iSignalTriggering`,
- and that `ISignalTriggering` is part of an `ISignalIPdu`,
- and that `ISignalIPdu` is referenced by a `PduTriggering`,
- and that `PduTriggering` is referenced by an `IEEE1722TpAcfCanPart` or `IEEE1722TpAcfLinPart`,

then the enclosing IEEE1722 ACF stream (defined by the [IEEE1722TpAcfConnection](#)) is subject to [signal/service translation](#).]

The IEEE1722 ACF stream identification is done based on the attributes [IEEE1722TpConnection.macAddressStreamId](#) and [IEEE1722TpConnection.uniqueStreamId](#) (see also [TPS_SYST_03098]).

If the subtype of the IEEE1722 ACF stream is [IEEE1722TpAcfConnection](#), then further identification is based on the [IEEE1722TpAcfBus](#). The specific IEEE1722 ACF message may contain several parts, each part belonging to a specific [IEEE1722TpAcfBus](#): [IEEE1722TpAcfCan](#) or [IEEE1722TpAcfLin](#).

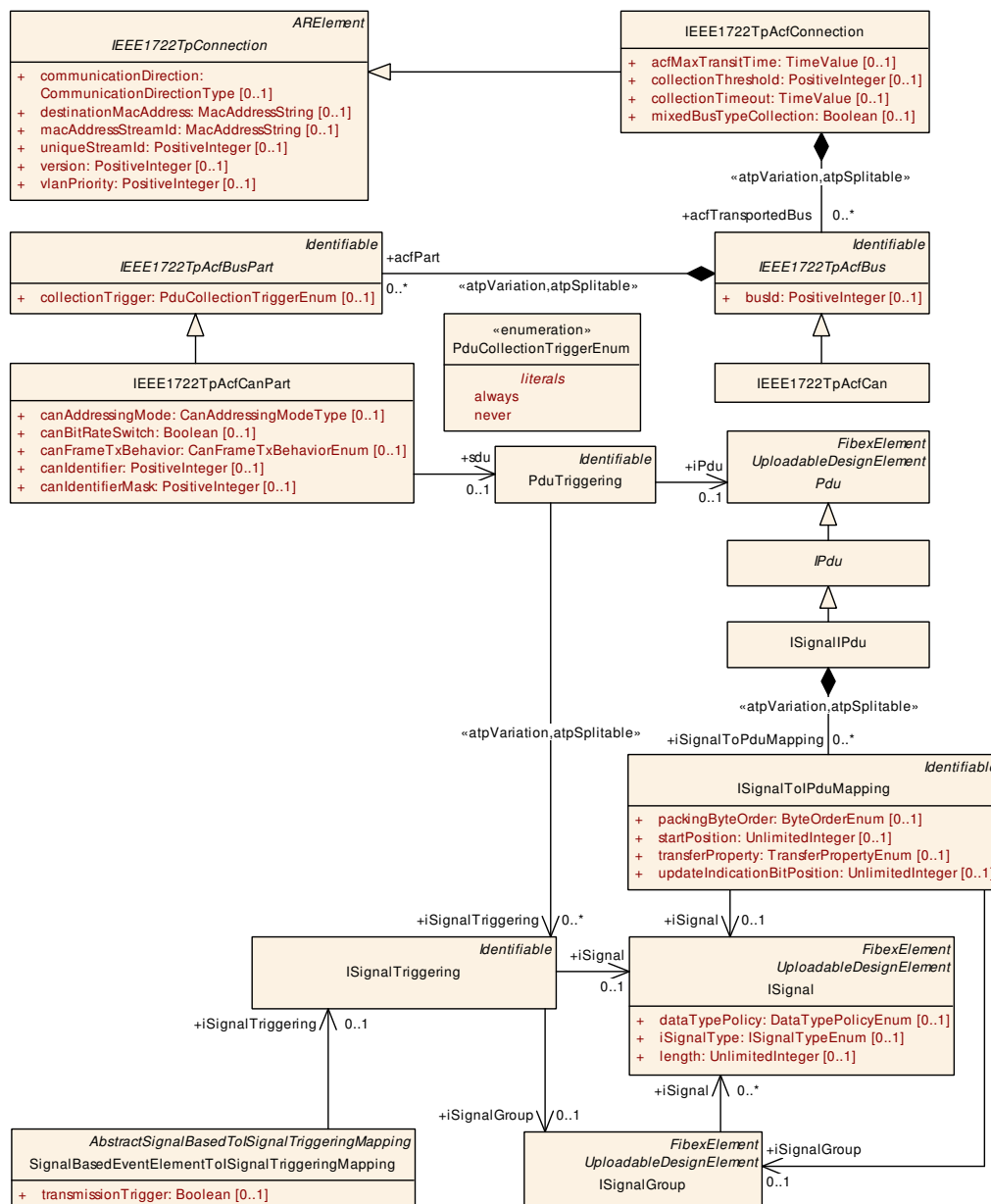


Figure 9.7: Relation of [SignalBasedEventElementToISignalTriggeringMapping](#) and [IEEE1722TpAcfConnection](#)

Note that the attribute `IEEE1722TpAcfBus.busId` is defined per `IEEE1722TpAcfCan` and `IEEE1722TpAcfLin`, thus it is possible to have an instance of `IEEE1722TpAcfCan` with `busId = 1` and also an `IEEE1722TpAcfLin` with `busId = 1`.

The final identification which CAN or LIN frame (and thus which `ISignalIPdu`) is transported is based on the bus type and is defined by:

- `IEEE1722TpAcfCanPart.canIdentifier`
- `IEEE1722TpAcfLinPart.linIdentifier`.

[TPS_MANI_03683] Identification of an `ISignalIPdu` inside an IEEE1722 ACF stream

Status: DRAFT

[The following attributes need to be respected to unambiguously identify an `ISignalIPdu` transported over an IEEE1722 ACF stream:

- `IEEE1722TpConnection.macAddressStreamId`
- `IEEE1722TpConnection.uniqueStreamId`
- `busId`
- Frame Id:
 - `IEEE1722TpAcfCanPart.canIdentifier` or
 - `IEEE1722TpAcfLinPart.linIdentifier`

]

Which `EthernetCommunicationConnector` shall be used for the communication of an IEEE1722 ACF stream is defined by the `UserDefinedServiceInstanceToMachineMapping.communicationConnector` reference.

[TPS_MANI_03684] Mapping of an IEEE1722 ACF stream to an `EthernetCommunicationConnector`

Status: DRAFT

[If a `UserDefinedServiceInstanceToMachineMapping` refers to a `RequiredUserDefinedServiceInstance` or a `ProvidedUserDefinedServiceInstance` of category `SIGNALBASED_IEEE1722_ACF` in the role `serviceInstance`, then the referenced `EthernetCommunicationConnector` shall be used for the transport of the IEEE1722 ACF stream.]

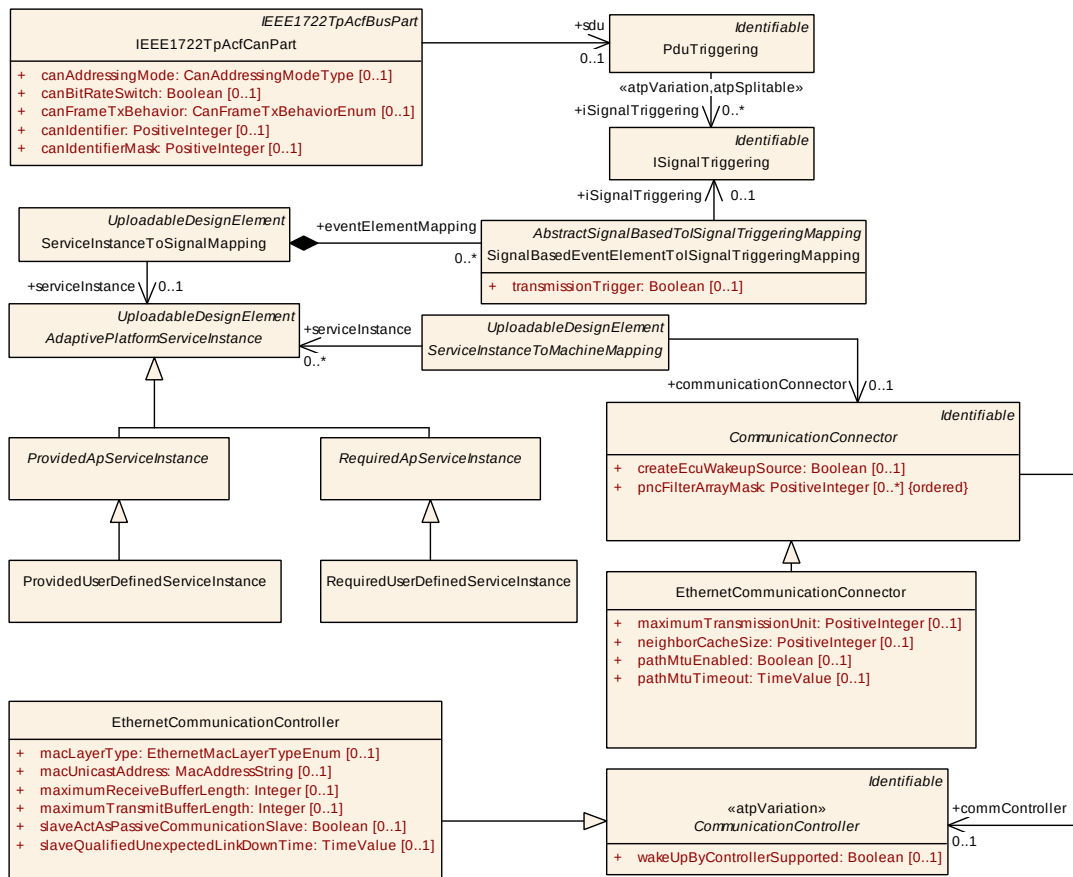


Figure 9.8: Definition which `EthernetCommunicationConnector` is considered for an IEEE1722 ACF stream

9.3 Signal-based Deployment

The signal-service-translation is embedded in the SOME/IP deployment using `SomeipServiceInterfaceDeployment`. The attribute `SomeipEventDeployment.serializer` defines whether the `someip` or the `signalBased` serialization shall be used for a specific `event` (see also Figure 13.4).

[TPS_MANI_03578] Signal-based `ServiceInterface` binding over Ethernet [In case of signal-based communication over Ethernet the `SomeipServiceInterfaceDeployment` is used to define the `Pdu` transport over the network.]

This aspect is described in Chapter 9.2.

[TPS_MANI_03579] Signal-based `ServiceEventDeployment` over Ethernet [If the attribute `SomeipEventDeployment.serializer` equals `signalBased` then the `event` referenced by `ServiceEventDeployment.event` shall be handled using signal-service-translation.]

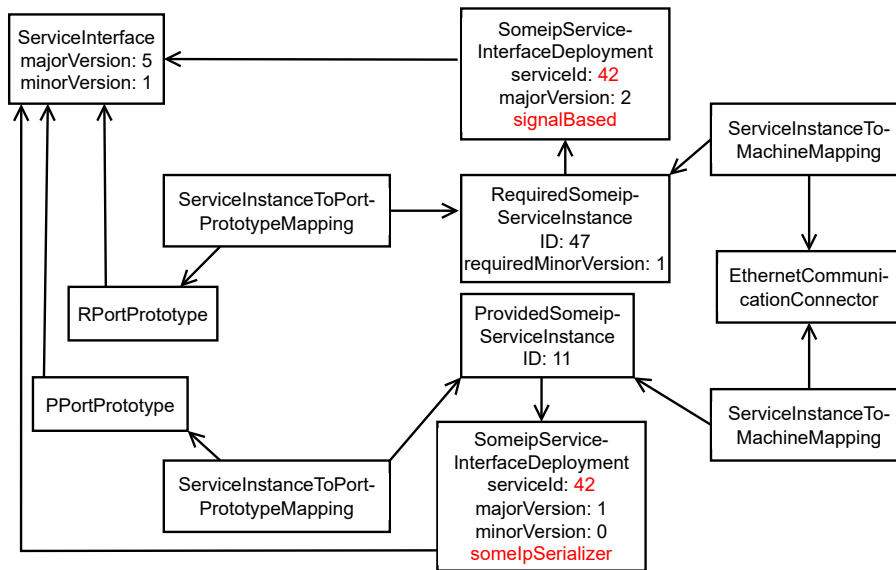


Figure 9.9: Example of 1 **PPortPrototype** mapped to one VLAN

Figure 9.9 illustrates a use-case where a **ServiceInterface** has two **SomeIpServiceInterfaceDeployments**, one with **signalBased** serializer technology and one with **someip**.

The translation use-case is defined by having one **RPortPrototype** receiving the **signalBased** serialized messages and one **PPortPrototype** providing the **someip** serialized service.

9.4 Signal/Service Translation Mapping

This chapter describes the mapping of **ServiceInterface** elements of a specific **AdaptivePlatformServiceInstance** to **ISignalTriggerings**.

Note that according to [TPS_MANI_03555] the same Ethernet socket (via **ISignalTriggering** and **PduTriggering**) may be used for signal-based and service-oriented communication at the same time.

This allows to define one service instance which consists of events with different serialization technologies (i.e. **someip** and **signalBased**).

[TPS_MANI_03627] No signal/service translation for methods [As Methods and Field getter/setter are already serialized using the **someip** serialization there is no need for **signal/service translation** for them.]

Therefore, Methods and Field getter/setter are directly accessible using **ara::com** via the *Signal Based Network Binding* as defined in [23, SWS Communication Management]. For passing methods through refer to Chapter 9.7.

A `ServiceInstanceToSignalMapping` refers to an `AdaptivePlatformServiceInstance` in the role `ServiceInstanceToSignalMapping.serviceInstance`. While it would be possible to define the mappings for all the `events`, `fields`, and `triggers` of an `AdaptivePlatformServiceInstance` in the scope of one `ServiceInstanceToSignalMapping`, it is rather advised to create several `ServiceInstanceToSignalMappings` referring to the same `AdaptivePlatformServiceInstance`, one for each service member.

[advisory_02000] Define a `ServiceInstanceToSignalMapping` per member of an `AdaptivePlatformServiceInstance`

Imposition time: IT_Mani

[If an `AdaptivePlatformServiceInstance` is referenced by a `ServiceInstanceToSignalMapping` in the role `ServiceInstanceToSignalMapping.serviceInstance`, then there should be one instance of `ServiceInstanceToSignalMapping` defined for every member of the corresponding `ServiceInterface` (`event`, `field`, `trigger`).]

9.4.1 Handling of `ISignalGroups`

`ISignalGroups` are used in the definition of `ISignalIPdus` to express that certain `ISignals` belong together and form a consistent set of data. The definition of `ISignalGroups` is part of the signal based communication matrix definition.

`ISignalGroups` do not need to be explicitly mapped when defining the `ServiceInstanceToSignalMappings`, they are implicitly covered in the mapping of the individual `ISignals` belonging to the `ISignalGroup`.

[advisory_02001] No explicit `signal/service translation` for `ISignalGroups`

Imposition time: IT_Mani

[The mapping elements of a `ServiceInstanceToSignalMapping`:

- `SignalBasedEventElementToISignalTriggeringMapping.iSignalTriggering`
- `SignalBasedTriggerToISignalTriggeringMapping.iSignalTriggering`
- `SignalBasedFieldToISignalTriggeringMapping.notifierSignalTriggering`
- `SignalBasedFireAndForgetMethodToISignalTriggeringMapping.iSignalTriggering`

should not refer to an `ISignalTriggering` that in turn refers to an `ISignalGroup`.]

9.4.2 Direction of **Signal/Service Translation Mapping**

The definition of the translation mappings has no explicitly modeled direction (has no source or target point of view). Each individual mapping ([AbstractSignalBasedToSignalTriggeringMapping](#)) takes one element from a [ServiceInterface](#) and one [ISignalTriggering](#).

[TPS_MANI_03635] Determination of translation direction [The translation direction is determined by

- the [communicationDirection](#) of the referenced [ISignalPort](#) which is referenced by the [ISignalTriggering](#)
- the kind of service instance which is referenced from the [ServiceInstanceToSignalMapping](#) in the role [serviceInstance](#). It can be either a [ProvidedApServiceInstance](#) or a [RequiredApServiceInstance](#).

]

[constr_3636] Consistent [ISignal](#) communication direction [in](#) and [RequiredApServiceInstance](#)

Imposition time: [IT_Mani](#)

[If the [ServiceInstanceToSignalMapping.serviceInstance](#) refers to a [RequiredApServiceInstance](#) then any [ServiceInstanceToSignalMapping.eventElementMapping](#) (respectively [ServiceInstanceToSignalMapping.fieldMapping](#)) shall refer to an [ISignalTriggering](#) which in turn refers to an [ISignalPort](#) with [communicationDirection](#) equal to [in](#).]

[constr_3637] Consistent [ISignal](#) communication direction [out](#) and [ProvidedApServiceInstance](#)

Imposition time: [IT_Mani](#)

[If the [ServiceInstanceToSignalMapping.serviceInstance](#) refers to a [ProvidedApServiceInstance](#) then any [ServiceInstanceToSignalMapping.eventElementMapping](#) (respectively [ServiceInstanceToSignalMapping.fieldMapping](#)) shall refer to an [ISignalTriggering](#) which in turn refers to an [ISignalPort](#) with [communicationDirection](#) equal to [out](#).]

Class	ServiceInstanceToSignalMapping			
Note	This meta-class is defined for a specific ServiceInstance and contains the mappings of elements of a ServiceInterface for which the ServiceInstance is defined to individual ISignalTriggerings. Tags: atp.recommendedPackage=ServiceInstanceToSignalMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	ServiceInstanceToSignalMapping			
eventElementMapping	SignalBasedEventElementToSignalTriggeringMapping	*	aggr	Mapping of an event or an element inside of the event to an ISignalTriggering.
fieldMapping	SignalBasedFieldToSignalTriggeringMapping	*	aggr	Mapping of a field to ISignalTriggerings.
fireAndForgetMethodMapping	SignalBasedFireAndForgetMethodToSignalTriggeringMapping	*	aggr	Mapping of an ISignalTriggering being part of a fire and forget message to a ClientServerOperation.
serviceInstance	AdaptivePlatformServiceInstance	0..1	ref	Reference to a ServiceInstance from which the corresponding ServiceInterface elements will be transported in the signal-based way over a communication medium.
triggerMapping	SignalBasedTriggerToSignalTriggeringMapping	*	aggr	Mapping of a trigger to an ISignalTriggering.

Table 9.1: ServiceInstanceToSignalMapping

The `ServiceInstanceToSignalMapping` refers to an `AdaptivePlatformServiceInstance` and thereby defines which `serviceInterfaceDeployment` elements will be mapped by the aggregated `eventElementMapping`, and/or `fieldMapping` to `ISignalTriggerings`. This is described in detail in the following chapters.

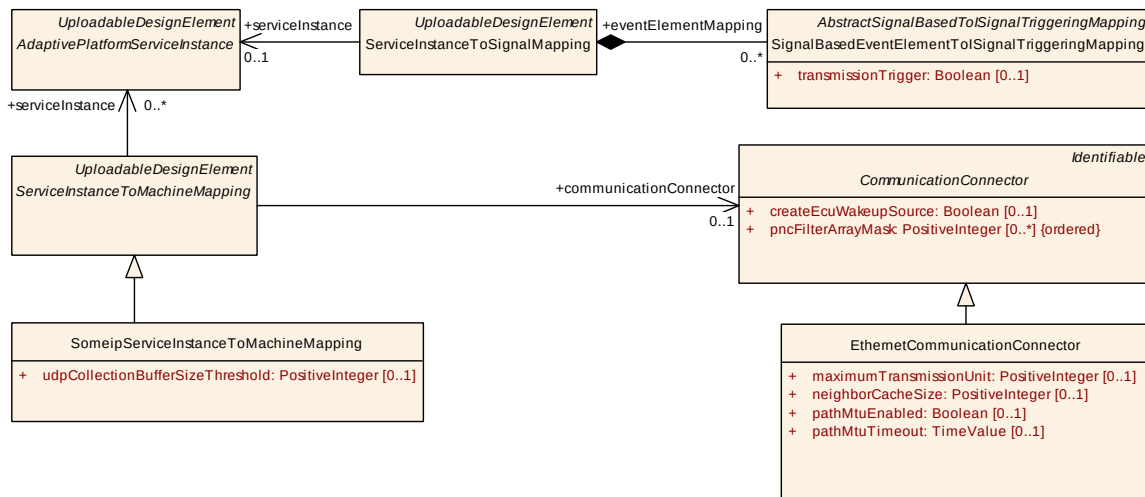


Figure 9.10: Relation of `ServiceInstanceToSignalMapping` and `CommunicationConnector`

The `ServiceInstanceToMachineMapping` which refers to the `AdaptivePlatformServiceInstance` (which in turn is referenced by the `ServiceInstanceToSignalMapping`) defines on which `CommunicationConnector` (i.e. network / VLAN) the signal based communication shall be performed.

[TPS_MANI_03629] Relation of `ServiceInstanceToSignalMapping` and `CommunicationConnector` [The `ServiceInstanceToMachineMapping` referring to

the `AdaptivePlatformServiceInstance` defines on which `CommunicationConnector` the `AdaptivePlatformServiceInstance` shall be communicated. If a `ServiceInstanceToSignalMapping` refers to the same `AdaptivePlatformServiceInstance` then the signal based communication shall be performed on the referenced `CommunicationConnector`.]

9.4.3 SignalBasedEvent Mapping

It is required that every `event` with `signalBased` serialization has a `ServiceInstanceToSignalMapping` defined.

[constr_3550] Existence of `ServiceInstanceToSignalMapping` for an `event` with `signalBased` serialization

Imposition time: `IT_Mani`

[If

- an `event` is referenced by a `SomeipEventDeployment` in the role `event` and
- the attribute `SomeipEventDeployment.serializer` is set to `signalBased`,

then a `ServiceInstanceToSignalMapping` shall exist with `eventElementMapping` referring to the `event` in the role `dataPrototypeInServiceInterfaceRef`.]

In case of composite payload it is important that the mapping definition is complete from the target point of view:

[constr_3551] Full mapping of target `ISignalGroup`

Imposition time: `IT_Mani`

[If

- an `ISignalTriggering` is part of a `ServiceInstanceToSignalMapping` and
- the `ISignalTriggering` refers to an `ISignalPort` with `communicationDirection` equals `out` and
- the `ISignalTriggering` refers to an `ISignalGroup` in the role `iSignalGroup`,

then a `SignalBasedEventElementToISignalTriggeringMapping` shall exist for every `ISignal` referenced by the `ISignalGroup` in the role `iSignal`.]

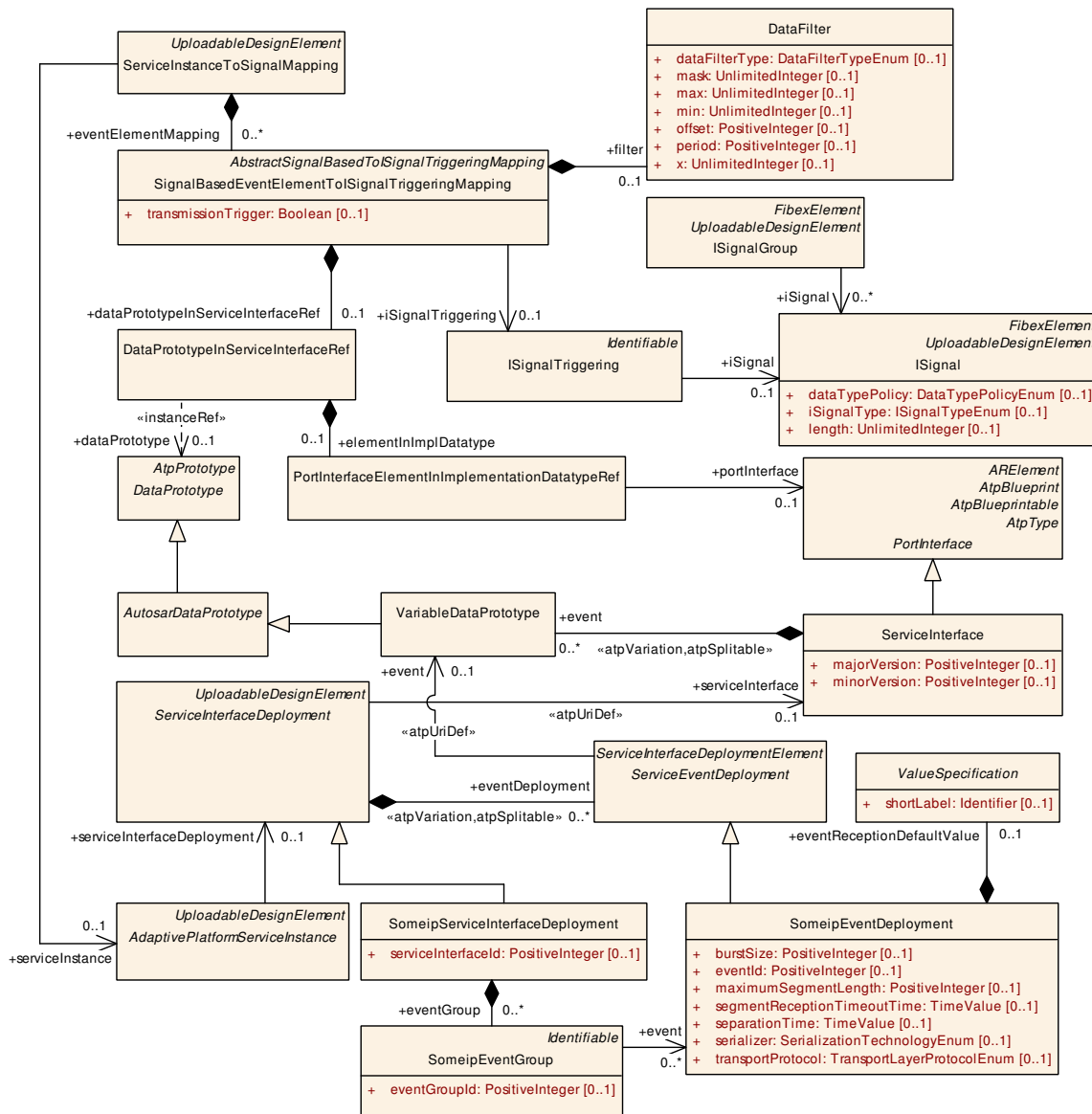


Figure 9.11: Mapping of Event elements to ISignals

[constr_3552] Full mapping of target **event**

Imposition time: *IT_Mani*

[If

- the *ServiceInstanceToSignalMapping* refers to a *ProvidedSomeipServiceInstance* and
- the *dataPrototypeInServiceInterfaceRef* refers to a *DataPrototype* which is part of a composite data type,

then a *SignalBasedEventElementToSignalTriggeringMapping* shall exist for every *DataPrototype* that is part of the composite data type.]

[TPS_MANI_03124] **ServiceInterface.event** to **ISignalTriggering** mapping [The `SignalBasedEventElementToISignalTriggeringMapping` meta-class provides the ability to map a `DataPrototype` defined in the context of a `ServiceInterface` to one `ISignalTriggering` of the `ISignal` or `ISignalGroup`.]

Class	SignalBasedEventElementToISignalTriggeringMapping			
Note	This meta-class defines the mapping of a ServiceInterface event or an element that is defined inside of the event in case that the datatype is composite to an ISignalTriggering. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractSignalBasedToISignalTriggeringMapping , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ServiceInstanceToSignalMapping.eventElementMapping			
Attribute	Type	Mult.	Kind	Note
dataPrototypeInServiceInterfaceRef	DataPrototypeInServiceInterfaceRef	0..1	aggr	Reference to a DataPrototype or to an internal structure of a DataPrototype in the context of a ServiceInterface.
filter	DataFilter	0..1	aggr	Defines an optional filter to be applied during translation.
iSignalTriggering	ISignalTriggering	0..1	ref	Reference to the ISignalTriggering that is used to transport a piece of data of an event that is defined in a ServiceInterface in a signal-based way over a communication channel.
transmissionTrigger	Boolean	0..1	attr	Defines whether the source element triggers the sending of the respective payload.

Table 9.2: SignalBasedEventElementToISignalTriggeringMapping

[constr_10252] Multiplicity of attribute `SignalBasedEventElementToISignalTriggeringMapping.dataPrototypeInServiceInterfaceRef`

Imposition time: IT_Mani

[For each `SignalBasedEventElementToISignalTriggeringMapping`, the attribute `dataPrototypeInServiceInterfaceRef` shall exist.]

Class	AbstractSignalBasedToISignalTriggeringMapping (abstract)			
Note	This meta-class is the common class for all SignalBased to ISignalTriggering mappings. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	SignalBasedEventElementToISignalTriggeringMapping , SignalBasedFieldToISignalTriggeringMapping , SignalBasedFireAndForgetMethodToISignalTriggeringMapping , SignalBasedTriggerToISignalTriggeringMapping			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 9.3: AbstractSignalBasedToISignalTriggeringMapping

A `ServiceInstanceToSignalMapping` with several `SignalBasedEventElementToISignalTriggeringMappings` is used to map the data leaves of `TestEvent` to the corresponding `ISignalTriggerings`.

An example of a mapping of event content to a signal is described in [Chapter B.10.1.1](#).

9.4.4 SignalBasedTrigger Mapping

It is required that every `trigger` with `signalBased` serialization has a `ServiceInstanceToSignalMapping` defined:

[constr_5318] Existence of `ServiceInstanceToSignalMapping` for an `trigger` with `signalBased` serialization

Imposition time: `IT_Mani`

[If a `trigger` is referenced by a `SomeipEventDeployment` in the role `trigger` and the attribute `SomeipEventDeployment.serializer` is set to `signalBased` then a `ServiceInstanceToSignalMapping` shall exist with `triggerMapping` referring to the `trigger` in the role `trigger`.]

[TPS_MANI_03287] `ServiceInterface.trigger` to `ISignalTriggering` mapping [The `SignalBasedTriggerToISignalTriggeringMapping` meta-class provides the ability to map a `trigger` defined in the context of a `ServiceInterface` to one `ISignalTriggering` of the `ISignal`.]

Please note that [constr_1198] and [constr_1199] that are defined in the [4, TPS System Template] apply for the `ISignal` to which the `trigger` is mapped via the `ISignalTriggering` by the `SignalBasedTriggerToISignalTriggeringMapping`. This means that the `length` of the `ISignal` shall be 0 and an update bit shall be defined for the `ISignal` in case that no `DataTransformation` is used.

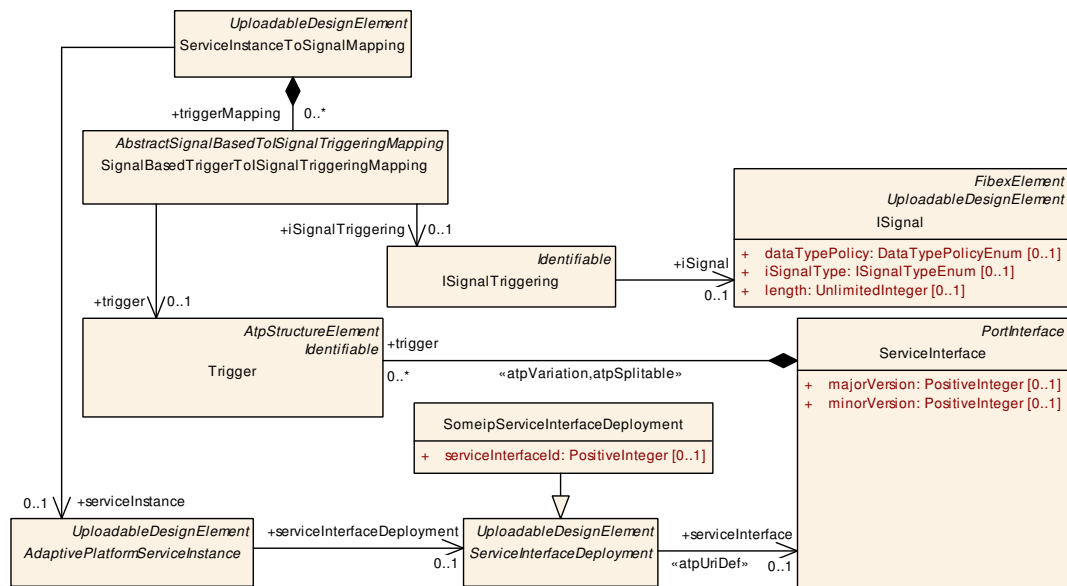


Figure 9.12: Mapping of a Trigger to an ISignal

Class	SignalBasedTriggerToSignalTriggeringMapping			
Note	This meta-class defines the mapping of a ServiceInterface trigger to an ISignalTriggering. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractSignalBasedToSignalTriggeringMapping , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ServiceInstanceToSignalMapping.triggerMapping			
Attribute	Type	Mult.	Kind	Note
iSignal Triggering	ISignalTriggering	0..1	ref	Reference to the ISignalTriggering that is used to transport the trigger that is defined in a ServiceInterface in a signal-based way over a communication channel.
trigger	Trigger	0..1	ref	Reference to a trigger defined in the context of a Service Interface.

Table 9.4: SignalBasedTriggerToSignalTriggeringMapping

9.4.5 SignalBasedField Mapping

[advisory_02002] [ServiceInterface.field](#) mapping to [ISignalTriggerings](#) for primitive data type **fields**

Imposition time: [IT_Mani](#)

[If [Field.hasNotifier](#) equals true, then one [SignalBasedFieldToISignalTriggeringMapping](#) should be used to map a primitive data type **field** to one [ISignalTriggering](#) for the [ISignal](#) representing the primitive Notifier element using the role [notifierSignalTriggering](#).]

[advisory_02003] [ServiceInterface.field](#) mapping to [ISignalTriggerings](#) for composite data type **fields**

Imposition time: [IT_Mani](#)

[If [Field.hasNotifier](#) equals true, then a separate [SignalBasedFieldToISignalTriggeringMapping](#) should be used to map each [ISignal](#) belonging to the [ISignalGroup](#) used for the transport of the notifier using the role [notifierSignalTriggering](#).]

It means that several [SignalBasedFieldToISignalTriggeringMappings](#) may be necessary to map a **field** to the corresponding [ISignalTriggerings](#).

It is required that every **field** using a [SomeipFieldDeployment.notifier](#) with [signalBased](#) serialization has a [ServiceInstanceToSignalMapping](#) defined:

[constr_3553] Existence of [ServiceInstanceToSignalMapping](#) for an **field** with [signalBased](#) serialization

Imposition time: [IT_Mani](#)

[If a **field** is referenced by a [SomeipFieldDeployment](#) in the role **field** and that [SomeipFieldDeployment](#) aggregates a [SomeipEventDeployment](#) in the role [notifier](#) and the [SomeipEventDeployment](#) has an attribute [SomeipEventDeployment.serializer](#) set to [signalBased](#) then there shall exist a [ServiceInstanceToSignalMapping](#) with a [fieldMapping](#) referring to the **field** in

the role `dataPrototypeInServiceInterfaceRef` and the `SignalBasedFieldToISignalTriggeringMapping` shall refer to a `ISignalTriggering` in the role `notifierSignalTriggering`.]

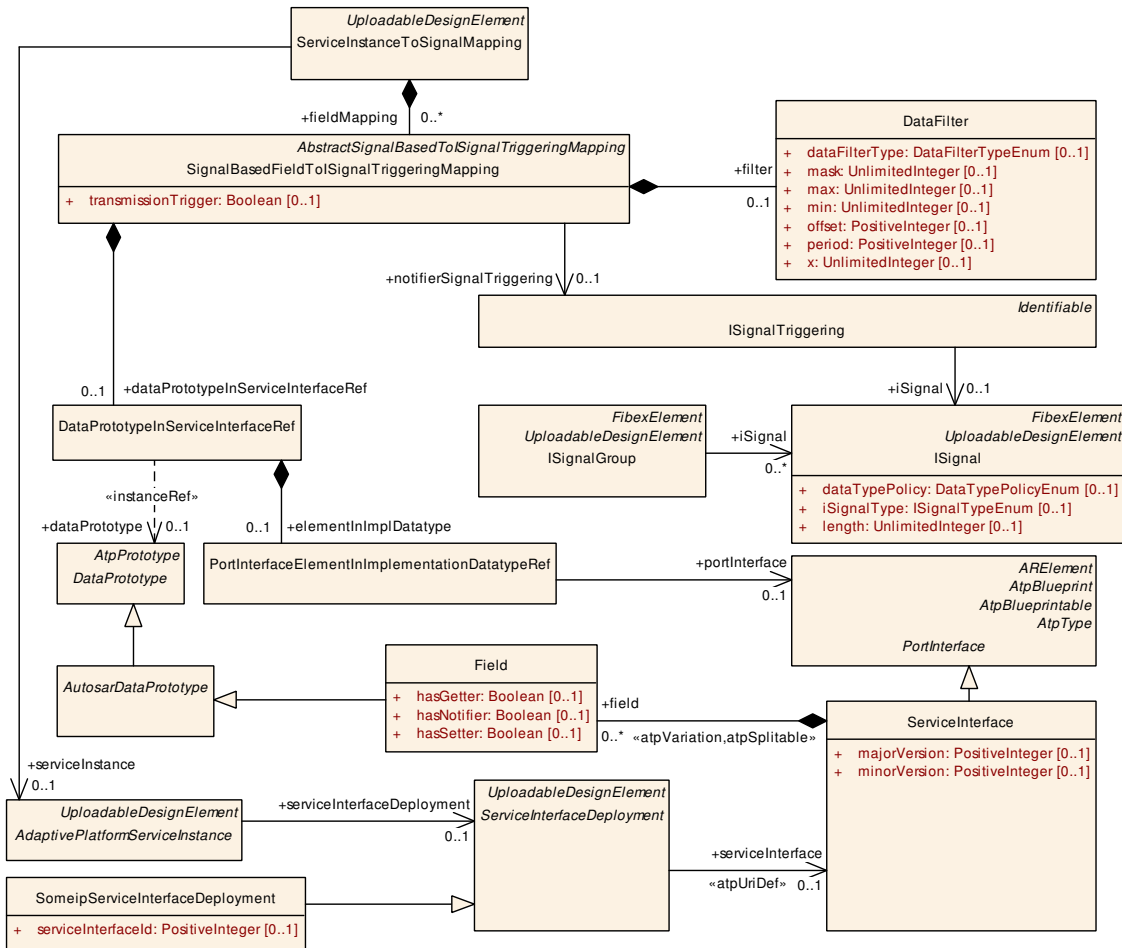


Figure 9.13: Mapping of Fields to ISignals

[constr_10228] Multiplicity of attribute `SignalBasedFieldToISignalTriggeringMapping.dataPrototypeInServiceInterfaceRef`

Imposition time: IT_Mani

[For each `SignalBasedFieldToISignalTriggeringMapping`, the attribute `dataPrototypeInServiceInterfaceRef` shall exist.]

Class	SignalBasedFieldToISignalTriggeringMapping
Note	This meta-class defines the mapping of a ServiceInterface field to ISignalTriggerings that represent the notifier elements on a signal-based communication channel. This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject, AbstractSignalBasedToISignalTriggeringMapping, Identifiable, MultilanguageReferrable, Referrable
Aggregated by	ServiceInstanceToSignalMapping.fieldMapping





Class	SignalBasedFieldToSignalTriggeringMapping			
Attribute	Type	Mult.	Kind	Note
dataPrototypeInServiceInterfaceRef	DataPrototypeInServiceInterfaceRef	0..1	aggr	Reference to a DataPrototype or to an internal structure of a DataPrototype in the context of a ServiceInterface.
filter	DataFilter	0..1	aggr	Defines an optional filter to be applied during translation.
notifierSignalTriggering	ISignalTriggering	0..1	ref	Reference to the ISignalTriggering that is used to transport a piece of data of a notifier in a signal-based way over a communication channel.
transmissionTrigger	Boolean	0..1	attr	Defines whether the source notifier element triggers the sending of the respective payload.

Table 9.5: SignalBasedFieldToSignalTriggeringMapping

An example of a mapping of a field to a signals is described in [Chapter B.10.1.2](#).

9.4.6 SignalBased Fire and Forget Method Mapping

[TPS_MANI_03665] [ServiceInterface.method](#) with [fireAndForget](#) equals `true` to [ISignalTriggerings](#) mapping [The [SignalBasedFireAndForgetMethodToISignalTriggeringMapping](#) meta-class provides the ability to map a part of a [method](#) with [ClientServerOperation.fireAndForget](#) equals `true` to one [ISignalTriggering](#) for the [ISignal](#) representing one part of the “fire & forget” method message.]

[constr_3692] [DataPrototypeInServiceInterfaceInstanceRef.targetDataPrototype](#) in the context of a [SignalBasedFireAndForgetMethodToISignalTriggeringMapping](#)

Imposition time: [IT_Mani](#)

[If a [DataPrototypeInServiceInterfaceInstanceRef](#) is aggregated by a [SignalBasedFireAndForgetMethodToISignalTriggeringMapping](#) in the role [dataPrototypeInMethodArgumentInstanceRef](#), then the reference [DataPrototypeInServiceInterfaceInstanceRef.targetDataPrototype](#) shall refer to an [ArgumentDataPrototype](#).]

Please note that, on the *AUTOSAR classic platform*, the “call” of a “fire & forget method” is modeled by means of a [dataElement](#) within a [SenderReceiverInterface](#). In other words, the [dataElement](#) carries the entire collection of arguments of the “fire & forget method call” method call to ensure atomic transport over the network.

To be clear, if

- a “fire & forget method call” has more than one argument or
- one argument of the “fire & forget method call” is typed by a composite data type,

then the transmission of the arguments of the “fire & forget method call”, modeled as a [dataElement](#), involves the definition of an [ISignalGroup](#) that bundles all the [ISignals](#) that are used to transport individual primitive arguments or the elements of

composite arguments of the corresponding `ClientServerOperation` on the side of the *AUTOSAR adaptive platform*.

This important model relation is enforced by [\[constr_10540\]](#) and [\[constr_10541\]](#).

[constr_10540] Arguments of a `ClientServerOperation` shall be fully covered by `SignalBasedFireAndForgetMethodToISignalTriggeringMappings`

Imposition time: IT_Mani

[If

- an `ArgumentDataPrototype` (if it has a primitive data type) or
- a leaf element of an `ArgumentDataPrototype` (if it has a composite data type)

owned by a `ClientServerOperation` is referenced in the role `dataPrototypeInMethodArgumentInstanceRef` by a `SignalBasedFireAndForgetMethodToISignalTriggeringMapping`, then **every other**

- `ArgumentDataPrototype` (if it has a primitive data type) or
- leaf element of an `ArgumentDataPrototype` (if it has a composite data type)

of the enclosing `ClientServerOperation` shall also be referenced in the role `dataPrototypeInMethodArgumentInstanceRef`.]

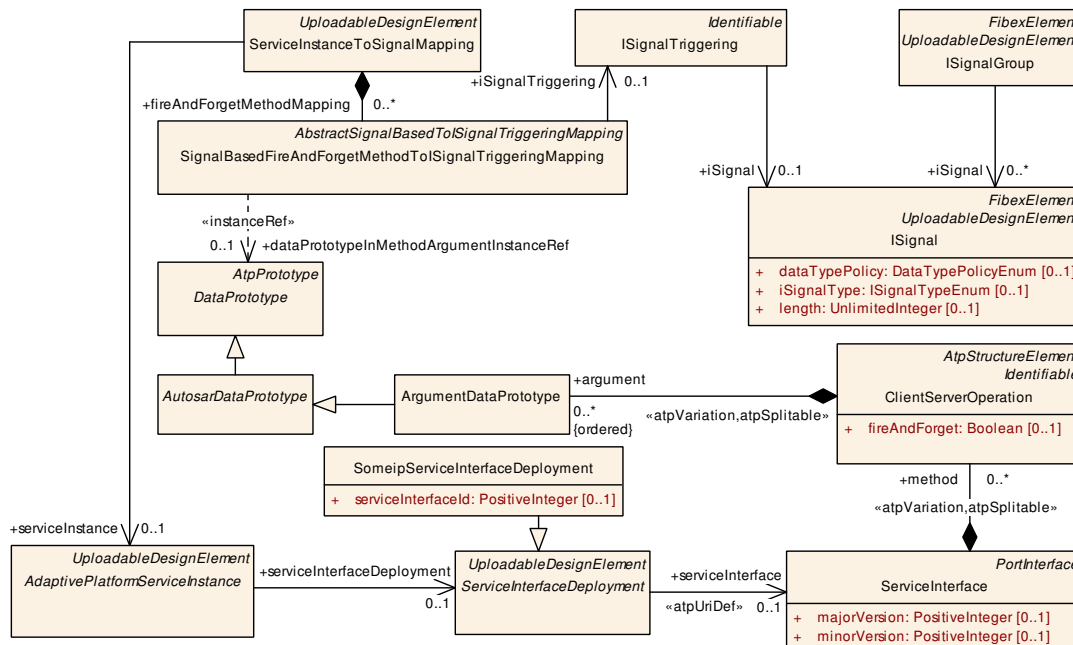


Figure 9.14: Mapping of “fire & forget” methods to `ISignals`

[constr_10541] Consistent assignment of `ISignalTriggerings` to an `ISignalGroup` for `SignalBasedFireAndForgetMethodToISignalTriggeringMapping`*Imposition time:* `IT_Mani`

[Each `SignalBasedFireAndForgetMethodToISignalTriggeringMapping` affected by [constr_10540] shall also refer to an `ISignalTriggering` that references an `ISignal` that in turn is also referenced in the role `iSignal` by the **same** `ISignalGroup`.]

Class	SignalBasedFireAndForgetMethodToISignalTriggeringMapping			
Note	This meta-class defines the mapping of a ServiceInterface fire and forget method part to an ISignal Triggering. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractSignalBasedToISignalTriggeringMapping , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ServiceInstanceToSignalMapping.fireAndForgetMethodMapping			
Attribute	Type	Mult.	Kind	Note
dataPrototypeInMethodArgumentInstanceRef	DataPrototype	0..1	iref	Instance reference to a (potentially structured) member of a ClientServerOperation. InstanceRef implemented by: DataPrototypeInServiceInterfaceInstanceRef
iSignalTriggering	ISignalTriggering	0..1	ref	Reference to an ISignalTriggering being part of a fire and forget message.

Table 9.6: SignalBasedFireAndForgetMethodToISignalTriggeringMapping

9.5 Service Discovery and Static Communication Configuration

Although the `ISignalIPdus`, which are candidate for [signal/service translation](#), may be communicated to/from CAN or FlexRay networks (where there is no service discovery support available) the messages still might be candidate for service discovery and event subscription on the Ethernet network. In such cases the gateway ECU connecting the Can/FlexRay networks to the Ethernet network is responsible to provide service discovery and event subscription support as part of the gateway operation.

Only SOME/IP supports service discovery in combination with [signal/service translation](#). Whether or not service discovery shall be done in case of the [Partial SOME/IP Header](#) approach is defined by the [category](#) of the [RequiredSomeipServiceInstance](#) or [ProvidedSomeipServiceInstance](#).

Even in cases where SOME/IP service discovery defined by the [category](#) of the [RequiredSomeipServiceInstance](#) or [ProvidedSomeipServiceInstance](#) is configured there may still be a static configurations applied as defined in [TPS_MANI_03295] and [TPS_MANI_03298].

If no SOME/IP service discovery is used, then there is the possibility to define a static configuration as described in [Chapter 9.5.4](#).

[TPS_MANI_03657] Signal-service-translation SOME/IP Service Discovery Find [If there is a `RequiredSomeipServiceInstance` of category `SIGNAL-BASED_WITH_HEADER` defined for the `signal-service-translation`, then this `RequiredSomeipServiceInstance` shall be handled using SOME/IP service discovery.]

[TPS_MANI_03658] Service-signal-translation SOME/IP Service Discovery Offer [If there is a `ProvidedSomeipServiceInstance` of category `SIGNAL-BASED_WITH_HEADER` defined for the `service-signal-translation`, then this `ProvidedSomeipServiceInstance` shall be handled using SOME/IP service discovery.]

If the source `ISignalIPdu` in a `signal-service-translation` scenario is composed of several parts (`ISignalGroups` and/or individual `ISignals`) and these parts shall be mapped to several `events` or field notifiers (according to [TPS_MANI_03667]) and a service discovery shall be performed, then a specific configuration of the `SomeipServiceInterfaceDeployment` and `SomeipEventDeployment` is required.

As in case of [TPS_MANI_03654] the SOME/IP Message ID is derived from the `SomeipServiceInterfaceDeployment.serviceInterfaceId` and the `SomeipEventDeployment.eventId`, all the `events` mapped from one `ISignalIPdu` shall have identical `SomeipServiceInterfaceDeployment.serviceInterfaceIds` and `SomeipEventDeployment.eventIds`.

[TPS_MANI_03666] Service Discovery for multi-event ISignalIPdus [If the `ISignals` of one `ISignalIPdu` are mapped to more than one `events` (using `SignalBasedEventElementToISignalTriggeringMapping.iSignalTriggering`) or field notifiers (using `SignalBasedFieldToISignalTriggeringMapping.notifierSignalTriggering`),

then each of the `SignalBasedEventElementToISignalTriggeringMappings` and `SignalBasedFieldToISignalTriggeringMappings` referring to `ISignals` of that `ISignalIPdu` shall be aggregated by one or more `ServiceInstanceToSignalMappings` where the reference `ServiceInstanceToSignalMapping.serviceInstance` refers to a `RequiredSomeipServiceInstance`

and that `RequiredSomeipServiceInstance` shall refer to a `SomeipServiceInterfaceDeployment` where

- each of the referenced `SomeipServiceInterfaceDeployments` has the identical value for `SomeipServiceInterfaceDeployment.serviceInterfaceId` defined
- every `event` taking part in that `signal-service-translation` has the attribute `SomeipEventDeployment.serializer` set to `SerializationTechnologyEnum.signalBased` and has the identical value for:
 - `SomeipEventDeployment.eventId`

– SomeipEventDeployment.transportProtocol

]

[TPS_MANI_03659] No **signal-service-translation** SOME/IP Service Discovery Find

Status: DRAFT

[If there is a **RequiredSomeipServiceInstance** of category **SIGNAL-BASED_NO_HEADER** defined for the **signal-service-translation**, then this **RequiredSomeipServiceInstance** shall not be handled using SOME/IP service discovery.]

[TPS_MANI_03660] No **signal-service-translation** SOME/IP Service Discovery Offer

Status: DRAFT

[If there is a **ProvidedSomeipServiceInstance** of category **SIGNAL-BASED_NO_HEADER** defined for the **service-signal-translation**, then this **ProvidedSomeipServiceInstance** shall not be handled using SOME/IP service discovery.]

9.5.1 Service discovery control

The **signal/service translation** needs to determine when the translated service (service which originates in signal-based messages) shall actually be offered/subscribed.

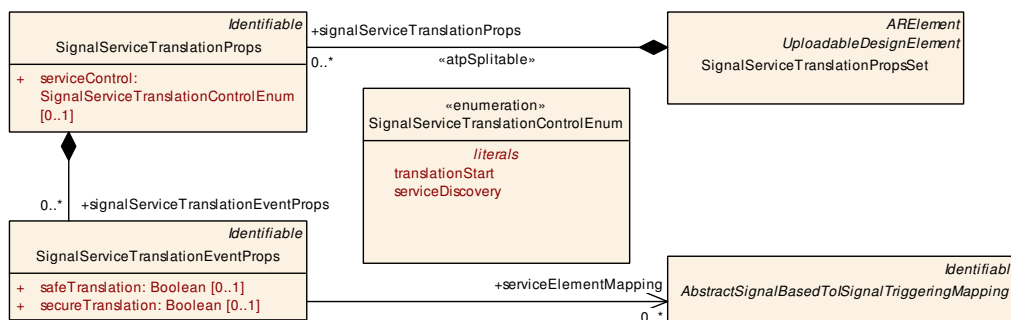


Figure 9.15: **Signal/service translation** properties

Attributes defining the behavior of **signal/service translation** are available at the **SignalServiceTranslationProps**. The reference **serviceElementMapping** determines to which service instance these settings apply.

Class	SignalServiceTranslationPropsSet			
Note	Collection of SignalServiceTranslationProps. Tags: atp.recommendedPackage=SignalServiceTranslationProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
signalServiceTranslationProps	SignalServiceTranslationProps	*	aggr	Collection of SignalServiceTranslationProps. Stereotypes: atpSplittable Tags: atp.Splitkey=signalServiceTranslationProps.shortName

Table 9.7: SignalServiceTranslationPropsSet

Class	SignalServiceTranslationProps			
Note	This element allows to define the properties which are applicable for the signal/service translation service.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SignalServiceTranslationPropsSet.signalServiceTranslationProps			
Attribute	Type	Mult.	Kind	Note
serviceControl	SignalServiceTranslationControlEnum	0..1	attr	Defines how the service instance control shall behave.
signalServiceTranslationEventProps	SignalServiceTranslationEventProps	*	aggr	Defines properties for a single translated event.

Table 9.8: SignalServiceTranslationProps

[constr_10255] Multiplicity of attribute [SignalServiceTranslationProps.serviceControl](#)

Imposition time: IT_Mani

[For each [SignalServiceTranslationProps](#), the attribute [serviceControl](#) shall exist.]

Class	SignalServiceTranslationEventProps			
Note	This element allows to define the properties which are applicable for the signal/service translation event.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SignalServiceTranslationProps.signalServiceTranslationEventProps			
Attribute	Type	Mult.	Kind	Note
safeTranslation	Boolean	0..1	attr	Defined whether the translation shall happen in a safe way.
secureTranslation	Boolean	0..1	attr	Defined whether the translation shall happen in a secure way.
serviceElementMapping	AbstractSignalBasedToISignalTriggeringMapping	*	ref	Reference to the collection of SignalBased to ISignal Triggerung mappings the properties apply to. This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 9.9: SignalServiceTranslationEventProps

[constr_10230] Multiplicity of attribute `SignalServiceTranslationEventProps.safeTranslation`

Imposition time: `IT_Mani`

[For each `SignalServiceTranslationEventProps`, the attribute `safeTranslation` shall exist.]

[constr_10231] Multiplicity of attribute `SignalServiceTranslationEventProps.secureTranslation`

Imposition time: `IT_Mani`

[For each `SignalServiceTranslationEventProps`, the attribute `secureTranslation` shall exist.]

At which point in time a specific service instance (originating from `signal/service translation`) is actually offered / subscribed at the service discovery can be defined per service instance:

Possible approaches for service availability/subscription are:

- `translationStart` - right after translation software is started
- `serviceDiscovery` - availability of related service instance

The attribute `SignalServiceTranslationProps.serviceControl` defines the service instance control behavior.

Enumeration	SignalServiceTranslationControlEnum
Note	This enumeration allows to define how the service instance offer/subscribe control shall behave.
Aggregated by	<code>SignalServiceTranslationProps.serviceControl</code>
Literal	Description
<code>serviceDiscovery</code>	Defines the start of service control when other service is available. Tags: <code>atp.EnumerationLiteralIndex=2</code>
<code>translationStart</code>	Defines the start of service control at translation start. Tags: <code>atp.EnumerationLiteralIndex=0</code>

Table 9.10: SignalServiceTranslationControlEnum

9.5.2 Service control right after translation start

If the availability of the signal-based PDUs is not controlled then the respective translated services offers/subscriptions may be activated immediately at start of the translation software.

[TPS_MANI_03580] Service offer at startup [For a provided translated service instance, if the `SignalServiceTranslationProps.serviceControl` equals `translationStart` then the translation software shall - right after translation software start - *offer* the respective translated service instance.]

[TPS_MANI_03581] Service find at startup [For a required translated service instance, if the `SignalServiceTranslationProps.serviceControl` equals `translationStart` then the translation shall right after translation software start issue the *find* of the respective translated service instance and *subscribe* to its event groups.]

9.5.3 Service control due to availability of related service instance

There are scenarios where the signal-based PDUs are actually controlled using SOME/IP Service Discovery. So there are services defined using events/methods/-fields and the service instances are offered / subscribed using the SOME/IP Service Discovery, just the payload of such services is not serialized according to the SOME/IP transformer rules (or a subset of events uses signal-based serialization). Therefore, a `signal/service translation` is required for the payload.

9.5.3.1 Signal-service-translation

[TPS_MANI_03582] Service find for required signal [For a required translated service instance, if the `SignalServiceTranslationProps.serviceControl` equals `serviceDiscovery` then upon startup the translation software component shall issue a *service find* for the `RequiredSomeipServiceInstance` which is referenced by the `ServiceInstanceToSignalMapping` in the role `serviceInstance`.]

[TPS_MANI_03583] Service subscribe for required signal [For a required translated service instance, if the `SignalServiceTranslationProps.serviceControl` equals `serviceDiscovery` and the *service find* of [TPS_MANI_03582] was successful then the translation software component shall issue a *subscribe* to all `SomeipServiceInterfaceDeployment.eventGroups`.]

9.5.3.2 Service-signal-translation

[TPS_MANI_03606] Service offer for provided signal [For a provided translated service instance, if the `SignalServiceTranslationProps.serviceControl` equals `serviceDiscovery` then upon startup the translation software component shall issue an *offer* for the `ProvidedSomeipServiceInstance` which is referenced by the `ServiceInstanceToSignalMapping` in the role `serviceInstance`.]

9.5.4 Static Communication Configuration

In case no service discovery shall be applied, it is possible to define a static configuration for non SOME/IP communication. The actual representation of the required

information is not standardized, thus the information can be provided using the model extension mechanism, as exemplified in [8, TPS Generic Structure Template].

9.5.4.1 Static Communication Configuration for the Server

If a `ProvidedUserDefinedServiceInstance` shall be statically configured for communication on Ethernet, then several elements need to be defined:

- `localUdpPortNumber`: a port number for the local UDP port needs to be defined on which the service will be provided using UDP protocol.
- `localTcpPortNumber`: a port number for the local TCP port needs to be defined on which the service will be provided using TCP protocol.
- `UserDefinedServiceInstanceToMachineMapping`: a mapping needs to be defined (for the local connection where the service will be provided) that associates the `ProvidedUserDefinedServiceInstance` to an `EthernetCommunicationConnector` (VLAN).
- `remotePeers`: a list of remote IP-Address and Port combinations needs to be defined where the messages will be sent to. A mix of unicast and multicast IP-Addresses is supported.
- `udpCollectionBufferTimeout`: Maximum time, an outgoing message may be delayed, due to data collection.
- `udpCollectionTrigger`: Defines whether the element contributes to the triggering of the UDP data transmission if data collection is enabled.
- `udpCollectionBufferSizeThreshold`: Specifies the amount of data in bytes that shall be buffered for data transmission over the UDP connection in case data collection is enabled.

9.5.4.2 Static Communication Configuration for the Client

If a `RequiredUserDefinedServiceInstance` shall be statically configured for communication on Ethernet, then several elements need to be defined:

- `localUdpPortNumber`: a port number for the local UDP port needs to be defined on which the service will be consumed using UDP protocol.
- `localTcpPortNumber`: a port number for the local TCP port needs to be defined on which the service will be consumed using TCP protocol.
- `UserDefinedServiceInstanceToMachineMapping`: a mapping needs to be defined (for the local connection where the service will be consumed) that associates the `RequiredUserDefinedServiceInstance` to an `EthernetCommunicationConnector` (VLAN).

- `eventMulticastUdpPort`: a port number for the local UDP port in case of multicast reception may be defined.
- `multicastIpAddress`: an IP-Address where the events will be consumed in case of multicast reception.
- `remotePeer`: an IP-Address and Port combination needs to be defined for the remote provider of the service.

9.6 Translation behavior

The `signal/service translation` is defined as a network binding for the [23, SWS Communication Management] and it is not specified at which exact point in time or in which context the data transformation (i.e. `signal-service-translation` or `service-signal-translation`) will be executed.

The behavior of `signal-service-translation` is governed by the application software which calls `ara::com-APIs` to interact with the communication management.

9.6.1 `ServiceInterface` representation of translation data

Due to update-bits (see [Chapter 9.6.2](#)) and data filtering (see [Chapter 9.6.3](#)), the `ServiceInterface` – which is used to represent the `signal/service translated` information – needs to be able to represent partially available information. For such cases, the AUTOSAR data type systems has defined the `isOptional` feature of structured data (see also the [2, TPS Software Component Template] for details).

For `ApplicationDataTypes`, the optionality is configured at the `ApplicationRecordElement.isOptional` attribute.

For `CppImplementationDataTypes`, the optionality is configured at the `CppImplementationDataTypeElement.isOptional` attribute.

The goal of the `signal/service translation` mapping is to define the proper `ServiceInterface` representation for the corresponding `ISignalIPdu`, respecting update bits and filtering.

9.6.1.1 Optional elements in case `signal-service-translation`

The approach for the `signal-service-translation` direction is: if a received `ISignal` or `ISignalGroup` has an update-bit defined (see [Chapter 9.6.2](#)) or the reception is guarded by a reception-filter (see [Chapter 9.6.3](#)), then the corresponding element in the `ServiceInterface` event shall be defined as `ApplicationRecordElement.isOptional` (resp. `CppImplementationDataTypeElement.isOptional`).

Please find an example for the handling of optional elements in signal/service translation in [Chapter B.10.2.1](#).

9.6.1.2 Optional elements in case `service-signal-translation`

The approach for the `service-signal-translation` direction is: if the `ServiceInterface` event has a member with `CppImplementationDataTypeElement.isOptional`, then the corresponding `ISignal` or `ISignalGroup` shall have an update-bit defined. During runtime, it will be checked which optional elements are actually defined in the event / field and the corresponding values are put into the `ISignalIPdu`. Also the update-bits are set accordingly.

Please find an example for the handling of optional elements in signal/service translation in [Chapter B.10.2.2](#).

9.6.2 Event and update-bit semantics

A variety of sources may exist where the `ISignalIPdus` originate that are candidates for `signal/service translation`. And the `ISignalIPdus` produced by the `signal/service translation` may be routed to many different targets in the vehicle network. It is essential to understand the semantics of the received and sent data in the scope of the `signal/service translation`.

Often `ISignalIPdus` are transported using periodic transmission in order to not only transport data but also have a liveliness indication of the information producer and the communication path.

If the sender would just transmit an `ISignalIPdu` when the value changes, a receiver would not be able to detect whether the sender just did not send anything because there is no new information or whether the sender (or the transport path) has a malfunction and therefore an intended sent message was not able to get through.

In the simplest case, the arrival of one `ISignalIPdu` actually represents the functional reception of all the included information. This means that the resulting event (resp. field) for the application software can be derived from the reception of that `ISignalIPdu`. In the opposite direction, the notification of an event (resp. field) from the application software results in the sending of the `signal/service translation ISignalIPdu`.

But there are scenarios where the layout of the `ISignalIPdu` is composed of information from different sources or are produced at different points in time. In order to indicate which parts of the `ISignalIPdu` actually have been updated and which parts have just been sent because they are part of the `ISignalIPdu`, the *update-bits* are used.

These update-bits are part of the `ISignalIPdu` payload and indicate whether the associated information has actually been sent intentionally or just has been sent because the `ISignalIPdu` was sent as a whole.

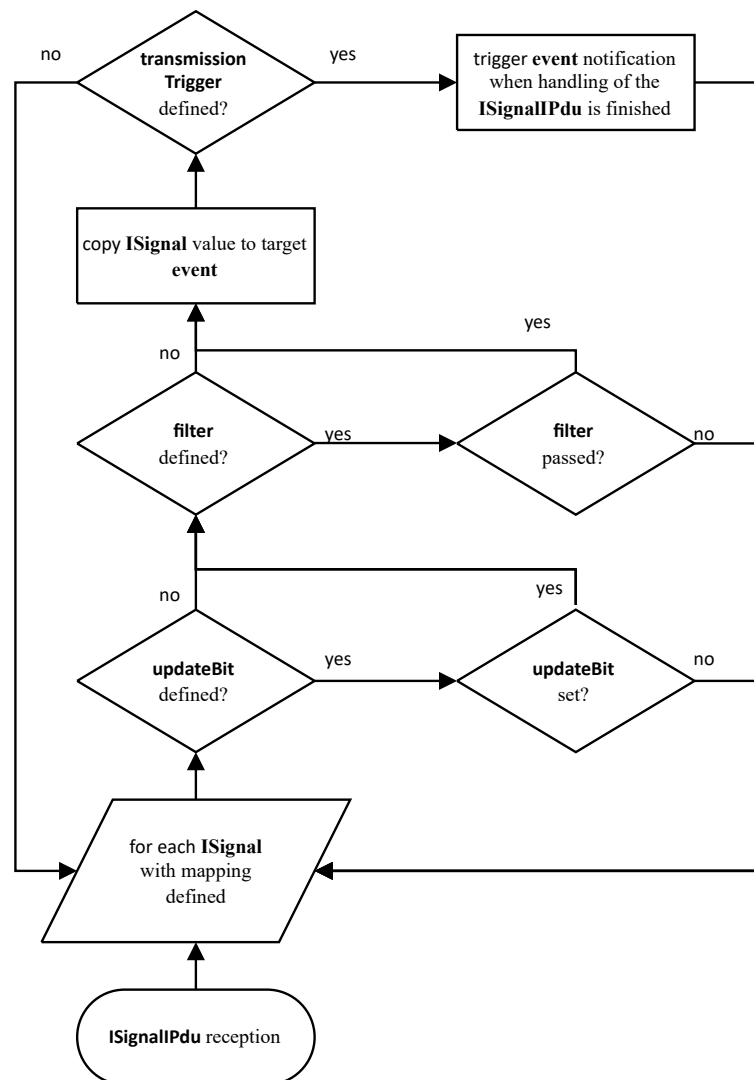


Figure 9.16: Processing order reception

If no update-bits are used, then every arrival of an `ISignalIPdu` has to be considered as being updated by the producer as a whole.

If update-bits are used, then not all of the included information may actually have been produced by the sender. In an extreme case – if all information of the `ISignalIPdu` has associated update-bits – all of the update-bits might not be set, resulting in reception of an `ISignalIPdu` but without any effect to the `signal-service-translation`.

Another way to influence the translation behavior is the usage of reception data filters during `signal-service-translation` (see also [Chapter 9.6.3](#)). This also may lead to the situation that the reception of an `ISignalIPdu` only triggers a subset of the contained information (or none at all).

The third check during `signal-service-translation` is the evaluation of the `SignalBasedEventElementToISignalTriggeringMapping.transmissionTrigger` (resp. `SignalBasedFieldToISignalTriggeringMapping.transmissionTrigger`). If an `ISignal` was actually taken to update the resulting event, the `transmissionTrigger` defines whether that update actually causes the notification of the mapped event.

One use-case may be to define which `signal-service-translation` elements actually cause the sending of an event. So if – due to update-bits and filters – only least important elements have been translated, it can be defined that in such cases the event will not be triggered.

[constr_3644] No `transmissionTrigger` support for `service-signal-translation` direction

Imposition time: `IT_Mani`

[If a `ServiceInstanceToSignalMapping.serviceInstance` refers to a `ProvidedApServiceInstance` then

- every `SignalBasedEventElementToISignalTriggeringMapping` aggregated in the role `eventElementMapping` and
- every `SignalBasedFieldToISignalTriggeringMapping` aggregated in the role `fieldMapping`

shall not have a `SignalBasedEventElementToISignalTriggeringMapping.transmissionTrigger` (respectively `SignalBasedFieldToISignalTriggeringMapping.transmissionTrigger`) defined.]

[TPS_MANI_03646] Definition of transmission triggers for `signal-service-translation` [The attribute `SignalBasedEventElementToISignalTriggeringMapping.transmissionTrigger`, respectively `SignalBasedFieldToISignalTriggeringMapping.transmissionTrigger`, defines which translation parts contribute to the transmission triggering for the mapped payload.]

[TPS_MANI_03647] Full translation before transmission triggering [In case there has been a transmission trigger caused by a source signal, the `signal-service-translation` shall first process all other mapped source signals for that target before sending out the target.]

[TPS_MANI_03648] Transmission trigger for `signal-service-translation` [If the attribute `SignalBasedEventElementToISignalTriggeringMapping.transmissionTrigger`, respectively `SignalBasedFieldToISignalTriggeringMapping.transmissionTrigger`, equals `true` then the translation of the respective source signal causes the sending of the target (after all mapped sources have been processed, see [TPS_MANI_03647]).]

[TPS_MANI_03649] No transmission trigger for `signal-service-translation` [If the attribute `SignalBasedEventElementToISignalTriggeringMapping`.

`transmissionTrigger`, respectively `SignalBasedFieldToISignalTriggeringMapping.transmissionTrigger`, is not defined or has the value *false*, then the translation of that respective source signal does not cause the sending of the target.]

Note that in case none of the `SignalBasedEventElementToISignalTriggeringMapping` or `SignalBasedFieldToISignalTriggeringMapping` contributing to the target of a `signal-service-translation` has the attribute `SignalBasedEventElementToISignalTriggeringMapping.transmissionTrigger` (respectively `SignalBasedFieldToISignalTriggeringMapping.transmissionTrigger`) set to *true* then the translation target will not be sent.

The combination of update-bits, filters, and transmission triggers may be configured for one `ISignal` – resulting in a sequential processing according to [Figure 9.16](#).

9.6.3 Data filtering

Filtering can be used to potentially reduce the amount of generated event notifications in case of `signal-service-translation` direction. There is no filtering support available for the `service-signal-translation` direction, although the transmission mode selection can be used to influence the amount of sent `ISignalIPdus` (see [Chapter 9.8.5](#)).

[constr_3643] No filter support for `service-signal-translation` direction

Imposition time: `IT_Mani`

[If a `ServiceInstanceToSignalMapping.serviceInstance` refers to a `ProvidedApServiceInstance` then

- every `SignalBasedEventElementToISignalTriggeringMapping` aggregated in the role `eventElementMapping` and
- every `SignalBasedFieldToISignalTriggeringMapping` aggregated in the role `fieldMapping`

shall not have a `SignalBasedEventElementToISignalTriggeringMapping.filter` (resp. `SignalBasedFieldToISignalTriggeringMapping.filter`) defined.]

If a data filtering shall be applied during the `signal-service-translation` then it is possible to define a `DataFilter` at the `SignalBasedEventElementToISignalTriggeringMapping` and `SignalBasedFieldToISignalTriggeringMapping` in the role `filter`.

[TPS_MANI_03621] Data filtering during the `signal-service-translation` [If there is a `SignalBasedEventElementToISignalTriggeringMapping.filter` (resp. `SignalBasedFieldToISignalTriggeringMapping.filter`) defined this filtering shall be implemented during the `signal-service-translation`.

This is the only supported application of `filters` for `signal-service-translation`.]

[TPS_MANI_03644] Supported reception data filters [The following `DataFilter` settings are supported by the `signal-service-translation`:

- `always`
- `maskedNewEqualsX`
- `maskedNewDiffersX`
- `maskedNewDiffersMaskedOld`

]

Note that the setting of `maskedNewDiffersMaskedOld` requires the translation software to keep the previous (*old*) value for comparison.

The possibility to define an `always` filter allows to specify a filter for each mapped signal, even if that particular signal shall not contribute to the filter result - as it always yields *passed*. This allows to define a full set of filters and thus gives the possibility to check for complete filter definitions.

The usage of a *never* filter is not supported by the `signal-service-translation`. Such a filter would always yield *not passed*, which is equivalent to not having a `SignalBasedEventElementToISignalTriggeringMapping` defined at all for this specific `ISignal`.

Potentially there could be several `SignalBasedEventElementToISignalTriggeringMapping.filters` (resp. `SignalBasedFieldToISignalTriggeringMapping.filters`) defined in the context of one target element (in the example [Figure 9.17](#) the event `xyz` the `x1` and `z`).

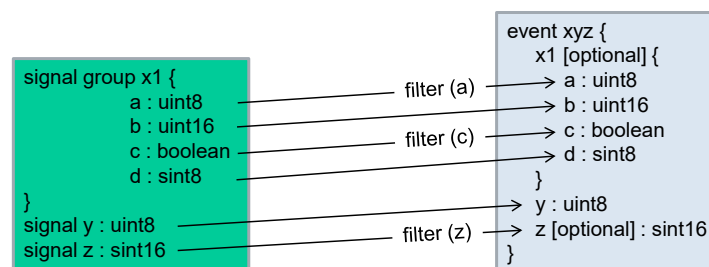


Figure 9.17: Filter example during `signal-service-translation`

In such a case ALL of the defined filters for the `scoped filtered element` have to pass in order to let the `signal/service translation` actually get effective. For the optional element `x1` to actually be set both, the *filter (a)* and *filter (c)*, have to pass. The optional element `z` will only be set if the *filter (z)* passes.

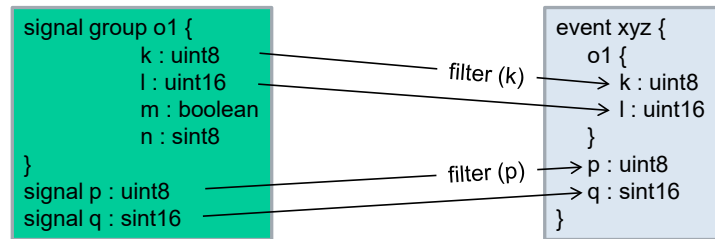


Figure 9.18: Filter example during `signal-service-translation` with no optional target elements

In case the target event of the `signal-service-translation` has no optional elements defined and at least one filter does not pass then the whole event is not sent. This is illustrated in [Figure 9.18](#), where the `event xyz` is considered to be the scoped element.

The `scoped filtered element` is defined as either

- the filtered element, if it is defined as *optional*
- the closest *optional* element traversing from the filtered element and going towards the root element
- the root element itself, if there is no *optional* element traversing from the filtered element and going towards the root element.

[TPS_MANI_03645] Applicability of a filter to the `scoped filtered element` [If a filter does not pass then the `scoped filtered element` shall not be considered for `signal-service-translation`.]

9.6.4 Translation from one source

The simplest translation approach is a one source translation. If the translation target is primitive then it has by nature only one source. If the translation target is a composite data then it depends on the structure of the sources whether a one source translation is possible.

[TPS_MANI_03620] Service discovery control [If the service discovery control is enabled for a specific service instance then any payload coming / going to that service instance shall be translated and forwarded to the mapped output(s).]

Every time an input signal or event arrives it is translated to the mapped output path. Since this is a one source translation the arrival of the input signal or event is the trigger for the translation. Therefore, if all the translation mappings have been performed the target payload can be sent out.

The example in [Figure 9.19](#) illustrates the full approach of a `signal-service-translation` with application component forwarding of the payload.

On the reception side, the `ISignalIPdu uv1` is the source of the `signal-service-translation`. The payload of the `ISignalIPdu` is translated into an instance of the event `uv2`. The event is part of a `ServiceInterface` that types the `RPortPrototype` which defines the `ara::com` API at that `RPortPrototype`.

It is the job of the application component code to use the `ara::com` API and fetch the information from the `RPortPrototype` and forward it to the `PPortPrototype`. In this example, it is not further defined how that forwarding is implemented, but for such a simple use-case the usage of a `PassThroughSwConnector` could be used to express the desired forwarding. For further details on this approach, refer to [Chapter 9.7](#). Of course, also a custom code implementation can be used to fetch the data and forward it.

At the `PPortPrototype` a `ServiceInterface` with an event `uv3` is defined. This is the basis to provide the information in a service-oriented manner to further software components. What kind of network binding is used for the transport of the `PPortPrototype` payload is not in scope of this example. However, the `PPortPrototype` could be mapped to any available kind of network binding available (SOME/IP, DDS, IPC, or even another `service-signal-translation`).

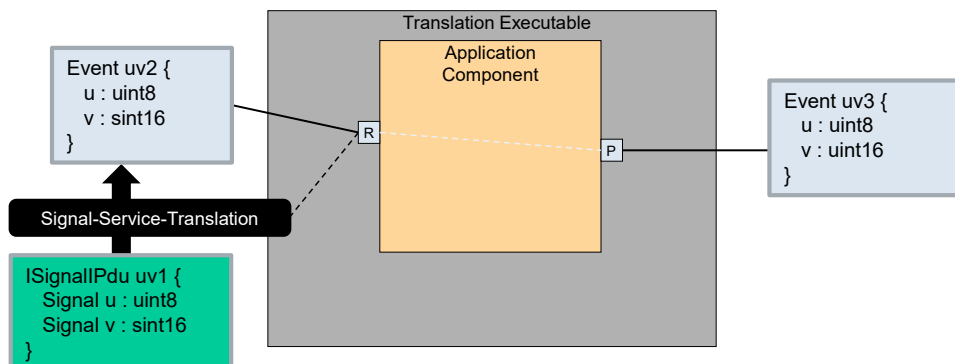


Figure 9.19: Example `signal-service-translation` and forwarding from one source

9.6.5 Translation from several sources

There is also the use-case to support the composition of data from different sources. However, because the sources will most likely not be received in a coordinated way, it would be hard to define an automatic behavior based on the usage of `PassThroughSwConnectors` for this setup. Thus, for the usage of `PassThroughSwConnectors`, it is required by the `signal/service translation` that the input for the `signal/-service translation` comes from one source.

The merging of data from several sources can be implemented on application component level and still utilize the `signal/service translation` features to interface with `ISignals` and `ISignalIPdus`. The code, however, which reads several source data and produces a consistent set of information is considered to be custom code.

An example for signal/service translation from different sources can be found in [Chapter B.10.2.3.1](#). Conversely, an example for service/signal translation from different sources is documented in [Chapter B.10.2.3.2](#)

9.6.6 Signal-Service-Translation to several targets

If the source `ISignalIPdu` in a `signal-service-translation` scenario is composed of several parts (`ISignalGroups` and/or individual `ISignals`), then it is possible to map the parts of that `ISignalIPdu` to several targets (events or field notifiers).

[TPS_MANI_03667] Mapping from one `ISignalIPdu` to several events in case of `signal-service-translation` [The `ISignals` of one `ISignalIPdu` can be mapped to one or more events (using `SignalBasedEventElementToISignalTriggeringMapping.iSignalTriggering`) or field notifiers (using `SignalBasedFieldToISignalTriggeringMapping.notifierSignalTriggering`).]

The individual `SignalBasedEventElementToISignalTriggeringMappings` and `SignalBasedFieldToISignalTriggeringMappings` will define in their `DataPrototypeInServiceInterfaceRef` the target of the `signal-service-translation`.

One scenario mandates the mapping of parts of an `ISignalIPdu` to different events: If the source `ISignalIPdu` is composed of several parts (`ISignalGroups` and/or individual `ISignals`) and at least one of the `ISignalGroups` is end-to-end protected.

In such cases it is required to get the end-to-end status per protected `ISignalGroup`, thus merging the whole `ISignalIPdu`'s content into one event does not suffice, as only a part of the `ISignalIPdu` is actually end-to-end protected, and the `ara::com` status APIs are available on an event level.

The modeling approach according to [Chapter 9.4.3](#) results in one or more `Service-InstanceToSignalMappings` which distribute the content of one `ISignalIPdu` to several events.

An example for the signal/service translation to several targets can be found in [Chapter B.10.2.4](#).

9.7 Translation pass-through composition

In case a *Pass-through Composition* is defined (see [Figure 9.4](#)) the behavior for the defined pass-through definition shall be implemented. It is well possible to automatically generate the implementation of such a pass-through behavior out of the information given in the *Pass-through Composition*.

The mapping approach is already used in [Chapter 4.3](#) where the `PassThrough-SwConnector` is used to define the matching `PortPrototypes` for the *facade* use-case. Specifically [\[constr_5056\]](#) applies as well for the *signal/service translation*.

SOME/IP services may consist of a mixture of events, fields and methods. While events and field notifiers are (potentially) subject to *signal/service translation* it is well-defined that methods (methods, getter- and setter-methods, and fire-and-forget methods) are serialized according to the SOME/IP serialization rules.

However, the mixed nature of a specific service instance makes it necessary that methods also have to be considered in the *Pass-through Composition*. It is not so much about the translation of the payload serialization, but the general wrapping of events, fields and methods in one service instance makes it necessary that methods get *passed through* as well.

9.8 Expected features of Classic platform

Classic AUTOSAR SWS-COM Specification provides a variety of possibilities to pack signals into PDUs - from a structural as well as from a behavioral perspective. Also, the further layers in the COM-Stack may influence the PDUs layout.

The goal of this section is to specify which of these Classic COM-Stack features shall also be available on the Adaptive Platform *signal/service translation*.

9.8.1 Processing order

For the features of the Classic platform COM-Stack there is a well-defined processing order in which the actions are performed upon Tx and Rx of data. It is required for the *signal/service translation* to ensure the same processing order.

[TPS_MANI_03585] Processing order of COM-Stack features [For the COM-Stack features the *signal/service translation* supports the processing order shall be the same as on the Classic platform.]

9.8.2 Reception data filter

The reception filter support for *signal-service-translation* is defined in [Chapter 9.6.3](#).

The potentially defined reception filters at an `ISignalPort` shall be ignored, as [\[TPS_MANI_03621\]](#) is the only supported way to define *filters* for *signal-service-translation*.

[TPS_MANI_03589] **Reception data filter of COM-Stack** [If the `ISignalTriggering` refers to an `ISignalPort` and that `ISignalPort` has a `dataFilter` defined then the `signal-service-translation` shall ignore the filter definition.]

9.8.3 Reception of invalid signal

[TPS_MANI_03592] **`ISignal` invalidation of COM-Stack** [If the `ISignalTriggering` refers to an `ISignalPort` with `communicationDirection` equal `in` then the following values for `ISignalPort.handleInvalid` shall be supported by the `signal/service translation`:

- `dontInvalidate`
- `replace`

]

[TPS_MANI_03593] **`handleInvalid = dontInvalidate` behavior of COM-Stack** [If the `ISignalTriggering` refers to an `ISignalPort` with `communicationDirection` equal `in` and the `ISignalPort.handleInvalid` equals `dontInvalidate` then the `signal/service translation` shall not perform any invalidation handling.]

[TPS_MANI_03594] **`handleInvalid = replace` behavior of COM-Stack** [If the `ISignalTriggering` refers to an `ISignalPort` with `communicationDirection` equal `in` and the `ISignalPort.handleInvalid` equals `replace` and the received value of the `ISignal` equals the `ISignal.networkRepresentationProps.invalidValue` then the `signal/service translation` shall *replace* the `invalidValue` with the `ISignal.initValue`.]

9.8.4 Update Bit handling

For details on the handling of update bits refer to [Chapter 9.6](#).

[TPS_MANI_03595] **Update Bit support for `ISignal`** [If the `ISignalTriggering` refers to an `ISignalPort` with `communicationDirection` set to the value `in` and the `ISignalTriggering` refers to an `ISignal` and that `ISignal` is mapped into an `ISignalIPdu` with a `ISignalToIPduMapping.updateIndicationBitPosition` defined, then the following rules apply:

- If the received *update bit* is *true*, then the respective `ISignal` shall be considered for reception.
- If the received *update bit* is *false*, then the respective `ISignal` shall not be considered for reception.

]

9.8.5 Transfer properties and transmission modes for **Service-Signal-Translation**

[TPS_MANI_03590] Transfer properties and transmission modes of COM-Stack
 [If the `ISignalTriggering` refers to an `ISignalPort` with `communicationDirection` equal `out` and the `ISignalTriggering` refers to an `ISignal` and that `ISignal` is mapped into an `ISignalIPdu` with an `IPduTimingSpecification` and the `IPduTiming` has a `transmissionModeDeclaration` defined and the `TransmissionModeDeclaration` has a `transmissionModeCondition` defined and the following values for `TransmissionModeCondition.dataFilter` shall be supported by the `service-signal-translation`:

- `always`
- `never`
- `maskedNewEqualsX`
- `maskedNewDiffersX`

]

Class	TransmissionModeCondition			
Note	Possibility to attach a condition to each signal within an I-PDU. If at least one condition evaluates to true, TRANSMISSION MODE True shall be used for this I-Pdu. In all other cases, the TRANSMISSION MODE FALSE shall be used.			
Base	ARObject			
Aggregated by	TransmissionModeDeclaration.transmissionModeCondition			
Attribute	Type	Mult.	Kind	Note
dataFilter	DataFilter	0..1	aggr	Possibilities to define conditions
iSignalInIPdu	ISignalToIPduMapping	0..1	ref	Reference to a signal to which a condition is attached.

Table 9.11: TransmissionModeCondition

Class	TransmissionModeDeclaration			
Note	AUTOSAR COM provides the possibility to define two different TRANSMISSION MODES (True and False) for each I-PDU. As TransmissionMode selector the signal content can be evaluated via transmissionModeCondition (implemented directly in the COM module) or mode conditions can be defined with the modeDrivenTrueCondition or modeDrivenFalseCondition (evaluated by BswM and invoking Com_SwitchIpduTxMode COM API). If modeDrivenTrueCondition and modeDrivenFalseCondition are defined they shall never evaluate to true both at the same time. The mixing of Transmission Mode Switch via API and signal value is not allowed.			
Base	ARObject			
Aggregated by	IPduTiming.transmissionModeDeclaration			
Attribute	Type	Mult.	Kind	Note
modeDrivenFalseCondition	ModeDrivenTransmissionModeCondition	*	aggr	Defines the trigger for the Com_SwitchIpduTxMode Transmission Mode switch. Only if all defined modeDrivenFalseConditions evaluate to true (AND associated) the transmissionModeFalseTiming shall be activated. modeDrivenTrueCondition and modeDrivenFalseCondition shall never evaluate to true both at the same time.





Class	TransmissionModeDeclaration			
modeDriven TrueCondition	ModeDriven TransmissionMode Condition	*	aggr	Defines the trigger for the Com_SwitchIpduTxMode Transmission Mode switch. Only if all defined modeDriven TrueConditions evaluate to true (AND associated) the transmissionModeTrueTiming shall be activated. modeDrivenTrueCondition and modeDrivenFalseCondition shall never evaluate to true both at the same time.
transmission ModeCondition	TransmissionMode Condition	*	aggr	The Transmission Mode Selector evaluates the conditions for a subset of signals and decides which transmission mode should be used. In case only one transmission mode is used there is no need for the "TransmissionMode Condition" and its sub-structure. In case the transmission mode shall be switched using the COM-API "Com_Switch IpduTxMode" there is no need for the "TransmissionMode Condition" and its sub-structure.
transmission ModeFalse Timing	TransmissionMode Timing	0..1	aggr	Timing Specification if the COM Transmission Mode is false. The Transmission Mode Selector is defined to be false, if all Conditions evaluate to false.
transmission ModeTrue Timing	TransmissionMode Timing	0..1	aggr	Timing Specification if the COM Transmission Mode is true. The Transmission Mode Selector is defined to be true, if at least one Condition evaluates to true.

Table 9.12: TransmissionModeDeclaration

9.8.6 Deadline monitoring

The application software is responsible for the deadline monitoring.

9.8.7 Signal and IPdu Transmission

The application software is responsible for the periodic production of data and triggering of sending.

9.8.8 IPdu multiplexing

On low-payload networks there is the usage of IPdu Multiplexing to handle the limited number of identifiers for the respective network transport (e.g. CAN-Ids). The potential alternatives of a [MultiplexedIPdu](#) shall be represented as optional alternative [CpImplementationDataType](#) of category [STRUCTURE](#) in the [ServiceInterface](#) event or field.

[TPS_MANI_03597] Support for [MultiplexedIPdu](#) [The [signal/service translation](#) shall support the handling of [MultiplexedIPdu](#) defined payload. The support shall be available for sending and receiving of [MultiplexedIPdus](#).]

[TPS_MANI_03638] Mapping of [MultiplexedIPdu](#) [The content of the [MultiplexedIPdu](#) shall be mapped to a [CpImplementationDataType](#) of category [STRUCTURE](#) consisting of the elements:

- [MultiplexedIPdu](#) static part: directly mapped into the top-level structure

- **MultiplexedIPdu** dynamic part: each dynamic part alternative shall be mapped inside a **CppImplementationDataTypeElement** of category **STRUCTURE**

]

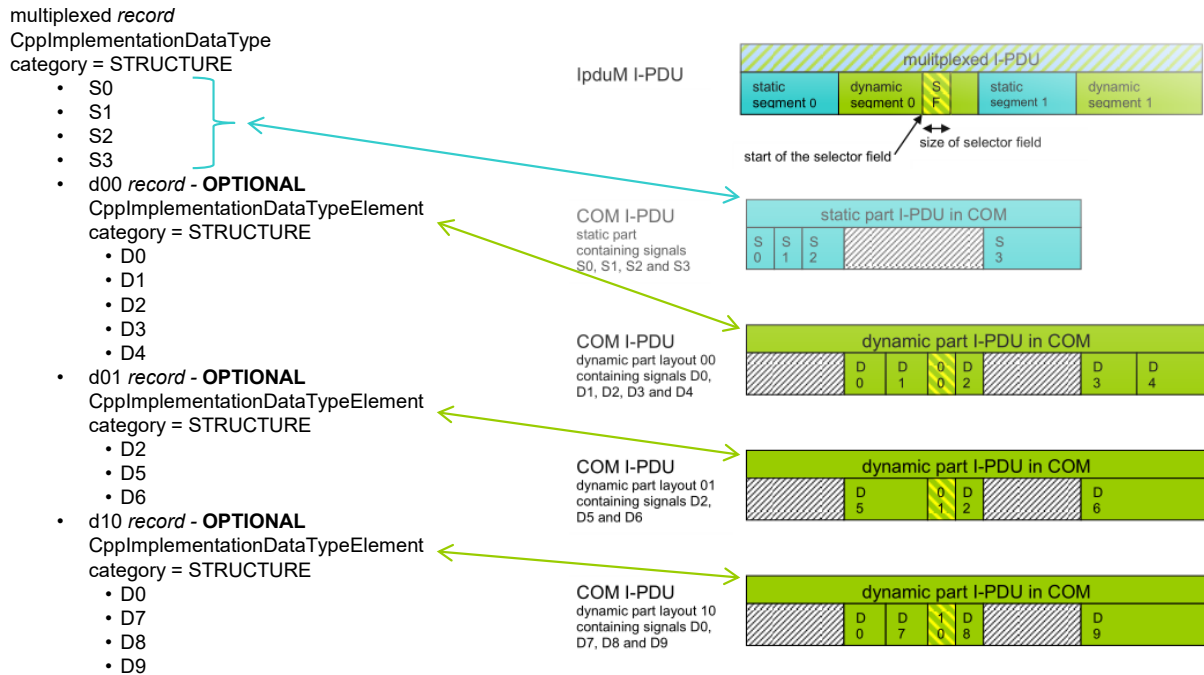


Figure 9.20: Example mapping for **MultiplexedIPdu**

[TPS_MANI_03639] Mapping of **MultiplexedIPdu static part** [The content of the **MultiplexedIPdu** static part shall be mapped to the a **CppImplementationDataType** of category **STRUCTURE** defined for the whole **MultiplexedIPdu** in [TPS_MANI_03638].]

[TPS_MANI_03640] Mapping of **MultiplexedIPdu dynamic part** [The content of each **MultiplexedIPdu** dynamic part shall be mapped to one of the optional alternatives of the **CppImplementationDataTypeElement** of category **STRUCTURE** with **CppImplementationDataTypeElement.isOptional** set to *true* for each dynamic part in [TPS_MANI_03638].]

Note that even in cases where there is just one member mapped from a **MultiplexedIPdu** dynamic part there shall still be a wrapping **CppImplementationDataTypeElement** of category **STRUCTURE** defined according to [TPS_MANI_03640].

[TPS_MANI_03641] No mapping of **MultiplexedIPdu selector field value** [The selector field value of a **MultiplexedIPdu** shall not be mapped in the context of signal-service-translation (or service-signal-translation).]

In order to keep the event or field of the `ServiceInterface` status consistent there shall only be exactly one of the optional alternatives used.

[TPS_MANI_03642] Exactly one alternative defined for mapped event / field during runtime [Exactly one option (as defined in [TPS_MANI_03640] for the dynamic part) shall be defined in the event / field representing the `MultiplexedIPdu` during runtime.]

In [Figure 9.20](#) an example for the mapping between a `MultiplexedIPdu` and the composite data type is illustrated.

9.9 End-to-End considerations

The `signal/service translation` on Adaptive platform follows a single-sided approach on `ara::com`. To the application software there is no difference whether the service is communicated using SOME/IP or DDS, or whether the service originates in a `signal/service translation`. As the translation is running in the same `Process` as the application software itself, the application software has direct access to the translated service payload.

In case there is an E2E header attached and/or a secure communication defined the translation software needs to check the validity (for reception) or calculate the CRC/-MAC (for sending) of signal-based payload.

The information whether and which E2E / Security profile is configured is defined in the [4, TPS System Template] part belonging to the mapping information of [Chapter 9.4.3](#) and [Chapter 9.4.5](#).

The assignment of the `ISignals` to `ISignalIPdus` which in turn are assigned to `SecuredIPdus` defines the security aspects.

The assignment of `ISignals` to `EndToEndTransformationDescriptions` define the safety aspects.

9.9.1 Safety

The attribute `SignalServiceTranslationEventProps.safeTranslation` is used to explicitly require that the translation shall be configured in a safe transport and that the translation software shall handle the translation activity in an end-to-end preserving way.

[TPS_MANI_03607] Handling of safe `signal/service translation` in one Executable [It is required that the `signal-service-translation` (and `service-signal-translation`) of one Service/SignalGroup pair which are mapped to each other, shall be handled in one `Executable` to also cover a closed mapping from one E2E profile to another, if necessary.

The `signal/service translation` of different (independent) Services/Signal-Groups may be handled by different `Executables`.]

[TPS_MANI_03608] Support for safe `signal/service translation` [The translation of E2E protected data shall be supported in both directions, `signal-service-translation` and `service-signal-translation`.]

[TPS_MANI_03609] Support for safe `signal/service translation` with same or different E2E profiles [The translation of E2E protected data shall support the occurrence of

- the same E2E profile on both sides of the communication and
- different E2E profiles on each side of the communication.

]

[TPS_MANI_03610] 1:n mapping for E2E protected data [It shall be possible to map the same E2E protected source data to several E2E protected target data (1:n).]

[TPS_MANI_03611] E2E protected target out of E2E protected sources [The content of one E2E protected target shall only be composed out of data from E2E protected sources.]

The rationale for [\[TPS_MANI_03611\]](#) is to support the use-case where target data shall be E2E protected and it is composed of several sources.

[TPS_MANI_03614] No translation of not OK E2E protected data out of several sources [If a E2E protected source data is mapped into a composed E2E protected target data (according to [\[TPS_MANI_03611\]](#)) and if the E2E-Check for the source data returns any E2E error (not `E_OK`) then this source data shall not be forwarded to the respective target data and (if applicable) shall not trigger the transmission of the target.]

If source data is not verified as `E_OK` it is not translated. If the translated E2E protected data comes from several sources there may occur correlation and synchronicity issues during translation.

[TPS_MANI_03612] Sufficient ASIL level of translation software [If the `SignalServiceTranslationEventProps.safeTranslation` equals true then the implementation of the translation software shall fulfill a sufficient ASIL.]

[constr_3554] E2E protection configuration check

Imposition time: [IT_Mani](#)

[If the `SignalServiceTranslationEventProps.safeTranslation` equals true then the signal-based payload shall have an EndToEnd profile defined.]

The current EndToEnd profiles for Classic platform rely on a periodic communication paradigm. For the translation software of the Adaptive platform this requires to know the specified period the payload has to be updated / checked for.

[TPS_MANI_03598] Expected check period of E2E-Protected payload [If the [RPortPrototype](#) has a [ReceiverComSpec.receptionProps.dataUpdatePeriod](#) defined for an [event](#) then the application software calling the `ara::com` APIs shall check periodically for updates using the specified period.]

[TPS_MANI_03599] Expected update period of E2E-Protected payload [If the [PPortPrototype](#) has a [SenderComSpec.transmissionProps.dataUpdatePeriod](#) defined for an [event](#) then the application software calling the `ara::com` APIs shall periodically update the [event](#) using the specified period.]

Class	ReceptionComSpecProps			
Note	This meta-class defines a set of reception attributes which the application software is assumed to implement.			
Base	ARObject			
Aggregated by	ReceiverComSpec.receptionProps			
Attribute	Type	Mult.	Kind	Note
dataUpdatePeriod	TimeValue	0..1	attr	This attribute defines the period in which the application shall check for updated data. This attribute is used for the configuration of the E2E protection, but may also indicate a general data reception period.
timeout	TimeValue	0..1	attr	This attribute defines the time interval after which the application shall assume that the to be received data reception has timed out, i.e. the respective data has not been received for that amount of time.

Table 9.13: ReceptionComSpecProps

Class	TransmissionComSpecProps			
Note	This meta-class defines a set of transmission attributes which the application software is assumed to implement.			
Base	ARObject			
Aggregated by	SenderComSpec.transmissionProps			
Attribute	Type	Mult.	Kind	Note
dataUpdatePeriod	TimeValue	0..1	attr	This attribute defines the period in which the application is assumed to transmit the respective data.
minimumSendInterval	TimeValue	0..1	attr	This attribute defines the minimum interval between two consecutive transmissions of the respective data the application is assumed to ensure.
onChangeDataPrototype	DataPrototype Reference	*	aggr	This reference defines which DataPrototypes trigger the onChange transmission of the data. Stereotypes: atpSplitable Tags: atp.Splitkey=onChangeDataPrototype
transmissionMode	TransmissionMode DefinitionEnum	0..1	attr	The attribute defines the mode in which the application is assumed to transmit the respective data.

Table 9.14: TransmissionComSpecProps

Enumeration	TransmissionModeDefinitionEnum
Note	This meta-class defines possible settings for the transmission mode.
Aggregated by	TransmissionComSpecProps.transmissionMode
Literal	Description
cyclic	The data is assumed to be transmitted in a cyclic manner. The cycle is defined by dataUpdatePeriod. Tags: atp.EnumerationLiteralIndex=0
cyclicAndOn Change	The data is assumed to be transmitted in a cyclic manner (with cycle time dataUpdatePeriod) and additionally there may be arbitrary transmission if the data value changes (minimumSendInterval to be respected, if defined). Which data prototypes trigger the transmission if their value changes is defined by TransmissionComSpecProps.onChangeDataPrototype. Tags: atp.EnumerationLiteralIndex=2
onChange	The data is assumed to be transmitted in an arbitrary manner only if the data value changes (minimumSendInterval to be respected, if defined). Which data prototypes trigger the transmission if their value changes is defined by TransmissionComSpecProps.onChangeDataPrototype. Tags: atp.EnumerationLiteralIndex=3
triggered	The data is assumed to be transmitted in an arbitrary manner (minimumSendInterval to be respected, if defined). Tags: atp.EnumerationLiteralIndex=1

Table 9.15: TransmissionModeDefinitionEnum

9.9.1.1 Signal-service-translation

[TPS_MANI_03600] Signal-service-translation of E2E protected payload [[Signal-service-translation](#) shall check the end-to-end status of every received signal-based payload. If the E2E-Check returns *E_OK* for the received payload then the data shall be forwarded to the respective sending of the translation software.]

Error handling:

[TPS_MANI_03601] Signal-service-translation of E2E protected payload - timeout handling [If no message is received within the specified message cycle time (timeout is detected), then no data shall be transmitted to the service-based part.]

[TPS_MANI_03602] Signal-service-translation of E2E protected payload - error handling [If the E2E-Check returns any E2E error (not *E_OK*), then the service-based message shall reflect that E2E error.]

Note: This is necessary to provide E2E information to the application software and support an End-to-End view on the data exchange from sender to receiver / provider to consumer.

9.9.1.2 Service-signal-translation

[TPS_MANI_03603] Service-signal-translation of E2E protected payload [[Service-signal-translation](#) shall check the end-to-end status of every received service-oriented payload. If the E2E-Check returns *E_OK* for the received payload then the data can be forwarded to the respective sending of the translation software.]

Error handling:

[TPS_MANI_03604] Service-signal-translation of E2E protected payload - timeout handling [If no message is received within the specified message cycle time (timeout is detected), then no data shall be transmitted to the signal-based part.]

[TPS_MANI_03605] Service-signal-translation of E2E protected payload - error handling [If the service-oriented payload is handed over with any E2E error (not *E_OK*), then the newly created signal-based E2E protected message shall reflect that E2E error.]

Note: This is necessary to provide E2E information to the receiving application and support an End-to-End view on the data exchange from sender to receiver/provider to consumer.

9.9.2 Security

In the context of Signal Service Translation the Secure Onboard Communication *SecOC* (see [24, SWS Secure Onboard Communication]) is the major security technology. Further technologies (like *IPSec* or *TLS*) have not been included in the considerations for *signal/service translation*.

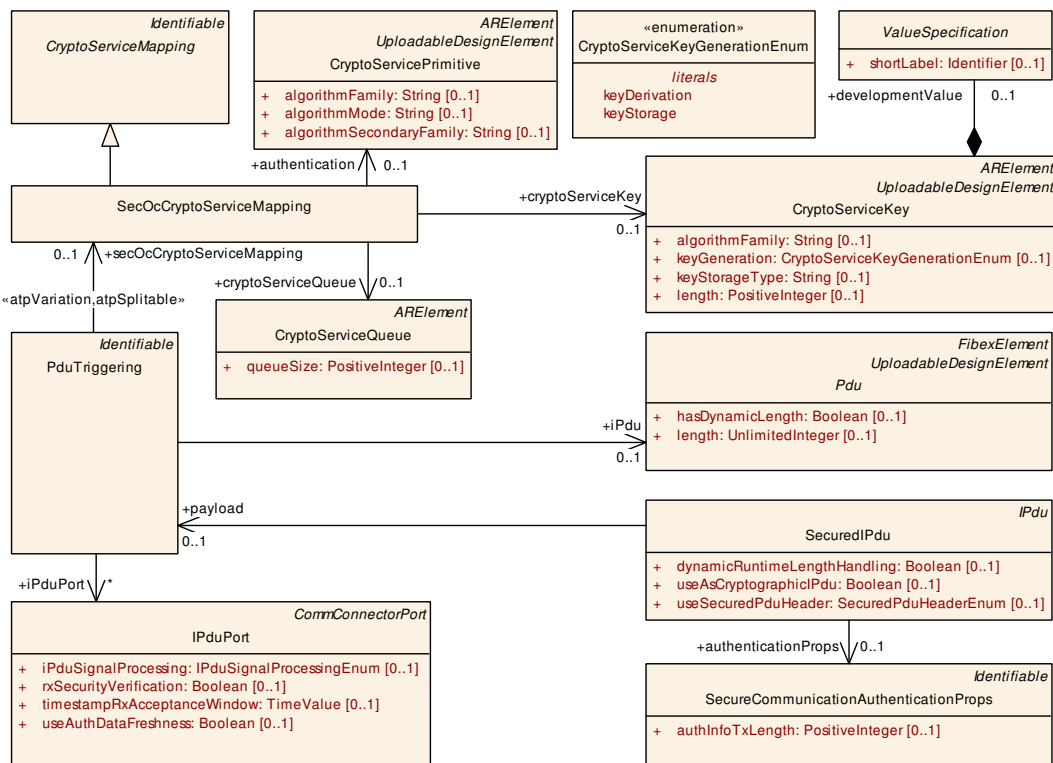


Figure 9.21: SecOC configuration

The configuration of *SecOC* on the signal-based communication is defined by having the *ISignalTriggering* used in one of the *signal/service translation*

mappings refer to an [ISignal](#) and that [ISignal](#) is part of an [ISignalIPdu](#). A [PduTriggering](#) of this [ISignalIPdu](#) is referenced by a [SecuredIPdu](#) in the role payload.

The [SecuredIPdu](#) defines all the details which are required to *generate* / *verify* the cryptographic information. The description of the configuration is provided in the [4, TPS System Template] of Classic platform.

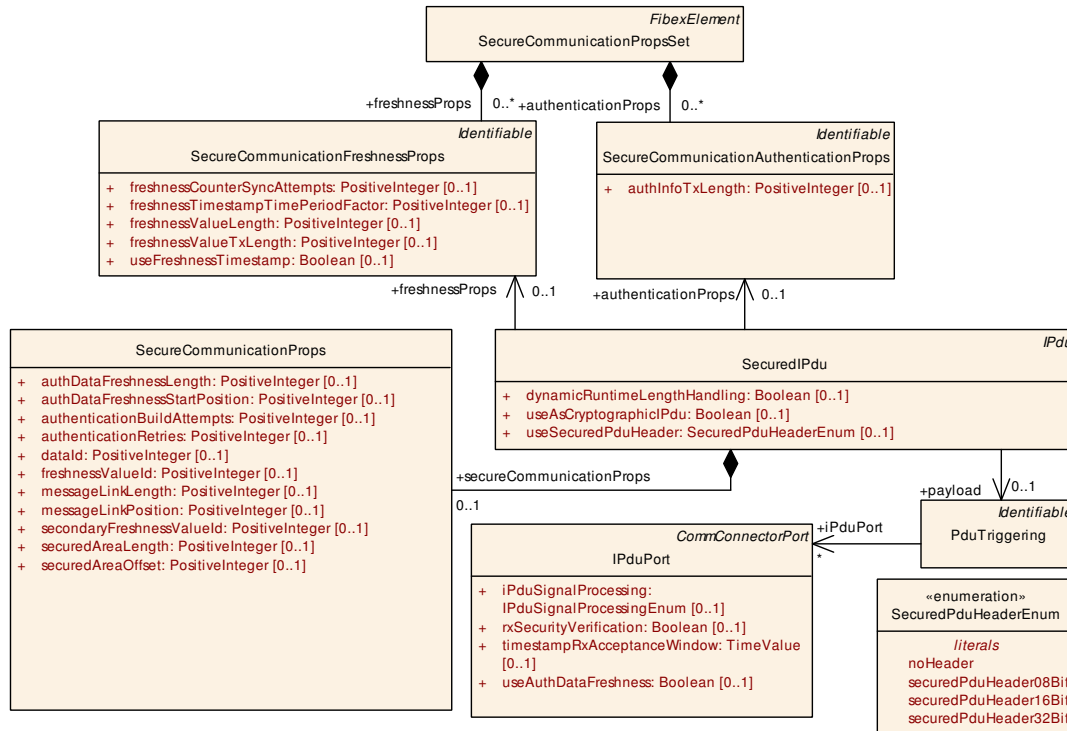


Figure 9.22: Details on [SecuredIPdu](#)

As the [SecOC](#) is highly embedded into the Classic platform architecture the [signal/-service translation](#) approach on security is to use the same architecture for its specification.

9.9.2.1 Restrictions on Classic Platform [SecOC](#)

[constr_3555] No support for [SecuredIPdu.useAsCryptographicIPdu](#) set to `true`

Imposition time: [IT_Mani](#)

[If a [PduTriggering](#) is referencing a [SecuredIPdu](#) where the attribute [useAsCryptographicIPdu](#) is set to the value `true`, then no subclass of [AbstractSignalBasedToISignalTriggeringMapping](#) shall refer to an [ISignalTriggering](#) that in turn refers to an [ISignal](#) that is referenced in the role [iSignal](#) by any [ISignalToIPduMapping](#) that is owned by the [ISignalIPdu](#) referenced by the [SecuredIPdu](#) in the role [payload](#).]

The rationale for [constr_3555] is that the separate handling of two PDUs for the transport of one secured message is not supported by the SOME/IP protocol. In such cases the [signal/service translation](#) has to be performed on a Classic platform gateway ECU.

9.9.2.2 Link between Classic Platform SecOC and [CryptoKeySlot](#)

While most of the information how to configure the SecOC behavior are available in the Classic platform model, there is also the need to define which [CryptoKeySlot](#) shall be used for the processing of the SecOC message.

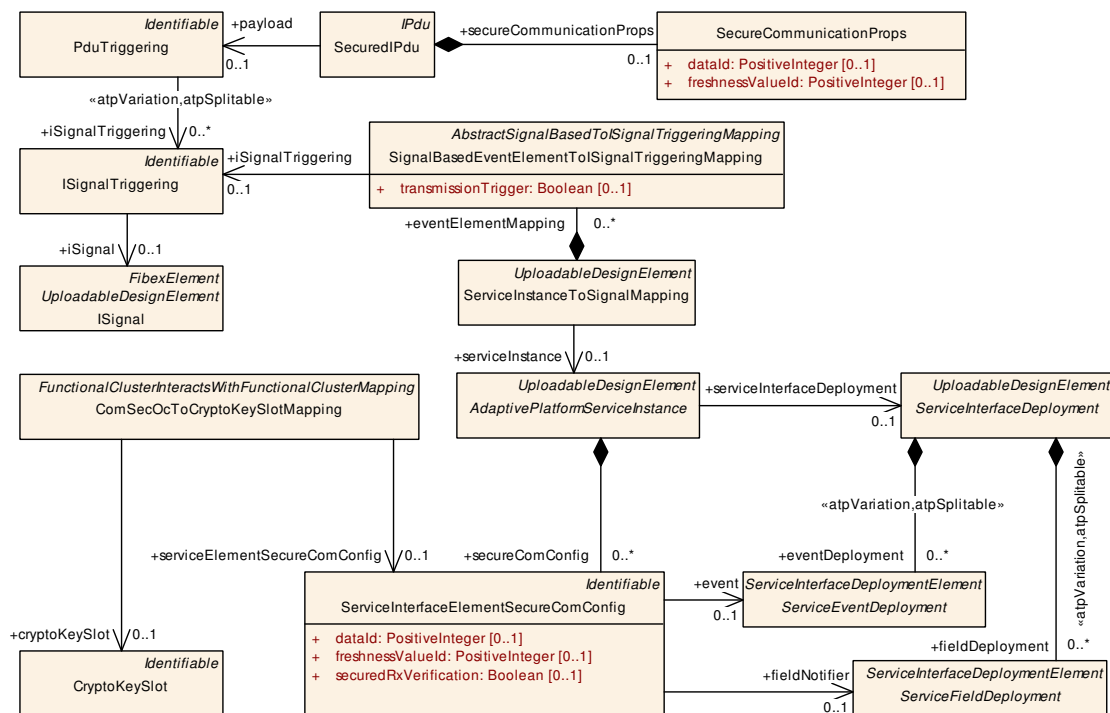


Figure 9.23: Classic SecOC and Adaptive [CryptoKeySlot](#)

[TPS_MANI_03636] Definition of [ServiceInterfaceElementSecureComConfig](#) in the context of [signal/service translation](#) [A [ServiceInterfaceElementSecureComConfig](#) at the [AdaptivePlatformServiceInstance](#) shall be created for each Event or FieldNotifier if the following conditions apply:

- the [AdaptivePlatformServiceInstance](#) is target of a [ServiceInstanceToSignalMapping](#) in the role [serviceInstance](#)
- the [ServiceInstanceToSignalMapping](#) has a [SignalBasedEventElementToISignalTriggeringMapping](#) (resp. [SignalBasedFieldToISignalTriggeringMapping](#)) that refers to an [ISignalTriggering](#) that are part of an [ISignalIPdu](#)
- that [ISignalIPdu](#) is referenced by a [PduTriggering](#) which in turn is referenced by a [SecuredIPdu](#) in the role [payload](#)

- the `SecuredIPdu` is referenced by a `PduTriggering` and that `PduTriggering` refers to an `IPduPort` that has the attribute `rxSecurityVerification` set to true.

]

[TPS_MANI_03637] Ignored attributes of `ServiceInterfaceElementSecureComConfig` in the context of signal/service translation [If a `ServiceInterfaceElementSecureComConfig` qualifies according to [TPS_MANI_03636] then any attributes (e.g. `dataId` and `freshnessValueId`) - except the reference in the role `event` or `fieldNotifier` - shall be ignored. The information how to configure the SecOC shall be taken from the `SecuredIPdu`.]

[TPS_MANI_03663] Ignored references of `ServiceInstanceToMachineMapping` in the context of signal/service translation [If an `AdaptivePlatformServiceInstance` qualifies according to [TPS_MANI_03636] and a `ServiceInstanceToMachineMapping` exists that refers to that `AdaptivePlatformServiceInstance` in the role `serviceInstance` and in the context of that `ServiceInstanceToMachineMapping` any of the following references exist:

- `ServiceInstanceToMachineMapping.secureComPropsForUdp`
- `ServiceInstanceToMachineMapping.secureComPropsForTcp`
- `ServiceInstanceToMachineMapping.secOcComPropsForMulticast`,

they shall be ignored.]

The information of `SecOcSecureComProps` is available from the `SecuredIPdu` description in:

- `SecureCommunicationAuthenticationProps.authInfoTxLength`
- `SecureCommunicationFreshnessProps.freshnessValueLength`
- `SecureCommunicationFreshnessProps.freshnessValueTxLength`
- `SecOcCryptoServiceMapping.authentication`.

10 Execution Manifest

10.1 Overview

The purpose of the execution manifest is to provide information that is needed for the actual target-configuration of an application (formally modeled as an [SwComponentType](#)) onto the AUTOSAR adaptive platform.

One aspect of the target-configuration information is the provision of information that could in principle be provided as part of the application software code but which would make the application software code become very much bound to specific usage scenarios.

The general idea is to keep the application software code as independent as possible from the target-configuration scenario in order to increase the odds that the application software can be reused in different target-configuration scenarios.

In particular, the usage of [PortPrototypes](#) as a means to express communication with the “outside” of the application software allows for abstracting away the details (the concrete service instance identification) of the service configuration. As far as the model is concerned, the [API](#) between the application and the middleware is represented by the [PortPrototype](#).

The application code does not use specific service instances but takes the [PortPrototype](#) as a symbolic replacement for this information. The specifics of this modeling aspect are described in [Chapter 13](#).

10.2 Process

The top-level element of the [Execution Manifest](#) definition is the [Process](#), in reference to the fact that the unit of target-configuration on the *AUTOSAR adaptive platform* is a binary that, at runtime, makes a POSIX process.

[TPS_MANI_01308] [Process](#) is not designed for re-usability [Meta-class [Process](#) has **not** been created with the goal of reusing it on different [Machines](#).

However, there is *some* potential for reusing configuration aspects in the definition of the [Process.stateDependentStartupConfig.startupConfig](#).]

Class	Process
Note	This meta-class provides information required to execute the referenced Executable . Tags: atp.recommendedPackage=Processes This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , AbstractExecutionContext , AtpClassifier , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement





Class	Process			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
design	ProcessDesign	0..1	ref	This reference represents the identification of the design-time representation for the Process that owns the reference.
executable	Executable	*	ref	Reference to executable that is executed in the process. Stereotypes: atpUriDef
functionCluster Affiliation	String	0..1	attr	This attribute specifies which functional cluster the Process is affiliated with.
numberOf RestartAttempts	PositiveInteger	0..1	attr	This attribute defines how often a process shall be restarted if the start fails. numberOfRestartAttempts = "0" OR Attribute not existing, start once numberOfRestartAttempts = "1", start a second time
preMapping	Boolean	0..1	attr	This attribute describes whether the executable is preloaded into the memory.
processState Machine	ModeDeclarationGroup Prototype	0..1	aggr	Set of Process States that are defined for the process. This attribute is used to support the modeling of execution dependencies that utilize the condition of process state. Please note that the process states may not be modeled arbitrarily at any stage of the AUTOSAR workflow because the supported states are standardized in the context of the SWS Execution Management [13].
stateDependent StartupConfig	StateDependentStartup Config	*	aggr	Applicable startup configurations.

Table 10.1: Process

[constr_3732] Upper multiplicity of reference in the role `Process.executable`*Imposition time: IT_Mani*

[In the context of `Process`, the reference in the role `executable` shall exist at most once.]

Class	AbstractExecutionContext (abstract)			
Note	This meta-class acts as a base class for entities that execute code on different levels, e.g. container, process, thread, fiber. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, AtpClassifier, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Subclasses	Process			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 10.2: AbstractExecutionContext

[TPS_MANI_01337] Standardized values for attribute `Process.functionClusterAffiliation` [The following values of attribute `Process.functionClusterAffiliation` are standardized by AUTOSAR:

- **STATE_MANAGEMENT**
- **PLATFORM_HEALTH_MANAGEMENT**

]

Please note that it is possible to use values other than from the standardized set in attribute `Process.functionClusterAffiliation`.

However, it is important that proprietary values of this attribute are formulated in a way that a potential clash with future standardized values can be avoided.

Clash-avoidance could be implemented by using a company-specific or project-specific prefix, infix, or suffix.

The `preMapping` approach of a `Process` is described in more detail in the [13, SWS Execution Management], specifically in the context of [SWS_EM_02109].

10.2.1 Process relates to Executable

[TPS_MANI_01011] Connection between application design and application target-configuration [The connection between the *application design* and the *application target-configuration* is implemented by means of a reference from meta-class `Process` to meta-class `Executable` in the role `executable`.

By modeling the reference in this direction it is possible to keep the design level independent of the target-configuration level and, at the same time, bind the target-configuration to a specific design.]

Please note that the meta-model, as depicted in Figure 10.1 supports the existence of two or more `Processes` that reference the same `Executable`.

This is an indication that the specific `Executable` is supposed to be executed in several instances (i.e. in the form of POSIX processes) on the same platform. Such a situation is sketched in Figure 10.2

It is somehow likely that the startup conditions and startup parameters of different `Processes` may be different (in order to achieve a variation of the functionality of the `Executable`).

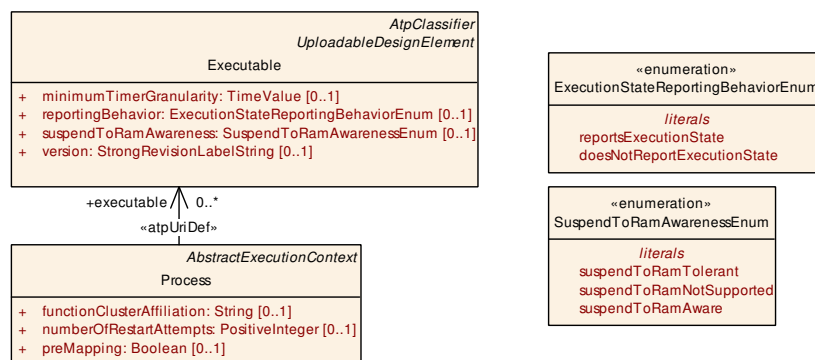


Figure 10.1: Relation of meta-classes `Executable` and `Process`

Therefore, it is necessary to allow for the definition of startup configurations on a per-[Process](#)-basis. This aspect is described in [Chapter 10.3](#).

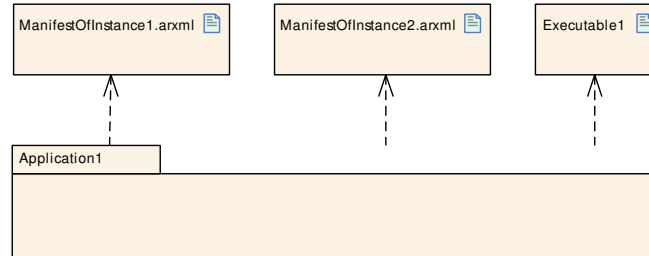


Figure 10.2: Example target-configuration where one [Executable](#) is bundled with two ARXML files that each contain the description of one [Process](#)

10.2.2 Process States

A [Process](#) is a state-full entity. The state machine associated with a [Process](#) is modeled based on the aggregation of a [ModeDeclarationGroupPrototype](#) in the role [processStateMachine](#), as sketched by [Figure 10.3](#).

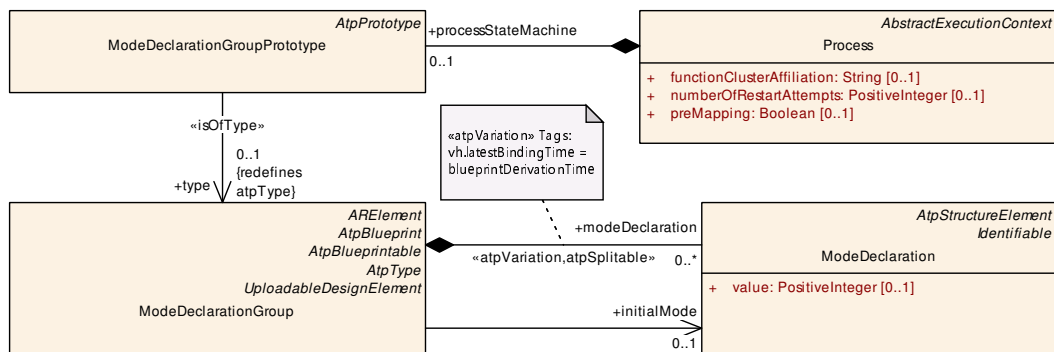


Figure 10.3: Modeling of process states

Please note that the process states may not be modeled arbitrarily at any stage of the AUTOSAR workflow because the supported states are standardized in the context of the [13, SWS Execution Management].

It is possible to define a so-called *execution dependency*, such that one [Process](#) can only launch if a referenced other [Process](#) is in a given process state. The details are explained in [Chapter 10.3.5](#).

10.3 Startup Configuration

The configuration of startup behavior is an essential part of the execution manifest.

[TPS_MANI_01012] Formal modeling of application startup behavior [The formal modeling of application startup behavior is implemented by means of the aggregation of meta-class [StateDependentStartupConfig](#) in the role [Process.stateDependentStartupConfig](#).]

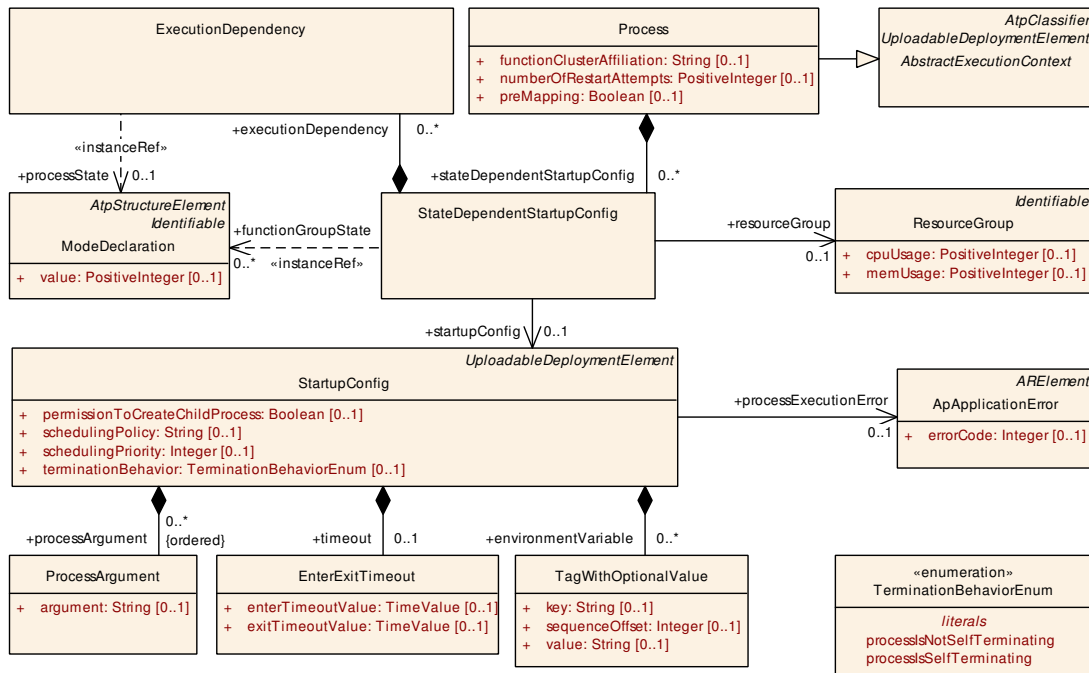


Figure 10.4: Content of a **Process**

10.3.1 State-dependent Startup Configuration

[TPS_MANI_01013] Semantics of meta-class [StateDependentStartupConfig](#) [The purpose of meta-class [StateDependentStartupConfig](#) is to qualify the startup configuration represented by meta-class [StartupConfig](#) for specific [ModeDeclarations](#).]

In other words, the intention is to express that the [StartupConfig](#) is applicable if the state machines that control the startup are in the states represented by the [ModeDeclaration](#) referenced in the role [StateDependentStartupConfig.functionGroupState](#).]

As a consequence of the reference from the [StateDependentStartupConfig](#) to [ModeDeclaration](#) the [Execution Manifest](#) is defined for a specific [Machine](#) to which the binary and the Manifest is deployed.

[constr_3423] StateDependentStartupConfig of a Process shall reference a functionGroupState

Imposition time: IT_Mani

[Each StateDependentStartupConfig of a Process shall reference at least one ModeDeclaration in the role functionGroupState.]

However, the references to Function Group States within the context of one Process shall only refer to Function Group States of the same Function Group. This aspect is formalized by [constr_1688].

[constr_1688] StateDependentStartupConfig shall only refer to Function Group States of the same Function Group

Imposition time: IT_Mani

[For all StateDependentStartupConfigs aggregated in the role Process.stateDependentStartupConfig, references in the role functionGroupState to ModeDeclaration shall only refer to ModeDeclarations aggregated by the same ModeDeclarationGroup in the context of the same ModeDeclarationGroupPrototype (that represents the actual Function Group).]

It is necessary to specify constraint [constr_3396] to regulate the number of StateDependentStartupConfigs that refer to the same ModeDeclaration in the context of one Process because the resulting startup configuration would be ambiguous.

[constr_3396] Number of Process.stateDependentStartupConfig that refer to the same functionGroupState

Imposition time: IT_Mani

[Within the context of a given Process, no two StateDependentStartupConfigs shall refer to the same ModeDeclaration in the role functionGroupState.]

[TPS_MANI_01046] Semantics of StateDependentStartupConfig.functionGroupState [The ModeDeclarations referenced in the role StateDependentStartupConfig.functionGroupState shall be considered in a way such that the StateDependentStartupConfig applies if **any** of the referenced ModeDeclarations is active.

In other words, the ModeDeclarations are or-ed for the determination of whether a StateDependentStartupConfig is applicable.]

[constr_3424] StateDependentStartupConfig shall never reference the functionGroupState Off

Imposition time: IT_Mani

[A StateDependentStartupConfig shall never reference the ModeDeclaration that has the shortName Off in the role functionGroupState. Please note that the Off ModeDeclaration is a special state in a Function Group as defined by [TPS_MANI_03195].]

[TPS_MANI_01209] Definition of environment variables in process scope [It is possible to define environment variables in the scope of any given [Process](#).

For this purpose the aggregation of [TagWithOptionalValue](#) in the role [StartupConfig.environmentVariable](#) exists.

The name of the environment variable shall be specified by means of the attribute [TagWithOptionalValue.key](#), the value can be modeled by means of [TagWithOptionalValue.value](#).

This encloses the ability to define environment variables with empty values. For this purpose, the attribute [TagWithOptionalValue.value](#) shall simply be omitted.]

Class	StateDependentStartupConfig			
Note	This meta-class defines the startup configuration for the process depending on a collection of machine states. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	Process.stateDependentStartupConfig			
Attribute	Type	Mult.	Kind	Note
execution Dependency	ExecutionDependency	*	aggr	This attribute defines that all processes that are referenced via the ExecutionDependency shall be launched and shall reach a certain ProcessState before the referencing process is started.
functionGroup State	ModeDeclaration	*	iref	This represent the applicable functionGroupMode. InstanceRef implemented by: FunctionGroupStateInFunctionGroupSetInstanceRef
resource Consumption	ResourceConsumption	0..1	aggr	This aggregation provides the ability to define resource consumption boundaries on a per-process-startup-config basis.
resourceGroup	ResourceGroup	0..1	ref	Reference to an applicable resource group.
startupConfig	StartupConfig	0..1	ref	Reference to a reusable startup configuration with startup parameters.

Table 10.3: StateDependentStartupConfig

[constr_10175] Multiplicity of attribute [StateDependentStartupConfig.resourceGroup](#)

Imposition time: [IT_Mani](#)

[For each [StateDependentStartupConfig](#), the attribute [resourceGroup](#) shall exist.]

[constr_10176] Multiplicity of attribute [StateDependentStartupConfig.startupConfig](#)

Imposition time: [IT_Mani](#)

[For each [StateDependentStartupConfig](#), the attribute [startupConfig](#) shall exist.]

[constr_1618] Ability to shut down

Imposition time: IT_Mani

[In the context of one [Machine](#), at least one [Process](#) shall have a [stateDependentStartupConfig.functionGroupState](#) that has the [shortName](#) Shut-down.]

[constr_1619] Ability to restart

Imposition time: IT_Mani

[In the context of one [Machine](#), at least one [Process](#) shall have a [stateDependentStartupConfig.functionGroupState](#) that has the [shortName](#) Restart.]

Class	StartupConfig			
Note	This meta-class represents a reusable startup configuration for processes.. Tags: atp.recommendedPackage=StartupConfigs This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
environment Variable	TagWithOptionalValue	*	aggr	This aggregation represents the collection of environment variables that shall be added to the respective Process's environment prior to launch.
permissionTo CreateChild Process	Boolean	0..1	attr	This attribute defines if Process is permitted to create child Processes. When setting this parameter to true two things should be kept in mind: 1) safety and security implication of this configuration, 2) the fact that Process will assume management responsibilities for child Processes (i.e. it will be responsible for terminating Processes that it creates).
process Argument (ordered)	ProcessArgument	*	aggr	This aggregation represents the collection of command-line arguments applicable to the enclosing StartupConfig.
process ExecutionError	ApApplicationError	0..1	ref	this reference is used to identify the applicable execution error. Tags: atp.Status=draft
scheduling Policy	String	0..1	attr	This attribute represents the ability to define the scheduling policy for the initial thread of the application.
scheduling Priority	Integer	0..1	attr	This is the scheduling priority requested by the application itself.
termination Behavior	TerminationBehaviorEnum	0..1	attr	This attribute defines the termination behavior of the Process.
timeout	EnterExitTimeout	0..1	aggr	This aggregation can be used to specify the timeouts for launching and terminating the process depending on the StartupConfig.

Table 10.4: StartupConfig

[TPS_MANI_01277] Definition of a start-up timeout for a [StartupConfig](#) of a [Process](#) [Meta-class [StartupConfig](#) provides the ability to define a start-up timeout for a [Process](#) by means of the attribute [enterTimeoutValue](#) that is aggregated by meta-class [EnterExitTimeout](#) that is aggregated by the [StartupConfig](#) in the role [timeout](#).]

[TPS_MANI_01278] Definition of a termination timeout for a `StartupConfig` of a `Process` [Meta-class `StartupConfig` provides the ability to define a termination timeout for a `Process` by means of the attribute `exitTimeoutValue` that is aggregated by meta-class `EnterExitTimeout` that is aggregated by the `StartupConfig` in the role `timeout`.]

10.3.2 Scheduling

[TPS_MANI_01061] Requirements on scheduling [The attributes `StartupConfig.schedulingPolicy` and `StartupConfig.schedulingPriority` make requirements on the scheduling of the main thread of a process that is created out of launching the corresponding `Executable`.]

[TPS_MANI_01328] Standardized values for attribute `StartupConfig.schedulingPolicy` [The following values are standardized for attribute `StartupConfig.schedulingPolicy`:

- `SCHED_RR`
- `SCHED_FIFO`
- `SCHED_OTHER`

]

It is possible to use a custom, non-standardized value for the attribute `StartupConfig.schedulingPolicy` but this option comes with the obligation to use a value that is guaranteed to not clash with possible future extensions of the collection of standardized values.

[TPS_MANI_01188] Semantics of attribute `schedulingPriority` [The value of attribute `StartupConfig.schedulingPriority` shall be interpreted such that the higher values represent a higher scheduling priority.]

[constr_1692] Value of `schedulingPriority`

Imposition time: `IT_Mani`

[The value of attribute `StartupConfig.schedulingPriority` shall be set to a positive integer value.]

10.3.3 Process Arguments

Please find more information about the interpretation of `ProcessArgument` in the [13, SWS Execution Management].

[constr_1769] Existence of **ProcessArgument.argument**

Imposition time: **IT_Mani**

[For each **ProcessArgument**, attribute **argument** shall exist.]

Class	ProcessArgument			
Note	This meta-class has the ability to define command line arguments for processing by the Main function. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	StartupConfig.processArgument			
Attribute	Type	Mult.	Kind	Note
argument	String	0..1	attr	This represents one command-line argument to be processed by the executable software.

Table 10.5: ProcessArgument

10.3.4 Association with Resource Group

Meta-class **StateDependentStartupConfig** also supports the specification of a relation to a resource group.

[TPS_MANI_01017] Relation of startup configuration to resource group [The modeling of a resource group is possible by means of meta-class **ResourceGroup** in the **OsModuleInstantiation** of the **Machine** and the assignment of a **Process** to a **ResourceGroup** is supported by the association from **StateDependentStartupConfig** to **ResourceGroup** in the role **resourceGroup**.]

[constr_3413] StateDependentStartupConfig of a Process is mapped to exactly one ResourceGroup

Imposition time: **IT_Mani**

[Each **StateDependentStartupConfig** of a **Process** shall be assigned to exactly one **ResourceGroup** that is defined in the Machine Manifest.]

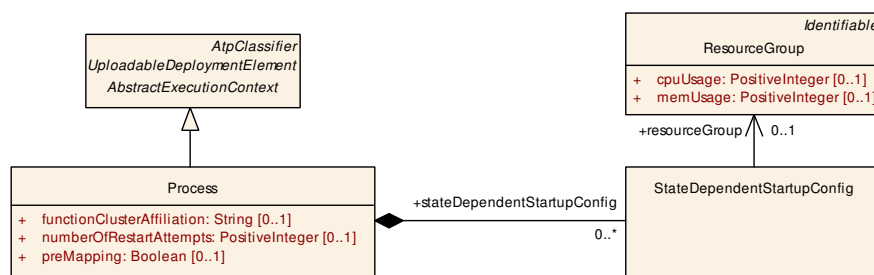


Figure 10.5: Modeling of how **Process relates to **ResourceGroup****

10.3.5 Execution Dependency

The modeling of an execution dependency makes two **Processes** become associated to each other by means of the definition of an **ExecutionDependency**.

But since the reference that defines the execution dependency is modeled as an **<<instanceRef>>**, the referenced **Process** needs to be extracted from the context references in the **<<instanceRef>>**.

Once the two **Processes** are identified it is necessary for the validity of the startup dependency that they refer to the identical **Function Group**.

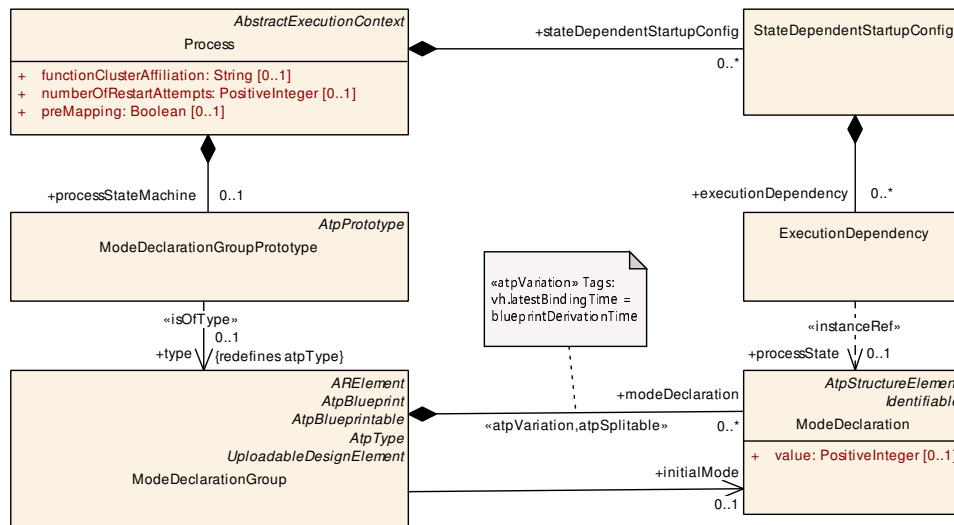


Figure 10.6: Modeling of how **Process relates to **ModeDeclaration** owned by another **Process****

[TPS_MANI_01041] Startup configuration supports the definition of a launch sequence dependency [The modeling of startup configuration also supports the definition of a launch sequence dependency, formalized by the meta-class **ExecutionDependency** that is aggregated by **StateDependentStartupConfig** in the role **executionDependency**.

The **ExecutionDependency** allows to define a dependency to a process that needs to be in a specific process state before the process that aggregates the **ExecutionDependency** via **StateDependentStartupConfig** is launched.]

Figure 10.7 provides an exemplary explanation of [constr_1689]. In this example, **Process “B”** (the referencing **Process** as of [constr_1689]) defines an **executionDependency** to **Process “A”**.

This **executionDependency** is only valid if both **Process “A”** and **Process “B”** aggregate a **StateDependentStartupConfig** that refers to the same **Function Group State “MD”** within **Function Group “FG”**.

Process “A” can be found by following the [ExecutionDependency](#) (specifically the [contextModeDeclarationGroupPrototype](#)) and the [«instanceRef»](#) that goes from the [ExecutionDependency](#) to the [Process](#) State “PS”.

The **owner** of “PS” is [Process](#) “A”, and if “A” refers to [Function Group State](#) “MD” within [Function Group](#) “FG” and if “B” refers to [Function Group State](#) “MD” within “FG” then the constraint [[constr_1689](#)] is fulfilled.

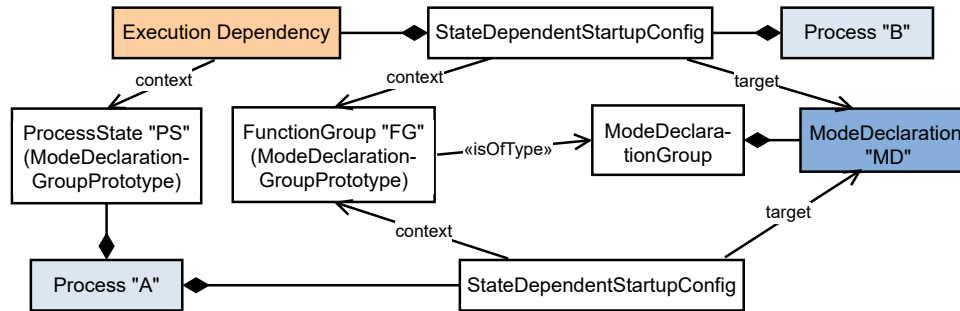


Figure 10.7: Explanation of dependencies from one [Process](#) to another

[[constr_1689](#)] Modeling of a startup dependency between different [Processes](#)

Imposition time: [IT_Mani](#)

[The existence of attribute [Process.stateDependentStartupConfig.executionDependency](#) is only valid if

- the owner of the [stateDependentStartupConfig.executionDependency](#) (in other words: the **referencing** [Process](#)) and
- the owner of the [ModeDeclarationGroupPrototype](#) referenced in the role [contextModeDeclarationGroupPrototype](#) within the reference [stateDependentStartupConfig.executionDependency.processState](#) (i.e. the **referenced** [Process](#))

refer to the **identical** [Function Group State](#) formalized as [ModeDeclaration](#).]

There are scenarios where potential references to more than one [functionGroupState](#) in the presence of an [ExecutionDependency](#) lead to a conflict at run-time (specifically if the [Process](#) referenced in the [ExecutionDependency](#) is self-terminating). The prevention of such a scenario is the reason for the existence of [[constr_10411](#)].

[[constr_10411](#)] Existence of [ExecutionDependency](#) and references to [Function Group States](#)

Imposition time: [IT_Mani](#)

[Each [StateDependentStartupConfig](#) that aggregates at least one [ExecutionDependency](#) in the role [executionDependency](#) shall reference at most one [ModeDeclaration](#) in the role [functionGroupState](#).]

For the exploration of such a scenario, Figure 10.8 sketches a scenario that is not allowed in the presence of [constr_10411].

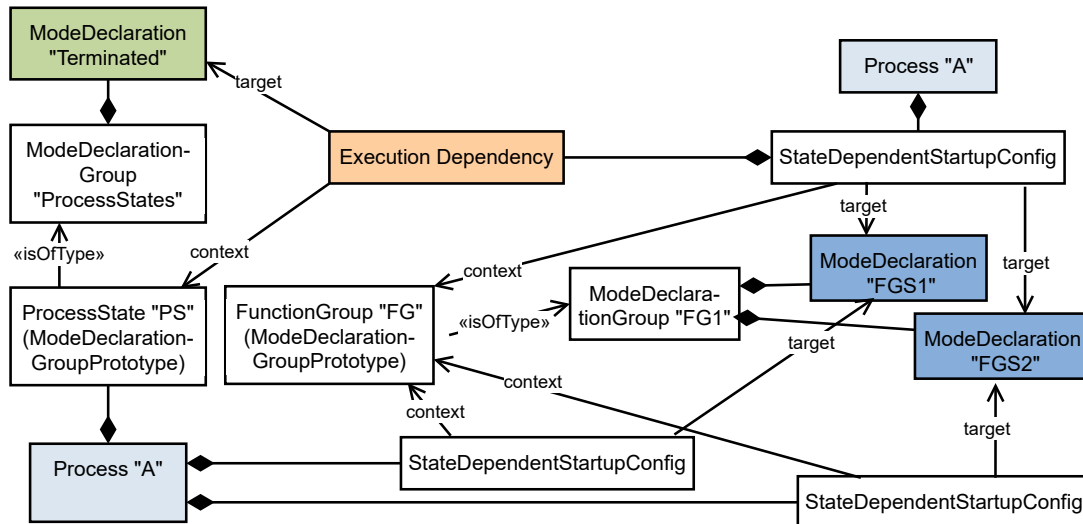


Figure 10.8: *StateDependentStartupConfig* references more than one *Function Group State* (invalid configuration)

In the sketched scenario in Figure 10.8, the execution of *Process* “B” depends on the launch and sub-sequent termination of *Process* “A”.

Process “A” owns two *StateDependentStartupConfigs*, one that references the *Function Group State* “FGS1” and another that references *Function Group State* “FGS2”.

At runtime, this means that in the event of switching the *Function Group* to *Function Group State* “FGS1” (or “FGS2”) both *Processes* “A” and “B” want to be executed.

Thanks to the existence of the *ExecutionDependency*, a POSIX-process that represents *Process* “A” is launched first, then a POSIX-process that represents *Process* “B”.

Now, if the *Function Group State* switched from “FGS1” to “FGS2” (or vice versa), it is (with respect to the modeling of the example) expected that the same sequence of execution will be repeated. But instead, the following sequence will occur:

- a new POSIX-process that represents *Process* “A” will be launched and
- the POSIX-process that represents *Process* “B” will **not** be terminated and re-launched because *Process* “B” aggregates a *StateDependentStartupConfig* that references both *Function Group States* “FGS1” and “FGS2”.

As a result, the order of execution (“A” launches and terminates, then “B” launches) as defined by the *ExecutionDependency* cannot be implemented in the event of a switch of *Function Group States* between the two *Function Group States* referenced by the *StateDependentStartupConfig* aggregated by *Process* “B”.

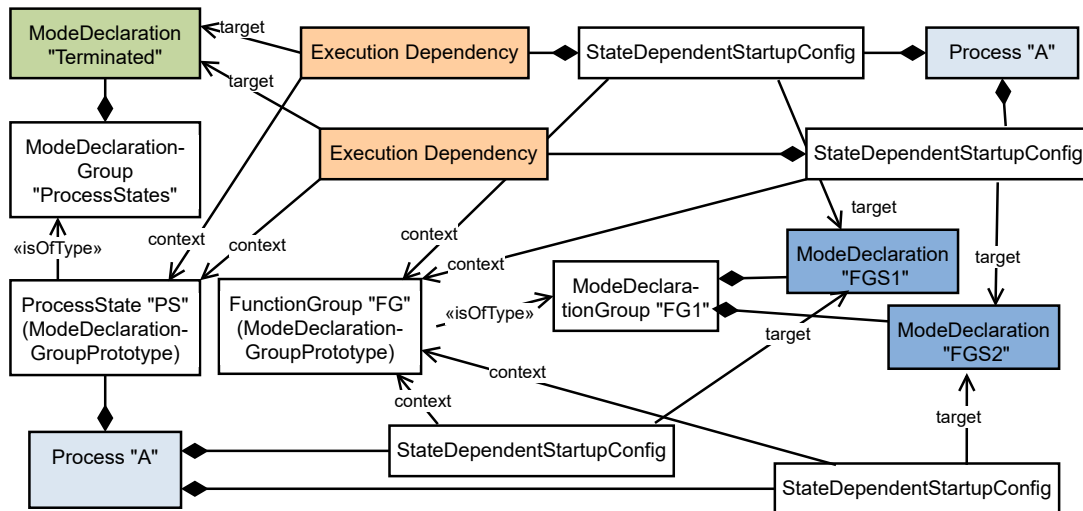


Figure 10.9: Two `StateDependentStartupConfigs` that each reference just one `Function Group State`

In order to prevent this contradiction between modeled semantics and real-world behavior, [constr_10411] has been created.

On the other hand, the scenario depicted in [Figure 10.9](#) is cleared according to `[constr_10411]`.

In the example depicted in [Figure 10.9](#) it is expected that, upon [Function Group State](#) “FGS1” becoming active, a POSIX-process representing [Process](#) “A” is launched and, at some time later, terminates.

Then, a POSIX-process representing `Process` “B” is executed. Of course, the same sequence would occur upon the `Function Group State` being switched from any other `Function Group State` except “FGS1” to “FGS2”.

When the **Function Group** is switched to “FGS2”, the POSIX-process that represents **Process “B”** terminates as the exit from “FGS1” happens.

As “FGS2” is entered, a POSIX-process representing `Process` “A” is launched. After it terminates, a POSIX-process that represents `Process` “B” starts being executed, which is exactly the expected sequence.

To summarize the example behavior, the intended execution dependency is realized when

- one of the referenced `Function Group States` becomes active or
- a switch from one referenced `Function Group State` to the other referenced `Function Group State` occurs.

[constr 1606] Processes with mutual ExecutionDependencies

Imposition time: IT Mani

[A `Process.stateDependentStartupConfig.executionDependency` shall not refer to any `ModeDeclaration` owned by a second `Process` that in turn refers

via `stateDependentStartupConfig.executionDependency` to any `ModeDeclaration` owned by the first `Process`.]

10.3.6 Assignment of Processes to Function Group states

There are use cases where starting and terminating of individual groups of processes is necessary. This is supported in AUTOSAR by `Function Groups` that group processes together.

A `Function Group` may have a number of `Function Group States`, e.g. Running, Idle, Terminating. The `StateDependentStartupConfig` of a `Process` can be assigned to a `Function Group State` and the start-up of the `Process` will then depend on this assignment.

The modeling of a `Function Group` and its `Function Group States` is described in [Chapter 10.4](#) in more detail. The usage of `Function Groups` is described in more detail in [13, SWS Execution Management].

[TPS_MANI_03152] Assignment of a `StateDependentStartupConfig` to a `Function Group State` [The `StateDependentStartupConfig` is assigned to a `Function Group State` with the `functionGroupState` reference.]

10.3.7 Resource Consumption Boundaries

[TPS_MANI_01269] Specification of boundaries for resource consumption [It is possible to specify boundaries for resource consumption, specifically in terms of memory consumption for memory of a given startup configuration of a `Process`: the formalization of process memory usage is represented by meta-class `MemoryUsage`, aggregated via meta-class `ResourceConsumption` at `StateDependentStartupConfig`.]

The actual value of the memory usage is computed out of the sum of all aggregated `ResourceConsumption.memoryUsage`.]

Please note the difference between the ability of defining resource consumption boundaries for a single `Process`, as opposed to the ability to associate a `Process` with a `ResourceGroup` that has the ability to also define resource consumption boundaries, albeit on a more coarse-grained level.

In contrast to that, the `StateDependentStartupConfig.resourceConsumption` allows for a fine-grained definition that can even observe the differences in resource consumption with respect to different startup configurations.

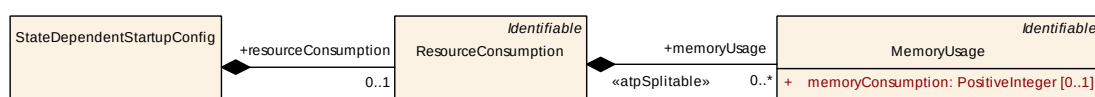


Figure 10.10: Modeling of resource consumption boundaries for a given `Process`

Class	ResourceConsumption			
Note	Description of consumed resources by one implementation of a software.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	EcuResourceEstimation.bswResourceEstimation, EcuResourceEstimation.rteResourceEstimation, Implementation.resourceConsumption, StateDependentStartupConfig.resourceConsumption			
Attribute	Type	Mult.	Kind	Note
memoryUsage	MemoryUsage	*	aggr	Collection of the memory allocated by the owner. Stereotypes: atpSplitable Tags: atp.Splitkey=memoryUsage.shortName This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 10.6: ResourceConsumption

Class	MemoryUsage			
Note	This meta-class is used to describe the memory consumption. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ResourceConsumption.memoryUsage			
Attribute	Type	Mult.	Kind	Note
memory Consumption	PositiveInteger	0..1	attr	Provides a formal worst case system usage. The unit is byte.

Table 10.7: MemoryUsage

10.3.8 Error and Termination Behavior

[TPS_MANI_01334] Semantics of [StartupConfig.terminationBehavior](#) [The attribute [StartupConfig.terminationBehavior](#) defines the termination behavior of the [Process](#) in terms of whether (or not) the [Process](#) that references the enclosing [StartupConfig](#) in the role [stateDependentStartupConfig.startupConfig](#) is configured to self-terminate.]

Enumeration	TerminationBehaviorEnum
Note	This enumeration provides options for controlling of how a Process terminates. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	StartupConfig.terminationBehavior
Literal	Description
processIsNotSelf Terminating	The Process terminates only on request from Execution Management. Tags: atp.EnumerationLiteralIndex=0
processIsSelf Terminating	The Process is allowed to terminate without request from Execution Management. Tags: atp.EnumerationLiteralIndex=1

Table 10.8: TerminationBehaviorEnum

10.4 Function Groups

10.4.1 Semantics of Function Group

Function Groups with Function Group States individually control groups of Application processes. The Process state may depend on a mode that is defined in the Function Group in case that the StateDependentStartupConfig refers to the Function Group State with the functionGroupState reference.

The usage of Function Groups is described in more detail in [13, SWS Execution Management].

[TPS_MANI_03145] Description of a Function Group [By defining a ModeDeclarationGroupPrototype aggregated in the role FunctionGroupSet.functionGroup it is possible to define a Function Group that has a shortName and a set of Modes (States).

The ModeDeclarationGroupPrototype points to a reusable ModeDeclarationGroup in the role type that contains the different modes as ModeDeclarations and a designated initialMode.]

[TPS_MANI_03194] Function Group State [A Function Group State is described by a ModeDeclaration within a ModeDeclarationGroup that is referenced in the role type by a ModeDeclarationGroupPrototype aggregated as functionGroup by a FunctionGroupSet. The Function Group State is identified by its shortName.]

The modeling described in [TPS_MANI_03145] and [TPS_MANI_03194] is depicted in Figure 10.11.

[constr_1786] Restriction to use functionGroup in terms of SoftwareCluster

Imposition time: IT_Mani

[Each functionGroup shall only be referenced in the role claimedFunctionGroup by at most one SoftwareCluster.]

[TPS_MANI_03195] Off state in Function Group [Each functionGroup shall define a ModeDeclaration with the shortName Off. This ModeDeclaration shall also be referenced in the role initialMode by ModeDeclarationGroup that types the respective functionGroup.]

Please note that each FunctionGroupSet.functionGroup modeled as a ModeDeclarationGroupPrototype that is typed by a ModeDeclarationGroup shall have a defined ModeDeclarationGroup.initialMode according to [constr_1973] [2, TPS Software Component Template] that is also valid for this specification.

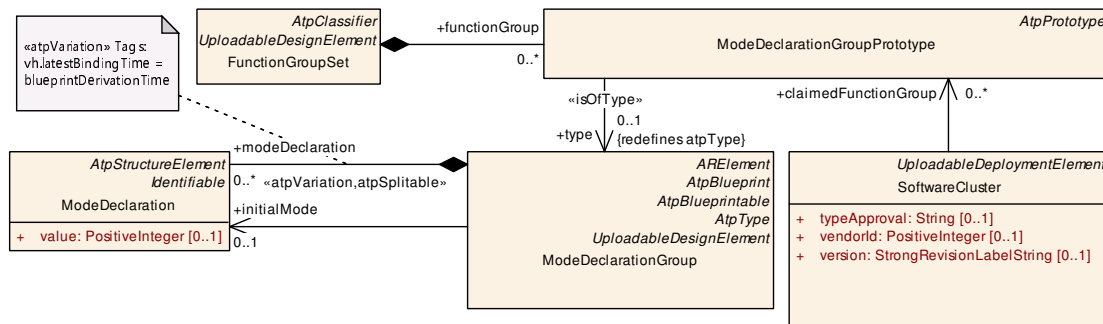


Figure 10.11: Configuration of Function Groups

[constr_1787] Restricted use of Function Groups in the context of a SoftwareCluster*Imposition time:* IT_Mani

[All Processes referenced by a SoftwareCluster in the role containedProcess shall only aggregate StateDependentStartupConfigs where the reference functionGroupState refers to a ModeDeclarationGroupPrototype (as context) that is also referenced by the same SoftwareCluster in the role claimedFunctionGroup.]

The description of SoftwareCluster can be found in Chapter 16.

[constr_10023] Mandatory content of any functionGroup*Imposition time:* IT_Mani

[All ModeDeclarationGroupPrototypes aggregated by a FunctionGroupSet in the role functionGroup shall refer to a ModeDeclarationGroup that contains one ModeDeclaration with the shortName Verify.]

Class	FunctionGroupSet			
Note	This meta-class provides the ability to create arbitrary collections of function groups. Tags: atp.recommendedPackage=FunctionGroupSets This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpClassifier, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
functionGroup	ModeDeclarationGroupPrototype	*	aggr	This aggregation represents the collection of function groups.

Table 10.9: FunctionGroupSet

Class	ModeDeclarationGroupPrototype
Note	The ModeDeclarationGroupPrototype specifies a set of Modes (ModeDeclarationGroup) which is provided or required in the given context.
Base	ARObject, AtpFeature, AtpPrototype, Identifiable, MultilanguageReferrable, Referrable





Class	ModeDeclarationGroupPrototype			
Aggregated by	AtpClassifier.atpFeature, BswModuleDescription.providedModeGroup, BswModuleDescription.requiredModeGroup, FirewallStateSwitchInterface.firewallStateMachine, FunctionGroupSet.functionGroup, ModeSwitchInterface.modeGroup, Process.processStateMachine, StateManagementStateNotification.stateMachine			
Attribute	Type	Mult.	Kind	Note
type	ModeDeclarationGroup	0..1	tref	The "collection of ModeDeclarations" (= ModeDeclarationGroup) supported by a component Stereotypes: isOfType

Table 10.10: ModeDeclarationGroupPrototype

Class	ModeDeclarationGroup			
Note	A collection of Mode Declarations. Also, the initial mode is explicitly identified. Tags: atp.recommendedPackage=ModeDeclarationGroups			
Base	ARElement, ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
initialMode	ModeDeclaration	0..1	ref	The initial mode of the ModeDeclarationGroup. This mode is active before any mode switches occurred.
mode Declaration	ModeDeclaration	*	aggr	The ModeDeclarations collected in this ModeDeclarationGroup. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=modeDeclaration.shortName, modeDeclaration.variationPoint.shortLabel vh.latestBindingTime=blueprintDerivationTime

Table 10.11: ModeDeclarationGroup

Class	ModeDeclaration			
Note	Declaration of one Mode. The name and semantics of a specific mode is not defined in the meta-model.			
Base	ARObject, AtpClassifier, AtpFeature, AtpStructureElement, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	AtpClassifier.atpFeature, ModeDeclarationGroup.modeDeclaration			
Attribute	Type	Mult.	Kind	Note
value	PositiveInteger	0..1	attr	The RTE shall take the value of this attribute for generating the source code representation of this Mode Declaration.

Table 10.12: ModeDeclaration

10.5 Reporting of Security Events

It is possible to report so-called security events (formalized by meta-class [SecurityEventDefinition](#)) from the context of a [Process](#).

This approach works for application-level software (see [Figure 12.56](#)) as well as for functional clusters (see [Figure 15.12](#)) with the exception of the Execution Manager (because the Execution Manager is itself not modeled as a [Process](#)).

Please find more information about the semantics and usage of security events in the [25, TPS Security Extract Template].

Class	SecurityEventDefinition			
Note	This meta-class defines a security-related event as part of the intrusion detection system. Tags: atp.Status=candidate atp.recommendedPackage=SecurityEventDefinitions			
Base	ARElement , ARObject , CollectableElement , Identifiable , IdsCommonElement , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
eventSymbol Name	SymbolProps	0..1	aggr	This aggregation defines optionally an alternative Event Name for the SecurityEventDefinition in case there is a collision of shortNames. Stereotypes: atpSplitable Tags: atp.Splitkey=eventSymbolName.shortName atp.Status=candidate
id	PositiveInteger	0..1	attr	This attribute represents the numerical identification of the defined security event. The identification shall be unique within the scope of the IDS. Tags: atp.Status=candidate
securityEvent ContextData Definition	SecurityEventContext DataDefinition	*	ref	Definition of additional context data that is reported with the security event in order to better support the analysis of a possible security threat. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=securityEventContextDataDefinition.securityEventContextDataDefinition, securityEventContextDataDefinition.variationPoint.shortLabel atp.Status=candidate vh.latestBindingTime=systemDesignTime

Table 10.13: SecurityEventDefinition

11 Machine Manifest

11.1 Machine

The *Machine* meta-class defines the entity on which one *Adaptive AUTOSAR Software Stack* is running with an operating system. The *Machine* may be physical or virtual.

Some aspects of the actual *Machine* are already available from the System Design (see [Chapter 7.2](#)) at the *MachineDesign*.

The information defined at the *MachineDesign* is available to the *Machine* as well since *Machine* has a reference to the *MachineDesign* in the role *machineDesign* (see [Figure 6.1](#)).

[TPS_MANI_03035] Content of the Machine configuration [The purpose of the *Machine* is to provide machine specific configuration settings.]

An overview of the *Machine* meta-class is sketched in [Figure 11.1](#).

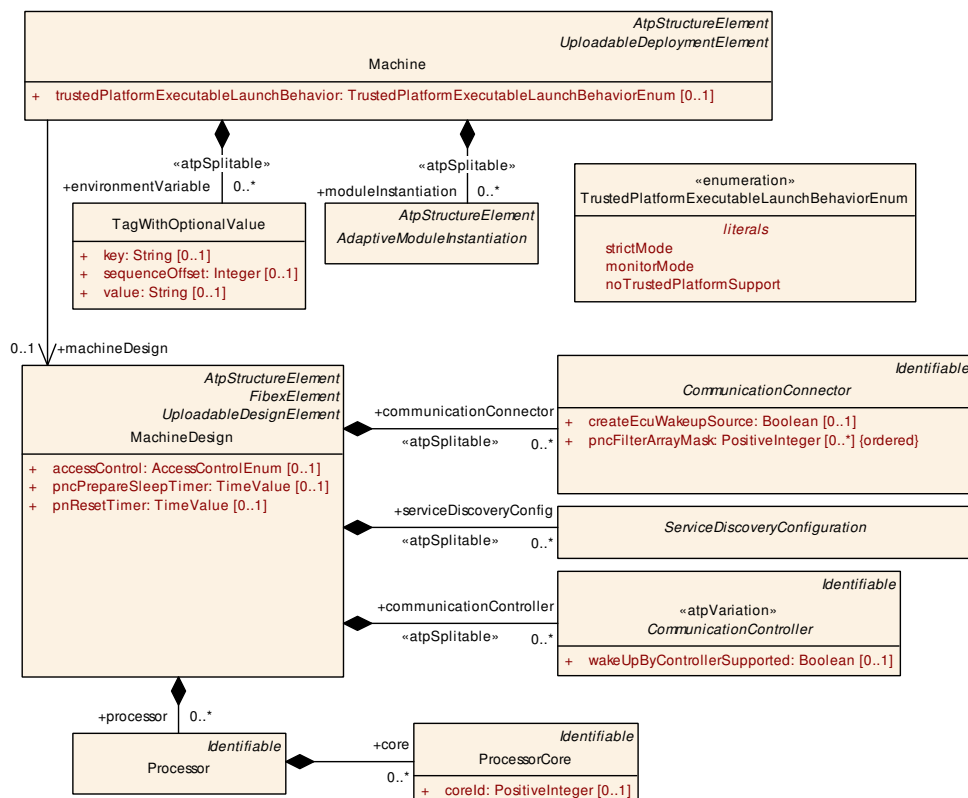


Figure 11.1: Overview about the content of the Machine configuration

[TPS_MANI_01273] Support for trusted Platform [If attribute *Machine.trustedPlatformExecutableLaunchBehavior* is set to a value that is different from *noTrustedPlatformSupport* then features of the “trusted platform” are activated,

depending on the concrete value of `Machine.trustedPlatformExecutableLaunchBehavior`.]

Class	Machine			
Note	Machine that represents an Adaptive Autosar Software Stack. Tags: atp.recommendedPackage=Machines This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AtpClassifier , AtpFeature , AtpStructureElement , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element , AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
default Application Timeout	EnterExitTimeout	0..1	aggr	This aggregation defines a default timeout in the context of a given Machine with respect to the launching and termination of applications.
environment Variable	TagWithOptionalValue	*	aggr	This aggregation represents the collection of environment variables that shall be added to the environment defined on the level of the enclosing Machine. Stereotypes: atpSplitable Tags: atp.Splitkey=environmentVariable
machineDesign	MachineDesign	0..1	ref	Reference to the MachineDesign this Machine is implementing.
module Instantiation	AdaptiveModuleInstantiation	*	aggr	Configuration of Adaptive Autosar module instances that are running on the machine. Stereotypes: atpSplitable Tags: atp.Splitkey=moduleInstantiation.shortName
processor	Processor	*	aggr	This represents the collection of processors owned by the enclosing machine.
secure Communication Deployment	SecureCommunicationDeployment	*	aggr	Target-configuration of secure communication protocol configuration settings to crypto module entities. Stereotypes: atpSplitable Tags: atp.Splitkey=secureCommunicationDeployment.shortName
trustedPlatform Executable LaunchBehavior	TrustedPlatformExecutableLaunchBehaviorEnum	0..1	attr	This attribute controls the behavior of how authentication affects the ability to launch for each Executable.

Table 11.1: Machine

Class	SecureCommunicationDeployment (abstract)			
Note	The meta-class represents the ability to define a target-configuration of secure communication protocol configuration settings to crypto module entities. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	SecOcDeployment , TlsDeployment			
Aggregated by	Machine.secureCommunicationDeployment			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 11.2: SecureCommunicationDeployment

[constr_10169] Multiplicity of reference in the role `Machine.machineDesign`

Imposition time: `IT_Mani`

[For each `Machine`, the reference in the role `machineDesign` shall exist.]

[constr_10170] Multiplicity of attribute `Machine.trustedPlatformExecutableLaunchBehavior`*Imposition time:* `IT_Mani`

[For each `Machine`, the attribute `trustedPlatformExecutableLaunchBehavior` shall exist.]

[constr_10171] Multiplicity of attribute `Machine.processor`*Imposition time:* `IT_Mani`

[For each `Machine`, at least one aggregation on the role `processor` shall exist.]

Enumeration	TrustedPlatformExecutableLaunchBehaviorEnum
Note	This enumeration provides options for controlling the behavior of how authentication affects the ability to launch an Executable. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	<code>Machine.trustedPlatformExecutableLaunchBehavior</code>
Literal	Description
monitorMode	An Executable shall always launch, even if the corresponding authentication fails Tags: <code>atp.EnumerationLiteralIndex=1</code>
noTrustedPlatformSupport	This value shall be used if there is no TrustedPlatform support on the Machine Tags: <code>atp.EnumerationLiteralIndex=2</code>
strictMode	An Executable shall not launch if the corresponding authentication fails. Tags: <code>atp.EnumerationLiteralIndex=0</code>

Table 11.3: TrustedPlatformExecutableLaunchBehaviorEnum

11.2 Environment Variable

[TPS_MANI_01208] Definition of environment variables in the scope of a `Machine`

[It is possible to define environment variables in the scope of the entire `Machine`.

For this purpose the aggregation of `TagWithOptionalValue` in the role `Machine.environmentVariable` exists.

The name of the environment variable shall be specified by means of the attribute `TagWithOptionalValue.key`, the value can be modeled by means of `TagWithOptionalValue.value`.

This encloses the ability to define environment variables with empty values. For this purpose, the attribute `TagWithOptionalValue.value` shall simply be omitted.]

Please note that the aggregation `Machine.environmentVariable` has been defined with the stereotype `<<atpSplittable>>`. The consequence of this modeling is that it is possible to contribute to the definition of environment variables from **different sources**.

Chapter B.8.1 contains a description of a scenario for the definition of environment variables in different partial models.

11.3 Process To Machine Mapping

11.3.1 General Modeling Approach

[TPS_MANI_03147] Mapping of a **Process** to a **Machine** [The meta-class `ProcessToMachineMapping` provides the ability to map a `Process` to a `Machine`.]

[constr_1553] Restriction for `ProcessToMachineMapping`

Imposition time: `IT_Mani`

[The following restrictions apply for the usage of `ProcessToMachineMapping`:

1. Each combination of `Process` and `Machine` shall only be referenced by one `ProcessToMachineMapping` in the role `process` or `machine`.
2. Each `Process` shall only be referenced by a single `ProcessToMachineMapping` in the role `process`.

]

Please note that [constr_1553] does not imply that a given `Machine` shall only be referenced by a single `ProcessToMachineMapping`. It only says that one `Process` shall only be mapped once, to exactly one `Machine`.

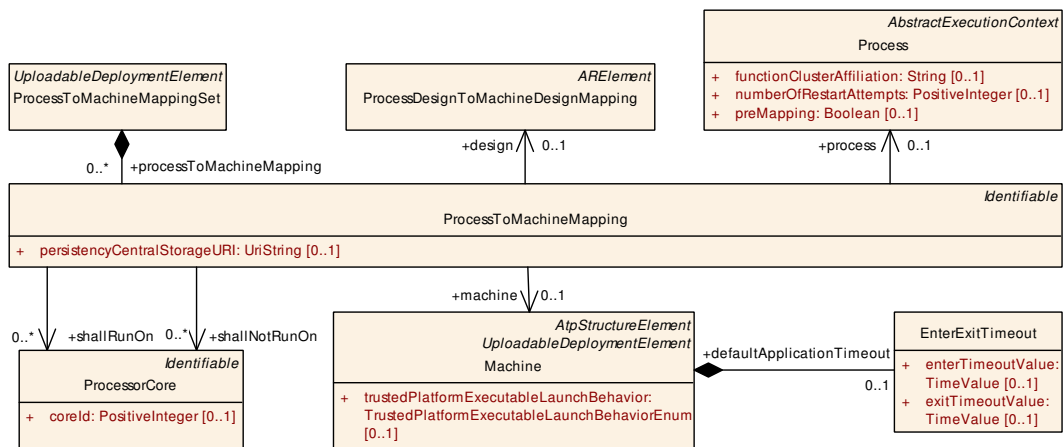


Figure 11.2: Mapping of a **Process** to a **Machine**

[constr_5004] Mapping of a **Process** to a **Machine** is mandatory in the Execution Manifest

Imposition time: `IT_Mani`

[Each `Process` shall be mapped by a `ProcessToMachineMapping` to one `Machine`.]

[constr_5004] means that a formal description of the assignment of a `Process` to a `Machine` shall be provided in the Execution Manifest, even though the Manifest will be uploaded to the `Machine` in combination with other artifacts to which the Manifest

applies. The formal [ProcessToMachineMapping](#) was introduced because it is useful in the processing of the model in many cases.

Please note that according to the AUTOSAR Methodology the Execution Manifest is created on the basis of an existing Machine Manifest and therefore the link to the [Machine](#) can always be created in the Execution Manifest.

[constr_10090] Existence of [ProcessToMachineMapping.persistencyCentralStorageURI](#)

Imposition time: [IT_Mani](#)

[Attribute [ProcessToMachineMapping.persistencyCentralStorageURI](#) shall exist if the [Process](#) referenced in the role [ProcessToMachineMapping.process](#) is also referenced by at least one of

- [PersistencyPortPrototypeToDeploymentMapping](#) in the role [process](#)
- [FunctionalClusterInteractsWithPersistencyDeploymentMapping](#) in the role [process](#)

]

Class	ProcessToMachineMappingSet			
Note	This meta-class acts as a bucket for collecting ProcessToMachineMappings. Tags: atp.recommendedPackage=ProcessToMachineMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
processToMachineMapping	ProcessToMachineMapping	*	aggr	This represents the collection of ProcessToMachine Mappings of the enclosing ProcessToMachineMapping Set.

Table 11.4: ProcessToMachineMappingSet

Class	ProcessToMachineMapping			
Note	This meta-class has the ability to associate a Process with a Machine. This relation involves the definition of further properties, e.g. timeouts. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ProcessToMachineMappingSet.processToMachineMapping			
Attribute	Type	Mult.	Kind	Note
design	ProcessDesignToMachineDesignMapping	0..1	ref	This reference represents the identification of the design-time representation for the ProcessToMachine Mapping that owns the reference.
machine	Machine	0..1	ref	This reference identifies the Machine in the context of the ProcessToMachineMapping.
nonOsModuleInstantiation	NonOsModuleInstantiation	0..1	ref	This supports the optional case that the process represents a platform module.





Class	ProcessToMachineMapping			
persistency CentralStorage URI	UriString	0..1	attr	This attribute identifies a central place for the mapped Process to store the list of available storages and version information.
process	Process	0..1	ref	This reference identifies the Process in the context of the ProcessToMachineMapping.
shallNotRunOn	ProcessorCore	*	ref	This reference indicates a collection of cores onto which the mapped process shall not be executing.
shallRunOn	ProcessorCore	*	ref	This reference indicates a collection of cores onto which the mapped process shall be executing.

Table 11.5: ProcessToMachineMapping

Primitive	UriString
Note	A Uniform Resource Identifier (URI), is a compact string of characters used to identify or name a resource. Tags: xml.xsd.customType=URI-STRING xml.xsd.type=string

Table 11.6: UriString

[constr_10174] Multiplicity of the reference in the role **ProcessToMachineMapping.process**

Imposition time: IT_Mani

[For each **ProcessToMachineMapping**, the reference in the role **process** shall exist.]

[constr_10658] Multiplicity of the reference in the role **ProcessToMachineMapping.machine**

Imposition time: IT_Mani

[For each **ProcessToMachineMapping**, the reference in the role **machine** shall exist.]

11.3.2 Core Affinity

There are two ways to define the core affinity of a **Process**:

- On *design level*, the references **ProcessDesignToMachineDesignMapping.shallRunOn** and **ProcessDesignToMachineDesignMapping.shallNotRunOn** can be used.

This is a way to define core affinity in the early stages of a project, in the context of an overall system design.

- On *target configuration level*, the references **ProcessToMachineMapping.shallRunOn** and **ProcessToMachineMapping.shallNotRunOn** can be used.

From the standard's perspective, it is in principle possible to override the definition of core affinity on the design level in this step. Projects need to decide whether this capability shall be available.

[TPS_MANI_03148] Description of Core affinity [The meta-class `ProcessToMachineMapping` provides the ability to restrict the assignment of processes to selected `ProcessorCores` with the two references `shallRunOn` and `shallNotRunOn`.]

[constr_3393] Usage of `shallRunOn` and `shallNotRunOn` references

Imposition time: `IT_Mani`

[The `ProcessorCore` that is referenced by a `ProcessToMachineMapping` in the role `shallRunOn` or `shallNotRunOn` shall be aggregated by the `Machine` that is referenced in the role `machine` by the same `ProcessToMachineMapping`.]

[constr_1676] Consistency of references `shallRunOn` and `shallNotRunOn`

Imposition time: `IT_Mani`

[Within the context of one `ProcessToMachineMapping`, all `ProcessorCores` referenced in the role `shallRunOn` or `shallNotRunOn` shall be aggregated by the same `Processor`.]

If a model defines that a given `Process` shall run on a select set of `ProcessorCores` then there is hardly a use case to (in addition) also specify the opposite, i.e. that the `Process` shall not run on another set of `ProcessorCores`, and vice versa.

In other words, either there is a motivation to identify the `ProcessorCores` on which a `Process` is supposed to run or there is a motivation to do the exact opposite and specify the `ProcessorCores` where the `Process` is not supposed to run.

This conclusion provides the motivation for the existence of [\[constr_1677\]](#).

[constr_1677] Mutual exclusive existence of references `shallRunOn` and `shallNotRunOn`

Imposition time: `IT_Mani`

[For any given `ProcessToMachineMapping`, either the reference in the role `shallRunOn` or the reference in the role `shallNotRunOn` may exist.]

11.3.3 Default Start-up and Termination Timeout

[TPS_MANI_03151] Default value for termination timeout [The meta-class `Machine` provides the ability to define a default value for termination timeout of applications in the context of the `Machine` with the attribute `exitTimeoutValue` that is available in the `EnterExitTimeout` meta-class that is aggregated by the `Machine` in the role `defaultApplicationTimeout`.]

[TPS_MANI_01412] Default value for startup timeout [The meta-class `Machine` provides the ability to define a default value for startup timeout of applications in the context of the `Machine` with the attribute `enterTimeoutValue` that is available in the `EnterExitTimeout` meta-class that is aggregated by the `Machine` in the role `defaultApplicationTimeout`.]

[constr_10430] Existence of attribute `Machine.defaultApplicationTimeout`

Imposition time: IT_Mani

[For each `Machine`, the attribute `defaultApplicationTimeout` shall exist.]

[constr_10431] Existence of attribute `Machine.defaultApplicationTimeout.enterTimeoutValue`

Imposition time: IT_Mani

[For each `Machine`, the attribute `defaultApplicationTimeout.enterTimeoutValue` shall exist.]

[constr_10432] Existence of attribute `Machine.defaultApplicationTimeout.exitTimeoutValue`

Imposition time: IT_Mani

[For each `Machine`, the attribute `defaultApplicationTimeout.exitTimeoutValue` shall exist.]

Class	EnterExitTimeout			
Note	This meta-class represents the ability to specify a pair of timeouts, one for entering, and one for exiting. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code>			
Aggregated by	<code>Machine.defaultApplicationTimeout</code> , <code>StartupConfig.timeout</code>			
Attribute	Type	Mult.	Kind	Note
<code>enterTimeoutValue</code>	<code>TimeValue</code>	0..1	attr	This attribute represents the value of the enter timeout in seconds.
<code>exitTimeoutValue</code>	<code>TimeValue</code>	0..1	attr	This attribute represents the value of the exit timeout in seconds.

Table 11.7: EnterExitTimeout

12 Platform Module Development

The model of platform modules and their instantiation has two major use-cases:

- provide dedicated attributes to configure the platform modules
- define the potential start of the module's executable as process.

The two use-cases are combined in one modeling approach: the `Machine.module-Instantiation`, which collects sub-classes of `AdaptiveModuleInstantiation`. This modeling approach boils down to the variety of platform module models found in this chapter.

The `OsModuleInstantiation` defines several attributes to be configured for the `Os`, however the `OsModuleInstantiation` is the only `AdaptiveModuleInstantiation` where it is not possible to map it to a `Process` model element.

Of course there will be `processes` running the `Os` on the `Machine` anyway, however, these `processes` are not modeled.

Then there is the scenario where dedicated sub-classes of `NonOsModuleInstantiation` exist. Here the specific attributes are provided individually per sub-class, e.g. `NmInstantiation` or `LogAndTraceInstantiation`.

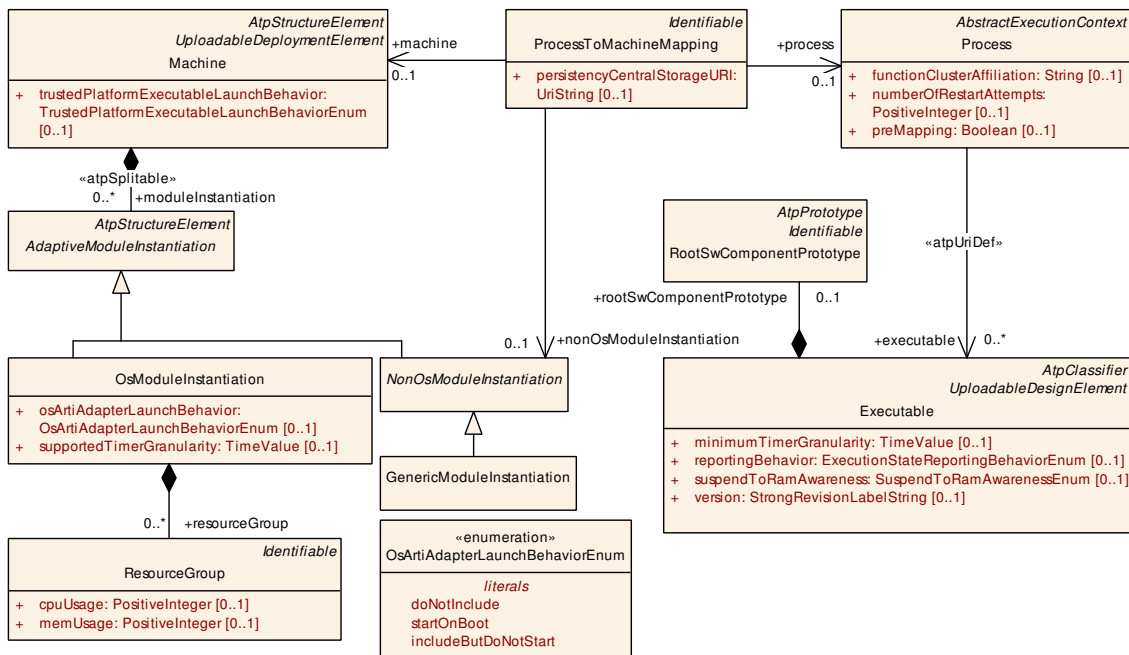


Figure 12.1: Adaptive Autosar Module Configuration

Those `NonOsModuleInstantiations` are independent from the startup behavior implementation. If a stack implementation decides to implement a specific functional cluster in a dedicated `Process`, then the specific `NonOsModuleInstantiation` will also be part of a `ProcessToMachineMapping`.

But, if the stack implementation decides to implement a specific functional cluster as a library (or make the functionality part of another functional cluster), then the specific [NonOsModuleInstantiation](#) just defines the configuration values for that functionality and does not explicitly take part in a [ProcessToMachineMapping](#).

Another scenario is a rather distributed nature of a functional cluster, where there is no need to provide centralized configuration means. This is applicable for example to [PersistencyDeployment](#) or [PlatformHealthManagementContribution](#).

The functional behavior of the functional cluster is determined by the sum of several contributions. There is no single configuration entity provided.

Nevertheless, if a stack implementation decides to implement such a distributed functional cluster as a single [Executable](#), the [GenericModuleInstantiation](#) can be used to define the startup behavior for a specific machine.

The configuration settings for individual Adaptive AUTOSAR modules are covered by specializations of the abstract class [AdaptiveModuleInstantiation](#).

Class	AdaptiveModuleInstantiation (abstract)			
Note	This meta-class defines the abstract attributes for the configuration of an adaptive autosar module instance on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	NonOsModuleInstantiation , OsModuleInstantiation			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.1: AdaptiveModuleInstantiation

Each Adaptive AUTOSAR module other than OS can be assigned to a [Process](#) with the [ProcessToMachineMapping](#).

[constr_1490] Allowed value for [Executable.category](#) if [ProcessToMachineMapping](#) references a [NonOsModuleInstantiation](#)

Imposition time: [IT_Mani](#)

[If a [ProcessToMachineMapping](#) references a [NonOsModuleInstantiation](#), then the [Process](#) referenced in the role [ProcessToMachineMapping.process](#) shall only refer (in the role [Process.executable](#)) to an [Executable](#) where attribute [Executable.category](#) is set to [PLATFORM_LEVEL](#) (see [\[constr_1605\]](#)).]

Please note that the model relation described in [\[constr_1490\]](#) is sketched in [Figure 12.1](#).

The meta-class [GenericModuleInstantiation](#) can be used to define configuration settings of generic modules and modules that are not standardized by AUTOSAR. Different modules are distinguishable by the [category](#) attribute.

Please note that both elements are [Identifiable](#) and therefore are able to describe special data ([sdg](#)), by which means it is possible to define generic custom settings that are not represented by the standard model. For more information, please refer to the [8, TPS Generic Structure Template].

[TPS_MANI_03096] Machine-specific configuration settings for a generic module [The [Machine](#)-specific configuration settings for a generic module are collected in [GenericModuleInstantiation](#) where the value of attribute [category](#) value denotes the module.]

Class	GenericModuleInstantiation			
Note	This meta-class defines the attributes for the generic module configuration on a specific machine. Different modules are distinguishable by the category attribute. This element can also be used to describe modules that are not standardized by AUTOSAR. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.2: GenericModuleInstantiation

12.1 OS Module configuration

[TPS_MANI_03098] Machine-specific configuration settings for the OS module [The [Machine](#)-specific configuration settings for the OS module are collected in [OsModuleInstantiation](#).]

Class	OsModuleInstantiation			
Note	This meta-class defines the attributes for the OS configuration on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
osArtiAdapterLaunchBehavior	OsArtiAdapterLaunchBehaviorEnum	0..1	attr	This attribute controls the startup behavior of the OS/ARTI Adapter. Tags: atp.Status=candidate
resourceGroup	ResourceGroup	*	aggr	This represents the collection of ResourceGroups owned by the enclosing OsModuleImplementation.
supportedTimerGranularity	TimeValue	0..1	attr	This attribute describes the supported timer granularity (TimeValue of one tick).

Table 12.3: OsModuleInstantiation

[TPS_MANI_01433] Semantics of attribute [OsModuleInstantiation.osArtiAdapterLaunchBehavior](#) [Attribute [OsModuleInstantiation.osArtiAdapterLaunchBehavior](#) defines launch behavior of the OS/ARTI Adapter that is

used in the system for tracing the states of the operating system, as described in [26, AUTOSAR TR Operating System Tracing Interface].]

Enumeration	OsArtiAdapterLaunchBehaviorEnum
Note	This enumeration provides options to start the OS/ARTI Adapter when starting the machine. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	OsModuleInstantiation.osArtiAdapterLaunchBehavior
Literal	Description
doNotInclude	Do not include the OS/ARTI Adapter when building the system. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate
includeButDoNotStart	Include the OS/ARTI Adapter when building the system but do not start it automatically. Tags: atp.EnumerationLiteralIndex=2 atp.Status=candidate
startOnBoot	Include the OS/ARTI Adapter when building the system and start it when booting the system. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate

Table 12.4: OsArtiAdapterLaunchBehaviorEnum

Class	NonOsModuleInstantiation (abstract)			
Note	This meta-class defines the abstract attributes for the configuration of an adaptive autosar module other than the OS module. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation, AtpClassifier, AtpFeature, AtpStructureElement, Identifiable, MultilanguageReferrable, Referrable			
Subclasses	AdaptiveFirewallModuleInstantiation, CmModuleInstantiation, CryptoModuleInstantiation, DolpInstantiation, GenericDiagnosticTransportInstantiation, GenericModuleInstantiation, IdsPlatformInstantiation, LogAndTraceInstantiation, NmInstantiation, SovdModuleInstantiation, StateManagementModuleInstantiation, SuspendToRamModuleInstantiation, TimeSyncModuleInstantiation, UcmModuleInstantiation			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 12.5: NonOsModuleInstantiation

AUTOSAR supports the configuration of [ResourceGroups](#) in the [OsModuleInstantiation](#) of the [Machine](#) that correspond for example to cgroups (aka control groups) in Linux. [ResourceGroups](#) provide a mechanism to manage system resources by partitioning constraints like [cpuUsage](#) and [memUsage](#) into groups that limit the resource usage for a collection of processes (see also [TPS_MANI_01017]).

[constr_1661] Multiplicity of [OsModuleInstantiation.resourceGroup](#)

Imposition time: [IT_Mani](#)

[Any given [OsModuleInstantiation](#) shall always define at least one [resourceGroup](#).]

The rationale for [constr_1661] is that the [StateDependentStartupConfig](#) requires a reference to a [ResourceGroup](#).

More information about the semantics of meta-class [ResourceGroup](#) can be found in [SWS_OSI_02001].

Class	ResourceGroup			
Note	This meta-class represents a resource group that limits the resource usage of a collection of processes. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	OsModuleInstantiation.resourceGroup			
Attribute	Type	Mult.	Kind	Note
cpuUsage	PositiveInteger	0..1	attr	CPU resource limit in percentage of the total CPU capacity on the machine.
memUsage	PositiveInteger	0..1	attr	Memory limit in bytes.

Table 12.6: ResourceGroup

12.2 Persistency Target-Configuration

Disclaimer

As of AUTOSAR R25-11, the canonical approach for the the target configuration of the persistency functional cluster is by usage of the APMC model documented in [15, SWS Persistency] Chapter 10.1. The description of target configuration via the M2 model (as described in this chapter) is still provided, but may be discontinued at a later point in time.

12.2.1 Overview

This chapter explains the part of the support for persistent storage in terms of mapping of concrete storage models to the corresponding parts of the application software.

[TPS_MANI_01205] Semantics of meta-class [PersistencyDeployment](#) [Abstract meta-class [PersistencyDeployment](#) provides shared attributes to more specific specializations.]

[TPS_MANI_01380] Usage of [PersistencyDeployment](#) [Meta-class [PersistencyDeployment](#) can be used in different scenarios:

- Persistency is used in combination with the application software by means of [PersistencyPortPrototypeToDeploymentMapping](#).
- Persistency is used in combination with another functional cluster by means of [FunctionalClusterInteractsWithPersistencyDeploymentMapping](#).

]

Class	PersistencyDeployment (abstract)			
Note	This abstract meta-class serves as a base class for concrete classes representing different aspects of persistency. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadableExclusivePackageElement , UploadablePackageElement			
Subclasses	PersistencyFileStorage , PersistencyKeyValueStorage			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
deploymentUri (ordered)	PersistencyDeploymentUri	*	aggr	This aggregation represents the collection of URIs relevant for the enclosing PersistencyDeployment.
maximum AllowedSize	PositiveUnlimitedInteger	0..1	attr	The value of this attribute represents the maximum size (unit: bytes) allowed at target-configuration time for the enclosing PersistencyDeployment.
minimum SustainedSize	PositiveInteger	0..1	attr	The value of this attribute represents the minimum size (unit: bytes) guaranteed at deployment time for the enclosing PersistencyDeployment.
redundancy Handling	PersistencyRedundancyHandling	*	aggr	This aggregation represents the chosen approaches to handle redundancy. Stereotypes: atpSplittable Tags: atp.Splitkey=redundancyHandling
updateStrategy	PersistencyCollectionLevelUpdateStrategyEnum	0..1	attr	This attribute shall be used to specify the update strategy of the respective PersistencyDeployment as a whole.
version	StrongRevisionLabelString	0..1	attr	The attribute represents the version of the PersistencyFileStorage or PersistencyKeyValueStorage .

Table 12.7: PersistencyDeployment

[constr_10177] Multiplicity of attribute [PersistencyDeployment.updateStrategy](#)

Imposition time: IT_Mani

[For each [PersistencyDeployment](#), the attribute [updateStrategy](#) shall exist.]

[constr_10365] Existence of [PersistencyDeployment.deploymentUri](#)

Imposition time: IT_Mani

[For each concrete sub-class of [PersistencyDeployment](#), attribute [deploymentUri](#) shall exist.]

[constr_10509] Existence of attribute [PersistencyDeployment.maximumAllowedSize](#)

Imposition time: IT_Mani

[For each concrete sub-class of [PersistencyDeployment](#), attribute [maximumAllowedSize](#) shall exist.]

[constr_10510] Existence of attribute `PersistencyDeployment.minimumSustainedSize`

Imposition time: IT_Mani

[For each concrete sub-class of `PersistencyDeployment`, attribute `minimumSustainedSize` shall exist.]

Class	PersistencyDeploymentUri			
Note	This meta-class represents the ability to contain URIs relevant for the persistency deployment. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	PersistencyDeployment.deploymentUri			
Attribute	Type	Mult.	Kind	Note
uri	UriString	0..1	attr	This attribute holds the storage location for the concrete subclass of PersistencyDeployment, e.g. file on the file system.

Table 12.8: PersistencyDeploymentUri

The possibility that attribute `deploymentUri` has a multiplicity greater than 1 is only foreseen to be utilized if redundancy handling on the basis of m-out-of-n is activated, i.e. the aggregation of `PersistencyRedundancyMOutOfN` is aggregated in the role `PersistencyDeployment.redundancyHandling`.

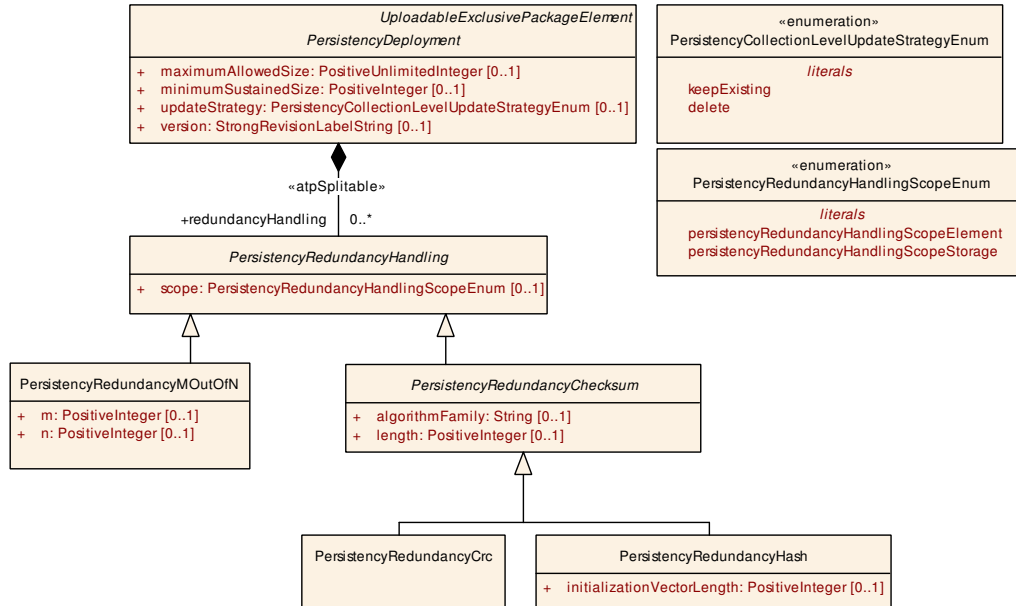


Figure 12.2: Modeling of the abstract base class `PersistencyDeployment`

In this case, the actual multiplicity of `PersistencyDeployment.deploymentUri` in an AUTOSAR model shall be one of

- 1: in this case all copies are stored in one location.
- 2: in this case, the “main” copy is stored in the location `deploymentUri[0]` and all other copies are stored at the location `deploymentUri[1]`

- the value of `PersistencyRedundancyMOutOfN.n`: each copy is stored in the location `deploymentUri[i]`, where $0 \leq i < n$

Please find more details about the storage strategy in the [15, SWS Persistency].

[constr_10366] Possible multiplicities of `PersistencyDeployment.deploymentUri`

Imposition time: IT_Mani

[Possible multiplicities of `PersistencyDeployment.deploymentUri` shall be one of

- 1
- 2
- value of attribute `PersistencyRedundancyMOutOfN.n`

]

[constr_10367] Condition for the multiplicity of attribute `PersistencyDeployment.deploymentUri`

Imposition time: IT_Mani

[The multiplicity of attribute `PersistencyDeployment.deploymentUri` shall only be greater than 1 if meta-class `PersistencyRedundancyMOutOfN` is aggregated in the role `PersistencyDeployment.redundancyHandling` and attribute `PersistencyDeployment.redundancyHandling.scope` is set to the value `PersistencyRedundancyHandlingScopeEnum.persistencyRedundancyHandlingScopeStorage`.]

[constr_10035] Completeness of the `PersistencyDeployment.version`

Imposition time: IT_Mani

[The `PersistencyDeployment.version` shall contain all the following parts:

- Major version
- Minor version
- Patch version
- Additional labels for pre-release version and build metadata

]

The `version` is used to determine whether an update or rollback of persistent data is required. When an application opens the `PersistencyFileStorage` or `PersistencyKeyValueStorage`, the Persistency module will check the `PersistencyDeployment.version` in the manifest against the stored version information.

If the stored version is lower than the manifest version, the Persistency module will update persistent data after creating a backup of the data (see [SWS_PER_00386] for more details).

If the stored version is higher than the manifest version, a rollback of the persistent data from the backup is required (see [SWS_PER_00396] for more details).

[TPS_MANI_01321] Semantics of meta-class `PersistencyDeploymentElement`

[Meta-class `PersistencyDeploymentElement` represents an abstract base class for the modeling of different aspects of persistency on element level.]

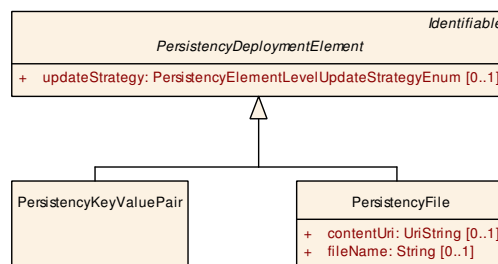


Figure 12.3: Modeling of the abstract base class `PersistencyDeploymentElement`

Class	<code>PersistencyDeploymentElement</code> (abstract)			
Note	This abstract meta-class serves as a base class for concrete classes representing different aspects of elements of a <code>PersistencyDeployment</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Subclasses	<code>PersistencyFile</code> , <code>PersistencyKeyValuePair</code>			
Attribute	Type	Mult.	Kind	Note
updateStrategy	<code>PersistencyElementLevelUpdateStrategyEnum</code>	0..1	attr	This attribute can be used to specify the update strategy of the respective <code>PersistencyDeploymentElement</code> .

Table 12.9: `PersistencyDeploymentElement`

[constr_10426] Multiplicity of attribute `PersistencyDeploymentElement.updateStrategy`

Imposition time: `IT_Mani`

[For each `PersistencyDeploymentElement`, the attribute `updateStrategy` shall exist.]

[TPS_MANI_01322] Semantics of meta-class `PersistencyPortPrototypeToDeploymentMapping`

[Meta-class `PersistencyPortPrototypeToDeploymentMapping` represents an abstract base class for the modeling of the mapping of concrete persistency cases (key-value storage, file storage) to a `PortPrototype` and a `Process`.]

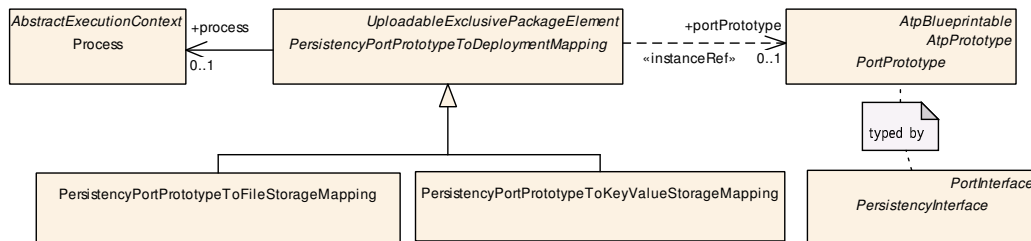


Figure 12.4: Modeling of the abstract base class `PersistencyPortPrototypeToDeploymentMapping`

Class	<code>PersistencyPortPrototypeToDeploymentMapping</code> (abstract)			
Note	This abstract bas class implements the shared functionality of all mapping between a <code>PortPrototype</code> , a <code>Process</code> , and a specific subclass of <code>PersistencyDeployment</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code> , <code>UploadableDeploymentElement</code> , <code>UploadableExclusivePackageElement</code> , <code>UploadablePackageElement</code>			
Subclasses	<code>PersistencyPortPrototypeToFileStorageMapping</code> , <code>PersistencyPortPrototypeToKeyValueStorageMapping</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
portPrototype	<code>PortPrototype</code>	0..1	iref	This reference represents the mapped PortPrototype. InstanceRef implemented by: <code>PortPrototypeInExecutableInstanceRef</code>
process	<code>Process</code>	0..1	ref	This reference represents the process required as context for the mapping.

Table 12.10: `PersistencyPortPrototypeToDeploymentMapping`

[constr_10178] Multiplicity of the reference in the role `PersistencyPortPrototypeToDeploymentMapping.process`

Imposition time: `IT_Mani`

[For each `PersistencyPortPrototypeToDeploymentMapping`, the reference in the role `process` shall exist.]

12.2.1.1 Redundancy Handling

[TPS_MANI_01206] Modeling of redundancy in the context of `PersistencyDeployment` [The target-configuration level provides the ability to provide a more detailed definition of redundant behavior for both key-value storage and file storage.

This modeling is attached to the abstract base class `PersistencyDeployment` in order to let both aspects of persistency on the *AUTOSAR adaptive platform* benefit from the existence of meta-class `PersistencyRedundancyHandling`.]

[constr_1710] Consistency of values of attributes `PersistencyInterface.redundancy` and `PersistencyRedundancyHandling.scope`*Imposition time:* `IT_Mani`

[If attribute `PersistencyInterface.redundancy` is set to value `PersistencyRedundancyEnum.redundantPerElement` then attribute `PersistencyRedundancyHandling.scope` shall be set to `PersistencyRedundancyHandlingScopeEnum.persistencyRedundancyHandlingScopeElement` for at least one `PersistencyRedundancyHandling` aggregated by the corresponding `PersistencyDeployment`.]

[TPS_MANI_01371] `PersistencyDeployment.redundancyHandling` does not exist [If no aggregation in the role `redundancyHandling` exists for a specific `PersistencyDeployment`, then the configuration of the redundancy handling shall be taken from the value of `PersistencyInterface.redundancyHandling`, if this aggregation exists.]

12.2.1.2 Update Handling

[TPS_MANI_01155] `PersistencyDeployment.updateStrategy` overrides `PersistencyInterface.updateStrategy` [The value of attribute `PersistencyDeployment.updateStrategy` shall overrule the value of `PersistencyInterface.updateStrategy` for any combination of `PersistencyInterface` mapped to a `PersistencyDeployment` by means of a `PersistencyPortPrototypeToDeploymentMapping`.]

[TPS_MANI_01147] Semantics of `PersistencyDeployment.updateStrategy` [The attribute `PersistencyDeployment.updateStrategy` shall be used to specify the strategy for updating the actual persistent elements.

This update strategy shall be applied to the `PersistencyDeployment` as a whole except for the explicitly modeled `PersistencyDeploymentElements` that define their own `updateStrategy`.]

[TPS_MANI_01157] Semantics of `updateStrategy` on collection level [

<code>updateStrategy</code>	Use Case: Installation	Use Case: Update
<code>delete</code>	irrelevant	delete all elements not contained in current manifest
<code>keepExisting</code>	irrelevant	keep all elements not contained in current manifest

]

[TPS_MANI_01313] Definition of `updateStrategy` on element level [The definition of the update strategy on element level is modeled by means of the abstract base class `PersistencyDeploymentElement` (and its attribute `updateStrategy`) from which the concrete sub-classes for persistency elements are derived.]

[TPS_MANI_01159] Semantics of `updateStrategy` on element level [

<code>updateStrategy</code>	Use Case: Installation	Use Case: Update
<code>delete</code>	don't create	remove
<code>keepExisting</code>	create	do nothing
<code>overwrite</code>	create	replace

]

[TPS_MANI_01148] Semantics of `PersistencyDeploymentElement.updateStrategy` [The attribute `PersistencyDeploymentElement.updateStrategy` can be used to specify the strategy for updating the actual persistent element that corresponds to `PersistencyDeploymentElement`.]

[TPS_MANI_01156] `PersistencyDeploymentElement.updateStrategy` overrides `PersistencyDeployment.updateStrategy` [The value specified for `PersistencyDeploymentElement.updateStrategy` overrides the value of `PersistencyDeployment.updateStrategy` for this specific `PersistencyDeploymentElement`.]

[TPS_MANI_01182] Value of `PersistencyDeploymentElement.updateStrategy` overrides `PersistencyInterfaceElement.updateStrategy` [The value of attribute `PersistencyDeploymentElement.updateStrategy` overrides the value of attribute `PersistencyInterfaceElement.updateStrategy`]

This means that the integrator of the software gets the authority to either agree to the designer's point of view or else overrule the designer's decision based on superior knowledge regarding the integration strategy.

12.2.1.3 Size Handling

[TPS_MANI_01196] Semantics of `PersistencyDeployment.minimumSustainedSize` [Attribute `PersistencyDeployment.minimumSustainedSize` can be used for the definition of a **minimum amount of storage** that the `PersistencyDeployment` will need to allocate from an integrator's point of view.

It is the responsibility of the underlying platform to make sure that this minimum amount of storage is available at any time.]

[TPS_MANI_01197] Semantics of `PersistencyDeployment.maximumAllowedSize` [Attribute `PersistencyDeployment.maximumAllowedSize` can be used for the definition of the **maximum amount of storage** that the `PersistencyDeployment` may allocate at runtime from an integrator's point of view.

The existence of `PersistencyDeployment.maximumAllowedSize` does not constitute a binding requirement to the platform that this amount of storage shall be available at any time.]

For explanation, the amount of storage available shall be at least the sum of the values of `minimumSustainedSize`.

That said, it is consequently plausible that storage might be exceeded if more than the minimum amount of storage (let alone the maximum amount) is allocated by all the key-value storage at the same time.

12.2.1.4 Security Handling

The encryption and/or authentication of data stored in a Key-Value Storage or File Storage is described in the manifest by `PersistencyDeploymentToCryptoKeySlotMapping` or `PersistencyDeploymentElementToCryptoKeySlotMapping` that are described in more detail in [Chapter 15.4](#) and [Chapter 15.5](#).

If the `PersistencyDeploymentToCryptoKeySlotMapping.keySlotUsage` or `PersistencyDeploymentElementToCryptoKeySlotMapping.keySlotUsage` is set to `encryption`, the Persistency cluster shall encrypt the data before storing it to the persistent memory or shall decrypt the data after reading it from persistent memory.

If the `PersistencyDeploymentToCryptoKeySlotMapping.keySlotUsage` or `PersistencyDeploymentElementToCryptoKeySlotMapping.keySlotUsage` is set to `verification`, the Persistency cluster shall sign the data before storing it to the persistent memory or verify the signature of the data after reading it from persistent memory.

Please note that the `PersistencyDeploymentToCryptoKeySlotMapping` is able to define a `verificationHash` that shall be used by the PersistencyCluster to verify the data. The same is true for the `PersistencyDeploymentElementToCryptoKeySlotMapping.verificationHash`.

12.2.1.5 Preference Rules

In the context of the modeling of persistency design (see [Chapter 4.6](#)) and target-configuration ([Chapter 12.2](#)), information can be available on the *design* and *target-configuration* level, and on *storage* and *element* level. In general, the following rules apply regarding the preference of this information:

- if a configuration item exists in the context of the *design element level*, then the value of this configuration item shall be preferred over the value of a corresponding configuration item available on the *design storage level*.
- if a configuration item exists in the context of the *target-configuration element level*, then the value of this configuration item shall be preferred over the value of a corresponding configuration item available on the *target-configuration storage level*.

- if a configuration item exists in the context of the *target-configuration storage level*, then the value of this configuration item shall be preferred over the value of a corresponding configuration item available on the *design storage level*.
- if a configuration item exists in the context of the *target-configuration element level*, then the value of this configuration item shall be preferred over the value of a corresponding configuration item available on the *design element level*.

In other words, there is a growing priority of the value of a configuration item starting from *design storage level*, to *design element level*, to *target-configuration storage level*, and finally to *target-configuration element level*.

On the other hand, models may exist that leave out certain information on the target-configuration level in favor of implicitly taking over the corresponding information from design level. This approach is not encouraged because (where possible) model semantics should preferably be defined explicitly rather than implied by rules.

Nevertheless, the following rules apply:

- if a configuration item exists on the *target-configuration storage level* but is missing on the *target-configuration element level*, then the *target-configuration element level* shall implicitly take over the value from the *target-configuration storage level*.
- if a configuration item exists on the *design storage level* but is missing on the *target-configuration storage level*, then the *target-configuration storage level* shall implicitly take over the value from the *design storage level*.
- if a configuration item exists on the *design element level* but is missing on the *target-configuration element level*, then the *target-configuration element level* shall implicitly take over the value from the *design element level*.
- if a configuration item exists on the *design storage level* but is missing on the *design element level*, then the *design element level* implicitly takes over the value from the *design storage level*.

12.2.2 Target-Configuration of Persistent Key-Value Storage

[TPS_MANI_01079] Semantics of meta-class **PersistencyKeyValueStorage**

[Meta-class **PersistencyKeyValueStorage** represents an actual key-value storage used for persistently storing data.]

Class	PersistencyKeyValueStorage
Note	This meta-class represents the ability to model a key-value storage on target-configuration level. Tags: atp.recommendedPackage=PersistencyKeyValueStorages This Class is only used by the AUTOSAR Adaptive Platform.





Class	PersistencyKeyValueStorage			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, PersistencyDeployment, Referrable, UploadableDeploymentElement, UploadableExclusivePackageElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
keyValuePair	PersistencyKeyValuePair	*	aggr	This aggregation represents the key-value-pairs owned by the enclosing PersistencyKeyValueStorage.

Table 12.11: PersistencyKeyValueStorage

[TPS_MANI_01144] Semantics of **PersistencyKeyValuePair** [Meta-class **PersistencyKeyValuePair** represents an **entry** to a key-value storage (formalized by **PersistencyKeyValueStorage**) used for persistently storing data.]

[constr_10102] Existence of initial values for **PersistencyKeyValuePair**

Imposition time: IT_Mani

[For each **PersistencyKeyValuePair**, if the value of attribute **updateStrategy** is set to either of the values

- **keepExisting** or
- **overwrite**,

then attribute **PersistencyKeyValuePair.initValue** shall exist.]

Class	PersistencyKeyValuePair			
Note	This meta-class represents the ability to formally model a key-value pair in the context of the target-configuration of persistency. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, PersistencyDeploymentElement, Referrable			
Aggregated by	PersistencyKeyValueStorage.keyValuePair			
Attribute	Type	Mult.	Kind	Note
initValue	ValueSpecification	0..1	aggr	This aggregation represents the ability to define an initial value for the value side of the key-value pair. Please note that it does not make sense to configure an initial value if the PersistencyDeploymentElement.updateStrategy is set to the value delete .
valueDataType	AbstractImplementationDataType	0..1	ref	This reference represents the data type applicable for the value of the key-value pair.

Table 12.12: PersistencyKeyValuePair

[constr_10179] Multiplicity of attribute **PersistencyKeyValuePair.valueDataType**

Imposition time: IT_Mani

[For each **PersistencyKeyValuePair**, the attribute **valueDataType** shall exist.]

[constr_10083] Existence of initial values for **PersistencyKeyValuePair**

Imposition time: IT_Mani

[For each **PersistencyKeyValuePair**, if the value of attribute **updateStrategy** is set to the value **delete**, then attribute **PersistencyKeyValuePair.initValue** shall not exist.]

The modeling of **PersistencyKeyValuePair** aggregated in the role **PersistencyKeyValueStorage.keyValuePair** is optional. It would be possible to use persistency functionality regardless of the existence of **keyValuePair**.

However, the presence of **keyValuePair** gives more freedom and ways for the customization of behavior.

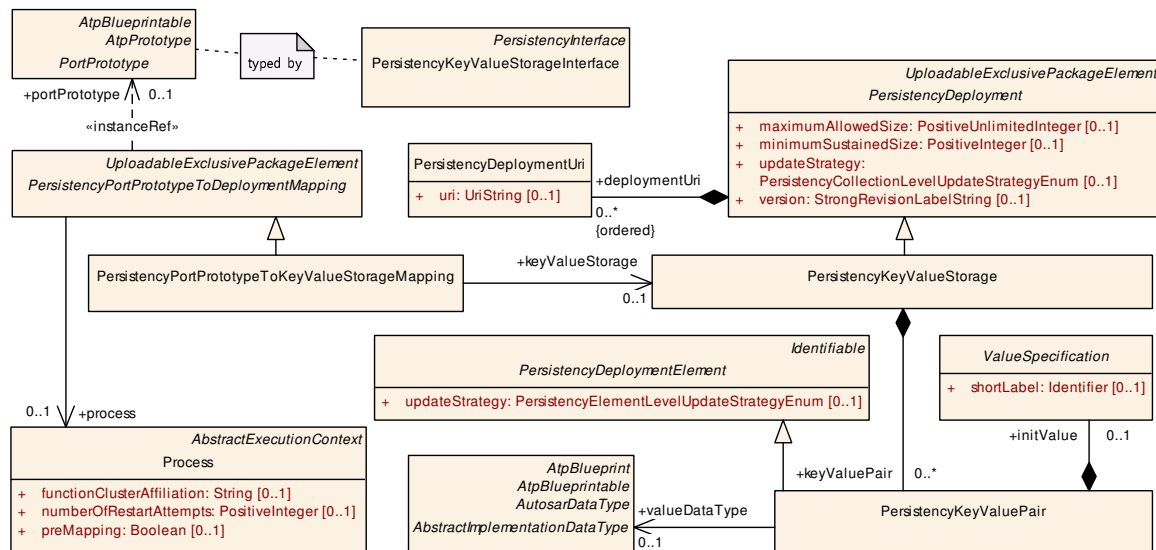


Figure 12.5: Connect a specific **PortPrototype to a **PersistencyKeyValueStorage****

[TPS_MANI_01078] Semantics of **PersistencyPortPrototypeToKeyValueStorageMapping** [Meta-class **PersistencyPortPrototypeToKeyValueStorageMapping** has the ability to map a specific **PortPrototype** referenced in the role **portPrototype** to a **PersistencyKeyValueStorage** referenced in the role **keyValueStorage**.

The mapping also comprises a reference to meta-class **process** in order to accommodate for the fact that identical combinations of **keyValueStorage** and **portPrototype** may or may not apply for a given **Process** that represents the enclosing **Executable** at runtime.]

[constr_1555] Restriction applicable for **PersistencyPortPrototypeToKeyValueStorageMapping.portPrototype**

Imposition time: IT_Mani

[The reference **PersistencyPortPrototypeToKeyValueStorageMapping.portPrototype** shall only be used for a **PortPrototype** typed by a **PersistencyKeyValueStorageInterface**.]

Class	PersistencyPortPrototypeToKeyValueStorageMapping			
Note	This meta-class represents the ability to define a mapping between a PortPrototype and a key-value storage. Tags: atp.recommendedPackage=PersistencyPortPrototypeToKeyValueStorageMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PersistencyPortPrototypeToDeploymentMapping , Referrable , UploadableDeploymentElement , UploadableExclusivePackageElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
keyValueStorage	PersistencyKeyValueStorage	0..1	ref	This reference represents the mapped key-value storage.

Table 12.13: PersistencyPortPrototypeToKeyValueStorageMapping

[constr_10180] Multiplicity of the reference in the role [PersistencyPortPrototypeToKeyValueStorageMapping.keyValueStorage](#)*Imposition time:* IT_Mani

[For each [PersistencyPortPrototypeToKeyValueStorageMapping](#), the reference in the role [keyValueStorage](#) shall exist.]

Please note that typically the existence of [PersistencyKeyValueStorage.keyValuePair](#) depends on the existence of [PersistencyKeyValueStorageInterface.dataElement](#).

On the other hand, if a [PersistencyKeyValueStorage](#) contains [PersistencyKeyValuePairs](#) that do not correspond to any [dataElements](#) of the [PersistencyKeyValueStorageInterface](#) that is mapped (indirectly) via [PersistencyPortPrototypeToKeyValueStorageMapping](#) then those [keyValuePairs](#) are created within the [PersistencyKeyValueStorage](#).

[TPS_MANI_01146] Initial value for [PersistencyKeyValuePair](#) [It is possible to define an initial value for a given [PersistencyKeyValuePair](#) by means of the aggregation of [ValueSpecification](#) in the role [initValue](#).]

[constr_1554] Restriction regarding attribute [PersistencyKeyValuePair.initValue](#)*Imposition time:* IT_Mani

[The concrete sub-class of [ValueSpecification](#) aggregated in the role [PersistencyKeyValuePair.initValue](#) shall not (after resolving a possible redirection by means of [ConstantReference](#)) be a [ReferenceValueSpecification](#).]

[TPS_MANI_01315] [PersistencyKeyValuePair.initValue](#) overrides [PersistencyDataRequiredComSpec.initValue](#) [The value of attribute [PersistencyKeyValuePair.initValue](#) shall overrule the value of [PersistencyDataRequiredComSpec.initValue](#) for any combination of [PersistencyKeyValueStorageInterface](#) mapped to a [PersistencyKeyValueStorage](#) by means of a [PersistencyPortPrototypeToKeyValueStorageMapping](#).]

This means that the integrator of the software gets the authority to either agree to the designer's point of view or else overrule the designer's decision based on superior knowledge regarding the integration strategy.

[constr_1582] `PersistencyKeyValuePair.valueDataType` shall match to `AbstractImplementationDataType` for the corresponding `PersistencyDataElement`

Imposition time: `IT_Mani`

[Each `PersistencyKeyValuePair.valueDataType` shall match the `AbstractImplementationDataType` that either directly or indirectly (via the applicable `DataTypeMap`) types the corresponding (based on identical values of the respective `shortName`) `PersistencyDataElement`.]

[constr_1666] References from `PersistencyPortPrototypeToKeyValueStorageMapping` to `PersistencyKeyValueStorage`

Imposition time: `IT_Mani`

[Each `PersistencyKeyValueStorage` shall only be referenced by at most one `PersistencyPortPrototypeToKeyValueStorageMapping`.]

[TPS_MANI_01323] Matching pairs of `PersistencyDataElement` and `PersistencyKeyValuePair` [Matching pairs of `PersistencyDataElement` and `PersistencyKeyValuePair` shall be identified by having the identical value of attribute `shortName` within the scope of a `PersistencyKeyValueStorageInterface` (or a `PortPrototype` typed by the `PersistencyKeyValueStorageInterface`) mapped to a `PersistencyKeyValueStorage` by means of a `PersistencyPortPrototypeToKeyValueStorageMapping`.]

12.2.3 Target-Configuration of File Storage

[TPS_MANI_01150] Semantics of `PersistencyFileStorage` [A `PortPrototype` typed by a `PersistencyFileStorageInterface` actually builds an abstraction for an entire directory of files.

This abstraction is also visible in the target-configuration by means of the existence of the companion meta-class `PersistencyFileStorage`.

This approach allows for the dynamic creation and/or deletion of files during runtime while still keeping the structural model of the file interaction static.]

At one point, however, it is necessary to boil down the relation of such a `PortPrototype` typed by a `PersistencyFileStorageInterface` to individual files and how these individual files are represented on the file system themselves.

This aspect is covered by the modeling of meta-class `PersistencyPortPrototypeToFileStorageMapping`, as depicted in [Figure 12.6](#).

Class	PersistencyFileStorage			
Note	This meta-class comes with the ability to define a collection of single files (directory) that creates the deployment-side counterpart to a PortPrototype typed by a PersistencyFileStorageInterface . Tags: atp.recommendedPackage=PersistencyFileStorages This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PersistencyDeployment , Referrable , UploadableDeploymentElement , UploadableExclusivePackageElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
file	PersistencyFile	*	aggr	This aggregation represents the collection of files aggregated by the PersistencyFileStorage.

Table 12.14: PersistencyFileStorage

[TPS_MANI_01080] Semantics of meta-class [PersistencyPortPrototypeToFileStorageMapping](#) [Meta-class [PersistencyPortPrototypeToFileStorageMapping](#) creates a mapping between a [PortPrototype](#) referenced in the role [portPrototype](#) to a [PersistencyFileStorage](#) referenced in the role [fileStorage](#) under consideration of a [Process](#) referenced in the role [process](#).]

Class	PersistencyPortPrototypeToFileStorageMapping			
Note	This meta-class represents the ability to define a mapping between a collection of files on deployment level to a given PortPrototype . Tags: atp.recommendedPackage=PersistencyPortPrototypeToFileStorageMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PersistencyPortPrototypeToDeploymentMapping , Referrable , UploadableDeploymentElement , UploadableExclusivePackageElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
fileStorage	PersistencyFileStorage	0..1	ref	This reference represents the mapped file storage.

Table 12.15: PersistencyPortPrototypeToFileStorageMapping

[constr_10182] Multiplicity of the reference in the role [PersistencyPortPrototypeToFileStorageMapping.fileStorage](#)

Imposition time: [IT_Mani](#)

[For each [PersistencyPortPrototypeToFileStorageMapping](#), the reference in the role [fileStorage](#) shall exist.]

[TPS_MANI_01149] Semantics of [PersistencyFileStorage.file](#) [The usage of [PersistencyFileStorage.file](#) allows for the explicit modeling of elements of the [PersistencyFileStorage](#).

The creation of this aggregation is optional. It can be used to define the update strategy and/or initial content of selected files.]

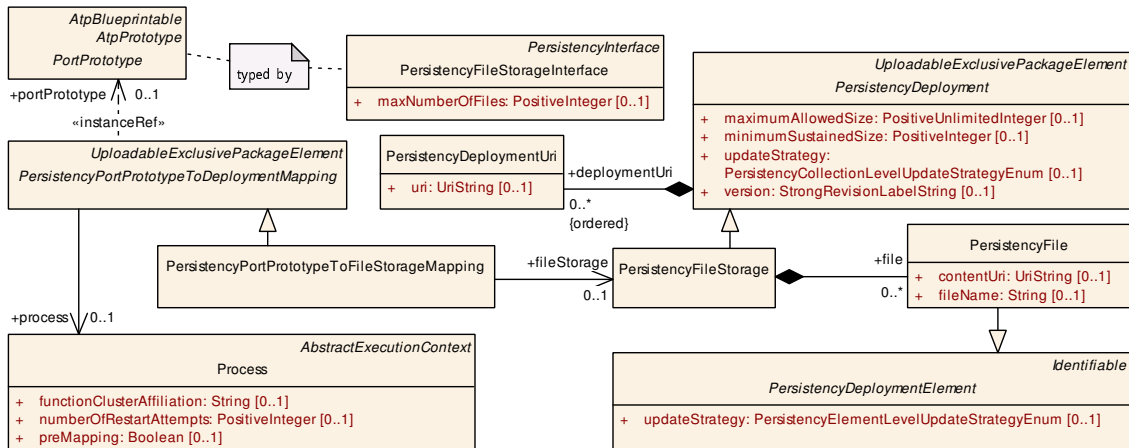


Figure 12.6: Connect a specific PortPrototype to a PersistencyFile

[constr_10103] Existence of initial values for PersistencyFile

Imposition time: IT_Mani

[For each PersistencyFile, if the value of attribute updateStrategy is set to either of the values

- keepExisting or
- overwrite,

then attribute PersistencyFile.contentUri shall exist.]

[constr_1556] Restriction applicable for PersistencyPortPrototype-ToFileStorageMapping.portPrototype

Imposition time: IT_Mani

[The reference PersistencyPortPrototypeToFileStorageMapping.portPrototype shall only be used for a PortPrototype typed by a PersistencyFileStorageInterface.]

Class	PersistencyFile			
Note	This meta-class represents the model of a file as part of the persistency on deployment level. Tags: atp.recommendedPackage=PersistencyFiles This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, PersistencyDeploymentElement, Referrable			
Aggregated by	PersistencyFileStorage.file			
Attribute	Type	Mult.	Kind	Note
contentUri	UriString	0..1	attr	This attribute represents the URI that identifies the initial content of the PersistencyFile.
fileName	String	0..1	attr	This attribute holds filename part of the storage location for the PersistencyFile, e.g. file on the file system.

Table 12.16: PersistencyFile

[constr_10183] Multiplicity of attribute `PersistencyFile.fileName`*Imposition time: IT_Mani*[For each `PersistencyFile`, the attribute `fileName` shall exist.]**[constr_10082] Existence of initial values for `PersistencyFile`***Imposition time: IT_Mani*[For each `PersistencyFile`, if the value of attribute `updateStrategy` is set to the value `delete`, then attribute `PersistencyFile.contentUri` shall not exist.]

[TPS_MANI_01179] Semantics of `PersistencyFileElement.contentUri/PersistencyFile.contentUri` vs. `PersistencyDeployment.deploymentUri` and `PersistencyFileElement.fileName/PersistencyFile.fileName` [Attributes `PersistencyFileElement.contentUri` and (after target-configuration) `PersistencyFile.contentUri` describe the URI of the file storage that is used to initialize the `PersistencyFile` (used during install or update).

On the other hand, the combination of `PersistencyDeployment.deploymentUri` and the `PersistencyFileElement.fileName` or (after target-configuration) `PersistencyFile.fileName` denote the position of the `PersistencyFile` in the ECU (used at run-time).]

[constr_1589] Value of `file.fileName`*Imposition time: IT_Mani*[Within the scope of any given `PersistencyFileStorage`, the value of all `file.fileName` shall be unique.

A `fileName` is considered unique if there are no other `fileNames` with **exactly** the same sequence of characters¹.]

[TPS_MANI_01187] Matching pairs of `PersistencyFileElement` and `PersistencyFile` [Matching pairs of `PersistencyFileElement` and `PersistencyFile` shall be identified by having the identical value of attribute `shortName` within the scope of a `PersistencyFileStorageInterface` (or a `PortPrototype` typed by the `PersistencyFileStorageInterface`) mapped to a `PersistencyFileStorage` by means of a `PersistencyPortPrototypeToFileStorageMapping`.]

[constr_1613] File name of matching pairs of `PersistencyFileElement` and `PersistencyFile`*Imposition time: IT_Mani*[The value of attributes `PersistencyFileElement.fileName` and `PersistencyFile.fileName` shall be identical for matching pairs (as identified by the application of [TPS_MANI_01187]) of `PersistencyFileStorage` and `PersistencyFile`.]

¹The characters “x” and “X” are not considered as identical characters for this purpose.

[constr_1667] References from `PersistencyPortPrototypeToFileStorageMapping` to `PersistencyFileStorage`

Imposition time: `IT_Mani`

[Each `PersistencyFileStorage` shall only be referenced by at most one `PersistencyPortPrototypeToFileStorageMapping`.]

12.3 Platform Health Management Target-Configuration

12.3.1 Overview

This chapter explains the interaction of application software with the [14, SWS Platform Health Management].

The `PlatformHealthManagementContribution` allows describing aspects for the target-configuration of configuration how the Platform Health Management shall behave during runtime.

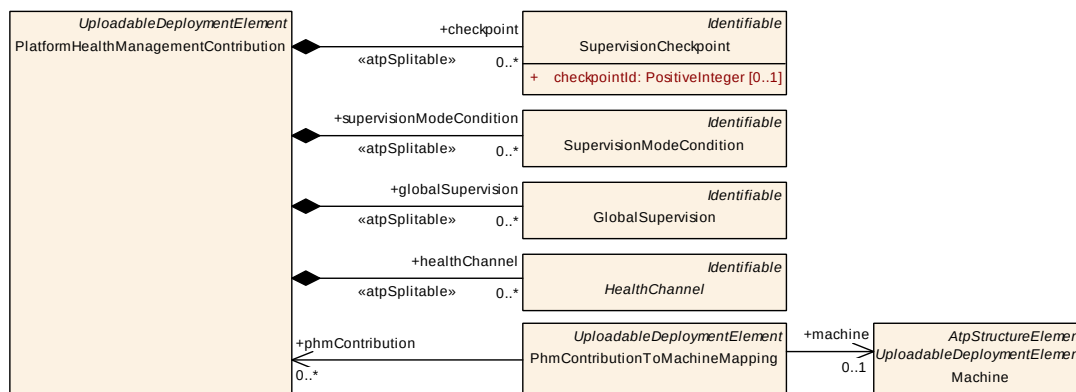


Figure 12.7: Modeling of `PlatformHealthManagementContribution`

[TPS_MANI_03544] Definition of `PlatformHealthManagementContribution`

[The meta-class `PlatformHealthManagementContribution` allows to define a set of configuration entities for the Platform Health Management.]

The `PlatformHealthManagementContribution` is structured into several aspects which will be described in the following sections:

- Supervision (Chapter 12.3.3)
- Recovery Notification (Chapter 12.3.5)

Class	PlatformHealthManagementContribution
Note	This element defines a contribution to the Platform Health Management. Tags: atp.recommendedPackage=PlatformHealthManagementContributions This Class is only used by the AUTOSAR Adaptive Platform.





Class	PlatformHealthManagementContribution			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
checkpoint	SupervisionCheckpoint	*	aggr	Collection of checkpoints in the context of a PlatformHealthManagementContribution. Stereotypes: atpSplitable Tags: atp.Splitkey=checkpoint.shortName xml.sequenceOffset=10
global Supervision	GlobalSupervision	*	aggr	Collection of GlobalSupervisions in the context of a PlatformHealthManagementContribution. Stereotypes: atpSplitable Tags: atp.Splitkey=globalSupervision.shortName xml.sequenceOffset=30
healthChannel	HealthChannel	*	aggr	Collection of HealthChannels in the context of a PlatformHealthManagementContribution. Stereotypes: atpSplitable Tags: atp.Splitkey=healthChannel.shortName xml.sequenceOffset=40
supervision ModeCondition	SupervisionModeCondition	*	aggr	Collection of SupervisionModeConditions in the context of a PlatformHealthManagementContribution. Stereotypes: atpSplitable Tags: atp.Splitkey=supervisionModeCondition.shortName xml.sequenceOffset=20

Table 12.17: PlatformHealthManagementContribution

[TPS_MANI_03502] Enabling of **PlatformHealthManagementContribution** on a **Machine** [To enable an instance of **PlatformHealthManagementContribution** on a specific **Machine** the **PlatformHealthManagementContribution** shall be mapped to the **Machine** via a **PhmContributionToMachineMapping**.]

[constr_3568] No support for cross **PlatformHealthManagementContribution** references

Imposition time: IT_Mani

[All references originating on elements aggregated by one **PlatformHealthManagementContribution** shall only refer to elements that are part of the same **PlatformHealthManagementContribution** aggregation chain.]

Class	PhmContributionToMachineMapping
Note	This element associates one or more PlatformHealthManagementContributions with a Machine. Tags: atp.recommendedPackage=PhmContributionToMachineMappings This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement
Aggregated by	ARPackage.element





Class	PhmContributionToMachineMapping			
Attribute	Type	Mult.	Kind	Note
machine	Machine	0..1	ref	This reference identifies the Machine in the context of the PhmContributionToMachineMapping.
phm Contribution	PlatformHealthManagementContribution	*	ref	This reference identifies one or more PlatformHealthManagementContributions in the context of a PhmContributionToMachineMapping.

Table 12.18: PhmContributionToMachineMapping

An application software can define the usage of several Platform Health Management supervisions (see [Chapter 4.8.2](#)).

In order to define the interaction between the application software and the Platform Health Management the [PlatformHealthManagementContribution](#) creates its own representations of the [RPortPrototypes](#) typed by the [PhmSupervisedEntityInterface](#) and creates relations to the application software [RPortPrototypes](#) (see [Figure 12.8](#)).

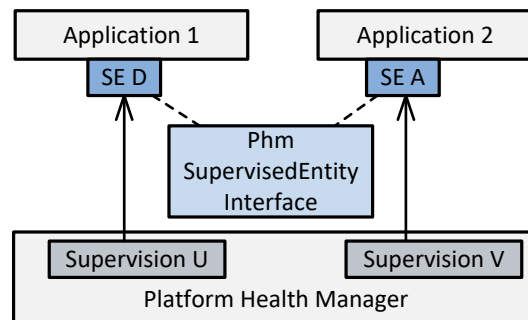


Figure 12.8: Interaction of application software with the platform health manager

In [Chapter 4.8.2](#) it is explained that the application software just calls methods in the context of the respective [RPortPrototypes](#) to interact with the Platform Health Management. From the application developer these methods have no addressing information, because the identity of the [RPortPrototype](#) is the identification in the scope of the application software.

The deployed structure (according to [Figure 12.7](#)) however requires more information when an API at the Platform Health Manager is called, namely:

- [RPortPrototype.shortName](#) i.e. [InstanceSpecifier](#)
- [Process](#) identification during runtime.

These additional arguments have to be injected to the API by the implementation of the interaction between the software component and the Platform Health Management (which implements the relations from [Figure 12.7](#)). The order of this argument injection is determined by the specification of the Platform Health Management APIs.

12.3.2 Relation between design and Target-Configuration

The application design in [Chapter 4.8.2](#) uses the declarations provided in the Interface definitions for `PhmSupervisedEntityInterface`. Specifically the handling of ids (`checkpointId`) requires a synchronized usage with the respective Interface definition.

It is required to establish a contract between the application code and the Phm target-configuration. The application code shall only use such id values which are declared at the respective Interface definitions.

During the configuration of the PHM the PHM artifacts are created. At target-configuration state there is no access to the design model available, thus the numeric values used for `checkpointId` at the Interface definition (`PhmSupervisedEntityInterface`) are not available to the Phm.

Therefore the numeric values for `checkpointId` are replicated in the target-configuration model of the PHM: `SupervisionCheckpoint.checkpointId` replicates `PhmCheckpoint.checkpointId`

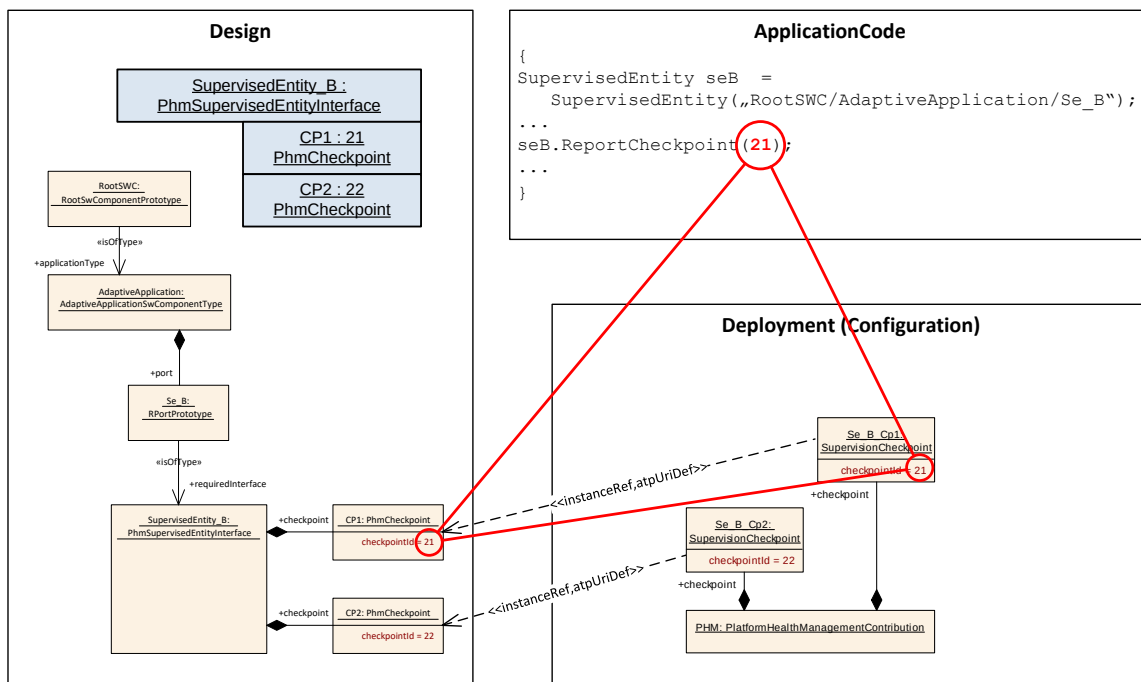


Figure 12.9: Example how IDs have to be in sync

It is a methodological task to make sure that the Ids correspond to each other and match in value. This consistency can be checked using specific tooling on the target-configuration model and the design model.

The example in [Figure 12.9](#) illustrates that the used IDs have to in sync in order to let design, code, and configuration work together.

12.3.3 Supervision Target-Configuration

In the application design chapter of this document the declaration of supervised entities and checkpoints has been described (see [Chapter 4.8.2](#)). These declarations provide the view on supervision from the application software code point. Since the application [Executable](#) can be started multiple times (via individual [Processes](#)), the configuration of the Platform Health Management needs to cope with these individual [Executable](#) instances.

[TPS_MANI_03503] Applicability of checkpoints to a specific [Process](#) [The reference [SupervisionCheckpoint.process](#) defines to which specific [Process](#) this [SupervisionCheckpoint](#) definition shall be applied to.]

This means that only if a [PhmCheckpoint](#) is reported from the context of this [Process](#) it is considered to be this [SupervisionCheckpoint](#).

Note: If the [SupervisionCheckpoint](#) represents the supervision of the *Execution Management* process, it will not be possible to configure [SupervisionCheckpoint.process](#) (unless there is a dummy configuration of *Execution Management* process) as the process for Execution Management is not a modeled [Process](#).

It is up to the Adaptive Platform Stack Vendor to define the mechanism how to identify the [SupervisionCheckpoint](#) (thereby the supervisions [AliveSupervision](#), [DeadlineSupervision](#), and [LogicalSupervision](#)) corresponding to the *Execution Management*.

For the Platform Health Management supervision to take effect it is required to define the instance the application is executed in, thus the reference to a [Process](#) has to be taken into account. In the model the [Process](#) also defines under which conditions ([StateDependentStartupConfig](#)) and with which arguments ([ProcessArgument](#)) the [Executable](#) will be started.

To also define the conditions for the supervision the state dependency is defined at the supervisions as well, see [Chapter 12.3.3.2](#).

For the configuration of the Platform Health Management the definition of [SupervisionCheckpoint](#) is used to stand in for the corresponding [PhmCheckpoint](#) including the execution context of the respective [Process](#).

The attribute [SupervisionCheckpoint.phmCheckpoint](#) replicates the value of the referenced [PhmCheckpoint.checkpointId](#). During target-configuration the [PhmSupervisedEntityInterface](#) and its content is no longer available and therefore needs to be made available to the Phm.

[TPS_MANI_03626] Consistency of [SupervisionCheckpoint.phmCheckpoint](#) and [PhmCheckpoint.checkpointId](#) [The value of [SupervisionCheckpoint.phmCheckpoint](#) shall be identical to the value of [PhmCheckpoint.checkpointId](#) which is referenced in [SupervisionCheckpoint.phmCheckpoint](#).]

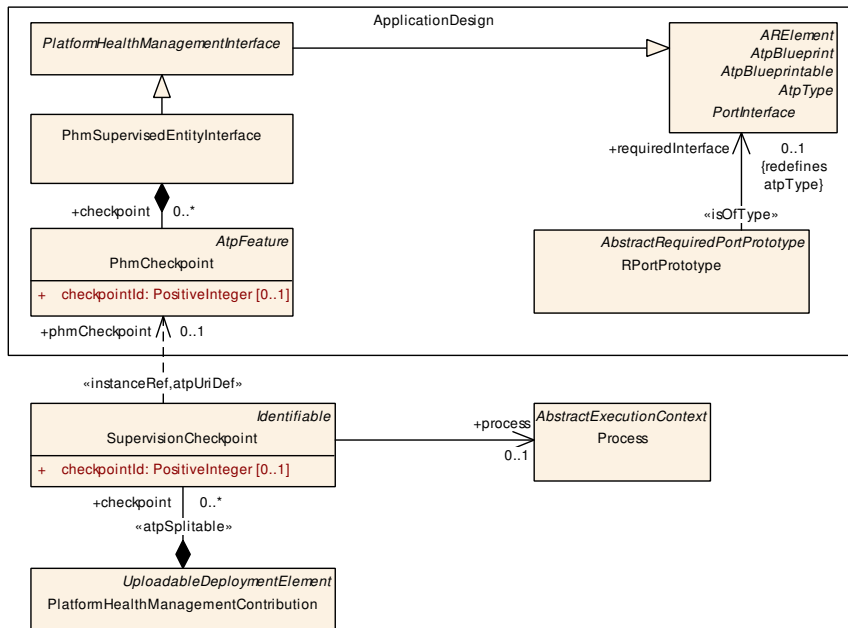


Figure 12.10: Modeling of SupervisionCheckpoint

[TPS_MANI_03505] Existence of SupervisionCheckpoint [For each `PhmCheckpoint` in the scope of a `Process` and `RPortPrototype` typed by a `PhmSupervisedEntityInterface` in the application definition, a `SupervisionCheckpoint` shall be defined. The correspondence of the two is defined by the instance reference `SupervisionCheckpoint.phmCheckpoint`.]

Since every possibly reported `PhmCheckpoint` is represented by a corresponding `SupervisionCheckpoint`, it is possible to explicitly exclude a set of `SupervisionCheckpoints` from the supervision activities using the `NoCheckpointSupervision` definition (see [Chapter 12.3.3.9](#)).

Class	SupervisionCheckpoint			
Note	This element contains an instance reference to a <code>RPortPrototype</code> representing a checkpoint for Platform Health Management. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>PlatformHealthManagementContribution.checkpoint</code>			
Attribute	Type	Mult.	Kind	Note
checkpointId	PositiveInteger	0..1	attr	Defines the numeric value which is used to identify the reporting of this <code>SupervisionCheckpoint</code> to the Phm.
phmCheckpoint	<code>PhmCheckpoint</code>	0..1	iref	Instance reference to the <code>PhmCheckpoint</code> defined in the context of a <code>PortInterface</code> . Stereotypes: <code>atpUriDef</code> InstanceRef implemented by: <code>PhmCheckpointInExecutableInstanceRef</code>
process	<code>Process</code>	0..1	ref	Reference to the <code>Process</code> this checkpoint shall be monitored.

Table 12.19: SupervisionCheckpoint

[TPS_MANI_03651] Mandatory `SupervisionCheckpoint.process` reference
 [Unless the `SupervisionCheckpoint` refers to a `PhmCheckpoint` which is defined in the scope of the *Execution Management*, each `SupervisionCheckpoint` shall define a process reference.]

[constr_3649] Consistent `SupervisionCheckpoint.process` reference

Imposition time: `IT_Mani`

[If a `SupervisionCheckpoint` refers to a `Process` in the role `process`, then

- the `SupervisionCheckpoint` shall refer to a `PhmCheckpoint` which is defined in a `PhmSupervisedEntityInterface` and
- that `PhmSupervisedEntityInterface` types an `RPortPrototype` of an `AdaptiveApplicationSwComponentType` and
- that `AdaptiveApplicationSwComponentType` is used in the scope of an `Executable` and
- that `Executable` is referenced by the same `Process` as `SupervisionCheckpoint.process`.

]

[constr_1742] Multiplicity of reference `SupervisionCheckpoint.phmCheckpoint`

Imposition time: `IT_Mani`

[At the time of target-configuration of a `SupervisionCheckpoint`, one reference to meta-class `PhmCheckpoint` in the role `phmCheckpoint` shall exist.]

[constr_1764] Counterpart of `PhmCheckpoint`

Imposition time: `IT_Mani`

[Each `PhmCheckpoint` shall be referenced once and only once in the role `targetPhmCheckpoint` by a `PhmCheckpointInExecutableInstanceRef` with the same `Executable` and chain of `contextComponentPrototype` and `contextRPortPrototype` that is aggregated by a `SupervisionCheckpoint` in combination with a specific `Process`. This reference shall exist.]

This means that each `SupervisionCheckpoint` is the unique representation of the corresponding `PhmCheckpoint` instance in the context of a `PhmCheckpointInExecutableInstanceRef` and one `Process`.

Please note that the detailed modeling of the `<<InstanceRef>>` from `SupervisionCheckpoint` to `PhmCheckpoint` is documented in [Chapter D.6](#).

12.3.3.1 Global supervision

The `GlobalSupervision` collects `PhmSupervisions` (`AliveSupervisions`, `LogicalSupervisions`, `DeadlineSupervisions`, `NoCheckpointSupervisions`, and `NoSupervisions`) and aggregates the individual states of these Alive, Deadline, and Logical Supervisions into one `GlobalSupervision` status (see also Figure 12.11).

[constr_3623] SupervisionCheckpoints in the context of a GlobalSupervision

Imposition time: `IT_Mani`

[All `SupervisionCheckpoints` belonging to the same `PhmSupervisedEntityInterface` instance (`SupervisionCheckpoints` with identical `PhmCheckpointInExecutableInstanceRef.contextRootSwComponentPrototype`, `contextComponentPrototype`, `contextRPortPrototype`, and `process` references) shall only be referenced by `PhmSupervisions` which are aggregated by the same `GlobalSupervision`.]

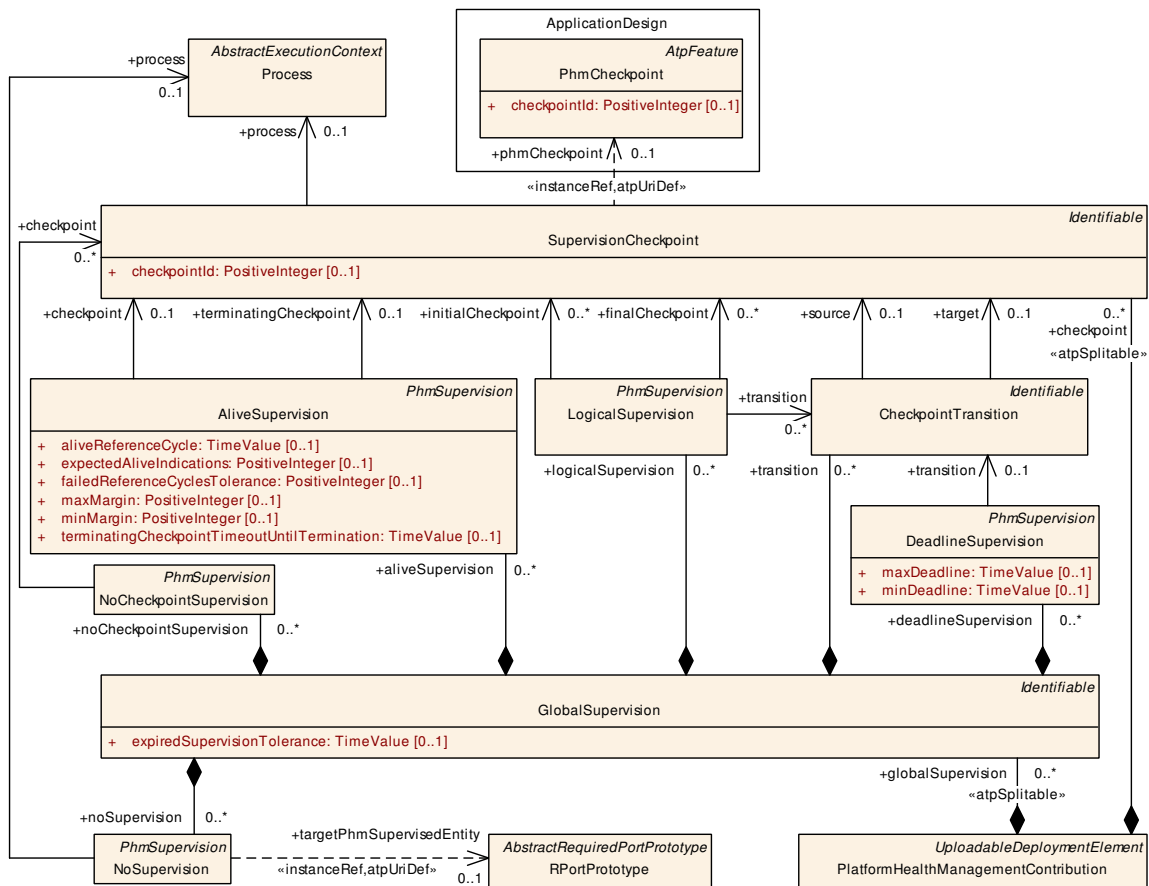


Figure 12.11: Modeling of `GlobalSupervision`

[constr_3624] At least one Supervision defined in the context of a `GlobalSupervision`

Imposition time: `IT_Mani`

[At least one `AliveSupervision`, `LogicalSupervision`, or `DeadlineSupervision` shall be defined in the scope of a `GlobalSupervision`.]

[constr_3823] Existence of `GlobalSupervision.expiredSupervisionTolerance`

Imposition time: `IT_Mani`

[For each `GlobalSupervision` the attribute `expiredSupervisionTolerance` shall exist.]

[TPS_MANI_03514] Expiration tolerance for `GlobalSupervision` [The attribute `GlobalSupervision.expiredSupervisionTolerance` defines the time which a `GlobalSupervision` is maintained in the state *expired* before it is considered *stopped*.]

[TPS_MANI_03512] Applicability of global supervision without `Process` context [The aggregated `AliveSupervisions`, `LogicalSupervisions`, and `DeadlineSupervisions` contributing to a specific `GlobalSupervision` may refer to `SupervisionCheckpoints` where each `SupervisionCheckpoint` may refer to a different `Process`.]

With [TPS_MANI_03512] the `GlobalSupervision` and the aggregation `AliveSupervisions`, `LogicalSupervisions`, and `DeadlineSupervisions` can be used to establish three use-cases:

- compose the status of one `Executable` instance (`Process`) in case all aggregated `PhmSupervisions` are defined with the same `Process` context.
- compose the status of several `Executable` instances (`Processes`) of a `FunctionGroup` in case the aggregated `PhmSupervisions` are defined with (partially) different `Process` contexts within a `FunctionGroup` context.
- compose the status of all `Executable` instances (`Processes`) of a `FunctionGroup` in case the aggregated `PhmSupervisions` are defined with (all) different `Process` contexts within a `FunctionGroup` context.

[constr_3625] `DeadlineSupervision` referencing `CheckpointTransition` in the context of a `GlobalSupervision`

Imposition time: `IT_Mani`

[`DeadlineSupervision` aggregated in a `GlobalSupervision` shall only refer to a `CheckpointTransition` which is aggregated by the same `GlobalSupervision`.]

[constr_3626] LogicalSupervision referencing CheckpointTransition in the context of a GlobalSupervision

Imposition time: IT_Mani

[LogicalSupervision aggregated in a GlobalSupervision shall only refer to CheckpointTransitions that are aggregated by the same GlobalSupervision.]

Class	GlobalSupervision			
Note	This element defines a collection of AliveSupervisions, DeadlineSupervisions, and LogicalSupervisions in order to provide an aggregated supervision state. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	PlatformHealthManagementContribution.globalSupervision			
Attribute	Type	Mult.	Kind	Note
alive Supervision	AliveSupervision	*	aggr	Collection of AliveSupervisions in the context of this GlobalSupervision.
deadline Supervision	DeadlineSupervision	*	aggr	Collection of DeadlineSupervisions in the context of this GlobalSupervision.
expired Supervision Tolerance	TimeValue	0..1	attr	Defines the acceptable amount of time with EXPIRED supervision status before the GlobalSupervision is considered STOPPED.
logical Supervision	LogicalSupervision	*	aggr	Collection of LogicalSupervisions in the context of this GlobalSupervision.
noCheckpoint Supervision	NoCheckpointSupervision	*	aggr	Definition of No Checkpoint Supervision.
noSupervision	NoSupervision	*	aggr	Collection of NoSupervisions in the context of this GlobalSupervision.
supervision Mode	SupervisionMode	*	aggr	Collection of SupervisionModes in the context of this GlobalSupervision. Stereotypes: atpSplitable Tags: atp.Splitkey=supervisionMode.shortName
transition	CheckpointTransition	*	aggr	Collection of CheckpointTransitions in the context of this GlobalSupervision.

Table 12.20: GlobalSupervision

12.3.3.2 Supervision Mode

Expected execution (timing or sequence) of the Software can change based on certain conditions. Hence, the value of the Supervision attributes might have to be changed based on conditions as well. [SupervisionMode](#) defines the Supervision attributes which change based on the referenced [modeCondition](#).

The Execution Management may use [Function Groups](#) and [Function Group States](#) to define the startup conditions of application software. The behavior of the application software can change based on the [Function Group State](#). Hence the monitoring shall also be configurable based on [Function Group State](#) changes.

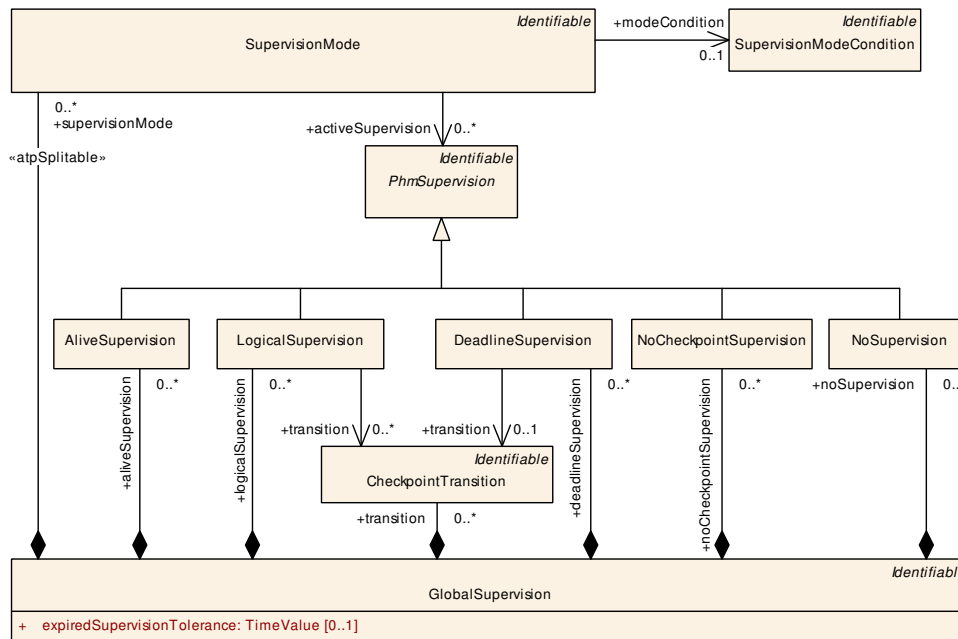


Figure 12.12: Mode dependent supervision

A **SupervisionMode** does define a set of **PhmSupervisions** in the role **activeSupervision** which shall be active while this **SupervisionMode** is active. This modeling allows for one specific **PhmSupervision** to be defined as active in several **SupervisionModes**.

[TPS_MANI_03513] Collection of supervisions into a **GlobalSupervision** [The **PhmSupervisions** referenced from a **SupervisionMode** in the role **activeSupervision** are taken into account to evaluate the supervision status of the **GlobalSupervision** in that particular **SupervisionMode**.]

[TPS_MANI_03633] Semantics of several supervisionMode references for one supervision [If a **PhmSupervision** is referenced in the role **activeSupervision** then this **PhmSupervision** will be active while the referencing **SupervisionMode** is active.]

Class	SupervisionMode			
Note	This element defines a SupervisionMode. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	GlobalSupervision.supervisionMode			
Attribute	Type	Mult.	Kind	Note
activeSupervision	PhmSupervision	*	ref	The reference defines which PhmSupervisions shall be active in this specific SupervisionMode.
modeCondition	SupervisionModeCondition	0..1	ref	Reference to SupervisionModeCondition (Condition under which the configuration made under this SupervisionMode are to be applied).

Table 12.21: SupervisionMode

[constr_3640] Existence of **SupervisionMode.modeCondition**

Imposition time: **IT_Mani**

[For each **SupervisionMode** the attribute **modeCondition** shall exist.]

12.3.3.3 Supervision Mode condition

Each **SupervisionMode** refers to exactly one **SupervisionModeCondition** in the role **modeCondition**. The **SupervisionModeCondition** defines an collection of one or several **stateReferences** which are combined to provide a single logical state.

The reference to **Function Groups** and their **Function Group States** is essential for the definition of **SupervisionModeConditions** as the supervised **Processes** are started and stopped according to changes in **Function Group States**.

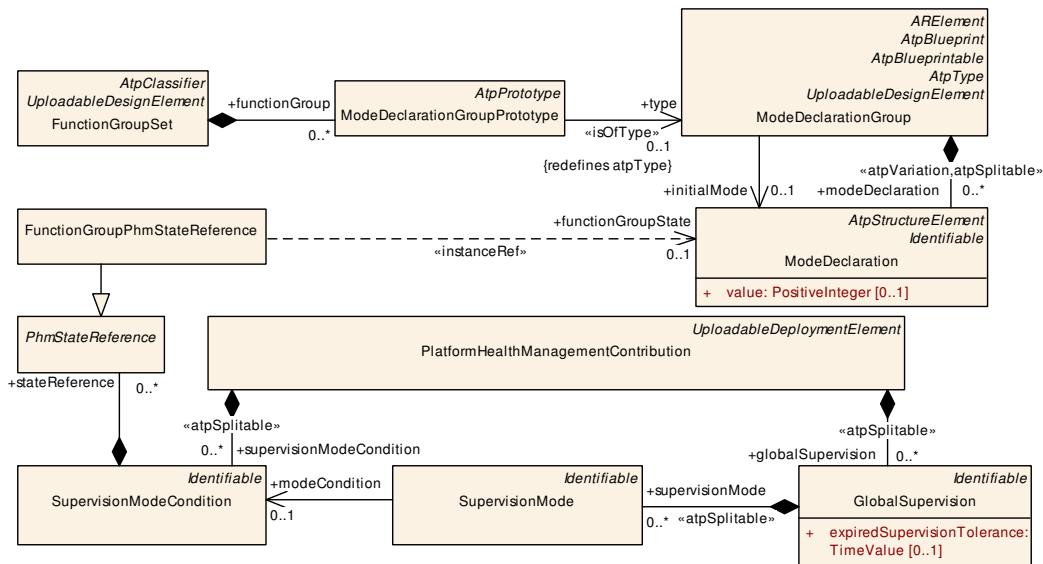


Figure 12.13: Modeling of **SupervisionMode**

Class	FunctionGroupPhmStateReference			
Note	Function Group state dependency. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, PhmStateReference			
Aggregated by	SupervisionModeCondition.stateReference			
Attribute	Type	Mult.	Kind	Note
functionGroup State	ModeDeclaration	0..1	iref	This represent the applicable functionGroupState. InstanceRef implemented by: FunctionGroupStateInFunctionGroupSetInstanceRef

Table 12.22: FunctionGroupPhmStateReference

Class	SupervisionModeCondition			
Note	This element defines a SupervisionModeCondition in the context of platform health management contribution. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	PlatformHealthManagementContribution.supervisionModeCondition			
Attribute	Type	Mult.	Kind	Note
stateReference	PhmStateReference	*	aggr	Collection of stateReferences.

Table 12.23: SupervisionModeCondition

[constr_3627] Existence of [SupervisionModeCondition.stateReference](#)

Imposition time: [IT_Mani](#)

[At the time of target-configuration of [SupervisionModeCondition](#), at least one aggregation of [PhmStateReference](#) in the role [SupervisionModeCondition.stateReference](#) shall exist.]

[constr_3628] Reference to [Function Group State](#) from a [SupervisionModeCondition](#)

Imposition time: [IT_Mani](#)

[If a [Function Group State](#) is referenced by a [SupervisionModeCondition](#) in the scope of one [GlobalSupervision](#), then that same [Function Group State](#) shall NOT be referenced by any other [SupervisionModeCondition](#) in the scope of the same [GlobalSupervision](#).]

Rationale for [constr_3628]: It is guaranteed that only one of the [SupervisionModes](#) is active at any point in time. The [SupervisionModeConditions](#) referenced under a [GlobalSupervision](#) in the context of [SupervisionMode](#) shall be mutually exclusive.

E.g. Following [SupervisionModeConditions](#) referenced under the same [GlobalSupervision](#) in the context of [SupervisionMode](#) is not allowed:

- [SupervisionModeCondition_1](#):
([FunctionGroup_X](#) in State 'a') or ([FunctionGroup_X](#) in State 'b')
- [SupervisionModeCondition_2](#):
([FunctionGroup_X](#) in State 'a') or ([FunctionGroup_X](#) in State 'c')

In the above example, ([FunctionGroup_X](#) in State 'a') is common between the 2 [SupervisionModeConditions](#).

[constr_3629] Identical [Function Group](#) in the scope of a [GlobalSupervision](#)

Imposition time: [IT_Mani](#)

[Within the context of one [GlobalSupervision](#), all [SupervisionMode.modeCondition](#) shall only aggregate [FunctionGroupPhmStateReferences](#) in the role [stateReference](#) where the reference [FunctionGroupPhmStateReference.functionGroupState.contextModeDeclarationGroupPrototype](#) refers to

the identical `ModeDeclarationGroupPrototype` (that implements the `Function Group`, as far as state management is concerned).]

That is, within the context of one `GlobalSupervision`, all `SupervisionMode.modeCondition.stateReference` shall reference states(modes) of the same `Function Group`.

[constr_3630] GlobalSupervision and Process relation

Imposition time: IT_Mani

[Within the context of one `GlobalSupervision`, all aggregated `PhmSupervisions` shall refer to `SupervisionCheckpoints` where the referenced `Process` aggregates a `stateDependentStartupConfig` that in turn refers to a `functionGroupState` where the `contextModeDeclarationGroupPrototype` refers to the identical `ModeDeclarationGroupPrototype` (that implements the `Function Group`, as far as state management is concerned).]

That is, all `PhmSupervisions` aggregated in a `GlobalSupervision` are referencing `SupervisionCheckpoints` corresponding to `Processes` that are configured to be executed in state/s of the same `Function Group`.

[constr_3631] Global supervision restricted to one Function Group

Imposition time: IT_Mani

[The `Function Group` (`ModeDeclarationGroupPrototype`) referenced in [constr_3629] and [constr_3630] shall be identical for one particular `GlobalSupervision`.]

[constr_3632] Supervision of a Supervised Entity Instance in the scope of a Function Group State

Imposition time: IT_Mani

[A `Supervised Entity Instance` shall be configured with checkpoint supervision (all `SupervisionCheckpoints` of the `Supervised Entity Instance` are covered by `AliveSupervision`, `DeadlineSupervision`, `LogicalSupervision`, `NoCheckpointSupervision`) or `NoSupervision` in all `Function Group States` in which the corresponding `Process` is configured to be executed.]

Rationale for [constr_3632]: The configuration of supervision for a specific `Supervised Entity Instance` is not missed unintentionally in a `Function Group State`.

Note that [constr_3632] requires for the `Supervised Entity Instance` to be part of the supervision definition in all `Function Group States` in which the corresponding `Process` is configured to be executed.

In case there is no supervision required in a specific `Function Group State` (because the `Supervised Entity Instance` does not need to be supervised in that specific `Function Group State`), then `NoSupervision` can be configured for that `Supervised Entity Instance`.

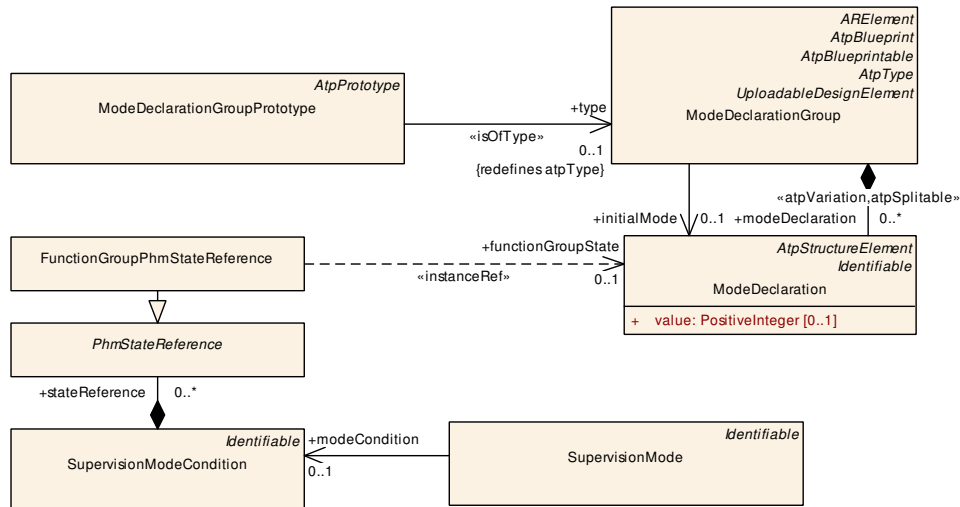


Figure 12.14: Modeling of **FunctionGroupPhmStateReference**

Note: If a **Process** survives a **Function Group State** change running (because the **Process** is defined to be running in two consecutive **Function Group States**), then it is important that the configuration of the **activeSupervision** for the Supervised Entity Instances corresponding to the **Process** is identical for the **SupervisionModes** that corresponds to the affected **Function Group States**.

This relations can not be formally expressed (because the possible **Function Group State** transitions are not formalized) and therefore this restriction can not be defined as a constraint.

A possible mitigation strategy is to define different **Process** arguments and therefore force a re-start of the **Process**, even if the **Function Group States** have been switched consecutively.

12.3.3.4 NoSupervision definition

In the scope of a **GlobalSupervision**, a **NoSupervision** can be defined for a Supervised Entity Instance as a whole. A **NoSupervision** can be configured to indicate that this Supervised Entity Instance shall not be monitored by the Phm in a specific **SupervisionMode**.

The Supervised Entity Instance is identified using the **NoSupervision.targetPhmSupervisedEntity** instance ref and **NoSupervision.process** reference.

Class	NoSupervision			
Note	Defines explicitly that NO supervision shall be applied for a specific Supervised Entity instance. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , PhmSupervision , Referrable			
Aggregated by	GlobalSupervision.noSupervision			
Attribute	Type	Mult.	Kind	Note





Class	NoSupervision			
process	Process	0..1	ref	Reference to the Process this NoSupervision applies to.
targetPhm Supervised Entity	RPortPrototype	0..1	iref	Instance reference to the RPortPrototype which represents the Supervised Entity instance. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeIn ExecutableInstanceRef

Table 12.24: NoSupervision

[constr_3674] Existence of NoSupervision.targetPhmSupervisedEntity*Imposition time:* IT_Mani

[For each NoSupervision the attribute targetPhmSupervisedEntity shall exist.]

[constr_3675] Existence of NoSupervision.process*Imposition time:* IT_Mani

[For each NoSupervision the attribute process shall exist.]

[constr_3676] Exclusive usage of NoSupervision*Imposition time:* IT_Mani

[For a Supervised Entity Instance, in a given SupervisionMode, either a checkpoint supervision (AliveSupervision, DeadlineSupervision, LogicalSupervision, and/or NoCheckpointSupervision referencing all SupervisionCheckpoints corresponding to the Supervised Entity Instance) or NoSupervision shall be configured, but not both.]

Note: The NoSupervision approach disables the supervision for all the SupervisionCheckpoints of a Supervised Entity Instance.

12.3.3.5 AliveSupervision definition

In the scope of a GlobalSupervision an AliveSupervision can be defined for a specific SupervisionCheckpoint. AliveSupervision can be used to define in which timing boundaries one specific checkpoint shall be monitored.

[TPS_MANI_03508] Definition of an AliveSupervision for a SupervisionCheckpoint [An AliveSupervision definition provides attributes to configure the supervision of the referenced SupervisionCheckpoint.

- aliveReferenceCycle defines the time base used to monitor the reporting of this specific SupervisionCheckpoint
- expectedAliveIndications defines the number of indications which shall be observed during the time period defined by aliveReferenceCycle

- `minMargin` and `maxMargin` define the acceptable deviation from the `expectedAliveIndications` within the time period defined by `aliveReferenceCycle`

]

[TPS_MANI_03575] Definition of no minimum alive supervision [If the value `AliveSupervision.minMargin` equals 0, this defines that no minimum alive supervision shall be performed.]

[TPS_MANI_03576] Definition of no maximum alive supervision [If the value `AliveSupervision.maxMargin` equals INF, this defines that no maximum alive supervision shall be performed.]

[constr_3539] Only one `AliveSupervision` per `SupervisionCheckpoint`

Imposition time: `IT_Mani`

[A `SupervisionCheckpoint` shall only be referenced up to once by an `AliveSupervision` in the role `checkpoint` in the context of an identical `SupervisionMode`.]

[TPS_MANI_03515] Failure tolerance for `AliveSupervision` [The attribute `AliveSupervision.failedReferenceCyclesTolerance` defines the acceptable amount of `AliveSupervision.aliveReferenceCycles` with incorrect/failed `AliveSupervision`.]

Class	AliveSupervision			
Note	Defines an AliveSupervision for one checkpoint. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, PhmSupervision, Referrable			
Aggregated by	GlobalSupervision.aliveSupervision			
Attribute	Type	Mult.	Kind	Note
aliveReferenceCycle	TimeValue	0..1	attr	Time period at which the Alive Supervision mechanism compares the amount of received Alive Indications for the SupervisionCheckpoint against the expectedAliveIndications.
checkpoint	SupervisionCheckpoint	0..1	ref	Reference to a checkpoint in the context of Alive Supervision.
expectedAliveIndications	PositiveInteger	0..1	attr	Defines the amount of expected Alive Indications of the SupervisionCheckpoint within the aliveReferenceCycle.
failedReferenceCyclesTolerance	PositiveInteger	0..1	attr	This attribute defines the acceptable amount of alive ReferenceCycles with incorrect/failed AliveSupervision.
maxMargin	PositiveInteger	0..1	attr	Defines the amount of Alive Indications of the SupervisionCheckpoint that are acceptable to be additional to the expectedAliveIndications within the aliveReferenceCycle.
minMargin	PositiveInteger	0..1	attr	Defines the amount of Alive Indications of the SupervisionCheckpoint that are acceptable to be missing to the expectedAliveIndications within the aliveReferenceCycle.
terminatingCheckpoint	SupervisionCheckpoint	0..1	ref	Reference to the SupervisionCheckpoint which is defined as the terminating checkpoint of this AliveSupervision.





Class	AliveSupervision			
terminating Checkpoint TimeoutUntil Termination	TimeValue	0..1	attr	Defines the time a process shall terminate after it has announced its start of termination by reporting terminatingCheckpoint.

Table 12.25: AliveSupervision

[constr_3633] Mandatory attributes of AliveSupervision*Imposition time:* IT_Mani

[The following attributes of AliveSupervision shall be defined:

- aliveReferenceCycle
- checkpoint
- expectedAliveIndications
- failedReferenceCyclesTolerance
- minMargin
- maxMargin

]

12.3.3.5.1 AliveSupervision of self-terminating processes

If a Process is defined to be self-terminating (according to [TPS_MANI_01334]) and that Process has an AliveSupervision defined, then it is essential for that Process to indicate to the Phm when that Process is about to self terminate.

The indication is done using a dedicated SupervisionCheckpoint and is associated with the AliveSupervision. In this case the Phm can stop the AliveSupervision in a defined way when the application reports that AliveSupervision.terminatingCheckpoint has been reached.

[constr_3709] AliveSupervision.terminatingCheckpoint required for self terminating Processes*Imposition time:* IT_Mani

[Only if a Process

- refers to a StartupConfig (via stateDependentStartupConfig), and that StartupConfig has the attribute StartupConfig.terminationBehavior set to the value TerminationBehaviorEnum.processIsSelfTerminating, and

- the `StateDependentStartupConfig.functionGroupState` is identical to the respective `GlobalSupervision.supervisionMode.modeCondition.stateReference.functionGroupState` and
- there exists an `AliveSupervision` which refers to a `SupervisionCheckpoint` in the role `checkpoint`, and that `SupervisionCheckpoint` refers to that `Process`, then

there shall exist an `AliveSupervision.terminatingCheckpoint` reference from the `AliveSupervision`.]

That is, if an `AliveSupervision` is defined for a `Process` in a `SupervisionMode` that corresponds to a `Function Group State` in which the `Process` is configured to be self-terminating, then and only then `AliveSupervision.terminatingCheckpoint` shall be defined.

[constr_3710] `Process` referenced by `AliveSupervision.terminatingCheckpoint`

Imposition time: IT_Mani

[The `SupervisionCheckpoint` that is referenced in the role `AliveSupervision.terminatingCheckpoint` shall refer to the same `Process` as the `SupervisionCheckpoint` that is referenced by the `AliveSupervision.checkpoint`.]

[constr_3711] `AliveSupervision.terminatingCheckpointTimeoutUntilTermination`

Imposition time: IT_Mani

[If an `AliveSupervision` has the reference `AliveSupervision.terminatingCheckpoint` defined, then the attribute `AliveSupervision.terminatingCheckpointTimeoutUntilTermination` shall be defined.]

12.3.3.6 CheckpointTransition definition

For the definition of further supervision strategies the need to first define possible `CheckpointTransitions` between `SupervisionCheckpoints` arises. Since the application software design does not provide any transition definition between checkpoints, it is essential to define possible `CheckpointTransitions`.

The definition of `CheckpointTransitions` is done in the scope of the `GlobalSupervision` and can be used by the `LogicalSupervision` and `DeadlineSupervision` of the same `GlobalSupervision`.

[TPS_MANI_03509] Definition of a `CheckpointTransition` [A `CheckpointTransition` defines one possible transition from the `source SupervisionCheckpoint` to the `target SupervisionCheckpoint`.]

[constr_3634] Multiplicity of `CheckpointTransition.source` and `CheckpointTransition.target`

Imposition time: `IT_Mani`

[Each `CheckpointTransition` shall define exactly one `source` reference and one `target` reference.]

Class	CheckpointTransition			
Note	Defines one transition between two checkpoints. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	GlobalSupervision.transition			
Attribute	Type	Mult.	Kind	Note
source	SupervisionCheckpoint	0..1	ref	Reference to the source checkpoint for this transition.
target	SupervisionCheckpoint	0..1	ref	Reference to the target checkpoint for this transition.

Table 12.26: CheckpointTransition

Any `CheckpointTransition` may be used in either a `LogicalSupervision`, a `DeadlineSupervision`, or both. This is illustrated in figure 12.15: The example shows 5 `SupervisionCheckpoints` and several `CheckpointTransitions`.

The `CheckpointTransitions` `t23` and `t34` are only used for the definition of the `LogicalSupervision` between the related `SupervisionCheckpoints`.

The `CheckpointTransitions` `t12` and `t45` are used for the definition of the `LogicalSupervision` between the related `SupervisionCheckpoints` as well as for the definition the `DeadlineSupervisions` on these `CheckpointTransitions`.

The `CheckpointTransition` `t24` is only used for the definition the `DeadlineSupervision` between the `CheckpointTransitions`. From a `LogicalSupervision` perspective it is not allowed to transition between `cp2` and `cp4` directly, but the total time for the transition chain `cp2` to `cp4` via `cp3` is set to take at most 8ms.

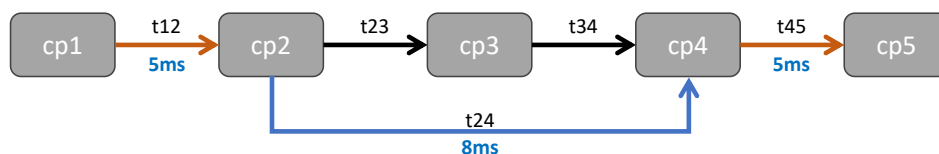


Figure 12.15: Usage of `CheckpointTransition` in `LogicalSupervision` and `DeadlineSupervision`

12.3.3.7 `LogicalSupervision` definition

The `LogicalSupervision` defines a supervision graph of allowed `CheckpointTransitions` which is monitored by the Platform Health Management without any timing considerations, just the order of reported checkpoints is considered for the monitoring.

[constr_3540] `SupervisionCheckpoint` in supervision graph*Imposition time:* `IT_Mani`

[Each `SupervisionCheckpoint` shall only be part of one supervision graph in the context of an identical `SupervisionMode`.]

When a `SupervisionCheckpoint` belonging to the supervision graph is reported to the Platform Health Management where there is no `CheckpointTransition` defined from the last reported `SupervisionCheckpoint` as `source` to the current reported `SupervisionCheckpoint` as `target`, this situation violates the `LogicalSupervision`.

[TPS_MANI_03510] Definition of `LogicalSupervision` [A `LogicalSupervision` defines relations between `SupervisionCheckpoints` which form a directed graph from one or more `initialCheckpoint` `SupervisionCheckpoints` through a set of `CheckpointTransitions` defined by collection of `transitions` to one or more `finalCheckpoint` `SupervisionCheckpoints`.]

Class	LogicalSupervision			
Note	Defines a LogicalSupervision graph consisting of transitions, initial- and final checkpoints. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , PhmSupervision , Referrable			
Aggregated by	GlobalSupervision.logicalSupervision			
Attribute	Type	Mult.	Kind	Note
finalCheckpoint	SupervisionCheckpoint	*	ref	Reference to the final Checkpoint(s) for this Logical Supervision. Tags: xml.sequenceOffset=20
initialCheckpoint	SupervisionCheckpoint	*	ref	Reference to the initial Checkpoint(s) for this Logical Supervision. Tags: xml.sequenceOffset=10
transition	CheckpointTransition	*	ref	Reference to the transitions for this LogicalSupervision. Tags: xml.sequenceOffset=30

Table 12.27: LogicalSupervision

[constr_1736] Multiplicity of reference `LogicalSupervision.initialCheckpoint`*Imposition time:* `IT_Mani`

[At the time of target-configuration of a `LogicalSupervision`, at least one reference to meta-class `SupervisionCheckpoint` in the role `initialCheckpoint` shall exist.]

[constr_1737] Multiplicity of reference `LogicalSupervision.finalCheckpoint`*Imposition time:* `IT_Mani`

[At the time of target-configuration of a `LogicalSupervision`, at least one reference to meta-class `SupervisionCheckpoint` in the role `finalCheckpoint` shall exist.]

[constr_1740] Multiplicity of reference `LogicalSupervision.transition`*Imposition time:* `IT_Mani`

[At the time of target-configuration of a `LogicalSupervision`, at least one reference to meta-class `CheckpointTransition` in the role `LogicalSupervision.transition` shall exist.]

12.3.3.8 `DeadlineSupervision` definition

The `DeadlineSupervision` defines timing attributes for one specific `CheckpointTransition`.

[TPS_MANI_03511] Definition of `DeadlineSupervision` [A `DeadlineSupervision` defines timing attributes which are monitored by the Platform Health Management for one specific `CheckpointTransition`.]

[constr_3635] Mandatory attributes of `DeadlineSupervision`*Imposition time:* `IT_Mani`

[The following attributes of `DeadlineSupervision` shall be defined:

- `transition`
- `minDeadline`
- `maxDeadline`

]

Class	<code>DeadlineSupervision</code>			
Note	Defines an <code>DeadlineSupervision</code> for one transition. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PhmSupervision</code> , <code>Referrable</code>			
Aggregated by	<code>GlobalSupervision.deadlineSupervision</code>			
Attribute	Type	Mult.	Kind	Note
<code>maxDeadline</code>	<code>TimeValue</code>	0..1	attr	Defines the longest time span before which the deadline is considered to be met for transition.
<code>minDeadline</code>	<code>TimeValue</code>	0..1	attr	Defines the shortest time span after which the deadline is considered to be met for transition.
<code>transition</code>	<code>CheckpointTransition</code>	0..1	ref	Reference to the transition in the context of a <code>DeadlineSupervision</code> .

Table 12.28: `DeadlineSupervision`

[TPS_MANI_03573] Definition of no minimum deadline supervision [If the value `DeadlineSupervision.minDeadline` equals 0, this defines that no minimum deadline supervision shall be performed.]

[TPS_MANI_03574] Definition of no maximum deadline supervision [If the value `DeadlineSupervision.maxDeadline` equals INF, this defines that no maximum deadline supervision shall be performed.]

12.3.3.9 NoCheckpointSupervision definition

The `NoCheckpointSupervision` is used to define a set of `SupervisionCheckpoints` for which no Alive, Deadline and Logical supervision shall be performed. It is a means to define a complete coverage of the configuration with respect to the possibly reported `SupervisionCheckpoints`.

If a set of `SupervisionCheckpoints` shall not be considered by the Phm for Supervision (Alive, Deadline and Logical) evaluation, then these `SupervisionCheckpoints` can be referenced from the `NoCheckpointSupervision` in the role `NoCheckpointSupervision.checkpoint`.

[TPS_MANI_03670] Definition of `NoCheckpointSupervision` [A `NoCheckpointSupervision` defines explicitly that no supervision (Alive, Deadline and Logical) shall be applied to the `SupervisionCheckpoints` which are referenced in the role `NoCheckpointSupervision.checkpoint`.]

[constr_3712] Exclusive usage of `NoCheckpointSupervision`

Imposition time: `IT_Mani`

[If a `SupervisionCheckpoint` is referenced by a `NoCheckpointSupervision` in the role `checkpoint`, then that `SupervisionCheckpoint` shall not be referenced by any other checkpoint supervision (`AliveSupervision`, `DeadlineSupervision` (via `CheckpointTransition`), `LogicalSupervision` (also via or `CheckpointTransition`)) in the scope of one `SupervisionMode`.]

Class	NoCheckpointSupervision			
Note	Defines explicitly that NO supervision shall be applied for a set of <code>SupervisionCheckpoints</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PhmSupervision</code> , <code>Referrable</code>			
Aggregated by	<code>GlobalSupervision.noCheckpointSupervision</code>			
Attribute	Type	Mult.	Kind	Note
checkpoint	<code>SupervisionCheckpoint</code>	*	ref	Reference to the set of <code>SupervisionCheckpoints</code> which shall not be considered for any kind of supervision.

Table 12.29: NoCheckpointSupervision

12.3.4 Supervision Recovery Notification Target-Configuration

The only purpose of meta-classes `HealthChannel` and `HealthChannelSupervision` is to **provide a mapping** between a `RecoveryNotification` and a `GlobalSupervision`, as shown in figure 12.16. Beside this limited functionality, `HealthChannel` and `HealthChannelSupervision` carry **no further semantics**.

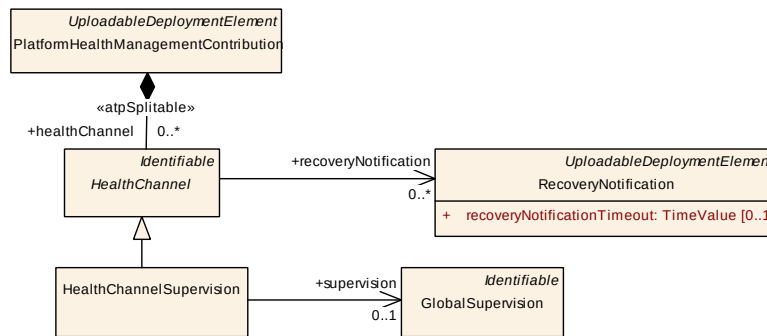


Figure 12.16: Modeling of **HealthChannelSupervision**

[constr_3730] Upper multiplicity of reference in the role **HealthChannel.recoveryNotification**

Imposition time: **IT_Mani**

[In the context of **HealthChannel**, the reference in the role **recoveryNotification** shall exist at most once.]

Class	HealthChannel (abstract)			
Note	This element defines the source of a health channel. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable, Referrable			
Subclasses	HealthChannelSupervision			
Aggregated by	PlatformHealthManagementContribution.healthChannel			
Attribute	Type	Mult.	Kind	Note
recovery Notification	RecoveryNotification	*	ref	Defines the RecoveryNotification for this HealthChannel.

Table 12.30: **HealthChannel**

[TPS_MANI_03672] Definition of **RecoveryNotification** for an **HealthChannel** [The reference **HealthChannel.recoveryNotification** defines which **RecoveryNotification** shall be triggered if the **HealthChannel** is violated.]

[TPS_MANI_03673] **RecoveryNotification** referenced by several **HealthChannel.recoveryNotifications** [One **RecoveryNotification** may be referenced by several **HealthChannel.recoveryNotifications** defining that the violation of any of the referencing **HealthChannels** will trigger that **RecoveryNotification**.]

The **HealthChannelSupervision** is used to take the status of a **GlobalSupervision** trigger the **RecoveryNotification** in case a violation is detected by the Phm.

[TPS_MANI_03516] Status for **HealthChannelSupervision** [The status of the **GlobalSupervision** which is referenced in the role **supervision** is taken as the trigger for the **RecoveryNotification**.]

Class	HealthChannelSupervision			
Note	This element defines a health channel representing the status of a PhmSupervision. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, HealthChannel , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	PlatformHealthManagementContribution.healthChannel			
Attribute	Type	Mult.	Kind	Note
supervision	GlobalSupervision	0..1	ref	Reference to the GlobalSupervision as source for the health channel.

Table 12.31: HealthChannelSupervision

12.3.5 Recovery Notification

If Phm detects a Supervision violation then the associated [RecoveryNotification](#) at the [HealthChannel](#) is activated. This general setup is illustrated in [Figure 4.28](#). Via the [RecoveryNotificationToPPortPrototypeMapping](#) a [RecoveryNotification](#) is mapped to a dedicated [PPortPrototype](#) in the context of a dedicated [Process](#) implementing the State Management functionality.

[constr_3612] Multiplicity of references [recoveryNotification](#), [recoveryAction](#), and [process](#) at [RecoveryNotificationToPPortPrototypeMapping](#)

Imposition time: IT_Mani

[The references [recoveryNotification](#), [recoveryAction](#), and [process](#) shall be defined for each [RecoveryNotificationToPPortPrototypeMapping](#).]

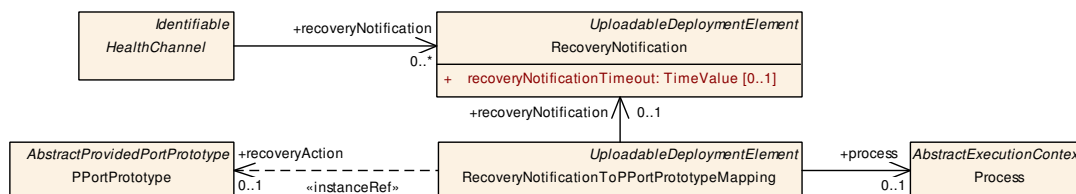


Figure 12.17: Modeling of [RecoveryNotification](#)

[constr_3613] Reference to a [PhmSupervisionRecoveryNotificationInterface](#) in the context of a [HealthChannelSupervision](#)

Imposition time: IT_Mani

[If the [RecoveryNotification](#) is aggregated by a [HealthChannelSupervision](#) then the [RecoveryNotificationToPPortPrototypeMapping](#) shall refer to a [PPortPrototype](#) in the role [recoveryAction](#) typed by [PhmSupervisionRecoveryNotificationInterface](#).]

Class	RecoveryNotification			
Note	This meta-class represents a PHM action that can trigger a recovery operation inside a piece of State Management software. Tags: atp.recommendedPackage=RecoveryNotifications This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
recovery Notification Timeout	TimeValue	0..1	attr	The maximum acceptable amount of time (in seconds), Platform Health Management waits for an acknowledgement by State Management after sending the notification.

Table 12.32: RecoveryNotification

Class	RecoveryNotificationToPPortPrototypeMapping			
Note	This meta-class represents the ability to associate a RecoveryNotification to a PPortPrototype while also being able to identify the respective Process in which the actual recovery executes. Tags: atp.recommendedPackage=RecoveryNotificationMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
process	Process	0..1	ref	Reference to the process which represents the State Management instance that the recovery notification shall be applied to.
recoveryAction	PPortPrototype	0..1	iref	This reference identifies the PortPrototype to be addressed as part of a PHM recovery. InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
recovery Notification	RecoveryNotification	0..1	ref	This reference identifies the applicable Recovery Notification to be mapped.

Table 12.33: RecoveryNotificationToPPortPrototypeMapping

12.4 Time Synchronization Target-Configuration

12.4.1 Overview

This chapter explains the configuration of the Time Synchronization functional cluster.

An adaptive AUTOSAR application can utilize several (synchronized) Time-Base Resources which are provided by the Time Synchronization functional cluster, see [17, SWS Time Synchronization].

The intended interaction of an adaptive AUTOSAR application with Time Synchronization is described in [Chapter 4.7](#).

Since an adaptive [Machine](#) is usually collaborating with other [Machines](#) (adaptive) and ECUs (classic), special focus has been put on the vehicle-wide definition of synchronized time.

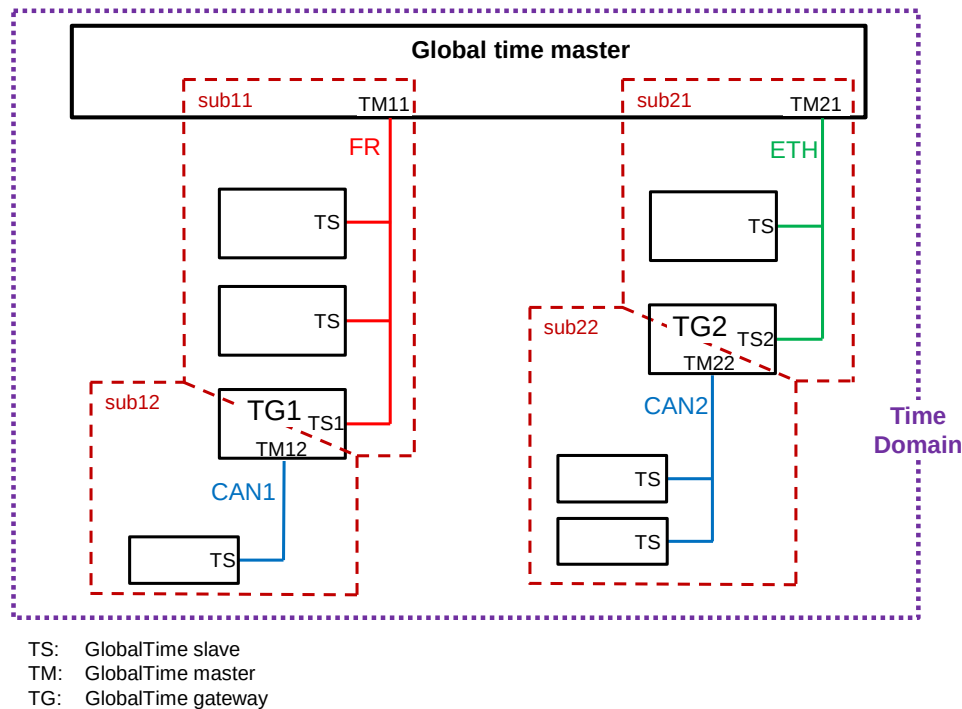


Figure 12.18: Example setup of Synchronized Global Time in AUTOSAR

For a detailed specification, please refer to the *Global Time Synchronization* chapter in the [4, TPS System Template].

Figure 12.18 provides an example system view on time domains and their transportation over diverse networks. In the scope of the *AUTOSAR adaptive platform* the focus is put on the Ethernet interaction with the rest of the system.

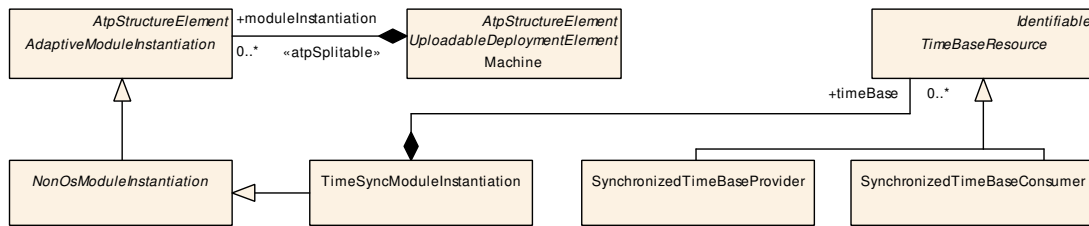
12.4.2 Time Synchronization functional cluster configuration

The representation of the Time Synchronization functional cluster(see [17, SWS Time Synchronization]) within one specific *Machine* is defined by the *TimeSyncModuleInstantiation*.

The *Machine* has the ability to define a set of *moduleInstantiations*, where a specialization can be the *TimeSyncModuleInstantiation*.

Class	TimeSyncModuleInstantiation			
Note	This meta-class defines the attributes for the Time Synchronization configuration on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, <i>AdaptiveModuleInstantiation</i> , <i>AtpClassifier</i> , <i>AtpFeature</i> , <i>AtpStructureElement</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>NonOsModuleInstantiation</i> , <i>Referrable</i>			
Aggregated by	<i>AtpClassifier.atpFeature</i> , <i>Machine.moduleInstantiation</i>			
Attribute	Type	Mult.	Kind	Note
timeBase	<i>TimeBaseResource</i>	*	aggr	This aggregation defines the configured Time Bases for Time Synchronization.

Table 12.34: TimeSyncModuleInstantiation

Figure 12.19: Modeling of `TimeSyncModuleInstantiation`

12.4.3 Time Base

The `TimeSyncModuleInstantiation` represents the actual instance of the Time Synchronization functional cluster executed on a specific `Machine`. In the scope of the `TimeSyncModuleInstantiation` the Time-Base Resources are defined.

[TPS_MANI_03539] Definition of Time-Base Resources [The meta-class `TimeSyncModuleInstantiation` has the ability to define a set of Time-Base Resources of kind `TimeBaseResource` in the role `timeBase`.]

There are several sub types of `TimeBaseResource` which will be explained in the following sections.

Class	<code>TimeBaseResource</code> (abstract)			
Note	This meta-class represents the attributes of one Time Base Resource for Time Synchronization. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Subclasses	<code>SynchronizedTimeBaseConsumer</code> , <code>SynchronizedTimeBaseProvider</code>			
Aggregated by	<code>TimeSyncModuleInstantiation.timeBase</code>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.35: `TimeBaseResource`

12.4.3.1 Synchronized time base

When configuring a synchronized time base many configuration aspects are already provided by the definition of the `GlobalTimeDomain` and are specified in the [4, TPS System TemplateS] and associated to `MachineDesign`.

As for the configuration of the `TimeSyncModuleInstantiation` the usage of the `SynchronizedTimeBaseProvider` respectively `SynchronizedTimeBaseConsumer` defines the interaction with the `GlobalTimeDomain`.

[TPS_MANI_03541] Definition of **SynchronizedTimeBaseConsumer** [The meta-class **SynchronizedTimeBaseConsumer** defines a Time Base which is synchronized with a time coming from the network. With the reference **SynchronizedTimeBaseConsumer.networkTimeConsumer** to a **GlobalTimeSlave** the relation to the system model is established.]

[TPS_MANI_03542] Definition of **SynchronizedTimeBaseProvider** [The meta-class **SynchronizedTimeBaseProvider** defines a Time Base which is propagated to a time on the network. With the reference **SynchronizedTimeBaseProvider.networkTimeProvider** to a **GlobalTimeMaster** the relation to the system model is established.]

Some aspects of the Synchronized Time Base for the *provider* role are not available in the system model, those are provided with the **TimeSyncCorrection**.

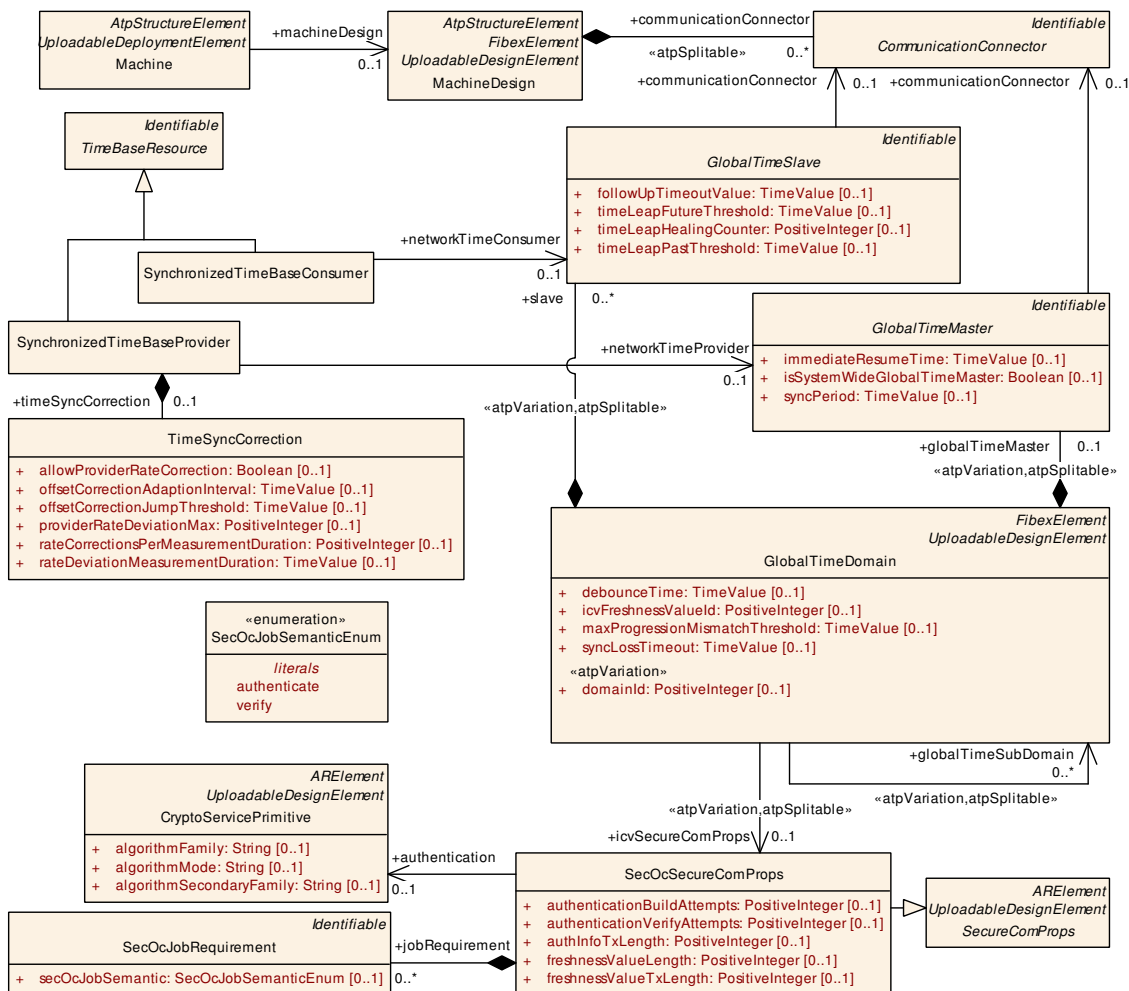


Figure 12.20: Modeling of synchronized time bases

It is possible to define that a **GlobalTimeDomain** is secured for the transport using the Integrity Check Value (ICV). This requires a configuration of the properties used for the calculation and verification of the ICV.

For a detailed specification please refer to the Global Time Synchronization chapter in the [4, TPS System Template].

[TPS_MANI_03543] Definition of time sync correction attributes [GlobalTimeCorrectionProps aggregated by the GlobalTimeDomain define the attributes for time correction. The attributes defined in [TPS_SYST_02436] for the GlobalTimeMaster are applicable for the SynchronizedTimeBaseProvider. The attributes defined in [TPS_SYST_02437] for the GlobalTimeSlave are applicable for the SynchronizedTimeBaseConsumer.]

Class	SynchronizedTimeBaseConsumer			
Note	This meta-class represents a Synchronized Time Base Consumer. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, Referrable, TimeBaseResource			
Aggregated by	TimeSyncModuleInstantiation.timeBase			
Attribute	Type	Mult.	Kind	Note
networkTime Consumer	GlobalTimeSlave	0..1	ref	This reference defines the GlobalTime Consumer which is synchronized with this Time Base.

Table 12.36: SynchronizedTimeBaseConsumer

[constr_10184] Multiplicity of the reference in the role SynchronizedTimeBaseConsumer.networkTimeConsumer

Imposition time: IT_Mani

[For each SynchronizedTimeBaseConsumer, the reference in the role networkTimeConsumer shall exist.]

Class	SynchronizedTimeBaseProvider			
Note	This meta-class represents a Synchronized Time Base Provider. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, Referrable, TimeBaseResource			
Aggregated by	TimeSyncModuleInstantiation.timeBase			
Attribute	Type	Mult.	Kind	Note
networkTime Provider	GlobalTimeMaster	0..1	ref	This reference defines the GlobalTime Provider which is synchronized with this Time Base.
timeSync Correction	TimeSyncCorrection	0..1	aggr	This aggregation defines the attributes used for the correction of time synchronization. Tags: atp.Status=obsolete

Table 12.37: SynchronizedTimeBaseProvider

[constr_10185] Multiplicity of the reference in the role SynchronizedTimeBaseProvider.networkTimeProvider

Imposition time: IT_Mani

[For each SynchronizedTimeBaseProvider, the reference in the role networkTimeProvider shall exist.]

Class	TimeSyncCorrection			
Note	This meta-class represents the attributes used for the correction of time synchronization. Tags: atp.Status=obsolete This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	SynchronizedTimeBaseProvider.timeSyncCorrection			
Attribute	Type	Mult.	Kind	Note
allowProviderRateCorrection	Boolean	0..1	attr	Defines whether the rate correction value of a Time Base can be set by means of the method setRateCorrection(). false: rate correction cannot be set by method setRateCorrection(). true: rate correction can be set by method setRateCorrection().
offsetCorrectionAdaptionInterval	TimeValue	0..1	attr	Defines the interval during which the adaptive rate correction cancels out the rate and time deviation. Unit: seconds.
offsetCorrectionJumpThreshold	TimeValue	0..1	attr	Threshold for the correction method. Deviations below this value will be corrected by a linear reduction over a defined timespan. Values equal and greater than this value will be corrected by immediately setting the correct time and rate in form of a jump. Unit: seconds.
providerRateDeviationMax	PositiveInteger	0..1	attr	This attribute describes the maximum allowed absolute value of the rate deviation value [unit: ppm].
rateCorrectionsPerMeasurementDuration	PositiveInteger	0..1	attr	Number of simultaneous rate measurements to determine the current rate deviation.
rateDeviationMeasurementDuration	TimeValue	0..1	attr	Time span used to calculate the rate deviation. Unit: seconds.

Table 12.38: TimeSyncCorrection

[constr_10628] Allowed range of attribute `TimeSyncCorrection.providerRateDeviationMax`

Imposition time: IT_Mani

[The value of attribute `TimeSyncCorrection.providerRateDeviationMax` shall only be within the interval [0..32000].]

12.4.3.2 Persistent Time Base value storage

The Time Synchronization functional cluster allows to define a storage for a `SynchronizedTimeBaseProvider` time base. During shutdown the value of that specific time base is stored in a `PersistencyDeploymentElement` (either `PersistencyKeyValuePair` or `PersistencyFile`) and during startup the value is read from persistency and restored at the time base.

[TPS_MANI_03632] Semantics of `TimeBaseProviderToPersistencyMapping` [The `TimeBaseProviderToPersistencyMapping` defines that the referenced `SynchronizedTimeBaseProvider` (`TimeBaseProviderToPersistencyMapping.timeBaseProvider`) time value shall be stored to persistency during

shutdown and restored from persistency during startup (`TimeBaseProviderToPersistencyMapping.persistencyDeploymentElement`).]

It is also possible to define a cycle in which the time base value shall be stored periodically using the attribute `TimeBaseProviderToPersistencyMapping.cyclicBackupInterval`.

[TPS_MANI_03671] Periodic storage of time base value [The attribute `TimeBaseProviderToPersistencyMapping.cyclicBackupInterval` defines an interval in which the time base value shall be stored periodically to the `TimeBaseProviderToPersistencyMapping.persistencyDeploymentElement`.]

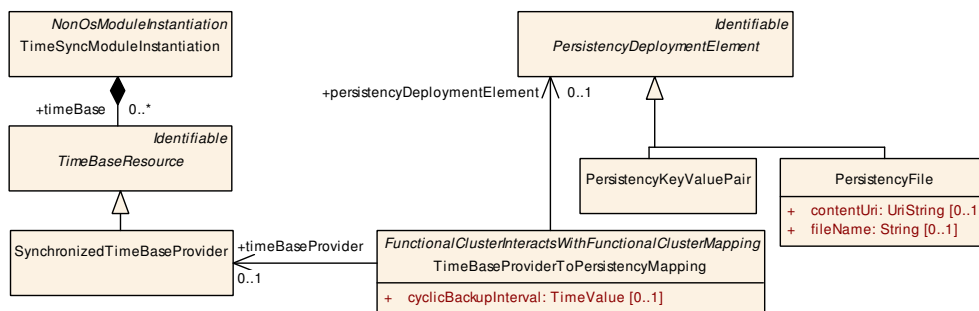


Figure 12.21: Modeling of `TimeBaseProviderToPersistencyMapping`

Class	TimeBaseProviderToPersistencyMapping			
Note	This meta-class represents the ability to define a mapping between a TimeBaseProvider and a PersistencyDeploymentElement for the purpose of storing and retrieving the time value. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, FunctionalClusterInteractsWithFunctionalClusterMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cyclicBackupInterval	TimeValue	0..1	attr	Time interval in seconds to store the time base value periodically to persistence.
persistencyDeploymentElement	PersistencyDeploymentElement	0..1	ref	This reference represents the PersistencyDeploymentElement where the time value shall be stored in and retrieved from.
timeBaseProvider	SynchronizedTimeBaseProvider	0..1	ref	This reference represents the mapped TimeBase Provider.

Table 12.39: TimeBaseProviderToPersistencyMapping

[constr_3619] Mandatory references of `TimeBaseProviderToPersistencyMapping`

Imposition time: IT_Mani

[The references `TimeBaseProviderToPersistencyMapping.persistencyDeploymentElement` and `TimeBaseProviderToPersistencyMapping.timeBaseProvider` shall exist.]

12.4.3.3 Ethernet synchronized time

As the *AUTOSAR adaptive platform* supports Ethernet as communication network also the time synchronization using Ethernet is supported.

In order to configure the behavior of the Ethernet time synchronization the specific sub-classes are used as shown in [Figure 12.22](#).

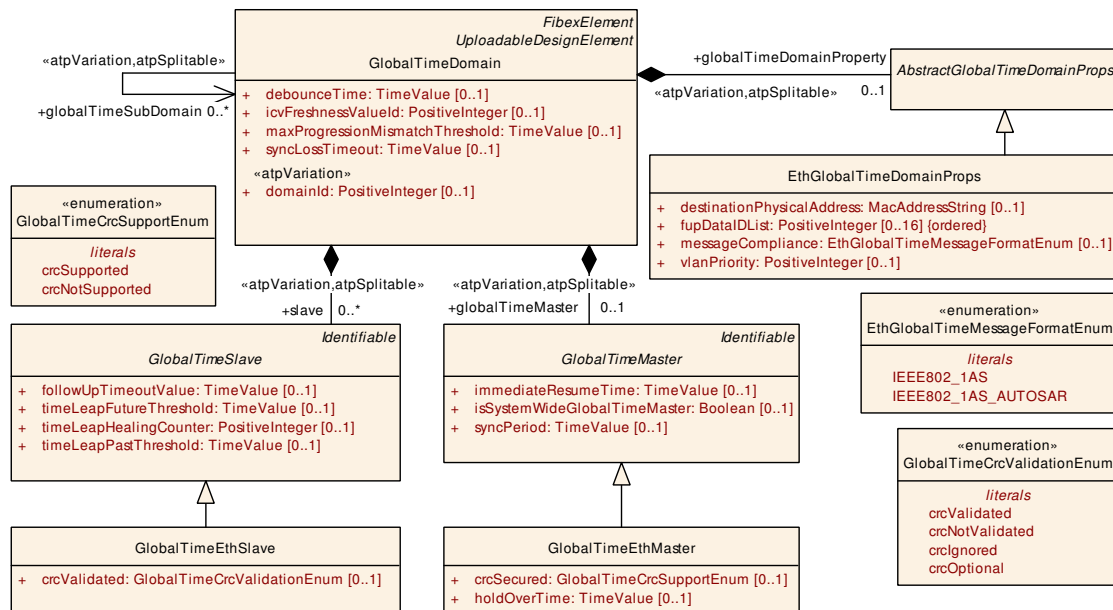


Figure 12.22: Modeling of Ethernet synchronized time

Class	EthGlobalTimeDomainProps			
Note	Enables the definition of Ethernet Global Time specific properties.			
Base	ARObject, AbstractGlobalTimeDomainProps			
Aggregated by	GlobalTimeDomain.globalTimeDomainProperty			
Attribute	Type	Mult.	Kind	Note
crcFlags	EthTSynCrcFlags	0..1	aggr	Defines the fields of the message which shall be taken into account for CRC calculation and verification.
destination Physical Address	MacAddressString	0..1	attr	Defines the MAC multicast address the Ethernet time sync messages are communicated on.
fupDataIDList (ordered)	PositiveInteger	0..16	attr	The DataIDList for FUP messages to calculate CRC.
managed CouplingPort	EthGlobalTimeManagedCouplingPort	*	aggr	Collection of CouplingPorts which are managed in the scope of this Ethernet GlobalTimeDomain.
message Compliance	EthGlobalTimeMessageFormatEnum	0..1	attr	Defines the compliance of the Ethernet time sync messages to specific standards.
vlanPriority	PositiveInteger	0..1	attr	Defines which VLAN priority shall be assigned to a time sync message in case the message is sent using a VLAN tag.

Table 12.40: EthGlobalTimeDomainProps

Class	EthTSynCrcFlags			
Note	Defines the fields of the message which shall be taken into account for CRC calculation and verification.			
Base	<i>ARObject</i>			
Aggregated by	EthGlobalTimeDomainProps.crcFlags			
Attribute	Type	Mult.	Kind	Note
crcCorrectionField	Boolean	0..1	attr	CorrectionField from the Follow_Up Message Header shall be included in CRC calculation.
crcDomainNumber	Boolean	0..1	attr	DomainNumber from the Follow_Up Message Header shall be included in CRC calculation.
crcMessageLength	Boolean	0..1	attr	MessageLength from the Follow_Up Message Header shall be included in CRC calculation.
crcPreciseOriginTimestamp	Boolean	0..1	attr	PreciseOriginTimestamp from the Follow_Up Message Field shall be included in CRC calculation.
crcSequenceId	Boolean	0..1	attr	SequenceId from the Follow_Up Message Header shall be included in CRC calculation.
crcSourcePortIdentity	Boolean	0..1	attr	SourcePortIdentity from the Follow_Up Message Header shall be included in CRC calculation.

Table 12.41: EthTSynCrcFlags

Primitive	MacAddressString
Note	This primitive specifies a Mac Address. Notation: FF:FF:FF:FF:FF:FF Alternative notations, e.g. using dash instead of colon, or another grouping of numbers, is not allowed. Tags: xml.xsd.customType=MAC-ADDRESS-STRING xml.xsd.pattern=([0-9a-fA-F]{2}:){5}[0-9a-fA-F]{2} xml.xsd.type=string

Table 12.42: MacAddressString

Class	EthGlobalTimeManagedCouplingPort			
Note	Specifies a CouplingPort which is managed by an Ethernet Global Time Domain.			
Base	<i>ARObject</i>			
Aggregated by	EthGlobalTimeDomainProps.managedCouplingPort			
Attribute	Type	Mult.	Kind	Note
couplingPort	CouplingPort	0..1	ref	Defines which CouplingPort is managed by this EthGlobalTimeManagedCouplingPort.
globalTimePortRole	GlobalTimePortRole Enum	0..1	attr	This attribute defines the port behavior.
globalTimeTxPeriod	TimeValue	0..1	attr	This attribute defines the TX period in seconds
pdelayLatencyThreshold	TimeValue	0..1	attr	Threshold for calculated Pdelay. If a measured Pdelay exceeds pdelayLatencyThreshold, the measured Pdelay value is discarded.
pdelayRequestPeriod	TimeValue	0..1	attr	Defines the period for the pdelay request messages.
pdelayRespAndRespFollowUpTimeout	TimeValue	0..1	attr	Timeout value for Pdelay_Resp and Pdelay_Resp_Follow_Up after a Pdelay_Req has been transmitted resp. a Pdelay_Resp has been received. A value of 0 or not defining this attribute deactivates this timeout observation.
pdelayResponseEnabled	Boolean	0..1	attr	Defines whether PDELAY RESPONSE and PDELAY RESPONSE FOLLOW UP shall be sent on this Coupling Port.

Table 12.43: EthGlobalTimeManagedCouplingPort

Enumeration	EthGlobalTimeMessageFormatEnum
Note	Specifies which message formats are available to for the Ethernet time sync protocol.
Aggregated by	EthGlobalTimeDomainProps.messageCompliance
Literal	Description
IEEE802_1AS	Message format according to IEEE 802.1AS standard. Tags: atp.EnumerationLiteralIndex=0 xml.name=IEEE802-1AS
IEEE802_1AS_ AUTOSAR	Message format according to IEEE 802.1AS standard with AUTOSAR extensions. Tags: atp.EnumerationLiteralIndex=1 xml.name=IEEE802-1AS-AUTOSAR

Table 12.44: EthGlobalTimeMessageFormatEnum

Class	GlobalTimeEthSlave			
Note	This represents the specialization of the GlobalTimeSlave for Ethernet communication.			
Base	<i>ARObject</i> , GlobalTimeSlave , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	GlobalTimeDomain.slave			
Attribute	Type	Mult.	Kind	Note
crcValidated	GlobalTimeCrcValidationEnum	0..1	attr	Definition of whether or not validation of the CRC is supported.

Table 12.45: GlobalTimeEthSlave

Enumeration	GlobalTimeCrcValidationEnum
Note	This enumeration provides values for the evaluation of the CRC
Aggregated by	GlobalTimeCanSlave.crcValidated , GlobalTimeEthSlave.crcValidated , GlobalTimeFrSlave.crcValidated
Literal	Description
crcIgnored	The CRC is supposed to be ignored Tags: atp.EnumerationLiteralIndex=0
crcNotValidated	The CRC is not supposed to be present. If CRC is present the message is ignored. Tags: atp.EnumerationLiteralIndex=1
crcOptional	Either the CRC is present and then shall be validated or the CRC is not present and no CRC check is done. Tags: atp.EnumerationLiteralIndex=3
crcValidated	This CRC is supposed to be validated. Tags: atp.EnumerationLiteralIndex=2

Table 12.46: GlobalTimeCrcValidationEnum

Class	GlobalTimeEthMaster			
Note	This represents the specialization of the GlobalTimeMaster for Ethernet communication.			
Base	<i>ARObject</i> , GlobalTimeMaster , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	GlobalTimeDomain.globalTimeMaster			
Attribute	Type	Mult.	Kind	Note
crcSecured	GlobalTimeCrcSupportEnum	0..1	attr	Definition of whether or not CRC is supported. This is only relevant for selected bus systems.





Class	GlobalTimeEthMaster			
holdOverTime	TimeValue	0..1	attr	This attribute defines the timeout for transmission of Sync and Follow_Up messages on Master ports in absence of reception of Sync and Follow_Up messages on Slave port.
subTlvConfig	EthTSynSubTlvConfig	0..1	aggr	Defines the subTLV fields which shall be included in the time sync message.

Table 12.47: GlobalTimeEthMaster

Enumeration	GlobalTimeCrcSupportEnum
Note	This enumeration is used to define whether and how CRC on the TX side shall be utilized.
Aggregated by	GlobalTimeCanMaster.crcSecured, GlobalTimeEthMaster.crcSecured , GlobalTimeFrMaster.crcSecured
Literal	Description
crcNotSupported	This indicates that CRC is not supported Tags: atp.EnumerationLiteralIndex=0
crcSupported	This indicates that CRC is supported Tags: atp.EnumerationLiteralIndex=1

Table 12.48: GlobalTimeCrcSupportEnum

Class	EthTSynSubTlvConfig			
Note	Defines the subTLV fields which shall be included in the time sync message.			
Base	ARObject			
Aggregated by	GlobalTimeEthMaster.subTlvConfig			
Attribute	Type	Mult.	Kind	Note
statusSubTlv	Boolean	0..1	attr	Defines whether an AUTOSAR Follow_Up TLV Status Sub-TLV is used.
timeSubTlv	Boolean	0..1	attr	Defines whether an AUTOSAR Follow_Up TLV Time Sub-TLV is used.
userDataSubTlv	Boolean	0..1	attr	Defines whether an AUTOSAR Follow_Up TLV UserData Sub-TLV is used.

Table 12.49: EthTSynSubTlvConfig

12.4.4 Time Base to Port Prototype mapping

The [TimeBaseResource](#) definition of [Chapter 12.4.3](#) and the [RPortPrototype](#) typed by a sub-class of [AbstractSynchronizedTimeBaseInterface](#) of [Chapter 4.7](#) have to be mapped to each other in order to define the binding of application software to the platform foundation software implementing the time synchronization.

The [TimeSyncPortPrototypeToTimeBaseMapping](#) takes the [Process](#) into account so that every instantiation of an [Executable](#) (and the resulting instantiation of all the [RPortPrototypes](#) typed by a sub-class of [AbstractSynchronizedTimeBaseInterface](#)) can be mapped individually to [TimeBaseResources](#).

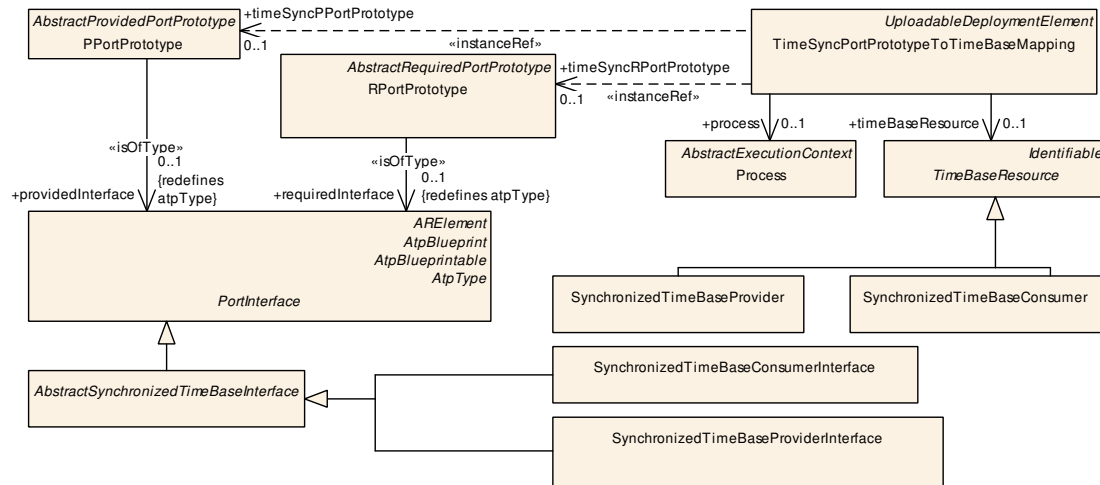


Figure 12.23: Modeling of TimeSyncPortPrototypeToTimeBaseMapping

[TPS_MANI_03548] Definition of TimeSyncPortPrototypeToTimeBaseMapping [A TimeSyncPortPrototypeToTimeBaseMapping is used to define a mapping between a TimeBaseResource and a RPortPrototype typed by a sub-class of AbstractSynchronizedTimeBaseInterface in the context of a Process.]

Class	TimeSyncPortPrototypeToTimeBaseMapping			
Note	This meta-class provides the ability to map a PortPrototype typed by a AbstractSynchronizedTimeBase Interface to a TimeBaseResource in the context of a Process. Tags: atp.recommendedPackage=TimeSyncPortPrototypeToTimeBaseMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
process	Process	0..1	ref	Reference to the context Process this mapping applies to.
timeBaseResource	TimeBaseResource	0..1	ref	Reference to the mapped TimeBaseResource.
timeSyncPPortPrototype	PPortPrototype	0..1	iref	Instance reference to the mapped PPortPrototype typed by a AbstractSynchronizedTimeBaseInterface. InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
timeSyncRPortPrototype	RPortPrototype	0..1	iref	Instance reference to the mapped RPortPrototype typed by a AbstractSynchronizedTimeBaseInterface. InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 12.50: TimeSyncPortPrototypeToTimeBaseMapping

The example shown in Figure 12.24 illustrates the mapping of RPortPrototypes typed by one of the sub-classes of AbstractSynchronizedTimeBaseInterface to actually configured TimeBaseResources at the Time Sync Management.

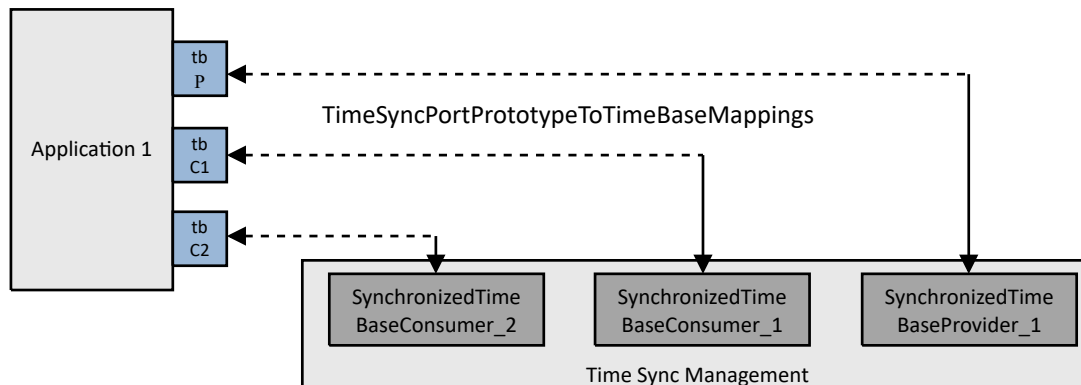


Figure 12.24: Example PortPrototype to TimeBase mapping

12.5 DoIP configuration

[TPS_MANI_03164] **Machine-specific configuration settings for DoIP** [The *Machine*-specific configuration settings for DoIP are collected in *DoIpInstantiation*.]

Class	DoIpInstantiation			
Note	This meta-class defines the attributes for the DoIP configuration on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
dolpDesign	DolpFunctionalClusterDesign	0..1	ref	Reference to the DoIP Design that this DoIpInstantiation implements.
gid	PositiveUnlimitedInteger	0..1	attr	Configured GID (Group ID) used for VehicleIdentification Request. If configured, take this value (and set "Further action required" byte to 0x00="No further action required"), if not configured use ServiceInterface DoIPGroupIdentification to retrieve GID and 'further action required' values.
logicalAddress	PositiveInteger	0..1	attr	Describes the logical address of the DoIP entity, which is used for VehicleAnnouncement and RoutingActivation responses.
networkInterface	DolpNetworkConfiguration	*	aggr	Network interface specific DoIP properties.
requestConfiguration	DolpRequestConfiguration	*	aggr	Request configuration that is used to determine whether an incoming DiagnosticMessage request needs to be interpreted as PHYSICAL or FUNCTIONAL. Any request with target address not within the configured target address range will be rejected.

Table 12.51: DoIpInstantiation

[constr_10188] Multiplicity of attribute [DoIpInstantiation.logicalAddress](#)

Imposition time: [IT_Mani](#)

[For each [DoIpInstantiation](#), the attribute [logicalAddress](#) shall exist.]

[constr_3425] Restriction of DoIpInstantiations on a Machine

Imposition time: IT_Mani

[Each Machine shall aggregate at most one DoIpInstantiation in the role moduleInstantiation.]

[constr_3496] Supported value range for attribute DoIpInstantiation.gid

Imposition time: IT_Mani

[The supported value range of attribute DoIpInstantiation.gid is limited to the interval [0..281474976710655].]

[constr_3498] Supported value range for attribute DoIpInstantiation.logicalAddress

Imposition time: IT_Mani

[The supported value range of attribute DoIpInstantiation.logicalAddress is limited to the interval [0..65535].]

Class	DolpNetworkConfiguration			
Note	This element collects DoIP properties that are network interface specific. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	DolpInstantiation.networkInterface			
Attribute	Type	Mult.	Kind	Note
eidRetrieval	DolpEidRetrievalEnum	0..1	attr	This attribute defines how DoIP Entity Identification is retrieved.
isActivationLineDependent	Boolean	0..1	attr	This attribute defines whether the network interface • is started "on-demand" when an activation line is sensed or • is always available.
maxInitialVehicleAnnouncementTime	TimeValue	0..1	attr	Upper bound for the time to wait in [s] for sending first vehicle announcement message after IP address assignment. Represents parameter A_DoIP_Announce_Wait of ISO 13400-2:2019. The value of this timing shall be determined randomly in the closed interval [0..maxInitialVehicleAnnouncementTime].
maxTesterConnections	PositiveInteger	0..1	attr	Maximum amount of tester connections that shall be maintained at one time before alive check is performed.
networkConfiguration	PlatformModuleEthernetEndpointConfiguration	*	ref	Network configuration (Protocol, Port, IP Address) for transmission of DoIP messages on a specific VLAN.
networkConfigurationDesign	DolpNetworkConfigurationDesign	0..1	ref	Reference to the DoIP network configuration design that this DolpNetworkConfiguration implements.
networkInterfaceId	PositiveInteger	0..1	attr	This attribute defines the identifier for the DoIPInterface.
tcpAliveCheckResponseTimeout	TimeValue	0..1	attr	Timeout in [s] for waiting for a response to an Alive Check request before the connection is considered to be disconnected. Represents parameter T_TCP_AliveCheck of ISO 13400-2:2019.





Class	DoIpNetworkConfiguration			
tcpGeneralInactivityTime	TimeValue	0..1	attr	Timeout in [s] for maximum inactivity of a TCP socket connection before the DoIP module will close the according socket connection. Represents parameter T_TCP_General_Inactivity of ISO 13400-2:2019.
tcpInitialInactivityTime	TimeValue	0..1	attr	Timeout in [s] used for initial inactivity of a connected TCP socket connection directly after socket connection. Represents parameter T_TCP_Initial_Inactivity of ISO 13400-2:2019.
vehicleAnnouncementCount	PositiveInteger	0..1	attr	Number of vehicle announcement messages on IP address assignment. Represents parameter A_DoIP_Announce_Num of ISO 13400-2:2019.
vehicleAnnouncementInterval	TimeValue	0..1	attr	Time to wait in [s] for sending subsequent vehicle announcement messages. Represents parameter A_DoIP_Announce_Interval of ISO 13400-2:2019.
vehicleIdentificationSyncStatus	Boolean	0..1	attr	Defines if the optional VIN/GID synchronization status is used additionally in the vehicle identification/announcement.

Table 12.52: DoIpNetworkConfiguration

[TPS_MANI_03165] Network Interface configuration for DoIP [The [DoIpNetworkConfiguration](#) contains all configuration settings that are specific for a configured network connection. The network connection is configured with the [PlatformModuleEthernetEndpointConfiguration](#) that is referenced by the [DoIpNetworkConfiguration](#) in the role [networkConfiguration](#).

The [tcpPort](#) and [udpPort](#) references to the [ApApplicationEndpoint](#) are used to configure the Transport Protocol (Udp or Tcp) and the used Port number. The IP Address is configured in the [NetworkEndpoint](#) that is referenced by the [PlatformModuleEthernetEndpointConfiguration](#) via the [EthernetCommunicationConnector](#).]

[TPS_MANI_03323] Support for TLS in DoIP communication [DoIP communication that is secured by TLS is modeled by a [DoIpNetworkConfiguration](#) that references the [PlatformModuleEthernetEndpointConfiguration](#) that in turn references [SecureComProps](#) in the role [secureComPropsForTcp](#), which contains the credentials to secure the DoIP communication over TCP.]

Please note that for vehicle discovery and UDP protocol-based DoIP communication, no secured communication is supported.

[constr_10191] Multiplicity of attribute [DoIpNetworkConfiguration.isActivationLineDependent](#)

Imposition time: [IT_Mani](#)

[For each [DoIpNetworkConfiguration](#), the attribute [isActivationLineDependent](#) shall exist.]

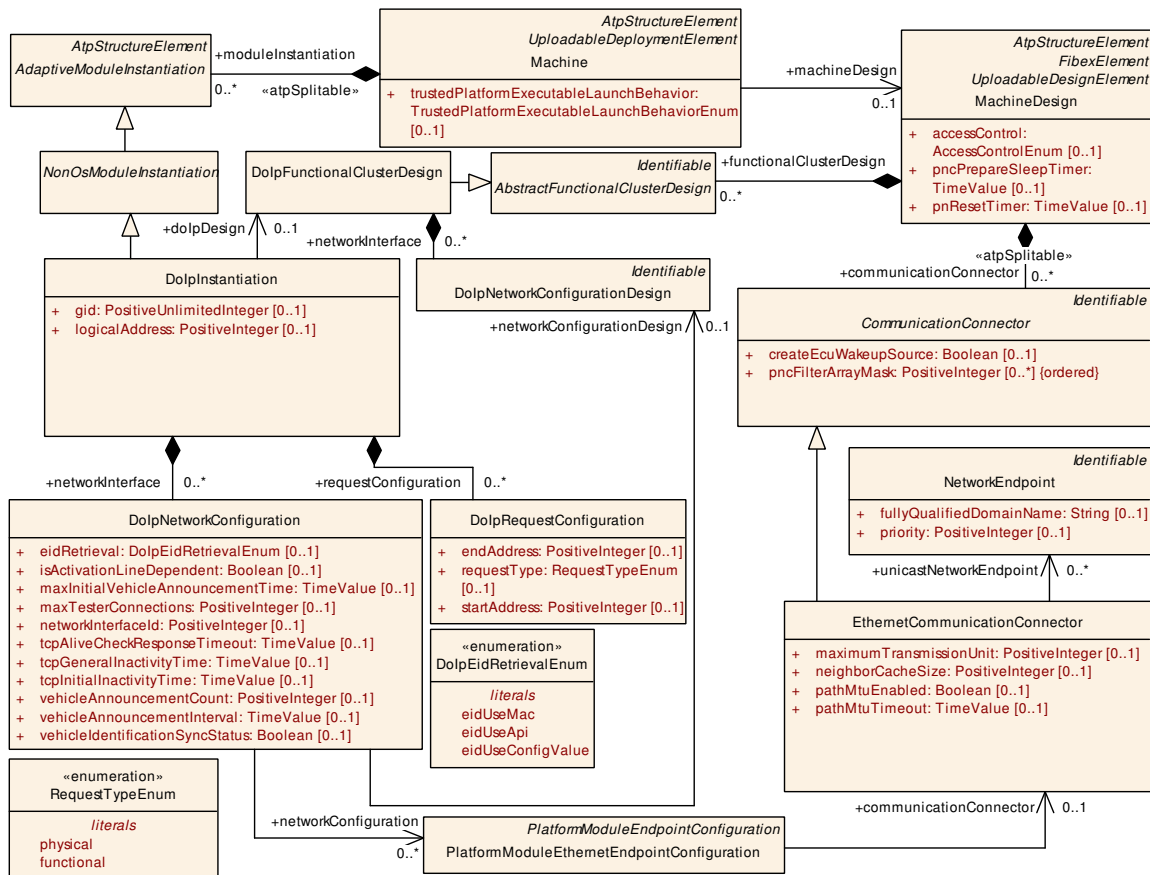


Figure 12.25: DoIP configuration

[constr_10192] Multiplicity of attribute `DoIpNetworkConfiguration.maxInitialVehicleAnnouncementTime`

Imposition time: IT_Mani

[For each `DoIpNetworkConfiguration`, the attribute `maxInitialVehicleAnnouncementTime` shall exist.]

[constr_10193] Multiplicity of attribute `DoIpNetworkConfiguration.maxTesterConnections`

Imposition time: IT_Mani

[For each `DoIpNetworkConfiguration`, the attribute `maxTesterConnections` shall exist.]

[constr_3734] Upper multiplicity of reference in the role `DoIpNetworkConfiguration.networkConfiguration`

Imposition time: IT_Mani

[In the context of `DoIpNetworkConfiguration`, the reference in the role `networkConfiguration` shall exist at most once.]

[constr_10194] Multiplicity of attribute `DoIpNetworkConfiguration.networkInterfaceId`*Imposition time:* `IT_Mani`

[For each `DoIpNetworkConfiguration`, the attribute `networkInterfaceId` shall exist.]

Please note that it is possible to define several `networkInterfaces` in a `DoIpInstantiation`. For each network connection individual configuration settings can be set with the attributes that are defined in the `DoIpNetworkConfiguration` element, e.g. it is possible to configure the vehicle announcement for different network connections differently.

[TPS_MANI_03294] Semantics of `DoIpNetworkConfiguration.eidRetrieval`

[If `DoIpNetworkConfiguration.eidRetrieval` is set to:

- `eidUseConfigValue`, then take the value from `DoIpInstantiation.doIpDesign.eid`
- `eidUseApi`, then `DoIpInstantiation.doIpDesign.eid` shall be ignored and the API `DiagnosticDoIPEntityIdentificationInterface` shall be used to retrieve the eid
- `eidUseMac`, then `DoIpInstantiation.doIpDesign.eid` shall be ignored and the MAC shall be taken as as the eid

]

[constr_5343] Usage of `DoIpNetworkConfiguration.eidRetrieval`*Imposition time:* `IT_Mani`

[If `DoIpNetworkConfiguration.eidRetrieval` is set to `eidUseConfigValue` then `DoIpInstantiation.doIpDesign.eid` shall exist and a value shall be assigned to it.]

During vehicle discovery, the DoIP module responds by informing the tester about its own address (address of Diagnostic Manager running the DoIP instance), configured as the `logicalAddress`. The tester will approach the ECU under this UDS target address, thus the ECU should have a `SoftwareCluster` that is configured to respond to this UDS target address.

Class	DoIpRequestConfiguration			
Note	This meta-class specifies a range of target addresses and its interpretation as either physical or functional request. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code>			
Aggregated by	<code>DoIpInstantiation.requestConfiguration</code>			
Attribute	Type	Mult.	Kind	Note





Class	DoIpRequestConfiguration			
endAddress	PositiveInteger	0..1	attr	End address for range of target-addresses (including this address).
requestType	RequestTypeEnum	0..1	attr	Determines the type of request.
startAddress	PositiveInteger	0..1	attr	Start address for range of target-addresses (including this address).

Table 12.53: DoIpRequestConfiguration

[constr_10197] Multiplicity of attribute `DoIpRequestConfiguration.endAddress`*Imposition time:* IT_Mani[For each `DoIpRequestConfiguration`, the attribute `endAddress` shall exist.]**[constr_10198] Multiplicity of attribute `DoIpRequestConfiguration.requestType`***Imposition time:* IT_Mani[For each `DoIpRequestConfiguration`, the attribute `requestType` shall exist.]**[constr_10199] Multiplicity of attribute `DoIpRequestConfiguration.startAddress`***Imposition time:* IT_Mani[For each `DoIpRequestConfiguration`, the attribute `startAddress` shall exist.]**[constr_3492] `DoIpInstantiation.logicalAddress` shall be defined as member in the `DoIpRequestConfiguration`***Imposition time:* IT_Mani[The `DoIpInstantiation.logicalAddress` shall be a member of the intervals of available physical addresses configured for the `DoIpInstantiation` in the `requestConfiguration`.]

On top of that, there is the expectation that the configured `DiagnosticCommonProps.diagnosticAddresses` deployed to the `Machine` fit to the intervals defined in the context of the `DoIpInstantiation` in the `requestConfiguration`.

Please note that the `DoIpRequestConfiguration` corresponds to Table 39 that is defined in [27, ISO-13400-2:2019].

[constr_3499] Supported value range for attribute `DoIpRequestConfiguration.startAddress`*Imposition time:* IT_Mani[The supported value range of attribute `DoIpRequestConfiguration.startAddress` is limited to the interval [0..65535].]

[constr_5000] Supported value range for attribute DoIpRequestConfiguration.endAddress

Imposition time: IT_Mani

[The supported value range of attribute `DoIpRequestConfiguration.endAddress` is limited to the interval [0..65535].]

12.6 Log and Trace module configuration

The Log and Trace functionality in AUTOSAR supports the monitoring of applications and provides means to forward logging information onto the communication bus, the console, to the file system, or to the ARTI trace API. Forwarding to ARTI trace API is only valid for modeled messages.

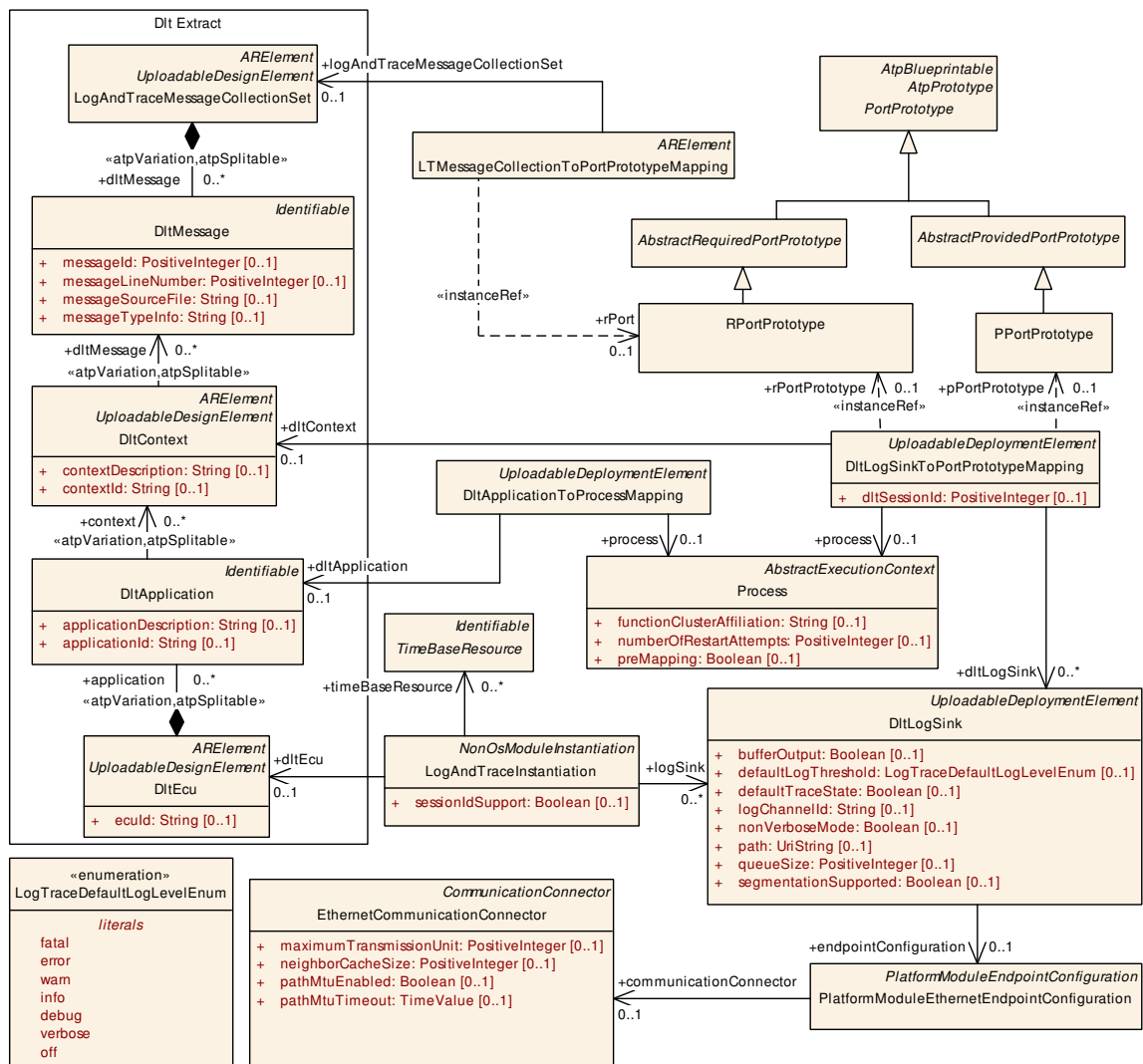


Figure 12.26: Log and Trace module configuration

The logging information is put into a standardized delivery and presentation format that is described in more detail in the [28, PRS Log and Trace protocol]. The format contains meta-data that identifies for example the application that produces the logging information.

This chapter describes settings that are available in the Machine Manifest to configure the logging framework and defines the relation between the application design and the target-configuration model.

Please note that the modeling elements described in this chapter are using elements from the Log And Trace Extract Template that defines a AUTOSAR platform independent format for description of log and trace messages and the source that produces these log and trace messages.

12.6.1 Log and Trace Target-Configuration

[TPS_MANI_03162] Machine-specific configuration settings for the Log and Trace functional cluster [The *Machine*-specific configuration settings for the Log and Trace functional cluster are collected in *LogAndTraceInstantiation*.]

[TPS_MANI_03282] Assignment of a Dlt Ecu Identifier to a LogAndTraceInstantiation [The *Machine* is represented in the Log And Trace Extract by the *DltEcu* that is referenced from the *LogAndTraceInstantiation* in the role *dltEcu*. The referenced *DltEcu* defines the *ecuId* that is transported in the standard header of the log and trace message.]

Class	LogAndTraceInstantiation			
Note	This meta-class defines the attributes for the Log&Trace configuration on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, <i>AdaptiveModuleInstantiation</i> , <i>AtpClassifier</i> , <i>AtpFeature</i> , <i>AtpStructureElement</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>NonOsModuleInstantiation</i> , <i>Referrable</i>			
Aggregated by	<i>AtpClassifier.atpFeature</i> , <i>Machine.moduleInstantiation</i>			
Attribute	Type	Mult.	Kind	Note
dltEcu	<i>DltEcu</i>	0..1	ref	Reference to the Ecu representation in the Log And Trace Extract.
logSink	<i>DltLogSink</i>	*	ref	Reference to output sinks for log or trace messages that are produced on the Machine.
sessionIdSupport	Boolean	0..1	attr	This attribute defines whether the sessionId is used or not.
timeBaseResource	<i>TimeBaseResource</i>	*	ref	This reference is used to describe to which time base the Log and Trace module has access. From the Time Base Resource the Log and Trace module gets the needed information to generate the time stamp.

Table 12.54: LogAndTraceInstantiation

[constr_5275] Existence of [LogAndTraceInstantiation.dltEcu](#)*Imposition time:* [IT_Mani](#)

[For each [LogAndTraceInstantiation](#) the reference to [DltEcu](#) in the role [dltEcu](#) shall exist.]

[constr_5276] Existence of [LogAndTraceInstantiation.logSink](#)*Imposition time:* [IT_Mani](#)

[Each [LogAndTraceInstantiation](#) shall reference at least one [DltLogSink](#) in the role [logSink](#).]

[constr_3729] Upper multiplicity of reference in the role [LogAndTraceInstantiation.timeBaseResource](#)*Imposition time:* [IT_Mani](#)

[In the context of [LogAndTraceInstantiation](#), the reference in the role [timeBaseResource](#) shall exist at most once.]

[TPS_MANI_03274] Configuration of log and trace sinks [The output sinks for log or trace messages that are produced on the [Machine](#) are defined by [DltLogSinks](#) that are referenced in the role [logSink](#) from the [LogAndTraceInstantiation](#).]

Class	DltLogSink			
Note	The meta-class defines the output sink for DltLogMessages Tags: atp.recommendedPackage=DltLogSinks This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
bufferOutput	Boolean	0..1	attr	This attribute defines whether a buffer is used in case that the output sink is the console.
defaultLogThreshold	LogTraceDefaultLogLevelEnum	0..1	attr	This attribute allows to set a log level Threshold for Log Level filtering.
defaultTraceState	Boolean	0..1	attr	This attributes defines the default trace status.
endpointConfiguration	PlatformModuleEthernetEndpointConfiguration	0..1	ref	Network configuration (Protocol, Port, IP Address) for transmission of dlt messages on a specific VLAN.
logChannelId	String	0..1	attr	This attribute identifies the LogChannel for usage within the Log And Trace protocol.
nonVerboseMode	Boolean	0..1	attr	This attribute defines whether this DltLogSink supports non-Verbose Dlt messages. If disabled only verbose mode messages shall be used.
path	UriString	0..1	attr	This attribute defines the path to the file that is used as output sink.
queueSize	PositiveInteger	0..1	attr	Length of the queue (in which messages can be stored before processing) in the unit "Log message".





Class	DltLogSink			
segmentation Supported	Boolean	0..1	attr	If enabled, segmentation will be used for DLT messages that are larger than EthernetCommunicationConnector.maximumTransmissionUnit referenced via DltLogSink.endpointConfiguration.

Table 12.55: DltLogSink

Enumeration	LogTraceDefaultLogLevelEnum
Note	This enum defines available log&trace log levels that may be used to define the severity level of a log message.
Aggregated by	DltLogChannel.logTraceDefaultLogThreshold, DltLogSink.defaultLogThreshold
Literal	Description
debug	Detailed information for programmers Tags: atp.EnumerationLiteralIndex=4
error	Error with impact to correct functionality Tags: atp.EnumerationLiteralIndex=1
fatal	Fatal error Tags: atp.EnumerationLiteralIndex=0
info	High level information Tags: atp.EnumerationLiteralIndex=3
off	logging is turned off Tags: atp.EnumerationLiteralIndex=6
verbose	Verbose debug message Tags: atp.EnumerationLiteralIndex=5
warn	Warning if correct behavior cannot be ensured Tags: atp.EnumerationLiteralIndex=2

Table 12.56: LogTraceDefaultLogLevelEnum

[TPS_MANI_03283] Standardized values for attribute [DltLogSink.category](#)
 [AUTOSAR reserves the following values for attribute [DltLogSink.category](#):

- [DLT_LOGSINK_REMOTE](#)
- [DLT_LOGSINK_DLT](#)
- [DLT_LOGSINK_FILE](#)
- [DLT_LOGSINK_CONSOLE](#)
- [DLT_LOGSINK_ARTI](#)

]

[TPS_MANI_02384] [DltLogSink](#) with category [DLT_LOGSINK_REMOTE](#) [[DltLogSink](#) with category [DLT_LOGSINK_REMOTE](#) provides means to forward logging information to a Dlt log channel defined by [logChannelId](#).]

[TPS_MANI_02385] [DltLogSink](#) with category [DLT_LOGSINK_DLT](#) [[DltLogSink](#) with category [DLT_LOGSINK_DLT](#) provides means to forward logging information onto on a specific VLAN configured by [endpointConfiguration](#) via a Dlt log channel defined by [logChannelId](#).]

[TPS_MANI_02386] `DltLogSink` with category `DLT_LOGSINK_FILE` [`DltLogSink` with category `DLT_LOGSINK_FILE` provides means to forward logging information to a file in `path` of a file system.]

[TPS_MANI_02387] `DltLogSink` with category `DLT_LOGSINK_CONSOLE` [`DltLogSink` with category `DLT_LOGSINK_CONSOLE` provides means to forward logging information to the console.]

[TPS_MANI_03325] `DltLogSink` with category `DLT_LOGSINK_ARTI` [`DltLogSink` with category `DLT_LOGSINK_ARTI` provides means to forward all modeled messages without filtering to ARTI trace API.]

[TPS_MANI_03163] Network configuration for Log and Trace messages [The output channel on Ethernet for Log and Trace messages is configured with the `PlatformModuleEthernetEndpointConfiguration` that is referenced by the `DltLogSink` in the role `endpointConfiguration`. The attributes `tcpPort` and `udpPort` are used to configure the Transport Protocol (Udp or Tcp) and the used Port number. The IP Address is configured in the `NetworkEndpoint` that is referenced by the `PlatformModuleEthernetEndpointConfiguration` via the `EthernetCommunicationConnector`.]

[constr_5278] `DltLogSink` with category `DLT_LOGSINK_REMOTE` is only allowed to be referenced by `DltLogSinkToPortPrototypeMapping`

Imposition time: `IT_Mani`

[`DltLogSink` with category `DLT_LOGSINK_REMOTE` shall not be referenced by `LogAndTraceInstantiation` in the role `logSink`.]

[constr_5279] `DltLogSink` with category `DLT_LOGSINK_DLT` is only allowed to be referenced by `LogAndTraceInstantiation`

Imposition time: `IT_Mani`

[`DltLogSink` with category `DLT_LOGSINK_DLT` shall not be referenced by `DltLogSinkToPortPrototypeMapping` in the role `dltLogSink`.]

[constr_5281] Existence of `DltLogSink.defaultTraceState`

Imposition time: `IT_Mani`

[For each `DltLogSink`, attribute `defaultTraceState` shall exist.]

[constr_5277] Applicable values of `DltLogSink.category` vs. `DltLogSink` attributes*Imposition time:* `IT_Mani`

[

Category	Applicable to ...					
	<code>DltLogSink.logChannelId</code>	<code>DltLogSink.endpointConfiguration</code>	<code>DltLogSink.path</code>	<code>DltLogSink.bufferOutput</code>	<code>DltLogSink.nonVerboseMode</code>	<code>DltLogSink.segmentationSupported</code>
<code>DLT_LOGSINK_REMOTE</code>	x					
<code>DLT_LOGSINK_DLT</code>	x	x			x	x
<code>DLT_LOGSINK_FILE</code>			x			
<code>DLT_LOGSINK_CONSOLE</code>				x		
<code>DLT_LOGSINK_ARTI</code>						

]

12.6.2 Relation between Design and Target-Configuration

The relation between the `DltLogSink` and applications that are monitored and are producing the logging information is created with the `DltLogSinkToPortPrototypeMapping`.

[TPS_MANI_02388] Semantics of `DltLogSinkToPortPrototypeMapping`

[Meta-class `DltLogSinkToPortPrototypeMapping` has the ability to map a specific `PortPrototype` referenced in the role `rPortPrototype` or `pPortPrototype` to a `DltLogSink` referenced in the role `dltLogSink`. The `dltContext` reference to the `DltContext` that is defined in the Log And Trace Extract defines the relationship to `DltMessages` that the application produces.

The mapping also comprises a reference to meta-class `Process` in order to accommodate for the fact that identical combinations of `DltLogSink` and `PortPrototype` may or may not apply for a given `Process` that represents the enclosing `Executable` at runtime.]

[constr_5282] Existence of `DltLogSinkToPortPrototypeMapping.process`*Imposition time:* `IT_Mani`

[Each `DltLogSinkToPortPrototypeMapping` shall reference a `Process` in the role `process`.]

[constr_5283] Existence of [DltLogSinkToPortPrototypeMapping.dltLogSink](#)

Imposition time: [IT_Mani](#)

[Each [DltLogSinkToPortPrototypeMapping](#) shall reference at least one [DltLogSink](#) in the role [dltLogSink](#).]

[constr_5284] Existence of [DltLogSinkToPortPrototypeMapping.dltContext](#)

Imposition time: [IT_Mani](#)

[Each [DltLogSinkToPortPrototypeMapping](#) shall reference a [DltContext](#) in the role [dltContext](#).]

[constr_5285] Existence of [PortPrototype](#) references in [DltLogSinkToPortPrototypeMapping](#)

Imposition time: [IT_Mani](#)

[Each [DltLogSinkToPortPrototypeMapping](#) shall reference exactly one [PortPrototype](#) in the role [rPortPrototype](#) or [pPortPrototype](#).]

Class	DltLogSinkToPortPrototypeMapping			
Note	This meta-class maps a PortPrototype to an output sink of a log and trace message. Tags: atp.recommendedPackage=DltLogSinkToPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dltContext	DltContext	0..1	ref	Assignment of the DltContext that groups log and trace messages that will be transmitted to the DltLogSink.
dltLogSink	DltLogSink	*	ref	Reference to the output sink to which the log or trace message will be transmitted,
dltSessionId	PositiveInteger	0..1	attr	This attribute allows distinguishing log/trace messages from different instances of the same SW-C.
pPortPrototype	PPortPrototype	0..1	iref	Reference to PPortPrototype that is mapped to the DltLog Sink. InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference represents the process required as context for the mapping.
rPortPrototype	RPortPrototype	0..1	iref	Reference to RPortPrototype that is mapped to a DltLog Sink InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 12.57: DltLogSinkToPortPrototypeMapping

[constr_5286] Restriction applicable for `DltLogSinkToPortPrototypeMapping.rPortPrototype`*Imposition time: IT_Mani*

[The reference `DltLogSinkToPortPrototypeMapping.rPortPrototype` shall only be used for a `RPortPrototype` typed by a `LogAndTraceInterface` or by a `ServiceInterface`.]

[constr_5287] Restriction applicable for `DltLogSinkToPortPrototypeMapping.pPortPrototype`*Imposition time: IT_Mani*

[The reference `DltLogSinkToPortPrototypeMapping.pPortPrototype` shall only be used for a `PPortPrototype` typed by a `ServiceInterface`.]

With the possibility to map a `DltLogSink` to a `PortPrototype` typed by a `ServiceInterface` it is possible to describe the `ara::com` communication that is monitored by Log And Trace.

[TPS_MANI_03286] Assignment of `DltApplication` to a `Process` [Meta-class `DltApplicationToProcessMapping` has the ability to map a specific `DltApplication` that defines the `applicationId` used in the Log And Trace Protocol to a `Process`.]

[constr_5292] Assigned `dltSessionId` shall be consistent for the same `PortPrototype`*Imposition time: IT_Mani*

[If several `DltLogSinkToPortPrototypeMappings` are referencing the same `PortPrototype` in the role `rPortPrototype` or `pPortPrototype` then the value for the `dltSessionId` in all these `DltLogSinkToPortPrototypeMappings` shall be the same.]

Class	DltApplicationToProcessMapping			
Note	This element assigns a <code>DltApplicationId</code> to a <code>Process</code> . Tags: <code>atp.recommendedPackage=DltApplicationToProcessMappings</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
<code>dltApplication</code>	DltApplication	0..1	ref	Reference to a <code>DltApplication</code> that defines the application Id
<code>process</code>	Process	0..1	ref	Reference to the process that is assigned to a Log And Trace applicationId.

Table 12.58: DltApplicationToProcessMapping

Typically, the [System](#) design model is provided by an OEM that defines the network configuration and provides all configuration settings that are relevant for a network management cluster to an integrator.

The NM configuration options that will typically be set by an Integrator are collected in the [NmInstantiation](#) element. The Machine Manifest delivery to configure [UdpNm](#) consists of both, the [NmInstantiation](#) settings together with the [UdpNmCluster](#) and [UdpNmNode](#) settings.

The [NmConfig](#) element is a wrapper that contains all network management specific configuration settings in the [System](#) model.

Class	NmInstantiation			
Note	This meta-class defines the attributes for the Nm configuration on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
networkHandle	NmNetworkHandle	*	aggr	Supported NmNetworkHandles used to control Partial Network Clusters/VLANs.

Table 12.59: NmInstantiation

Class	NmNetworkHandle			
Note	Group of partialNetworks and/or VLANs that can be controlled collectively. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Referrable			
Aggregated by	NmInstantiation.networkHandle			
Attribute	Type	Mult.	Kind	Note
partialNetwork	PncMappingIdent	*	ref	Reference to a Partial Network that is included in the Nm NetworkHandle. Stereotypes: atpSplittable Tags: atp.Splitkey=partialNetwork
vlan	EthernetCommunicationConnector	*	ref	Reference to a VLAN that is included in the NmNetwork Handle.

Table 12.60: NmNetworkHandle

Class	PncMappingIdent			
Note	This meta-class is created to add the ability to become the target of a reference to the non-Referrable PncMapping.			
Base	ARObject , Referrable			
Aggregated by	PncMapping.ident			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 12.61: PncMappingIdent

AUTOSAR Adaptive Network Management is based on periodic NM messages, which are received by all [UdpNmNodes](#) in the [UdpNmCluster](#) via multicast. Reception of NM packets indicates that sending [UdpNmNodes](#) want to keep the [UdpNmCluster](#) awake.

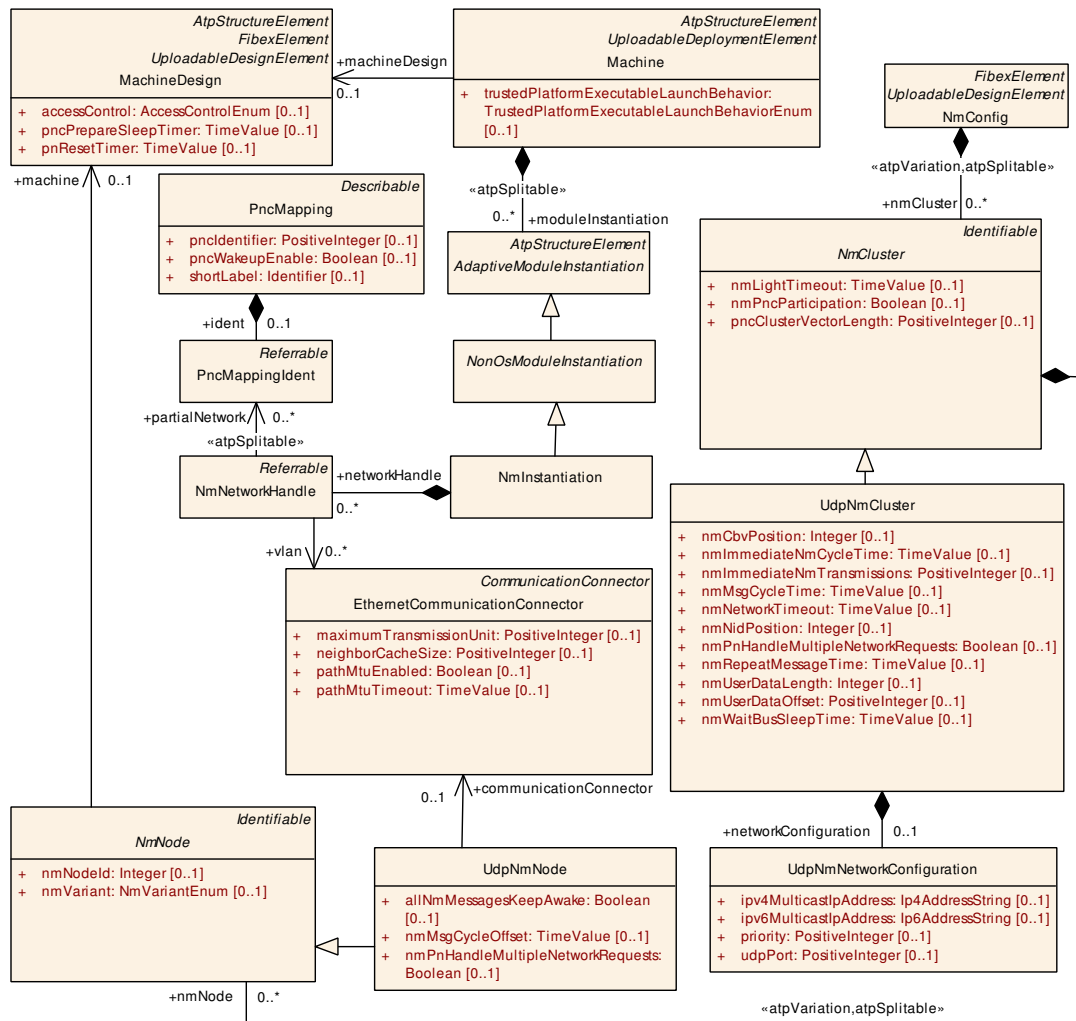


Figure 12.28: NM Cluster configuration

If any node is ready to go to sleep mode, it stops sending NM messages, but as long as NM packets from other [UdpNmNodes](#) are received, it postpones transition to sleep mode.

[TPS_MANI_03167] Network configuration for Nm [The UDP multicast connection over which Network Management messages are transported is configured with the [UdpNmNetworkConfiguration](#) that is aggregated by the [UdpNmCluster](#) in the role *networkConfiguration*. The attribute *udpPort* is used to configure the port number over which the Nm message is transmitted and received. The IP Address is configured either by [ipv4MulticastIpAddress](#) or [ipv6MulticastIpAddress](#).]

[TPS_MANI_03279] Priority of Nm messages [The attribute *priority* in the [UdpNmNetworkConfiguration](#) can be used to assign a VLAN priority to Network Management messages that are transmitted over the Socket defined by the [UdpNmNetworkConfiguration.udpPort](#) and [ipv4MulticastIpAddress](#) or [ipv6MulticastIpAddress](#).]

[constr_3419] Allowed usage of [UdpNmNetworkConfiguration](#) attributes

Imposition time: [IT_Mani](#)

[The [UdpNmNetworkConfiguration](#) that is aggregated by [UdpNmCluster](#) in the role [networkConfiguration](#) shall have either

- [ipv4MulticastIpAddress](#) or
- [ipv6MulticastIpAddress](#).

]

Class	UdpNmNetworkConfiguration			
Note	This meta-class defines the attributes for the configuration of a UDP port and UDP multicast IP address of the Nm communication on a VLAN. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	UdpNmCluster.networkConfiguration			
Attribute	Type	Mult.	Kind	Note
ipv4MulticastIpAddress	Ip4AddressString	0..1	attr	Multicast IPv4 Address to which the message will be transmitted.
ipv6MulticastIpAddress	Ip6AddressString	0..1	attr	Multicast IPv6 Address to which the message will be transmitted
priority	PositiveInteger	0..1	attr	This attribute defines the VLAN frame priority for messages on the Socket defined by the udpPort and the multicast IP address. Values from 0 (best effort) to 7 (highest) are allowed.
udpPort	PositiveInteger	0..1	attr	This attribute allows to configure a udp port number that is used for reception and transmission of UdpNm messages.

Table 12.62: UdpNmNetworkConfiguration

Class	NmConfig			
Note	Contains the all configuration elements for AUTOSAR Nm. Tags: atp.recommendedPackage=NmConfigs			
Base	ARElement , ARObject , CollectableElement , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
nmCluster	NmCluster	*	aggr	Collection of NM Clusters atpVariation: Derived, because cluster can be variable. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=nmCluster.shortName, nmCluster.variation Point.shortLabel vh.latestBindingTime=postBuild

Table 12.63: NmConfig

Class	NmCluster (abstract)			
Note	Set of NM nodes coordinated with use of the NM algorithm.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	CanNmCluster , FlexrayNmCluster , UdpNmCluster			
Aggregated by	NmConfig.nmCluster			
Attribute	Type	Mult.	Kind	Note
communication Cluster	CommunicationCluster	0..1	ref	Association to a CommunicationCluster in the topology description.
nmLightTimeout	TimeValue	0..1	attr	Defines the timeout (in seconds) after COMM_FULL_COMMUNICATION sub-state COMM_FULL_COM_READY_SLEEP is left.
nmNode	NmNode	*	aggr	Collection of NmNodes of the NmCluster. atpVariation: Derived, because NmNode can be variable. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=nmNode.shortName, nmNode.variation Point.shortLabel vh.latestBindingTime=postBuild
nmPnc Participation	Boolean	0..1	attr	Defines whether this NmCluster contributes to the partial network mechanism.
pncCluster VectorLength	PositiveInteger	0..1	attr	Optionally defines the length of the PNC Vector per CommunicationCluster (and VLAN in case of UdpNm). If not defined then System.pncVectorLength applies. Should only make the PNC Vector shorter (or same length as defined in System.pncVectorLength).

Table 12.64: NmCluster

Class	UdpNmCluster			
Note	Udp specific NmCluster attributes			
Base	ARObject, Identifiable , MultilanguageReferrable , NmCluster , Referrable			
Aggregated by	NmConfig.nmCluster			
Attribute	Type	Mult.	Kind	Note
network Configuration	UdpNmNetworkConfiguration	0..1	aggr	Configuration of a UDP port and UDP multicast IP address of the Nm communication on a VLAN. This Attribute is only used by the AUTOSAR Adaptive Platform.
nmCbvPosition	Integer	0..1	attr	Defines the position of the control bit vector within the Nm Pdu (Byte position). If this attribute is not configured, the Control Bit Vector is not used.
nmImmediate NmCycleTime	TimeValue	0..1	attr	Defines the immediate NmPdu cycle time in seconds which is used for nmImmediateNmTransmissions NmPdu transmissions. This attribute is only valid if nmImmediate NmTransmissions is greater one.
nmImmediate Nm Transmissions	PositiveInteger	0..1	attr	Defines the number of immediate NmPdus which shall be transmitted. If the value is zero no immediate NmPdus are transmitted. The cycle time of immediate NmPdus is defined by nmImmediateNmCycleTime.
nmMsgCycle Time	TimeValue	0..1	attr	Period of a NmPdu in seconds. It determines the periodic rate in the periodic transmission mode with bus load reduction and is the basis for transmit scheduling in the periodic transmission mode without bus load reduction.
nmNetwork Timeout	TimeValue	0..1	attr	Network Timeout for NmPdus in seconds. It denotes the time how long the UdpNm shall stay in the Network Mode before transition into Prepare Bus-Sleep Mode shall take place.





Class	UdpNmCluster			
nmNidPosition	Integer	0..1	attr	Defines the byte position of the source node identifier within the NmPdu. If this attribute is not configured, the Node Identification is not used.
nmPnHandleMultipleNetworkRequests	Boolean	0..1	attr	Defines if Nm performs an additional transition from Network Mode to Repeat Message State (true) or not (false).
nmRepeatMessageTime	TimeValue	0..1	attr	Timeout for Repeat Message State in seconds. Defines the time how long the NM shall stay in the Repeat Message State.
nmUserDataLength	Integer	0..1	attr	Defines the length in bytes of the user data contained in the Nm message. User data excludes the PNC bit vector. This Attribute is only used by the AUTOSAR Adaptive Platform.
nmUserDataOffset	PositiveInteger	0..1	attr	Specifies the offset (in bytes) of the user data information in the NM message. User data excludes the PNC bit vector. This Attribute is only used by the AUTOSAR Adaptive Platform.
nmWaitBusSleepTime	TimeValue	0..1	attr	Timeout for bus calm down phase in seconds. It denotes the time how long the CanNm shall stay in the Prepare Bus-Sleep Mode before transition into Bus-Sleep Mode shall take place.
vlan	EthernetPhysicalChannel	0..1	ref	Reference to the vlan (represented by the Ethernet PhysicalChannel) this UdpNmCluster shall apply to.

Table 12.65: UdpNmCluster

Class	NmNode (abstract)			
Note	The linking of NmEcus to NmClusters is realized via the NmNodes.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	CanNmNode , FlexrayNmNode , UdpNmNode			
Aggregated by	NmCluster.nmNode			
Attribute	Type	Mult.	Kind	Note
machine	MachineDesign	0..1	ref	Reference to the machine that contains the NmNode. This Attribute is only used by the AUTOSAR Adaptive Platform.
nmNodeid	Integer	0..1	attr	Node identifier of local NmNode. Shall be unique in the NmCluster.
nmVariant	NmVariantEnum	0..1	attr	Defines the functionality of Network Management.

Table 12.66: NmNode

Class	UdpNmNode			
Note	Udp specific NM Node attributes.			
Base	ARObject, Identifiable , MultilanguageReferrable , NmNode , Referrable			
Aggregated by	NmCluster.nmNode			
Attribute	Type	Mult.	Kind	Note





Class	UdpNmNode			
allNmMessagesKeepAwake	Boolean	0..1	attr	Specifies if Nm drops irrelevant NM PDUs. false: Only NM PDUs with a Partial Network Information Bit (PNI) = true and containing a Partial Network request for this ECU trigger the standard RX indication handling and thus keep the ECU awake true: Every NM PDU triggers the standard RX indication handling and keeps the ECU awake
communicationConnector	EthernetCommunicationConnector	0..1	ref	Reference to the CommunicationConnector that represents the UdpNmNode in the topology description. This Attribute is only used by the AUTOSAR Adaptive Platform.
nmMsgCycleOffset	TimeValue	0..1	attr	Node specific time offset in the periodic transmission node. It determines the start delay of the transmission. Specified in seconds.
nmPnHandleMultipleNetworkRequests	Boolean	0..1	attr	Specifies if NM performs an additional transition from Network Mode to Repeat Message State (true) or not (false). This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 12.67: UdpNmNode

12.7.2 Relation between Application Software and Network Handles

A [PPortPrototype](#) typed by a [NetworkManagementPortInterface](#) can make requests towards a status change of a network handle. But it is necessary to indicate which network handle is associated with which [PPortPrototype](#), This relation can be indicated by means of the [NetworkHandlePortMapping](#).

[constr_10441] Restriction for [NetworkHandlePortMapping.pPortPrototypeInExecutable](#)

Imposition time: IT_Mani

[A [PPortPrototype](#) referenced in the role [NetworkHandlePortMapping.pPortPrototypeInExecutable](#) shall only be typed by a [NetworkManagementPortInterface](#).]

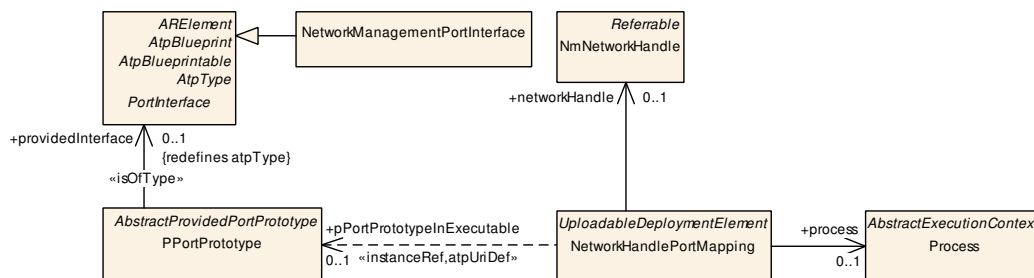


Figure 12.29: Modeling of the mapping between application software and network handle

Class	NetworkHandlePortMapping			
Note	This class is used to associate a PortPrototype with a network handle in order to control the network handle from the PortPrototype Tags: atp.recommendedPackage=NetworkHandleMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
networkHandle	NmNetworkHandle	0..1	ref	This reference identifies the applicable network handle.
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This reference identifies the applicable PortPrototype in the context of an enclosing Executable. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference identifies the process applicable for the state management

Table 12.68: NetworkHandlePortMapping

12.7.3 Relation between Function Group states and Network Handles

[TPS_MANI_01343] Relation between **Function Group States** and **NmNetworkHandle** [An essential part of the network management on the *AUTOSAR adaptive platform* is the understanding which **Function Group State** requires network access. This relation can be expressed by means of meta-class **NmHandleToFunctionGroupStateMapping**.]

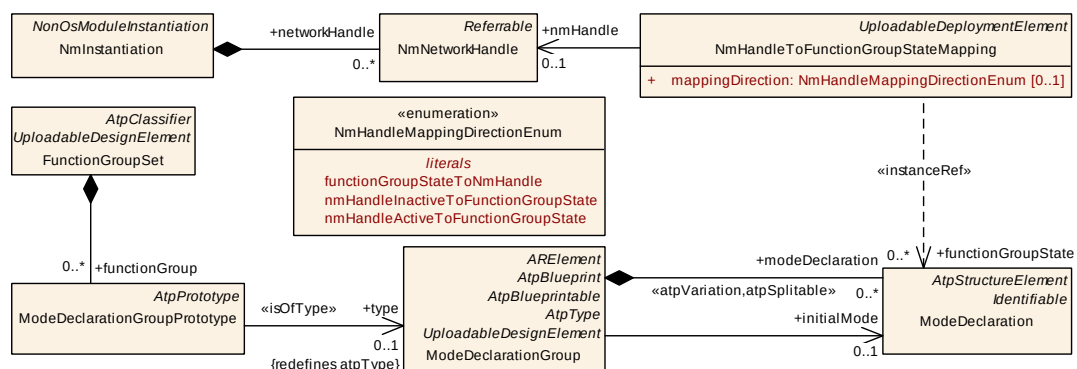


Figure 12.30: Mapping between NmNetworkHandle and Function Group States

The relation between **Function Group States** and network handles is in principle bi-directional, i.e. the following use cases exist for the creation of an **NmHandleToFunctionGroupStateMapping**:

- The application software wants to indicate which **Function Group States** require network access. This means that attribute **mappingDirection** of the first **NmHandleToFunctionGroupStateMapping** shall be set to **NmHandleMappingDirectionEnum.functionGroupStateToNmHandle**.

- The application software wants to indicate which **Function Group State** shall be set if the network goes down. This means that attribute **mappingDirection** shall be set to **NmHandleMappingDirectionEnum.nmHandleInactiveToFunctionGroupState**.
- The application software wants to indicate which **Function Group State** shall be set if the network goes up. This means that attribute **mappingDirection** shall be set to **NmHandleMappingDirectionEnum.nmHandleActiveToFunctionGroupState**.

Class	NmHandleToFunctionGroupStateMapping			
Note	This meta-class represents the ability to create a mapping between an NmNetworkHandle and a collection of function group states. This way, the impact of function groups on the network management can be specified. Tags: atp.recommendedPackage=NmHandleToFunctionGroupStateMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
functionGroupState	ModeDeclaration	*	iref	This reference identifies the collection of function group states in the context of the mapping. InstanceRef implemented by: FunctionGroupStateInFunctionGroupSetInstanceRef
mappingDirection	NmHandleMappingDirectionEnum	0..1	attr	This attribute describes the direction of the mapping.
nmHandle	NmNetworkHandle	0..1	ref	This reference identifies the applicable NmNetworkHandle in the context of the mapping.

Table 12.69: NmHandleToFunctionGroupStateMapping

Enumeration	NmHandleMappingDirectionEnum
Note	This enumeration provides direction values for the mapping of NM handles to function group states. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	NmHandleToFunctionGroupStateMapping.mappingDirection
Literal	Description
functionGroupStateToNmHandle	The purpose of the mapping is to indicate which function group state requires network access. Tags: atp.EnumerationLiteralIndex=0
nmHandleActiveToFunctionGroupState	The purpose of the mapping is to indicate that the function group shall be switched to a given state if the network handle becomes active. Tags: atp.EnumerationLiteralIndex=2
nmHandleInactiveToFunctionGroupState	The purpose of the mapping is to indicate that the function group shall be switched to a given state if the network handle becomes inactive. Tags: atp.EnumerationLiteralIndex=1

Table 12.70: NmHandleMappingDirectionEnum

[TPS_MANI_01365] Semantics of attribute **NmHandleToFunctionGroupStateMapping.mappingDirection** set to **functionGroupStateToNmHandle**
 [If the attribute **NmHandleToFunctionGroupStateMapping.mappingDirection** is set to the value **NmHandleMappingDirectionEnum.functionGroupStateToNmHandle**, then the semantics of the **NmHandleToFunctionGroupStateMapping** is that the referenced **nmHandle** is requested to become active if the **Function Group** to which the referenced **functionGroupState** belongs to is switched

to the referenced **Function Group State**, formalized by meta-class **ModeDeclaration**.]

Please note that the multiplicity of the reference **NmHandleToFunctionGroupStateMapping.functionGroupState** allows for the creation of a “shortcut” such that several **Function Group States** can simultaneously be indicated as requiring communication in the context of a single **NmHandleToFunctionGroupStateMapping**, as depicted in **Figure 12.31**.

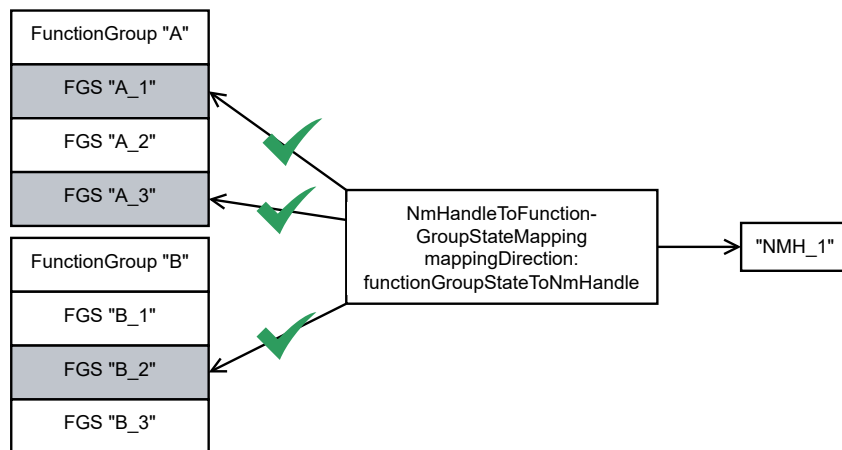


Figure 12.31: Mapping from **Function Group to NM handle**

[TPS_MANI_01366] Semantics of attribute **NmHandleToFunctionGroupStateMapping.mappingDirection set to **nmHandleInactiveToFunctionGroupState**** [If the attribute **NmHandleToFunctionGroupStateMapping.mappingDirection** is set to the value **NmHandleMappingDirectionEnum.nmHandleInactiveToFunctionGroupState**, then the semantics of the **NmHandleToFunctionGroupStateMapping** is that if the referenced **nmHandle** becomes **inactive**, the **Function Group** to which the referenced **functionGroupState** belongs to is switched to the referenced **Function Group State**, formalized by meta-class **ModeDeclaration**.]

[TPS_MANI_01367] Semantics of attribute **NmHandleToFunctionGroupStateMapping.mappingDirection set to **nmHandleActiveToFunctionGroupState**** [If the attribute **NmHandleToFunctionGroupStateMapping.mappingDirection** is set to the value **NmHandleMappingDirectionEnum.nmHandleActiveToFunctionGroupState**, then the semantics of the **NmHandleToFunctionGroupStateMapping** is that if the referenced **nmHandle** becomes **active**, the function group to which the referenced **functionGroupState** belongs to is switched to the referenced **Function Group State**, formalized by meta-class **ModeDeclaration**.]

It is important to note that the mapping from NM Handle to **Function Group State** can only identify on **Function Group State** per **Function Group** because it is obviously impossible to activate two **Function Group States** of the same **Function Group** at the same time.

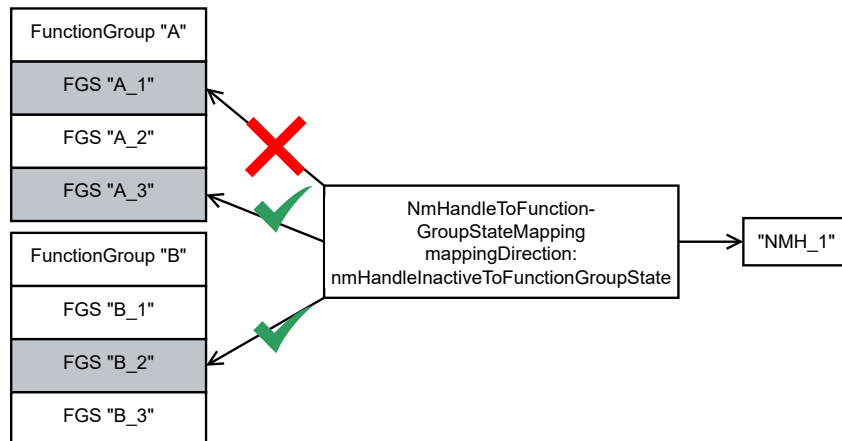


Figure 12.32: Mapping from NM handle to **Function Group**

Nevertheless, if an NM handle becomes active/inactive, it is very likely that this event has an impact on several SoftwareClusters. And because **Function Groups** cannot be shared among **SoftwareClusters**, it is necessary to be able to establish a 1:n communication pattern for this case under a precondition described by [constr_10101] and sketched by Figure 12.32.

[constr_10101] Attribute `NmHandleToFunctionGroupStateMapping.mappingDirection` is set to `nmHandleActiveToFunctionGroupState` or `nmHandleInactiveToFunctionGroupState`

Imposition time: `IT_Mani`

[If the value of attribute `NmHandleToFunctionGroupStateMapping.mappingDirection` is set to the value `NmHandleMappingDirectionEnum.nmHandleActiveToFunctionGroupState` or `NmHandleMappingDirectionEnum.nmHandleInactiveToFunctionGroupState`, then the reference `NmHandleToFunctionGroupStateMapping.functionGroupState` shall not refer to two (or more) **ModeDeclarations of the same ModeDeclarationGroup**.]

12.7.3.1 UdpNm configuration constraints

Please note that the Classic Platform and the Adaptive Platform are using the same model for configuration of UdpNm. Some Classic Platform features like the `NmCoordinator` and `UdpNmClusterCoupling` are not supported on the *AUTOSAR adaptive platform*.

But the [4, TPS System Template] contains a more detailed description of `UdpNmClusters` and `UdpNmNodes` and defines modeling constraints that are also valid for the Adaptive Platform.

The following constraints of the [4, TPS System Template] shall be considered if a `UdpNmCluster` with `UdpNmNodes` is described:

- [constr_3078]

- [constr_3079]
- [constr_3080]
- [constr_5223]
- [constr_5224]
- [constr_5225]
- [constr_5226]

Note that in the context of the *AUTOSAR adaptive platform*, the imposition time for these constraints shall be `IT_SysDes`.

In addition, the following Adaptive Platform specific constraints are valid:

[constr_5227] Mandatory elements of `UdpNmCluster`

Imposition time: `IT_Mani`

[The following attributes shall always be defined for the `UdpNmCluster`:

- `nmMsgCycleTime`
- `nmNetworkTimeout`
- `nmRepeatMessageTime`
- `nmWaitBusSleepTime`
- `communicationCluster`

]

[constr_5228] Partial Networking timing constraint

Imposition time: `IT_Mani`

[For Partial Networking the following timing constraints shall be ensured: (`MachineDesign.pnResetTimer` + `MachineDesign.pncPrepareSleepTimer`) < `UdpNmCluster.nmNetworkTimeout`.]

[constr_10098] Relation of `MachineDesign.pnResetTimer` and `UdpNmCluster.nmMsgCycleTime`

Imposition time: `IT_Mani`

[For the configuration of the partial networking timing, the following condition shall be ensured: `MachineDesign.pnResetTimer` > `UdpNmCluster.nmMsgCycleTime`.]

12.7.4 CAN XL Network Management

The network management for CAN XL is modeled in a very similar way as the UDP NM. Please find details in [Figure 12.33](#).

For this purpose, a relation between a `EthernetCommunicationConnector` and a `CanNmNode` that represents the local `Machine` in the CAN NM networking needs to be created.

The CAN IDs of received NM frames are configured by the respective attributes of the `CanNmNodes` connected to the same `CanNmCluster`.



Class	CanNmNode			
Note	CAN specific NM Node attributes.			
Base	ARObject, Identifiable , MultilanguageReferrable , NmNode , Referrable			
Aggregated by	NmCluster.nmNode			
Attribute	Type	Mult.	Kind	Note
allNmMessages KeepAwake	Boolean	0..1	attr	Specifies if Nm drops irrelevant NM PDUs. false: Only NM PDUs with a Partial Network Information Bit (PNI) = true and containing a Partial Network request for this ECU trigger the standard RX indication handling and thus keep the ECU awake true: Every NM PDU triggers the standard RX indication handling and keeps the ECU awake
canXINmProps	CanXINmNodeProps	0..1	aggr	This aggregation contributes the CAN IDs for the execution of CAN NM on the adaptive platform. This Attribute is only used by the AUTOSAR Adaptive Platform.
nmCarWakeUp FilterEnabled	Boolean	0..1	attr	If this attribute is set to true the CareWakeUp filtering is supported.
nmCarWakeUp RxEnabled	Boolean	0..1	attr	If set to true this attribute enables the support of CarWake Up bit evaluation in received NmPdus.
nmMsgCycle Offset	TimeValue	0..1	attr	Node specific time offset in the periodic transmission node. It determines the start delay of the transmission. Specified in seconds.
nmMsg ReducedTime	TimeValue	0..1	attr	Node specific bus cycle time in the periodic transmission mode with bus load reduction. Specified in seconds.

Table 12.71: CanNmNode

Class	CanXINmNodeProps			
Note	Definition of CAN attributes in the context of CanXL usage on the adaptive platform. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	CanNmNode.canXINmProps			
Attribute	Type	Mult.	Kind	Note
canNmTxCanId	PositiveInteger	0..1	attr	This attribute is used to define the identifier the CAN NM frame shall use on the CAN network.
rxIdentifier Range	RxIdentifierRange	0..1	aggr	Optional definition of a CanId range.
rxMask	PositiveInteger	0..1	attr	Identifier mask which denotes the relevant bits in the CAN Identifier. Together with the identifier, this parameter defines a CAN identifier range.

Table 12.72: CanXINmNodeProps

Class	RxIdentifierRange			
Note	Optional definition of a CanId range to reduce the effort of specifying every possible FrameTriggering within the defined Id range during reception. All frames received within a range are mapped to the same Pdu that is passed to a upper layer module (e.g. Nm, CDD, PduR).			
Base	ARObject			
Aggregated by	CanFrameTriggering.rxIdentifierRange, CanXINmNodeProps.rxIdentifierRange , IEEE1722TpAcFCanPart.canIdentifierRange			
Attribute	Type	Mult.	Kind	Note





Class	RxIdentifierRange			
lowerCanId	PositiveInteger	0..1	attr	This attribute can be used together with the upperCanId attribute to define a range of CanIds.
upperCanId	PositiveInteger	0..1	attr	This attribute can be used together with the lowerCanId attribute to define a range of CanIds.

Table 12.73: RxIdentifierRange

Class	CanNmCluster			
Note	Can specific NmCluster attributes			
Base	ARObject, Identifiable , MultilanguageReferrable , NmCluster , Referrable			
Aggregated by	NmConfig.nmCluster			
Attribute	Type	Mult.	Kind	Note
nmBusloadReductionActive	Boolean	0..1	attr	It determines if bus load reduction for the respective Can Nm channel is active or not.
nmCarWakeUpBitPosition	PositiveInteger	0..1	attr	Specifies the bit position of the CarWakeUp within the Nm Pdu.
nmCarWakeUpFilterNodeId	PositiveInteger	0..1	attr	Source node identifier for CarWakeUp filtering.
nmCbvPosition	Integer	0..1	attr	Defines the position of the control bit vector within the Nm Pdu (Byte position). If this attribute is not configured, the Control Bit Vector is not used.
nmImmediateNmCycleTime	TimeValue	0..1	attr	Defines the immediate NmPdu cycle time in seconds which is used for nmImmediateNmTransmissions NmPdu transmissions. This parameter is only valid if CanNmImmediateNmTransmissions is greater one.
nmImmediateNmTransmissions	PositiveInteger	0..1	attr	Defines the number of immediate NmPdus which shall be transmitted. If the value is zero no immediate NmPdus are transmitted. The cycle time of immediate NmPdus is defined by nmImmediateNmCycleTime.
nmMessageTimeoutTime	TimeValue	0..1	attr	Timeout of an NmPdu in seconds. It determines how long the NM shall wait with notification of transmission failure while communication errors occur on the bus.
nmMsgCycleTime	TimeValue	0..1	attr	Period of a NmPdu in seconds. It determines the periodic rate in the periodic transmission mode with bus load reduction and is the basis for transmit scheduling in the periodic transmission mode without bus load reduction.
nmNetworkTimeout	TimeValue	0..1	attr	Network Timeout for NmPdus in seconds It denotes the time how long the CanNm shall stay in the Network Mode before transition into Prepare Bus-Sleep Mode shall take place.
nmNidPosition	Integer	0..1	attr	Defines the byte position of the source node identifier within the NmPdu. If this attribute is not configured, the Node Identification is not used.
nmPnHandleMultipleNetworkRequests	Boolean	0..1	attr	Defines if Nm performs an additional transition from Network Mode to Repeat Message State (true) or not (false).
nmRemoteSleepIndicationTime	TimeValue	0..1	attr	Timeout for Remote Sleep Indication in seconds. It defines the time how long it shall take to recognize that all other nodes are ready to sleep.
nmRepeatMessageTime	TimeValue	0..1	attr	Timeout for Repeat Message State in seconds. Defines the time how long the NM shall stay in the Repeat Message State.





Class	CanNmCluster			
nmWaitBusSleepTime	TimeValue	0..1	attr	Timeout for bus calm down phase in seconds. It denotes the time how long the CanNm shall stay in the Prepare Bus-Sleep Mode before transition into Bus-Sleep Mode shall take place.

Table 12.74: CanNmCluster

12.8 Update and Configuration Management

Disclaimer

As of AUTOSAR R25-11, the canonical approach for the the target configuration of the update and configuration management functional cluster is by usage of the APMC model documented in [29, SWS Specification of Update and Configuration Management] Chapter 10.1. The description of target configuration via the M2 model (as described in this chapter) is still provided, but may be discontinued at a later point in time.

12.8.1 Overview

[TPS_MANI_01226] Machine-specific configuration settings for the UCM module

[The Machine-specific configuration settings for UCM are collected in abstract meta-class [UcmModuleInstantiation](#) and its two concrete specializations:

- [UcmMasterModuleInstantiation](#) represents the configuration of a *UCM Master*.
- [UcmSubordinateModuleInstantiation](#) represents the configuration of a *UCM Subordinate*.

]

Please find more information about meta-class [UcmMasterModuleInstantiation](#) in [Chapter 12.8.3](#) and about [UcmSubordinateModuleInstantiation](#) in [Chapter 12.8.4](#).

Class	<i>UcmModuleInstantiation</i> (abstract)			
Note	This meta-class represents the ability to define the target-configuration of a UCM instantiation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Subclasses	UcmMasterModuleInstantiation , UcmSubordinateModuleInstantiation			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note





Class	<i>UcmModuleInstantiation</i> (abstract)			
identifier	String	0..1	attr	This represents the identification of a UCM.
maxBlockSize	PositiveInteger	0..1	attr	This attribute denotes the maximum block size (unit: bytes) used in the UCM implementation.
version	StrongRevisionLabel String	0..1	attr	This attribute defines the software version of the UCM on this platform. Note that the definition of the version is required if the ability of the SoftwarePackage to require a minimum version of the UCM is utilized.

Table 12.75: UcmModuleInstantiation

[constr_10428] Existence of attribute *UcmModuleInstantiation.identifier* in subclasses

Imposition time: IT_Mani

[The Attribute *identifier* shall **not** exist in a *UcmMasterModuleInstantiation*.]

[constr_10200] Multiplicity of attribute *UcmModuleInstantiation.identifier*

Imposition time: IT_Mani

[For each *UcmModuleInstantiation*, the attribute *identifier* shall exist.]

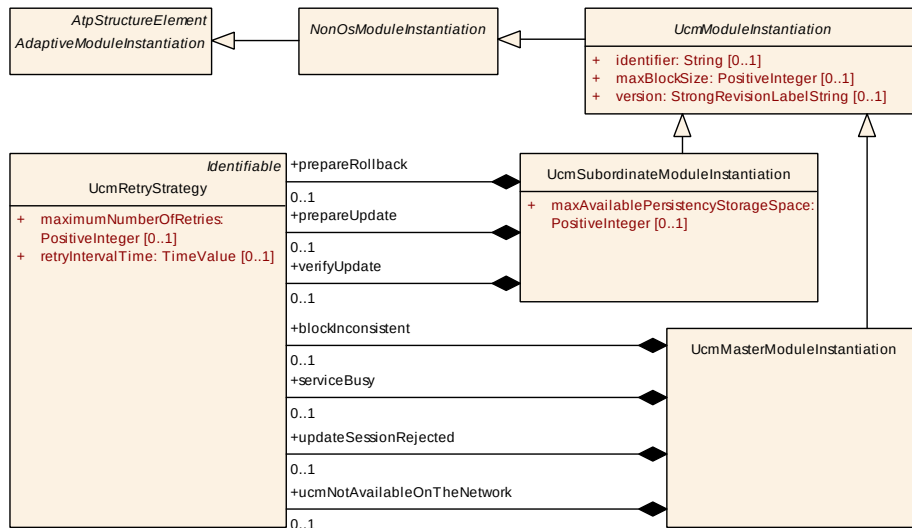


Figure 12.34: Modeling of *UcmModuleInstantiation*

[TPS_MANI_01227] Semantics of attribute *UcmModuleInstantiation.identifier* [Attribute *UcmModuleInstantiation.identifier* shall be used to identify a specific UCM on a specific *Machine* during a service discovery run by a master UCM or VUM.]

The usage of attribute *UcmModuleInstantiation.identifier* is documented in [Figure 12.35](#). The master UCM or VUM acts as a client in a service discovery that is configured to search for *any* server.

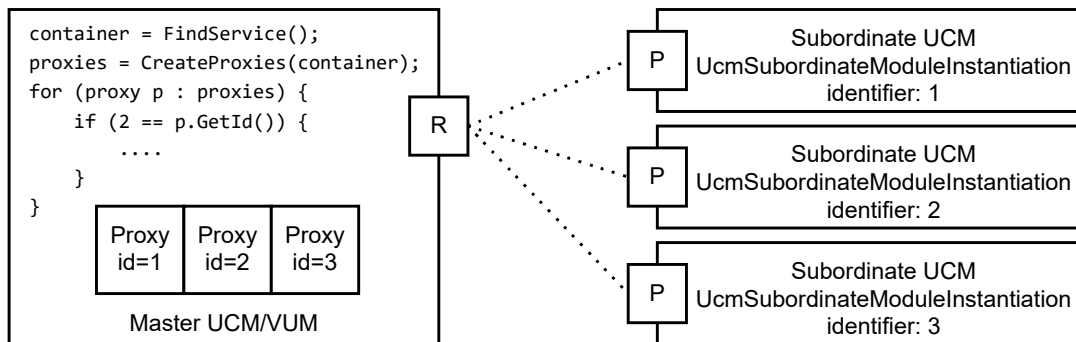


Figure 12.35: Identification of subordinate UCM modules by the master UCM

The individual UCMs offer their service and then the master UCM as the client calls a specific `method` in the server's `ServiceInterface` to reveal the `identifier` of each server.

In the case of this example there are three slave UCMs with `identifier` set to 1, 2, and 3. The master UCM instantiates a proxy for each of the slave UCMs such that the value of the respective `identifier` can be retrieved from the proxy in order to be able to communicate with a specific slave UCM.

The master UCM or VUM can then instantiate proxies for each service offer and programmatically access the respective server going forward.

[constr_1691] `UcmModuleInstantiation.identifier` shall be unique

Imposition time: `IT_Mani`

[The value of attribute `UcmModuleInstantiation.identifier` shall be unique for each `Machine` in a given vehicle.]

12.8.2 Retry Strategy

[TPS_MANI_01375] Semantics of meta-class `UcmRetryStrategy` [Both the `UcmMasterModuleInstantiation` and the `UcmSubordinateModuleInstantiation` have the ability to retry certain activities if these activities don't succeed. The configuration of such retry cycles is done by means of meta-class `UcmRetryStrategy`.]

Class	UcmRetryStrategy
Note	This meta-class describes the configuration of the retry strategy for a sub-class of <code>UcmModule</code> Implementation. This Class is only used by the AUTOSAR Adaptive Platform.
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>





Class	UcmRetryStrategy			
Aggregated by	UcmMasterModuleInstantiation.blockInconsistent, UcmMasterModuleInstantiation.serviceBusy, UcmMasterModuleInstantiation.ucmNotAvailableOnTheNetwork, UcmMasterModuleInstantiation.updateSessionRejected, UcmSubordinateModuleInstantiation.prepareRollback, UcmSubordinateModuleInstantiation.prepareUpdate, UcmSubordinateModuleInstantiation.verifyUpdate			
Attribute	Type	Mult.	Kind	Note
maximumNumberOfRetries	PositiveInteger	0..1	attr	This attribute defines the maximum number of time the UCM module instantiation shall attempt a retry.
retryIntervalTime	TimeValue	0..1	attr	This attribute defines the time (in seconds) between two retry attempts.

Table 12.76: UcmRetryStrategy

[constr_10105] Existence of [UcmRetryStrategy.maximumNumberOfRetries](#)*Imposition time: IT_Mani*[For each [UcmRetryStrategy](#), attribute [maximumNumberOfRetries](#) shall exist.]**[constr_10106] Existence of [UcmRetryStrategy.retryIntervalTime](#)***Imposition time: IT_Mani*[For each [UcmRetryStrategy](#), attribute [retryIntervalTime](#) shall exist.]**12.8.3 UCM Master Module Instantiation****[TPS_MANI_01376] Semantics of meta-class [UcmMasterModuleInstantiation](#)**[Meta-class [UcmMasterModuleInstantiation](#) is used to configure the deployment of a *UCM Master* and the various retry strategies associated with the *UCM Master*.]

Class	UcmMasterModuleInstantiation			
Note	This meta-class represents the ability to define the target-configuration of a UCM Master instantiation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier, AtpFeature, AtpStructureElement, Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable , UcmModuleInstantiation			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
blockInconsistent	UcmRetryStrategy	0..1	aggr	This attribute defines the retry strategy of the UCM Master for the case that the block is inconsistent.
serviceBusy	UcmRetryStrategy	0..1	aggr	This attribute defines the retry strategy of the UCM Master for the case that the service is busy.
ucmNotAvailableOnTheNetwork	UcmRetryStrategy	0..1	aggr	This attribute defines the retry strategy of the UCM Master for the case that one (or more) UCM is not available on the network.
updateSessionRejected	UcmRetryStrategy	0..1	aggr	This attribute defines the retry strategy of the UcmMaster for the case that the update session is rejected.

Table 12.77: UcmMasterModuleInstantiation

[constr_10107] Existence of the attribute `UcmMasterModuleInstantiation.blockInconsistent`*Imposition time:* `IT_Mani`[The attribute `UcmMasterModuleInstantiation.blockInconsistent` shall.]**[constr_10108] Existence of the attribute `UcmMasterModuleInstantiation.serviceBusy`***Imposition time:* `IT_Mani`[The attribute `UcmMasterModuleInstantiation.serviceBusy` shall exist.]**[constr_10109] Existence of the attribute `UcmMasterModuleInstantiation.updateSessionRejected`***Imposition time:* `IT_Mani`[The attribute `UcmMasterModuleInstantiation.updateSessionRejected` shall exist.]**[constr_10578] Existence of the attribute `UcmMasterModuleInstantiation.ucmNotAvailableOnTheNetwork`***Imposition time:* `IT_Mani`[The attribute `UcmMasterModuleInstantiation.ucmNotAvailableOnTheNetwork` shall exist.]**12.8.4 UCM Subordinate Module Instantiation**

[TPS_MANI_01377] Semantics of meta-class `UcmSubordinateModuleInstantiation` [Meta-class `UcmSubordinateModuleInstantiation` is used to configure the deployment of a *UCM Subordinate* and the various retry strategies associated with the *UCM Subordinate*.]

Class	<code>UcmSubordinateModuleInstantiation</code>			
Note	This meta-class represents the ability to define the target-configuration of a UCM Subordinate instantiation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , AdaptiveModuleInstantiation , <code>AtpClassifier</code> , <code>AtpFeature</code> , <code>AtpStructureElement</code> , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable , UcmModuleInstantiation			
Aggregated by	<code>AtpClassifier.atpFeature</code> , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note





Class	UcmSubordinateModuleInstantiation			
maxAvailablePersistencyStorageSpace	PositiveInteger	0..1	attr	This attribute names the maximum amount of space available for persistent data handled by the Persistency of installed packages. The UCM needs to figure out from traversing the minimum storage requirement from existing PersistencyDeployments whether specific packages can be installed from the perspective of available storage space. Note that the minimum storage requirement of PersistencyDeployment needs to include space for the handling of the storage, which shall be calculated by the tooling that creates the manifest information inside the package.
prepareRollback	UcmRetryStrategy	0..1	aggr	This attribute identifies the configuration of prepare rollback retries initiated by the Ucm Subordinate.
prepareUpdate	UcmRetryStrategy	0..1	aggr	This attribute identifies the configuration of prepare update retries initiated by the Ucm Subordinate.
verifyUpdate	UcmRetryStrategy	0..1	aggr	This attribute identifies the configuration of verify update retries initiated by the Ucm Subordinate.

Table 12.78: UcmSubordinateModuleInstantiation

[constr_10374] Existence of the attribute [UcmSubordinateModuleInstantiation.verifyUpdate](#)*Imposition time:* IT_Mani[The attribute [UcmSubordinateModuleInstantiation.verifyUpdate](#) shall exist.]**[constr_10375] Existence of the attribute [UcmSubordinateModuleInstantiation.prepareUpdate](#)***Imposition time:* IT_Mani[The attribute [UcmSubordinateModuleInstantiation.prepareUpdate](#) shall exist.]**[constr_10376] Existence of the attribute [UcmSubordinateModuleInstantiation.prepareRollback](#)***Imposition time:* IT_Mani[The attribute [UcmSubordinateModuleInstantiation.prepareRollback](#) shall exist.]**[constr_10508] Existence of the attribute [UcmSubordinateModuleInstantiation.maxAvailablePersistencyStorageSpace](#)***Imposition time:* IT_Mani[The attribute [UcmSubordinateModuleInstantiation.maxAvailablePersistencyStorageSpace](#) shall exist.]

[constr_10110] Existence of **UcmSubordinateModuleInstantiation** on a **Machine**

Imposition time: **IT_Mani**

[For each **Machine**, a **ProcessToMachineMapping** shall exist that refers in the role **machine** to the **Machine** and in the role **nonOsModuleInstantiation** to a **UcmSubordinateModuleInstantiation**.]

12.9 CM configuration

The definition of the target-configuration for the *Identity and Access Manager* represents the creation of actual grants, as opposed to the definition of grants on design level.

One important aspect of the modeling on target-configuration level is that it is not intended to include a large portion of the design model. The goal is to keep the target-configuration part as self-contained as possible.

While this approach represents a significant benefit for the size of target-configuration models it also creates some sort of disconnect between design and target-configuration. In other words, the connection of the modeling of a specific **Grant** to the respective intent in the design model is not immediately obvious.

To mitigate this issue, AUTOSAR introduced the **GrantDesign** that in turn allows for the identification of the corresponding intent modeling. When loading the design model and target-configuration model together into a suitable tool it would still be possible to run an analysis in terms of completeness of the overall IAM configuration.

The enforcement of access restrictions is not mandatory for a **Machine**. Therefore, the existence of a **Grant** by itself is not sufficient to activate the IAM mechanisms.



Figure 12.36: Modeling of the **CmModuleInstantiation**

Class	CmModuleInstantiation			
Note	This meta-class represents the ability to define a definition of a Communication Management instantiation. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier, AtpFeature, AtpStructureElement, Identifiable , MultilanguageReferrable, NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note





Class	CmModuleInstantiation			
grant	Grant	*	ref	This reference identifies the applicable Grants for this CmModuleInstantiation. Stereotypes: atpSplittable Tags: atp.Splitkey=grant atp.Status=candidate
localComAccessControlEnabled	Boolean	0..1	attr	This switch activates the policy enforcement in Communication Management on local applications. Tags: atp.Status=candidate
remoteAccessControlEnabled	Boolean	0..1	attr	This switch activates the check of the remote subject. Tags: atp.Status=candidate
secOCIgnoreVerificationResult	Boolean	0..1	attr	The result of the authentication process (e.g. MAC Verify) is ignored after the first try and the SecOC proceeds like the result was a success. The calculation of the authenticator is still done, only its result will be ignored. • true: enabled (verification result is ignored). • false: disabled (verification result is NOT ignored). Tags: atp.Status=candidate

Table 12.79: CmModuleInstantiation

[constr_1695] Semantics of a [Grant](#) depends on the existence of [CmModuleInstantiation](#)

Status: DRAFT

Imposition time: IT_Mani

[The existence of [Grants](#) shall only be enforced if in the context of the enclosing [Machine](#) an [CmModuleInstantiation](#) has been defined and is referencing the [Grant](#).]

[constr_3677] [ComGrants](#) referencing DDS Service Instances

Status: DRAFT

Imposition time: IT_Mani

[[ComGrants](#) associated with [DdsProvidedServiceInstances](#) or [DdsRequiredServiceInstances](#) via the [serviceInstance](#) attribute shall not be referenced by [CmModuleInstantiation.grant](#).]

Please note that [constr_3677] exists because access control in the DDS Network Binding is delegated to DDS Security.

Class	Grant (abstract)			
Note	This meta-class serves as the abstract base class for defining specific Grants Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	ComGrant , ComOfferServiceGrant			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.80: Grant

Class	ComGrant (abstract)			
Note	This meta-class serves as the abstract base class for defining specific ComGrants Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Grant , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	ComEventGrant , ComFieldGrant , ComMethodGrant , ComTriggerGrant			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
remoteSubject	AbstractIamRemoteSubject	*	ref	This optional reference defines the remoteSubject that is allowed to access the defined Object via the Grant. Tags: atp.Status=candidate
serviceInstance	AdaptivePlatformServiceInstance	0..1	ref	This reference identifies the applicable AdaptivePlatformServiceInstance for which the grant applies. Tags: atp.Status=candidate

Table 12.81: ComGrant

[constr_10201] Multiplicity of of the reference in the role [ComGrant.serviceInstance](#)*Status:* DRAFT*Imposition time:* [IT_Mani](#)[For each [ComGrant](#), the reference in the role [serviceInstance](#) shall exist.]Further information about DDS Security can be found in [Chapter 13.5.3](#).**12.9.1 Com Grant Target-Configuration****12.9.1.1 Com Field Grant Target-Configuration****[TPS_MANI_01237] Semantics of meta-class [ComFieldGrant](#)***Status:* DRAFT[Meta-class [ComFieldGrant](#) shall be used to award access to a given [field](#) (identified by means of the reference to meta-class [ServiceFieldDeployment](#) in the role [serviceDeployment](#)) in the context of a given [AdaptivePlatformServiceInstance](#) referenced in the role [serviceInstance](#).]In other words, if a given [AdaptivePlatformServiceInstance](#) and the respective [ServiceFieldDeployment](#) are not referenced from a [ComFieldGrant](#) and an [CmModuleInstantiation](#) exists **then this specific communication shall be suppressed**.

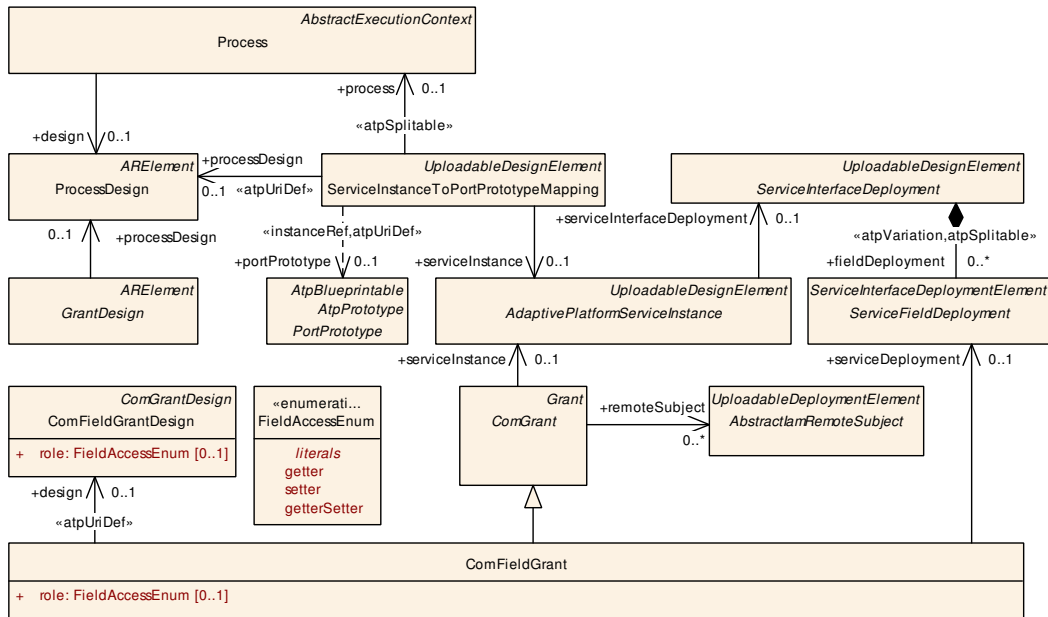


Figure 12.37: Modeling of the ComFieldGrant

Class	ComFieldGrant			
Note	This meta-class represents the ability to grant access to a ServiceInterface.field. Tags: atp.Status=candidate atp.recommendedPackage=Grants This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, ComGrant, Grant, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
design	ComFieldGrantDesign	0..1	ref	This reference identifies the ComFieldGrantDesign that the enclosing ComFieldGrant was created from. Stereotypes: atpUriDef Tags: atp.Status=candidate
role	FieldAccessEnum	0..1	attr	This attribute provides the ability to further specify the access to the ServiceInterface.field. Tags: atp.Status=candidate
service Deployment	ServiceField Deployment	0..1	ref	This reference identifies the applicable deployment within the context of an AdaptivePlatformServiceInstance for which the grant applies. Tags: atp.Status=candidate

Table 12.82: ComFieldGrant

[constr_10202] Multiplicity of attribute ComFieldGrant.role

Status: DRAFT

Imposition time: IT_Mani

[For each ComFieldGrant, the attribute role shall exist.]

[constr_10203] Multiplicity of the reference in the role **ComFieldGrant.serviceDeployment**

Status: DRAFT

Imposition time: IT_Mani

[For each **ComFieldGrant**, the reference in the role **serviceDeployment** shall exist.]

12.9.1.2 Com Method Grant Target-Configuration

[TPS_MANI_01238] Semantics of meta-class **ComMethodGrant**

Status: DRAFT

[Meta-class **ComMethodGrant** shall be used to clear the call of a given **method** (identified by means of the reference to meta-class **ServiceMethodDeployment** in the role **serviceDeployment**) in the context of a given **AdaptivePlatformServiceInstance** referenced in the role **serviceInstance**.]

In other words, if a given **AdaptivePlatformServiceInstance** and the respective **ServiceMethodDeployment** are not referenced from a **ComMethodGrant** and an **ComModuleInstantiation** exists **then this specific communication shall be suppressed**.

Class	ComMethodGrant			
Note	This meta-class represents the ability to grant access to a ServiceInterface.method. Tags: atp.Status=candidate atp.recommendedPackage=Grants This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, ComGrant, Grant, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
design	ComMethodGrant Design	0..1	ref	This reference identifies the ComMethodGrantDesign that the enclosing ComMethodGrant was created from. Stereotypes: atpUriDef Tags: atp.Status=candidate
service Deployment	ServiceMethod Deployment	0..1	ref	This reference identifies the applicable deployment within the context of an AdaptivePlatformServiceInstance for which the grant applies. Tags: atp.Status=candidate

Table 12.83: ComMethodGrant

[constr_10204] Multiplicity of the reference in the role **ComMethodGrant.serviceDeployment**

Status: DRAFT

Imposition time: IT_Mani

[For each **ComMethodGrant**, the reference in the role **serviceDeployment** shall exist.]

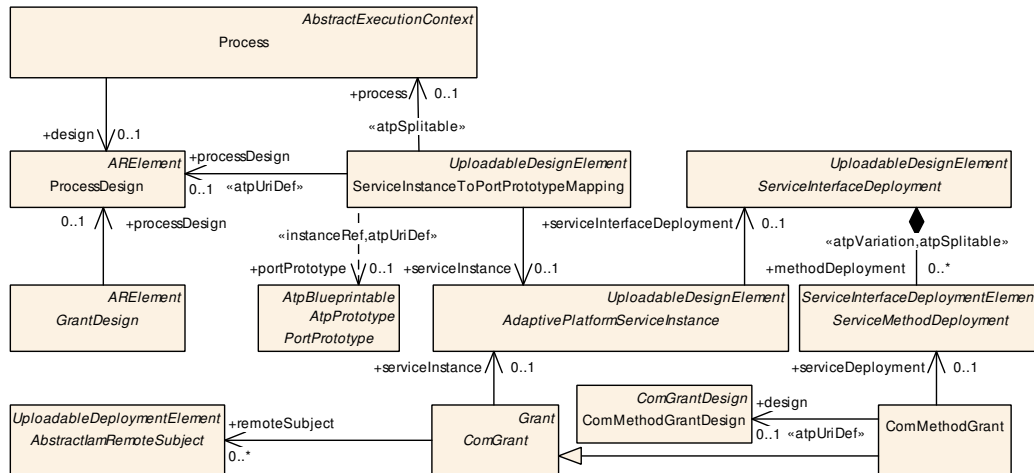


Figure 12.38: Modeling of the **ComMethodGrant**

12.9.1.3 Com Event Grant Target Configuration

[TPS_MANI_01239] Semantics of meta-class **ComEventGrant**

Status: DRAFT

[Meta-class **ComEventGrant** shall be used to award access to a given **event** (identified by means of the reference to meta-class **ServiceEventDeployment** in the role **serviceDeployment**) in the context of a given **AdaptivePlatformServiceInstance** referenced in the role **serviceInstance**.]

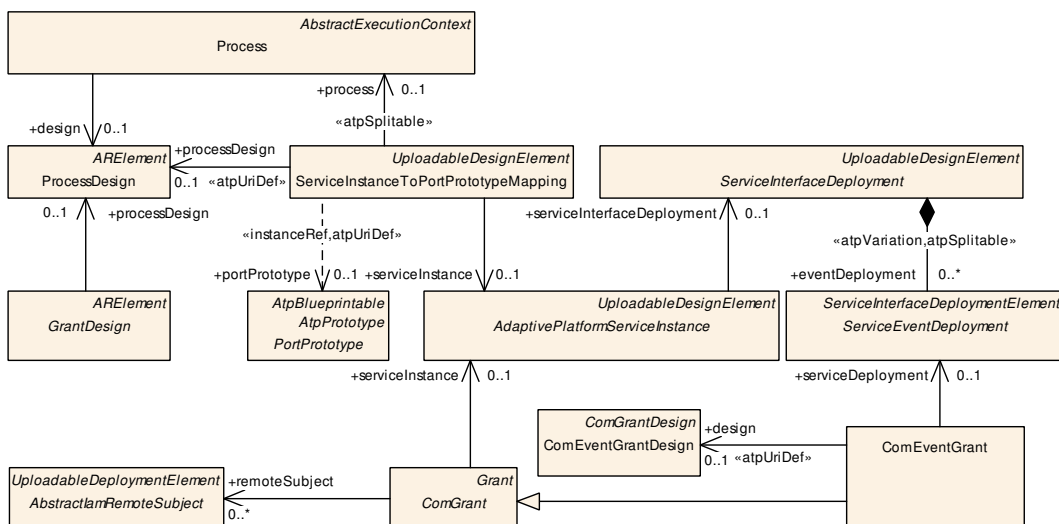


Figure 12.39: Modeling of the **ComEventGrant**

In other words, if a given **AdaptivePlatformServiceInstance** and the respective **ServiceEventDeployment** are not referenced from a **ComEventGrant** and an **CmModuleInstantiation** exists **then this specific communication shall be suppressed**.

[constr_5366] Allowed target of **ComEventGrant.serviceDeployment** reference

Status: DRAFT

Imposition time: IT_Mani

[ComEventGrant is allowed to reference only a ServiceEventDeployment in the role serviceDeployment that in turn references a VariableDataPrototype in the role event.]

Class	ComEventGrant			
Note	This meta-class represents the ability to grant access to a ServiceInterface.event. Tags: atp.Status=candidate atp.recommendedPackage=Grants This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , ComGrant , Grant , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
design	ComEventGrantDesign	0..1	ref	This reference identifies the ComEventGrantDesign that the enclosing ComEventGrant was created from. Stereotypes: atpUriDef Tags: atp.Status=candidate
service Deployment	ServiceEventDeployment	0..1	ref	This reference identifies the applicable deployment within the context of an AdaptivePlatformServiceInstance for which the grant applies. Tags: atp.Status=candidate

Table 12.84: ComEventGrant

[constr_10205] Multiplicity of the reference in the role **ComEventGrant.serviceDeployment**

Status: DRAFT

Imposition time: IT_Mani

[For each ComEventGrant, the reference in the role serviceDeployment shall exist.]

12.9.1.4 Com Trigger Grant Target-Configuration

[TPS_MANI_03322] Semantics of meta-class **ComTriggerGrant**

Status: DRAFT

[Meta-class ComTriggerGrant shall be used to award access to a given trigger (identified by means of the reference to meta-class ServiceEventDeployment in the role serviceDeployment) in the context of a given AdaptivePlatformServiceInstance referenced in the role serviceInstance.]

In other words, if a given AdaptivePlatformServiceInstance and the respective ServiceEventDeployment for a Trigger are not referenced from a ComTriggerGrant and an CmModuleInstantiation exists then this specific communication shall be suppressed.

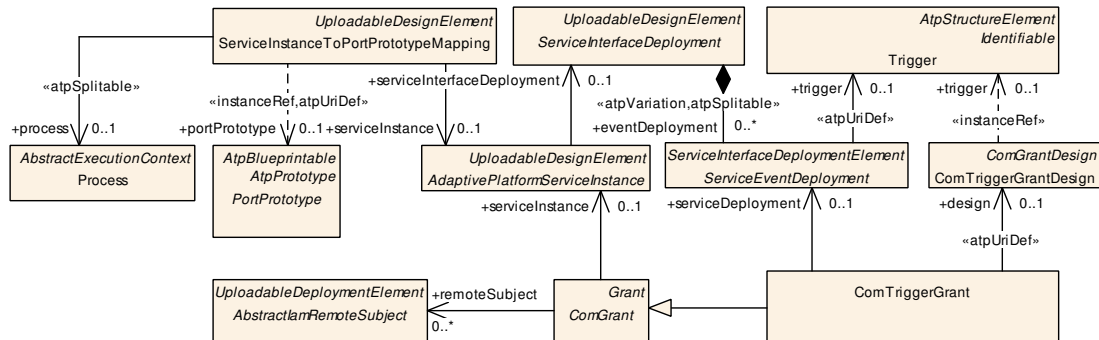


Figure 12.40: Modeling of the **ComTriggerGrant**

Class	ComTriggerGrant			
Note	This meta-class represents the ability to grant access to a ServiceInterface.trigger Tags: atp.Status=candidate atp.recommendedPackage=Grants This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , ComGrant , Grant , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
design	ComTriggerGrantDesign	0..1	ref	This reference identifies the ComTriggerGrantDesign that the enclosing ComTriggerGrant was created from Stereotypes: atpUriDef Tags: atp.Status=candidate
service Deployment	ServiceEventDeployment	0..1	ref	This reference identifies the applicable deployment within the context of an AdaptivePlatformServiceInstance for which the grant applies. Tags: atp.Status=candidate

Table 12.85: ComTriggerGrant

[constr_5367] Allowed target of [ComTriggerGrant.serviceDeployment](#) reference

Status: DRAFT
Imposition time: IT_Mani

[[ComTriggerGrant](#) is allowed to reference only a [ServiceEventDeployment](#) in the role [serviceDeployment](#) that in turn references a [Trigger](#) in the role [trigger](#).]

[constr_5368] Multiplicity of the reference in the role [ComTriggerGrant.serviceDeployment](#)

Status: DRAFT
Imposition time: IT_Mani

[For each [ComTriggerGrant](#), the reference in the role [serviceDeployment](#) shall exist.]

12.9.1.5 Com Offer Service Grant Target-Configuration

The enforcement of service discovery rights is modeled by means of meta-classes [ComOfferServiceGrant](#).

There is no need for a dedicated grant for service discovery on the client side because the existence of one of the dedicated grants to method, field, event, or trigger is taken as the implicit intent to also do service discovery.

[TPS_MANI_01240] Semantics of meta-class [ComOfferServiceGrant](#)

Status: DRAFT

[Meta-class [ComOfferServiceGrant](#) shall be used to award the right to offer the referenced [AdaptivePlatformServiceInstance](#).]

Class	ComOfferServiceGrant			
Note	This meta-class represents the ability to grant the offering of a service. Tags: atp.Status=candidate atp.recommendedPackage=Grants This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Grant , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
design	ComOfferServiceGrantDesign	0..1	ref	This reference identifies the ComOfferServiceGrant Design that the enclosing ComOfferServiceGrant was created from. Stereotypes: atpUriDef Tags: atp.Status=candidate
serviceInstance	AdaptivePlatformServiceInstance	0..1	ref	This reference identifies the AdaptivePlatformService Instances for which the grant applies. Tags: atp.Status=candidate

Table 12.86: ComOfferServiceGrant

[constr_10206] Multiplicity of the reference in the role [ComOfferServiceGrant.serviceInstance](#)

Status: DRAFT

Imposition time: IT_Mani

[For each [ComOfferServiceGrant](#), the reference in the role [serviceInstance](#) shall exist.]

12.9.2 Remote access control

The overview of the remote access control was already introduced in [Chapter 3.5.2](#). Please note that for the modeling of [AbstractIamRemoteSubjects](#) the same approach is used in the Design and in the Target-Configuration. So if [AbstractIamRemoteSubjects](#) were defined during the design phase they can be taken over into the target-configuration.

This chapter defines how `ComGrants` with a defined `remoteSubjects` shall be interpreted.

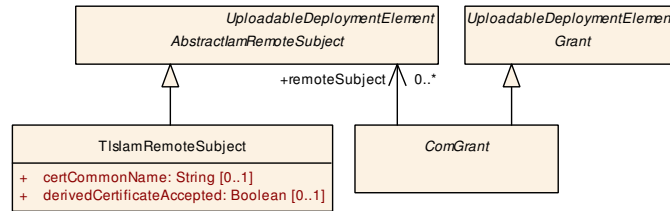


Figure 12.41: Modeling of the relation of `ComGrants` to the corresponding `remoteSubjects`

[TPS_MANI_03245] Definition of `ComMethodGrant.remoteSubjects` on server side

Status: DRAFT

[If the `ComMethodGrant` references a `ProvidedApServiceInstance` in the role `serviceInstance` then the `ComMethodGrant.remoteSubject` reference defines the `remoteSubjects` that are allowed to call the defined `method` that is referenced by the `ComMethodGrant` in the role `serviceDeployment`.]

[TPS_MANI_03246] Definition of `ComMethodGrant.remoteSubjects` on client side

Status: DRAFT

[If the `ComMethodGrant` references a `RequiredApServiceInstance` in the role `serviceInstance` then the `ComMethodGrant.remoteSubject` reference defines the `remoteSubjects` to which a `ServiceMethodDeployment.method` call is allowed to be sent.]

[TPS_MANI_03247] Definition of `ComEventGrant.remoteSubjects` on provider side

Status: DRAFT

[If the `ComEventGrant` references a `ProvidedApServiceInstance` in the role `serviceInstance` then the `ComEventGrant.remoteSubject` reference defines the `remoteSubjects` to which an `ServiceEventDeployment.event` is allowed to be sent.]

[TPS_MANI_03248] Definition of `ComEventGrant.remoteSubjects` on receiver side

Status: DRAFT

[If the `ComEventGrant` references a `RequiredApServiceInstance` in the role `serviceInstance` then the `ComEventGrant.remoteSubject` reference defines the `remoteSubjects` from which an `ServiceEventDeployment.event` is allowed to be received.]

[TPS_MANI_03249] Definition of `ComFieldGrant.remoteSubjects` on provider side*Status:* DRAFT

[If the `ComFieldGrant` references a `ProvidedApServiceInstance` in the role `serviceInstance` then the `ComFieldGrant.remoteSubject` reference defines the `remoteSubjects` that are allowed to access the `Field` that is referenced by the `ServiceFieldDeployment` that in turn is referenced by the `ComFieldGrant` in the role `serviceDeployment`. This allows the following communication between the local `Machine` and the `AbstractIamRemoteSubject`:

- the `Field` notifier is allowed to be sent to `remoteSubjects`,
- if `ComFieldGrant.role` equals `setter` or `getterSetter`, then the setter call is allowed to be received from the `remoteSubjects`,
- if `ComFieldGrant.role` equals `setter` or `getterSetter`, then the setter return is allowed to be sent to `remoteSubjects`,
- if `ComFieldGrant.role` equals `getter` or `getterSetter`, then the getter call is allowed to be received from the `remoteSubjects`,
- if `ComFieldGrant.role` equals `getter` or `getterSetter`, then the getter return is allowed to be sent to `remoteSubjects`.

]

[TPS_MANI_03250] Definition of `ComFieldGrant.remoteSubjects` on client side*Status:* DRAFT

[If the `ComFieldGrant` references a `RequiredApServiceInstance` in the role `serviceInstance` then the `ComFieldGrant.remoteSubject` reference defines the `remoteSubjects` that are allowed to provide the `Field` for access that is referenced by the `ServiceFieldDeployment` that in turn is referenced by the `ComFieldGrant` in the role `serviceDeployment`. This will allow the following communication between the local `Machine` and the `AbstractIamRemoteSubject`:

- the `Field` notifier is allowed to be received from `remoteSubjects`,
- if `ComFieldGrant.role` equals `setter` or `getterSetter`, then the setter call is allowed to be sent to the `remoteSubjects`,
- if `ComFieldGrant.role` equals `setter` or `getterSetter`, then the setter return is allowed to be received from `remoteSubjects`,
- if `ComFieldGrant.role` equals `getter` or `getterSetter`, the getter call is allowed to be sent to the `remoteSubjects`,
- if `ComFieldGrant.role` equals `getter` or `getterSetter`, the getter return is allowed to be received from `remoteSubjects`.

]

Please note that a [ComGrant](#) with the [remoteSubject](#) reference defines that a remote access control for this [ComGrant](#) will be performed. Such a [ComGrant](#) with the [remoteSubject](#) reference does not enforce any [Machine](#) local access restrictions.

To enforce local access restrictions for the same [ServiceInterface](#) element of the same [AdaptivePlatformServiceInstance](#) an additional [ComGrant](#) needs to be defined that points to the same [serviceInstance](#) and to the same [ComFieldGrant.serviceDeployment](#) or [ComEventGrant.serviceDeployment](#) or [ComMethodGrant.serviceDeployment](#) but does not contain the [remoteSubject](#) reference.

12.10 Crypto Target-Configuration

This chapter explains the configuration of the Crypto functional cluster and the interaction of application Software with the [18, SWS Cryptography].

[TPS_MANI_03260] Semantics of meta-class [CryptoModuleInstantiation](#)
[The representation of the Crypto functional cluster [18, SWS Cryptography] within one specific [Machine](#) is defined by the [CryptoModuleInstantiation](#).]

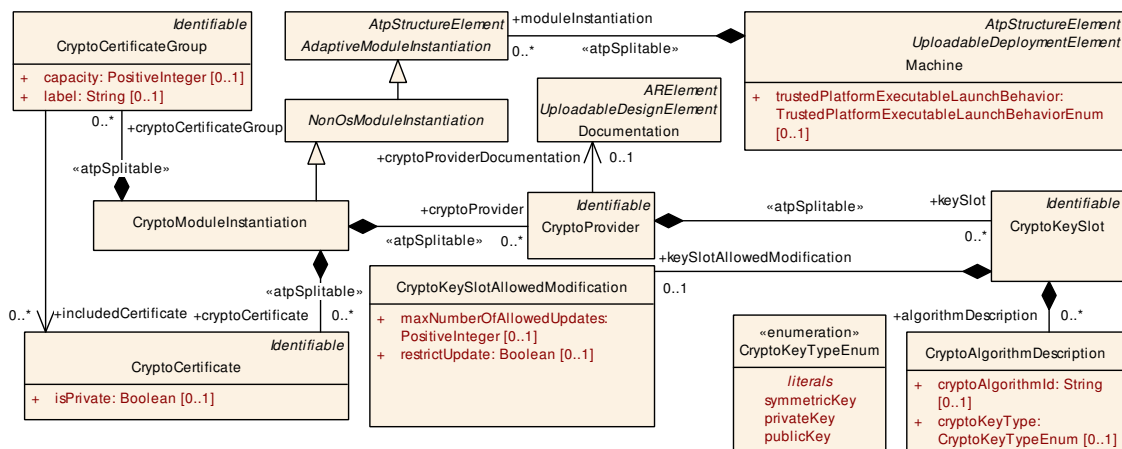


Figure 12.42: CryptoModuleInstantiation Overview

Class	CryptoModuleInstantiation			
Note	This meta-class defines the configuration for the Crypto stack on a specific machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
crypto Certificate	CryptoCertificate	*	aggr	List of CryptoCertificates managed in the CryptoStack Stereotypes: atpSplittable Tags: atp.Splitkey=cryptoCertificate.shortName





Class	CryptoModuleInstantiation			
crypto Certificate Group	CryptoCertificateGroup	*	aggr	List of CryptoCertificateGroups managed in the Crypto Stack. Stereotypes: atpSplitable Tags: atp.Splitkey=cryptoCertificateGroup.shortName atp.Status=candidate
cryptoProvider	CryptoProvider	*	aggr	List of CryptoProviders provided by the CryptoStack Stereotypes: atpSplitable Tags: atp.Splitkey=cryptoProvider.shortName

Table 12.87: CryptoModuleInstantiation

12.10.1 Crypto Provider

[TPS_MANI_03261] Support of [CryptoProviders](#) [The Crypto functional cluster is able to support multiple [CryptoProviders](#). Each [CryptoProvider](#) implements a software- or a hardware-based cryptographic library.]

Class	CryptoProvider			
Note	CryptoProvider implements cryptographic primitives (algorithms) supported by the stack. Implementation of this component may be software or hardware based (HSM/TPM). This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	CryptoModuleInstantiation.cryptoProvider			
Attribute	Type	Mult.	Kind	Note
cryptoProvider Documentation	Documentation	0..1	ref	Documentation of the CryptoProvider that describes the implemented cryptographic primitives.
keySlot	CryptoKeySlot	*	aggr	This aggregation represents the key slots that are allocated by the CryptoProvider. Stereotypes: atpSplitable Tags: atp.Splitkey=keySlot.shortName

Table 12.88: CryptoProvider

Please note that each [CryptoProvider](#) can be described in more detail with the [cryptoProviderDocumentation](#) that uses the [Documentation](#) element to provide means for a more detailed description.

[TPS_MANI_03262] Semantics of [CryptoProviderToPortPrototypeMapping](#) [Meta-class [CryptoProviderToPortPrototypeMapping](#) has the ability to map a specific [PortPrototype](#) referenced in the role [portPrototype](#) to a [CryptoProvider](#) referenced in the role [cryptoProvider](#).

The mapping also comprises a reference to meta-class [process](#) in order to accommodate for the fact that identical combinations of [cryptoProvider](#) and [portPrototype](#) may or may not apply for a given [Process](#) that represents the enclosing [Executable](#) at runtime.]

Class	CryptoProviderToPortPrototypeMapping			
Note	This meta-class represents the ability to define a mapping between a CryptoProvider on deployment level to a given PortPrototype that is typed by a CryptoProviderInterface. Tags: atp.recommendedPackage=CryptoProviderToPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoProvider	CryptoProvider	0..1	ref	This reference represents the mapped cryptoProvider.
portPrototype	RPortPrototype	0..1	iref	This reference represents the mapped PortPrototype. InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference represents the process required as context for the mapping.

Table 12.89: CryptoProviderToPortPrototypeMapping

[constr_10207] Multiplicity of the reference in the role [CryptoProviderToPortPrototypeMapping.cryptoProvider](#)*Imposition time:* IT_Mani

[For each [CryptoProviderToPortPrototypeMapping](#), the reference in the role [cryptoProvider](#) shall exist.]

[constr_10208] Multiplicity of the reference in the role [CryptoProviderToPortPrototypeMapping.process](#)*Imposition time:* IT_Mani

[For each [CryptoProviderToPortPrototypeMapping](#), the reference in the role [process](#) shall exist.]

[constr_5240] Restriction applicable for [CryptoProviderToPortPrototypeMapping.portPrototype](#)*Status:* DRAFT*Imposition time:* IT_Mani

[The reference [CryptoProviderToPortPrototypeMapping.portPrototype](#) shall only be used for an [RPortPrototype](#) typed by a [CryptoProviderInterface](#).]

The application developer uses the `ara::core::InstanceSpecifier` as local identifier in the API call that represents the path to the modeled [RPortPrototype](#). The Integrator maps the [RPortPrototype](#) in the target-configuration model with the [CryptoProviderToPortPrototypeMapping](#) to the concrete [CryptoProvider](#).

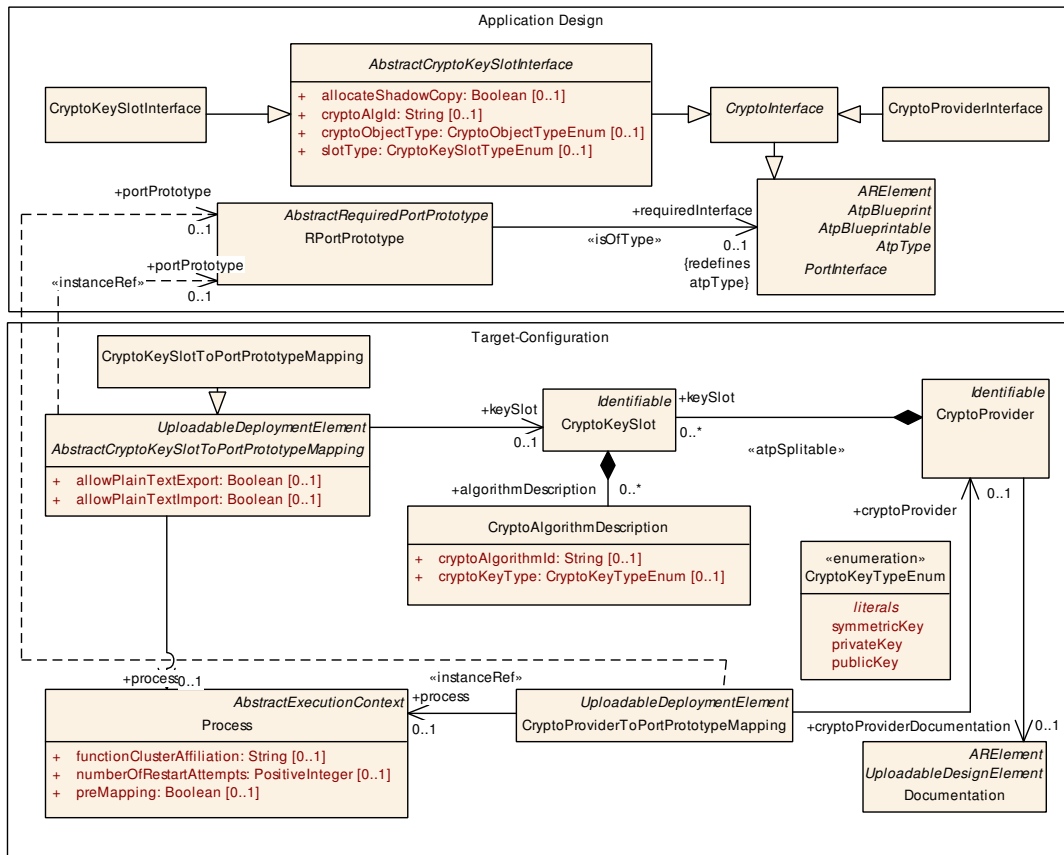


Figure 12.43: Mapping of CryptoProviders and CryptoKeySlots to RPortPrototypes

12.10.2 Crypto Key Slot

The Key Storage Provider is responsible for the storage of different type of key material. The crypto objects that are stored by the Key Storage Provider are represented as `CryptoKeySlots` in the model.

[TPS_MANI_03263] Assignment of **CryptoKeySlots** to **CryptoProviders**
 [Crypto objects that are used by the **CryptoProvider** are described by the **CryptoKeySlots** that are aggregated by the **CryptoProvider** in the role **keySlot**.]

Class	CryptoKeySlot			
Note	This meta-class represents the ability to define a concrete key to be used for a crypto operation. Tags: atp.ManifestKind=MachineManifest This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	CryptoProvider.keySlot			
Attribute	Type	Mult.	Kind	Note





Class	CryptoKeySlot			
algorithm Description	CryptoAlgorithm Description	*	aggr	This aggregation contains the collection of crypto algorithm descriptions that can be used in the context of the enclosing crypto key slot. Tags: atp.Status=candidate
allocateShadow Copy	Boolean	0..1	attr	This attribute defines whether a shadow copy of this Key Slot shall be allocated to enable rollback of a failed Key Slot update campaign (see interface BeginTransaction).
cryptoAlgId	String	0..1	attr	This attribute defines a crypto algorithm restriction (kAlgId Any means without restriction). The algorithm can be specified partially: family & length, mode, padding. Future Crypto Providers can support some crypto algorithms that are not well known/ standardized today, therefore AUTOSAR doesn't provide a concrete list of crypto algorithms' identifiers and doesn't suppose usage of numerical identifiers. Instead of this a provider supplier should provide string names of supported algorithms in accompanying documentation. The name of a crypto algorithm shall follow the rules defined in the specification of cryptography for Adaptive Platform.
cryptoKeySlot Design	CryptoKeySlotDesign	0..1	ref	This reference identifies the CryptoKeySlotDesign from which the referencing CryptoKeySlot was derived.
cryptoObject Type	CryptoObjectTypeEnum	0..1	attr	Object type that can be stored in the slot. If this field contains "Undefined" then mSlotCapacity must be provided and larger then 0. Tags: atp.Status=candidate
keySlotAllowed Modification	CryptoKeySlotAllowed Modification	0..1	aggr	Restricts how this keySlot may be used Tags: atp.Status=candidate
keySlotContent AllowedUsage	CryptoKeySlotContent AllowedUsage	*	aggr	Restriction of allowed usage of a key stored to the slot. Tags: atp.Status=candidate
slotCapacity	PositiveInteger	0..1	attr	Capacity of the slot in bytes to be reserved by the stack vendor. One use case is to define this value in case that the cryptoObjectType is undefined and the slot size can not be deduced from cryptoObjectType and cryptoAlgId. "0" means slot size can be deduced from cryptoObject Type and cryptoAlgId.
slotType	CryptoKeySlotType Enum	0..1	attr	This attribute defines whether the keySlot is exclusively used by the Application; or whether it is used by Stack Services and managed by a Key Manager Application. Tags: atp.Status=candidate

Table 12.90: CryptoKeySlot

Class	CryptoAlgorithmDescription			
Note	This meta-class is used to provide properties of the crypto algorithm. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	CryptoKeySlot.algorithmDescription			
Attribute	Type	Mult.	Kind	Note
cryptoAlgorithm Id	String	0..1	attr	This attribute describes the identity of the crypto algorithm.
cryptoKeyType	CryptoKeyTypeEnum	0..1	attr	This attribute describes the identity of the crypto algorithm.

Table 12.91: CryptoAlgorithmDescription

[constr_10690] Existence of `CryptoAlgorithmDescription.cryptoAlgorithmId`*Imposition time:* IT_Mani

[For each `CryptoAlgorithmDescription`, attribute `cryptoAlgorithmId` shall exist.]

[constr_10691] Existence of `CryptoAlgorithmDescription.cryptoKeyType`*Imposition time:* IT_Mani

[For each `CryptoAlgorithmDescription`, attribute `cryptoKeyType` shall exist.]

Enumeration	CryptoKeyTypeEnum
Note	This enumeration defines the type of a cryptographic key. Tags: atp.Status=candidate This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	<code>CryptoAlgorithmDescription.cryptoKeyType</code>
Literal	Description
privateKey	This denotes a private key. Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate
publicKey	This denotes a public key. Tags: atp.EnumerationLiteralIndex=2 atp.Status=candidate
symmetricKey	This denotes a symmetric key. Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate

Table 12.92: CryptoKeyTypeEnum

The application developer uses the `ara::core::InstanceSpecifier` as local identifier in the API call that represents the path to the modeled `RPortPrototype`. The Integrator maps the `RPortPrototype` in the target-configuration model with the `CryptoKeySlotToPortPrototypeMapping` resp. `CryptoKeySlotToClientPortPrototypeMapping` to the concrete `CryptoKeySlot` that is stored by the Key Storage Provider.

The information from the target-configuration model is therefore used to replace the local identifier from the Application Design by the concrete `CryptoKeySlot`.

12.10.2.1 Crypto Key Slot to Port Prototype Mapping**[TPS_MANI_03264] Semantics of `CryptoKeySlotToPortPrototypeMapping`***Status:* DRAFT

[Meta-class `CryptoKeySlotToPortPrototypeMapping` has the ability to map a specific `PortPrototype` typed by a `CryptoKeySlotInterface` referenced in the role `portPrototype` to a `CryptoKeySlot` referenced in the role `keySlot`.

The mapping also comprises a reference to meta-class `process` in order to accommodate for the fact that identical combinations of `keySlot` and `portPrototype` may or may not apply for a given `Process` that represents the enclosing `Executable` at runtime.

The usage of a `CryptoKeySlotToPortPrototypeMapping` indicates that the mapped `CryptoKeySlot` can be accessed for **reading and writing**.]

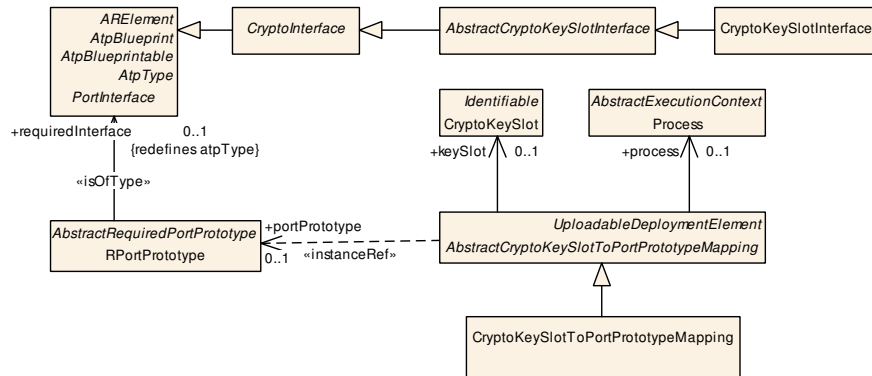


Figure 12.44: Modeling of `CryptoKeySlotToPortPrototypeMapping`

Class	<i>AbstractCryptoKeySlotToPortPrototypeMapping</i> (abstract)			
Note	This abstract meta-class acts as a base class for crypto key slot mappings. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	CryptoKeySlotToClientPortPrototypeMapping , CryptoKeySlotToPortPrototypeMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
allowPlainTextExport	Boolean	0..1	attr	This attribute describes whether the key slot content is allowed to be exported in plaintext format or not by the application referenced in the role process. Plaintext export is only possible if supported by the cryptographic module and by the CryptoProvider implementation and if the key has been generated/ imported with the keySlot.keySlotContentAllowedUsage.allowedKeyslotUsage set to exportable.
allowPlainTextImport	Boolean	0..1	attr	This attribute describes whether the key slot content is allowed to be imported in plaintext format or not by the application referenced in the role process. Plaintext import is only possible if supported by the cryptographic module and by the CryptoProvider implementation.
keySlot	CryptoKeySlot	0..1	ref	This reference represents the mapped CryptoKeySlot.
portPrototype	RPortPrototype	0..1	iref	This reference represents the mapped PortPrototype. InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference represents the process required as context for the mapping.

Table 12.93: AbstractCryptoKeySlotToPortPrototypeMapping

[constr_10209] Existence of the reference in the role **AbstractCryptoKeySlotToPortPrototypeMapping.keySlot**

Imposition time: IT_Mani

[For each **AbstractCryptoKeySlotToPortPrototypeMapping**, the reference in the role **keySlot** shall exist.]

[constr_10210] Existence of the reference in the role **AbstractCryptoKeySlotToPortPrototypeMapping.process**

Imposition time: IT_Mani

[For each **AbstractCryptoKeySlotToPortPrototypeMapping**, the reference in the role **process** shall exist.]

[constr_5241] Restriction applicable for **AbstractCryptoKeySlotToPortPrototypeMapping.portPrototype**

Status: DRAFT

Imposition time: IT_Mani

[The reference **AbstractCryptoKeySlotToPortPrototypeMapping.portPrototype** shall only be used for an **RPortPrototype** typed by a **CryptoKeySlotInterface**.]

Class	CryptoKeySlotToPortPrototypeMapping			
Note	This meta-class represents the ability to define a mapping between a CryptoKeySlot on target-configuration level to a given PortPrototype that is typed by a CryptoKeySlotInterface. Tags: atp.recommendedPackage=CryptoKeySlotMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractCryptoKeySlotToPortPrototypeMapping , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.94: CryptoKeySlotToPortPrototypeMapping

12.10.2.2 Crypto Key Slot to Client Port Prototype Mapping

[TPS_MANI_01471] Semantics of meta-class **CryptoKeySlotToClientPortPrototypeMapping**

Status: DRAFT

[Meta-class **CryptoKeySlotToClientPortPrototypeMapping** has the ability to map a specific **PortPrototype** typed by a **CryptoKeySlotClientInterface** referenced in the role **portPrototype** to a **CryptoKeySlot** referenced in the role **keySlot**.

The mapping also comprises a reference to meta-class **process** in order to accommodate for the fact that identical combinations of **keySlot** and **portPrototype** may

or may not apply for a given `Process` that represents the enclosing `Executable` at runtime.

The usage of a `CryptoKeySlotToClientPortPrototypeMapping` indicates that the mapped `CryptoKeySlot` can be accessed for **reading only**.]

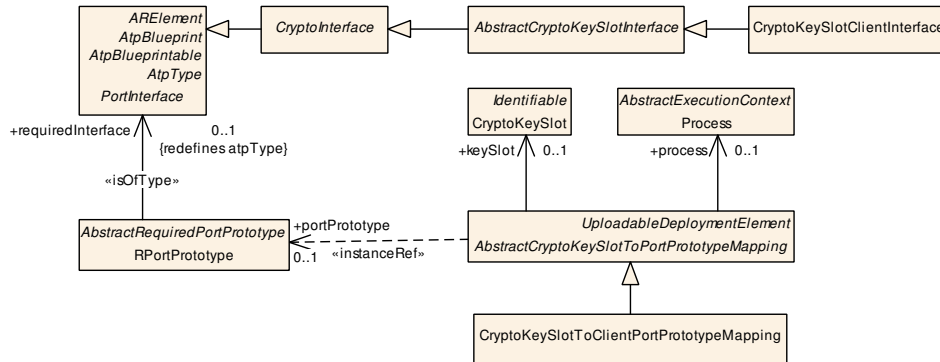


Figure 12.45: Modeling of `CryptoKeySlotToClientPortPrototypeMapping`

Class	CryptoKeySlotToClientPortPrototypeMapping				
Note	This meta-class represents the ability to define a mapping between a <code>CryptoKeySlot</code> on deployment level to a given <code>PortPrototype</code> that is typed by a <code>CryptoKeyClientSlotInterface</code> (this means only read is supported). Tags: atp.recommendedPackage=CryptoKeySlotMappings This Class is only used by the AUTOSAR Adaptive Platform.				
Base	ARElement , ARObject , AbstractCryptoKeySlotToPortPrototypeMapping , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement				
Aggregated by	ARPackage.element				
Attribute	Type	Mult.	Kind	Note	
—	—	—	—	—	

Table 12.95: `CryptoKeySlotToClientPortPrototypeMapping`

12.10.3 Crypto Certificate

[TPS_MANI_03265] Support of `CryptoCertificates` [Certificates stored by the Certificate Management Provider that is available in the Crypto functional cluster are modeled as `CryptoCertificates`.]

Class	CryptoCertificate				
Note	This meta-class represents the ability to model a cryptographic certificate. This Class is only used by the AUTOSAR Adaptive Platform.				
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable				
Aggregated by	CryptoModuleInstantiation.cryptoCertificate				
Attribute	Type	Mult.	Kind	Note	
—	—	—	—	—	





Class	CryptoCertificate			
isPrivate	Boolean	0..1	attr	This attribute controls the possibility to access the content of the CryptoCertificateSlot by Find() interfaces of the X509 Provider.

Table 12.96: CryptoCertificate

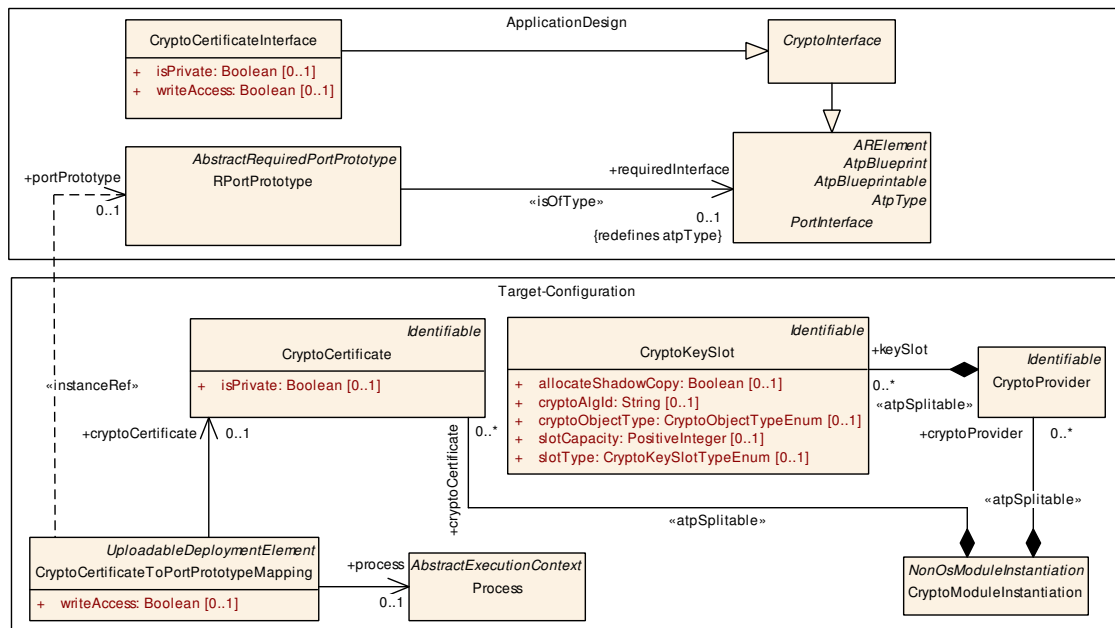


Figure 12.46: Mapping of CryptoCertificates to RPortPrototypes

[TPS_MANI_03267] Semantics of **CryptoCertificateToPortPrototypeMapping** [Meta-class **CryptoCertificateToPortPrototypeMapping** has the ability to map a specific **PortPrototype** referenced in the role **portPrototype** to a **CryptoCertificate** referenced in the role **cryptoCertificate**.

The mapping also comprises a reference to meta-class **process** in order to accommodate for the fact that identical combinations of **cryptoCertificate** and **portPrototype** may or may not apply for a given **Process** that represents the enclosing **Executable** at runtime.]

Class	CryptoCertificateToPortPrototypeMapping			
Note	This meta-class represents the ability to define a mapping between a CryptoCertificate on target-configuration level to a given PortPrototype that is typed by a CryptoCertificateInterface. Tags: atp.recommendedPackage=CryptoCertificateToPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObjct, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
crypto Certificate	CryptoCertificate	0..1	ref	This reference represents the mapped cryptoCertificate.





Class	CryptoCertificateToPortPrototypeMapping			
portPrototype	RPortPrototype	0..1	iref	This reference represents the mapped PortPrototype. InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference represents the process required as context for the mapping.
writeAccess	Boolean	0..1	attr	This attribute defines whether the application has write-access to the CryptoCertificate (true) or only read-access (false).

Table 12.97: CryptoCertificateToPortPrototypeMapping

[constr_5242] Restriction applicable for [CryptoCertificateToPortPrototypeMapping.portPrototype](#)*Status:* DRAFT*Imposition time:* [IT_Mani](#)

[The reference [CryptoCertificateToPortPrototypeMapping.portPrototype](#) shall only be used for an [RPortPrototype](#) typed by a [CryptoCertificateInterface](#).]

The application developer uses the `ara::core::InstanceSpecifier` as local identifier in the API call that represents the path to the modeled [RPortPrototype](#). The Integrator maps the [RPortPrototype](#) in the target-configuration model with the [CryptoCertificateToPortPrototypeMapping](#) to the concrete [CryptoCertificate](#) that is stored by the Certificate Management Provider. The information from the target-configuration model is therefore used to replace the local identifier from the Application Design by the concrete [CryptoCertificate](#).

12.10.4 Crypto Certificate Group

[TPS_MANI_01485] Support of [CryptoCertificateGroups](#) [It is possible to model a [CryptoCertificateGroup](#) that represents a storage allocation for crypto certificates that can **dynamically** be associated with the [CryptoCertificateGroup](#).

Optionally, it is also possible to include [CryptoCertificates](#) into a [CryptoCertificateGroup](#) by reference in the role [includedCertificate](#).]

The modeling of the [CryptoCertificateGroup](#) and its relations is depicted in [Figure 12.42](#).

The modeling of the [CryptoCertificateGroup](#) tries to accommodate to two different perspectives. On the one hand, the [CryptoCertificateGroup](#) was created to allow for access to cryptographic certificates with a collection-semantics.

The identity of the individual cryptographic certificates in the [CryptoCertificateGroup](#) is not relevant for users of the [CryptoCertificateGroup](#).

On the other hand, there is the second perspective from the management point of view. Certificates may need to be replaced and for this purpose need to have an identity.

In order to include a [CryptoCertificate](#) in a [CryptoCertificateGroup](#) and – at the same time – be able to access the [CryptoCertificate](#) by identity it is necessary to include the [CryptoCertificate](#) by reference into the [CryptoCertificateGroup](#).

Please note that the existence of the reference in the role [CryptoCertificateGroup.includedCertificate](#) is entirely optional.

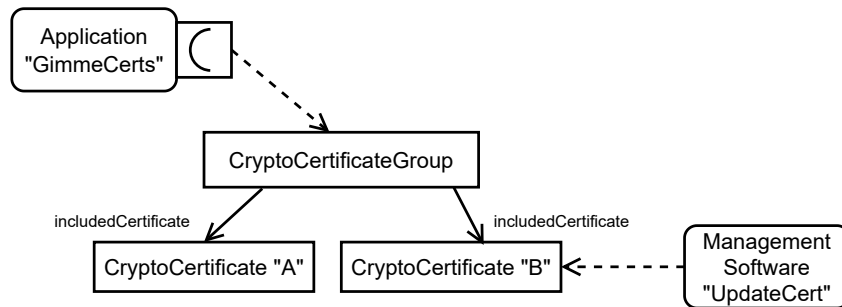


Figure 12.47: Different perspectives on the [CryptoCertificateGroup](#)

Class	CryptoCertificateGroup			
Note	This meta-class represents the ability to model a group of cryptographic certificates. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	CryptoModuleInstantiation.cryptoCertificateGroup			
Attribute	Type	Mult.	Kind	Note
capacity	PositiveInteger	0..1	attr	Capacity of the certificate group in bytes of DER serialized certificates. Tags: atp.Status=candidate
included Certificate	CryptoCertificate	*	ref	This optional collection of references to individual Crypto Certificates can be used to include some Crypto Certificates "by identity" into the CryptoCertificateGroup. Tags: atp.Status=candidate
label	String	0..1	attr	Label for application-level identification of certificate group. Tags: atp.Status=candidate

Table 12.98: CryptoCertificateGroup

12.10.5 Relation to Crypto System Design

Thanks to the existence of the crypto system design (which is described in [Chapter 7.5](#)), it is possible to trace the existence of a [CryptoKeySlot](#) up to the design level.

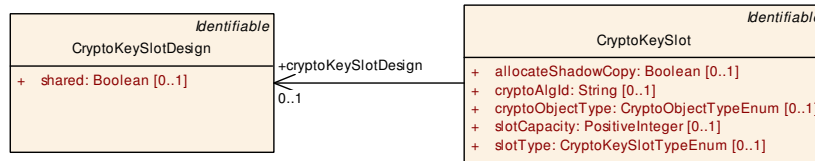


Figure 12.48: [CryptoKeySlot](#) traces to [CryptoKeySlotDesign](#)

[TPS_MANI_01472] Semantics of reference [CryptoKeySlot.cryptoKeySlotDesign](#) [The reference in the role [CryptoKeySlot.cryptoKeySlotDesign](#) carries no actual semantics, it just exists as a trace from the [CryptoKeySlot](#) to a [CryptoKeySlotDesign](#), indicating that the [CryptoKeySlot](#) was created out of the [CryptoKeySlotDesign](#).]

12.11 IdsM Target-Configuration

12.11.1 IdsM Instantiation

The definition of the target-configuration for the Intrusion Detection System Manager (IdsM) is modeled by means of the meta-class [IdsmModuleInstantiation](#)

Class	IdsmModuleInstantiation			
Note	This meta-class defines the attributes for the IdsM configuration on a specific machine. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , IdsPlatformInstantiation , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
reportable SecurityEvent	SecurityEventMapping	*	ref	Collection of reportable instances of security events. Stereotypes: atpSplitable Tags: atp.Splitkey=reportableSecurityEvent atp.Status=candidate

Table 12.99: IdsmModuleInstantiation

[constr_10021] Existence of [IdsmModuleInstantiation](#)

Status: DRAFT

Imposition time: [IT_Mani](#)

[On each [Machine](#), only one instance of the [Intrusion Detection System Manager](#) (modeled by [IdsmModuleInstantiation](#)) shall exist.]

This instance manages all the reported SEvs created by SWCLs or Function Clusters on this Adaptive Machine.

Meta-class [IdsmModuleInstantiation](#) is derived from the meta-class [IdsPlatformInstantiation](#) which acts as an abstract base class for all platform modules that contribute to the implementation of the Intrusion Detection System.

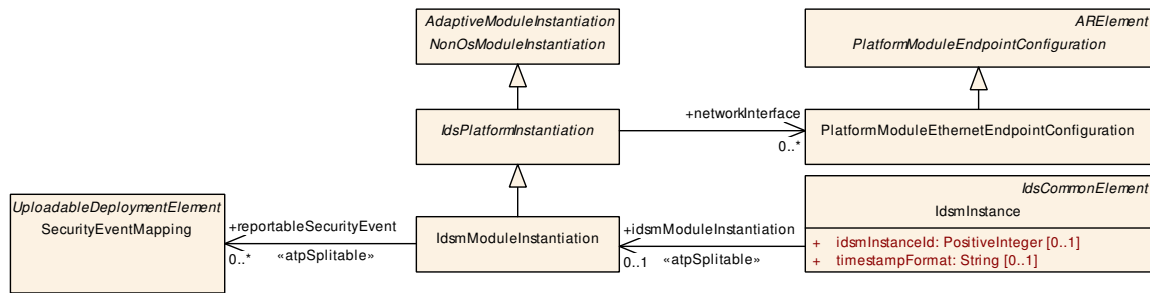


Figure 12.49: Specification of the `IdsmModuleInstantiation`

Class	<i>IdsPlatformInstantiation</i> (abstract)			
Note	This meta-class acts as an abstract base class for platform modules that implement the intrusion detection system. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier, AtpFeature, AtpStructureElement, Identifiable , MultilanguageReferrable, NonOsModuleInstantiation , Referrable			
Subclasses	IdsmModuleInstantiation			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
idsTimeBase	TimeBaseResource	*	ref	This reference identifies the applicable time base resource. Stereotypes: atpSplitable Tags: atp.Splitkey=idsTimeBase atp.Status=candidate
network Interface	PlatformModule EthernetEndpoint Configuration	*	ref	This association contains the network configuration that shall be applied to an instance of an IDS entity. Tags: atp.Status=candidate

Table 12.100: IdsPlatformInstantiation

[constr_3728] Upper multiplicity of reference in the role `IdsPlatformInstantiation.networkInterface`

Status: DRAFT

Imposition time: IT_Mani

[In the context of `IdsPlatformInstantiation`, the reference in the role `networkInterface` shall exist at most once.]

[advisory_01017] Existence of `IdsPlatformInstantiation.networkInterface` if `IdsmModuleInstantiation.reportableSecurityEvent` exists

Status: DRAFT

Imposition time: IT_Mani

[If the reference in the role `IdsmModuleInstantiation.reportableSecurityEvent` exists at least once, then the `IdsmModuleInstantiation` should also define at least one reference in the role `IdsPlatformInstantiation.networkInterface`.]

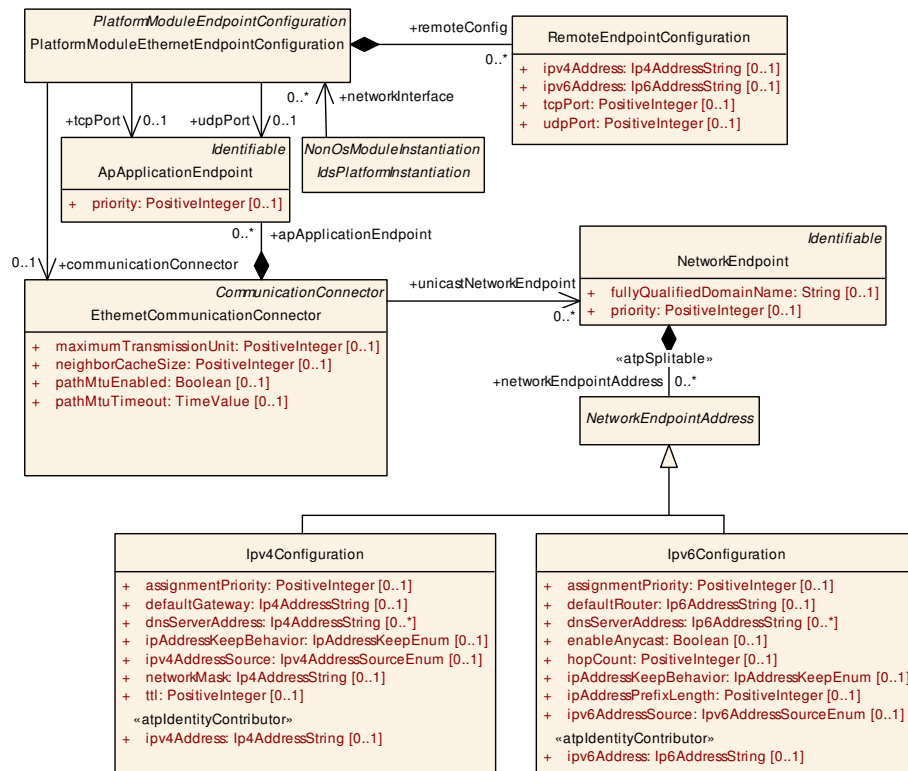


Figure 12.50: PlatformModuleEthernetEndpointConfiguration for transmission of security events

[TPS_MANI_03331] local ApApplicationEndpoint and NetworkEndpoint for transmission of security events

Status: DRAFT

[The ApApplicationEndpoint (Udp or Tcp port number) and NetworkEndpoint over which the security event is transmitted on a VLAN is defined by the IdsPlatformInstantiation.networkInterface reference. The referenced PlatformModuleEthernetEndpointConfiguration defines:

- the local NetworkEndpoint via PlatformModuleEthernetEndpointConfiguration.communicationConnector.unicastNetworkEndpoint
- the udp Port over which the security event is transmitted by PlatformModuleEthernetEndpointConfiguration.udpPort
- the tcp Port over which the security event is transmitted by PlatformModuleEthernetEndpointConfiguration.tcpPort

Please note that it is allowed to define either a udpPort or tcpPort or both.]

[constr_9329] Allowed PlatformModuleEthernetEndpointConfiguration.tcpPort and PlatformModuleEthernetEndpointConfiguration.udpPort references

Imposition time: IT_Mani

[The PlatformModuleEthernetEndpointConfiguration shall only reference ApApplicationEndpoints in the role tcpPort and udpPort that are aggregated by the EthernetCommunicationConnector that is also referenced by the same PlatformModuleEthernetEndpointConfiguration in the role communicationConnector.]

[TPS_MANI_03332] Remote credentials for transmission of security events

Status: DRAFT

[The remote IP Address, protocol and port number to which the security event is transmitted on a VLAN is defined by PlatformModuleEthernetEndpointConfiguration.remoteConfig. The aggregated RemoteEndpointConfiguration defines:

- the remote IP Address via RemoteEndpointConfiguration.ipv4Address and RemoteEndpointConfiguration.ipv6Address
- the udp Port to which the security event is transmitted by RemoteEndpointConfiguration.udpPort
- the tcp Port to which the security event is transmitted by RemoteEndpointConfiguration.tcpPort

]

Class	RemoteEndpointConfiguration			
Note	This meta-class is used to define the IP address and port of a peer. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	PlatformModuleEthernetEndpointConfiguration.remoteConfig			
Attribute	Type	Mult.	Kind	Note
ipv4Address	Ip4AddressString	0..1	attr	remote Unicast or Multicast IPv4 Address
ipv6Address	Ip6AddressString	0..1	attr	remote Unicast or Multicast IPv6 Address
tcpPort	PositiveInteger	0..1	attr	remote tcpPort
udpPort	PositiveInteger	0..1	attr	remote udpPort

Table 12.101: RemoteEndpointConfiguration

[constr_9352] Mutual exclusive existence of RemoteEndpointConfiguration.tcpPort and RemoteEndpointConfiguration.udpPort

Imposition time: IT_Mani

[For each RemoteEndpointConfiguration, either the attribute udpPort or the attribute tcpPort shall exist.]

[constr_9353] Mutual exclusive existence of `RemoteEndpointConfiguration.ipv4Address` and `RemoteEndpointConfiguration.ipv6Address`

Imposition time: `IT_Mani`

[For each `RemoteEndpointConfiguration`, either the attribute `ipv4Address` or the attribute `ipv6Address` shall exist.]

[constr_10517] Upper multiplicity of reference in the role `IdsPlatformInstantiation.idsTimeBase`

Status: DRAFT

Imposition time: `IT_Mani`

[In the context of `IdsPlatformInstantiation`, the reference in the role `idsTimeBase` shall exist at most once.]

One of the tasks of an IdsM is to obtain a custom time stamp that corresponds to reported security events under certain circumstances (which are not relevant for the sake of discussing the modeling).

AUTOSAR supports two ways to obtain a time stamp for the purpose of *Intrusion Detection System Management*, but only one of these ways shall be used at any given time. This restriction is formalized in [\[constr_10501\]](#).

[constr_10501] Access to time stamps for *Intrusion Detection System Management*

Status: DRAFT

Imposition time: `IT_Mani`

[Access to time stamps shall be configured in at most **one of two** possible ways:

- by reference in the role `idsTimeBase` from `IdsPlatformInstantiation` to `TimeBaseResource` or
- by creating a `IdsmTimestampProviderMapping` that refers in the role `pPortPrototypeInExecutable` to a `PPortPrototype` defined by a piece of application software that represents a time-stamp provider.

]

Please note that the first approach mentioned in [\[constr_10501\]](#) is documented in [Chapter 12.11.2](#), while second approach to obtain time-stamps mentioned in [\[constr_10501\]](#) is described in [Chapter 12.11.3](#), resp. [\[TPS_MANI_01440\]](#).

To be clear, the difference between the two approaches for obtaining a time stamp is that the first approach is implemented entirely on the level of the interaction of functional clusters, whereas the second approach involves the execution of application-level software.

12.11.2 Time Stamps for Security Events via Time-Base Resource

In general, there are two possible ways to obtain time stamps, as described in [Chapter 12.11.1](#). The approach described in this section is based on the creation of a reference to a [TimeBaseResource](#).

Time stamps can be obtained from concrete sub-classes of the abstract base-class [TimeBaseResource](#).

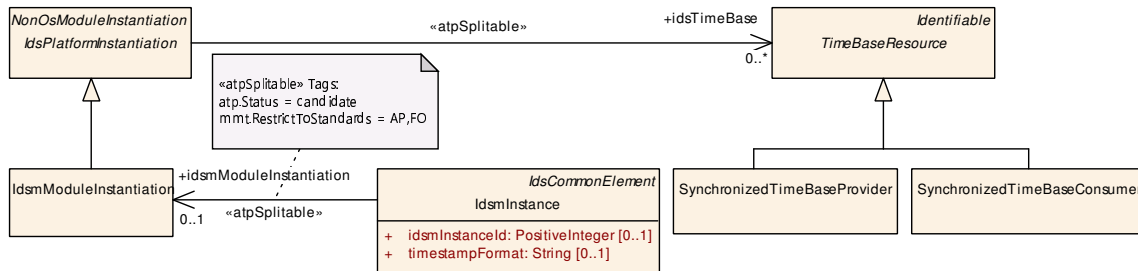


Figure 12.51: Creating an association between a [IdsmModuleInstantiation](#) and a [TimeBaseResource](#)

12.11.3 Mapping to Timestamp Provider

In general, there are two possible ways to obtain time stamps, as described in [Chapter 12.11.1](#). The approach described in this section is based on the creation of a [IdsmTimestampProviderMapping](#).

[TPS_MANI_01440] Using the [IdsmTimestampProviderMapping](#) for the provision of timestamps in the context of the *Intrusion Detection System Management*

Status: DRAFT

[Meta-class [IdsmTimestampProviderMapping](#) creates an association between

- a [PPortPrototype](#) defined in the context of an [Executable](#) that implements application software to provide timestamps for the *Intrusion Detection System Management* and
- a [Process](#) in which the [Executable](#) is configured to run and
- the [IdsPlatformInstantiation](#) in which the *Intrusion Detection System Management* is implemented.

]

[constr_10491] Type of [PPortPrototype](#) referenced in the role [IdsmTimestampProviderMapping.pPortPrototypeInExecutable](#)

Imposition time: [IT_Mani](#)

[A [PPortPrototype](#) referenced in the role [IdsmTimestampProviderMapping.pPortPrototypeInExecutable](#) shall only be typed by a [IdsmTimestampProviderInterface](#).]

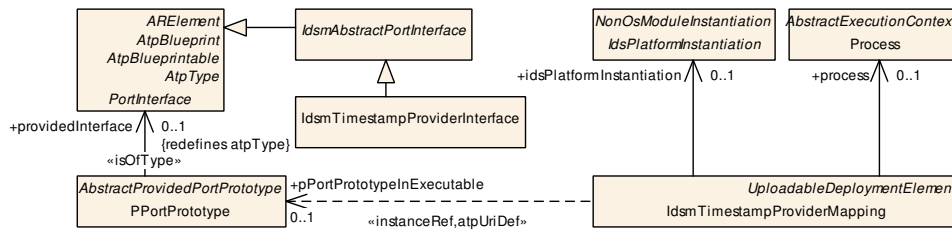


Figure 12.52: Mapping to timestamp provider

[constr_10492] **PPortPrototype** typed by a **IdsmTimestampProviderInterface**

Imposition time: IT_Mani

[A **PPortPrototype** that is typed by a **IdsmTimestampProviderInterface** shall only be referenced in the role **pPortPrototypeInExecutable** by a **IdsmTimestampProviderMapping**.]

Class	IdsmTimestampProviderMapping			
Note	This meta-class represents the ability to define a mapping between an IdsmInstance and a Process on target-configuration level to a given PortPrototype that is typed by a IdsmTimestampProviderInterface. Tags: atp.recommendedPackage=IdsmProviderMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
idsPlatformInstantiation	IdsPlatformInstantiation	0..1	ref	This represents the IdsM functional cluster. Tags: atp.Status=candidate
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This reference identifies the mapped PortPrototype in the application software. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference identifies the process in which the application runs.

Table 12.102: IdsmTimestampProviderMapping

[constr_10493] Existence of **IdsmTimestampProviderMapping.idsPlatformInstantiation**

Imposition time: IT_Mani

[For each **IdsmTimestampProviderMapping**, the reference to an **IdsPlatformInstantiation** in the role **idsPlatformInstantiation** shall exist.]

[constr_10494] Existence of **IdsmTimestampProviderMapping.pPortPrototypeInExecutable**

Imposition time: IT_Mani

[For each **IdsmTimestampProviderMapping**, the instance reference to a **PPortPrototype** in the role **pPortPrototypeInExecutable** shall exist.]

[constr_10495] Existence of `IdsmTimestampProviderMapping.process`

Imposition time: `IT_Mani`

[For each `IdsmTimestampProviderMapping`, the reference to a `Process` in the role `process` shall exist.]

12.11.4 Mapping to Context Provider

[TPS_MANI_01441] Using the `IdsmContextProviderMapping` for the provision of context in the context of the *Intrusion Detection System Management*

Status: DRAFT

[Meta-class `IdsmContextProviderMapping` creates an association between

- a `PPortPrototype` defined in the context of an `Executable` that implements application software to provide context for the *Intrusion Detection System Management* and
- a `Process` in which the `Executable` is configured to run and
- the `IdsPlatformInstantiation` (as the abstract base class `IdsM` module instantiations) in which the *Intrusion Detection System Management* is implemented.

]

[constr_10496] Type of `PPortPrototype` referenced in the role `IdsmContextProviderMapping.pPortPrototypeInExecutable`

Imposition time: `IT_Mani`

[A `PPortPrototype` referenced in the role `IdsmContextProviderMapping.pPortPrototypeInExecutable` shall only be typed by a `IdsmContextProviderInterface`.]

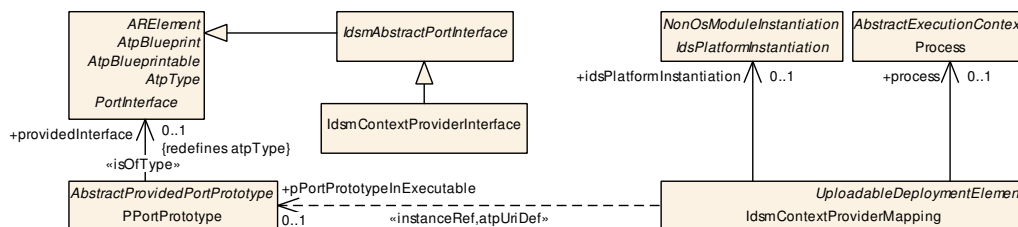


Figure 12.53: Mapping to context provider

[constr_10497] `PPortPrototype` typed by a `IdsmContextProviderInterface`

Imposition time: `IT_Mani`

[A `PPortPrototype` that is typed by a `IdsmContextProviderInterface` shall only be referenced in the role `pPortPrototypeInExecutable` by a `IdsmContextProviderMapping`.]

Class	IdsmContextProviderMapping			
Note	This meta-class represents the ability to define a mapping between an IdsMInstance and a Process on target-configuration level to a given PortPrototype that is typed by a IdsmContextProviderInterface. Tags: atp.recommendedPackage=IdsmProviderMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
idsPlatformInstantiation	IdsPlatformInstantiation	0..1	ref	This represents the IdsM functional cluster. Tags: atp.Status=candidate
pPortPrototypeInExecutable	PPortPrototype	0..1	iref	This reference identifies the mapped PortPrototype in the application software. Stereotypes: atpUriDef InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference identifies the process in which the application runs.

Table 12.103: IdsmContextProviderMapping

[constr_10498] Existence of [IdsmContextProviderMapping.idsPlatformInstantiation](#)

Status: DRAFT

Imposition time: [IT_Mani](#)

[For each [IdsmContextProviderMapping](#), the reference to an [IdsPlatformInstantiation](#) in the role [idsPlatformInstantiation](#) shall exist.]

[constr_10499] Existence of [IdsmContextProviderMapping.pPortPrototypeInExecutable](#)

Imposition time: [IT_Mani](#)

[For each [IdsmContextProviderMapping](#), the instance reference to a [PPortPrototype](#) in the role [pPortPrototypeInExecutable](#) shall exist.]

[constr_10500] Existence of [IdsmContextProviderMapping.process](#)

Imposition time: [IT_Mani](#)

[For each [IdsmContextProviderMapping](#), the reference to a [Process](#) in the role [process](#) shall exist.]

12.11.5 Mapping to Reporting Mode Provider

[TPS_MANI_01455] Using the [IdsmReportingModeProviderMapping](#) for the setting and getting the reporting mode in the context of the *Intrusion Detection System Management*

Status: DRAFT

[Meta-class [IdsmReportingModeProviderMapping](#) creates an association between

- an `RPortPrototype` defined in the context of an `Executable` that implements application software to set and get the reporting mode for the *Intrusion Detection System Management* and
- a `Process` in which the `Executable` is configured to run and
- the `IdsPlatformInstantiation` (as the abstract base class `IdsM` module instantiations) in which the *Intrusion Detection System Management* is implemented.

]

[constr_10568] Type of `RPortPrototype` referenced in the role `IdsmReportingModeProviderMapping.rPortPrototypeInExecutable`

Imposition time: `IT_Mani`

[An `RPortPrototype` referenced in the role `IdsmReportingModeProviderMapping.rPortPrototypeInExecutable` shall only be typed by a `IdsmReportingModeProviderInterface`.]

[constr_10569] `RPortPrototype` typed by an `IdsmReportingModeProviderInterface`

Imposition time: `IT_Mani`

[An `RPortPrototype` that is typed by a `IdsmReportingModeProviderInterface` shall only be referenced in the role `rPortPrototypeInExecutable` by a `IdsmReportingModeProviderMapping`.]

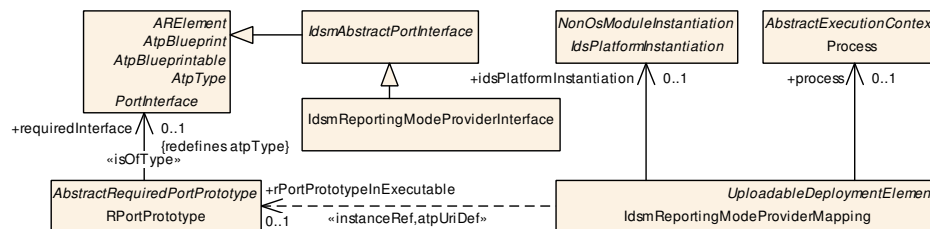


Figure 12.54: Mapping to reporting mode provider

Class	IdsmReportingModeProviderMapping			
Note	This meta-class represents the ability to define a mapping between an <code>IdsMInstance</code> and a <code>Process</code> on target-configuration level to a given <code>PortPrototype</code> that is typed by a <code>IdsmReportingModeProviderInterface</code> . Tags: <code>atp.recommendedPackage=IdsmProviderMappings</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
idsPlatform Instantiation	IdsPlatformInstantiation	0..1	ref	This represents the <code>IdsM</code> functional cluster. Tags: <code>atp.Status=candidate</code>





Class	IdsmReportingModeProviderMapping			
process	Process	0..1	ref	This reference identifies the process in which the application runs
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This reference identifies the mapped RPortPrototype in the application software. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 12.104: IdsmReportingModeProviderMapping

[constr_10570] Existence of IdsmReportingModeProviderMapping.idsPlatformInstantiation*Status:* DRAFT*Imposition time:* IT_Mani

[For each IdsmReportingModeProviderMapping, the reference to a IdsPlatformInstantiation in the role idsPlatformInstantiation shall exist.]

[constr_10571] Existence of IdsmReportingModeProviderMapping.rPortPrototypeInExecutable*Imposition time:* IT_Mani

[For each IdsmReportingModeProviderMapping, the reference to an RPortPrototype in the role rPortPrototypeInExecutable shall exist.]

[constr_10572] Existence of IdsmReportingModeProviderMapping.process*Imposition time:* IT_Mani

[For each IdsmReportingModeProviderMapping, the reference to a Process in the role process shall exist.]

12.11.6 Mapping to Qualified Event Receiver**[TPS_MANI_01474] Using the IdsmQualifiedEventReceiverMapping for the receiving of qualified security events in the context of the Intrusion Detection System Management***Status:* DRAFT

[Meta-class IdsmQualifiedEventReceiverMapping creates an association between

- an RPortPrototype, typed by an IdsmQualifiedEventReceiverInterface, defined in the context of an Executable that implements application software to receive qualified security events and
- a Process in which the Executable is configured to run and

- the `IdsPlatformInstantiation` (as the abstract base class `IdsM` module instantiations) in which the *Intrusion Detection System Management* is implemented.

]

[constr_10623] Type of RPortPrototype referenced in the role `IdsmQualifiedEventReceiverMapping.rPortPrototypeInExecutable`

Imposition time: `IT_Mani`

[An `RPortPrototype` referenced in the role `IdsmQualifiedEventReceiverMapping.rPortPrototypeInExecutable` shall only be typed by a `IdsmQualifiedEventReceiverInterface`.]

[constr_10624] RPortPrototype typed by an `IdsmQualifiedEventReceiverInterface`

Imposition time: `IT_Mani`

[An `RPortPrototype` that is typed by a `IdsmReportingModeProviderInterface` shall only be referenced in the role `rPortPrototypeInExecutable` by a `IdsmQualifiedEventReceiverMapping`.]

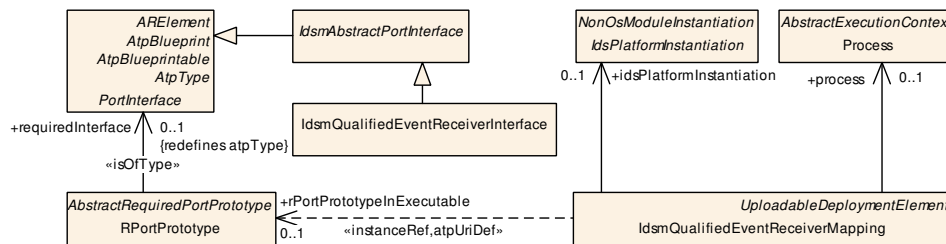


Figure 12.55: Mapping to qualified event receiver

Class	IdsmQualifiedEventReceiverMapping			
Note	This meta-class represents the ability to define a mapping between an <code>IdsM</code> Module Instance and a Process on deployment level to a given <code>PortPrototype</code> that is typed by a <code>IdsmQualifiedEventReceiverInterface</code> . Tags: <code>atp.recommendedPackage=IdsmReceiverMappings</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code> , <code>UploadableDeploymentElement</code> , <code>UploadablePackageElement</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
idsPlatform Instantiation	<code>IdsPlatformInstantiation</code>	0..1	ref	This represents the <code>IdsM</code> functional cluster. Tags: <code>atp.Status=candidate</code>
process	<code>Process</code>	0..1	ref	This reference identifies the process in which the application runs.





Class	IdsmQualifiedEventReceiverMapping			
rPortPrototype InExecutable	RPortPrototype	0..1	iref	This reference identifies the mapped RPortPrototype in the application software. Stereotypes: atpUriDef InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef

Table 12.105: IdsmQualifiedEventReceiverMapping

[constr_10625] Existence of IdsmQualifiedEventReceiverMapping.idsPlatformInstantiation*Status:* DRAFT*Imposition time:* IT_Mani

[For each IdsmQualifiedEventReceiverMapping, the reference to a IdsPlatformInstantiation in the role idsPlatformInstantiation shall exist.]

[constr_10626] Existence of IdsmQualifiedEventReceiverMapping.rPortPrototypeInExecutable*Imposition time:* IT_Mani

[For each IdsmQualifiedEventReceiverMapping, the reference to an RPortPrototype in the role rPortPrototypeInExecutable shall exist.]

[constr_10627] Existence of IdsmQualifiedEventReceiverMapping.process*Imposition time:* IT_Mani

[For each IdsmQualifiedEventReceiverMapping, the reference to a Process in the role process shall exist.]

12.11.7 Target-Configuration for Security Events**[TPS_MANI_01341] Security events that are actually reported by a local IdsM***Status:* DRAFT

[The security events that are actually reported by a local IdsM are represented by meta-class SecurityEventMapping, referenced by IdsmModuleInstantiation in the role reportableSecurityEvent.]

[TPS_MANI_01342] Semantics of SecurityEventMapping*Status:* DRAFT

[The semantics of meta-class SecurityEventMapping is to identify

- the PortPrototype in the context of an Executable from which the security event is reported,
- the Process that runs the Executable, and
- the SecurityEventDefinition that is subject to be reported.

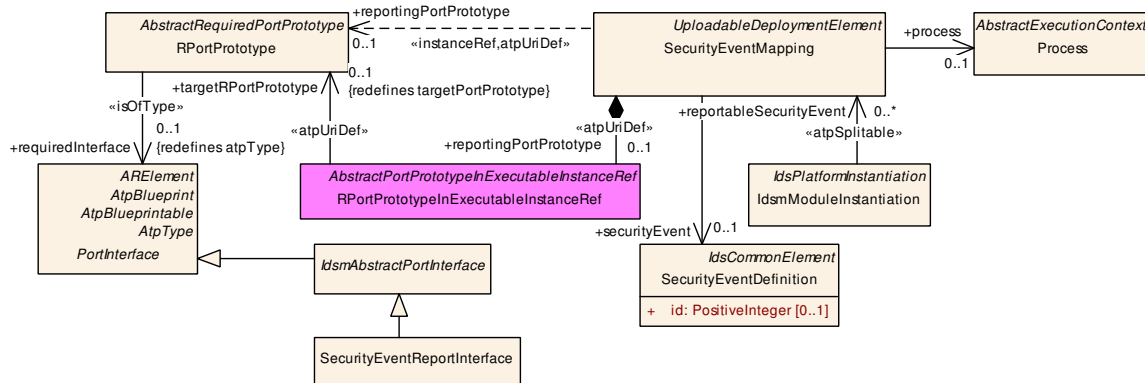


Figure 12.56: Modeling of between a **SecurityEventMapping**

Class	SecurityEventMapping			
Note	This meta-class represents a reportable instance of a security event. Tags: atp.Status=candidate atp.recommendedPackage=SecurityEventMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
process	Process	0..1	ref	This reference identifies the process in which context the security event is reported. Tags: atp.Status=candidate
reportingPort Prototype	RPortPrototype	0..1	iref	This instanceRef identifies the PortPrototype over which the security event is reported. Stereotypes: atpUriDef Tags: atp.Status=candidate InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef
securityEvent	SecurityEventDefinition	0..1	ref	This reference identifies the corresponding SecurityEvent Definition. Tags: atp.Status=candidate

Table 12.106: SecurityEventMapping

12.12 Service-oriented Vehicle Diagnostics

12.12.1 Overview

The SOVD architecture described in [30, ASAM SOVD] foresees the existence of an SOVD gateway that communicates with:

- an SOVD Client outside the vehicle's network
- the collection of SOVD Servers inside the vehicle's network.

Some of the configuration items of **SOVD** gateway and **SOVD Server** can be shared, but some are distinct for one of the two **SOVD** entities. This aspect is reflected in the formalization as **SovdServerInstantiation** and **SovdGatewayInstantiation**.

[TPS_MANI_01399] Modeling of the configuration of Service-oriented Vehicle Diagnostics [The target-configuration-level configuration of **SOVD** software is represented by abstract meta-class **SovdModuleInstantiation** and its two sub-classes:

- **SovdServerInstantiation**: representation of **SOVD Server** reachable via **SOVD** somewhere in the vehicle network.
- **SovdGatewayInstantiation**: representation of the “edge-node” that connects an **SOVD Client** with the **SOVD Servers** in the vehicle network. This is a logical role, i.e. the **Machine** on which an **SovdGatewayInstantiation** is running could also host one or more **SovdServerInstantiations**.

]

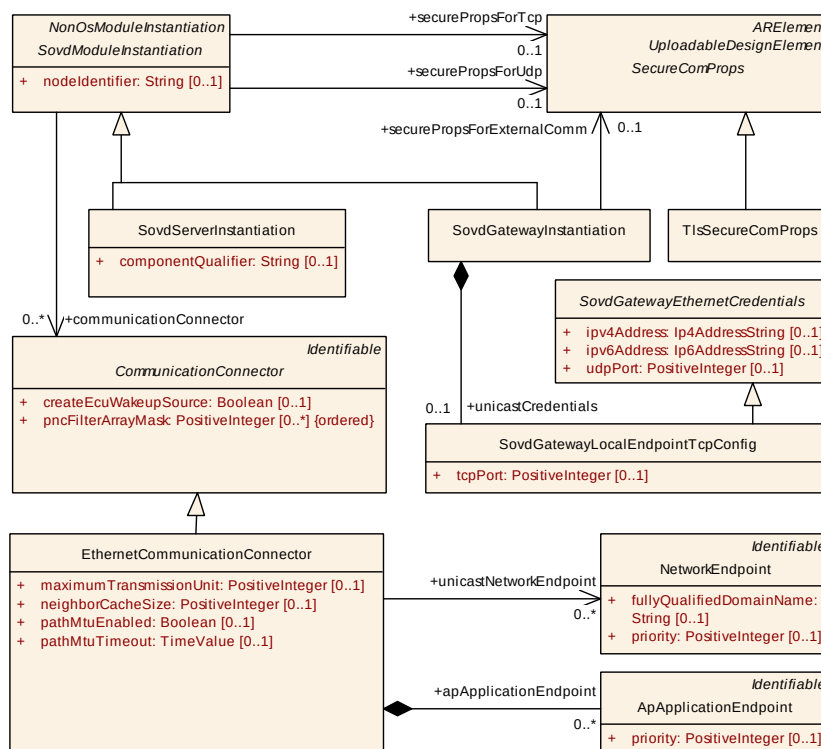


Figure 12.57: Modeling of subclasses of **SovdModuleInstantiation**

[TPS_MANI_01400] Secure communication between SOVD Gateway and SOVD Server [The *unicast* communication between **SOVD** gateway and **SOVD Server** is modeled using the same concepts as for other vehicle-internal communication, i.e. by reference to a **CommunicationConnector** in the role **SovdModuleInstantiation.communicationConnector**.]

[TPS_MANI_01401] Support for TLS in vehicle-internal SOVD communication [The internal **SOVD** communication can be secured by **TLS**. The configuration of the

TLS credentials is modeled by means of the reference [SovdModuleInstantiation.securePropsForTcp](#).]

Please note that the usage of TLS over UDP is not applicable to SOVD communication.

Class	SovdModuleInstantiation (abstract)			
Note	This abstract meta-class serves as the base class for meta-classes that describe the configuration of an SOVD module. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Subclasses	SovdGatewayInstantiation , SovdServerInstantiation			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
communicationConnector	CommunicationConnector	*	ref	This reference identifies the collection of communication connectors used by the SOVD module instantiation for vehicle-internal communication. Tags: atp.Status=candidate
nodeIdentifier	String	0..1	attr	This attribute represents the local hostname of the SOVD server to be used during the execution of the DNS-SD protocol. Tags: atp.Status=candidate
securePropsForTcp	SecureComProps	0..1	ref	This reference is used to identify the applicable TCP secure com properties for the external communication of the enclosing SOVD server. Tags: atp.Status=candidate
securePropsForUdp	SecureComProps	0..1	ref	This reference is used to identify the applicable UDP secure com properties for the external communication of the enclosing SOVD server. Tags: atp.Status=candidate

Table 12.107: SovdModuleInstantiation

12.12.2 SOVD Server

[TPS_MANI_01402] Identification of the [SOVD Server](#) [The identification of the [SOVD Server](#) is supported by the configuration of the attribute [SovdServerInstantiation.componentQualifier](#).

In other words, the [SOVD Client](#) communicates with the [SOVD Server](#) by putting the value of the [componentQualifier](#) into the *component-identifier* part of the query URL.]

Class	SovdServerInstantiation
Note	This meta-class represents the configuration of an SOVD server. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable , SovdModuleInstantiation





Class	SovdServerInstantiation			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
componentQualifier	String	0..1	attr	This attributes described the component qualifier used to compose an SOVD query. Tags: atp.Status=candidate

Table 12.108: SovdServerInstantiation

[constr_10400] Existence of [SovdServerInstantiation.componentQualifier](#)

Imposition time: [IT_Mani](#)

[For each [SovdServerInstantiation](#), attribute [componentQualifier](#) shall exist.]

12.12.3 SOVD Gateway

The [SOVD](#) gateway represents the “edge-node” of the SOVD-related internal communication network towards the tester.

This means that the [SOVD](#) gateway’s configuration not only consists of the definition of internal communication paths, it also needs to expose credentials for the communication with a [SOVD Client](#) as well as the application of search functionality via *multicast DNS* (mDNS), as described in [31, RFC-6762] and *DNS Service Discovery* (DNS-SD), see [32, RFC-6763].

[TPS_MANI_01403] External communication of the [SOVD](#) gateway [The specification of external communication with the [SOVD Client](#) needs to cover the following cases:

- multicast DNS: usage of standardized mDNS credentials².
- DNS-SD: configuration of hostname in the form of [SovdModuleInstantiation.nodeIdentifier](#).
- unicast communication with the diagnostic client: aggregation of [SovdGatewayLocalEndpointTcpConfig](#) in the role [SovdGatewayInstantiation.unicastCredentials](#).

]

[TPS_MANI_01404] Secure communication between [SOVD](#) gateway and [SOVD Client](#) [The communication between [SOVD](#) gateway and [SOVD Client](#) can be secured by TLS.

²mDNS uses multicast UDP credentials: 224.0.0.251, port 5353 (IPv4) [33] [34] or FF02::FB (IPv6), port 5353 [35] [34], reserved by IANA.

The TLS configuration for the [SOVD](#) gateway can be created by means of the reference in the role [SovdGatewayInstantiation.securePropsForExternalComm.](#)]

Class	SovdGatewayInstantiation			
Note	This meta-class represents the configuration of an SOVD gateway. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable , SovdModuleInstantiation			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
securePropsForExternalComm	SecureComProps	0..1	ref	This reference is used to identify the applicable secure com properties for the external communication of the enclosing SOVD gateway. Tags: atp.Status=candidate
unicastCredentials	SovdGatewayLocalEndpointTcpConfig	0..1	aggr	This aggregation is used to describe the unicast credentials for external (i.e. with a tester) communication of the enclosing SOVD gateway. Tags: atp.Status=candidate

Table 12.109: SovdGatewayInstantiation

Class	SovdGatewayLocalEndpointTcpConfig			
Note	This meta-class provides the ability to define the TCP configuration of a local endpoint for external communication of an SOVD gateway. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , SovdGatewayEthernetCredentials			
Aggregated by	SovdGatewayInstantiation.unicastCredentials			
Attribute	Type	Mult.	Kind	Note
tcpPort	PositiveInteger	0..1	attr	This attribute describes the port number of the port used for TCP communication. Tags: atp.Status=candidate

Table 12.110: SovdGatewayLocalEndpointTcpConfig

[constr_10401] Existence of [SovdGatewayLocalEndpointTcpConfig.tcpPort](#)

Imposition time: [IT_Mani](#)

[For each [SovdGatewayLocalEndpointTcpConfig](#), attribute [tcpPort](#) shall exist.]

Class	SovdGatewayEthernetCredentials (abstract)			
Note	This meta-class represents the ability to define Ethernet credentials for the purpose of connecting a client to an SOVD gateway. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Subclasses	SovdGatewayLocalEndpointTcpConfig			
Attribute	Type	Mult.	Kind	Note





Class	SovdGatewayEthernetCredentials (abstract)			
ipv4Address	Ip4AddressString	0..1	attr	This attribute represents the IPv4 address for the case that IPv4 is used for communication between the SOVD gateway and a client. Tags: atp.Status=candidate
ipv6Address	Ip6AddressString	0..1	attr	This attribute represents the IPv6 address for the case that IPv6 is used for communication between the SOVD gateway and a client. Tags: atp.Status=candidate
udpPort	PositiveInteger	0..1	attr	This attribute describes the port number of the port used for UDP communication. Tags: atp.Status=candidate

Table 12.111: SovdGatewayEthernetCredentials

[constr_10402] Existence of [SovdGatewayEthernetCredentials.ipv4Address](#) vs. [SovdGatewayEthernetCredentials.ipv6Address](#)

Imposition time: [IT_Mani](#)

[For each [SovdGatewayEthernetCredentials](#), at least one of attributes

- [SovdGatewayEthernetCredentials.ipv4Address](#)
- [SovdGatewayEthernetCredentials.ipv6Address](#)

]

[constr_10403] Existence of [SovdGatewayEthernetCredentials.udpPort](#)

Imposition time: [IT_Mani](#)

[For each [SovdGatewayEthernetCredentials](#), attribute [udpPort](#) shall exist.]

12.13 Firewall Target-Configuration

AUTOSAR supports an Ethernet packet filtering firewall as an additional security layer. Such a firewall checks, for example, the source and destination IP address, protocols (UDP and TCP) and port addresses. If the address information matches then the packet is considered secured.

Two kinds of firewalls are supported:

1. Stateful packet filtering firewalls
2. Stateless packet filtering firewalls

The stateful firewall monitors the state of network connections and analyzes the complete context of traffic and data packets. The context involves the metadata of the packets (e.g. the ports and IP address of the endpoint and destination) and the state refers to the policy based on the connection state. Approved traffic requests will be added to an approved list and will be allowed to proceed to the network.

The stateless firewall supports a rule-based filtering of traffic based on the evaluation of IP packet parameters without knowledge of the connection status (e.g. TCP session). The filtering can either be an allow list- or a block list-based.

Class	AdaptiveFirewallModuleInstantiation			
Note	This meta-class defines the attributes for the Firewall configuration on a specific machine. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier, AtpFeature, AtpStructureElement, Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
stateDep Firewall	StateDependentFirewall	*	ref	Firewall rules that are defined in a firewall state. Tags: atp.Status=candidate

Table 12.112: AdaptiveFirewallModuleInstantiation

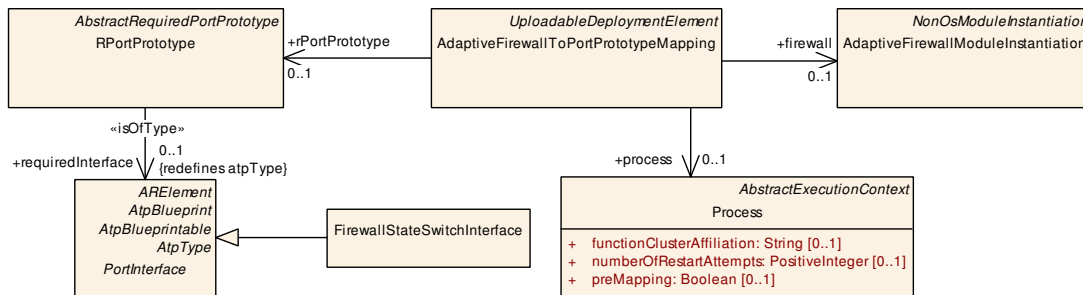


Figure 12.58: AdaptiveFirewallModuleInstantiation and the relationship to Application with a RPortPrototype typed by a FirewallStateSwitchInterface

[TPS_MANI_03296] Machine-specific configuration settings for Firewall

Status: DRAFT

[The Machine-specific configuration settings for the Firewall module are collected in [AdaptiveFirewallModuleInstantiation](#).]

Class	AdaptiveFirewallToPortPrototypeMapping			
Note	This meta-class maps the AdaptiveFirewall moduleInstantiation to the RPortPrototype that is typed by a FirewallModeSwitchInterface. Tags: atp.Status=candidate atp.recommendedPackage=AdaptiveFirewallToPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject, CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
firewall	AdaptiveFirewallModuleInstantiation	0..1	ref	Reference to the Firewall module Tags: atp.Status=candidate





Class	AdaptiveFirewallToPortPrototypeMapping			
process	Process	0..1	ref	The referenced Process is supposed to define the Port Prototype typed by a FirewallStateSwitchInterface, referenced by the enclosing mapping class. If this reference does not exist, any Process using the respective API can switch the firewall state. Tags: atp.Status=candidate
rPortPrototype	RPortPrototype	0..1	ref	Reference to RPortPrototype typed by a FirewallMode SwitchInterface Tags: atp.Status=candidate

Table 12.113: AdaptiveFirewallToPortPrototypeMapping

[TPS_MANI_03297] Semantics of AdaptiveFirewallToPortPrototypeMapping*Status:* DRAFT

[Meta-class `AdaptiveFirewallToPortPrototypeMapping` has the ability to map a specific `RPortPrototype` typed by the `FirewallStateSwitchInterface` to the configured `AdaptiveFirewallModuleInstantiation`.]

[constr_5358] AdaptiveFirewallToPortPrototypeMapping.rPortPrototype restriction*Status:* DRAFT*Imposition time:* IT_Mani

[The `AdaptiveFirewallToPortPrototypeMapping` is only allowed to reference a `RPortPrototype` that is typed by the `FirewallStateSwitchInterface`. This rule shall be imposed.]

Firewall functionality can be implemented on Host ECUs and on switches (as network firewalls). This is the reason why the `CouplingElement` (that defines a Switch) and the `Machine` (via the `AdaptiveFirewallModuleInstantiation`) both have an optional reference to the `StateDependentFirewall` that defines the entry point for the Firewall configuration.

The in-vehicle traffic may depend on the current state of the firewall state-machine. The firewall rules are adaptable to this and therefore the `StateDependentFirewall` is associated with a `firewallState`.

[TPS_MANI_03298] Semantics of StateDependentFirewall*Status:* DRAFT

[If the `firewallState` that is referenced by the `StateDependentFirewall` is active, then the firewall rule that is defined by the `StateDependentFirewall` shall be considered as active as well.]

[constr_5348] Mandatory `initialMode` in `ModeDeclarationGroup` that is referenced by `StateDependentFirewall`

Status: DRAFT

Imposition time: IT_Mani

[The `ModeDeclarationGroup` that is referenced via a `ModeDeclaration` from `StateDependentFirewall` in the role `firewallState` shall define an `initialMode`.]

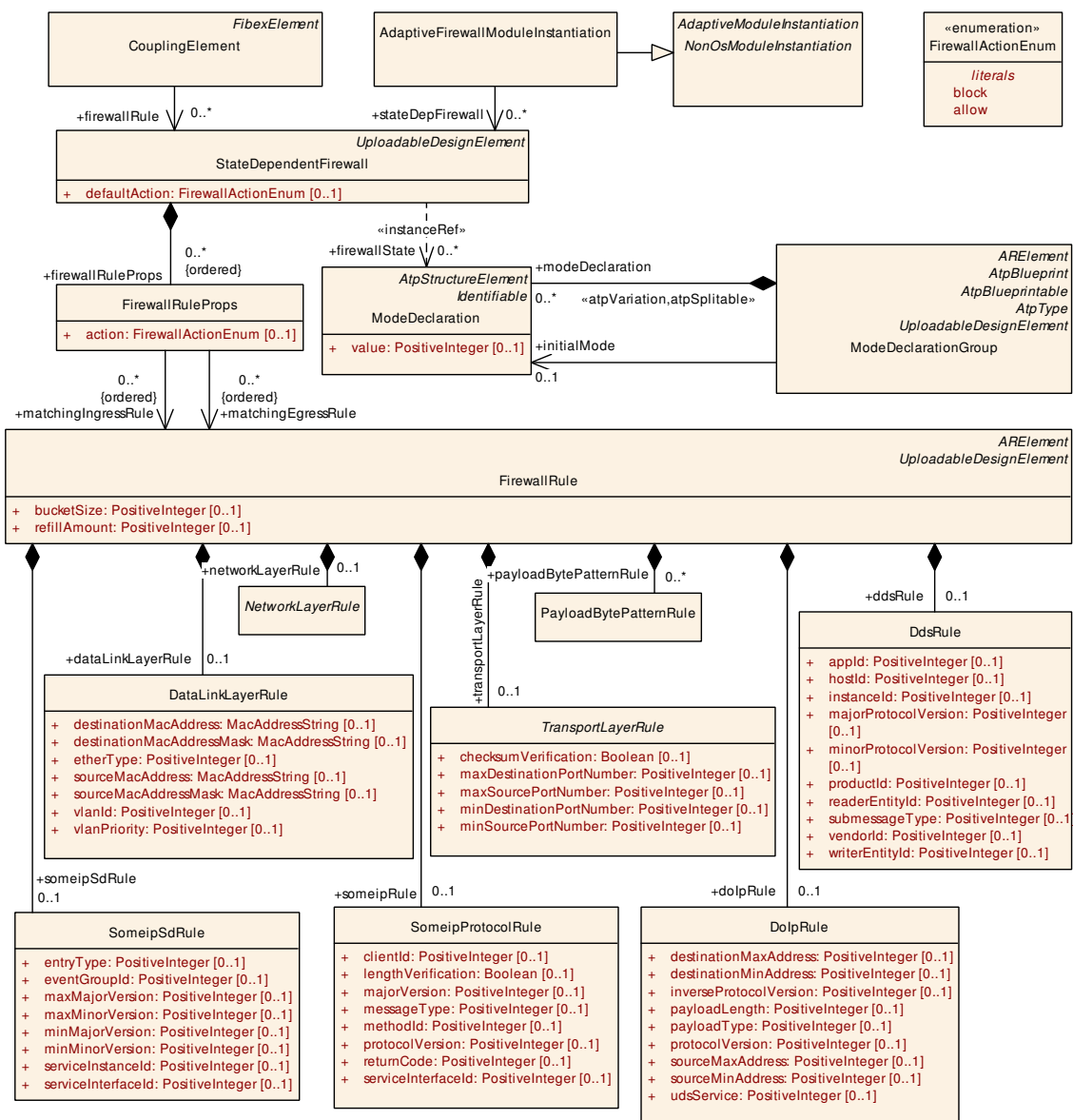


Figure 12.59: Modeling of the Firewall

This `initialMode` is used in the case that the system boots up and no `FirewallMode` is yet set by an application.

[constr_5349] Mandatory `defaultAction` in `StateDependentFirewall`

Status: DRAFT

Imposition time: IT_Mani

[The `StateDependentFirewall` shall always define the attribute `defaultAction`.]

[TPS_MANI_03299] Semantics of `FirewallRuleProps`

Status: DRAFT

[Each `StateDependentFirewall` defines `FirewallRuleProps` that in turn define a rule expression (`matchingIngressRule` and `matchingEgressRule`) and an `action` that is performed in case that the rule expression matches.]

[constr_5350] Mandatory `action` in `FirewallRuleProps`

Status: DRAFT

Imposition time: IT_Mani

[The `FirewallRuleProps` shall always define the attribute `action`.]

[TPS_MANI_03300] Semantics of `FirewallRule`

Status: DRAFT

[The `FirewallRule` defines an expression which matches network traffic against the conditions that are defined by the expression.]

[TPS_MANI_03301] Semantics of `FirewallRule.refillAmount` and `FirewallRule.bucketSize`

Status: DRAFT

[Every firewall matching rule can be associated with a rate limit for limiting network traffic. In AUTOSAR, the rate limit is implemented by a leaky bucket algorithm. The attributes `FirewallRule.refillAmount` and `FirewallRule.bucketSize` are used to configure the rate limit algorithm.]

[constr_5351] `FirewallRule` is allowed to aggregate at most one protocol subelement

Status: DRAFT

Imposition time: IT_Mani

[A `FirewallRule` is allowed to aggregate either:

- `someipSdRule`
- `someipRule`
- `doIpRule`

]

If a firewall rule needs to cover different different Protocols (e.g. SOME/IP, DoIP) then several `FirewallRules` need to be defined because of [constr_5351]. Please note

that a [FirewallRule](#) is allowed to aggregate a [DataLinkLayerRule](#), a [NetworkLayerRule](#) and a [TransportLayerRule](#) at the same time in addition to one of the sub-elements mentioned in [\[constr_5351\]](#).

Class	StateDependentFirewall			
Note	Firewall rules that are defined in a firewall state Tags: atp.Status=candidate atp.recommendedPackage=StateDependentFirewallRules			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
defaultAction	FirewallActionEnum	0..1	attr	This attribute defines a defaultAction in case that the VehicleMode is not yet set. Tags: atp.Status=candidate
firewallRule Props (ordered)	FirewallRuleProps	*	aggr	Collection of firewall rules that apply in the vehicle mode Tags: atp.Status=candidate
firewallState	ModeDeclaration	*	iref	Reference to firewall states in which the Firewall is active. If one of the referenced ModeDeclarations is the current firewall state then the firewall rule shall be considered as active. Tags: atp.Status=candidate InstanceRef implemented by: FirewallStateInFirwall StateSwitchInterfaceInstanceRef This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 12.114: StateDependentFirewall

Class	FirewallRule			
Note	Firewall Rule that defines the control information in individual packets. Tags: atp.Status=candidate atp.recommendedPackage=FirewallRules			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
bucketSize	PositiveInteger	0..1	attr	This attribute defines the capacity of the queue for rate limitation (leaky-bucket Algorithm). Tags: atp.Status=candidate
dataLinkLayer Rule	DataLinkLayerRule	0..1	aggr	Configuration of rules on the Data Link Layer Tags: atp.Status=candidate
ddsRule	DdsRule	0..1	aggr	Configuration of firewall rules for DDS. Tags: atp.Status=candidate
dolpRule	DolpRule	0..1	aggr	Configuration of firewall rules for DoIP messages Tags: atp.Status=candidate
networkLayer Rule	NetworkLayerRule	0..1	aggr	Configuration of rules on the Network Layer Tags: atp.Status=candidate
payloadByte PatternRule	PayloadBytePatternRule	*	aggr	Configuration of generic firewall rules Tags: atp.Status=candidate





Class	FirewallRule			
refillAmount	PositiveInteger	0..1	attr	This attribute defines the output rate that describes how many packets leave the queue per second (leaky-bucket Algorithm). Tags: atp.Status=candidate
someipRule	SomeipProtocolRule	0..1	aggr	Configuration of firewall rules for SOME/IP messages Tags: atp.Status=candidate
someipSdRule	SomeipSdRule	0..1	aggr	Configuration of firewall rules for SOME/IP Service Discovery messages Tags: atp.Status=candidate
transportLayerRule	TransportLayerRule	0..1	aggr	Configuration of rules on the Transport Layer Tags: atp.Status=candidate

Table 12.115: FirewallRule

Class	FirewallRuleProps			
Note	Firewall rule that is defined by an action that is performed if the referenced pattern matches. Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	StateDependentFirewall.firewallRuleProps			
Attribute	Type	Mult.	Kind	Note
action	FirewallActionEnum	0..1	attr	Action that is performed by the firewall if the matching Rule is fulfilled. Tags: atp.Status=candidate
matchingEgressRule (ordered)	FirewallRule	*	ref	This element defines an egress rule expression against which the network traffic is matched. Tags: atp.Status=candidate
matchingIngressRule (ordered)	FirewallRule	*	ref	This element defines an ingress rule expression against which the network traffic is matched. Tags: atp.Status=candidate

Table 12.116: FirewallRuleProps

Enumeration	FirewallActionEnum
Note	List of actions that the Firewall is able to perform. Tags: atp.Status=candidate
Aggregated by	FirewallRuleProps.action , StateDependentFirewall.defaultAction
Literal	Description
allow	Firewall allows the communication Tags: atp.EnumerationLiteralIndex=1 atp.Status=candidate This EnumerationLiteral is only used by the AUTOSAR Adaptive Platform.
block	Firewall blocks the communication Tags: atp.EnumerationLiteralIndex=0 atp.Status=candidate This EnumerationLiteral is only used by the AUTOSAR Adaptive Platform.

Table 12.117: FirewallActionEnum

12.13.1 Firewall rules on Datalink layer

[TPS_MANI_03302] Firewall rules on Data Link Layer

Status: DRAFT

[The meta-class `DataLinkLayerRule` is used to define firewall rules on the Data Link Layer (second layer of the seven-layer OSI model).]

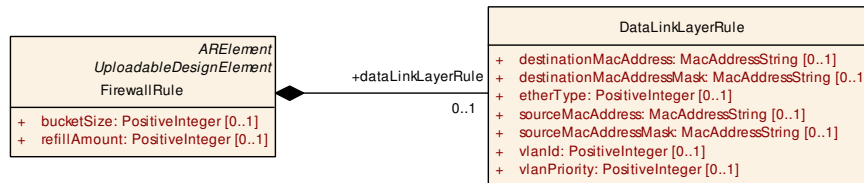


Figure 12.60: Modeling of Firewall rules on Data Link Layer

[TPS_MANI_03303] Filtering of packets with a single MAC address and MAC address range

Status: DRAFT

[The `sourceMacAddressMask` is specifying which bits in the `sourceMacAddress` are static to define a source MAC Address or source MAC Address Range. For each bit position in the MAC mask a 1 indicates that the corresponding address bit is significant and a 0 indicates that the address bit is ignored. `destinationMacAddressMask` and `destinationMacAddress` shall be used in the same way to define a destination MAC Address or destination MAC Address Range.]

If, for example, only the first four octets of a MAC address are relevant, a `sourceMacAddressMask` of ff:ff:ff:ff:00:00 is used. A `sourceMacAddressMask` of ff:ff:ff:ff:ff:ff defines that all address bits are relevant and is used to define a single MAC address.

Class	DataLinkLayerRule			
Note	Configuration of filter rules on the DataLink layer Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	FirewallRule.dataLinkLayerRule			
Attribute	Type	Mult.	Kind	Note
destinationMacAddress	MacAddressString	0..1	attr	Filter to match packets with the destination MAC address. Tags: atp.Status=candidate
destinationMacAddressMask	MacAddressString	0..1	attr	Filter to match packets with the destination MAC address range. The destinationMacAddress with the destinationMacAddressMask defines the MAC address range. Tags: atp.Status=candidate
etherType	PositiveInteger	0..1	attr	Filter to match packets based on the EtherType field in the Ethernet frame. The EtherType is used to indicate which protocol is encapsulated in the payload of the frame. Tags: atp.Status=candidate





Class	DataLinkLayerRule			
sourceMac Address	MacAddressString	0..1	attr	Filter to match packets with the source MAC address. Tags: atp.Status=candidate
sourceMac AddressMask	MacAddressString	0..1	attr	Filter to match packets with the source MAC address range. The sourceMacAddress with the sourceMacAddressMask defines the MAC address range. Tags: atp.Status=candidate
vlanId	PositiveInteger	0..1	attr	Filter of packets with a specific VlanId. Tags: atp.Status=candidate
vlanPriority	PositiveInteger	0..1	attr	Filter of packets with a specific Vlan priority. Tags: atp.Status=candidate

Table 12.118: DataLinkLayerRule

12.13.2 Firewall rules on Network layer

[TPS_MANI_03304] Firewall rules on Network Layer

Status: DRAFT

[The meta-class [NetworkLayerRule](#) is used to define firewall rules on the Network Layer (third layer of the seven-layer OSI model).]

[TPS_MANI_03305] Filtering of packets with a single IP address and IP address range

Status: DRAFT

[The [Ipv4Rule.sourceNetworkMask](#) (or [Ipv6Rule.sourceNetworkMask](#)) is specifying which bits in the [Ipv4Rule.sourceIpAddress](#) (or [Ipv6Rule.sourceIpAddress](#)) are static to define a source IP Address or source IP Address Range. [destinationIpAddress](#) and [destinationNetworkMask](#) shall be used in the same way to define a destination IP Address or destination IP Address Range.]

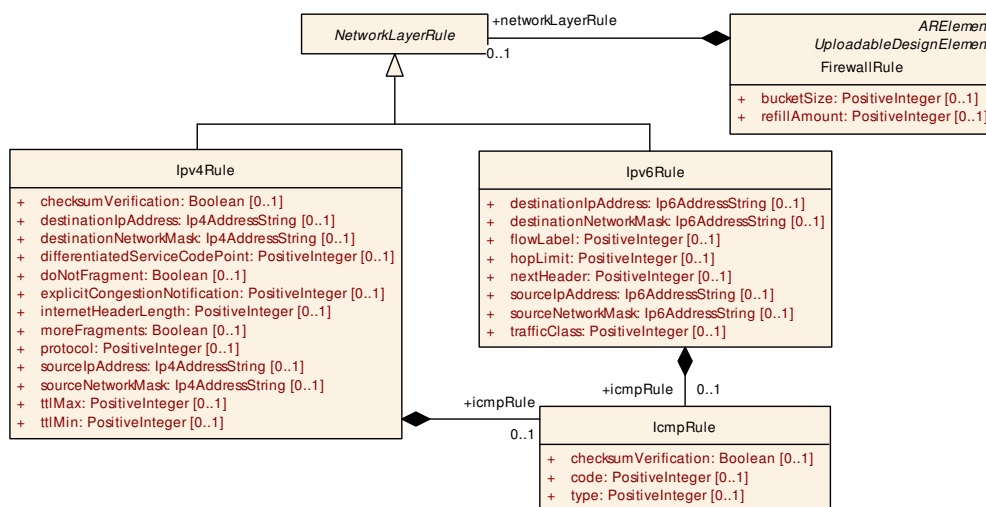


Figure 12.61: Modeling of Firewall rules on Network Layer

If for example only the first three octets of a IP address are relevant, a [sourceNetworkMask](#) of 255.255.255.0 is used. The 255 octets in the mask define that the corresponding numbers in the IP address are static and never change. In this example the first three octets are fixed and the fourth octet is 0. This means that on the fourth octet all individual numbers from 1-254 are valid.

Class	NetworkLayerRule (abstract)			
Note	Configuration of filter rules on the Network layer Tags: atp.Status=candidate			
Base	ARObject			
Subclasses	Ipv4Rule , Ipv6Rule			
Aggregated by	FirewallRule.networkLayerRule			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.119: NetworkLayerRule

Class	Ipv4Rule			
Note	Configuration of filter rules on IPv4 level. Tags: atp.Status=candidate			
Base	ARObject , NetworkLayerRule			
Aggregated by	FirewallRule.networkLayerRule			
Attribute	Type	Mult.	Kind	Note
checksum Verification	Boolean	0..1	attr	Defines whether a Ipv4 header checksum verification is performed or not. Tags: atp.Status=candidate
destinationIp Address	Ip4AddressString	0..1	attr	Filter to match packets with the destination IPv4 address. Tags: atp.Status=candidate
destination NetworkMask	Ip4AddressString	0..1	attr	Filter to match packets with the destination IPv4 address range. The destinationIpAddress with the destination NetworkMask defines the IP address range. Tags: atp.Status=candidate
differentiated ServiceCode Point	PositiveInteger	0..1	attr	Filter to match packets with a DSCP value. Tags: atp.Status=candidate
doNotFragment	Boolean	0..1	attr	Filter to match packets that have the doNotFragment bit in the Header set. Tags: atp.Status=candidate
explicit Congestion Notification	PositiveInteger	0..1	attr	Filter to match packets with a ECN code point. Tags: atp.Status=candidate
icmpRule	IcmpRule	0..1	aggr	Configuration of filter rules for ICMP (Internet Control Message Protocol). Tags: atp.Status=candidate
internetHeader Length	PositiveInteger	0..1	attr	Filter to match packets with a minimum ipv4 header length. Tags: atp.Status=candidate
moreFragments	Boolean	0..1	attr	Filter to match packets that have the moreFragments flag in the Header set. Tags: atp.Status=candidate
protocol	PositiveInteger	0..1	attr	Filter to match packets with a IP protocol number . Tags: atp.Status=candidate





Class	Ipv4Rule			
sourceIp Address	Ip4AddressString	0..1	attr	Filter to match packets with the source IPv4 address. Tags: atp.Status=candidate
sourceNetwork Mask	Ip4AddressString	0..1	attr	Filter to match packets with the source IPv4 address range. The sourceIp Address with the sourceNetwork Mask defines the IP address range. Tags: atp.Status=candidate
ttlMax	PositiveInteger	0..1	attr	Filter to match packets with a maximum ttl value (TimeTo Live defines the lifetime of data on the network). Tags: atp.Status=candidate
ttlMin	PositiveInteger	0..1	attr	Filter to match packets with a minimum ttl value (TimeTo Live defines the lifetime of data on the network). Tags: atp.Status=candidate

Table 12.120: Ipv4Rule

Class	Ipv6Rule			
Note	Configuration of filter rules on IPv6 level. Tags: atp.Status=candidate			
Base	ARObject , NetworkLayerRule			
Aggregated by	FirewallRule.networkLayerRule			
Attribute	Type	Mult.	Kind	Note
destinationIp Address	Ip6AddressString	0..1	attr	Filter to match packets with the destination IPv6 address. Tags: atp.Status=candidate
destination NetworkMask	Ip6AddressString	0..1	attr	Filter to match packets with the destination IPv6 address range. The destinationIp Address with the destination NetworkMask defines the MAC address range. Tags: atp.Status=candidate
flowLabel	PositiveInteger	0..1	attr	Filter to match packets with a defined flow label. Tags: atp.Status=candidate
hopLimit	PositiveInteger	0..1	attr	Filter to match packets with a minimum hop limit. Tags: atp.Status=candidate
icmpRule	IcmpRule	0..1	aggr	Configuration of filter rules for ICMP (Internet Control Message Protocol). Tags: atp.Status=candidate
nextHeader	PositiveInteger	0..1	attr	Filter to match packets with a defined type of an extension header. Tags: atp.Status=candidate
sourceIp Address	Ip6AddressString	0..1	attr	Filter to match packets with the source IPv6 address. Tags: atp.Status=candidate
sourceNetwork Mask	Ip6AddressString	0..1	attr	Filter to match packets with the source IPv6 address range. The sourceIp Address with the sourceNetwork Mask defines the IP address range. Tags: atp.Status=candidate
trafficClass	PositiveInteger	0..1	attr	Filter to match packets with a defined traffic class or priority. Tags: atp.Status=candidate

Table 12.121: Ipv6Rule

Class	IcmpRule			
Note	Configuration of filter rules for ICMP (Internet Control Message Protocol). Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	IcmpRule, IcmpRule			
Attribute	Type	Mult.	Kind	Note
checksum Verification	Boolean	0..1	attr	Defines whether a Icmp header checksum verification is performed or not. Tags: atp.Status=candidate
code	PositiveInteger	0..1	attr	Filter to match packets with the Icmp code. Tags: atp.Status=candidate
type	PositiveInteger	0..1	attr	Filter to match packets with the Icmp type. Tags: atp.Status=candidate

Table 12.122: IcmpRule

12.13.3 Firewall rules on Transport layer

[TPS_MANI_03306] Firewall rules on Transport Layer

Status: DRAFT

[The meta-class [TransportLayerRule](#) is used to define firewall rules on the Transport Layer (fourth layer of the seven-layer OSI model).]

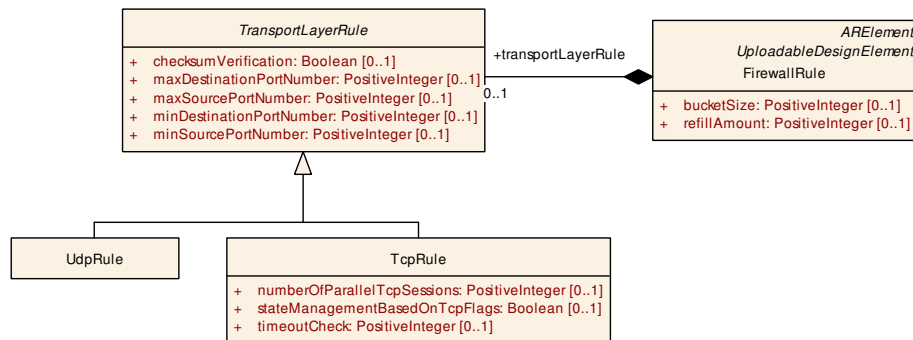


Figure 12.62: Modeling of Firewall rules on Transport Layer

Class	TransportLayerRule (abstract)			
Note	Configuration of filter rules on Transport Layer level. Tags: atp.Status=candidate			
Base	ARObject			
Subclasses	TcpRule, UdpRule			
Aggregated by	FirewallRule.transportLayerRule			
Attribute	Type	Mult.	Kind	Note
checksum Verification	Boolean	0..1	attr	Defines whether checksum verification is performed or not. Tags: atp.Status=candidate





Class	TransportLayerRule (abstract)			
maxDestinationPortNumber	PositiveInteger	0..1	attr	Filter to match packets with the maximum destination UDP/TCP port number. Tags: atp.Status=candidate
maxSourcePortNumber	PositiveInteger	0..1	attr	Filter to match packets with the maximum source UDP/TCP port number. Tags: atp.Status=candidate
minDestinationPortNumber	PositiveInteger	0..1	attr	Filter to match packets with the minimum destination UDP/TCP port number. Tags: atp.Status=candidate
minSourcePortNumber	PositiveInteger	0..1	attr	Filter to match packets with the minimum source UDP/TCP port number. Tags: atp.Status=candidate

Table 12.123: TransportLayerRule

Class	UdpRule			
Note	Configuration of UDP filter rules. Tags: atp.Status=candidate			
Base	ARObject, TransportLayerRule			
Aggregated by	FirewallRule.transportLayerRule			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.124: UdpRule

Class	TcpRule			
Note	Configuration of TCP filter rules. Tags: atp.Status=candidate			
Base	ARObject, TransportLayerRule			
Aggregated by	FirewallRule.transportLayerRule			
Attribute	Type	Mult.	Kind	Note
numberOfParallelTcpSessions	PositiveInteger	0..1	attr	This attribute defines the maximal number of TCP Sessions that are allowed to be established. Tags: atp.Status=candidate
stateManagementBasedOnTcpFlags	Boolean	0..1	attr	This attribute defines whether the StateManagement is based on TCP flags or not. Tags: atp.Status=candidate
timeoutCheck	PositiveInteger	0..1	attr	This attribute defines the TCP Session timeout in seconds Tags: atp.Status=candidate

Table 12.125: TcpRule

12.13.4 Firewall rules via byte pattern

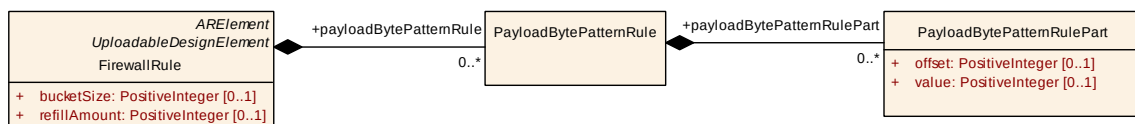


Figure 12.63: Modeling of Firewall rules via byte pattern

[TPS_MANI_03307] Byte-Pattern Firewall rule*Status:* DRAFT

[The meta-class `PayloadBytePatternRule` is used to define a generic firewall rule that specifies individually the value for each byte of the Ethernet frame. Each `PayloadBytePatternRulePart` that is aggregated by `PayloadBytePatternRule` defines one byte in the Ethernet frame. The `offset` defines the position in the Ethernet Frame and the `value` defines the byteValue.]

Class	PayloadBytePatternRule			
Note	Configuration of a generic firewall rule that defines the individual bytes of a message that shall match. Tags: atp.Status=candidate			
Base	<code>ARObject</code>			
Aggregated by	<code>FirewallRule.payloadBytePatternRule</code>			
Attribute	Type	Mult.	Kind	Note
payloadBytePatternRulePart	<code>PayloadBytePatternRulePart</code>	*	aggr	Configuration of bytes in the message, Tags: atp.Status=candidate

Table 12.126: PayloadBytePatternRule

Class	PayloadBytePatternRulePart			
Note	Configuration of one byte in the datagram, Tags: atp.Status=candidate			
Base	<code>ARObject</code>			
Aggregated by	<code>PayloadBytePatternRule.payloadBytePatternRulePart</code>			
Attribute	Type	Mult.	Kind	Note
offset	PositiveInteger	0..1	attr	This attribute defines the byte offset in the datagram (start byte of the Ethernet frame, i.e. offset 0 corresponds to the first byte of the destination MAC address). Tags: atp.Status=candidate
value	PositiveInteger	0..1	attr	This attribute defines the byteValue (0..255) in the datagram. Tags: atp.Status=candidate

Table 12.127: PayloadBytePatternRulePart**12.13.5 Firewall deep packet inspection of SOME/IP SD and SOME/IP messages****[TPS_MANI_03308] Deep inspection of SOME/IP SD messages***Status:* DRAFT

[The meta-class `SomeipSdRule` is used to define a firewall rule for SOME/IP SD messages.]

[TPS_MANI_03309] Deep inspection of SOME/IP messages*Status:* DRAFT

[The meta-class `SomeipProtocolRule` is used to define a firewall rule for SOME/IP messages.]

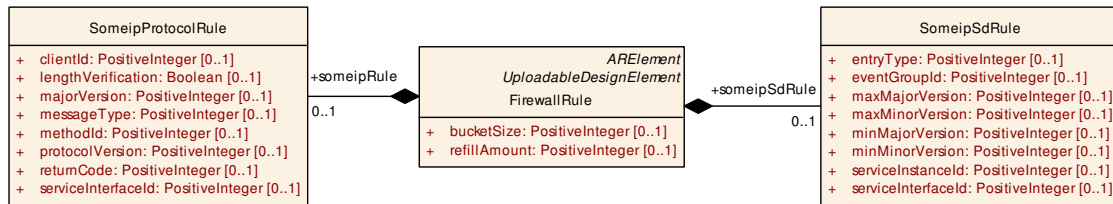


Figure 12.64: Modeling of SOME/IP Firewall rules

Class	SomeipProtocolRule			
Note	Configuration of SOME/IP firewall rules Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	FirewallRule.someipRule			
Attribute	Type	Mult.	Kind	Note
clientId	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the clientId in the SOME/IP header matches. Tags: atp.Status=candidate
length Verification	Boolean	0..1	attr	Defines whether length verification is performed or not. Tags: atp.Status=candidate
majorVersion	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the majorVersion in the SOME/IP header matches. Tags: atp.Status=candidate
messageType	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the messageType in the SOME/IP header matches. Tags: atp.Status=candidate
methodId	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the methodId in the SOME/IP header matches. Tags: atp.Status=candidate
protocolVersion	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the protocol Version in the SOME/IP header matches. Tags: atp.Status=candidate
returnCode	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the returnCode in the SOME/IP header matches. Tags: atp.Status=candidate
serviceInterface Id	PositiveInteger	0..1	attr	Filter for SOME/IP messages in which the service InterfaceId in the SOME/IP header matches. Tags: atp.Status=candidate

Table 12.128: SomeipProtocolRule

Class	SomeipSdRule			
Note	Configuration of SOME/IP Service Discovery firewall rules Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	FirewallRule.someipSdRule			
Attribute	Type	Mult.	Kind	Note
entryType	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the entryType in the SOME/IP header matches. Tags: atp.Status=candidate
eventGroupId	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the eventGroup Id in the SOME/IP header matches. Tags: atp.Status=candidate





Class	SomeipSdRule			
maxMajorVersion	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the Major Version in the SOME/IP header is smaller or equal than maxMajorVersion. Tags: atp.Status=candidate
maxMinorVersion	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the Minor Version in the SOME/IP header is smaller or equal than maxMinorVersion. Tags: atp.Status=candidate
minMajorVersion	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the Major Version in the SOME/IP header is greater or equal than minMajorVersion. Tags: atp.Status=candidate
minMinorVersion	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the Minor Version in the SOME/IP header is greater or equal than minMinorVersion. Tags: atp.Status=candidate
serviceInstanceId	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the service InstanceId in the SOME/IP header matches. Tags: atp.Status=candidate
serviceInterfaceId	PositiveInteger	0..1	attr	Filter for SOME/IP SD messages in which the service InterfaceId in the SOME/IP header matches. Tags: atp.Status=candidate

Table 12.129: SomeipSdRule

12.13.6 Firewall deep packet inspection of DoIP messages

[TPS_MANI_03310] Deep inspection of DoIP messages

Status: DRAFT

[The meta-class [DoIpRule](#) is used to define a firewall rule for DoIP messages.]

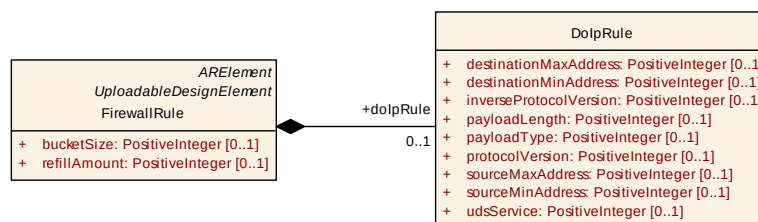


Figure 12.65: Modeling of DoIP Firewall rules

Class	DoIpRule			
Note	Configuration of a generic firewall rule Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	FirewallRule.doIpRule			
Attribute	Type	Mult.	Kind	Note





Class	DolpRule			
destinationMaxAddress	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the destination Address is smaller or equal than destinationMaxAddress. Tags: atp.Status=candidate
destinationMinAddress	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the destination Address is greater or equal than destinationMinAddress. Tags: atp.Status=candidate
inverseProtocolVersion	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the inverseprotocolVersion in the DoIP header matches. Tags: atp.Status=candidate
payloadLength	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the payload Length in the DoIP header matches. Tags: atp.Status=candidate
payloadType	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the payloadType in the DoIP header matches. Tags: atp.Status=candidate
protocolVersion	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the protocol Version in the DoIP header matches. Tags: atp.Status=candidate
sourceMaxAddress	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the source Address is smaller or equal than sourceMaxAddress. Tags: atp.Status=candidate
sourceMinAddress	PositiveInteger	0..1	attr	Filter to match DoIP messages in which the source Address is greater or equal than sourceMinAddress.. Tags: atp.Status=candidate
udsService	PositiveInteger	0..1	attr	Filter to match DoIP messages that contain the uds Service. Tags: atp.Status=candidate

Table 12.130: DolpRule

12.13.7 Firewall deep packet inspection of DDS messages

[TPS_MANI_03311] Deep inspection of DDS messages

Status: DRAFT

[The meta-class [DdsRule](#) is used to define a firewall rule for DDS messages.]

[constr_5352] [DdsRule.submessageType](#) value restriction

Status: DRAFT

Imposition time: [IT_Mani](#)

[The value of [DdsRule.submessageType](#) is restricted to the following values:

- 0x01 (PAD)
- 0x06 (ACKNACK)
- 0x07 (HEARTBEAT)
- 0x08 (GAP)
- 0x09 (INFO_TS)
- 0x0c (INFO_SRC)

- 0x0d (INFO_REPLY_IP4)
- 0x0e (INFO_DST)
- 0x0f (INFO_REPLY)
- 0x12 (NACK_FRAG)
- 0x13 (HEARTBEAT_FRAG)
- 0x15 (DATA)
- 0x16 (DATA_FRAG)

]

[constr_5353] `DdsRule.readerEntityId` and `DdsRule.writerEntityId` value restriction

Status: DRAFT
Imposition time: IT_Mani

[The value of `DdsRule.readerEntityId` and `DdsRule.writerEntityId` is only allowed to be set if the value of `DdsRule.submessageType` is set to one of the following values:

- 0x06 (ACKNACK)
- 0x07 (HEARTBEAT)
- 0x08 (GAP)
- 0x15 (DATA)

]

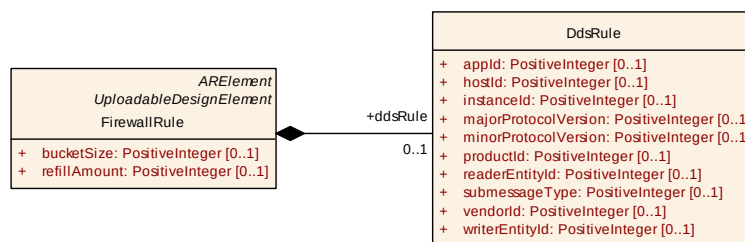


Figure 12.66: Modeling of DDS Firewall rules

Class	DdsRule			
Note	Configuration of a DDS firewall rule Tags: atp.Status=candidate			
Base	ARObject			
Aggregated by	FirewallRule.ddsRule			
Attribute	Type	Mult.	Kind	Note





Class	DdsRule			
appld	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the appld in the DDSI-RTPS header and the INFO_DST (0x0E) submessage matches. Tags: atp.Status=candidate
hostId	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the hostId in the DDSI-RTPS header and the INFO_DST (0x0E) submessage matches. Tags: atp.Status=candidate
instanceId	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the instanceId in the DDSI-RTPS header and the INFO_DST (0x0E) submessage matches. Tags: atp.Status=candidate
majorProtocolVersion	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the major ProtocolVersion in the DDSI-RTPS header matches. Tags: atp.Status=candidate
minorProtocolVersion	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the minor ProtocolVersion in the DDSI-RTPS header matches. Tags: atp.Status=candidate
productId	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the productId in the DDSI-RTPS header matches. Tags: atp.Status=candidate
readerEntityId	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the readerEntity ID in a DDSI-RTPS submessage matches Tags: atp.Status=candidate
submessageType	PositiveInteger	0..1	attr	Defines the allowed submessage type in the DDSI-RTPS message Tags: atp.Status=candidate
vendorId	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the vendorId in the DDSI-RTPS header matches. Tags: atp.Status=candidate
writerEntityId	PositiveInteger	0..1	attr	Filter for DDSI-RTPS messages in which the writerEntity ID in a DDSI-RTPS submessage matches Tags: atp.Status=candidate

Table 12.131: DdsRule

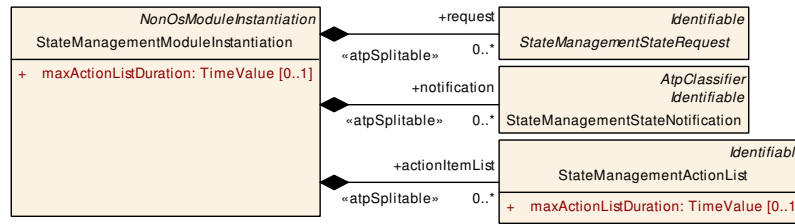
12.14 State Management Target-Configuration

12.14.1 Overview

On the *AUTOSAR adaptive platform*, state management can be implemented as a mixture of generated and manually written code. The generated code is created based on a model that is described in this chapter.

Another aspect of this hybrid nature of the state management is that it sometimes acts like an application and sometimes it acts like a functional cluster.

The entry point for the target-configuration-level configuration of the State Management on the AUTOSAR adaptive platform is represented by meta-class `StateManagementModuleInstantiation`, a sub-class of `NonOsModuleInstantiation`.

Figure 12.67: Modeling of the **StateManagementModuleInstantiation**

Class	StateManagementModuleInstantiation			
Note	This meta-class represents the target-configuration-level configuration of the state management on the AUTOSAR adaptive platform. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature , Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
actionItemList	StateManagementActionList	*	aggr	This represents the collection of action item lists defined in the context of the enclosing state management module. Stereotypes: atpSplitable Tags: atp.Splitkey=actionItemList.shortName atp.Status=draft
functionGroupErrorMapping	FunctionGroupErrorMapping	*	aggr	This aggregation contains the collection of FunctionGroupErrorMappings in the context of the enclosing StateManagementModuleInstantiation. Tags: atp.Status=draft
maxActionListDuration	TimeValue	0..1	attr	This attribute defines a global value for the maximum duration in which any enclosed StateManagementActionList shall finish execution. the value in this attribute will be superseded by the definition of attribute maxActionListDuration in the context of a specific StateManagementActionList Tags: atp.Status=draft
notification	StateManagementStateNotification	*	aggr	This aggregation represents the state switch notifications handled by the state manager. Stereotypes: atpSplitable Tags: atp.Splitkey=notification.shortName atp.Status=draft
request	StateManagementStateRequest	*	aggr	This aggregation represents the state requests handled by the state manager. Stereotypes: atpSplitable Tags: atp.Splitkey=request.shortName atp.Status=draft

Table 12.132: StateManagementModuleInstantiation

[constr_10641] Existence of reference in the role **StateManagementModuleInstantiation.maxActionListDuration**

Status: DRAFT

Imposition time: IT_Mani

[For each **StateManagementModuleInstantiation**, the attribute **maxActionListDuration** shall exist.]

The job of the State Management on the AUTOSAR adaptive platform is to control two kinds of states:

- the state of a [Function Group](#), modeled as a [ModeDeclarationGroup-Prototype](#) owned by a [FunctionGroupSet](#), that is referenced by a [SoftwareCluster](#) in the role [claimedFunctionGroup](#).

Note that these states are only indirectly controlled, because the actual state switch for [Function Groups](#) is in the responsibility of the Execution Management.

- the state of an “internal” state machine, owned by [StateManagementStateNotifications](#).

12.14.2 Requests to State Management

[TPS_MANI_01391] Semantics of [StateManagementStateRequest](#)

Status: DRAFT

[Meta-class [StateManagementStateRequest](#) that is aggregated directly at the [StateManagementModuleInstantiation](#) represents the ability to configure requests to State Management.]

Please note that meta-class [StateManagementStateRequest](#) is modeled as an abstract class so that the concrete sub-classes that correspond to different flavors of requests (which are also respected for the definition of applicable [PortInterfaces](#), see [Chapter 4.5](#)) can be individually considered.

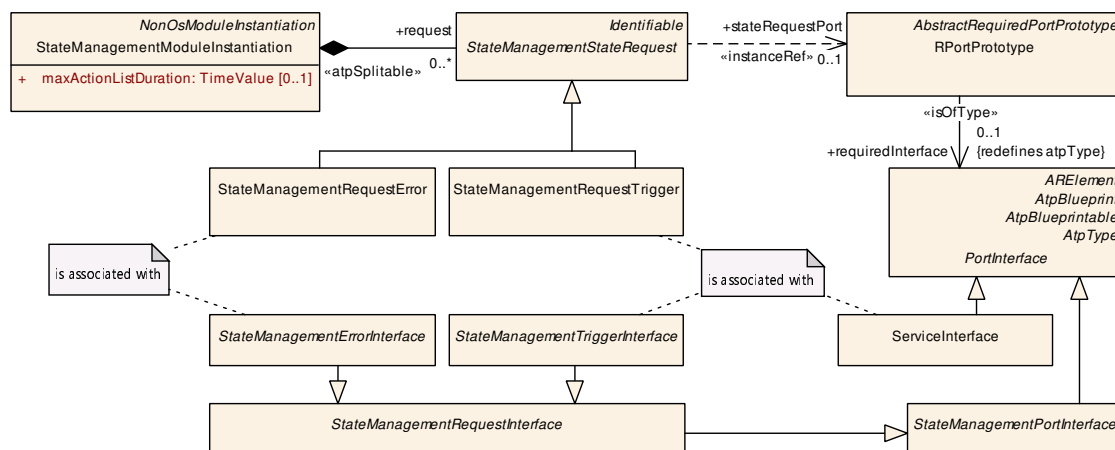


Figure 12.68: Modeling of [StateManagementStateRequest](#)

In particular, the State Management accepts requests for state changes in two different flavors:

- “triggers” (i.e. request for a state change from select functional clusters), modeled by mean of meta-class [StateManagementRequestTrigger](#), see [Chapter 12.14.2.1](#).

- “errors” (i.e. error report from a functional cluster), modeled by means of meta-class `StateManagementRequestError`, see [Chapter 12.14.2.2](#).

As depicted in [Figure 12.68](#), `StateManagementStateRequest` also references an `RPortPrototype` as the source of inputs from outside the State Management.

[Figure 12.69](#) also shows that the configuration of State Management on the AUTOSAR adaptive platform is modeled as a hybrid of target-configuration-level `StateManagementModuleInstantiation` and the definition of an `Executable` that is executed as a `Process`.

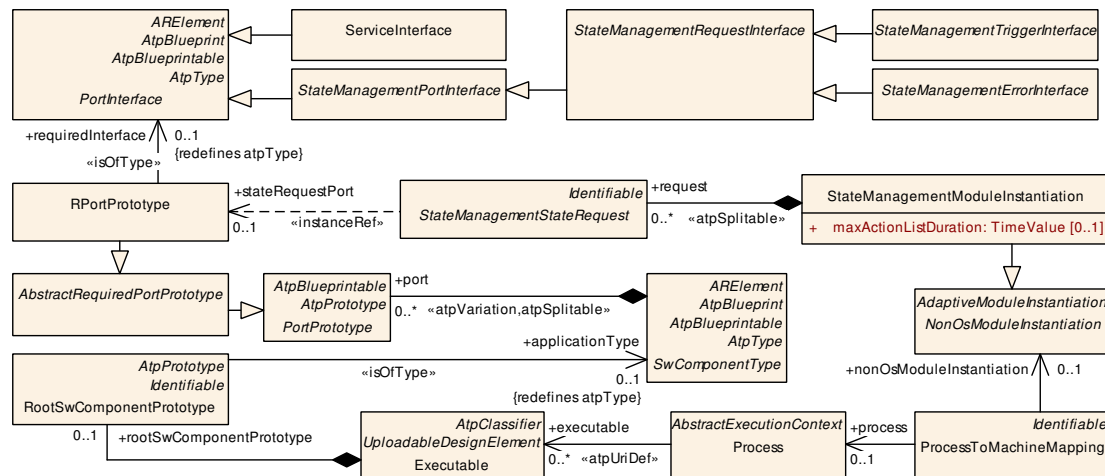


Figure 12.69: Modeling of `StateManagementStateRequest` including the association with the modeling of `Executable`

The connection between the `StateManagementModuleInstantiation` and the `Executable/Process` is created by `ProcessToMachineMapping` that references both the `StateManagementModuleInstantiation` and the `Process`, as depicted in [Figure 12.1](#).

Class	<code>StateManagementStateRequest</code> (abstract)			
Note	This abstract class serves as the base class for state requests on the AUTOSAR adaptive platform. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Subclasses	<code>StateManagementRequestError</code> , <code>StateManagementRequestTrigger</code>			
Aggregated by	<code>StateManagementModuleInstantiation.request</code>			
Attribute	Type	Mult.	Kind	Note
stateRequestPort	<code>RPortPrototype</code>	0..1	iref	This represents the <code>RPortPrototype</code> in the application software that is issuing the request for state change. Tags: atp.Status=draft InstanceRef implemented by: <code>RPortPrototypeInExecutableInstanceRef</code>

Table 12.133: `StateManagementStateRequest`

[constr_10390] Existence of reference `StateManagementStateRequest.stateRequestPort`*Status:* DRAFT*Imposition time:* IT_Mani

[Unless the `StateManagementStateRequest` is referenced from a `NmInteractsWithSmMapping`, the reference in the role `stateRequestPort` shall exist.]

[constr_10511] Reference `StateManagementStateRequest.stateRequestPort` shall not exist if `StateManagementStateRequest` is referenced from `NmInteractsWithSmMapping`*Status:* DRAFT*Imposition time:* IT_Mani

[The reference `StateManagementStateRequest.stateRequestPort` shall not exist if `StateManagementStateRequest` is referenced from `NmInteractsWithSmMapping`.]

12.14.2.1 Trigger Requests to State Management

Trigger requests to State Management are configured by means of meta-class `StateManagementRequestTrigger`.

As depicted by Figure 12.68, the existence of a `StateManagementRequestTrigger` is associated with either a subclass of `StateManagementTriggerInterface` or a `ServiceInterface`. This relation is formalized in [constr_10384].

[constr_10384] `PortInterface` used for trigger state requests*Status:* DRAFT*Imposition time:* IT_Mani

[Each `RPortPrototype` that is referenced by a `StateManagementRequestTrigger` shall be typed by ether

- a subclass of `StateManagementTriggerInterface` or
- a `ServiceInterface`.

]

Class	StateManagementRequestTrigger			
Note	This meta-class has the ability to configure a trigger request to the state management. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementStateRequest			
Aggregated by	StateManagementModuleInstantiation.request			
Attribute	Type	Mult.	Kind	Note





Class	StateManagementRequestTrigger			
rule	StateManagementRequestRule	*	aggr	This aggregation represents the collection of rules applicable for the trigger request. Tags: atp.Status=draft

Table 12.134: StateManagementRequestTrigger

12.14.2.2 Error Requests to State Management

Error submissions to State Management are configured by means of meta-class [StateManagementRequestError](#), see [Figure 12.68](#).

As depicted by [Figure 12.68](#), the existence of a [StateManagementRequestTrigger](#) is associated with a subclass of [StateManagementTriggerInterface](#). This relation is formalized in [\[constr_10385\]](#).

[constr_10385] PortInterface used for error state requests

Status: DRAFT

Imposition time: IT_Mani

[Each [RPortPrototype](#) that is referenced by a [StateManagementRequestError](#) shall be typed by subclass of [StateManagementErrorInterface](#).]

Class	StateManagementRequestError			
Note	This meta-class has the ability to configure the submission of an error to the state management. Tags: atp.Status=draft atp.recommendedPackage=StateManagementRequests This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable , StateManagementStateRequest			
Aggregated by	StateManagementModuleInstantiation.request			
Attribute	Type	Mult.	Kind	Note
rule	StateManagementRequestRule	*	aggr	This aggregation represents the collection of rules applicable for the error request. Tags: atp.Status=draft

Table 12.135: StateManagementRequestError

12.14.3 Notifications from State Management

[TPS_MANI_01392] Semantics of [StateManagementStateNotification](#)

Status: DRAFT

[Notifications are used to make state users aware of state changes. Meta-class [StateManagementStateNotification](#) is aggregated at [StateManagementModuleInstantiation](#) and in turn aggregates [ModeDeclarationGroupPrototype](#) and therefore one [StateManagementStateNotification](#) becomes the **owner of one internal state machine**.]

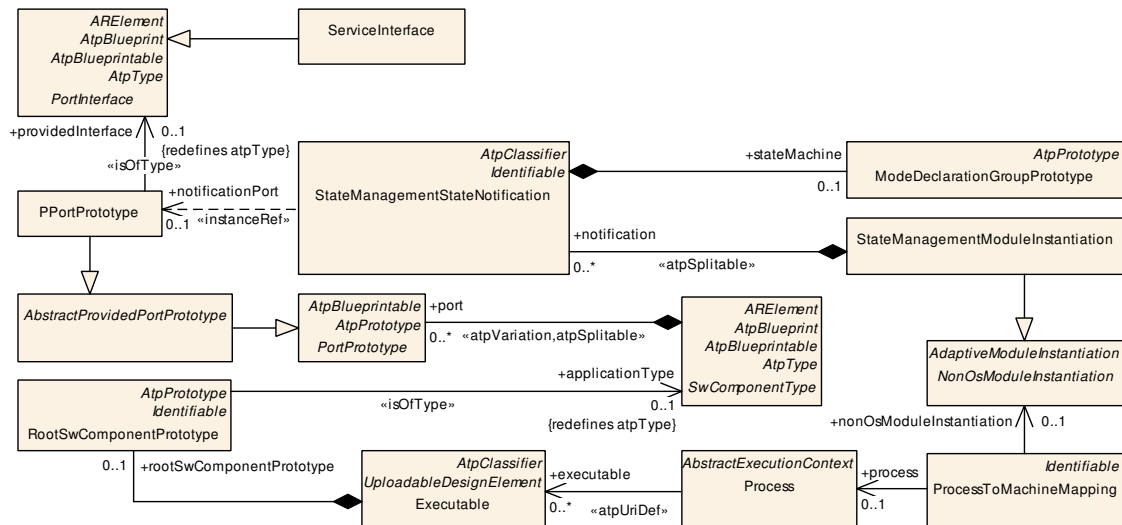


Figure 12.70: Modeling of `StateManagementStateNotification`

Please note that it is positively supported that several `StateManagementStateNotification` aggregate a `ModeDeclarationGroupPrototype` typed by the identical `ModeDeclarationGroup` as their internal state machine. This way, several instances of the same “type” of state machine are created.

A `StateManagementModuleInstantiation` references a `PPortPrototype` (typed by a `ServiceInterface`) that shall be taken to provide the actual state notification.

[constr_10388] Restriction for a **PortInterface** used for state switch notifications

Status: DRAFT

Imposition time: IT_Mani

Each `PPortPrototype` that is referenced by a `StateManagementStateNotification` shall be typed by a `ServiceInterface`.

```
[constr_10391] Existence of attribute StateManagementStateNotification.  
notificationPort
```

Status: DRAFT

Imposition time: IT_Mani

[For each `StateManagementStateNotification`, the aggregation in the role `notificationPort` shall exist.]

Please note that the `StateManagementStateNotification.stateMachine` modeled as a `ModeDeclarationGroupPrototype` that is typed by a `ModeDeclarationGroup` shall have a defined `ModeDeclarationGroup.initialMode` according to [constr_1973] [2, TPS Software Component Template] that is also valid for this specification.

Figure 12.70 also depicts the relation between the modeled `Executable` that implements the State Management functionality and the target-configuration aspects represented by the `StateManagementModuleInstantiation`.

Class	StateManagementStateNotification			
Note	This meta-class represents the ability to formalize state notifications on the AUTOSAR adaptive platform. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpClassifier, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	StateManagementModuleInstantiation.notification			
Attribute	Type	Mult.	Kind	Note
notificationPort	PPortPrototype	0..1	iref	This instanceRef identifies the PPortPrototype over which the notification is to be conveyed. Tags: atp.Status=draft InstanceRef implemented by: PPortPrototypeIn ExecutableInstanceRef
stateMachine	ModeDeclarationGroupPrototype	0..1	aggr	This aggregation represents the existence of an actual state machine. Tags: atp.Status=draft

Table 12.136: StateManagementStateNotification

12.14.4 Rules

12.14.4.1 Overview

[TPS_MANI_01384] Semantics of StateManagementRequestRule

Status: DRAFT

[The purpose of `StateManagementRequestRule` is to evaluate an incoming request against a given comparison value.

If the evaluation of the `formula` owned by the `StateManagementRequestRule` yields `true`, then a state machine (modeled as a `ModeDeclarationGroupPrototype`) is forwarded from the current state (represented by meta-class `ModeDeclaration`) to the `nextState`, as specified by the definition of the specific subclass of `StateManagementRequestRule`.]



Figure 12.71: Modeling of StateManagementRequestRule

Class	StateManagementRequestRule
Note	This meta-class represents a rule for deciding about a state change. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject





Class	StateManagementRequestRule			
Aggregated by	StateManagementRequestError.rule, StateManagementRequestTrigger.rule			
Attribute	Type	Mult.	Kind	Note
formula	StateManagementCompareFormula	0..1	aggr	This aggregation represents the definition of the formula for the StateManagementRequestRule Tags: atp.Status=draft
nextState	ModeDeclaration	0..1	iref	This reference identifies the state to be switched to if the condition is fulfilled. Tags: atp.Status=draft InstanceRef implemented by: ModeDeclarationInStateManagementStateNotificationInstanceRef

Table 12.137: StateManagementRequestRule

[constr_10392] Existence of attribute `StateManagementRequestRule.formula`

Status: DRAFT

Imposition time: IT_Mani

[For each `StateManagementRequestRule`, the aggregation in the role `formula` shall exist.]

[constr_10393] Existence of reference in the role `StateManagementRequestRule.nextState`

Status: DRAFT

Imposition time: IT_Mani

[For each `StateManagementRequestRule`, the reference in the role `nextState` shall exist.]

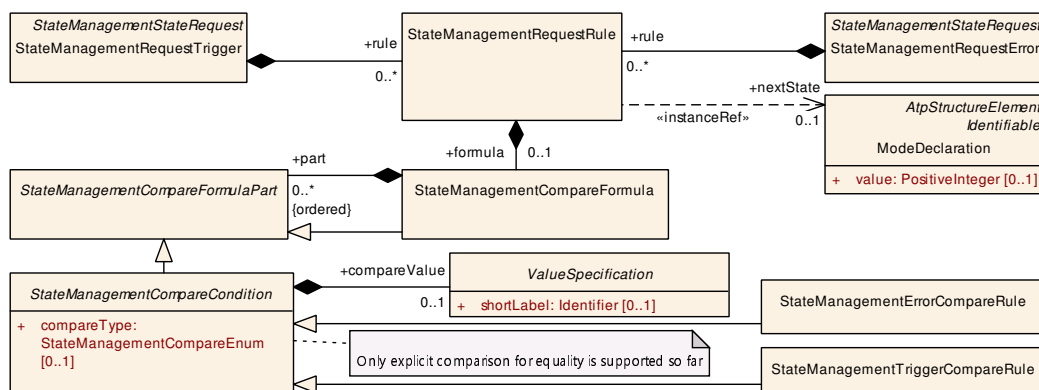


Figure 12.72: Relation between `StateManagementStateRequest` and `StateManagementRequestRule`

The general approach for rule formulation is very generic, although the State Management for the time being has only little requirements for rule evaluation: one value is checked against a reference value. But since the complexity of rule formulation might grow over time, the model is already prepared for future extensions.

The meta-model supports the formulation of hierarchical comparisons such that state changes could be evaluated against not only a single input, but also – where applicable – collection of inputs.

The execution of state changes is subject to the evaluation of rules that are owned by the respective request classes. This relation is depicted in [Figure 12.72](#).

The states that are involved in the evaluation of State Management rules are entirely “internal” states, [Function Group States](#) are not affected and shall³ not be used for rule evaluation.

Class	StateManagementCompareFormula			
Note	A StateManagementCompareFormula embodies the computation instruction that is to be evaluated at runtime to determine if the aggregating request rule yields true or false. The formula itself consists of parts which are combined by the logical operations specified by StateManagementCompareFormula.op. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, StateManagementCompareFormulaPart			
Aggregated by	StateManagementCompareFormula.part , StateManagementRequestRule.formula			
Attribute	Type	Mult.	Kind	Note
part (ordered)	StateManagementCompareFormulaPart	*	aggr	This aggregation represents the collection of formula parts that can be combined by logical operators. Tags: atp.Status=draft

Table 12.138: StateManagementCompareFormula

Enumeration	StateManagementLogicalOperatorEnum
Note	Logical AND and OR operation for the evaluation of rules in state management. Tags: atp.Status=draft This Enumeration is only used by the AUTOSAR Adaptive Platform.
Literal	Description
logicalAnd	This value represents the semantics of a logical "and" Tags: atp.EnumerationLiteralIndex=0 atp.Status=draft
logicalOr	This value represents the semantics of a logical "or" Tags: atp.EnumerationLiteralIndex=1 atp.Status=draft

Table 12.139: StateManagementLogicalOperatorEnum

Class	StateManagementCompareFormulaPart (abstract)			
Note	A StateManagementCompareFormulaPart can either be a atomic condition, e.g. a StateManagementTriggerCompareRule or StateManagementErrorCompareRule, or a StateManagementCompareFormula again, which allows arbitrary nesting. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Subclasses	StateManagementCompareCondition , StateManagementCompareFormula			
Aggregated by	StateManagementCompareFormula.part			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.140: StateManagementCompareFormulaPart

³The nature of the underlying `instanceRef` modeling would unfortunately not be able to prohibit a brute-force referencing of function groups states.

Class	StateManagementCompareCondition (abstract)			
Note	StateManagementCompareConditions are atomic conditions. They are based on the idea of a comparison at runtime of some variable data with something constant. The type of the comparison (==, !=, <, <=, ...) is specified in StateManagementCompareCondition.compareType. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, StateManagementCompareFormulaPart			
Subclasses	StateManagementErrorCompareRule , StateManagementTriggerCompareRule			
Aggregated by	StateManagementCompareFormula.part			
Attribute	Type	Mult.	Kind	Note
compareType	StateManagementCompareEnum	0..1	attr	This attributes represents the concrete type of the comparison. Tags: atp.Status=draft
compareValue	ValueSpecification	0..1	aggr	This aggregation represents the reference value against which the value obtained from request shall be compared to. Tags: atp.Status=draft

Table 12.141: StateManagementCompareCondition

[constr_10394] Existence of attribute [StateManagementCompareCondition.compareType](#)*Status:* DRAFT*Imposition time:* IT_Mani[For each [StateManagementCompareCondition](#), the aggregation in the role [compareType](#) shall exist.]**[constr_10395] Existence of attribute [StateManagementCompareCondition.compareValue](#)***Status:* DRAFT*Imposition time:* IT_Mani[For each [StateManagementCompareCondition](#), the aggregation in the role [compareValue](#) shall exist.]

Enumeration	StateManagementCompareEnum
Note	Enumeration for the type of a comparison of values usually expressed by the following operators: ==, !=, <, <=, >, >= Tags: atp.Status=draft This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	StateManagementCompareCondition.compareType
Literal	Description
isEqual	Equal Tags: atp.EnumerationLiteralIndex=0 atp.Status=draft

Table 12.142: StateManagementCompareEnum

12.14.4.2 Trigger Rules

The modeling of the rules for trigger requests is depicted in Figure 12.72 and Figure 12.73.

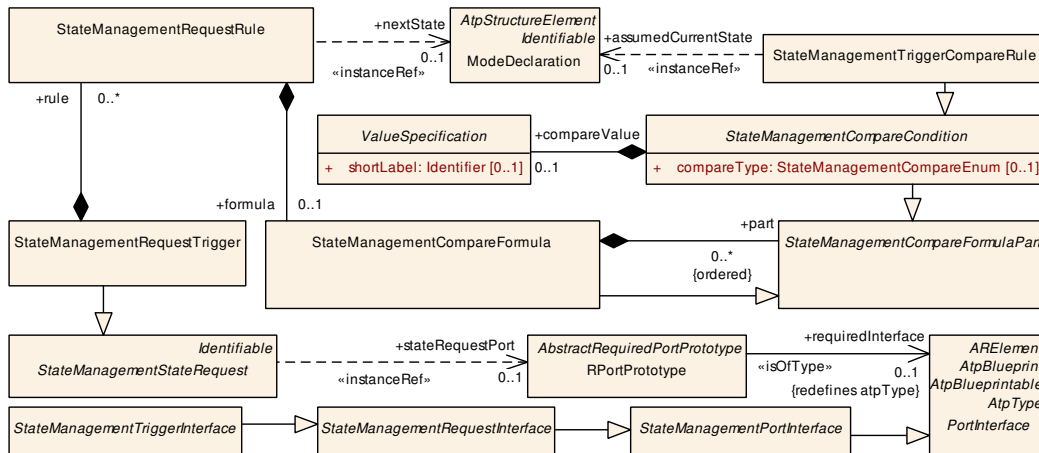


Figure 12.73: Modeling of **StateManagementRequestRule** for the “trigger” case

As depicted in Figure 12.73, the definition of the trigger request rule involves two `instanceRefs` to `ModeDeclarationGroup`, as further explained in

[TPS_MANI_01835] Semantics of **StateManagementRequestTrigger.rule**

Status: DRAFT

[The semantics of **StateManagementRequestTrigger.rule** is mainly defined by the existence of two `instanceRefs`:

- The reference in the role **StateManagementRequestTrigger.rule.nextState** denotes the state that shall be switched to if the rule evaluates to `true`.
- The additional reference in the role **StateManagementTriggerCompareRule.assumedCurrentState** represents an input to the rule evaluation. In other words, the **rule.formula** evaluates to `true` if
 - the input value obtained from the **PortPrototype** referenced in the role **StateManagementRequestTrigger.stateRequestPort** typed by either a sub-class of **StateManagementTriggerInterface** or a **ServiceInterface** is equal the compare value **and**
 - the reference **StateManagementTriggerCompareRule.assumedCurrentState** identifies the current state.

]

Class	StateManagementTriggerCompareRule			
Note	This meta-class represents the configuration of a compare rule for the processing of a trigger request. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, StateManagementCompareCondition , StateManagementCompareFormulaPart			
Aggregated by	StateManagementCompareFormula.part			
Attribute	Type	Mult.	Kind	Note
assumed CurrentState	ModeDeclaration	0..1	iref	This reference denotes the assumed current state for the given compare rule for trigger values. Tags: atp.Status=draft InstanceRef implemented by: ModeDeclarationInStateManagementStateNotificationInstanceRef

Table 12.143: StateManagementTriggerCompareRule

[constr_10396] Existence of reference in the role [StateManagementTriggerCompareRule.assumedCurrentState](#)

Status: DRAFT

Imposition time: IT_Mani

[For each [StateManagementTriggerCompareRule](#), the reference in the role [assumedCurrentState](#) shall exist.]

12.14.4.3 Error Rules

The modeling of the rules for error submissions is depicted in [Figure 12.72](#) and [Figure 12.74](#).

[TPS_MANI_01836] Semantics of [StateManagementRequestError.rule](#)

Status: DRAFT

[The semantics of the [rule](#) is that the affected state machine shall switch to the [nextState](#) if the [formula](#) evaluates to true.]

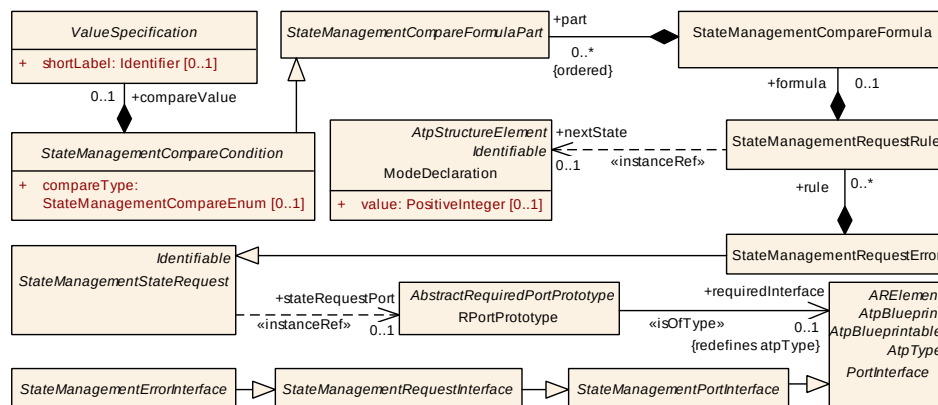


Figure 12.74: Modeling of [StateManagementRequestRule](#) for the “error” case

Class	StateManagementErrorCompareRule			
Note	This meta-class represents the configuration of a compare rule for the processing of an error submission. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, StateManagementCompareCondition , StateManagementCompareFormulaPart			
Aggregated by	StateManagementCompareFormula.part			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.144: StateManagementErrorCompareRule

12.14.5 Action Items

[TPS_MANI_01387] Semantics of meta-class [StateManagementActionList](#)

Status: DRAFT

[Whenever a state machine switches to a different state, one or more actions shall be executed in response.

This functionality is modeled by means of the existence of a [StateManagementActionList](#) that aggregates abstract class [StateManagementActionItems](#) as an **ordered** collection, i.e. the order of the execution of individual [StateManagementActionItems](#) is significant.

The [StateManagementActionList](#) refers to a [ModeDeclaration](#) (an “internal” state, as opposed to a [Function Group State](#)) as the representation of the state to which the state machine was switched to.]

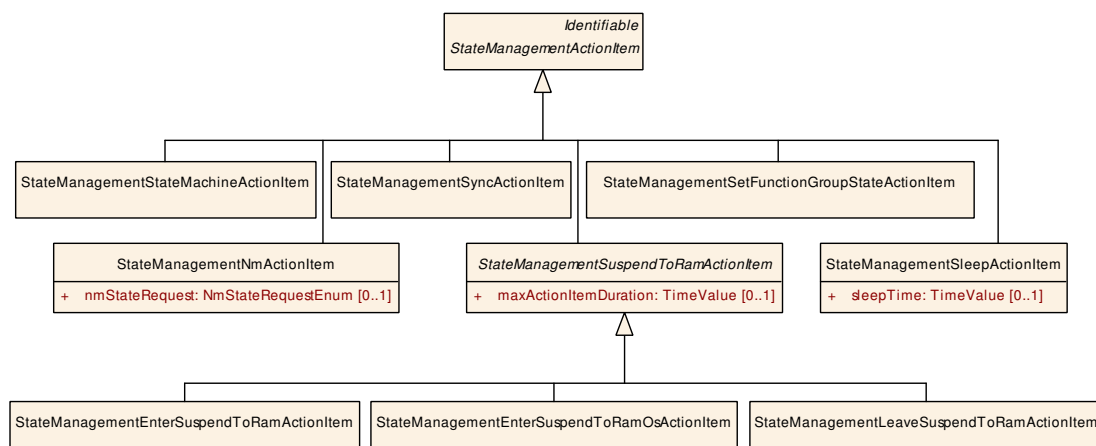


Figure 12.75: Modeling of [StateManagementActionItem](#)

Class	StateManagementActionList			
Note	This meta-class represents the ability to define an action list that is associated with a state of a state machine. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	StateManagementModuleInstantiation.actionItemList			
Attribute	Type	Mult.	Kind	Note
actionItem (ordered)	StateManagementActionItem	*	aggr	This represents the collection of action items in the context of the action item list. Tags: atp.Status=draft
actionList Processing FailedError	ApApplicationError	0..1	ref	This reference identifies the error code for the case that the enclosing action list fails to process successfully. This reference is only relevant for state management agents. Tags: atp.Status=draft
affectedState	ModeDeclaration	0..1	iref	This reference identifies the state for which the referencing action list applies. Tags: atp.Status=draft InstanceRef implemented by: ModeDeclarationInStateManagementStateNotificationInstanceRef
maxActionList Duration	TimeValue	0..1	attr	This attribute defines the maximum duration in which the enclosing StateManagementActionList shall finish execution Tags: atp.Status=draft
maxDuration ExceededError	ApApplicationError	0..1	ref	This reference identifies the ApApplicationError that shall be triggered if the configured maximum duration of the execution of the action item list is exceeded. Tags: atp.Status=draft

Table 12.145: StateManagementActionList

[constr_10405] Existence of reference in the role [StateManagementActionList.affectedState](#)

Status: DRAFT

Imposition time: IT_Mani

[For each [StateManagementActionList](#), the reference in the role [affectedState](#) shall exist.]

Class	StateManagementActionItem (abstract)			
Note	This meta-class represents an action item that is executed in response to a state change. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	StateManagementNmActionItem , StateManagementSetFunctionGroupStateActionItem , StateManagementSleepActionItem , StateManagementStateMachineActionItem , StateManagementSuspendToRamActionItem , StateManagementSyncActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.146: StateManagementActionItem

12.14.5.1 State Machine State Machine Action Item

[TPS_MANI_01388] Semantics of the meta-class `StateManagementStateMachineActionItem`

Status: DRAFT

[A `StateManagementStateMachineActionItem` can be used to start or stop a state machine in the context of State Management.

This activity is typically needed to interact with subordinate State Management software that comes with a specific `SoftwareCluster` and is responsible for the State Management of the enclosing `SoftwareCluster`.]

[TPS_MANI_01436] Relation of `StateManagementStateMachineActionItem` to internal state machine instances

Status: DRAFT

[The modeling of the relation between a `StateManagementStateMachineActionItem` and the affected state machines (represented by `ModeDeclarationGroupPrototype`) assumes that the internal state machines are located in the context of the same Executable/Process as the `StateManagementStateMachineActionItem`.

In other words, an inter-process communication is not foreseen for starting and stopping internal state machines.]

As mentioned by [TPS_MANI_01388], the purpose of the `StateManagementStateMachineActionItem` is to either start or stop a given state machine. There is therefore no valid use case for both references in the role `startAgent` and `stopAgent` to exist at the same time.

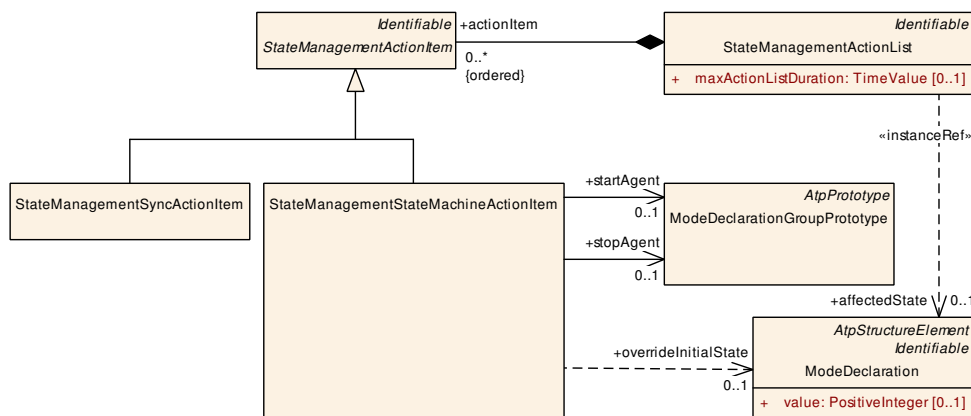


Figure 12.76: Modeling of `StateManagementStateMachineActionItem`

[constr_10386] Existence of references `StateManagementStateMachineActionItem.startAgent` and `stopAgent`*Status:* DRAFT*Imposition time:* IT_Mani

[For each `StateManagementStateMachineActionItem`, **at most one** of the two references

- `startAgent`
- `stopAgent`

shall exist.]

Of course, the roles `startAgent` and `stopAgent` can only be applied to a `StateManagementStateNotification.stateMachine` where attribute `category` is set to the value `STATE_MANAGEMENT_AGENT` and never to a `StateManagementStateNotification.stateMachine` where attribute `category` is set to the value `STATE_MANAGEMENT_CONTROLLER`. This restriction is formalized in [constr_10666].

[constr_10666] Restriction for `StateManagementStateMachineActionItem`*Status:* DRAFT*Imposition time:* IT_Mani

[No `StateManagementStateMachineActionItem` shall refer (in the roles `startAgent` and `stopAgent`) to any `StateManagementStateNotification.stateMachine` where attribute `category` is set to the value `STATE_MANAGEMENT_CONTROLLER`.]

[TPS_MANI_01437] Standardized values of attribute `StateManagementStateNotification.stateMachine.category`*Status:* DRAFT

[The following values of attribute `StateManagementStateNotification.stateMachine.category` are standardized:

STATE_MANAGEMENT_CONTROLLER the aggregated `StateManagementStateNotification.stateMachine` represents the state machine that starts all other state machines.

STATE_MANAGEMENT_AGENT the aggregated `StateManagementStateNotification.stateMachine` represents a state machine that is started by a “controller”.

]

[constr_10489] Existence of `StateManagementModuleInstantiation` in the context of a Machine*Status:* DRAFT*Imposition time:* `IT_Mani`

[Each `Machine` shall only aggregate at most one `StateManagementModuleInstantiation` in the role `moduleInstantiation`.]

[TPS_MANI_01438] Existence of `StateManagementStateMachineActionItem.overrideInitialState` [If the instance reference in the role `StateManagementStateMachineActionItem.overrideInitialState` exists, then the references

- `StateManagementStateMachineActionItem.startAgent.type.initialMode`
- `StateManagementStateMachineActionItem.stopAgent.type.initialMode`

shall be ignored.]

[constr_10633] Existence of references `StateManagementStateMachineActionItem.overrideInitialState` and `stopAgent`*Status:* DRAFT*Imposition time:* `IT_Mani`

[If the reference in the role `StateManagementStateMachineActionItem.stopAgent` exists, then the instance reference in the role `overrideInitialState` shall **not** exist.]

Class	StateManagementStateMachineActionItem			
Note	This meta-class represents a state management action item to start or stop a state machine. Tags: <code>atp.Status=draft</code> This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
<code>overrideInitial State</code>	ModeDeclaration	0..1	iref	The referenced <code>ModeDeclaration</code> shall be considered the initial state of the context <code>ModeDeclarationGroup</code> Prototype and the corresponding reference <code>ModeDeclarationGroup.initialMode</code> shall be ignored. Tags: <code>atp.Status=draft</code> InstanceRef implemented by: ModeDeclarationInStateManagementStateNotificationInstanceRef
<code>startAgent</code>	ModeDeclarationGroup Prototype	0..1	ref	This reference identifies the state machine that shall be started when the enclosing action list item is executed. Tags: <code>atp.Status=draft</code>
<code>startAgentError</code>	ApApplicationError	0..1	ref	This reference identifies the error that shall be raised if the starting of an agent failed. Tags: <code>atp.Status=draft</code>





Class	StateManagementStateMachineActionItem			
stopAgent	ModeDeclarationGroup Prototype	0..1	ref	This reference identifies the state machine that shall be stopped when the enclosing action list item is executed. Tags: atp.Status=draft
stopAgentError	ApApplicationError	0..1	ref	This reference identifies the error that shall be raised if the stopping of an agent failed. Tags: atp.Status=draft

Table 12.147: StateManagementStateMachineActionItem

12.14.5.2 Sync Action Item

[TPS_MANI_01389] Semantics of meta-class [StateManagementSyncActionItem](#)

Status: DRAFT

[A [StateManagementSyncActionItem](#) can be used to introduce a synchronization point at which the workflow waits for the completion of actions that could (in theory) be executed in parallel.

In other words, any [StateManagementActionItem](#) positioned after the [StateManagementSyncActionItem](#) can only be executed if the [StateManagementActionItem](#) placed before the [StateManagementSyncActionItem](#) are finished.]

Class	StateManagementSyncActionItem			
Note	This meta-class represents a state management action item to synchronize state machines. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.148: StateManagementSyncActionItem

12.14.5.3 Function Group Action Item

[TPS_MANI_01390] Semantics of meta-class [StateManagementSetFunctionGroupStateActionItem](#)

Status: DRAFT

[The purpose of [StateManagementSetFunctionGroupStateActionItem](#) is to enable the switch of the state machine representing a specific [Function Group](#) to a new [Function Group State](#), identified by means of the reference in the role [StateManagementSetFunctionGroupStateActionItem.setFunctionGroupState](#).]

Each `StateManagementSetFunctionGroupStateActionItem` references

- a `ModeDeclaration` that represents a `Function Group State` and
- a `PPortPrototype` over which the switch to the new `Function Group State` shall be communicated.

It is obviously very important that the `ModeDeclarationGroup` that is used in the context of the definition of the `Function Group` is identical⁴ to the definition of the `StateManagementFunctionGroupSwitchNotificationInterface.modeGroup`. This consequence is the basis for the definition of [\[constr_10387\]](#).

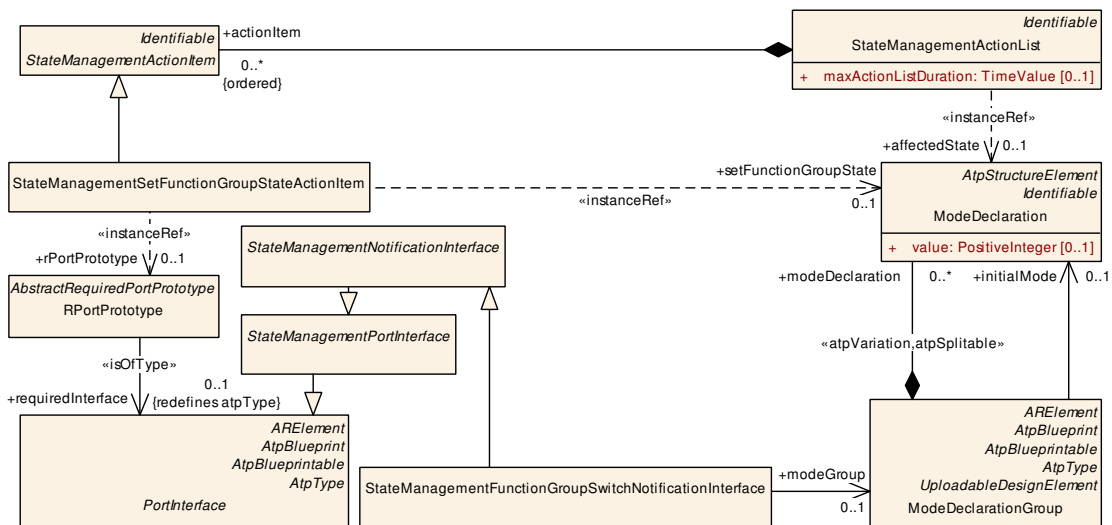


Figure 12.77: Modeling of `StateManagementSetFunctionGroupStateActionItem`

[\[constr_10387\]](#) Consistency of `StateManagementSetFunctionGroupStateActionItem.rPortPrototype` and `StateManagementSetFunctionGroupStateActionItem.setFunctionGroupState`

Status: DRAFT

Imposition time: IT_Mani

[For each `StateManagementSetFunctionGroupStateActionItem`, the `ModeDeclarationGroup` used to type the `ModeDeclaration` that is referenced in the role `setFunctionGroupState` shall be identical to the `ModeDeclarationGroup` referenced in the role `modeGroup` from the `StateManagementFunctionGroupSwitchNotificationInterface` that is used to type the `PPortPrototype` that is referenced in the role `rPortPrototype` from the affected `StateManagementSetFunctionGroupStateActionItem`.]

Please note that the relation described in [\[constr_10387\]](#) is depicted in Figure 12.77.

⁴Technically, it would be sufficient if the two affected `ModeDeclarationGroups` were compatible. But the utilization of the concept of compatibility doesn't (yet) have the same foothold on the *AUTOSAR adaptive platform* as it has on the *AUTOSAR classic platform*.

Class	StateManagementSetFunctionGroupStateActionItem			
Note	This meta-class represents a state management action item to set a specific state in a specific function group. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
rPortPrototype	RPortPrototype	0..1	iref	This reference identifies the PortPrototype over which the function group state switch shall be communicated. Tags: atp.Status=draft InstanceRef implemented by: RPortPrototypeInExecutableInstanceRef
setFunctionGroupState	ModeDeclaration	0..1	iref	This reference identifies the function group step that shall become active after the action step terminates. InstanceRef implemented by: FunctionGroupStateInFunctionGroupSetInstanceRef

Table 12.149: StateManagementSetFunctionGroupStateActionItem

[constr_10397] Existence of reference in the role [StateManagementSetFunctionGroupStateActionItem.rPortPrototype](#)*Status:* DRAFT*Imposition time:* [IT_Mani](#)

[For each [StateManagementSetFunctionGroupStateActionItem](#), the reference in the role [rPortPrototype](#) shall exist.]

[constr_10398] Existence of reference in the role [StateManagementSetFunctionGroupStateActionItem.setFunctionGroupState](#)*Status:* DRAFT*Imposition time:* [IT_Mani](#)

[For each [StateManagementSetFunctionGroupStateActionItem](#), the reference in the role [setFunctionGroupState](#) shall exist.]

12.14.5.4 Network Management Action Item**[TPS_MANI_01443] Semantics of meta-class [StateManagementNmActionItem](#)***Status:* DRAFT

[A [StateManagementNmActionItem](#) can be used to request a communication state of the network management to become active. At the moment, the following communication states are supported:

- [NmStateRequestEnum.noCom](#): network management switches communication off.
- [NmStateRequestEnum.fullCom](#): network management switches communication on.

]

Please note that the switch is applied on the granularity of the so-called *network management handle*, formalized as `NmNetworkHandle`. The relation of the `StateManagementNmActionItem` to the `NmNetworkHandle` is defined by meta-class `SmInteractsWithNmMapping`.

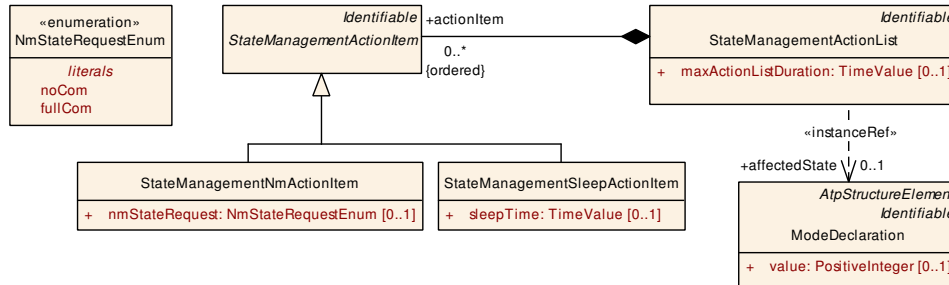


Figure 12.78: Modeling of `StateManagementNmActionItem`

Class	StateManagementNmActionItem			
Note	This meta-class represents a state management action item to interact with the network management. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
nmState Request	NmStateRequestEnum	0..1	attr	This attribute defines the target network management state that is requested by state management. Tags: atp.Status=draft

Table 12.150: StateManagementNmActionItem

Enumeration	NmStateRequestEnum
Note	This enumeration defines the description of states that can be requested from the network management. Tags: atp.Status=draft This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	StateManagementNmActionItem.nmStateRequest
Literal	Description
fullCom	This literal represents that case that full communication should be possible. Tags: atp.EnumerationLiteralIndex=1 atp.Status=draft
noCom	This literal represents that case that no communication should be possible. Tags: atp.EnumerationLiteralIndex=0 atp.Status=draft

Table 12.151: NmStateRequestEnum

12.14.5.5 Sleep Action Item

[TPS_MANI_01445] Semantics of meta-class `StateManagementSleepActionItem`

Status: DRAFT

[A `StateManagementSleepActionItem` can be used to make the execution of a `StateManagementActionList` pause for some time.

The purpose is to give external code time for completion until the execution of the `StateManagementActionList` commences.]

[TPS_MANI_01444] Semantics of attribute `StateManagementSleepActionItem.sleepTime`

Status: DRAFT

[Attribute `StateManagementSleepActionItem.sleepTime` can be used to define a time interval, after which the action represented by the `StateManagementSleepActionItem` is expected to be complete. The action is considered failed should the timeout expire without completion.]

[constr_10512] Restriction for the value of `StateManagementSleepActionItem.sleepTime`

Status: DRAFT

Imposition time: `IT_Mani`

[For each `StateManagementSleepActionItem`, the value of attribute `sleepTime` shall only have a value greater than 0.]

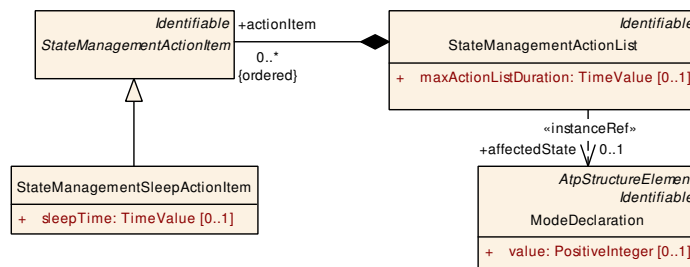


Figure 12.79: Modeling of `StateManagementSleepActionItem`

Class	StateManagementSleepActionItem				
Note	This action item can be used to universally implement afterrun. One specific use case for afterrun comes up in the context of network management. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.				
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem				
Aggregated by	StateManagementActionList.actionItem				
Attribute	Type	Mult.	Kind	Note	





Class	StateManagementSleepActionItem			
sleepTime	TimeValue	0..1	attr	This attribute represents the amount of time that the execution of the StateManagementActionItemList is supposed to go to sleep. Tags: atp.Status=draft

Table 12.152: StateManagementSleepActionItem

12.14.5.6 Suspend to RAM Action Item

[TPS_MANI_01508] Semantics of meta-class **StateManagementSuspendToRamActionItem**

Status: DRAFT

[A **StateManagementSuspendToRamActionItem** can be used to enter or leave a suspend-to-RAM state.]

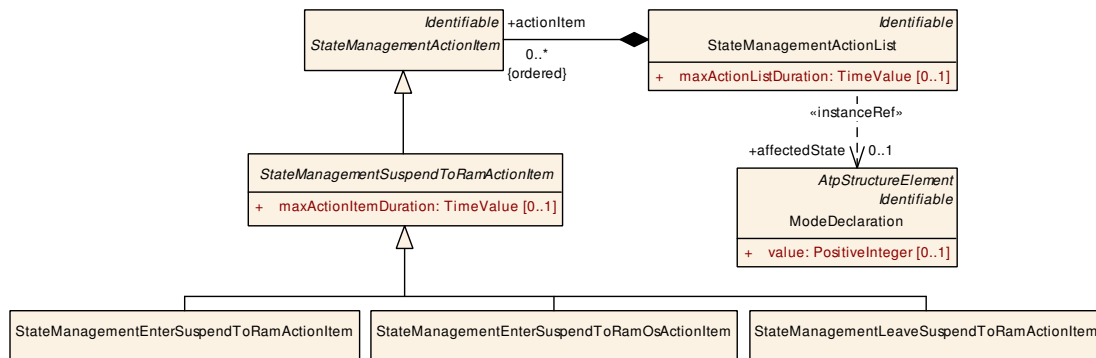


Figure 12.80: Modeling of **StateManagementSuspendToRamActionItem**

Class	StateManagementSuspendToRamActionItem (abstract)			
Note	This meta-class serves as an abstract base class for all suspend-to-RAM-related subclasses. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem			
Subclasses	StateManagementEnterSuspendToRamActionItem , StateManagementEnterSuspendToRamOsActionItem , StateManagementLeaveSuspendToRamActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
maxActionItemDuration	TimeValue	0..1	attr	This attribute denotes the amount of time after which the execution of the action item is considered failed. Tags: atp.Status=draft

Table 12.153: StateManagementSuspendToRamActionItem

[constr_10720] Restriction for the value of `StateManagementSuspendToRamActionItem.maxActionItemDuration`

Status: DRAFT

Imposition time: IT_Mani

[For each `StateManagementSuspendToRamActionItem`, the value of attribute `maxActionItemDuration` shall exist and only have a value greater than 0.]

Class	StateManagementEnterSuspendToRamOsActionItem			
Note	This meta-class represents a state management action item to trigger the OS to enter the Suspend2Ram state. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem , StateManagementSuspendToRamActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.154: StateManagementEnterSuspendToRamOsActionItem

Class	StateManagementEnterSuspendToRamActionItem			
Note	This meta-class represents a state management action item to trigger S2R-aware application to enter the Suspend2Ram state. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem , StateManagementSuspendToRamActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
enterSuspendToRamError	ApApplicationError	0..1	ref	This reference identifies the error code for the case that entering suspend-to-RAM fails. Tags: atp.Status=draft

Table 12.155: StateManagementEnterSuspendToRamActionItem

Class	StateManagementLeaveSuspendToRamActionItem			
Note	This meta-class represents a state management action item to trigger S2R-aware application to leave the Suspend2Ram state. Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , StateManagementActionItem , StateManagementSuspendToRamActionItem			
Aggregated by	StateManagementActionList.actionItem			
Attribute	Type	Mult.	Kind	Note
leaveSuspendToRamError	ApApplicationError	0..1	ref	This reference identifies the error code for the case that leaving suspend-to-RAM fails. Tags: atp.Status=draft

Table 12.156: StateManagementLeaveSuspendToRamActionItem

[constr_10617] Existence of the reference in the role `FunctionGroupPortMapping.functionGroup`*Status:* DRAFT*Imposition time:* IT_Mani

[For each `FunctionGroupPortMapping`, the reference in the role `functionGroup` shall exist.]

[constr_10618] Existence of the reference in the role `FunctionGroupPortMapping.process`*Status:* DRAFT*Imposition time:* IT_Mani

[For each `FunctionGroupPortMapping`, the reference in the role `process` shall exist.]

[constr_10619] Existence of the reference in the role `FunctionGroupPortMapping.rPortPrototypeInExecutable`*Status:* DRAFT*Imposition time:* IT_Mani

[For each `FunctionGroupPortMapping`, the reference in the role `rPortPrototypeInExecutable` shall exist.]

[constr_10620] Reference to function group from `FunctionGroupPortMapping`*Status:* DRAFT*Imposition time:* IT_Mani

[Each function group modeled as a `ModeDeclarationGroupPrototype` aggregated by a `FunctionGroupSet` shall only be referenced by a single `FunctionGroupPortMapping`.]

[constr_10621] Same `ModeDeclarationGroup` for `StateClientInterface` and `FunctionGroupPortMapping.functionGroup`*Status:* DRAFT*Imposition time:* IT_Mani

[For each `FunctionGroupPortMapping`, the `ModeDeclarationGroup` referenced in the role `FunctionGroupPortMapping.rPortPrototypeInExecutable.requiredInterface.functionGroupType` shall be identical to the `FunctionGroupPortMapping.functionGroup.type`.]

[constr_10622] Existence of `FunctionGroupPortMapping` depending on the role `rPortPrototypeInExecutable` and `process`*Status:* DRAFT*Imposition time:* IT_Mani

[Each combination of `RPortPrototype` and `Process` may be referenced by **at most one** `FunctionGroupPortMapping` in the roles `rPortPrototypeInExecutable` and `process`.]

12.14.7 Error Handling inside State Management

The processing of errors inside state management is based on the configuration of references to `ApApplicationError` from various corners of the state management configuration.

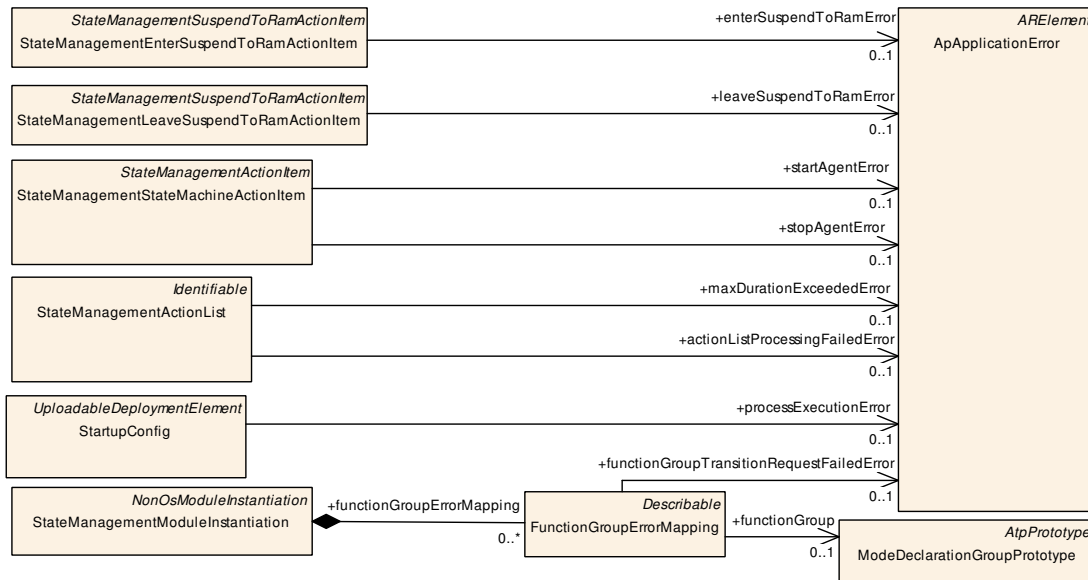


Figure 12.82: Modeling of the configuration for error handling

[TPS_MANI_01478] Supported error handling scenarios in the context of state management [The following error scenarios are supported in the context of state management:

- Error while setting up and starting a state management agent, independent of the initial state: `StateManagementStateMachineActionItem.startAgentError`.
- Error while stopping a state management agent: `StateManagementStateMachineActionItem.stopAgentError`.
- Error while requesting to switch a function group state: `FunctionGroupErrorMapping.functionGroupTransitionRequestFailedError`.
- Executing an action item list takes too long: `StateManagementActionList.maxDurationExceededError`.
- Error while processing of action list fails: `StateManagementActionList.actionListProcessingFailedError`.
- Error while launching a Process: `StartupConfig.processExecutionError`.
- Error while trying to enter suspend-to-RAM: `StateManagementEnterSuspendToRamActionItem.enterSuspendToRamError`.

- Error while trying to leave suspend-to-RAM: `StateManagementLeaveSuspendToRamActionItem.leaveSuspendToRamError`.

]

The error scenarios listed in [TPS_MANI_01478] are also depicted in Figure 12.82.

The modeling of most of the error scenarios is quite straight-forward. The notable exception affects the switching of function group states⁵.

12.14.7.1 Request Function Group State

There is no intention to support the assignment of an individual error code for each function group state if the request of a function group state goes wrong. Instead, a single error code is assigned to the entire function group, independent of the state request that may have caused a problem.

For this purpose, meta-class `FunctionGroupErrorMapping` allows for the association of a function group to a **single** error code in the context of a `StateManagementModuleInstantiation`.

Class	FunctionGroupErrorMapping			
Note	This meta-class is used to associate an error code to an entire function group. The error code shall be used if any function group state change in the referenced function group fails.			
Base	ARObject, Describable			
Aggregated by	StateManagementModuleInstantiation.functionGroupErrorMapping			
Attribute	Type	Mult.	Kind	Note
functionGroup	ModeDeclarationGroup Prototype	0..1	ref	This reference identifies the function group that is affected by an error raised if a request to transition a function group failed. Tags: atp.Status=draft This Attribute is only used by the AUTOSAR Adaptive Platform.
functionGroup Transition RequestFailed Error	ApApplicationError	0..1	ref	This reference identifies the ApApplicationError to be raised if a request to transition a function group failed. Tags: atp.Status=draft This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 12.158: FunctionGroupErrorMapping

12.15 Suspend to RAM

The control over the `suspend-to-RAM` functionality implemented in state management, which consequently represents a “hub” in the communication with various pieces of application software, taking over a “satellite” role.

Requests sent out by the hub are either confirmed or denied by the satellites. The communication pattern is sketched in Figure 12.83.

⁵This scenario requires additional modeling effort that is explained in Chapter 12.14.7.1.

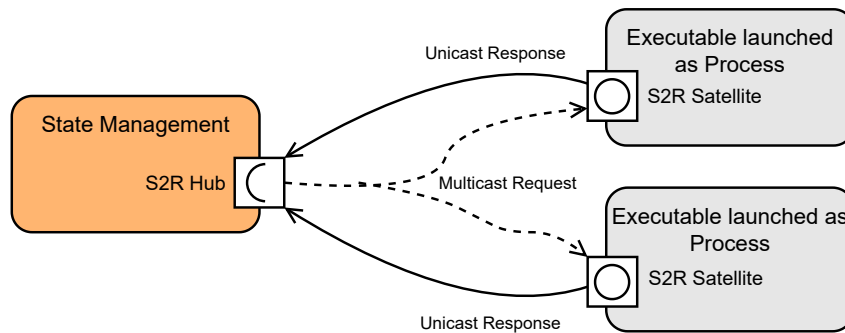


Figure 12.83: Interaction pattern for [suspend-to-RAM](#) functionality

12.15.1 Suspend to RAM Module Instantiation

On the *AUTOSAR adaptive platform*, support for [suspend-to-RAM](#) functionality is implemented by state management and the application software, as sketched in [Figure 12.83](#).

The existence of the [SuspendToRamModuleInstantiation](#) is mainly bound to the necessity to provide identity and access management in the context of [suspend-to-RAM](#).

Class	SuspendToRamModuleInstantiation			
Note	This meta-class represents the ability to define the target-configuration of a suspend-to-RAM module instantiation. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier, AtpFeature, AtpStructureElement, Identifiable , MultilanguageReferrable, NonOsModuleInstantiation , Referrable			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.159: SuspendToRamModuleInstantiation

The connection between a [SuspendToRamModuleInstantiation](#) and [PortPrototype](#)(s) in the application software is created by two different mapping classes:

- [SuspendToRamSatelliteMapping](#) associates the [SuspendToRamModuleInstantiation](#) to a [PPortPrototype](#) that is typed by a [SuspendToRamSatelliteInterface](#). This aspect is described in [Chapter 12.15.2](#).
- [SuspendToRamHubMapping](#) associates the [SuspendToRamModuleInstantiation](#) to a [PPortPrototype](#) that is typed by a [SuspendToRamHubInterface](#). This aspect is described in [Chapter 12.15.3](#).

12.15.2 Suspend to RAM Module Satellite Mapping

[TPS_MANI_01510] Mapping of `SuspendToRamModuleInstantiation` to a `PortPrototype` in the `suspend-to-RAM` satellite role

Status: DRAFT

[The relation between a `SuspendToRamModuleInstantiation` and one `PPortPrototype` in the `suspend-to-RAM` satellite role is created by using the `SuspendToRamSatelliteMapping` that refers to

- a `SuspendToRamModuleInstantiation` in the role `moduleInstantiation`,
- a `Process` in the role `process`, and
- a `PPortPrototype` typed by a `SuspendToRamSatelliteInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the `SuspendToRamModuleInstantiation`. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

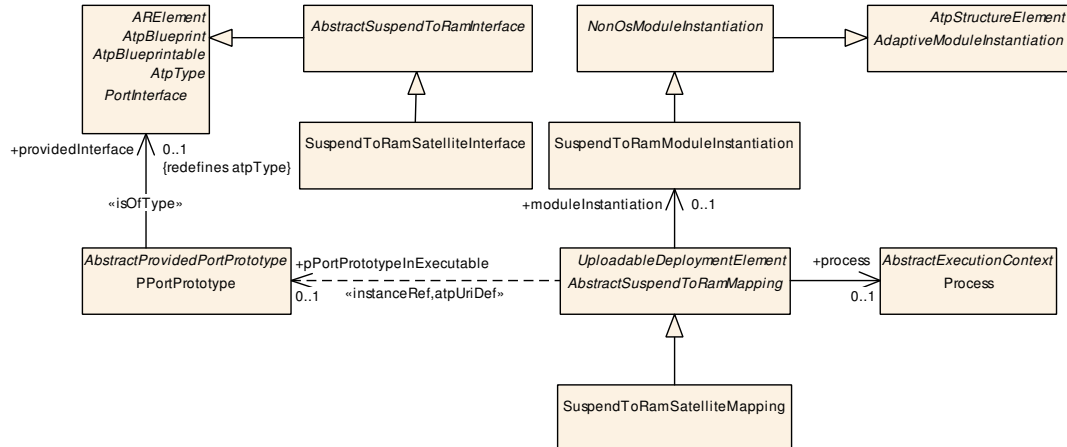


Figure 12.84: Modeling of the `SuspendToRamSatelliteMapping`

[constr_10721] Target of `AbstractSuspendToRamMapping.pPortPrototypeInExecutable`

Status: DRAFT

Imposition time: `IT_Mani`

[The target of the `instanceRef` in the role `AbstractSuspendToRamMapping.pPortPrototypeInExecutable` shall only be a `PPortPrototype` that is typed by a `SuspendToRamSatelliteInterface`.]

[constr_10722] Restriction for **pPortPrototype** that is typed by a **SuspendToRamSatelliteInterface**

Status: DRAFT

Imposition time: IT_Mani

[A **pPortPrototype** that is typed by a **SuspendToRamSatelliteInterface** shall only be referenced by a **SuspendToRamSatelliteMapping** in the role **pPortPrototypeInExecutable**.]

Class	SuspendToRamSatelliteMapping			
Note	This mapping associates a suspend-to-RAM satellite with the applicable module instantiation. Tags: atp.Status=candidate atp.recommendedPackage=SuspendToRamMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractSuspendToRamMapping , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 12.160: SuspendToRamSatelliteMapping

Class	AbstractSuspendToRamMapping (abstract)			
Note	This meta-class acts as an abstract base class for suspend-to-RAM-related mappings. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	SuspendToRamHubMapping , SuspendToRamSatelliteMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
module Instantiation	SuspendToRamModule Instantiation	0..1	ref	This reference identifies the applicable suspend-to-RAM module instantiation. Tags: atp.Status=candidate
pPortPrototype InExecutable	PPortPrototype	0..1	iref	This reference identifies the suspend-to-RAM-related port. Stereotypes: atpUriDef Tags: atp.Status=candidate InstanceRef implemented by: PPortPrototypeInExecutableInstanceRef
process	Process	0..1	ref	This reference identifies the Process in which the Executable referenced in the role pPortPrototypeInExecutable is executed. Tags: atp.Status=candidate

Table 12.161: AbstractSuspendToRamMapping

[constr_10723] Existence of **SuspendToRamSatelliteMapping.moduleInstantiation**

Status: DRAFT

Imposition time: IT_Mani

[For each concrete sub-class of **SuspendToRamSatelliteMapping**, attribute **moduleInstantiation** shall exist.]

[constr_10724] Existence of `SuspendToRamSatelliteMapping.pPortPrototypeInExecutable`*Status:* DRAFT*Imposition time:* IT_Mani

[For each concrete sub-class of `SuspendToRamSatelliteMapping`, attribute `pPortPrototypeInExecutable` shall exist.]

[constr_10725] Existence of `SuspendToRamSatelliteMapping.process`*Status:* DRAFT*Imposition time:* IT_Mani

[For each concrete sub-class of `SuspendToRamSatelliteMapping`, attribute `process` shall exist.]

12.15.3 Suspend to RAM Module Hub Mapping**[TPS_MANI_01512] Mapping of `SuspendToRamModuleInstantiation` to a `PortPrototype` in the `suspend-to-RAM` hub role***Status:* DRAFT

[The relation between a `SuspendToRamModuleInstantiation` and one `PPortPrototype` in the `suspend-to-RAM` hub role is created by using the `SuspendToRamHubMapping` that refers to

- a `SuspendToRamModuleInstantiation` in the role `moduleInstantiation`,
- a `Process` in the role `process`, and
- a `PPortPrototype` typed by a `SuspendToRamHubInterface` in the role `pPortPrototypeInExecutable`. The target of this reference does not necessarily have to exist at the time of configuration of the `SuspendToRamModuleInstantiation`. The reference itself, however, is required for constructing the corresponding `InstanceSpecifier` that the `PortPrototype` on the application layer will use at run-time.

]

[constr_10726] Target of `AbstractSuspendToRamMapping.pPortPrototypeInExecutable`*Status:* DRAFT*Imposition time:* IT_Mani

[The target of the instanceRef in the role `AbstractSuspendToRamMapping.pPortPrototypeInExecutable` shall only be a `PPortPrototype` that is typed by a `SuspendToRamHubInterface`.]

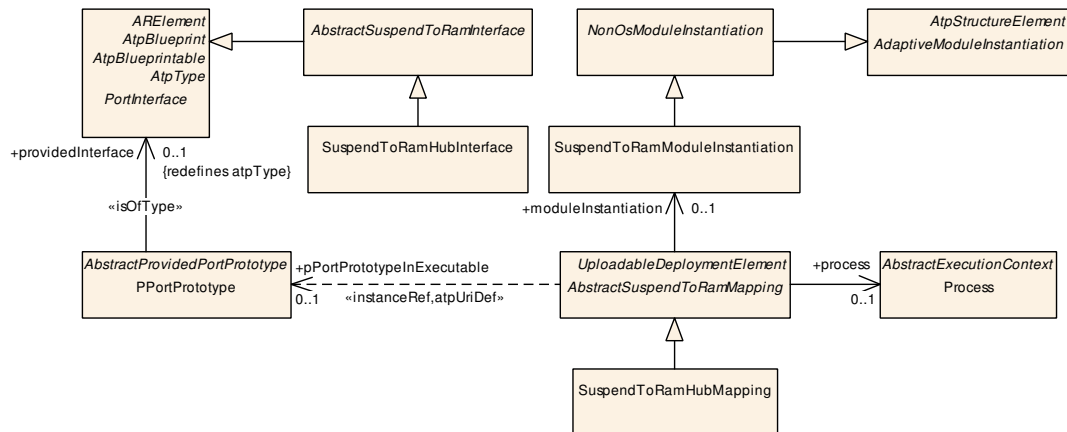


Figure 12.85: Modeling of the **SuspendToRamHubMapping**

[constr_10727] Restriction for **PPortPrototype** that is typed by a **SuspendToRamHubInterface**

Status: DRAFT

Imposition time: IT_Mani

[A **PPortPrototype** that is typed by a **SuspendToRamHubInterface** shall only be referenced by a **SuspendToRamHubMapping** in the role **pPortPrototypeInExecutable**.]

[constr_10728] Restriction for **SuspendToRamHubMapping.moduleInstantiation**

Status: DRAFT

Imposition time: IT_Mani

[Each **SuspendToRamModuleInstantiation** shall only be referenced from at most one **SuspendToRamHubMapping** in the role **moduleInstantiation**.]

Class	SuspendToRamHubMapping			
Note	This mapping associates a suspend-to-RAM hub with the applicable module instantiation. Tags: atp.Status=candidate atp.recommendedPackage=SuspendToRamMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AbstractSuspendToRamMapping , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 12.162: SuspendToRamHubMapping

[constr_10729] Existence of `SuspendToRamHubMapping.moduleInstantiation`

Status: DRAFT

Imposition time: IT_Mani

[For each concrete sub-class of `SuspendToRamHubMapping`, attribute `moduleInstantiation` shall exist.]

[constr_10730] Existence of `SuspendToRamHubMapping.pPortPrototypeInExecutable`

Status: DRAFT

Imposition time: IT_Mani

[For each concrete sub-class of `SuspendToRamHubMapping`, attribute `pPortPrototypeInExecutable` shall exist.]

[constr_10731] Existence of `SuspendToRamHubMapping.process`

Status: DRAFT

Imposition time: IT_Mani

[For each concrete sub-class of `SuspendToRamHubMapping`, attribute `process` shall exist.]

12.16 GenericDiagnosticTransportInstantiation

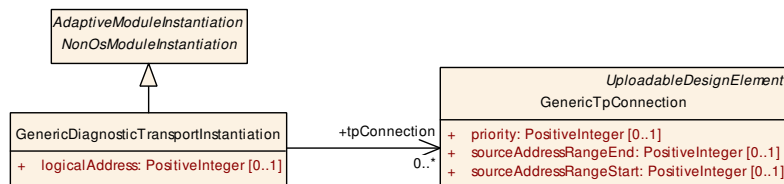


Figure 12.86: Modeling of the `GenericDiagnosticTransportInstantiation`

[TPS_MANI_03335] Semantics of `GenericDiagnosticTransportInstantiation` [Meta-class `GenericDiagnosticTransportInstantiation` represents the ability to configure a generic diagnostic transport protocol (other than DoIP) used to define the communication of diagnostic testers with the vehicle.]

The configuration of DoIP is described in [Chapter 12.5](#).

Class	GenericDiagnosticTransportInstantiation
Note	This meta-class defines a generic transport protocol (other than DoIP) for communication of diagnostic testers with a vehicle. Please note that the necessary configuration attributes can be defined via Special Data Groups. This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARObject, AdaptiveModuleInstantiation , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , NonOsModuleInstantiation , Referrable





Class	GenericDiagnosticTransportInstantiation			
Aggregated by	AtpClassifier.atpFeature, Machine.moduleInstantiation			
Attribute	Type	Mult.	Kind	Note
logicalAddress	PositiveInteger	0..1	attr	Contains the logical address of the receiver of a diagnostic message
tpConnection	GenericTpConnection	*	ref	Reference to a TpConnection that identifies the receiver(s) of a particular communication

Table 12.163: GenericDiagnosticTransportInstantiation

12.17 Ethernet Endpoint Configuration for Platform Modules

The [PlatformModuleEthernetEndpointConfiguration](#) allows the configuration of a socket address in form of a TCP/UDP port and an IP Address that is used by a Platform module.

Class	PlatformModuleEthernetEndpointConfiguration			
Note	This meta-class defines the attributes for the configuration of a port, protocol type and IP address (local address) of the communication on a VLAN. Tags: atp.recommendedPackage=PlatformModuleEndpointConfigurations This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PlatformModuleEndpointConfiguration , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
communicationConnector	EthernetCommunicationConnector	0..1	ref	Reference to the CommunicationConnector (VLAN) for which the network configuration is defined.
remoteConfig	RemoteEndpointConfiguration	*	aggr	Defintion of remote addresses of peers.
secureComPropsForTcp	SecureComProps	0..1	ref	Reference to communication security configuration settings that are valid for the tcp unicast endpoint (Tcp Port + unicast IP Address) defined by the PlatformModule EthernetEndpointConfiguration.
secureComPropsForUdp	SecureComProps	0..1	ref	Reference to communication security configuration settings that are valid for the udp unicast endpoint (Udp Port + unicast IP Address) defined by the PlatformModule EthernetEndpointConfiguration.
tcpPort	ApApplicationEndpoint	0..1	ref	This reference allows to configure a tcp port number.
udpPort	ApApplicationEndpoint	0..1	ref	This reference allows to configure a udp port number.

Table 12.164: PlatformModuleEthernetEndpointConfiguration

[constr_3414] Allowed usage of PlatformModuleEthernetEndpointConfiguration attributes that are allowed to be used to configure the network communication in the different platform modules

Status: DRAFT

Imposition time: IT_Mani

PlatformModuleEthernetEndpointConfiguration attributes	Element		
	Usage in DoIpInstantiation	Usage in DltLogSink	Usage in IdsmModuleInstantiation
tcpPort	Optional	Optional	Optional
udpPort	Optional	Optional	Optional
communicationConnector	Mandatory	Mandatory	Mandatory
remoteConfig	N/A	Optional	Mandatory
secureComPropsForUdp	N/A	Optional	Optional
secureComPropsForTcp	Optional	Optional	Optional

[constr_5372] SecureComProps for a PlatformModuleEthernetEndpointConfiguration that contains a UDP configuration

Imposition time: IT_Mani

[Only a PlatformModuleEthernetEndpointConfiguration that is referencing an ApApplicationEndpoint in the role udpPort is allowed to reference SecureComProps in the role secureComPropsForUdp.]

[constr_5373] SecureComProps for a PlatformModuleEthernetEndpointConfiguration that contains a TCP configuration

Imposition time: IT_Mani

[Only a PlatformModuleEthernetEndpointConfiguration that is referencing an ApApplicationEndpoint in the role tcpPort is allowed to reference SecureComProps in the role secureComPropsForTcp.]

13 Service Instance Manifest

13.1 ApplicationEndpoint

[TPS_MANI_03280] **Semantics of [ApApplicationEndpoint](#)** [The [ApApplicationEndpoint](#) defines a UDP or TCP Port on a [EthernetCommunicationConnector](#) and defines together with the [NetworkEndpoint](#) that is referenced by the same [EthernetCommunicationConnector](#) in the role [unicastNetworkEndpoint](#) a local endpoint of a network communication path, i.e. a Socket.]

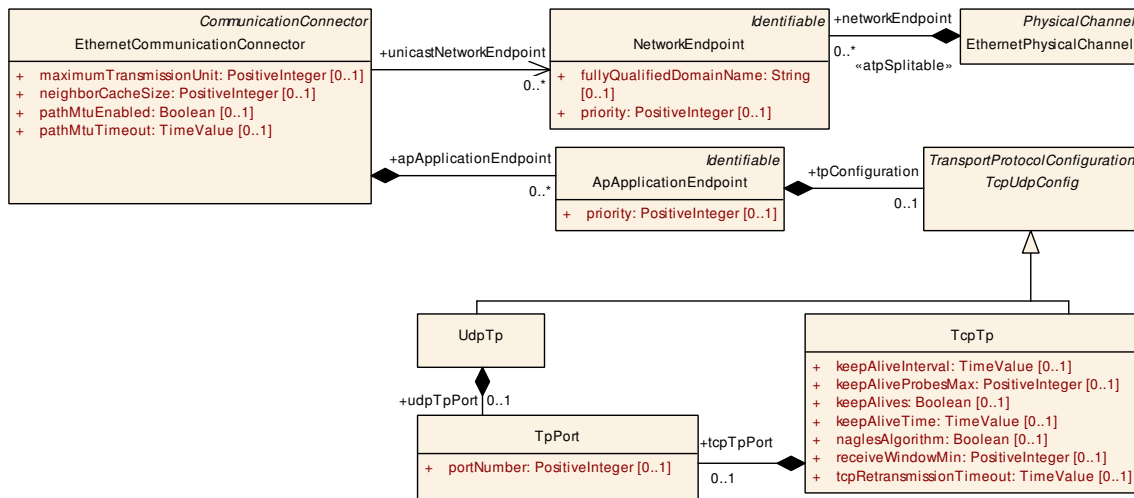


Figure 13.1: ApApplicationEndpoint definition

Class	ApApplicationEndpoint			
Note	An application endpoint is the endpoint on an Ecu in terms of application addressing (e.g. UDP or TCP Port). This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	EthernetCommunicationConnector.apApplicationEndpoint			
Attribute	Type	Mult.	Kind	Note
priority	PositiveInteger	0..1	attr	This attribute defines the VLAN frame priority where values from 0 (best effort) to 7 (highest) are allowed.
tpConfiguration	TcpUdpConfig	0..1	aggr	Configuration of the used transport protocol.

Table 13.1: ApApplicationEndpoint

Class	TcpUdpConfig (abstract)			
Note	Tcp or Udp Transport Protocol Configuration.			
Base	ARObject, TransportProtocolConfiguration			
Subclasses	TcTp , UdpTp			
Aggregated by	ApApplicationEndpoint.tpConfiguration , ApplicationEndpoint.tpConfiguration			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 13.2: TcpUdpConfig

Class	UdpTp			
Note	Content Model for UDP configuration.			
Base	ARObject, TcpUdpConfig , TransportProtocolConfiguration			
Aggregated by	ApApplicationEndpoint.tpConfiguration , ApplicationEndpoint.tpConfiguration			
Attribute	Type	Mult.	Kind	Note
udpTpPort	TpPort	0..1	aggr	Udp Port configuration.

Table 13.3: UdpTp

Class	TcpTp			
Note	Content Model for TCP configuration.			
Base	ARObject, TcpUdpConfig , TransportProtocolConfiguration			
Aggregated by	ApApplicationEndpoint.tpConfiguration , ApplicationEndpoint.tpConfiguration			
Attribute	Type	Mult.	Kind	Note
keepAliveInterval	TimeValue	0..1	attr	Specifies the interval in seconds between subsequent keepalive probes.
keepAliveProbesMax	PositiveInteger	0..1	attr	Maximum number of times that TCP retransmits an individual data segment before aborting the connection.
keepAlives	Boolean	0..1	attr	Indicates if Keep-Alive messages are sent.
keepAliveTime	TimeValue	0..1	attr	Specifies the time in seconds between the last data packet sent and the first keepalive probe.
naglesAlgorithm	Boolean	0..1	attr	Indicates if Nagle's Algorithm is used.
receiveWindowMin	PositiveInteger	0..1	attr	Minimum size of the TCP receive window in bytes.
tcpRetransmissionTimeout	TimeValue	0..1	attr	Defines the timeout in seconds before an unacknowledged TCP segment is sent again. If the tcpRetransmissionTimeout is not defined or set to "INF", no TCP segments shall be re-transmitted.
tcpTpPort	TpPort	0..1	aggr	TCP Port configuration.

Table 13.4: TcpTp

[TPS_MANI_03281] Port specific TCP configuration settings [The configuration settings in the [TcpTp](#) element of an [ApApplicationEndpoint](#) overwrite potential TCP settings that are available in [TcpProps](#) referenced by the [MachineDesign](#) that aggregates the [EthernetCommunicationConnector](#) that in turn contains the [ApApplicationEndpoint](#).]

Class	TpPort			
Note	Dynamic or direct assignment of a PortNumber.			
Base	ARObject			
Aggregated by	TcpTp.tcpTpPort , UdpTp.udpTpPort			
Attribute	Type	Mult.	Kind	Note
portNumber	PositiveInteger	0..1	attr	Port Number.

Table 13.5: TpPort

13.1.1 VLAN Priority

The `priority` is a 3-bit field which refers to the IEEE 802.1Q priority. It indicates the frame priority level. Values are from 0 (best effort) to 7 (highest); These values can be used to prioritize different classes of traffic (voice, video, data, etc.). The priority is contained in the Ethernet Header together with the `vlanIdentifier`.

The priority can be defined on different levels and can overwrite the `defaultPriority` on the VLAN:

1. `NetworkEndpoint` (for network traffic over the IP Address)
2. `ApApplicationEndpoint` (for TCP Port and/or UDP Port network traffic)
3. `ProvidedSomeipServiceInstance` (for network traffic resulting from the Service Instance)

Please find an example of the definition of VLAN priority in [Chapter B.2.5](#).

Please note that the definition of the `priority` in the `SomeipSdServerServiceInstanceConfig` can be used to define priorities for SD messages like `Service Offer` and `SubscribeEventGroupAck` that are resulting from `ProvidedSomeipServiceInstances` that are referencing the `SomeipSdServerServiceInstanceConfig` in the role `sdServerConfig`.

To prioritize SD messages that are sent from the service consumer to the service provider like `FindService` or `SubscribeEventGroup`, the `priority` in the `SomeipSdClientServiceInstanceConfig` can be used.

The SD messages are communicated over a UDP Port that is defined in `SomeipServiceDiscovery.someipServiceDiscoveryPort` and over a IP Multicast Address that is defined by `SomeipServiceDiscovery.multicastSdIpAddress`. In other words, the priority in the `SomeipSdServerServiceInstanceConfig` and `SomeipSdClientServiceInstanceConfig` can be used to prioritize network traffic that results from specific ServiceInstances on SD level.

13.2 Service Interface Deployment

The different meta-class specializations of `ServiceInterfaceDeployment` define a binding of a `ServiceInterface` to a middleware transport layer.

This chapter describes the usage of the `ServiceInterfaceDeployment` in different bindings that are supported by AUTOSAR.

[TPS_MANI_03036] `ServiceInterface` deployment to a middleware transport layer [The `ServiceInterfaceDeployment` meta-class provides the ability to map a `ServiceInterface` to a middleware transport layer that is represented by a concrete class that is derived from the abstract `ServiceInterfaceDeployment` meta-class.]

The association between the `ServiceInterfaceDeployment` and the `ServiceInterface` implicitly also defines the relation between the technology specific version number of the service on the `ServiceInterfaceDeployment` and the service version of the `ServiceInterface` (defined by `ServiceInterface.majorVersion` and `ServiceInterface.minorVersion`)

[TPS_MANI_03617] Version mapping between `ServiceInterface` and `ServiceInterfaceDeployment` [The contract version of a `ServiceInterface` (`majorVersion`, `minorVersion`) shall be mapped to a version of the `ServiceInterfaceDeployment` for each transport layer.]

This version mapping may lead to different version numbers for different `ServiceInterfaceDeployments` that refer to the same `ServiceInterface`. This allows to define different version numbers, on the same network or on different networks (e.g. VLANs).]

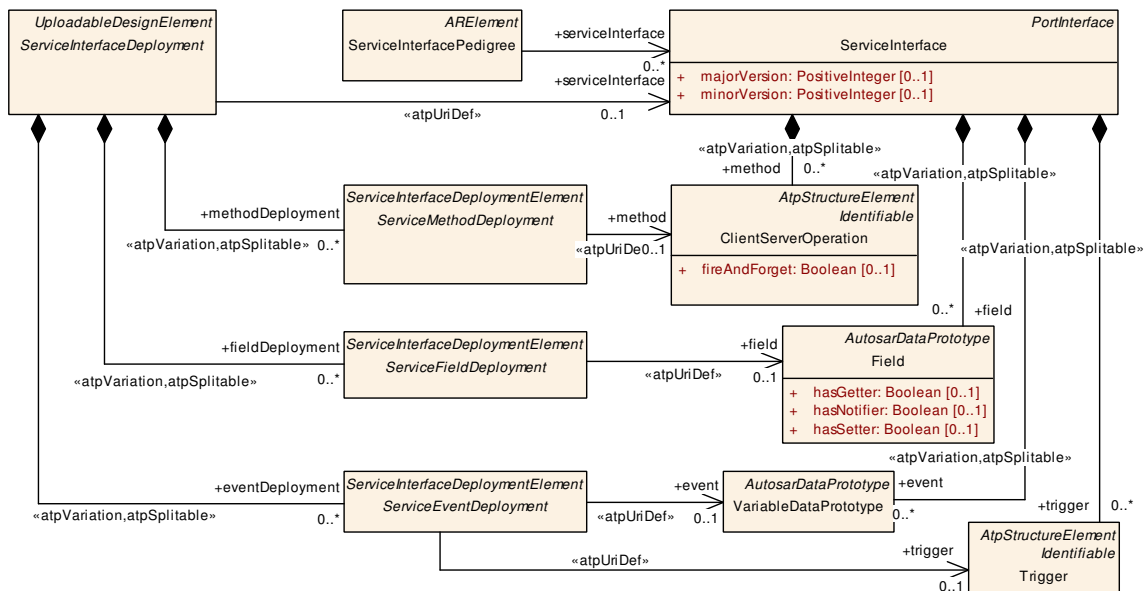


Figure 13.2: Deployment-related modeling of ServiceInterface

Note that transport layer specific constraints on the uniqueness of protocol credentials still have to be respected, e.g. [constr_1723].

In Figure 13.3, the use-case of having one `PPortPrototype` typed by one `ServiceInterface` and having several `ProvidedSomeipServiceInstances` on several VLANs is illustrated.

It is possible to have different `serviceInterfaceId`, `serviceInstanceId`, and `majorVersion` values on each individual VLAN. But also the use-case of providing both service instances on the same VLAN would be supported, as long as their SOME/IP credentials are unique (see [constr_1723]).

On different VLANs the service instance may also use the same SOME/IP credentials. But only in case that all service instance specific configuration settings (e.g. IP Multicast Address, SD Timing Properties) are exactly the same on both VLANs the same [AdaptivePlatformServiceInstance](#) can be used to model the communication on both VLANs.

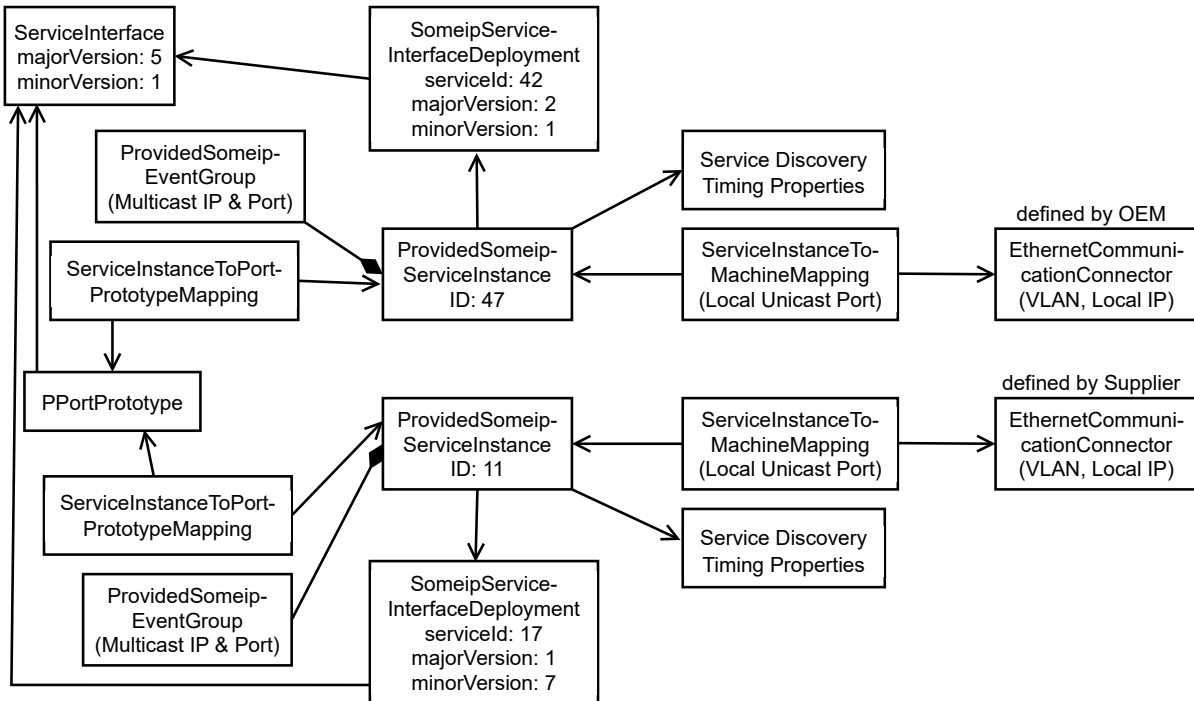


Figure 13.3: Example of 1 [PPortPrototype](#) mapped to 2 VLANs

If, for example, the [serviceInterfaceId](#), [serviceInstanceId](#), and [majorVersion](#) values of a service instance on each VLAN are the same, but different IP Multicast Addresses are used on the different VLANs for the EventGroup transmission, then an individual VLAN specific modeling of [AdaptivePlatformServiceInstance](#) is necessary as shown in [Figure 13.3](#).

Class	<i>ServiceInterfaceDeployment</i> (abstract)			
Note	Middleware transport layer specific configuration settings for the ServiceInterface and all contained ServiceInterface elements. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Subclasses	DdsServiceInterfaceDeployment , SomeipServiceInterfaceDeployment , UserDefinedServiceInterfaceDeployment			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	<i>ServiceInterfaceDeployment</i> (abstract)			
event Deployment	ServiceEvent Deployment	*	aggr	Middleware transport layer specific configuration settings for an Event that is defined in the ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=eventDeployment.shortName, event Deployment.variationPoint.shortLabel vh.latestBindingTime=blueprintDerivationTime
fieldDeployment	ServiceField Deployment	*	aggr	Middleware transport layer specific configuration settings for a Field that is defined in the ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=fieldDeployment.shortName, field Deployment.variationPoint.shortLabel vh.latestBindingTime=blueprintDerivationTime
method Deployment	ServiceMethod Deployment	*	aggr	Middleware transport layer specific configuration settings for a method that is defined in the ServiceInterface. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=methodDeployment.shortName, method Deployment.variationPoint.shortLabel vh.latestBindingTime=blueprintDerivationTime
serviceInterface	ServiceInterface	0..1	ref	Reference to a ServiceInterface that is deployed to a middleware transport layer. Stereotypes: atpUriDef

Table 13.6: ServiceInterfaceDeployment

Class	<i>ServiceInterfaceDeploymentElement</i> (abstract)			
Note	This meta-class provides shared attributes for concrete classes used in the context of the definition of the ServiceInterfaceDeployment. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	ServiceEventDeployment , ServiceFieldDeployment , ServiceMethodDeployment			
Attribute	Type	Mult.	Kind	Note
minimumSend Interval	TimeValue	0..1	attr	Minimum time between two consecutive transmissions of a service instance element (event, field, trigger or method call). Unit: seconds

Table 13.7: ServiceInterfaceDeploymentElement

[constr_10655] Allowed range of values for attribute [ServiceInterfaceDeploymentElement.minimumSendInterval](#)

Imposition time: [IT_Mani](#)

[The allowed value of attribute [ServiceInterfaceDeploymentElement.minimumSendInterval](#) shall be within the interval [0.0 .. 10.0].]

A value of 0 for [ServiceInterfaceDeploymentElement.minimumSendInterval](#) means that **no minimum transmission time** for the corresponding [event](#), [field](#), [trigger](#) or [method](#) shall be enforced, i.e., the tx frequency is **not** limited by ara::com.

[TPS_MANI_03037] Purpose of `ServiceMethodDeployment` [The `ServiceMethodDeployment` meta-class provides the ability to define middleware transport layer specific configuration settings relevant for a `method` that is defined in the context of a `ServiceInterface`.]

[constr_3300] Allowed `ServiceMethodDeployment.method` references

Imposition time: IT_Mani

[The `ClientServerOperation` that is referenced by `ServiceMethodDeployment` in the role `method` shall be defined in the context of a `ServiceInterface` that is referenced by the `ServiceInterfaceDeployment` in the role `serviceInterface` that contains the `ServiceMethodDeployment`.]

[TPS_MANI_03038] Purpose of `ServiceEventDeployment` [The `ServiceEventDeployment` meta-class provides the ability to define middleware transport layer specific configuration settings relevant for an `event` or `trigger` that is defined in the context of a `ServiceInterface`.]

[constr_3301] Allowed `ServiceEventDeployment.event` references

Imposition time: IT_Mani

[The `VariableDataPrototype` that is referenced by `ServiceEventDeployment` in the role `event` shall be defined in the context of a `ServiceInterface` that is referenced by the `ServiceInterfaceDeployment` in the role `serviceInterface` that contains the `ServiceEventDeployment`.]

[constr_5316] Allowed `ServiceEventDeployment.trigger` references

Imposition time: IT_Mani

[The `Trigger` that is referenced by `ServiceEventDeployment` in the role `trigger` shall be defined in the context of a `ServiceInterface` that is referenced by the `ServiceInterfaceDeployment` in the role `serviceInterface` that contains the `ServiceEventDeployment`.]

[constr_5317] `ServiceEventDeployment` not allowed to reference an `event` and a `trigger` at the same time

Imposition time: IT_Mani

[The `ServiceEventDeployment` element shall reference either:

- a `VariableDataPrototype` in the role `event` or
- a `Trigger` in the role `trigger`,

but not both at the same time.]

[TPS_MANI_03039] Purpose of `ServiceFieldDeployment` [The `ServiceFieldDeployment` meta-class provides the ability to define middleware transport layer specific configuration settings relevant for a `field` that is defined in the context of a `ServiceInterface`.]

[constr_3302] Allowed `ServiceFieldDeployment.field` references*Imposition time: IT_Mani*

[The `Field` that is referenced by `ServiceFieldDeployment` in the role `field` shall be defined in the context of a `ServiceInterface` that is referenced by the `ServiceInterfaceDeployment` in the role `serviceInterface` that contains the `ServiceFieldDeployment`.]

Please note that a partial `ServiceInterfaceDeployment` that only covers certain parts of the corresponding `ServiceInterfaceDeployment` is not supported. This understanding is formalized in [constr_10029]

Please note further that the coverage of elements of a `ServiceInterfaceDeployment` varies depending on the sub-class of `ServiceInterfaceDeployment`. This distinction is formalized in the existence of [constr_10029] and [constr_10629].

[constr_10029] `ServiceInterfaceDeployment` (except `DdsServiceInterfaceDeployment`) shall cover all elements of the corresponding `ServiceInterface`*Imposition time: IT_Mani*

[With the exception of `DdsServiceInterfaceDeployment`, if a `ServiceInterfaceDeployment` references a `ServiceInterface` in the role `serviceInterface`, then all `methods`, `fields`, `triggers`, and `events` defined in the context of the referenced `ServiceInterface` shall be referenced by respective `methodDeployments`, `fieldDeployments`, and `eventDeployments` owned by the referencing `ServiceInterfaceDeployment`.]

[constr_3715] Reference in the role `SomeipEventGroup.event`*Imposition time: IT_Mani*

[In the context of a given `SomeipServiceInterfaceDeployment`, all aggregated `SomeipEventDeployments` shall be referenced at least once in the role `event` by `SomeipEventGroups` that in turn are aggregated at the same `SomeipServiceInterfaceDeployment`.]

Class	<code>ServiceMethodDeployment</code> (abstract)			
Note	This abstract meta-class represents the ability to specify a deployment of a Method to a middleware transport layer. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code> , <code>ServiceInterfaceDeploymentElement</code>			
Subclasses	<code>SomeipMethodDeployment</code> , <code>UserDefinedMethodDeployment</code>			
Aggregated by	<code>ServiceInterfaceDeployment.methodDeployment</code>			
Attribute	Type	Mult.	Kind	Note
method	<code>ClientServerOperation</code>	0..1	ref	Reference to a method that is deployed to a middleware transport layer. Stereotypes: <code>atpUriDef</code>

Table 13.8: ServiceMethodDeployment

Class	ServiceEventDeployment (abstract)			
Note	This abstract meta-class represents the ability to specify a deployment of an Event to a middleware transport layer. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , ServiceInterfaceDeploymentElement			
Subclasses	DdsEventDeployment , SomeipEventDeployment , UserDefinedEventDeployment			
Aggregated by	ServiceInterfaceDeployment.eventDeployment			
Attribute	Type	Mult.	Kind	Note
event	VariableDataPrototype	0..1	ref	Reference to an Event that is deployed to a middleware transport layer. Stereotypes: atpUriDef
trigger	Trigger	0..1	ref	Reference to a Trigger that is deployed to a middleware transport layer. Stereotypes: atpUriDef

Table 13.9: ServiceEventDeployment

Class	ServiceFieldDeployment (abstract)			
Note	This abstract meta-class represents the ability to specify a deployment of a Field to a middleware transport layer. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , ServiceInterfaceDeploymentElement			
Subclasses	DdsFieldDeployment , SomeipFieldDeployment , UserDefinedFieldDeployment			
Aggregated by	ServiceInterfaceDeployment.fieldDeployment			
Attribute	Type	Mult.	Kind	Note
field	Field	0..1	ref	Reference to a Field that is deployed to a middleware transport layer. Stereotypes: atpUriDef

Table 13.10: ServiceFieldDeployment

[constr_10251] Multiplicity of the reference in the role [ServiceFieldDeployment.field](#)

Imposition time: [IT_Mani](#)

[For each [ServiceFieldDeployment](#), the reference in the role [field](#) shall exist.]

13.2.1 SOME/IP Service Interface Deployment

This chapter describes the SOME/IP deployment of a [ServiceInterface](#).

[TPS_MANI_03040] SOME/IP ServiceInterface binding [The [SomeipServiceInterfaceDeployment](#) meta-class provides the ability to bind a [ServiceInterface](#) to SOME/IP and to assign a SOME/IP Service identifier to the [ServiceInterface](#) with the [serviceInterfaceId](#) attribute.]

The idea behind the [SomeipServiceInterfaceDeployment](#) is the definition of a common configuration set that is shared between the server that provides the [ServiceInterface](#) and all clients that are consuming the [ServiceInterface](#). So it contains all relevant SOME/IP settings used for identification of the [ServiceInterface](#) and its content in messages on the network.

[constr_3410] Value range of `SomeipServiceInterfaceDeployment.serviceInterfaceId`

Imposition time: `IT_Mani`

[The value of `serviceInterfaceId` shall be in the range of 0..65535.]

Please note that the SOME/IP MessageId that is 32 Bit long contains a 16 Bit `serviceInterfaceId`, a single bit that defines whether the message transports a method or an event and a 15 Bit `eventId` or `methodId`.

Please also consider [PRS_SOMEIPSD_00515] in [36, PRS SOME/IP Service Discovery Protocol] that defines special and reserved `serviceInterfaceIds` for SOME/IP and SOME/IP-SD.

[TPS_MANI_03041] Definition of SOME/IP EventGroups [The `SomeipServiceInterfaceDeployment.eventGroup` allows to define SOME/IP *EventGroups* that are included in the SOME/IP Service and provide a logical grouping of events and notification events used for publish/subscribe handling.]

[constr_3304] Value of attribute `SomeipEventGroup.eventGroupId` shall be unique

Imposition time: `IT_Mani`

[The value of attribute `eventGroupId` shall be unique in the context of the enclosing `SomeipServiceInterfaceDeployment`.]

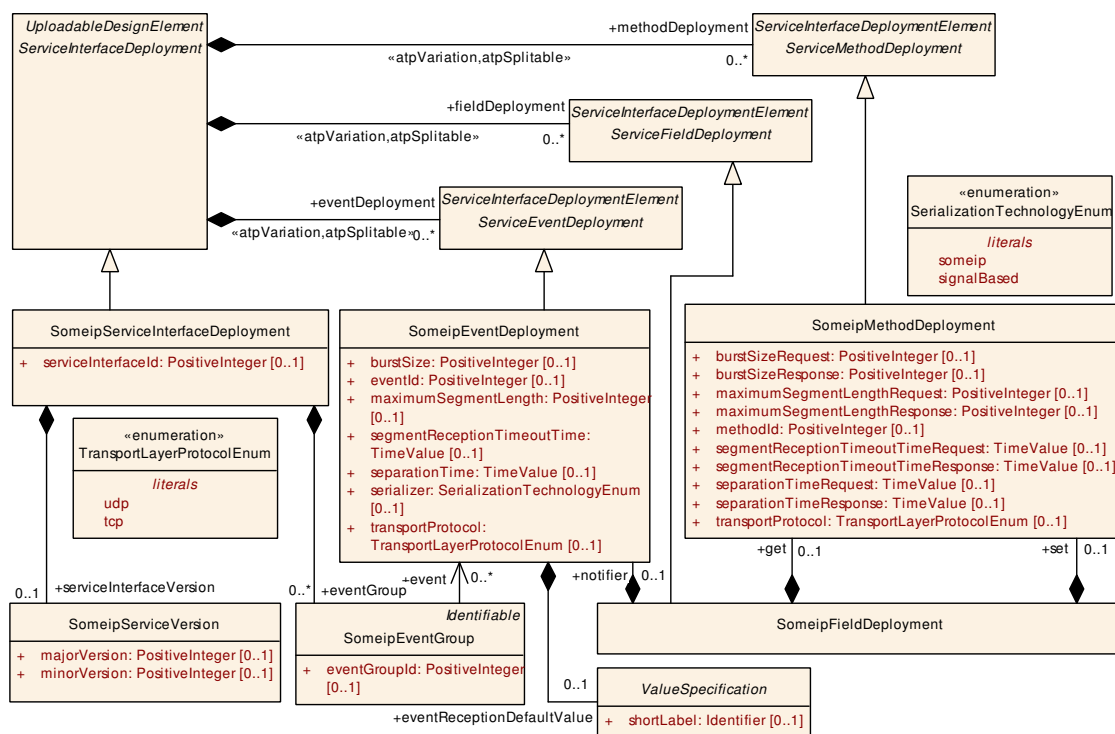


Figure 13.4: SOME/IP deployment of ServiceInterface

[TPS_MANI_03042] Definition of SOME/IP Service Version [The `SomeipServiceInterfaceDeployment.serviceInterfaceVersion` allows to define a major and a minor version for the SOME/IP Service.]

[constr_3557] Mandatory `majorVersion` at `SomeipServiceInterfaceDeployment.serviceInterfaceVersion`

Imposition time: IT_Mani

[If the `SomeipServiceVersion` is aggregated at the `SomeipServiceInterfaceDeployment` in the role `serviceInterfaceVersion` then the attribute `SomeipServiceVersion.majorVersion` shall be defined.]

Class	SomeipServiceInterfaceDeployment			
Note	SOME/IP configuration settings for a ServiceInterface. Tags: atp.recommendedPackage=ServiceInterfaceDeployments This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInterfaceDeployment , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
eventGroup	SomeipEventGroup	*	aggr	SOME/IP EventGroups that are defined within the SOME/IP ServiceClass.
serviceInterfaceId	PositiveInteger	0..1	attr	Unique Identifier that identifies the ServiceInterface in SOME/IP. This Identifier is sent as Service ID in SOME/IP Service Discovery messages.
serviceInterfaceVersion	SomeipServiceVersion	0..1	aggr	The SOME/IP major and minor Version of the Service.

Table 13.11: SomeipServiceInterfaceDeployment

[constr_10212] Multiplicity of attribute `SomeipServiceInterfaceDeployment.serviceInterfaceId`

Imposition time: IT_Mani

[For each `SomeipServiceInterfaceDeployment`, the attribute `serviceInterfaceId` shall exist.]

[constr_10213] Multiplicity of attribute `SomeipServiceInterfaceDeployment.serviceInterfaceVersion`

Imposition time: IT_Mani

[For each `SomeipServiceInterfaceDeployment`, the attribute `serviceInterfaceVersion`.]

Please note that the value of each `SomeipEventDeployment.eventId` that is used in the context of an enclosing `SomeipServiceInterfaceDeployment` is allowed to overlap with the value of each `SomeipEventGroup.eventGroupId` used in the same `SomeipServiceInterfaceDeployment`.

In other words, the range of valid numbers of `SomeipEventDeployment.eventId` is independent of the range of valid numbers used for `SomeipEventGroup.eventGroupId` and both attributes are allowed to use the same value in the context of the same `SomeipServiceInterfaceDeployment`.

For `service-signal-translation` according to [TPS_MANI_03667] special semantics applies as defined in [TPS_MANI_03666].

Class	SomeipEventGroup			
Note	Grouping of events and notification events inside a ServiceInterface in order to allow subscriptions. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SomeipServiceInterfaceDeployment.eventGroup			
Attribute	Type	Mult.	Kind	Note
event	SomeipEventDeployment	*	ref	Reference to an event that is part of the EventGroup.
eventGroupId	PositiveInteger	0..1	attr	Unique Identifier that identifies the EventGroup in SOME/IP. This Identifier is sent as Eventgroup ID in SOME/IP Service Discovery messages.

Table 13.12: SomeipEventGroup

[constr_10214] Multiplicity of attribute [SomeipEventGroup.eventGroupId](#)

Imposition time: IT_Mani

[For each [SomeipEventGroup](#), the attribute `eventGroupId` shall exist.]

[TPS_MANI_03043] SOME/IP [VariableDataPrototype](#) binding [The [SomeipEventDeployment](#) meta-class provides the ability to bind a [VariableDataPrototype](#) to SOME/IP and to assign a SOME/IP Event identifier to the `event` with the `eventId` attribute.]

[constr_3305] Value of attribute [SomeipEventDeployment.eventId](#) shall be unique

Imposition time: IT_Mani

[The value of `eventId` shall be unique in the context of the enclosing [SomeipServiceInterfaceDeployment](#), unless [SomeipEventDeployment.serializer](#) is set to [SerializationTechnologyEnum.signalBased](#).]

[constr_3408] Value range of [SomeipEventDeployment.eventId](#)

Imposition time: IT_Mani

[The value of `eventId` shall be in the range of 0..32767.]

Please note that [PRS_SOMEIPSD_00517] in [36, PRS SOME/IP Service Discovery Protocol] defines special and reserved EVENT-IDs for SOME/IP and SOME/IP-SD that result in the `eventId` values of 0 and 32767.

[TPS_MANI_03050] Usage of `SomeipEventDeployment.transportProtocol`
[The value of `SomeipEventDeployment.transportProtocol` defines over which Transport Layer Protocol the `SomeipEventDeployment.event` is provided.]

[constr_5156] `SomeipEventDeployment.transportProtocol` setting to `udp` and the impact on `ProvidedSomeipServiceInstances`

Imposition time: `IT_Mani`

[If `SomeipEventDeployment.transportProtocol` is set to `udp` then each `ProvidedSomeipServiceInstance` that refers the `SomeipServiceInterfaceDeployment` in the role `serviceInterfaceDeployment` shall only be mapped to a `MachineDesign` with a `SomeipServiceInstanceToMachineMapping` with a configured `udpPort`.]

[constr_3308] `SomeipEventDeployment.transportProtocol` setting to `tcp` and the impact on `ProvidedSomeipServiceInstances`

Imposition time: `IT_Mani`

[If `SomeipEventDeployment.transportProtocol` is set to `tcp` then each `ProvidedSomeipServiceInstance` that refers the `SomeipServiceInterfaceDeployment` in the role `serviceInterfaceDeployment` shall only be mapped to a `MachineDesign` with a `SomeipServiceInstanceToMachineMapping` with a configured `tcpPort`.]

[TPS_MANI_03067] SOME/IP segmentation of `udp SomeipEventDeployments` [If the `maximumSegmentLength` is set to a value and the data length is larger than `maximumSegmentLength` then SOME/IP shall segment the `SomeipEventDeployment` into several packets and transmit them over the network.

The sender shall wait the `separationTime` between the transmissions of segments. On the reception side, SOME/IP re-assembles the received SOME/IP segments to the original `SomeipEventDeployment`.]

[constr_3351] SOME/IP segmentation allowed for `udp SomeipEventDeployments`

Imposition time: `IT_Mani`

[Attribute `SomeipEventDeployment.maximumSegmentLength` shall only be used if the value of attribute `SomeipEventDeployment.transportProtocol` is set to `udp`.]

[TPS_MANI_03328] Reception Monitoring of SOME/IP segments [The attribute `SomeipEventDeployment.segmentReceptionTimeoutTime` is used to monitor the successful reception of SOME/IP segments (conforms to SOMEIPTP_REASSEMBLY_TIMEOUT of [11, PRS SOME/IP Protocol]).]

[constr_9327] SOME/IP segment reception monitoring allowed for udp SomeipEventDeployments

Imposition time: IT_Mani

[Attribute `SomeipEventDeployment.segmentReceptionTimeoutTime` shall only be used if the value of attribute `SomeipEventDeployment.transportProtocol` is set to `udp`.]

As the `SomeipServiceInterfaceDeployment` is also used for the deployment of signal-based `Pdus` on Ethernet the attribute `SomeipEventDeployment.serializer` defines whether the `someip` or the `signalBased` serialization shall be used for a specific `event`.

[TPS_MANI_03615] `SomeipEventDeployment.serializer` equals `someip` [If the attribute `SomeipEventDeployment.serializer` is not defined or is set to the value `someip` then the `event` shall be serialized/de-serialized using the `SOME/IP` serializer.]

[TPS_MANI_03591] `SomeipEventDeployment.serializer` equals `signalBased` [If the attribute `SomeipEventDeployment.serializer` is set to the value `signalBased` then the `event` shall be serialized/de-serialized using the signal-based approach.]

This aspect is described in [Chapter 9](#).

Class	SomeipEventDeployment			
Note	SOME/IP configuration settings for an Event. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , ServiceEventDeployment , ServiceInterfaceDeploymentElement			
Aggregated by	ServiceInterfaceDeployment.eventDeployment , SomeipFieldDeployment.notifier			
Attribute	Type	Mult.	Kind	Note
burstSize	PositiveInteger	0..1	attr	Specifies the number of segments that shall be transmitted in a burst ignoring separationTime. SeparationTime will then only be applied between bursts. If not configured, SeparationTime will be applied between all frames.
eventId	PositiveInteger	0..1	attr	Unique Identifier within a ServiceInterface that identifies the Event in SOME/IP. This Identifier is sent as part of the Message ID in SOME/IP messages.
eventReceptionDefaultValue	ValueSpecification	0..1	aggr	Value used to fill the Event data on the receiver side, if less data than expected is received. The value is expected to cover the entire expected event network payload. The value specification is supposed to take the order of serialized representation of the data on the network, as opposed to the order of elements in a data type description. Tags: atp.Status=obsolete





Class	SomeipEventDeployment			
maximumSegmentLength	PositiveInteger	0..1	attr	This attribute describes the length in bytes of the SOME/IP segment. This includes 8 bytes for the Request ID, Protocol Version, Interface Version, Message Type and Return Code and 4 additional SOME/IP TP bytes. If this attribute is set to a value and the data length is larger than maximumSegmentLength then the corresponding SOME/IP message will be segmented into smaller parts that are transmitted over the network.
segmentReceptionTimeoutTime	TimeValue	0..1	attr	Timer to monitor the successful reception of segments (in seconds) in SOME/IP.
separationTime	TimeValue	0..1	attr	Sets the duration of the minimum time in seconds SOME/IP shall wait between the transmissions of segments.
serializer	SerializationTechnologyEnum	0..1	attr	Defines which serialization technology shall be used.
transportProtocol	TransportLayerProtocolEnum	0..1	attr	This attribute defines over which Transport Layer Protocol this event is intended to be sent.

Table 13.13: SomeipEventDeployment

[constr_10215] Multiplicity of attribute [SomeipEventDeployment.eventId](#)

Imposition time: IT_Mani

[For each [SomeipEventDeployment](#), the attribute [eventId](#) shall exist.]

[constr_10216] Multiplicity of attribute [SomeipEventDeployment.transportProtocol](#)

Imposition time: IT_Mani

[For each [SomeipEventDeployment](#), the attribute [transportProtocol](#) shall exist.]

Enumeration	SerializationTechnologyEnum
Note	This enumeration allows to choose a Serialization Technology. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SomeipEventDeployment.serializer
Literal	Description
signalBased	Signal-Based serializer. Tags: atp.EnumerationLiteralIndex=1
someip	SOME/IP Serializer Tags: atp.EnumerationLiteralIndex=0

Table 13.14: SerializationTechnologyEnum

[TPS_MANI_03044] SOME/IP [ClientServerOperation](#) binding [The [SomeipMethodDeployment](#) meta-class provides the ability to bind a [ClientServerOperation](#) to SOME/IP and to assign a SOME/IP Method identifier to the [method](#) with the [methodId](#) attribute.]

[constr_3306] Value of attribute `methodId` shall be unique per `SomeipServiceInterfaceDeployment`*Imposition time: IT_Mani*

[The value of `methodId` shall be unique in the context of the enclosing `SomeipServiceInterfaceDeployment`.]

[constr_3409] Value range of `SomeipMethodDeployment.methodId`*Imposition time: IT_Mani*

[The value of `methodId` shall be in the range of 0..32767.]

Please note that [PRS_SOMEIPSD_00517] in [36, PRS SOME/IP Service Discovery Protocol] defines special and reserved METHOD-IDs for SOME/IP and SOME/IP-SD that result in the `methodId` values of 0 and 32767.

[TPS_MANI_03051] Usage of `SomeipMethodDeployment.transportProtocol` [The value of `SomeipMethodDeployment.transportProtocol` defines over which Transport Layer Protocol this method is provided.]**[constr_3309] `SomeipMethodDeployment.transportProtocol` setting to `udp` and the impact on `ProvidedSomeipServiceInstances`***Imposition time: IT_Mani*

[If `SomeipMethodDeployment.transportProtocol` is set to `udp` then each `ProvidedSomeipServiceInstance` that refers the `SomeipServiceInterfaceDeployment` in the role `serviceInterfaceDeployment` shall only be mapped to a `MachineDesign` with a `SomeipServiceInstanceToMachineMapping` with a configured `udpPort`.]

[constr_3310] `SomeipMethodDeployment.transportProtocol` setting to `tcp` and the impact on `ProvidedSomeipServiceInstances`*Imposition time: IT_Mani*

[If `SomeipMethodDeployment.transportProtocol` is set to `tcp` then each `ProvidedSomeipServiceInstance` that refers the `SomeipServiceInterfaceDeployment` in the role `serviceInterfaceDeployment` shall only be mapped to a `MachineDesign` with a `SomeipServiceInstanceToMachineMapping` with a configured `tcpPort`.]

[TPS_MANI_03068] SOME/IP segmentation of `SomeipMethodDeployment` Calls

[If the `maximumSegmentLengthRequest` is set to a value and the data length is larger than `maximumSegmentLengthRequest` then SOME/IP shall segment the `SomeipMethodDeployment` Call-Message into several packets and transmit them over the network.

The sender shall wait the `separationTimeRequest` between the transmissions of segments. On the reception side, SOME/IP re-assembles the received SOME/IP segments to the original `SomeipMethodDeployment` Call-Message.]

[TPS_MANI_03069] SOME/IP segmentation of `SomeipMethodDeployment` Responses [If the `maximumSegmentLengthResponse` is set to a value and the data length is larger than `maximumSegmentLengthResponse` then SOME/IP shall segment the `SomeipMethodDeployment` Response-Message into several packets and transmit them over the network.

The sender shall wait the `separationTimeResponse` between the transmissions of segments. On the reception side, SOME/IP re-assembles the received SOME/IP segments to the original `SomeipMethodDeployment` Response-Message.]

[constr_3352] SOME/IP segmentation allowed for udp `SomeipMethodDeployments`

Imposition time: IT_Mani

[`SomeipMethodDeployment.maximumSegmentLengthRequest` and `SomeipMethodDeployment.maximumSegmentLengthResponse` shall only be used if `SomeipMethodDeployment.transportProtocol` is set to udp.]

[TPS_MANI_03329] Reception Monitoring of SOME/IP segments of the Method Call Message [The attribute `SomeipMethodDeployment.segmentReceptionTimeoutTimeRequest` is used to monitor the successful reception of SOME/IP segments of the Method Call Message (conforms to SOMEIPTP_REASSEMBLY_TIMEOUT of [11, PRS SOME/IP Protocol]).]

[TPS_MANI_03330] Reception Monitoring of SOME/IP segments of the Method Response Message [The attribute `SomeipMethodDeployment.segmentReceptionTimeoutTimeResponse` is used to monitor the successful reception of SOME/IP segments of the Method Response Message (conforms to SOMEIPTP_REASSEMBLY_TIMEOUT of [11, PRS SOME/IP Protocol]).]

[constr_9328] Reception Monitoring of SOME/IP segments is allowed for udp `SomeipMethodDeployments`

Imposition time: IT_Mani

[`SomeipMethodDeployment.segmentReceptionTimeoutTimeRequest` and `SomeipMethodDeployment.segmentReceptionTimeoutTimeResponse` shall only be used if the value of attribute `SomeipMethodDeployment.transportProtocol` is set to udp.]

Class	<code>SomeipMethodDeployment</code>			
Note	SOME/IP configuration settings for a Method. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code> , <code>ServiceInterfaceDeploymentElement</code> , <code>ServiceMethodDeployment</code>			
Aggregated by	<code>ServiceInterfaceDeployment.methodDeployment</code> , <code>SomeipFieldDeployment.get</code> , <code>SomeipFieldDeployment.set</code>			
Attribute	Type	Mult.	Kind	Note





Class	SomeipMethodDeployment			
burstSize Request	PositiveInteger	0..1	attr	Specifies the number of segments for the Method Call that shall be transmitted in a burst ignoring separation Time. SeparationTime will then only be applied between bursts. If not configured, SeparationTime will be applied between all frames.
burstSize Response	PositiveInteger	0..1	attr	Specifies the number of segments for the Method Response that shall be transmitted in a burst ignoring separationTime. SeparationTime will then only be applied between bursts. If not configured, SeparationTime will be applied between all frames.
maximum SegmentLength Request	PositiveInteger	0..1	attr	This attribute describes the length in bytes of one SOME/IP segment into which the Method Call Message will be divided. This length field includes 8 bytes for the Request ID, Protocol Version, Interface Version, Message Type and Return Code and 4 additional SOME/IP TP bytes. If this attribute is set to a value and the data length is larger than maximumSegmentLengthRequest then the corresponding SOME/IP message will be segmented into smaller parts that are transmitted over the network.
maximum SegmentLength Response	PositiveInteger	0..1	attr	This attribute describes the length in bytes of one SOME/IP segment into which the Method Return Message will be divided. This length field includes 8 bytes for the Request ID, Protocol Version, Interface Version, Message Type and Return Code and 4 additional SOME/IP TP bytes. If this attribute is set to a value and the data length is larger than maximumSegmentLengthResponse then the corresponding SOME/IP message will be segmented into smaller parts that are transmitted over the network.
methodId	PositiveInteger	0..1	attr	Unique Identifier within a ServiceInterface that identifies the Method in SOME/IP. This Identifier is sent as part of the Message ID in SOME/IP messages.
segment Reception TimeoutTime Request	TimeValue	0..1	attr	Timer to monitor the successful reception of segments (in seconds) in SOME/IP for the Method Call.
segment Reception TimeoutTime Response	TimeValue	0..1	attr	Timer to monitor the successful reception of segments (in seconds) in SOME/IP for the Method Response.
separationTime Request	TimeValue	0..1	attr	Sets the duration of the minimum time in seconds SOME/IP shall wait between the transmissions of segments into which the Method Call Message will be divided.
separationTime Response	TimeValue	0..1	attr	Sets the duration of the minimum time in seconds SOME/IP shall wait between the transmissions of segments into which the Method Return Message will be divided.
transport Protocol	TransportLayerProtocol Enum	0..1	attr	This attribute defines over which Transport Layer Protocol this method is intended to be sent.

Table 13.15: SomeipMethodDeployment

Class	SomeipServiceInstanceToMachineMapping
Note	This meta-class allows to map SomeipServiceInstances to a CommunicationConnector of a Machine. In this step the network configuration (IP Address, Transport Protocol, Port Number) for the ServiceInstance is defined. Tags: atp.recommendedPackage=ServiceInstanceToMachineMappings This Class is only used by the AUTOSAR Adaptive Platform.





Class	SomeipServiceInstanceToMachineMapping			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInstanceToMachineMapping , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
remoteMulticast Config	SomeipRemoteMulticastConfig	*	ref	This reference defines a remote multicast Address (IP Address, Port) that is used in a static configuration to setup the communication path between a service provider and service consumer. This reference shall ONLY be used if the remote address is determined from the configuration and not at runtime from the Service Discovery. Tags: atp.Status=candidate
remoteUnicast Config	SomeipRemoteUnicastConfig	*	ref	In case that a static service connection is used and a single peer exists this element is used to statically configure the remote peer's address. Tags: atp.Status=candidate
tcpPort	ApApplicationEndpoint	0..1	ref	local TcpPort that will be used by the ServiceInstance for the communication.
udpCollection BufferSize Threshold	PositiveInteger	0..1	attr	Specifies the amount of data in bytes that shall be buffered for data transmission over the udp connection specified by this SomeipServiceInstanceToMachine Mapping. If this attribute is set to a value, then the data collection feature is enabled.
udpPort	ApApplicationEndpoint	0..1	ref	local UdpPort that will be used by the ServiceInstance for the communication.

Table 13.16: SomeipServiceInstanceToMachineMapping

[TPS_MANI_03057] **SOME/IP Field binding** [The [SomeipFieldDeployment](#) meta-class provides the ability to bind a [Field](#) to SOME/IP.

If the [Field](#) contains a notifier ([hasNotifier](#) = true), it is possible to assign a SOME/IP notifier identifier to the [field](#) by setting the value of attribute [SomeipFieldDeployment.notifier.eventId](#).

If the [Field](#) contains a getter method ([hasGetter](#) = true), it is possible to assign a SOME/IP method identifier to the [field](#) by setting the value of attribute [SomeipFieldDeployment.get.methodId](#).

If the [Field](#) contains a setter method ([hasSetter](#) = true), it is possible to assign a SOME/IP method identifier to the [field](#) by setting the value of attribute [SomeipFieldDeployment.set.methodId](#)]

Please note that each [methodId](#) and each [eventId](#) of a [SomeipFieldDeployment](#) shall be unique in the context of a [ServiceInterface](#) as defined in [[constr_3306](#)] and [[constr_3305](#)].

Class	SomeipFieldDeployment			
Note	SOME/IP configuration settings for a Field. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable , ServiceFieldDeployment , ServiceInterfaceDeploymentElement			
Aggregated by	ServiceInterfaceDeployment.fieldDeployment			
Attribute	Type	Mult.	Kind	Note
get	SomeipMethodDeployment	0..1	aggr	This aggregation represents the setting of the get method.
notifier	SomeipEventDeployment	0..1	aggr	This aggregation represents the settings of the notifier.
set	SomeipMethodDeployment	0..1	aggr	This aggregation represents the settings of the set method

Table 13.17: SomeipFieldDeployment

[constr_3362] SomeipEventDeployments aggregated by a SomeipFieldDeployment*Imposition time: IT_Mani*

[A [SomeipEventDeployment](#) that is aggregated by a [SomeipFieldDeployment](#) in the role [notifier](#) shall not reference a [VariableDataPrototype](#) in the role [event](#).]

[constr_3363] SomeipMethodDeployments aggregated by a SomeipFieldDeployment*Imposition time: IT_Mani*

[A [SomeipMethodDeployment](#) that is aggregated by a [SomeipFieldDeployment](#) in the role [get](#) or [set](#) shall not reference a [ClientServerOperation](#) in the role [method](#).]

[TPS_MANI_03227] Usage of ephemeral ports [Ephemeral ports are short-lived transport protocol ports that are allocated automatically by the communication middleware. In case the port number in the [ApApplicationEndpoint](#) ([TpPort.portNumber](#)) is configured to 0, an *ephemeral* port shall be used. If the port number is configured to a value different from 0, exactly that value shall be used.]

13.2.2 DDS Service Interface Deployment

This chapter describes the [37, DDS] deployment of a [ServiceInterface](#).

[TPS_MANI_03525] DDS ServiceInterface binding [The [DdsServiceInterfaceDeployment](#) meta-class provides the ability to bind a [ServiceInterface](#) to DDS and to assign a DDS Service identifier to the [ServiceInterface](#) with the [serviceInterfaceId](#) attribute.]

[constr_3690] `DdsServiceInterfaceDeployment.serviceInterfaceId` value shall not conflict with topic-based service discovery

Imposition time: `IT_SysDes`

[The value “discovery” for `DdsServiceInterfaceDeployment.serviceInterfaceId` is reserved and shall not be used for modeled `DdsServiceInterfaceDeployments` Note that in the context of the *AUTOSAR adaptive platform*.]

[**constr_3690**] is defined according to [SWS_CM_90508] of [23, SWS Communication Management].

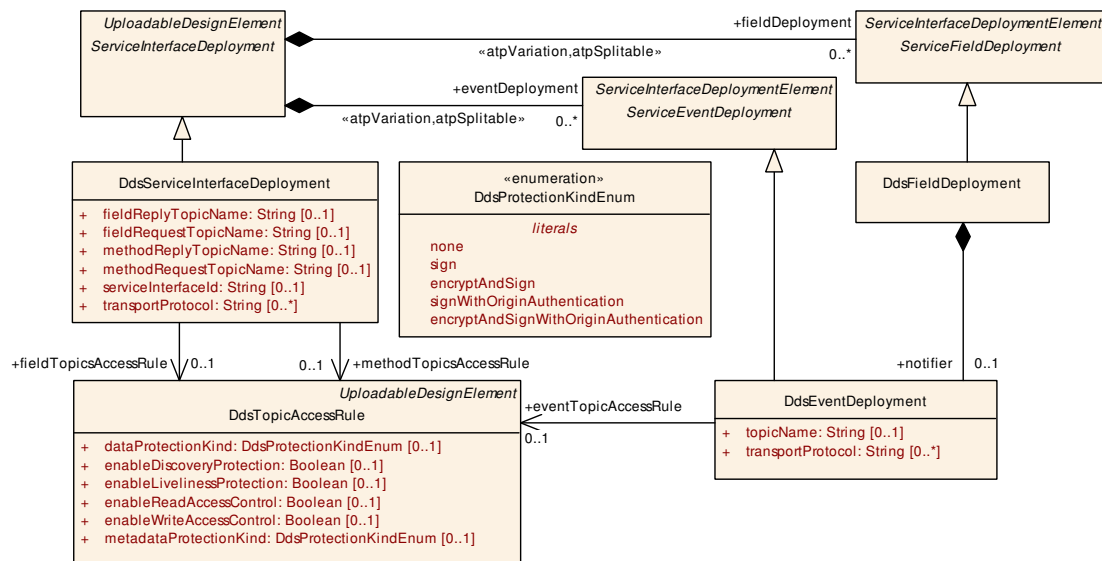


Figure 13.5: DDS deployment of ServiceInterface

[TPS_MANI_03556] DDS-RPC Service Binding [The `DdsServiceInterfaceDeployment` meta-class provides the ability to configure the name of the DDS Request and Reply Topics associated with a DDS-RPC Service with the `methodRequestTopicName` and `methodReplyTopicName` attributes, respectively. DDS-RPC Services are the mechanisms specified in the OMG RPC over DDS specification (see [38, DDS RPC]) to handle method calls with DDS.

The `methodRequestTopicName` and `methodReplyTopicName` attributes are optional, if unspecified they shall be configured as specified in the DDS-RPC specification.]

[TPS_MANI_03526] DDS `VariableDataPrototype` binding [The `DdsEventDeployment` meta-class provides the ability to bind a `VariableDataPrototype` to DDS and to assign a DDS Topic to the `event` with the `topicName` attribute. Moreover, the meta-class provides the ability to configure the `transportProtocols` over which the `VariableDataPrototype` may be accessed.]

Class	DdsServiceInterfaceDeployment			
Note	DDS configuration settings for a ServiceInterface. Tags: atp.recommendedPackage=ServiceInterfaceDeployments This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInterfaceDeployment , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
fieldReplyTopicName	String	0..1	attr	Name of the DDS Reply Topic associated with the Field.
fieldRequestTopicName	String	0..1	attr	Name of the DDS Request Topic associated with the Field.
fieldTopicsAccessRule	DdsTopicAccessRule	0..1	ref	DDS Security access rule applicable to the DDS Topics used for service interface field access methods (Get, Set).
methodReplyTopicName	String	0..1	attr	Name of the DDS Reply Topic associated with the Method.
methodRequestTopicName	String	0..1	attr	Name of the DDS Request Topic associated with the Method.
methodTopicsAccessRule	DdsTopicAccessRule	0..1	ref	DDS Security access rule applicable to the DDS Topics used for service interface methods.
serviceInterfaceId	String	0..1	attr	Unique Identifier that identifies the ServiceInterface in DDS. This Identifier is encoded in the USER_DATA QoS of the DomainParticipant associated with the Service Instance and its value is propagated by DDS Discovery messages.
transportProtocol	String	*	attr	This attribute defines over which Transport Layer Protocol(s) this Method is intended to be sent.

Table 13.18: DdsServiceInterfaceDeployment

[constr_10217] Multiplicity of the attribute [DdsServiceInterfaceDeployment.serviceInterfaceId](#)

Imposition time: IT_Mani

[For each [DdsServiceInterfaceDeployment](#), the attribute [serviceInterfaceId](#) shall exist.]

Class	DdsEventDeployment			
Note	DDS configuration settings for an Event. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable , ServiceEventDeployment , ServiceInterfaceDeploymentElement			
Aggregated by	DdsFieldDeployment.notifier , ServiceInterfaceDeployment.eventDeployment			
Attribute	Type	Mult.	Kind	Note
eventTopicAccessRule	DdsTopicAccessRule	0..1	ref	DDS Security access rule applicable to the DDS Topics used for the service interface event.
topicName	String	0..1	attr	Name of the DDS Topic associated with the Event.
transportProtocol	String	*	attr	This attribute defines over which Transport Layer Protocol(s) this event is intended to be sent.

Table 13.19: DdsEventDeployment

[TPS_MANI_03557] DDS `ClientServerOperation` Binding [There exists no concrete subclass of `ServiceMethodDeployment` to bind a `ClientServerOperation` to DDS. This binding is done with the `DdsServiceInterfaceDeployment` (see [TPS_MANI_03556]).]

[TPS_MANI_03558] DDS `Field` Binding [The `DdsFieldDeployment` meta-class provides the ability to bind a `Field` to DDS.

To bind the `Field`'s notification event the `notifier` is used to define a DDS Topic. To assign the get/set `Field` methods the `fieldRequestTopicName` and `fieldReplyTopicName` are used to define a DDS Topic.

The `fieldRequestTopicName` and `fieldReplyTopicName` attributes are optional, if unspecified they shall be configured as specified in the DDS-RPC specification.]

[TPS_MANI_03622] DDS Transport Protocols are up to the stack implementer [Underlying transports below the RTPS protocol are not part of the DDS OMG standard (QoS APIs of [37, DDS]) or (XML schema [39, DDS XML]). It is up to each DDS implementation vendor to decide which transports are supported and how those are expressed in APIs and XML.]

Class	DdsFieldDeployment			
Note	DDS configuration settings for a <code>Field</code> . This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code> , <code>ServiceFieldDeployment</code> , <code>ServiceInterfaceDeploymentElement</code>			
Aggregated by	<code>ServiceInterfaceDeployment.fieldDeployment</code>			
Attribute	Type	Mult.	Kind	Note
<code>notifier</code>	<code>DdsEventDeployment</code>	0..1	aggr	This aggregation represents the settings of the notifier.

Table 13.20: DdsFieldDeployment

[constr_3563] Mandatory topic name values

Imposition time: `IT_Mani`

[The attributes `methodRequestTopicName`, `methodReplyTopicName`, `fieldRequestTopicName`, `fieldReplyTopicName`, `topicName` shall specify string values, each of them unique within the service interface.]

[TPS_MANI_03662] Configuration of Topic access rules

Status: DRAFT

[The `DdsTopicAccessRule` meta-class defines rules generally applicable to DDS Topics defined by Service Interface deployments, determining the protection mechanisms applicable for discovery, liveliness, access control, metadata and user data.

The `enableReadAccessControl` and `enableWriteAccessControl` attributes are not meant to interfere with or duplicate `ComGrant`-based access rules. These are just an additional mechanisms for integrators to fully disable access control for an

specific topic at Service Interface Deployment level, in case that is desirable for an specific deployment scenario.]

Class	DdsTopicAccessRule			
Note	DDS Topic access rule definition. Tags: atp.recommendedPackage=DdsTopicAccessRules This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataProtectionKind	DdsProtectionKindEnum	0..1	attr	Defines the data protection policy applicable to metadata related to the DDS Topic(s).
enableDiscoveryProtection	Boolean	0..1	attr	Defines whether discovery protection mechanisms should apply to the DDS Topic(s).
enableLivelinessProtection	Boolean	0..1	attr	Defines whether liveliness protection mechanisms should apply to the DDS Topic(s).
enableReadAccessControl	Boolean	0..1	attr	Defines whether read access control mechanisms should apply to the DDS Topic(s).
enableWriteAccessControl	Boolean	0..1	attr	Defines whether write access control mechanisms should apply to the DDS Topic(s).
metadataProtectionKind	DdsProtectionKindEnum	0..1	attr	Defines the data protection policy applicable to metadata related to the DDS Topic(s).

Table 13.21: DdsTopicAccessRule

[constr_3680] Existence of attributes for [DdsTopicAccessRule](#)

Imposition time: IT_Mani

[The following attributes of [DdsTopicAccessRule](#) shall exist:

- [enableDiscoveryProtection](#)
- [enableLivelinessProtection](#)
- [enableReadAccessControl](#)
- [enableWriteAccessControl](#)
- [metadataProtectionKind](#)
- [dataProtectionKind](#)

]

[constr_3681] Supported values of [DdsTopicAccessRule.dataProtectionKind](#)

Imposition time: IT_Mani

[Only values [none](#), [sign](#), or [encryptAndSign](#) from [DdsProtectionKindEnum](#) shall be used when setting [DdsTopicAccessRule.dataProtectionKind](#).]

[constr_3683] Attributes referencing `DdsTopicAccessRule`*Imposition time:* `IT_Mani`

[`DdsServiceInterfaceDeployment.fieldTopicsAccessRule`, `DdsServiceInterfaceDeployment.methodTopicsAccessRule`, and `DdsEventDeployment.eventTopicAccessRule` shall be set if the Service Interface Deployment is to be used by Service Instances relying in DDS Security (meaning `DdsServiceInstanceToMachineMapping.secureComPropsForDds` is defined).]

[constr_10629] `DdsServiceInterfaceDeployment` shall cover all applicable elements of the corresponding `ServiceInterface`*Imposition time:* `IT_Mani`

[If a `DdsServiceInterfaceDeployment` references a `ServiceInterface` in the role `serviceInterface`, then all `fields`, `triggers`, and `events` defined in the context of the referenced `ServiceInterface` shall be referenced by respective `fieldDeployments` and `eventDeployments` owned by the referencing `DdsServiceInterfaceDeployment`.]

13.2.3 User Defined Service Interface Deployment

This chapter describes a user defined deployment of a `ServiceInterface` to a middleware technology that is not standardized by AUTOSAR. Such `UserDefinedServiceInterfaceDeployment` can for example also be used to describe a machine local IPC communication.

[TPS_MANI_03045] User-Defined `ServiceInterface` binding [The `UserDefinedServiceInterfaceDeployment` meta-class provides the ability to bind a `ServiceInterface` that is referenced in the role `serviceInterface` to a middleware technology that is not standardized by AUTOSAR.]

Please note that `UserDefinedServiceInterfaceDeployment` is `Identifiable` and therefore it is able to describe special data (sdg) which is not represented by the standard model.

Class	UserDefinedServiceInterfaceDeployment			
Note	UserDefined configuration settings for a ServiceInterface. Tags: atp.recommendedPackage=ServiceInterfaceDeployments This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInterfaceDeployment , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.22: UserDefinedServiceInterfaceDeployment

[TPS_MANI_01165] Standardized value of **UserDefinedServiceInterfaceDeployment.category** [The AUTOSAR Standard reserves the following value for attribute **UserDefinedServiceInterfaceDeployment.category**:

- SERVICE_INTERFACE_DEPLOYMENT_IPC

It is possible to use a custom, non-standardized value for the attribute **UserDefinedServiceInterfaceDeployment.category** but this option comes with the obligation to use a value that is guaranteed to not clash with possible future extensions of the collection of standardized values.]

IPC communication may or may not require configuration settings that nevertheless aren't standardized by AUTOSAR. The best support that the AUTOSAR standard can deliver is the provision of meta-classes that can be taken as the basis to define configuration settings by means of the definition of **Sdg**.

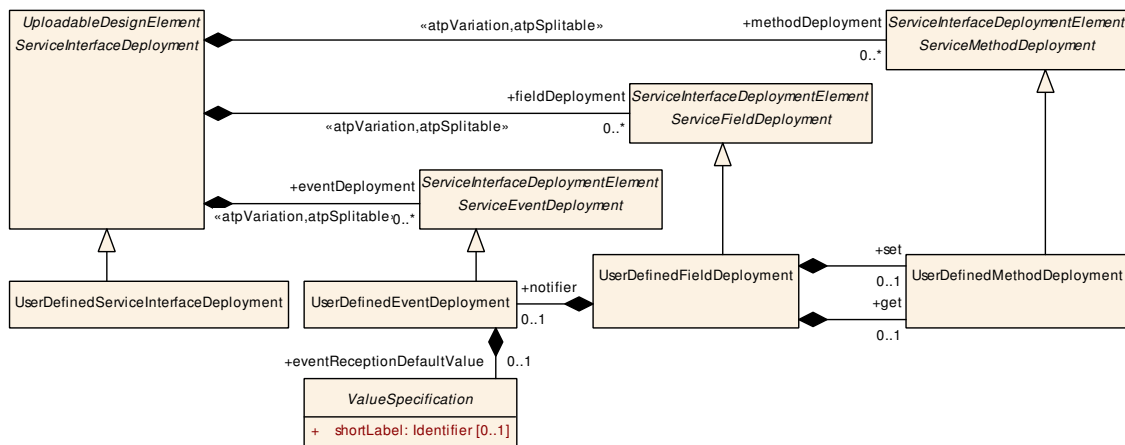


Figure 13.6: User defined deployment of ServiceInterface

[constr_1570] Restriction for **UserDefinedServiceInterfaceDeployment** of category **SERVICE_INTERFACE_DEPLOYMENT_IPC**

Imposition time: IT_Mani

[An **AdaptivePlatformServiceInstance** that references a **UserDefinedServiceInterfaceDeployment** of category **SERVICE_INTERFACE_DEPLOYMENT_IPC** shall **only** be referenced by a **UserDefinedServiceInstanceToMachineMapping** in the role **serviceInstance** that in turn references a **UserDefinedCommunicationConnector**.]

Class	UserDefinedServiceInstanceToMachineMapping
Note	This meta-class allows to map UserDefinedServiceInstances to a CommunicationConnector of a Machine. Tags: atp.recommendedPackage=ServiceInstanceToMachineMappings This Class is only used by the AUTOSAR Adaptive Platform.





Class	UserDefinedServiceInstanceToMachineMapping			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInstanceToMachineMapping , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.23: UserDefinedServiceInstanceToMachineMapping

Rationale for [constr_1570]: for a local IPC binding it is sometimes necessary to define properties of the IPC system. And for this purpose the [UserDefinedCommunicationConnector](#) mapped to an [AdaptivePlatformServiceInstance](#) can be used to define global properties (e.g. for service discovery) of a given “IPC-Domain”.

In other words, each defined [UserDefinedCommunicationConnector](#) may represent such an “IPC-Domain” that requires a dedicated configuration on the basis of the definition of [Sdgs](#).

Class	UserDefinedCommunicationConnector			
Note	This element allows the modeling of arbitrary Communication Connectors.			
Base	ARObject , CommunicationConnector , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	EcuInstance.connector , MachineDesign.communicationConnector			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.24: UserDefinedCommunicationConnector

[TPS_MANI_03046] User defined [VariableDataPrototype](#) binding [The [UserDefinedEventDeployment](#) meta-class provides the ability to bind a [VariableDataPrototype](#) that is referenced in the role [event](#) to a middleware technology that is not standardized by AUTOSAR.]

Please note that [UserDefinedEventDeployment](#) is [Identifiable](#) and therefore it is able to describe special data (sdg) which is not represented by the standard model.

Class	UserDefinedEventDeployment			
Note	UserDefined configuration settings for an Event. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable , ServiceEventDeployment , ServiceInterfaceDeploymentElement			
Aggregated by	ServiceInterfaceDeployment.eventDeployment , UserDefinedFieldDeployment.notifier			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–





Class	UserDefinedEventDeployment			
eventReception DefaultValue	ValueSpecification	0..1	aggr	Value used to fill the Event data on the receiver side, if less data than expected is received. The value is expected to cover the entire expected event network payload. The value specification is supposed to take the order of serialized representation of the data on the network, as opposed to the order of elements in a data type description. Tags: atp.Status=obsolete

Table 13.25: UserDefinedEventDeployment

[TPS_MANI_03047] User defined **ClientServerOperation** binding [The **UserDefinedMethodDeployment** meta-class provides the ability to bind a **ClientServerOperation** that is referenced in the role **method** to a middleware technology that is not standardized by AUTOSAR.]

Please note that **UserDefinedMethodDeployment** is **Identifiable** and therefore it is able to describe special data (sdg) which is not represented by the standard model.

Class	UserDefinedMethodDeployment			
Note	UserDefined configuration settings for a Method. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable, Referrable , ServiceInterfaceDeploymentElement , ServiceMethodDeployment			
Aggregated by	ServiceInterfaceDeployment.methodDeployment , UserDefinedFieldDeployment.get , UserDefinedFieldDeployment.set			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.26: UserDefinedMethodDeployment

[TPS_MANI_03048] User defined **Field** binding [The **UserDefinedFieldDeployment** meta-class provides the ability to bind a **Field** that is referenced in the role **field** to a middleware technology that is not standardized by AUTOSAR.]

Please note that **UserDefinedFieldDeployment** is **Identifiable** and therefore it is able to describe special data (sdg) which is not represented by the standard model.

Class	UserDefinedFieldDeployment			
Note	UserDefined configuration settings for a Field. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable, Referrable , ServiceFieldDeployment , ServiceInterfaceDeploymentElement			
Aggregated by	ServiceInterfaceDeployment.fieldDeployment			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–





Class	UserDefinedFieldDeployment			
get	UserDefinedMethodDeployment	0..1	aggr	This aggregation represents the settings of the get method
notifier	UserDefinedEventDeployment	0..1	aggr	This aggregation represents the settings of the notifier.
set	UserDefinedMethodDeployment	0..1	aggr	This aggregation represents the settings of the set method

Table 13.27: UserDefinedFieldDeployment

[constr_3417] UserDefinedEventDeployments aggregated by a UserDefinedFieldDeployment

Imposition time: IT_Mani

[A UserDefinedEventDeployment that is aggregated by a UserDefinedFieldDeployment in the role `notifier` shall not reference a VariableDataPrototype in the role `event`.]

[constr_3418] UserDefinedMethodDeployments aggregated by a UserDefinedFieldDeployment

Imposition time: IT_Mani

[A UserDefinedMethodDeployment that is aggregated by a UserDefinedFieldDeployment in the role `get` or `set` shall not reference a ClientServerOperation in the role `method`.]

13.3 Service Instance Target-Configuration

An AdaptivePlatformServiceInstance makes the functionality of a ServiceInterface available on the AUTOSAR adaptive platform. Several AdaptivePlatformServiceInstances may be set up for the same ServiceInterface. They deliver the same functionality, but for different purposes and/or to different users.

The ProvidedApServiceInstance represents a provider that offers the functionality of a ServiceInterface with particular properties. Clients that are represented by the RequiredApServiceInstance observe offers and choose a provider with respect to service properties.

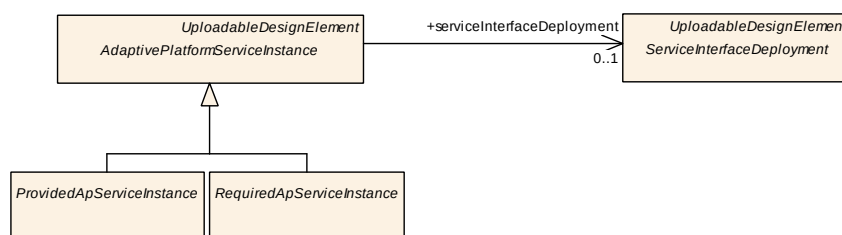


Figure 13.7: Modeling of the AdaptivePlatformServiceInstance

Note that the abstract meta-class [AdaptivePlatformServiceInstance](#) is derived from [ARElement](#). This means that all meta-classes derived from [AdaptivePlatformServiceInstance](#) can be declared on the M1 level as part of an [ARPackage](#) and thus can be used in several Manifest descriptions.

Class	<i>AdaptivePlatformServiceInstance</i> (abstract)			
Note	This meta-class represents the ability to describe the existence and configuration of a service instance in an abstract way. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Subclasses	ProvidedApServiceInstance , RequiredApServiceInstance			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
e2eEvent ProtectionProps	End2EndEvent ProtectionProps	*	aggr	This aggregation allows to protect an event or a field notifier that is defined inside of the ServiceInterface that is referenced by the ServiceInstance in the role service Interface.
e2eMethod ProtectionProps	End2EndMethod ProtectionProps	*	aggr	This aggregation allows to protect a method or a field getter or a field setter that is defined inside of the Service Interface that is referenced by the ServiceInstance in the role serviceInterface
secureCom Config	ServiceInterface ElementSecureCom Config	*	aggr	Configuration settings to secure the communication of ServiceInterface elements.
serviceInterface Deployment	ServiceInterface Deployment	0..1	ref	Reference to a ServiceInterfaceDeployment that identifies the ServiceInterface that is represented by the Service Instance.

Table 13.28: AdaptivePlatformServiceInstance

Class	<i>RequiredApServiceInstance</i> (abstract)			
Note	This meta-class represents the ability to describe the existence and configuration of a required service instance in an abstract way. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Subclasses	DdsRequiredServiceInstance , RequiredSomeipServiceInstance , RequiredUserDefinedServiceInstance			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 13.29: RequiredApServiceInstance

Class	<i>ProvidedApServiceInstance</i> (abstract)			
Note	This meta-class represents the ability to describe the existence and configuration of a provided service instance in an abstract way. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Subclasses	DdsProvidedServiceInstance , ProvidedSomeipServiceInstance , ProvidedUserDefinedServiceInstance			





Class	ProvidedApServiceInstance (abstract)			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.30: ProvidedApServiceInstance

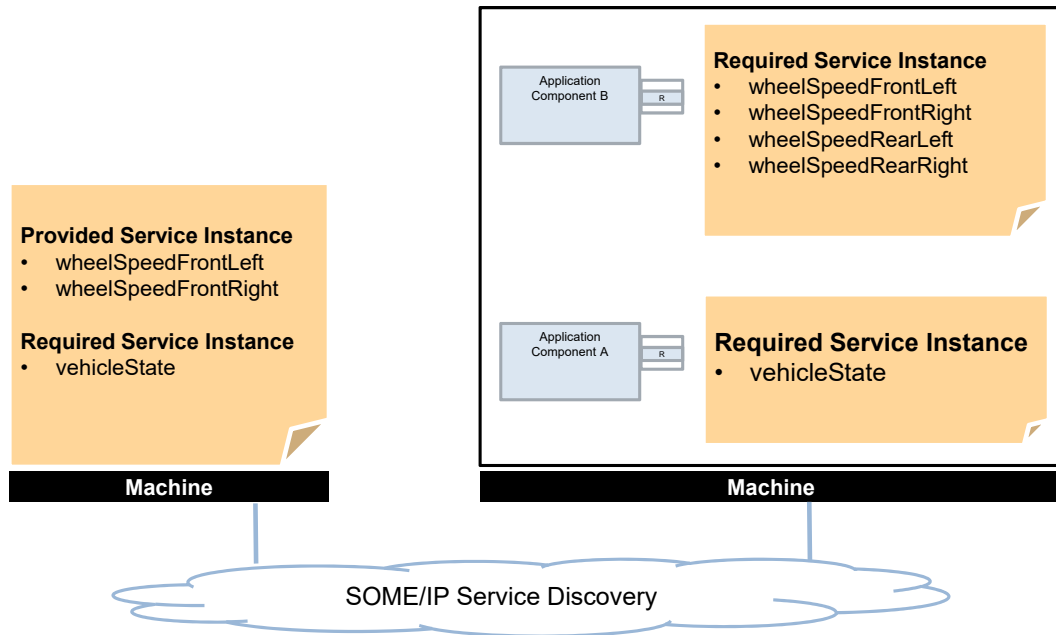


Figure 13.8: Different approaches for ServiceInstanceMapping

There are two alternative ways to relate an [AdaptivePlatformServiceInstance](#) with a [MachineDesign](#) as described in [TPS_MANI_03000] and [TPS_MANI_03001]. Figure [Figure 13.8](#) shows both approaches in an example.

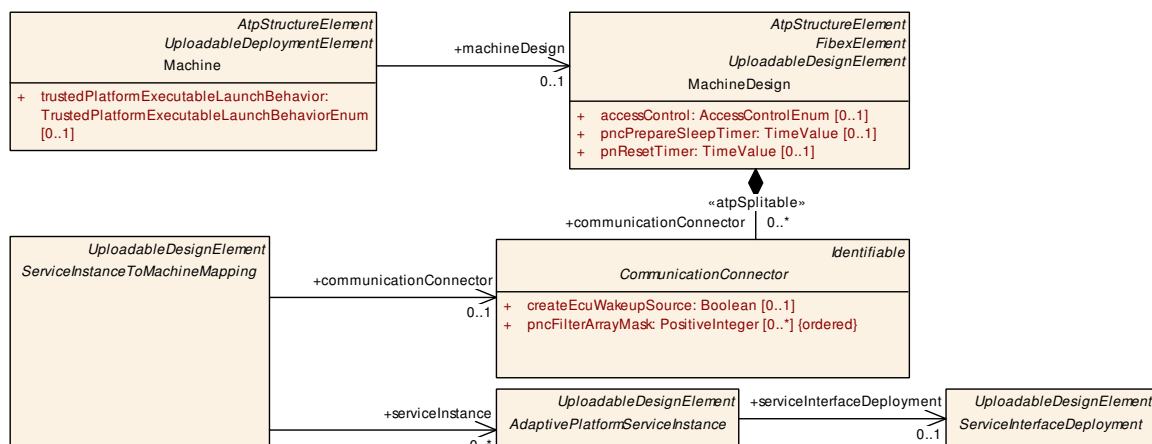


Figure 13.9: ServiceInstanceToMachineMapping

[TPS_MANI_03001] Mapping of [AdaptivePlatformServiceInstance](#) to a [MachineDesign](#) [[ServiceInstanceToMachineMapping](#) is used to assign one or

several [AdaptivePlatformServiceInstances](#) to (via a [CommunicationConnector](#)) a [MachineDesign](#). This allows to define a “black box” machine view without any assumption on the application software but with all necessary information to configure the communication (e.g. SOME/IP).]

Class	ServiceInstanceToMachineMapping (abstract)			
Note	This meta-class represents the ability to map one or several AdaptivePlatformServiceInstances to a CommunicationConnector of a Machine. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Subclasses	DdsServiceInstanceToMachineMapping , SomeipServiceInstanceToMachineMapping , UserDefinedServiceInstanceToMachineMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
communicationConnector	CommunicationConnector	0..1	ref	Reference to the Machine to which the ServiceInstance is mapped.
secOcComPropsForMulticast	SecOcSecureComProps	*	ref	Reference to communication security configuration settings that are valid for the udp multicast endpoint (Port + Multicast IP Address) defined by the ServiceInstanceToMachineMapping.
secureComPropsForTcp	SecureComProps	0..1	ref	Reference to communication security configuration settings that are valid for the tcp unicast endpoint (Tcp Port + Unicast IP Address) defined by the ServiceInstanceToMachineMapping.
secureComPropsForUdp	SecureComProps	0..1	ref	Reference to communication security configuration settings that are valid for the udp unicast endpoint (Udp Port + Unicast IP Address) defined by the ServiceInstanceToMachineMapping.
serviceInstance	AdaptivePlatformServiceInstance	*	ref	Reference to a ServiceInstance that is mapped to the Machine.

Table 13.31: ServiceInstanceToMachineMapping

[constr_5155] [SomeipServiceInstanceToMachineMapping](#) only supports a single Address Family

Imposition time: [IT_Mani](#)

[A [SomeipServiceInstanceToMachineMapping](#) shall only support a single Address Family, i.e. either IPv4 or IPv6. If IPv4 is defined for IP unicast communication according to [\[constr_3288\]](#) then the [SomeipProvidedEventGroups](#) in [ProvidedSomeipServiceInstances](#) that are referenced by the [SomeipServiceInstanceToMachineMapping](#) shall only define an [ipv4MulticastIpAddress](#).

If IPv6 is defined for IP unicast communication according to [\[constr_3288\]](#) then the [SomeipProvidedEventGroups](#) in [ProvidedSomeipServiceInstances](#) that are referenced by the [SomeipServiceInstanceToMachineMapping](#) shall only define an [ipv6MulticastIpAddress](#).]

[TPS_MANI_03292] Semantic of [SomeipServiceInstanceToMachineMapping.tcpPort](#) [The [SomeipServiceInstanceToMachineMapping.tcpPort](#) defines a TCP-Port number that will be used in the following way:

- In case of a `ProvidedSomeipServiceInstance`, the value of attribute `tcpPort` will be transmitted in the SD-Offer message to the client and this port number will be used in the following way:
 - Method communication: over this port the `ProvidedSomeipServiceInstance` will receive the method call messages from the clients and over the same port the `ProvidedSomeipServiceInstance` will send the responses to the service consumers.
 - Event communication: over this port the `ProvidedSomeipServiceInstance` will transmit the event messages to the subscribed client in IP-Unicast case.
- In case of a `RequiredSomeipServiceInstance`, the value of attribute `tcpPort` will be transmitted in the SD-SubscribeEventGroup message to the server and this port number will be used in the following way:
 - Method communication: over this port the `RequiredSomeipServiceInstance` will send the method call messages to the `ProvidedSomeipServiceInstance` and over the same port the `RequiredSomeipServiceInstance` will receive the responses from the service provider.
 - Event communication: over this port the `RequiredSomeipServiceInstance` will receive the event messages in IP-Unicast case.

]

[TPS_MANI_03293] Semantic of `SomeipServiceInstanceToMachineMapping.udpPort` [The `SomeipServiceInstanceToMachineMapping.udpPort` defines a UDP-Port number that will be used in the following way:

- In case of a `ProvidedSomeipServiceInstance`, the value of attribute `udpPort` will be transmitted in the SD-Offer message to the client and this port number will be used in the following way:
 - Method communication: over this port the `ProvidedSomeipServiceInstance` will receive the method call messages from the clients and over the same port the `ProvidedSomeipServiceInstance` will send the responses to the service consumers.
 - Event communication: over this port the `ProvidedSomeipServiceInstance` will transmit the event messages to the subscribed client in IP-Unicast case.
- In case of a `RequiredSomeipServiceInstance`, the value of attribute `udpPort` will be transmitted in the SD-SubscribeEventGroup message to the server and this port number will be used in the following way:

- Method communication: over this port the `RequiredSomeipServiceInstance` will send the method call messages to the `ProvidedSomeipServiceInstance` and over the same port the `RequiredSomeipServiceInstance` will receive the responses from the service provider.
- Event communication: over this port the `RequiredSomeipServiceInstance` will receive the event messages in IP-Unicast case.

]

[constr_3487] TCP endpoint can only serve provided or required service instances exclusively

Imposition time: IT_Mani

[`ServiceInstanceToMachineMapping` is not allowed to refer to a `ProvidedApServiceInstance` and at the same time a `RequiredApServiceInstance` in the role `serviceInstance` if

- the `ServiceInterfaceDeployment` that is referenced by the `ProvidedApServiceInstance` in the role `serviceInterfaceDeployment` and
- the `ServiceInterfaceDeployment` that is referenced by the `RequiredApServiceInstance` in the role `serviceInterfaceDeployment`

both contain defined tcp content that is described by the `transportProtocol` attribute in the deployment elements of SOME/IP or DDS.

In other words a TCP endpoint can only serve provided or required service instances exclusively.]

The reason for [constr_3487] is that the POSIX Socket API does not support the binding of several TCP sockets onto the same tuple <local IP address, local port>. But this would be necessary if a service is provided and consumed over the same TCP Endpoint.

[TPS_MANI_03000] Mapping of `AdaptivePlatformServiceInstance` to `Port-Prototypes` [`ServiceInstanceToPortPrototypeMapping` is used to assign an `AdaptivePlatformServiceInstance` to a `PortPrototype` of a `SwComponentType`. This allows to define how specific `PortPrototypes` of a Software Component are represented in the middleware in terms of the service configuration.]

In other words, the “outside” appearance of a `PortPrototype` from the middleware point of view is the `AdaptivePlatformServiceInstance`, or the concrete subclasses `RequiredApServiceInstance` and `ProvidedApServiceInstance`.

Meta-classes `ProvidedApServiceInstance` and `RequiredApServiceInstance` are abstract and this allows for using specific derived classes that fit the underlying middleware (e.g. SOME/IP). The following sub-chapters will detail the supported specializations.

[TPS_MANI_01316] Existence of **ServiceInstanceToPortPrototypeMapping**. **processDesign** [The reference **ServiceInstanceToPortPrototypeMapping**. **processDesign** shall only be used in a design-level modeling scenario where a pre-assignment of a given **ServiceInstanceToPortPrototypeMapping** to a specific **ProcessDesign** is intended.

By this means it is possible to express that one **Executable** is foreseen to be executed in multiple instances and it is also possible to assign service instances to each of the foreseen **ProcessDesigns** that represent instances of **Executable** at design time.]

Class	ServiceInstanceToPortPrototypeMapping			
Note	This meta-class represents the ability to assign a transport layer dependent ServiceInstance to a Port Prototype. With this mapping it is possible to define how specific PortPrototypes are represented in the middleware in terms of service configuration. Tags: atp.recommendedPackage=ServiceInstanceToPortPrototypeMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
portPrototype	PortPrototype	0..1	iref	Reference to a specific PortPrototype that represents the ServiceInstance. Stereotypes: atpUriDef InstanceRef implemented by: PortPrototypeIn ExecutableInstanceRef
process	Process	0..1	ref	Reference to the Process in which the enclosing Service InstanceToPortPrototypeMapping is executed. Stereotypes: atpSplittable Tags: atp.Splitkey=process
processDesign	ProcessDesign	0..1	ref	Reference to the ProcessDesign in which the Executable that contains the SoftwareComponent and the referenced PortPrototype is executed. Stereotypes: atpUriDef
serviceInstance	AdaptivePlatformServiceInstance	0..1	ref	Reference to a ServiceInstance that is represented in the Software Component by the mapped group of Port Prototypes.

Table 13.32: ServiceInstanceToPortPrototypeMapping

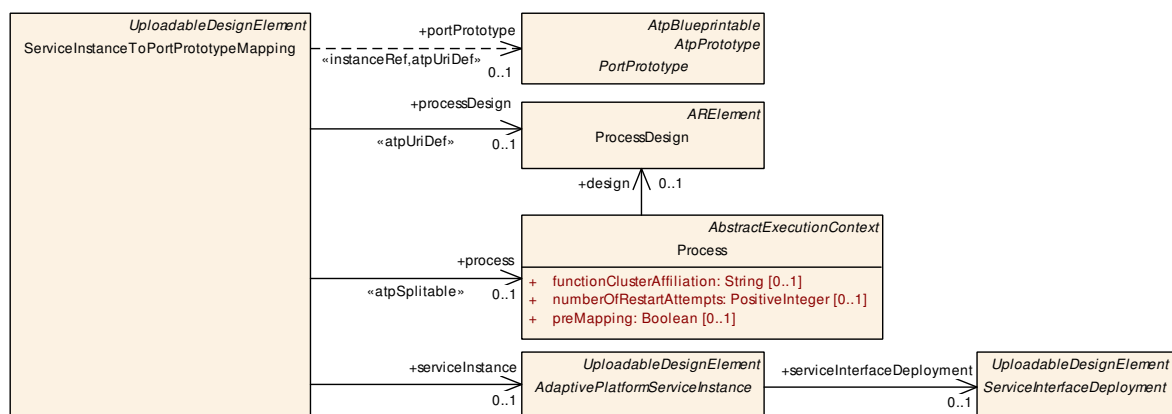


Figure 13.10: Modeling of the **ServiceInstanceToPortPrototypeMapping**

[TPS_MANI_01317] **Existence of `ServiceInstanceToPortPrototypeMapping.process`** [The reference `ServiceInstanceToPortPrototypeMapping.process` shall be only used in a deployment-level modeling where the integration of a `SoftwareCluster` is created. The reference has the role to identify the actual `Process` used in the execution manifest.

This reference overwrites a potentially existing reference to a `ProcessDesign` in the context of the enclosing `ServiceInstanceToPortPrototypeMapping`]

Please note that if both `ServiceInstanceToPortPrototypeMapping.processDesign` and `process` exist, the latter gets the higher significance because it is created by an integrator who may overrule design decisions on the basis of superior knowledge about the context.

In such a case it is acceptable that the `Process` references a different `ProcessDesign` than the one referenced in the role `ServiceInstanceToPortPrototypeMapping.processDesign`. This is just the result of superior knowledge of the integrator over the designer.

13.3.1 SOME/IP Service Instance Deployment

In the case of SOME/IP used as the middleware the derived meta-classes are `ProvidedSomeipServiceInstance` or `RequiredSomeipServiceInstance`. These meta-classes also carry attributes that apply for the service discovery on SOME/IP.

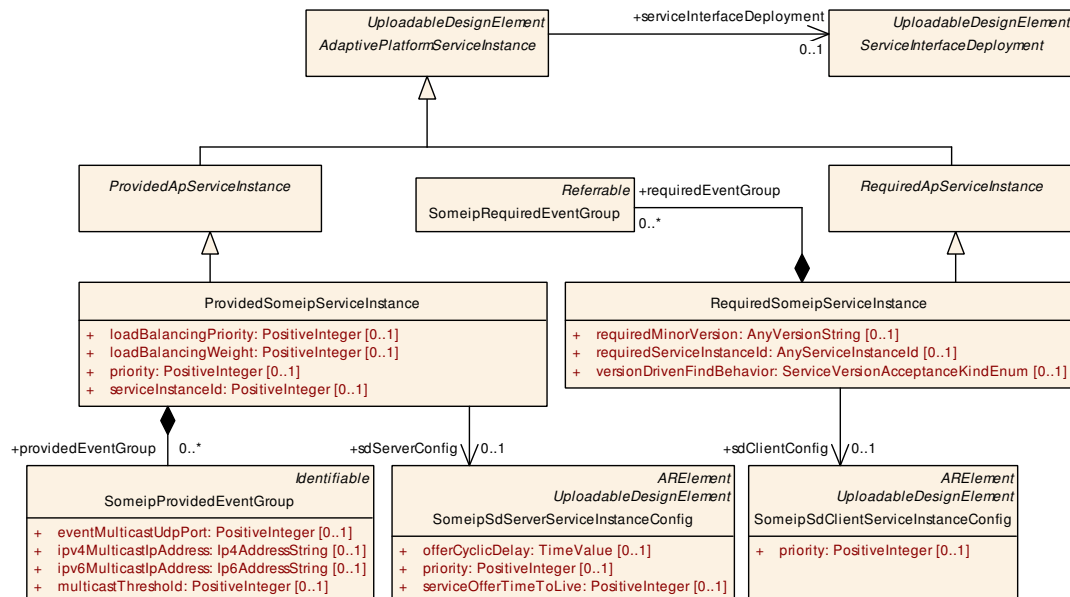


Figure 13.11: SOME/IP Service Instances

Primitive	AnyServiceInstanceId
Note	This is a positive integer or the literal ALL (the value ANY is technically supported but deprecated) which can be denoted in decimal, octal and hexadecimal. The value is between 0 and 65535. Tags: xml.xsd.customType=ANY-SERVICE-INSTANCE-ID xml.xsd.pattern=[1-9][0-9]* 0[xX][0-9a-fA-F]+ 0[0-7]* 0[bB][0-1]+ ANY ALL xml.xsd.type=string

Table 13.33: AnyServiceInstanceId

13.3.1.1 Provided Service Instance

The [ProvidedSomeipServiceInstance](#) defines the [serviceInstanceId](#) for the Service Instance of the [SomeipServiceInterfaceDeployment](#) that is referenced with the [serviceInterfaceDeployment](#) reference.

It means that the Server on which the [ProvidedSomeipServiceInstance](#) is deployed offers the Service Instance over SOME/IP with the [serviceInstanceId](#) and [serviceInterfaceId](#).

Class	ProvidedSomeipServiceInstance			
Note	This meta-class represents the ability to describe the existence and configuration of a provided service instance in a concrete implementation on top of SOME/IP. Tags: atp.recommendedPackage=ServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , ProvidedApServiceInstance , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
capability Record (ordered)	TagWithOptionalValue	*	aggr	A sequence of records to store arbitrary name/value pairs conveying additional information about the named service.
eventProps	SomeipEventProps	*	aggr	Configuration settings for individual events that are provided by the ServiceInstance.
loadBalancing Priority	PositiveInteger	0..1	attr	This attribute is used to specify the priority in the load balancing option of SOME/IP that is added to the Offer Service. When a client searches for all service instances of a service, the client shall choose the service instance with highest priority if one is defined.
loadBalancing Weight	PositiveInteger	0..1	attr	This attribute is used to specify the weight in the load balancing option of SOME/IP that is added to the Offer Service. When a client searches for all service instances of a service, the client shall choose the service instance with highest priority if one is defined. If several service instances exist with the highest priority the service instance shall be chosen based on the weights of the service instances.
method ResponseProps	SomeipMethodProps	*	aggr	Configuration settings for individual methods that are provided by the ServiceInstance.





Class	ProvidedSomeipServiceInstance			
priority	PositiveInteger	0..1	attr	This attribute defines the VLAN frame priority for SOME/IP messages that are resulting from this ProvidedSomeip ServiceInstance (Method and Event communication). Values from 0 (best effort) to 7 (highest) are allowed.
providedEvent Group	SomeipProvidedEvent Group	*	aggr	List of EventGroups that are provided by the Service Instance.
sdServerConfig	SomeipSdServer ServiceInstanceConfig	0..1	ref	Server specific configuration settings relevant for the SOME/IP service discovery.
serviceInstance Id	PositiveInteger	0..1	attr	Identification number that is used by SOME/IP service discovery to identify the instance of the service. The value 65535 for service instance id is reserved and should not be used.

Table 13.34: ProvidedSomeipServiceInstance

[constr_10218] Multiplicity of reference in the role [ProvidedSomeipServiceInstance.sdServerConfig](#)*Imposition time: IT_Mani*

[For each [ProvidedSomeipServiceInstance](#), the reference in the role [sd-ServerConfig](#) shall exist.]

[constr_10219] Multiplicity of attribute [ProvidedSomeipServiceInstance.serviceInstanceId](#)*Imposition time: IT_Mani*

[For each [ProvidedSomeipServiceInstance](#), the attribute [serviceInstanceId](#) shall exist.]

[constr_3287] Mandatory information of a [ProvidedSomeipServiceInstance](#)*Imposition time: IT_Mani*

[The [ProvidedSomeipServiceInstance](#) shall always define the [serviceInstanceId](#).]

[constr_1770] Value of [ProvidedSomeipServiceInstance.serviceInstanceId](#)*Imposition time: IT_Mani*

[For each [ProvidedSomeipServiceInstance.serviceInstanceId](#), the value shall be in the range 0..65534.]

Rationale for [constr_1770]: on protocol level, the value 65535 represents the “ALL” semantics that can only be used in find messages.

In addition to the service identification properties a SOME/IP offer message contains so called endpoint options that define how the service instance is reachable by clients.

[constr_5338] `ProvidedSomeipServiceInstance` shall offer all `SomeipEventGroups` for subscription*Imposition time: IT_Mani*

[In the scope of a `ProvidedSomeipServiceInstance`, `SomeipProvidedEventGroups` shall be defined such that

- every aggregated `ProvidedSomeipServiceInstance.providedEventGroup` references a `SomeipEventGroup` in the context of the `SomeipServiceInterfaceDeployment` referenced from the enclosing `ProvidedSomeipServiceInstance` in the role `serviceInterfaceDeployment`
- each `SomeipEventGroup` defined in the scope of the `SomeipServiceInterfaceDeployment` referenced from the enclosing `ProvidedSomeipServiceInstance` in the role `serviceInterfaceDeployment` shall be referenced from exactly one `SomeipProvidedEventGroup` aggregated in the role `providedEventGroup` in the scope of the enclosing `ProvidedSomeipServiceInstance`.

]

In other words each `ProvidedSomeipServiceInstance` shall offer all `SomeipEventGroups` for subscription that are defined in the `SomeipServiceInterfaceDeployment` and there shall not be two or more `SomeipProvidedEventGroups` in the `ProvidedSomeipServiceInstance` that are referencing to the same `SomeipEventGroup` in the `SomeipServiceInterfaceDeployment`.

[constr_5339] `SomeipEventGroups` of a `SomeipServiceInterfaceDeployment` shall be referenced at most once from a `RequiredSomeipServiceInstance` that instantiates the `SomeipServiceInterfaceDeployment`*Imposition time: IT_Mani*

[Each `SomeipEventGroup` that is defined in a `SomeipServiceInterfaceDeployment` shall be referenced at most once from a `SomeipRequiredEventGroup` that is aggregated by the `RequiredSomeipServiceInstance` that is referencing the `SomeipServiceInterfaceDeployment` in the role `serviceInterfaceDeployment`.]

In other words there shall not be two or more `SomeipRequiredEventGroups` in the `RequiredSomeipServiceInstance` that are referencing to the same `SomeipEventGroup` in the `SomeipServiceInterfaceDeployment`.

[TPS_MANI_03168] Configuration of the SOME/IP load balancing option [The SOME/IP load balancing option is configurable per `ProvidedSomeipServiceInstance` with the two attributes `loadBalancingPriority` and `loadBalancingWeight`.]

The SOME/IP load balancing option is used to prioritize different `ProvidedSomeipServiceInstances` that point to the same `SomeipServiceInterfaceDeployment`, so that a client chooses the service instance based on these settings. This option is attached to SOME/IP Offer Service entries.

[constr_3415] Value range of `ProvidedSomeipServiceInstance.loadBalancingPriority`

Imposition time: IT_Mani

[The value of attribute `ProvidedSomeipServiceInstance.loadBalancingPriority` shall be in the range of 0..65535.]

Please note that according to SOME/IP a lower value means higher priority.

[constr_3416] Value range of `ProvidedSomeipServiceInstance.loadBalancingWeight`

Imposition time: IT_Mani

[The value of attribute `ProvidedSomeipServiceInstance.loadBalancingWeight` shall be in the range of 0..65535.]

Please note that according to SOME/IP a higher value means higher probability to be chosen.

[constr_1723] `ProvidedSomeipServiceInstance` shall be unique in respect of `serviceInstanceId`, `serviceInterfaceId` and `majorVersion` on a VLAN

Imposition time: IT_Mani

[On a VLAN, each `ProvidedSomeipServiceInstance` shall have a different `serviceInstanceId`, `serviceInterfaceId` and `majorVersion` value combination.

In other words, no two `ProvidedSomeipServiceInstances` shall have the same `serviceInstanceId`, `serviceInterfaceId` and `majorVersion` value combination during runtime on the same VLAN.]

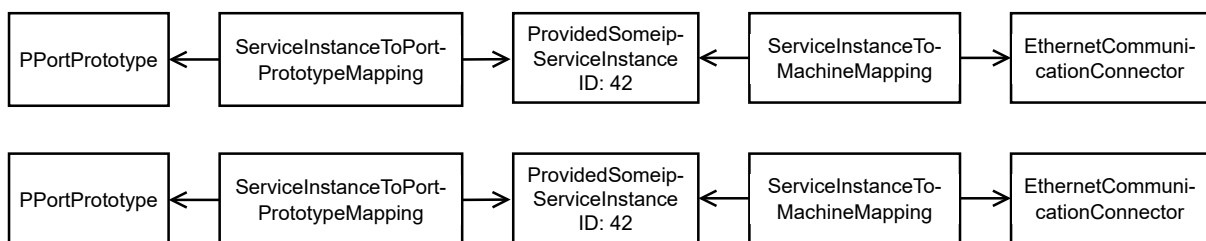


Figure 13.12: Scenario in which two `ProvidedSomeipServiceInstances` with the same credentials are provided on two VLANs

Figure 13.12 shows that different SOME/IP `ServiceInstances` with the same `serviceInstanceId`, `serviceInterfaceId` and `majorVersion` are provided on different VLANs. This is a valid setup according to [constr_1723].

In the following example where the same `ProvidedSomeipServiceInstance` is mapped to different `PPortPrototypes` and is provided on different VLANs the specification item [TPS_MANI_03236] applies. This means that only one of the `PPortPrototypes` is active at runtime at the same time and offers the `ServiceInstance` on two different VLANs.

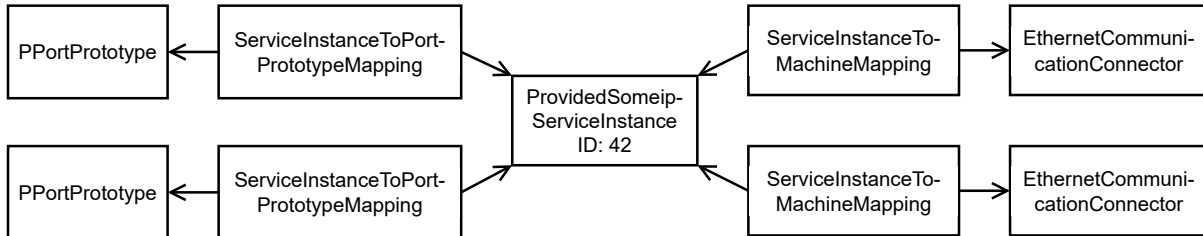


Figure 13.13: Scenario in which a `ProvidedSomeipServiceInstance` is provided on two VLANs and is mapped to different `PPortPrototypes` from which latest at runtime only one is operational

[TPS_MANI_03236] Mapping of `ProvidedSomeipServiceInstance` to different `PPortPrototypes` [In case that the same `ProvidedSomeipServiceInstance` is mapped by several `ServiceInstanceToPortPrototypeMappings` to different `PPortPrototypes` it shall be ensured (latest at runtime) that only one of these mapped `PPortPrototypes` is actually operational at any given point in time.]

Please note that two `ProvidedSomeipServiceInstance` elements with the same credentials according to [constr_1723] may exist that both are mapped to different `PPortPrototypes` and the `ProvidedSomeipServiceInstances` are mapped by `ServiceInstanceToMachineMappings` to the same VLAN. At runtime only one of these `PPortPrototypes` shall be operational at any given point in time.

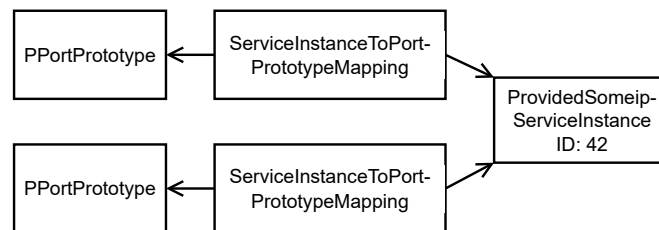


Figure 13.14: Static setup in which a `ProvidedSomeipServiceInstance` is mapped to two `PPortPrototypes` from which latest at runtime only one is operational

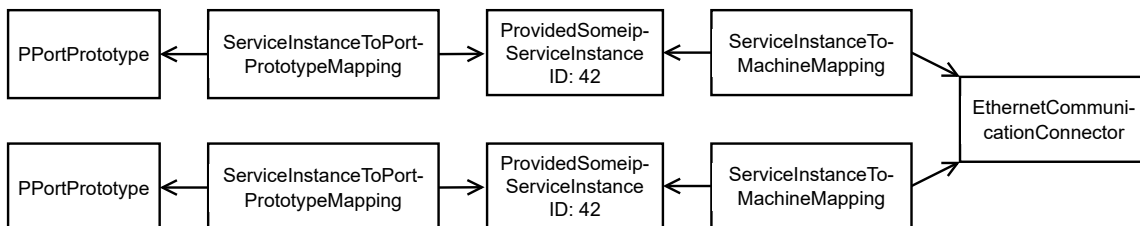


Figure 13.15: Static setup in which `ProvidedSomeipServiceInstances` with the same credentials provided on the same VLAN are mapped to two different `PPortPrototypes` from which latest at runtime only one is operational

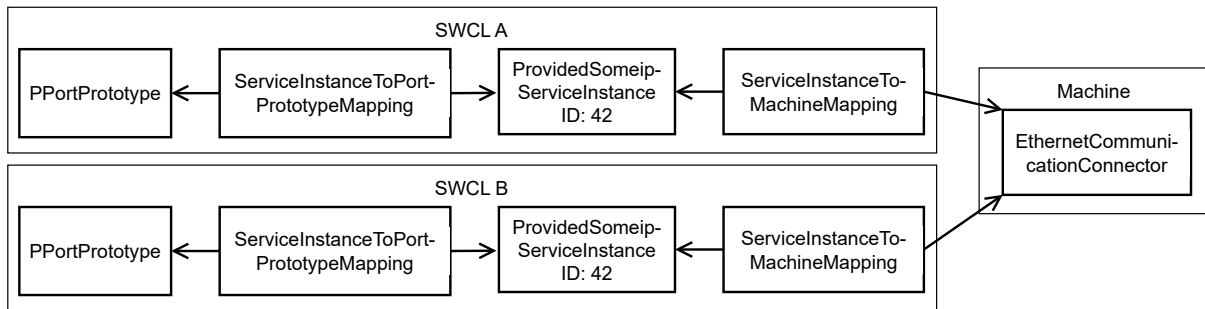


Figure 13.16: **SoftwareCluster** scenario in which **ProvidedSomeipServiceInstances** with the same credentials provided on the same VLAN exist

Such a scenario may be created by the installation of two separate **SoftwareClusters** as shown in the following figure. It is not possible to check such a setup since the **SoftwareClusters** may be developed, integrated, and deployed independent from each other.

13.3.1.1.1 IP Configuration

In SOME/IP the Offer service entry references IPv4 or IPv6 Endpoint options to indicate to the client where the server accepts the method calls and where the server sends the event messages.

Such an Endpoint contains the IP address of the sender. The IP address configuration is described in this chapter.

[TPS_MANI_03002] IP configuration for a **ProvidedSomeipServiceInstance**

[A **ProvidedSomeipServiceInstance** can be mapped to a **CommunicationConnector** of a **MachineDesign** with the **SomeipServiceInstanceToMachineMapping**.

With this mapping an assignment of the **ProvidedSomeipServiceInstance** to a unicast IP Address is established since the **EthernetCommunicationConnector** refers to a **NetworkEndpoint** in the role **unicastNetworkEndpoint**.]

[TPS_MANI_03003] **ProvidedSomeipServiceInstance Fanout**

[It is allowed to map the same **ProvidedSomeipServiceInstance** to different **CommunicationConnectors** of a **MachineDesign**. In such a case, several **SomeipServiceInstanceToMachineMappings** shall be defined.

This allows for offering the same **ProvidedSomeipServiceInstance** on different **VLANs** or even on different **CommunicationClusters**.]

[constr_3538] Only one `ServiceInstanceToMachineMapping` per technology and `CommunicationConnector`

Imposition time: IT_Mani

[Each `AdaptivePlatformServiceInstance` shall only be referenced up to once by a specific `ServiceInstanceToMachineMapping` subclass in the role `serviceInstance` where the `ServiceInstanceToMachineMapping` refer to the same `CommunicationConnector`.]

In other words, it is not allowed to define for the same service instance two `ServiceInstanceToMachineMapping` of the same kind (e.g. `SomeipServiceInstanceToMachineMapping`) which refer to the same `CommunicationConnector`.

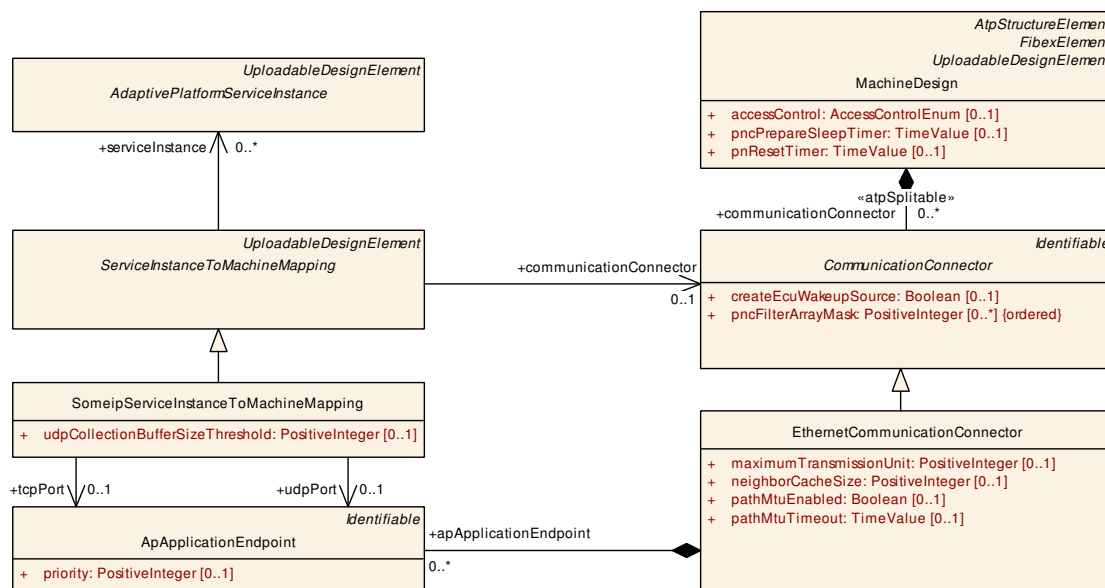


Figure 13.17: `SomeipServiceInstanceToMachineMapping` with TP and IP configuration

[TPS_MANI_03554] Several `SomeipServiceInstanceToMachineMappings` with equal settings [If

- one `SomeipServiceInstanceToMachineMapping` refers to several service instances in the role `serviceInstance`
- several `SomeipServiceInstanceToMachineMappings` with equal settings refer to several service instances in the role `serviceInstance`
- the combination of the two above applies

then for all the referenced service instances the same network connection (i.e. Ethernet socket) will be used.]

[constr_5052] ProvidedSomeipServiceInstances of the same serviceInterface on one Machine*Imposition time:* IT_Mani

[ProvidedSomeipServiceInstances that are referring to the same SomeipServiceInterfaceDeployment element or to several SomeipServiceInterfaceDeployments that all have the same SOME/IP credentials (SomeipServiceInterfaceDeployment.serviceInterfaceId and SomeipServiceInterfaceDeployment.serviceInterfaceVersion.majorVersion) shall not be mapped to the same combination of:

- IP address that is assigned by the SomeipServiceInstanceToMachineMapping with the reference to the EthernetCommunicationConnector that in turn references the NetworkEndpoint and
- UDP Port or TCP Port number that are defined by the SomeipServiceInstanceToMachineMapping.udpPort and SomeipServiceInstanceToMachineMapping.tcpPort references to the ApApplicationEndpoint.

]

The reason for this restriction is that the Instance IDs are only used for Service Discovery but are not contained in the SOME/IP header. So if for example two ProvidedSomeipServiceInstances of the same ServiceInterface are provided on the same machine and a client wants to call a method of one of these ProvidedSomeipServiceInstances the only possibility for the client to distinguish the ProvidedSomeipServiceInstances is the port number over which the individual ProvidedSomeipServiceInstances are provided.

[TPS_MANI_03555] Mix of SomeipServiceInstanceToMachineMapping and signal-based communication [SomeipServiceInstanceToMachineMapping defines service instance communication on a specific Ethernet socket and the same socket may also be used for signal-based communication at the same time.]

Please note that the signal-based communication is described in [Chapter 9](#).

Via the definition of respective ISignalTriggering and PduTriggering for signal-based communication, the same values for Ethernet address and port may be defined as used at the SomeipServiceInstanceToMachineMapping.

Class	«atpVariation» CommunicationCluster (abstract)
Note	The CommunicationCluster is the main element to describe the topological connection of communicating ECUs. A cluster describes the ensemble of ECUs, which are linked by a communication medium of arbitrary topology (bus, star, ring, ...). The nodes within the cluster share the same communication protocol, which may be event-triggered, time-triggered or a combination of both. A CommunicationCluster aggregates one or more physical channels. Tags: vh.latestBindingTime=postBuild
Base	ARElement , ARObject , CollectableElement , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement





Class	«atpVariation» CommunicationCluster (abstract)			
Subclasses	AbstractCanCluster, EthernetCluster, FlexrayCluster, LinCluster, UserDefinedCluster			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
baudrate	PositiveUnlimitedInteger	0..1	attr	Channels speed in bits/s.
physical Channel	PhysicalChannel	*	aggr	This relationship defines which channel element belongs to which cluster. A channel shall be assigned to exactly one cluster, whereas a cluster may have one or more channels. Note: This atpSplitable property has no atp.Splitkey due to atpVariation (PropertySetPattern). Stereotypes: atpSplitable; atpVariation Tags: vh.latestBindingTime=systemDesignTime
protocolName	String	0..1	attr	The name of the protocol used.
protocolVersion	String	0..1	attr	The version of the protocol used.

Table 13.35: CommunicationCluster

Class	CommunicationConnector (abstract)			
Note	The connection between the referencing ECU and the referenced channel via the referenced controller. Connectors are used to describe the bus interfaces of the ECUs and to specify the sending/receiving behavior. Each CommunicationConnector has a reference to exactly one communicationController. Note: Several CommunicationConnectors can be assigned to one PhysicalChannel in the scope of one ECU Instance.			
Base	ARObject, Identifiable, MultilanguageReferrable, Referrable			
Subclasses	AbstractCanCommunicationConnector, EthernetCommunicationConnector, FlexrayCommunicationConnector, UserDefinedCommunicationConnector			
Aggregated by	EcuInstance.connector, MachineDesign.communicationConnector			
Attribute	Type	Mult.	Kind	Note
commController	CommunicationController	0..1	ref	Reference to the communication controller. The CommunicationConnector and referenced CommunicationController shall be aggregated by the same ECUInstance. The communicationController can be referenced by several CommunicationConnector elements. This is important for the FlexRay Bus. FlexRay communicates via two physical channels. But only one controller in an ECU is responsible for both channels. Thus, two connectors (for channel A and for channel B) shall reference to the same controller.
createEcuWakeupSource	Boolean	0..1	attr	If this parameter is available and set to true then a channel wakeup source shall be created for the PhysicalChannel referencing this CommunicationConnector.
explicitWakeupChannel	PhysicalChannel	*	ref	Defines a restriction which PhysicalChannels shall be woken up if this CommunicationConnector is the wakeup source. If not defined, then no restriction applies. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=explicitWakeupChannel.physicalChannel, explicitWakeupChannel.variationPoint.shortLabel vh.latestBindingTime=postBuild





Class	CommunicationConnector (abstract)			
explicitWakeupPnc	PncMappingIdent	*	ref	Defines a restriction which PNCs shall be woken up if this CommunicationConnector is the wakeup source. If not defined, then no restriction applies. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=explicitWakeupPnc.pncMappingIdent, explicitWakeupPnc.variationPoint.shortLabel vh.latestBindingTime=postBuild
pncFilterArrayMask (ordered)	PositiveInteger	*	attr	Bit mask for NM-Pdu Payload used to configure the NM filter mask for the Network Management.

Table 13.36: CommunicationConnector

Class	EthernetCommunicationConnector			
Note	Ethernet specific attributes to the CommunicationConnector.			
Base	ARObject, CommunicationConnector, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	EcuInstance.connector, MachineDesign.communicationConnector			
Attribute	Type	Mult.	Kind	Note
apApplicationEndpoint	ApApplicationEndpoint	*	aggr	Collection of Application Addresses that are used on the CommunicationConnector. This Attribute is only used by the AUTOSAR Adaptive Platform.
canXIProps	CanXIProps	*	ref	If the Ethernet frames handled by this Ethernet CommunicationConnector are tunneled through CAN XL, then this reference shall refer the CanXIProps which contains the specific configuration parameters of the CAN XL controller of the physical CAN XL connection to be used for tunneling. This Attribute is only used by the AUTOSAR Adaptive Platform.
maximumTransmissionUnit	PositiveInteger	0..1	attr	This attribute specifies the maximum transmission unit in bytes.
neighborCacheSize	PositiveInteger	0..1	attr	This attribute specifies the size of neighbor cache or ARP table in units of entries.
pathMtuEnabled	Boolean	0..1	attr	If enabled the IPv4/IPv6 processes incoming ICMP "Packet Too Big" messages and stores a MTU value for each destination address. Tags: atp.Status=obsolete
pathMtuTimeout	TimeValue	0..1	attr	If this value is >0 the IPv4/IPv6 will reset the MTU value stored for each destination after n seconds. Tags: atp.Status=obsolete
unicastNetworkEndpoint	NetworkEndpoint	*	ref	Network Endpoint that defines the IPAddress of the machine. This Attribute is only used by the AUTOSAR Adaptive Platform.

Table 13.37: EthernetCommunicationConnector

[constr_3721] Upper multiplicity of reference in the role [EthernetCommunicationConnector.unicastNetworkEndpoint](#)

Imposition time: IT_Mani

[In the context of [EthernetCommunicationConnector](#), the reference in the role [unicastNetworkEndpoint](#) shall exist at most once.]

[constr_3722] Upper multiplicity of reference in the role `EthernetCommunicationConnector.canXlProps`

Imposition time: `IT_Mani`

[In the context of `EthernetCommunicationConnector`, the reference in the role `canXlProps` shall exist at most once.]

[constr_3288] IP configuration restriction for `unicastNetworkEndpoints`

Imposition time: `IT_Mani`

[A `NetworkEndpoint` that is referenced by a `EthernetCommunicationConnector` in the role `unicastNetworkEndpoint` shall have either

- one `Ipv4Configuration` or
- one `Ipv6Configuration`

as `networkEndpointAddress` that is defined in the unicast IP range according to the rules defined in `[TPS_MANI_03005]` and `[TPS_MANI_03006]`.]

In SOME/IP, a server that offers a `ProvidedSomeipServiceInstance` is able to send events and notification events to an IP-Multicast address.

As the server needs to inform the client to which Multicast IP address the event messages will be sent, the *Subscribe Eventgroup Acknowledgement Entry* contains a reference to an IPv4 Multicast Option and/or an IPv6 Multicast Option.

[TPS_MANI_03004] IPv4 Multicast event destination address [Meta-class `SomeipProvidedEventGroup` defines the multicast IPv4 address to which the events and notification events of the `SomeipProvidedEventGroup` are sent to with the attribute `ipv4MulticastIpAddress`.]

[TPS_MANI_03061] IPv6 Multicast event destination address [Meta-class `SomeipProvidedEventGroup` defines the multicast IPv6 address to which the events and notification events of the `SomeipProvidedEventGroup` are sent to with the attribute `ipv6MulticastIpAddress`.]

[TPS_MANI_03005] IPv4 Multicast address range

Status: DRAFT

[The IPv4 addresses reserved for multicast communication are in the range 224.0.0.0 through 239.255.255.255. Addresses between 0.0.0.0 and 223.255.255.255 are reserved for unicast communication.]

Please note that the endpoint 224.0.0.251:5353 is reserved by [33, IANA] [34] for the utilization of mDNS (only relevant if `SOVD` is used).

[TPS_MANI_03006] IPv6 Multicast address range [IPv6 multicast addresses are distinguished from unicast addresses by the value of the high-order octet of the addresses: a value of 0xFF (binary 11111111) identifies an address as an address reserved for multicast communication; any other value identifies an address as a unicast address.]

Please note that the endpoint [FF02::FB]:5353 is reserved by [35, IANA] [34] for the utilization of mDNS (only relevant if [SOVD](#) is used).

Class	NetworkEndpointAddress (abstract)			
Note	To build a valid network endpoint address there has to be either one MAC multicast group reference or an ipv4 configuration or an ipv6 configuration.			
Base	ARObject			
Subclasses	Ipv4Configuration , Ipv6Configuration , MacMulticastConfiguration			
Aggregated by	NetworkEndpoint.networkEndpointAddress			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.38: NetworkEndpointAddress

13.3.1.1.2 TP Configuration

The IPv4 or IPv6 Endpoint option that is referenced in the SOME/IP Offer message contains besides the IP address the transport layer protocol (e.g. UDP or TCP), and the port number of the sender.

With the [SomeipServiceInstanceToMachineMapping](#) the Transport Layer configuration attributes are assigned to the [ProvidedSomeipServiceInstance](#).

The same element contains the Transport Layer configuration attributes for the IPv4/IPv6 Multicast Option that may be used in the SOME/IP [SubscribeEvent-GroupAck](#) message.

[TPS_MANI_03007] Udp Transport Protocol Configuration for [ProvidedSomeipServiceInstance](#) [The reference [SomeipServiceInstanceToMachineMapping.udpPort](#) to the [ApApplicationEndpoint](#) defines the Transport Protocol for a UDP communication.

This setting is used in an IPv4 or IPv6 Endpoint Option that is referenced by an [OfferService](#) entry.]

[TPS_MANI_03008] Tcp Transport Protocol Configuration for [ProvidedSomeipServiceInstance](#) [The reference [SomeipServiceInstanceToMachineMapping.tcpPort](#) to the [ApApplicationEndpoint](#) defines the Transport Protocol for a TCP communication.

This setting is used in an IPv4 or IPv6 Endpoint Option that is referenced by an [OfferService](#) entry.]

[TPS_MANI_03009] Tcp and Udp Transport Protocol Configuration for `ProvidedSomeipServiceInstance` [It is allowed to set `tcpPort` and `udpPort` in the same `SomeipServiceInstanceToMachineMapping`.

Such a setting shall be used to indicate that one UDP endpoint and one TCP endpoint are referenced in the `OfferService` entry. It means that the Server provides the `ProvidedSomeipServiceInstance` over both Transport Protocols.]

If a `Tcp` and `Udp` Transport Protocol Configuration is defined for a `ProvidedSomeipServiceInstance` as described in [TPS_MANI_03009] then the `SOME/IP ServiceInterfaceDeployment` settings decide which content of the `ProvidedSomeipServiceInstance` is transported over `udp` and which content is transported over `tcp`.

This is described in [TPS_MANI_03050] and [TPS_MANI_03051].

[TPS_MANI_03010] Udp Transport Protocol Configuration in case of IP-Multicast [The `SomeipProvidedEventGroup.eventMulticastUdpPort` defines the Transport Protocol Port Number for a UDP event communication in case IP-Multicast is used.

This setting is used in an IPv4 or IPv6 Multicast Option that is referenced by a `SubscribeEventGroupAck` Service entry.]

[constr_3290] Transport Protocol attributes defined for a `ProvidedSomeipServiceInstance`

Imposition time: `IT_Mani`

[Each `SomeipServiceInstanceToMachineMapping` that is defined for a `ProvidedSomeipServiceInstance` shall define either

- a `udpPort` or
- a `tcpPort` or
- a `udpPort` and a `tcpPort`.

]

[TPS_MANI_03157] Enabling of data collection for UDP data transmission

[The setting of the attribute `SomeipServiceInstanceToMachineMapping.udpCollectionBufferSizeThreshold` to a value enables the data collection for data transmission over the `udpPort` and `unicastNetworkEndpoint` defined on the `EthernetCommunicationConnector` that is referenced by the `SomeipServiceInstanceToMachineMapping`. In this case all event and method messages that are configured for data collection will be collected in the buffer until a transmission trigger arrives and the data transmission starts.]

For configuration of transmission triggers please see [TPS_MANI_03158] and [TPS_MANI_03159].

13.3.1.1.3 Service Discovery Server Configuration

The multicast messages of the SOME/IP Service Discovery come with the risk of overflowing [Machines](#) with too many messages. Therefore, the Service Discovery can be configured with a suitable message sending behavior.

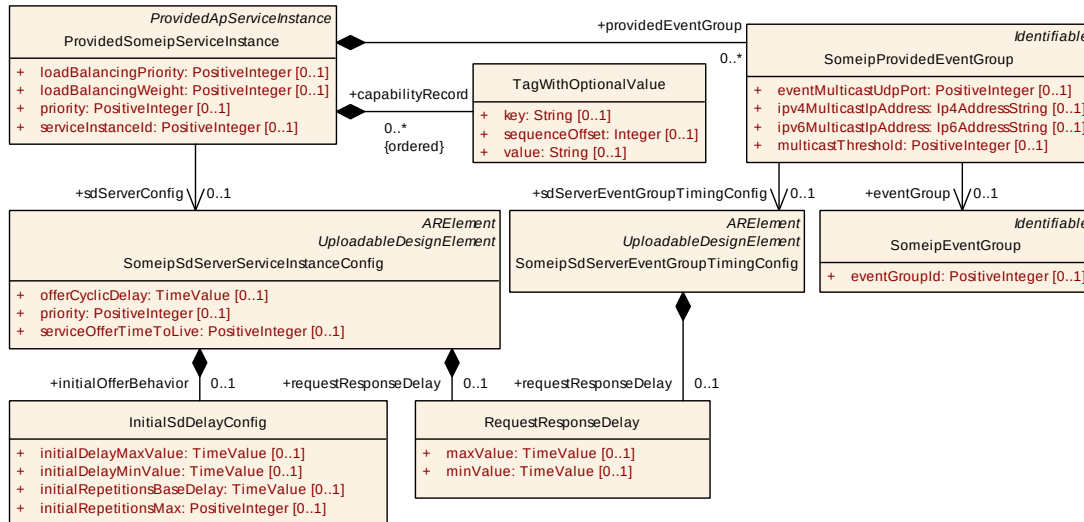


Figure 13.18: SOME/IP Service Discovery Server configuration settings

For every [ProvidedSomeipServiceInstance](#) on a Server different phases are existing:

- Down
- Available
 - Initial Wait Phase
 - Repetition Phase
 - Main Phase

[TPS_MANI_03011] Server Timing configuration for a [ProvidedSomeipServiceInstance](#) [The Server Timing is configurable with [SomeipSdServerServiceInstanceConfig](#) that is referenced in the role [sdServerConfig](#) by the [ProvidedSomeipServiceInstance](#) for which the Timing is valid.]

The number of [SomeipSdServerServiceInstanceConfig](#) elements determine how many timers shall actually be used by the middleware to keep the randomized times. Via the reference [ProvidedSomeipServiceInstance.sdServerConfig](#) each [ProvidedSomeipServiceInstance](#) defines to which timer it is assigned.

If several [ProvidedSomeipServiceInstances](#) share the same timer then the expiration of that timer will lead a combined sending of service discovery messages.

Note that it is possible to define several `SomeipSdServerServiceInstanceConfig` elements with identical timing specification values in order to request several timer handling in the middleware.

[TPS_MANI_03230] Sharing timers for `ProvidedSomeipServiceInstance` [If several `ProvidedSomeipServiceInstances` point to the same `SomeipSdServerServiceInstanceConfig` in the role `sdServerConfig` then all of these `ProvidedSomeipServiceInstances` will share the same timers for their timing behavior. This will lead to combining several service discovery entries in one service discovery message.]

Class	SomeipSdServerServiceInstanceConfig			
Note	Server specific settings that are relevant for the configuration of SOME/IP Service-Discovery. Tags: <code>atp.recommendedPackage=SomeipSdTimingConfigs</code>			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
initialOfferBehavior	InitialSdDelayConfig	0..1	aggr	Controls offer behavior of the server.
offerCyclicDelay	TimeValue	0..1	attr	Optional attribute to define cyclic offers. Cyclic offer is active, if the delay is set (in seconds) and greater then 0.
priority	PositiveInteger	0..1	attr	This attribute defines the VLAN frame priority for Service Discovery messages that result from <code>ProvidedSomeipServiceInstances</code> that are referencing the <code>SomeipSdServerServiceInstanceConfig</code> (<code>OfferService</code> , <code>StopOfferService</code> , <code>SubscribeEventGroupAck</code>). Values from 0 (best effort) to 7 (highest) are allowed.
requestResponseDelay	RequestResponseDelay	0..1	aggr	Maximum/Minimum allowable response delay to entries received by multicast in seconds. The Service Discovery shall delay answers to entries that were transported in a multicast SOME/IP-SD message (e.g. <code>FindService</code>).
serviceOfferTimeToLive	PositiveInteger	0..1	attr	Defines the time in seconds the service offer is valid.

Table 13.39: SomeipSdServerServiceInstanceConfig

[TPS_MANI_03012] Initial Wait Phase configuration for a `ProvidedSomeipServiceInstance` [The Initial Wait Phase for a `ProvidedSomeipServiceInstance` is configured with the `initialOfferBehavior` and the two attributes `initialDelayMinValue` and `initialDelayMaxValue`.

When a calculated random timer based on these min and max values expires the first `OfferService` entry will be sent out.]

When the calculated random timer expires, the Repetition Phase will be entered.

[TPS_MANI_03013] Repetition Phase configuration for a `ProvidedSomeipServiceInstance` [The Repetition Phase for a `ProvidedSomeipServiceInstance` is configured with the `initialOfferBehavior` and the two attributes `initialRepetitionsMax` and `initialRepetitionsBaseDelay`.]

If the Repetition Phase is entered the Service Discovery waits for the `initialRepetitionsBaseDelay` and then sends an `OfferService` entry. If the amount of sent `OfferService` entries reaches `initialRepetitionsMax`, the Main Phase will be entered.

[TPS_MANI_03014] Main Phase configuration for a `ProvidedSomeipServiceInstance` [The Main Phase for a `ProvidedSomeipServiceInstance` is configured with the `offerCyclicDelay` attribute of `SomeipSdServerServiceInstanceConfig`.

The `OfferService` entry will be sent cyclically with an interval that is defined by the value of attribute `offerCyclicDelay`, if the value is greater than 0.]

Class	InitialSdDelayConfig			
Note	This element is used to configure the offer behavior of the server and the find behavior on the client.			
Base	ARObject			
Aggregated by	<code>SomeipSdClientServiceInstanceConfig.initialFindBehavior</code> , <code>SomeipSdServerServiceInstanceConfig.initialOfferBehavior</code>			
Attribute	Type	Mult.	Kind	Note
<code>initialDelayMaxValue</code>	TimeValue	0..1	attr	Max Value in seconds to delay randomly the first offer (if aggregated in role <code>initialOfferBehavior</code> by <code>SomeipSdServerServiceInstanceConfig</code>) or the transmission of a find message (if aggregated in role <code>initialFindBehavior</code> by <code>SomeipSdClientServiceInstanceConfig</code>).
<code>initialDelayMinValue</code>	TimeValue	0..1	attr	Min Value in seconds to delay randomly the first offer (if aggregated in role <code>initialOfferBehavior</code> by <code>SomeipSdServerServiceInstanceConfig</code>) or the transmission of a find message (if aggregated in role <code>initialFindBehavior</code> by <code>SomeipSdClientServiceInstanceConfig</code>).
<code>initialRepetitionsBaseDelay</code>	TimeValue	0..1	attr	The base delay for offer repetitions (if aggregated in role <code>initialOfferBehavior</code> by <code>SomeipSdServerServiceInstanceConfig</code>) or find repetitions (if aggregated in role <code>initialFindBehavior</code> by <code>SomeipSdClientServiceInstanceConfig</code>). Successive find messages have an exponential back off delay.
<code>initialRepetitionsMax</code>	PositiveInteger	0..1	attr	Describes the maximum amount of offer repetitions (if aggregated in role <code>initialOfferBehavior</code> by <code>SomeipSdServerServiceInstanceConfig</code>) or the maximum amount of find repetitions (if aggregated in role <code>initialFindBehavior</code> by <code>SomeipSdClientServiceInstanceConfig</code>).

Table 13.40: InitialSdDelayConfig

[TPS_MANI_03015] TTL for Offer Service Entries [The lifetime of a `ProvidedSomeipServiceInstance` is configurable with the `serviceOfferTimeToLive` attribute of `SomeipSdServerServiceInstanceConfig`.

If the time that is configured by `serviceOfferTimeToLive` expires, the `ProvidedSomeipServiceInstance` is no longer offered.

If the `offerCyclicDelay` attribute of `SomeipSdServerServiceInstanceConfig` is not configured, or the configured value of `offerCyclicDelay` is 0, the configured value of `serviceOfferTimeToLive` shall be ignored, and the infinite value 0xFFFFFFFF (24 bits) shall be used instead.]

Please note that the [4, TPS System Template] defines [constr_5382] and [constr_5383] that are also valid for [SomeipSdServerServiceInstanceConfigs](#) that are referenced by a [ProvidedSomeipServiceInstance](#).

[TPS_MANI_03016] Servers [RequestResponseDelay](#) for received **FindService entries** [The Server will delay the `OfferService` answer to a received multicast `FindService` entry by the configured [SomeipSdServerServiceInstanceConfig.requestResponseDelay](#).

The actual delay will be randomly chosen between the [maxValue](#) and [minValue](#).]

Class	RequestResponseDelay			
Note	Time to wait before answering the query.			
Base	ARObject			
Aggregated by	SomeipSdClientEventGroupTimingConfig.requestResponseDelay , SomeipSdServerEventGroupTimingConfig.requestResponseDelay , SomeipSdServerServiceInstanceConfig.requestResponseDelay			
Attribute	Type	Mult.	Kind	Note
maxValue	TimeValue	0..1	attr	Maximum allowable response delay to entries received by multicast in seconds.
minValue	TimeValue	0..1	attr	Minimum allowable response delay to entries received by multicast in seconds.

Table 13.41: RequestResponseDelay

[Figure 13.19](#) shows an example of the different SOME/IP phases on the Server side.

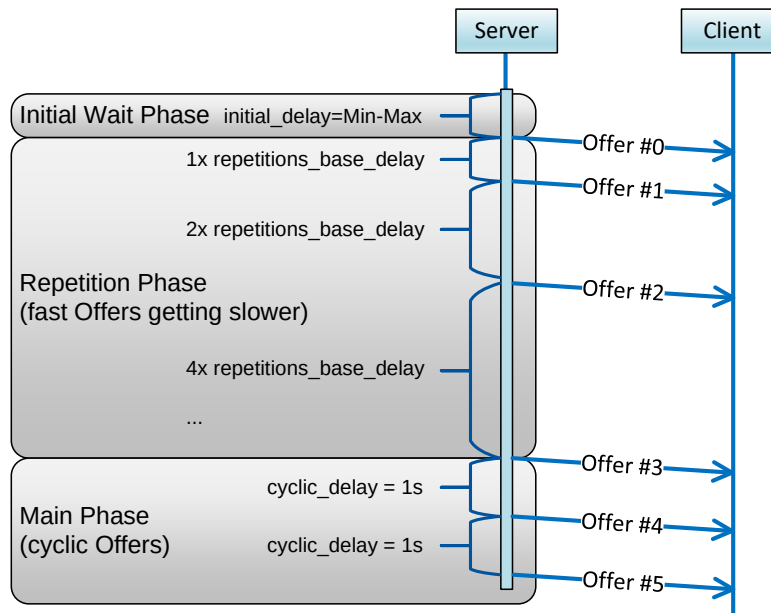


Figure 13.19: SOME/IP Server Timing example

SOME/IP allows for the specification of additional information about the `ProvidedSomeipServiceInstance` with the Capability Record that allows to transport arbitrary configuration strings (key/value pairs). This allows to encode additional information like the name of a service or its configuration.

[TPS_MANI_03017] Server Capability Records [A Capability Record (key/value pair) on the Server side is configurable with the `capabilityRecord` and the two attributes `key` and `value`.]

Class	TagWithOptionalValue			
Note	A tagged value is a combination of a tag (key) and a value that gives supplementary information that is attached to a model element. Please note that keys without a value are allowed.			
Base	ARObject			
Aggregated by	AbstractServiceInstance.capabilityRecord, Machine.environmentVariable, ProvidedSomeipServiceInstance.capabilityRecord, RequiredSomeipServiceInstance.capabilityRecord, StartupConfig.environmentVariable			
Attribute	Type	Mult.	Kind	Note
key	String	0..1	attr	Defines a key.
sequenceOffset	Integer	0..1	attr	The sequenceOffset attribute supports the use case where TagWithOptionalValue is aggregated as splittable. If multiple aggregations define the same value of attribute key then the order in which the value collection is merged might be significant. As an example consider the modeling of the \$PATH environment variable by means of a meta class TagWithOptionalValue. The sequenceOffset describes the relative position of each contribution in the concatenated value. The contributions are sorted in increasing integer order.
value	String	0..1	attr	Defines the corresponding value.

Table 13.42: TagWithOptionalValue

[constr_10037] Existence of attribute `TagWithOptionalValue.sequenceOffset` in the context of attribute `capabilityRecord` owned by `ProvidedSomeipServiceInstance`, `RequiredSomeipServiceInstance`, or `AbstractServiceInstance`

Imposition time: IT_Mani

[For all `capabilityRecord` modeled in the context of `ProvidedSomeipServiceInstance`, `RequiredSomeipServiceInstance`, or `AbstractServiceInstance`, attribute `TagWithOptionalValue.sequenceOffset` shall not exist.]

13.3.1.1.4 Provided Event Group

The `ProvidedSomeipServiceInstance` aggregates a `SomeipProvidedEventGroup` in the role `providedEventGroup` that allows to define service instance specific configuration settings for a `SomeipEventGroup`.

Class	SomeipProvidedEventGroup			
Note	The meta-class represents the ability to configure ServiceInstance related communication settings on the provided side for each EventGroup separately. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ProvidedSomeipServiceInstance.providedEventGroup			
Attribute	Type	Mult.	Kind	Note
eventGroup	SomeipEventGroup	0..1	ref	Reference to the SomeipEventGroup in the System Manifest for which the ServiceInstance related Event Group settings are valid.
eventMulticast UdpPort	PositiveInteger	0..1	attr	UdpPort configuration that is used for Event communication in the IP-Multicast case. During SOME/IP Service Discovery: Send in the SD-SubscribeEventGroupAck Message to client (answer to SD-SubscribeEventGroup). Event: This is the destination-port where the server sends the multicast event messages if the multicastThreshold is exceeded.
ipv4MulticastIp Address	Ip4AddressString	0..1	attr	Multicast IPv4 Address that is transmitted in the Event GroupSubscribeAck message.
ipv6MulticastIp Address	Ip6AddressString	0..1	attr	Multicast IPv6 Address that is transmitted in the Event GroupSubscribeAck message.
multicast Threshold	PositiveInteger	0..1	attr	Specifies the number of subscribed clients that trigger the server to change the transmission of events to multicast. Example: If configured to 0 only unicast will be used. If configured to 1 the first client will be already served by multicast. If configured to 2 the first client will be served with unicast and as soon as the 2nd client arrives both will be served by multicast. This does not influence the handling of initial events, which are served using unicast only.
sdServerEvent GroupTiming Config	SomeipSdServerEvent GroupTimingConfig	0..1	ref	Server Timing configuration settings that are EventGroup specific.

Table 13.43: SomeipProvidedEventGroup

[constr_10220] Multiplicity of attribute [SomeipProvidedEventGroup.multicastThreshold](#)

Imposition time: [IT_Mani](#)

[For each [SomeipProvidedEventGroup](#), the attribute [multicastThreshold](#) shall exist.]

[TPS_MANI_03018] Usage of [SomeipProvidedEventGroup.multicastThreshold](#) [The switching between IP-Unicast and IP-Multicast is guided by the server with the [SomeipProvidedEventGroup.multicastThreshold](#) attribute and by the number of subscribed clients to the [SomeipProvidedEventGroup](#).

The Server will change the transmission of events to Multicast if the [multicastThreshold](#) of the corresponding [SomeipProvidedEventGroup](#) is reached by the number of subscribed clients. If the number of subscribed clients is smaller than the configured [multicastThreshold](#), the transmission of events takes place via unicast communication.]

The following example shows the effect of the `multicastThreshold` in relation to the number of subscribed clients to the transmission of the SOME/IP event to the unicast or multicast destination address:

- If `multicastThreshold` is configured to 0, only the unicast IP address and the port will be used as destination address.
- If `multicastThreshold` is configured to 1, the first client will be served by multicast.
- If `multicastThreshold` is configured to 2, the first client will be served with unicast and as soon as the second client arrives both will be served by multicast, etc.

[constr_5332] Mandatory multicast endpoint in case of `multicastThreshold` different from 0

Imposition time: `IT_Mani`

[If `SomeipProvidedEventGroup.multicastThreshold` is configured to a value different from 0, then

- `SomeipProvidedEventGroup.eventMulticastUdpPort`

and either

- `SomeipProvidedEventGroup.ipv4MulticastIpAddress` or
- `SomeipProvidedEventGroup.ipv6MulticastIpAddress`

]

[constr_5333] No multicast in case of TCP

Imposition time: `IT_Mani`

[If a `SomeipProvidedEventGroup` references only `SomeipEventDeployments` that have the attribute `transportProtocol` set to `tcp` (via `SomeipProvidedEventGroup.eventGroup.event`) then this `SomeipProvidedEventGroup` shall not have a `SomeipProvidedEventGroup.multicastThreshold` attribute or shall have the `SomeipProvidedEventGroup.multicastThreshold` set to 0.]

[constr_5392] Assignment of the same `event` to several `SomeipEventGroups` is forbidden in case one of the `SomeipEventGroups` has the `multicastThreshold` set to a value greater than 0

Imposition time: `IT_Mani`

[The same `SomeipEventDeployment` (Event) shall not be referenced by several `SomeipEventGroups` if these `SomeipEventGroups`

- are referenced by different `SomeipProvidedEventGroups` in the context of one `Machine` and
- one or more of these `SomeipProvidedEventGroups` has the `multicastThreshold` set to a value > 0

except for the case that all these `SomeipProvidedEventGroups` have the `multicastThreshold` set to the value 1.]

[[constr_5392](#)] is introduced to forbid scenarios in which the Service Provider is forced to transmit the same event over IP Unicast and IP Multicast in cases where the same event is assigned to several `SomeipProvidedEventGroups` and the `multicastThreshold` is reached for one `SomeipProvidedEventGroup` but not for the other ones.

[TPS_MANI_03020] Servers `RequestResponseDelay` for received `SubscribeEventGroup` entries [The Server will delay the `SubscribeEventGroupAck` answer to a received `SubscribeEventGroup` message that was triggered by a multicast `ServiceOffer` by the configured `SomeipSdClientEventGroupTimingConfig.requestResponseDelay`.

The actual delay will be randomly chosen between the `maxValue` and `minValue`.]

Class	SomeipSdServerEventGroupTimingConfig			
Note	EventGroup specific timing configuration settings. Tags: atp.recommendedPackage=SomeipSdTimingConfigs			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
request ResponseDelay	RequestResponseDelay	0..1	aggr	The Service Discovery shall delay answers to unicast messages triggered by multicast messages (e.g. <code>Subscribe Eventgroup</code> after <code>Offer Service</code>).

Table 13.44: SomeipSdServerEventGroupTimingConfig

13.3.1.1.5 `ProvidedSomeipServiceInstance` related event and method properties

[TPS_MANI_03154] `ProvidedSomeipServiceInstance` related configuration settings for `events` [The class `SomeipEventProps` that is aggregated by the `ProvidedSomeipServiceInstance` in the role `eventProps` allows for specifying `ProvidedSomeipServiceInstance` related configuration settings for `events` that are defined in the `SomeipServiceInterfaceDeployment` referenced by the `ProvidedSomeipServiceInstance` in the role `serviceInterfaceDeployment`.]

[TPS_MANI_03155] `ProvidedSomeipServiceInstance` related configuration settings for `methods` [The class `SomeipMethodProps` that is aggregated by the `ProvidedSomeipServiceInstance` in the role `methodResponseProps` allows for specifying `ProvidedSomeipServiceInstance` related configuration settings for a `method` response message.

The `method` is defined in the `SomeipServiceInterfaceDeployment` referenced by the `ProvidedSomeipServiceInstance` in the role `serviceInterfaceDeployment`.]

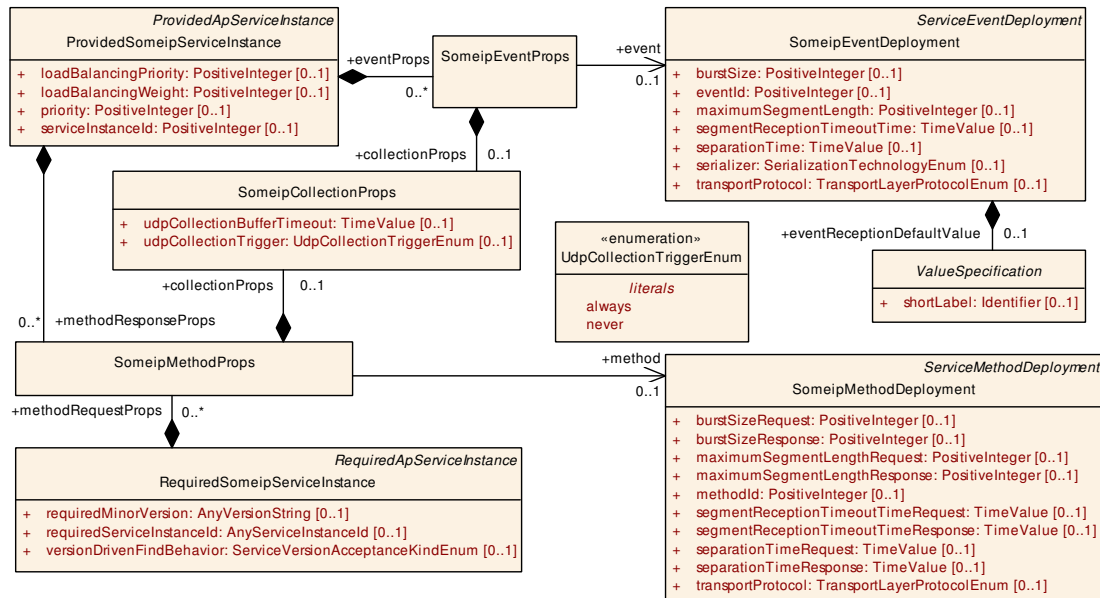


Figure 13.20: `ProvidedSomeipServiceInstance` related event and method properties

Class	SomeipEventProps			
Note	This meta-class allows to set configuration options for an event in the provided service instance. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	ProvidedSomeipServiceInstance.eventProps			
Attribute	Type	Mult.	Kind	Note
collectionProps	SomeipCollectionProps	0..1	aggr	Collection of timing attributes configurable for an event that is provided by a Service Instance.
event	SomeipEvent Deployment	0..1	ref	Reference to the event for which the SomeipEventProps are applicable.

Table 13.45: SomeipEventProps

Class	SomeipMethodProps			
Note	This meta-class allows to set configuration options for a method in the service instance. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	ProvidedSomeipServiceInstance.methodResponseProps, RequiredSomeipServiceInstance.method RequestProps			
Attribute	Type	Mult.	Kind	Note
collectionProps	SomeipCollectionProps	0..1	aggr	Collection of timing attributes configurable for a method that is provided or requested by a Service Instance.
method	SomeipMethod Deployment	0..1	ref	Reference to the method for which the SomeipMethod Props are applicable.

Table 13.46: SomeipMethodProps

Class	SomeipCollectionProps			
Note	Collection of attributes that are configurable for an event that is provided by a ServiceInstance or for a method that is provided or requested by a ServiceInstance. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	SomeipEventProps.collectionProps, SomeipMethodProps.collectionProps			
Attribute	Type	Mult.	Kind	Note
udpCollectionBufferTimeout	TimeValue	0..1	attr	Maximum time, an outgoing message (event, method call or method response) may be delayed, due to data collection.
udpCollectionTrigger	UdpCollectionTriggerEnum	0..1	attr	Defines whether the ServiceInterface element (event or method) contributes to the triggering of the udp data transmission if data collection is enabled.

Table 13.47: SomeipCollectionProps

Enumeration	UdpCollectionTriggerEnum
Note	Defines whether the ServiceInterface element (event or method) contributes to the triggering of the udp data transmission if data collection is enabled. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SomeipCollectionProps.udpCollectionTrigger
Literal	Description
always	ServiceInterface element will trigger the transmission of the data. Tags: atp.EnumerationLiteralIndex=0
never	ServiceInterface element will be buffered and will not trigger the transmission of the data. Tags: atp.EnumerationLiteralIndex=1

Table 13.48: UdpCollectionTriggerEnum

[TPS_MANI_03158] Configuration of a data collection on a [ProvidedServiceInstance](#) for transmission over udp [The attributes [udpCollectionBufferTimeout](#) and [udpCollectionTrigger](#) support the configuration of a data collection of several messages for transmission over Udp.

In the [ProvidedServiceInstance](#) all [method](#) responses and [events](#) for which the [udpCollectionTrigger](#) is set to [never](#) will be collected in a buffer until a trigger arrives that starts the data transmission.

The following trigger options are supported:

- a message needs to be transmitted for which the [udpCollectionTrigger](#) is set to [always](#).
- the [udpCollectionBufferTimeout](#) is reached for a message.
- the buffer size defined by the attribute [udpCollectionBufferSizeThreshold](#) is reached.

]

13.3.1.2 Required Service Instance

[TPS_MANI_03059] **RequiredSomeipServiceInstance.requiredServiceInstanceId** [The **RequiredSomeipServiceInstance** defines the **requiredServiceInstanceId** of a **SomeipServiceInterfaceDeployment** that the client searches.

The client may search for a specific **requiredServiceInstanceId** or for ALL **requiredServiceInstanceId** of the **serviceInterfaceDeployment**.]

[constr_10070] Value of **RequiredSomeipServiceInstance.requiredServiceInstanceId**

Imposition time: IT_Mani

[For each **RequiredSomeipServiceInstance.requiredServiceInstanceId**, the value shall be in the range 0..65534 or ALL.]

Class	RequiredSomeipServiceInstance			
Note	This meta-class represents the ability to describe the existence and configuration of a required service instance in a concrete implementation on top of SOME/IP. Tags: atp.recommendedPackage=ServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , RequiredApServiceInstance , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
blocklisted Version	SomeipServiceVersion	*	aggr	Collection of blocklisted versions.
capability Record (ordered)	TagWithOptionalValue	*	aggr	A sequence of records to store arbitrary name/value pairs conveying additional information about the named service.
methodRequest Props	SomeipMethodProps	*	aggr	Configuration settings for individual methods that are requested by the ServiceInstance.
requiredEvent Group	SomeipRequiredEventGroup	*	aggr	List of EventGroups that are used by the RequiredService Instance.
requiredMinor Version	AnyVersionString	0..1	attr	This attribute is used to configure for which minor version of the Someip ServiceInterface the Service Discovery will search. Value can be set to a number that represents the Minor Version of the searched service or to ANY.
requiredService InstanceId	AnyServiceInstanceId	0..1	attr	This attribute represents the ability to describe the required service instance ID.
sdClientConfig	SomeipSdClientServiceInstanceConfig	0..1	ref	Client specific configuration settings relevant for the SOME/IP service discovery.
versionDriven FindBehavior	ServiceVersionAcceptanceKindEnum	0..1	attr	Defines the service discovery find behavior.

Table 13.49: RequiredSomeipServiceInstance

[constr_10221] Multiplicity of reference in the role `RequiredSomeipServiceInstance.sdClientConfig`*Imposition time:* `IT_Mani`

[For each `RequiredSomeipServiceInstance`, the reference in the role `sd-ClientConfig` shall exists.]

Class	SomeipServiceVersion			
Note	This meta-class represents the ability to describe a version of a SOME/IP Service.			
Base	<code>ARObject</code>			
Aggregated by	<code>ConsumedServiceInstance.blocklistedVersion</code> , <code>RequiredSomeipServiceInstance.blocklistedVersion</code> , <code>SomeipServiceInterfaceDeployment.serviceInterfaceVersion</code>			
Attribute	Type	Mult.	Kind	Note
majorVersion	PositiveInteger	0..1	attr	Major Version of the ServiceInterface. Tags: xml.sequenceOffset=10
minorVersion	PositiveInteger	0..1	attr	Minor Version of the ServiceInterface. Tags: xml.sequenceOffset=20

Table 13.50: SomeipServiceVersion

Enumeration	ServiceVersionAcceptanceKindEnum			
Note	Defined the possible acceptance kinds for required service instances.			
Aggregated by	<code>ConsumedServiceInstance.versionDrivenFindBehavior</code> , <code>RequiredSomeipServiceInstance.versionDrivenFindBehavior</code>			
Literal	Description			
exactOrAnyMinorVersion	Search for ANY or specific minor version service instance and select either ALL returned service instances (in case of ANY) or exactly the specific minor version service instances defined in required MinorVersion. Tags: atp.EnumerationLiteralIndex=0			
minimumMinorVersion	Search for ANY minor version service instance and select only those service instances which have an equal or greater minor version than given in requiredMinorVersion. Tags: atp.EnumerationLiteralIndex=1			

Table 13.51: ServiceVersionAcceptanceKindEnum

[TPS_MANI_03021] Requirements on the searched minor version from the client's point of view [The meta-class `RequiredSomeipServiceInstance` is able to make further specifications regarding the version of the service from the client's point of view.

For this purpose, the attribute `RequiredSomeipServiceInstance.requiredMinorVersion` exists and provides the ability to define the required minor version (`SomeipServiceVersion.minorVersion`).]

Please note that the major version that the client searches for is already defined by the `SomeipServiceVersion.majorVersion` in the `SomeipServiceInterfaceDeployment`. It is therefore not possible to search for ANY major version, so the client looks always for a specific major version.

The minor version that may be defined by `SomeipServiceVersion.minorVersion` in the `SomeipServiceInterfaceDeployment` is irrelevant for the client and the service search and shall be ignored.

[TPS_MANI_03619] SOME/IP Service search for `requiredMinorVersion` [A `RequiredSomeipServiceInstance` is searching for a SOME/IP Service Instance `requiredMinorVersion`:

- in case `versionDrivenFindBehavior = exactOrAnyMinorVersion`: Service minor version that matches the value set in `requiredMinorVersion` or ANY minor version of the Service Instance in case the `requiredMinorVersion` is set to ANY
- in case `versionDrivenFindBehavior = minimumMinorVersion`: Service minor version that matches at least the value set in `requiredMinorVersion` or is higher

]

[constr_3561] `minimumMinorVersion` and `RequiredSomeipServiceInstance.requiredMinorVersion` value

Imposition time: IT_Mani

[The `RequiredSomeipServiceInstance.requiredMinorVersion` shall not have the value ANY if `versionDrivenFindBehavior = minimumMinorVersion`.]

[TPS_MANI_03618] Usage of `RequiredSomeipServiceInstance.blocklistedVersion` [A service connection of a `RequiredSomeipServiceInstance` to a `ProvidedSomeipServiceInstance` is not considered for service discovery if the `SomeipServiceVersion.minorVersion` of the enclosing `SomeipServiceInterfaceDeployment` that is referenced by the `ProvidedSomeipServiceInstance` exists in the collection of `SomeipServiceVersions` aggregated at the `RequiredSomeipServiceInstance` in the role `blocklistedVersion`.]

A typical scenario for using a blocklist may be: For a certain `RequiredSomeipServiceInstance` a certain compatible provider service version inside a system may not work which may have been identified after the design phase.

In order to keep the system running this certain provider version won't be considered in the service search if it has been block-listed. Therefore, the `RequiredSomeipServiceInstance` may connect only to `ProvidedSomeipServiceInstances` that fulfill the search criteria and are not block-listed.

[constr_3558] `RequiredSomeipServiceInstance.blocklistedVersion` is restricted to the usage of `minorVersion`

Imposition time: IT_Mani

[The `majorVersion` attribute shall not be used in the `SomeipServiceVersion` that is aggregated by the `RequiredSomeipServiceInstance` in the role `blocklistedVersion`.]

[constr_5115] Search for a specific SOME/IP ServiceInstance and for all SOME/IP ServiceInstances over the same RPortPrototype

Imposition time: IT_Mani

[A [RequiredSomeipServiceInstance](#) that configures the search for a specific ServiceInstance on SOME/IP (with concrete [requiredServiceInstanceId](#)) and a [RequiredSomeipServiceInstance](#) that configures the search for ALL ServiceInstances on SOME/IP (with [requiredServiceInstanceId](#) = ALL) that are mapped using [ServiceInstanceToMachineMapping](#) to the same [EthernetCommunicationConnector](#) (and therefore are searching for SOME/IP ServiceInstances on the same VLAN) are not allowed to be mapped by [ServiceInstanceToPortPrototypeMappings](#) to the same [RPortPrototype](#).]

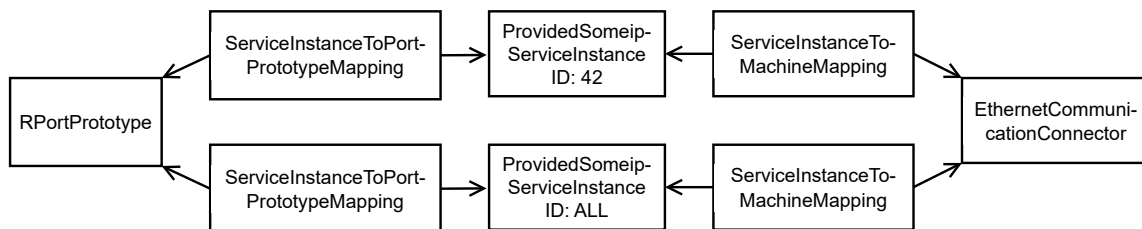


Figure 13.21: Depiction of not-allowed scenario

Please note that the depicted scenario in [Figure 13.21](#) is covered by [\[constr_5115\]](#).

In other words the middleware is allowed to search for a concrete SOME/IP ServiceInstance on one VLAN and for ALL SOME/IP ServiceInstances on a different VLAN via a single [RPortPrototype](#). But the middleware is only able to search for either ALL SOME/IP ServiceInstances or for one concrete SOME/IP ServiceInstance on the same VLAN via a single [RPortPrototype](#).

Please note that the depicted scenario in [Figure 13.22](#) is covered by [\[constr_5115\]](#).

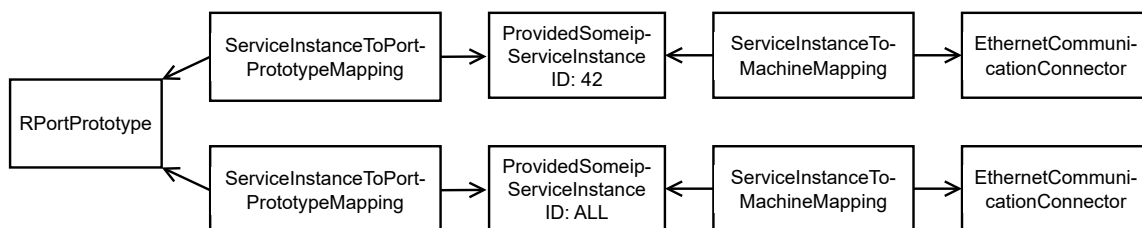


Figure 13.22: Depiction of allowed scenario

13.3.1.2.1 IP Configuration

In SOME/IP, the [SubscribeEventGroup](#) entry references IPv4 or IPv6 Endpoint options to indicate to the server where the client wants to receive the events of the [SomeipEventGroup](#). Such an Endpoint contains the IP address of the client.

[TPS_MANI_03022] Context of [RequiredSomeipServiceInstance](#) [A [RequiredSomeipServiceInstance](#) can be mapped to a [CommunicationConnector](#) of a [MachineDesign](#) with the [SomeipServiceInstanceToMachineMapping](#).

With this mapping an assignment of the [RequiredSomeipServiceInstance](#) to a unicast IP Address is established since the [EthernetCommunicationConnector](#) refers to a [NetworkEndpoint](#) in the role [unicastNetworkEndpoint](#). The [unicastNetworkEndpoint](#) defines the local IP address of the client.]

13.3.1.2.2 TP Configuration

The IPv4 or IPv6 Endpoint option that is referenced in the [SOME/IP SubscribeEventGroup](#) message contains besides the IP address the transport layer protocol (e.g. UDP or TCP), and the port number of the client.

With the [SomeipServiceInstanceToMachineMapping](#) the Transport Layer configuration attributes are assigned to the [RequiredSomeipServiceInstance](#).

The Transport Layer (TCP/UDP) configuration attributes for the [SubscribeEventGroup](#) entry are directly available in the [SomeipServiceInstanceToMachineMapping](#) element.

The [SomeipServiceInstanceToMachineMapping](#) defines also the source-port where the client sends the method call messages to the server and the destination-port where the client receives the method responses from the server.

The modeling of the [SomeipServiceInstanceToMachineMapping](#) with TP and IP configuration is depicted in [Figure D.1](#).

[TPS_MANI_03023] Udp Transport Protocol Configuration for [RequiredSomeipServiceInstance](#) [The [SomeipServiceInstanceToMachineMapping](#).[udpPort](#) defines the Transport Protocol for a UDP communication in case that the server provides [ServiceInterface](#) content over UDP and the client wants to use it.]

[TPS_MANI_03024] Tcp Transport Protocol Configuration for [RequiredSomeipServiceInstance](#) [The [SomeipServiceInstanceToMachineMapping](#).[tcpPort](#) defines the Transport Protocol for a TCP communication in case that the server provides [ServiceInterface](#) content over TCP and the client wants to use it.]

[TPS_MANI_03049] Tcp and Udp Transport Protocol Configuration for [RequiredSomeipServiceInstance](#) [It is allowed to set [tcpPort](#) and [udpPort](#) in the same [SomeipServiceInstanceToMachineMapping](#). Such a setting shall be used in case that the server provides [ServiceInterface](#) content over Udp and Tcp and the client wants to use it.]

[TPS_MANI_03237] Transport Protocol attributes defined for a [RequiredSomeipServiceInstance](#) [Each [SomeipServiceInstanceToMachineMapping](#) that is defined for a [RequiredSomeipServiceInstance](#) is allowed to have:

- a configured [udpPort](#) or
- a configured [tcpPort](#) or
- a configured [udpPort](#) and a [tcpPort](#) or
- no configured [udpPort](#) and [tcpPort](#).

]

A [RequiredSomeipServiceInstance](#) that is mapped by a [SomeipServiceInstanceToMachineMapping](#) that does not contain a [udpPort](#) and [tcpPort](#) is allowed to receive events over IP Multicast only.

In this case, it is not required for a client to have a unicast socket prepared if the server will always use the multicast transport. In such a case, the [SubscribeEventGroup](#) SOME/IP SD message that is sent from the [ServiceConsumer](#) to the [ServiceProvider](#) will not contain any [Unicast Endpoint](#) options.

In addition, the corresponding [ServiceInterface](#) is not allowed to have any Methods defined since the Request/Response communication pattern is restricted to IP Unicast only.

An additional prerequisite for such a setup is that the [ProvidedSomeipServiceInstance](#) is configured for IP multicast transmission only. In other words, the value of attribute [multicastThreshold](#) for all [SomeipProvidedEventGroups](#) needs to be set to 1.

[constr_5161] [RequiredSomeipServiceInstance](#) that is mapped by a [SomeipServiceInstanceToMachineMapping](#) without a configured [tcpPort](#) and [udpPort](#)

Imposition time: [IT_Mani](#)

[A [RequiredSomeipServiceInstance](#) that is mapped to a [EthernetCommunicationConnector](#) by a [SomeipServiceInstanceToMachineMapping](#) that does not have neither a [udpPort](#) nor a [tcpPort](#) is not allowed to reference a [SomeipServiceInterfaceDeployment](#) that includes [SomeipMethodDeployments](#) (directly or indirectly via [ServiceFieldDeployment](#)).]

If a [Tcp](#) and [Udp](#) Transport Protocol Configuration is defined for a [RequiredSomeipServiceInstance](#) as described in [\[TPS_MANI_03049\]](#) then the [SOME/IP ServiceInterfaceDeployment](#) settings decide which content of the [ProvidedSomeipServiceInstance](#) is transported over [udp](#) and which content is transported over [tcp](#). This is described in [\[TPS_MANI_03050\]](#) and [\[TPS_MANI_03051\]](#).

13.3.1.2.3 Service Discovery Client Configuration

Service Discovery phases on the Client side allow minimizing the number of Service Discovery messages and allow a fast synchronization upon ECU start.

For every [RequiredSomeipServiceInstance](#) on a Client different phases are existing:

- Down
- Requested
 - Initial Wait Phase
 - Repetition Phase
 - Main Phase

[TPS_MANI_03025] Client Timing configuration for a [RequiredSomeipServiceInstance](#) [The Client Timing is configurable with [SomeipSdClientServiceInstanceConfig](#) that is referenced in the role [sdClientConfig](#) by the [RequiredSomeipServiceInstance](#) for which the Timing is valid.]

The number of [SomeipSdClientServiceInstanceConfig](#) elements determine how many timers shall actually be used by the middleware to keep the randomized times. Via the reference [RequiredSomeipServiceInstance.sdClientConfig](#) each [RequiredSomeipServiceInstance](#) defines to which timer it is assigned.

Note that it is possible to define several [SomeipSdClientServiceInstanceConfig](#) elements with identical timing specification values in order to request several timer handling in the middleware.

If several [RequiredSomeipServiceInstance](#) share the same timer then the expiration of that timer will lead a combined sending of service discovery messages.

[TPS_MANI_03231] Sharing timers for [RequiredSomeipServiceInstance](#) [If several [RequiredSomeipServiceInstances](#) point to the same [SomeipSdClientServiceInstanceConfig](#) in the role [sdClientConfig](#) then all of these [RequiredSomeipServiceInstances](#) will share the same timers for their timing behavior. This will lead to combining several service discovery entries in one service discovery message.]

Class	SomeipSdClientServiceInstanceConfig			
Note	Client specific settings that are relevant for the configuration of SOME/IP Service-Discovery. Tags: atp.recommendedPackage=SomeipSdTimingConfigs			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	SomeipSdClientServiceInstanceConfig			
initialFindBehavior	InitialSdDelayConfig	0..1	aggr	Controls initial find behavior of clients.
priority	PositiveInteger	0..1	attr	This attribute defines the VLAN frame priority for Service Discovery messages that result from RequiredSomeipServiceInstances that are referencing this SomeipSdClientServiceInstanceConfig (Find, SubscribeEventGroup, Stop SubscribeEventgroup). Values from 0 (best effort) to 7 (highest) are allowed.

Table 13.52: SomeipSdClientServiceInstanceConfig

[TPS_MANI_03026] Initial Wait Phase configuration for a RequiredSomeipServiceInstance [The Initial Wait Phase for a RequiredSomeipServiceInstance is configured with the `initialFindBehavior` and the two attributes `initialDelayMinValue` and `initialDelayMaxValue`.

If a calculated random timer based on these min and max values expires the first FindService entry will be sent out.]

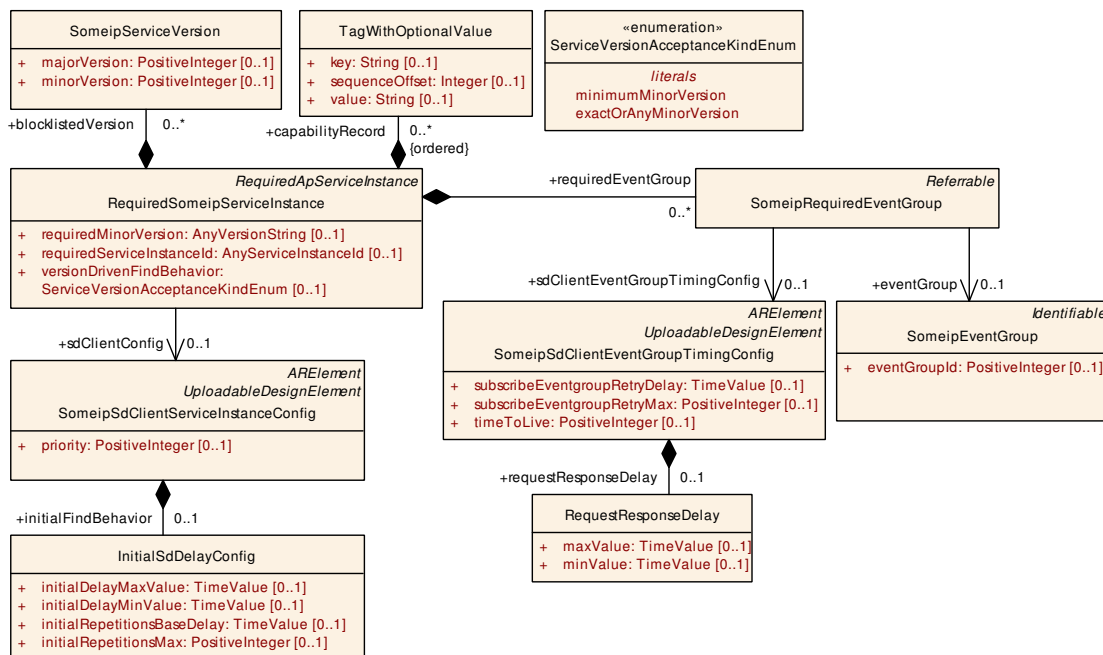


Figure 13.23: SOME/IP Service Discovery Client configuration settings

When the calculated random timer expires and no OfferService is received the Repetition Phase will be entered.

[TPS_MANI_03027] Repetition Phase configuration for a RequiredSomeipServiceInstance [The Repetition Phase for a RequiredSomeipServiceInstance is configured with the `initialFindBehavior` and the two attributes `initialRepetitionsMax` and `initialRepetitionsBaseDelay`.]

If the Repetition Phase is entered, the Service Discovery waits the `initialRepetitionsBaseDelay` and sends an FindService entry.

If the amount of sent `FindService` entries reaches `initialRepetitionsMax` and no `OfferService` is received the Main Phase will be entered. In the Main Phase no further `FindService` entries are sent by the client.

SOME/IP allows for specifying additional information about the `RequiredSomeipServiceInstance` with the Capability Record that allows to transport arbitrary configuration strings (key/value pairs).

This allows to encode additional information like the name of a service or its configuration.

Figure 13.24 shows an example of the different SOME/IP phases on the Client side.

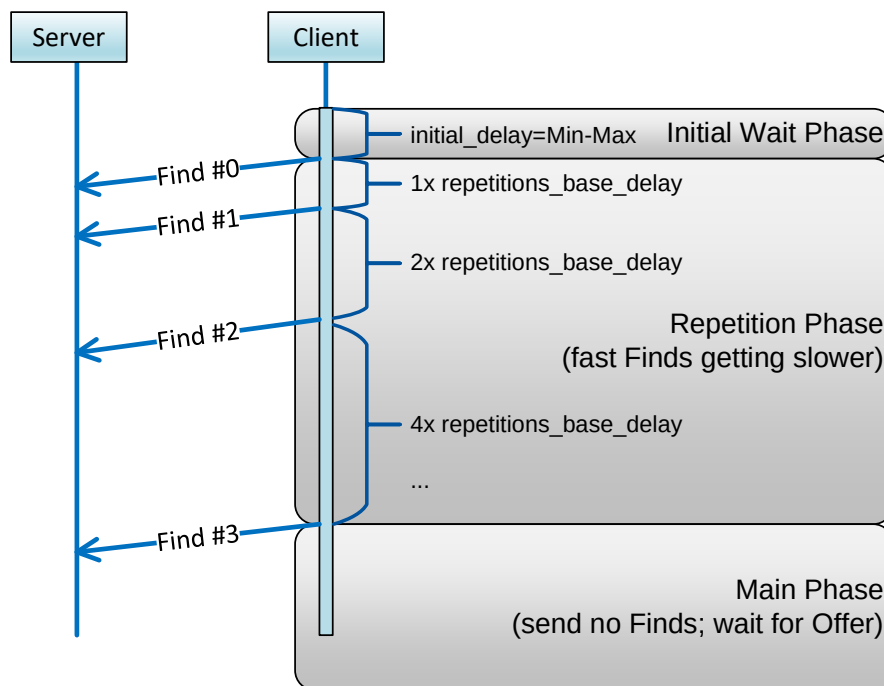


Figure 13.24: SOME/IP Client Timing example

[TPS_MANI_03029] Client Capability Records [A Capability Record (key/value pair) on the Client side is configurable with the `capabilityRecord` and the two attributes `key` and `value`.]

13.3.1.2.4 Required Event Group

The `RequiredSomeipServiceInstance` aggregates a `SomeipRequiredEventGroup` in the role `requiredEventGroup` that allows to define service instance specific configuration settings for a `SomeipEventGroup`.

Class	SomeipRequiredEventGroup			
Note	The meta-class represents the ability to configure ServiceInstance related communication settings on the required side for each EventGroup separately. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Referrable			
Aggregated by	RequiredSomeipServiceInstance.requiredEventGroup			
Attribute	Type	Mult.	Kind	Note
eventGroup	SomeipEventGroup	0..1	ref	Reference to the SomeipEventGroup in the System Manifest for which the ServiceInstance related Event Group settings are valid.
sdClientEventGroupTimingConfig	SomeipSdClientEventGroupTimingConfig	0..1	ref	Client Timing configuration settings that are EventGroup specific.

Table 13.53: SomeipRequiredEventGroup

[constr_10222] Multiplicity of the reference in the role [SomeipRequiredEventGroup.sdClientEventGroupTimingConfig](#)

Imposition time: [IT_Mani](#)

[For each [SomeipRequiredEventGroup](#), the reference in the role [sdClientEventGroupTimingConfig](#) shall exist.]

Class	SomeipSdClientEventGroupTimingConfig			
Note	This meta-class is used to specify configuration related to service discovery in the context of an event group on SOME/IP. Tags: atp.recommendedPackage=SomeipSdTimingConfigs			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
requestResponseDelay	RequestResponseDelay	0..1	aggr	The Service Discovery shall delay answers to unicast messages triggered by multicast messages (e.g. Subscribe Eventgroup after Offer Service).
subscribeEventgroupRetryDelay	TimeValue	0..1	attr	This attribute defines the interval in seconds to re-trigger a subscription to a Eventgroup, if a retry to subscribe to a Eventgroup is configured (subscribeEventgroupRetryMax > 0).
subscribeEventgroupRetryMax	PositiveInteger	0..1	attr	This attribute define the maximum counts of retries to subscribe to an Eventgroup. If the value is set to 0 no retry shall be done. If the value is set to 255 the retry shall be done as long as the Eventgroup is requested and no SubscribeEventGroupAck was received.
timeToLive	PositiveInteger	0..1	attr	Defines the time in seconds the subscription of this event is expected by the client. this value is sent from the client to the server in the SD-subscribeEvent message.

Table 13.54: SomeipSdClientEventGroupTimingConfig

[TPS_MANI_03030] [SomeipSdClientEventGroupTimingConfig.timeToLive](#) for **SubscribeEventGroup Entries** [The lifetime of an event subscription is configurable with the [timeToLive](#) attribute of [SomeipSdClientEventGroupTimingConfig](#).

If the time that is configured by `timeToLive` expires, the event subscription is canceled.]

[TPS_MANI_03031] Clients `RequestResponseDelay` for received `ServiceOffer` entries [The Client will delay the `SubscribeEventGroup` answer to a received `ServiceOffer` message by the configured `SomeipSdClientEventGroupTimingConfig.requestResponseDelay`.

The actual delay will be randomly chosen between the `maxValue` and `minValue`.]

13.3.1.2.5 `RequiredSomeipServiceInstance` related method call properties

[TPS_MANI_03156] `RequiredSomeipServiceInstance` related configuration settings for `methods` [The class `SomeipMethodProps` that is aggregated by the `RequiredSomeipServiceInstance` in the role `methodRequestProps` allows specifying `RequiredSomeipServiceInstance` related configuration settings for a `method` request message. The `method` is defined in the `SomeipServiceInterfaceDeployment` referenced by the `RequiredSomeipServiceInstance` in the role `serviceInterfaceDeployment`.]

[TPS_MANI_03159] Configuration of a data collection on a `RequiredSomeipServiceInstance` for transmission over UDP [The attributes `udpCollectionBufferTimeout` and `udpCollectionTrigger` support the configuration of a data collection of several messages for transmission over UDP. In the `RequiredSomeipServiceInstance` all `method` requests for which the `udpCollectionTrigger` is set to `never` will be collected in a buffer until a trigger arrives that starts the data transmission.

The following trigger options are supported:

- a message needs to be transmitted for which the `udpCollectionTrigger` is set to `always`.
- the `udpCollectionBufferTimeout` is reached for a message.
- the buffer size defined by the attribute `udpCollectionBufferSizeThreshold` is reached.

]

The modeling of the `RequiredSomeipServiceInstance`-related event-properties and method-properties is depicted in [Figure 13.20](#).

13.3.1.3 Provided Service Instance with static remote peers

[TPS_MANI_03312] Static configuration of remote peer addresses for a `ProvidedSomeipServiceInstance` [AUTOSAR supports a static configuration of remote

peers for a `ProvidedSomeipServiceInstance` that is mapped with a `SomeipServiceInstanceToMachineMapping` to an `ApApplicationEndpoint` with the `remoteUnicastConfig`.]

If such `SomeipRemoteUnicastConfig` is referenced by the `SomeipServiceInstanceToMachineMapping` then the Service Discovery mechanism is not used and the address of the remote peers is retrieved from the configuration.

This allows to establish a communication connection between the local address (defined by the `ApApplicationEndpoint` and the `NetworkEndpoint`) and the configured remote address that is defined by the referenced `SomeipRemoteUnicastConfig`.

Please note that a collection of remote peers can be defined if the `SomeipServiceInstanceToMachineMapping` references a `ProvidedSomeipServiceInstance` in the role `serviceInstance`.

In this case a communication connection to each of the configured remote peer addresses will be established. The `ProvidedSomeipServiceInstance` will transmit event and field notifications to the address that is defined in the `SomeipRemoteUnicastConfig`.

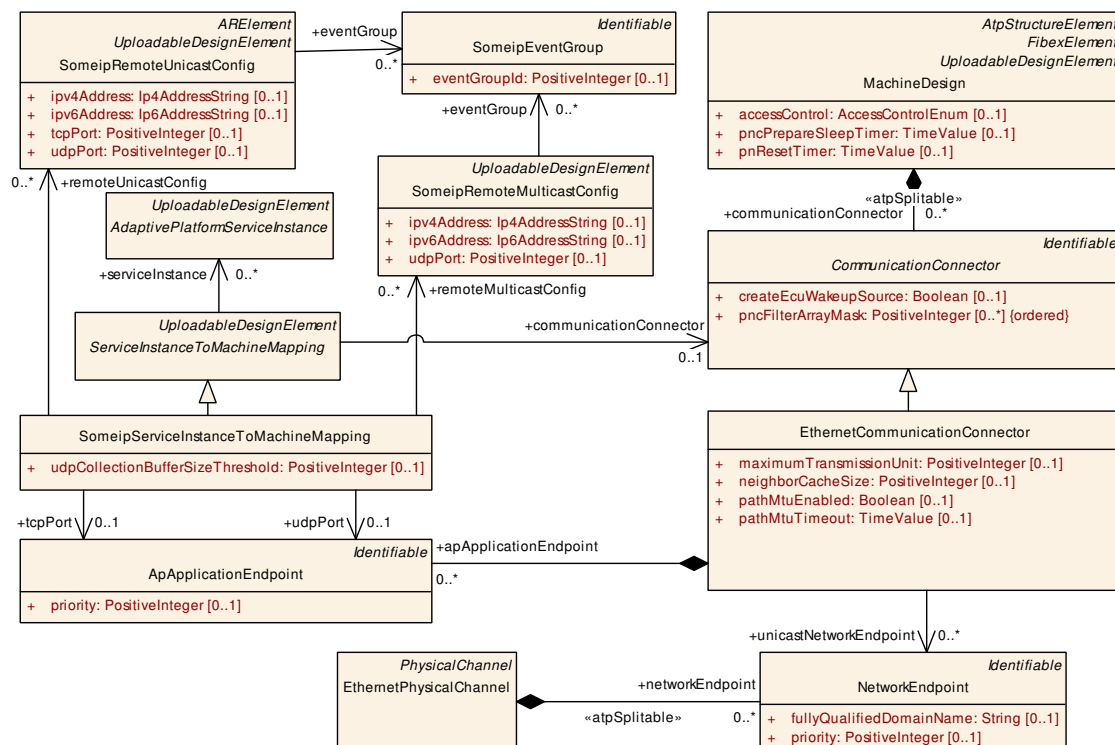


Figure 13.25: SomeipServiceInstanceToMachineMapping with static configured remote peers

Class	SomeipRemoteUnicastConfig			
Note	This meta-class is used to statically configure the remote peer's unicast address in case that a static service connection is used and only a single remote peer exists. Tags: atp.Status=candidate atp.recommendedPackage=SomeipRemoteUnicastConfigs This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
eventGroup	SomeipEventGroup	*	ref	Reference to the SomeipEventGroups this Someip RemoteUnicastConfig applies to. Tags: atp.Status=candidate
ipv4Address	Ip4AddressString	0..1	attr	This attribute defines the IPv4 address of the remote peer to allow a static service connection between Service Provider and Service Consumer. Tags: atp.Status=candidate
ipv6Address	Ip6AddressString	0..1	attr	This attribute defines the IPv6 address of the remote peer to allow a static service connection between Service Provider and Service Consumer. Tags: atp.Status=candidate
tcpPort	PositiveInteger	0..1	attr	This attribute defines the tcpPort of the remote peer to allow a static service connection between Service Provider and Service Consumer. Tags: atp.Status=candidate
udpPort	PositiveInteger	0..1	attr	This attribute defines the udpPort of the remote peer to allow a static service connection between Service Provider and Service Consumer. Tags: atp.Status=candidate

Table 13.55: SomeipRemoteUnicastConfig

[constr_5355] [SomeipServiceInstanceToMachineMapping](#) with configured remote peer addresses shall not mix [ProvidedSomeipServiceInstances](#) and [RequiredSomeipServiceInstances](#)

Imposition time: [IT_Mani](#)

[A [SomeipServiceInstanceToMachineMapping](#) that contains a reference to a [SomeipRemoteUnicastConfig](#) with the [remoteUnicastConfig](#) shall not reference:

- [ProvidedSomeipServiceInstances](#) in the role [serviceInstance](#) and
- [RequiredSomeipServiceInstances](#) in the role [serviceInstance](#) at the same time.

]

[TPS_MANI_03313] Semantics of [SomeipRemoteUnicastConfig.eventGroup](#) reference [For each remote peer that is specified with the [SomeipRemoteUnicastConfig](#) it is possible to statically define the [SomeipEventGroups](#) that the remote peer is interested in with the [SomeipRemoteUnicastConfig.eventGroup](#) reference.]

With the `SomeipRemoteUnicastConfig.eventGroup` information each service provider has the knowledge from the configuration to which service consumers which event notifications need to be transmitted.

An example for the static configuration of a `ProvidedSomeipServiceInstance` with remote peers can be found in [Chapter B.2.6.1](#).

13.3.1.4 Required Service Instance with static remote peers

[TPS_MANI_03314] Static configuration of a remote peer address for a `RequiredSomeipServiceInstance` [AUTOSAR supports a static configuration of a remote peer for a `RequiredSomeipServiceInstance` that is mapped with a `SomeipServiceInstanceToMachineMapping` to an `ApApplicationEndpoint` with the `remoteUnicastConfig`.]

With the static configuration of a remote peer the `RequiredSomeipServiceInstance` knows the address of the `ProvidedSomeipServiceInstance` and is able to call methods of the provided service.

[constr_5356] `RequiredSomeipServiceInstance` is allowed to have only a single statically configured remote peer as service provider

Imposition time: IT_Mani

[A `SomeipServiceInstanceToMachineMapping` that contains references to a `RequiredSomeipServiceInstance` with the `serviceInstance` is allowed to reference only a single `SomeipRemoteUnicastConfig` in the role `remoteUnicastConfig`.]

Since the service provider may transport event notification via IP Multicast, the service consumer needs to know the IP Multicast groups it needs to join:

[TPS_MANI_03315] Semantics of `SomeipRemoteMulticastConfig` [It is possible to statically define the IP Multicast addresses that the `RequiredSomeipServiceInstances` shall listen to with the `SomeipRemoteMulticastConfig` element that is referenced in the `remoteMulticastConfig` role by the `SomeipServiceInstanceToMachineMapping` that references the `RequiredSomeipServiceInstances` in the role `serviceInstance`.]

Class	SomeipRemoteMulticastConfig
Note	This meta-class is used to statically configure the remote peer's multicast address. Tags: atp.Status=candidate atp.recommendedPackage=RemoteMulticastConfigs This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement





Class	SomeipRemoteMulticastConfig			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
eventGroup	SomeipEventGroup	*	ref	Reference to the SomeipEventGroups this Someip RemoteMulticastConfig applies to. Tags: atp.Status=candidate
ipv4Address	Ip4AddressString	0..1	attr	This attribute defines the multicast IPv4 address to allow a static service connection between Service Provider and Service Consumers. Tags: atp.Status=candidate
ipv6Address	Ip6AddressString	0..1	attr	This attribute defines the multicast IPv6 address to allow a static service connection between Service Provider and Service Consumers. Tags: atp.Status=candidate
udpPort	PositiveInteger	0..1	attr	This attribute defines the udpPort used for the multicast communication. Tags: atp.Status=candidate

Table 13.56: SomeipRemoteMulticastConfig

[TPS_MANI_03316] Semantics of [SomeipRemoteMulticastConfig.eventGroup](#) [For each Multicast group that is specified with the [SomeipRemoteMulticastConfig](#), it is possible to statically define the [eventGroups](#) that include events that may be transmitted from the configured remote peer to the configured IP Multicast address.]

[constr_5357] [SomeipRemoteMulticastConfig](#) shall only be used on required side

Imposition time: [IT_Mani](#)

[Only a [SomeipServiceInstanceToMachineMapping](#) that contains references to one or several [RequiredSomeipServiceInstances](#) with the [serviceInstance](#) role is allowed to reference one or several [SomeipRemoteMulticastConfigs](#) in the role [remoteUnicastConfig](#).]

An example for the static configuration of a [RequiredSomeipServiceInstance](#) with remote peers can be found in [Chapter B.2.6.2](#).

13.3.2 DDS Service Instance Deployment

In the case of DDS used as the transport layer the derived meta-classes are [DdsProvidedServiceInstance](#) or [DdsRequiredServiceInstance](#). These meta-classes also carry attributes that apply for the service discovery on DDS.

Two discovery protocols are supported by the DDS Network binding:

- Service Instance announcement via purpose-specific formatting of the Domain Participant USER_DATA QoS policy
- Service Instance announcement through a purpose-specific discovery Topic.

For details on these two protocols and their implications, please refer to section 7.7.3 “DDS Network Binding” in [23, SWS Communication Management].

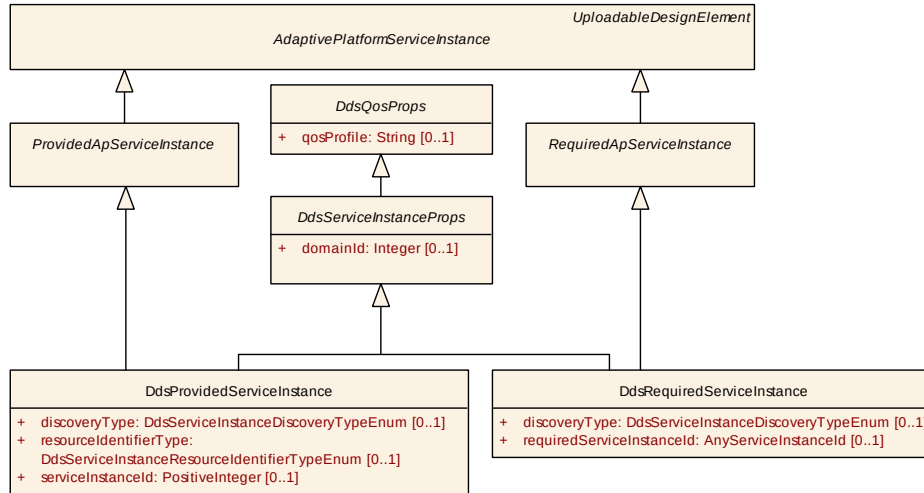


Figure 13.26: Dds Service Instances

Class	<i>DdsQosProps</i> (abstract)			
Note	QoS configuration properties for the DDS entities associated with an event, method, or field provided by or requested from a Service Instance using DDS as the underlying network binding. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i>			
Subclasses	DdsEventQosProps , DdsFieldQosProps , DdsServiceInstanceProps			
Attribute	Type	Mult.	Kind	Note
qosProfile	String	0..1	attr	Identifies a group of QoS Policies that apply to the DDS entities associated with the event, method, field, or the service instance.

Table 13.57: DdsQosProps

Class	<i>DdsServiceInstanceProps</i> (abstract)			
Note	Common configuration properties for the DDS entities provided by or requested from a Service Instance using DDS as the underlying network binding. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i> , DdsQosProps			
Subclasses	DdsProvidedServiceInstance , DdsRequiredServiceInstance			
Attribute	Type	Mult.	Kind	Note
domainId	Integer	0..1	attr	This attribute identifies the DDS Domain the Service Instance shall join.

Table 13.58: DdsServiceInstanceProps

[constr_10223] Multiplicity of attribute [DdsServiceInstanceProps.domainId](#)

Imposition time: [IT_Mani](#)

[For each [DdsServiceInstanceProps](#), the attribute [domainId](#) shall exist.]

13.3.2.1 Provided DDS Service Instance

[TPS_MANI_03527] Definition of `DdsProvidedServiceInstance` [The `DdsProvidedServiceInstance` configures the Service to join a DDS Domain with the `domainId` attribute, and to instantiate the underlying DDS entities according to a QoS profile with the `qosProfile` attribute, using the discovery protocol defined by `discoveryType` and resource identification scheme defined by the `resourceIdentifierType` attribute.]

Moreover, it assigns an Instance ID to the Service for deployment with the `serviceInstanceId` attribute.]

[TPS_MANI_03650] Definition of `DdsServiceInstanceResourceIdentifierTypeEnum` [The resource identification schemes enumerated by `DdsServiceInstanceResourceIdentifierTypeEnum` in `DdsProvidedServiceInstance`. `resourceIdentifierType` attribute define the various combinations of DDS features through which Provided Service Interface Instances can advertise, be bound, and communicate on a given DDS domain, as defined by section 7.7.3 “DDS Network Binding” of [23, SWS Communication Management].]

[constr_3528] Value range of `DdsServiceInstanceProps.domainId`

Imposition time: `IT_Mani`

[The value of attribute `DdsServiceInstanceProps.domainId` at `DdsProvidedServiceInstance` and `domainId` at `DdsRequiredServiceInstance` shall be in the range of a signed 32-bit integer.]

[constr_3529] Value range of `DdsProvidedServiceInstance.serviceInstanceId`

Imposition time: `IT_Mani`

[The value of attribute `DdsProvidedServiceInstance.serviceInstanceId` shall be in the range of 0..65535.]

[constr_3541] `qosProfile` mandatory for `DdsProvidedServiceInstance`

Imposition time: `IT_Mani`

[The attribute `qosProfile` shall be defined for every `DdsProvidedServiceInstance`.]

[constr_3645] `discoveryType` mandatory for `DdsProvidedServiceInstance`

Imposition time: `IT_Mani`

[The attribute `discoveryType` shall be defined for every `DdsProvidedServiceInstance`.]

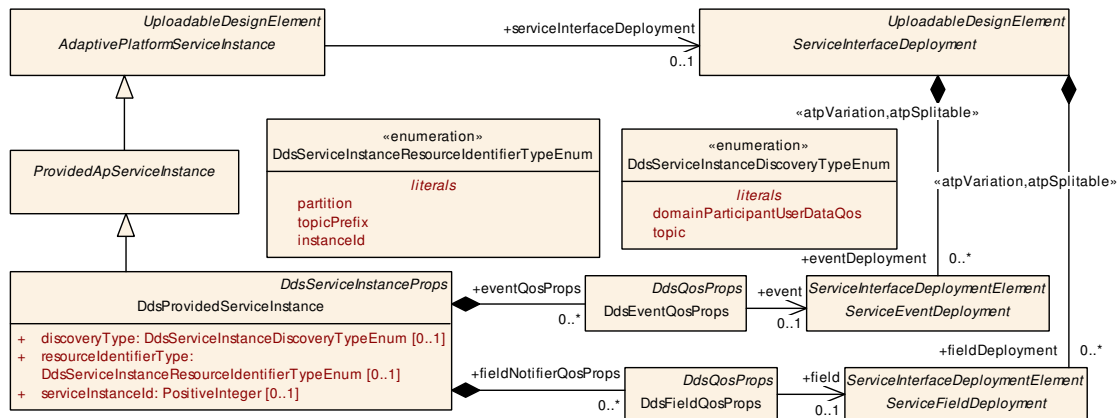


Figure 13.27: Provided Dds Service Instances

[constr_3646] resourceIdentifierType mandatory for DdsProvidedServiceInstance

Imposition time: IT_Mani

[The attribute `resourceIdentifierType` shall be defined for every `DdsProvidedServiceInstance`.]

[constr_3647] resourceIdentifierType value for USER_DATA QoS-based discovery

Imposition time: IT_Mani

[If the value of `discoveryType` is `domainParticipantUserDataQos`, for a given `DdsProvidedServiceInstance`, the only valid value for attribute `resourceIdentifierType` is `partition`.]

[constr_3564] Consistency between DDS Service Interface Deployment and Provided DDS Service Instance

Imposition time: IT_Mani

[Transport attributes `DdsServiceInterfaceDeployment.transportProtocol` and `DdsEventDeployment.transportProtocol` shall be consistent with DDS profiles generated and selected by the `DdsQosProps` component of `DdsProvidedServiceInstance`, `DdsFieldQosProps`, and `DdsEventQosProps`.]

Class	DdsProvidedServiceInstance			
Note	This meta-class represents the ability to describe the existence and configuration of a provided service instance in a concrete implementation on top of DDS. Tags: atp.recommendedPackage=ServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObjct, AdaptivePlatformServiceInstance, CollectableElement, DdsQosProps, DdsServiceInstanceProps, Identifiable, MultilanguageReferrable, PackageableElement, ProvidedApServiceInstance, Referrable, UploadableDesignElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DdsProvidedServiceInstance			
discoveryType	DdsServiceInstanceDiscoveryTypeEnum	0..1	attr	Discovery protocol.
eventQosProps	DdsEventQosProps	*	aggr	List of configuration properties for the Events that are provided by the Service Instance.
fieldNotifierQosProps	DdsFieldQosProps	*	aggr	List of configuration properties for Field notifiers that are provided by the Service Instance.
resourceIdentifierType	DdsServiceInstanceResourceIdentifierTypeEnum	0..1	attr	Type of resource identification scheme.
serviceInstanceId	PositiveInteger	0..1	attr	Identification number that is used by DDS to identify DomainParticipants associated with an instance of the service.

Table 13.59: DdsProvidedServiceInstance

Enumeration	DdsServiceInstanceDiscoveryTypeEnum
Note	Supported discovery schemes for DDS Service Instances. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	DdsProvidedServiceInstance.discoveryType , DdsRequiredServiceInstance.discoveryType
Literal	Description
domainParticipantUserDataQos	The USER_DATA QoS policy is used to advertise and discover available Service Instances hosted by each Domain Participant. Tags: atp.EnumerationLiteralIndex=0
topic	A purpose-specific Topic is used to convey availability of Service Instances and how to bind against them. Tags: atp.EnumerationLiteralIndex=1

Table 13.60: DdsServiceInstanceDiscoveryTypeEnum

Enumeration	DdsServiceInstanceResourceIdentifierTypeEnum
Note	Supported Resource Identification schemes for DDS Service Instances. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	DdsProvidedServiceInstance.resourceIdentifierType
Literal	Description
instanceId	In-band instance identification fields are used to discriminate samples related to specific Service Instances sharing the same DDS Topics • Partitions: - • Topics: ara.com://services/<InterfaceId>/<Major>.<<Minor>/<TopicName> Tags: atp.EnumerationLiteralIndex=2
partition	The DDS PARTITION QoS policy is used to isolate DDS Topics related to specific Service Instances • Partitions: ara.com://services/<InterfaceId>/<InstanceId> • Topics: ara.com://services/<InterfaceId>/<Major>.<Minor>/<TopicName> Tags: atp.EnumerationLiteralIndex=0
topicPrefix	Unique prefixes are assigned to DDS Topics related to specific Service Instances • Partitions: - • Topics: ara.com://services/<InterfaceId>/<InstanceId>/<TopicName> Tags: atp.EnumerationLiteralIndex=1

Table 13.61: DdsServiceInstanceResourceIdentifierTypeEnum

[TPS_MANI_03528] Definition of [DdsProvidedServiceInstance.eventQosProps](#) [The [DdsProvidedServiceInstance.eventQosProps](#) configures

the DDS entities associated with the `event` according to a QoS Profile specified with the `qosProfile` attribute.]

[TPS_MANI_03531] `qosProfile` of `DdsProvidedServiceInstance.eventQosProps` is optional [The attribute `qosProfile` of `DdsProvidedServiceInstance.eventQosProps` is optional; if `qosProfile` is not defined, the underlying DDS entities shall be configured according to the `qosProfile` attribute of the parent `DdsProvidedServiceInstance`.]

[TPS_MANI_03561] Definition of `DdsProvidedServiceInstance.fieldNotifierQosProps` [The `DdsProvidedServiceInstance.fieldNotifierQosProps` configures the DDS entities associated with the `field` according to a QoS Profile specified with the `qosProfile` attribute.]

Class	DdsEventQosProps			
Note	Configuration properties of the Event using DDS as the underlying network binding. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, DdsQosProps			
Aggregated by	DdsProvidedServiceInstance.eventQosProps , DdsRequiredServiceInstance.eventQosProps			
Attribute	Type	Mult.	Kind	Note
event	ServiceEventDeployment	0..1	ref	Reference to an event that is provided.

Table 13.62: DdsEventQosProps

[constr_10224] Multiplicity of reference in the role `DdsEventQosProps.event`

Imposition time: `IT_Mani`

[For each `DdsEventQosProps`, the reference in the role `event` shall exist.]

[TPS_MANI_03562] `qosProfile` of `DdsProvidedServiceInstance.fieldNotifierQosProps` is optional [The attribute `qosProfile` of `DdsProvidedServiceInstance.fieldNotifierQosProps` is optional; if `qosProfile` is not defined, the underlying DDS entities shall be configured according to the `qosProfile` attribute of the parent `DdsProvidedServiceInstance`.]

Class	DdsFieldQosProps			
Note	Configuration properties of the Field interaction when using DDS as the underlying network binding. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, DdsQosProps			
Aggregated by	DdsProvidedServiceInstance.fieldNotifierQosProps , DdsRequiredServiceInstance.fieldNotifierQosProps			
Attribute	Type	Mult.	Kind	Note
field	ServiceFieldDeployment	0..1	ref	Reference to the field.

Table 13.63: DdsFieldQosProps

[constr_10225] Multiplicity of reference in the role **DdsFieldQosProps.field**

Imposition time: *IT_Mani*

[For each **DdsFieldQosProps**, the reference in the role **field** shall exist.]

13.3.2.2 Required DDS Service Instance

[TPS_MANI_03529] Definition of **DdsRequiredServiceInstance** [The **DdsRequiredServiceInstance** configures the Client to join a DDS Domain with the **domainId** attribute, and to instantiate the underlying DDS entities according to a QoS Profile with the **qosProfile** attribute, using the discovery protocol defined by **discoveryType**. Optionally, the **requiredServiceInstanceId** attribute allows a Client to search for a specific Instance ID of the serviceInterface.]

[constr_3542] **qosProfile** mandatory for **DdsRequiredServiceInstance**

Imposition time: *IT_Mani*

[The attribute **qosProfile** shall be defined for every **DdsRequiredServiceInstance**.]

[constr_3648] **discoveryType** mandatory for **DdsRequiredServiceInstance**

Imposition time: *IT_Mani*

[The attribute **discoveryType** shall be defined for every **DdsRequiredServiceInstance**.]

[constr_3565] Consistency between DDS Service Interface Deployment and Required DDS Service Instance

Imposition time: *IT_Mani*

[Transport attributes **DdsServiceInterfaceDeployment.transportProtocol** and **DdsEventDeployment.transportProtocol** shall be consistent with DDS profiles generated and selected by the **DdsQosProps** component of **DdsRequiredServiceInstance**, **DdsFieldQosProps**, and **DdsEventQosProps**.]

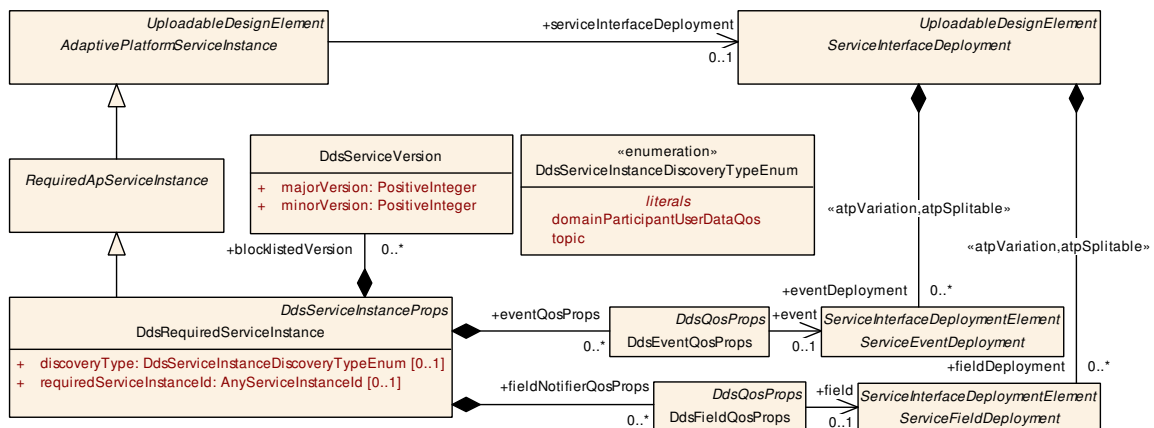


Figure 13.28: Required Dds Service Instances

Class	DdsRequiredServiceInstance			
Note	This meta-class represents the ability to describe the existence and configuration of a required service instance in a concrete implementation on top of DDS. Tags: atp.recommendedPackage=ServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , DdsQosProps , DdsServiceInstanceProps , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , RequiredApServiceInstance , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
blocklistedVersion	DdsServiceVersion	*	aggr	Collection of blocklisted versions.
discoveryType	DdsServiceInstanceDiscoveryTypeEnum	0..1	attr	Discovery protocol.
eventQosProps	DdsEventQosProps	*	aggr	List of configuration properties for the Events that are required by the Service Instance.
fieldNotifierQosProps	DdsFieldQosProps	*	aggr	List of configuration properties for Field notifiers that are required by the Service Instance.
requiredServiceInstanceld	AnyServiceInstanceld	0..1	attr	This attribute represents the ability to describe the required service instance ID.

Table 13.64: DdsRequiredServiceInstance

Class	DdsServiceVersion			
Note	Definition of a Dds service version. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	DdsRequiredServiceInstance.blocklistedVersion			
Attribute	Type	Mult.	Kind	Note
majorVersion	PositiveInteger	1	attr	Service major version. Tags: xml.sequenceOffset=10
minorVersion	PositiveInteger	1	attr	Service minor version. Tags: xml.sequenceOffset=20

Table 13.65: DdsServiceVersion

[TPS_MANI_03530] Definition of [DdsRequiredServiceInstance.eventQosProps](#) [The [DdsRequiredServiceInstance.eventQosProps](#) configures the DDS entities responsible for subscribing to an [event](#) according to a QoS Profile specified with the [qosProfile](#) attribute.]

[TPS_MANI_03532] [qosProfile](#) of [DdsRequiredServiceInstance.eventQosProps](#) is optional [The attribute [qosProfile](#) of [DdsRequiredServiceInstance.eventQosProps](#) is optional; if [qosProfile](#) is not defined, the underlying DDS entities shall be configured according to the [qosProfile](#) attribute of the parent [DdsRequiredServiceInstance](#).]

[TPS_MANI_03567] Definition of [DdsRequiredServiceInstance.fieldNotifierQosProps](#) [The [DdsRequiredServiceInstance.fieldNotifierQosProps](#) configures the DDS entities associated with the [field](#) according to a QoS Profile specified with the [qosProfile](#) attribute.]

[TPS_MANI_03568] **qosProfile** of **DdsRequiredServiceInstance.fieldNotifierQosProps** is optional [The attribute **qosProfile** of **DdsRequiredServiceInstance.fieldNotifierQosProps** is optional; if **qosProfile** is not defined, the underlying DDS entities shall be configured according to the **qosProfile** attribute of the parent **DdsRequiredServiceInstance**.]

13.3.2.3 DDS Service Instance to Machine mapping

The **DdsServiceInstanceToMachineMapping** defines on which network / VLAN the DDS communication shall be deployed.

[TPS_MANI_03533] **DdsServiceInstanceToMachineMapping** [The **DdsServiceInstanceToMachineMapping** defines for a specific **serviceInstance** (either **DdsProvidedServiceInstance** or **DdsRequiredServiceInstance**) on which network the communication shall be done using the reference **communicationConnector** to **CommunicationConnector**.]

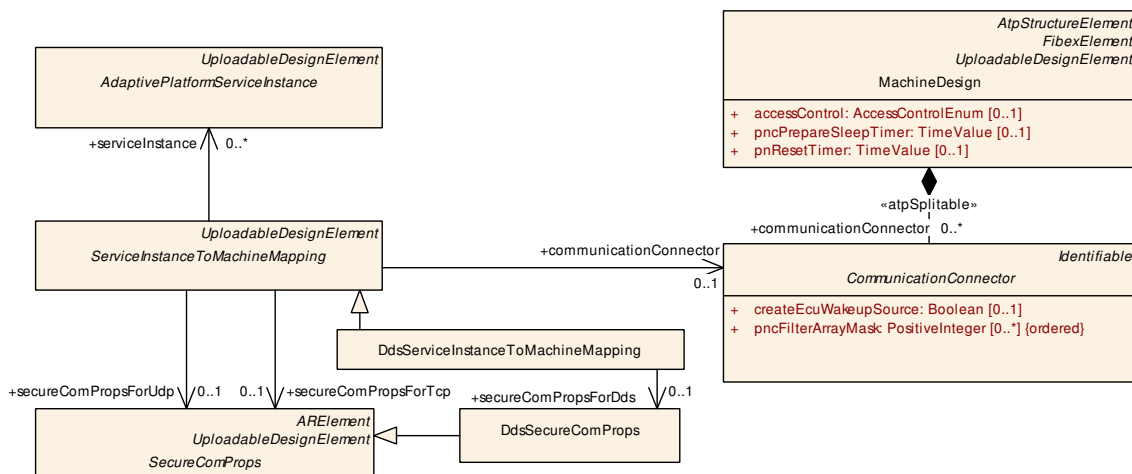


Figure 13.29: Dds Service Instance to Machine mapping

[constr_3684] Mutual exclusivity of Secure Communication Properties

Imposition time: IT_Mani

[The attributes **ServiceInstanceToMachineMapping.secOcComPropsForMulticast** and **DdsServiceInstanceToMachineMapping.secureComPropsForDds** are mutually exclusive, meaning zero or just one of them shall be set depending on whether no security, SecOC, or DDS Security is chosen as data-level security (optionally) above transport-level security.]

Class	DdsServiceInstanceToMachineMapping			
Note	This meta-class allows to map DdsServiceInstances to a CommunicationConnector of a Machine. Tags: atp.recommendedPackage=ServiceInstanceToMachineMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , ServiceInstanceToMachineMapping , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
secureCom PropsForDds	DdsSecureComProps	0..1	ref	Reference to SecureComProps applicable to the service instance.

Table 13.66: DdsServiceInstanceToMachineMapping

13.3.3 User Defined Service Instance Deployment

[TPS_MANI_03032] Description of middleware technologies not standardized by AUTOSAR [The elements [ProvidedUserDefinedServiceInstance](#) and [RequiredUserDefinedServiceInstance](#) can be used to describe alternative middleware technologies that are not standardized by AUTOSAR.]

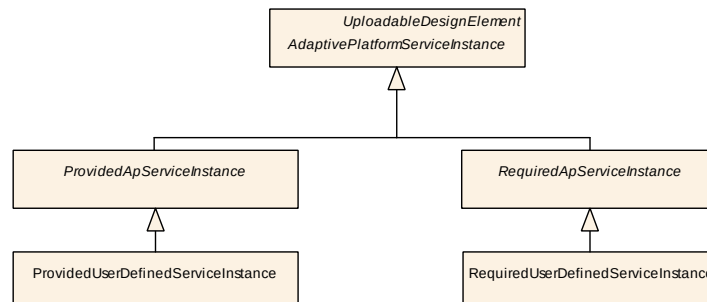


Figure 13.30: User Defined Service Instance Deployment

Please note that both elements [ProvidedUserDefinedServiceInstance](#) and [RequiredUserDefinedServiceInstance](#) are [Identifiable](#) and therefore are able to describe special data ([sdg](#)) which is not represented by the standard model.

Class	ProvidedUserDefinedServiceInstance			
Note	This meta-class represents the ability to describe the existence and configuration of a provided service instance in a concrete implementation that is not standardized by AUTOSAR. Tags: atp.recommendedPackage=ServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , ProvidedApServiceInstance , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 13.67: ProvidedUserDefinedServiceInstance

Class	RequiredUserDefinedServiceInstance			
Note	This meta-class represents the ability to describe the existence and configuration of a required service instance in a concrete implementation that is not standardized by AUTOSAR. Tags: atp.recommendedPackage=ServiceInstances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , AdaptivePlatformServiceInstance , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , RequiredApServiceInstance , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.68: RequiredUserDefinedServiceInstance

13.3.4 Service Deployment Relations

The meta-model is set up in a way that it is in general possible to create a relation between different sub-classes of

- [ServiceInterfaceDeployment](#)
- [AdaptivePlatformServiceInstance](#)
- [ServiceInstanceToMachineMapping](#)

For example, from the formal point of view, it would be possible to let a [UserDefinedServiceInstanceToMachineMapping](#) reference a [DdsProvidedServiceInstance](#) that in turn references a [SomeipServiceInterfaceDeployment](#). But it is obviously questionable whether such a combination makes sense in a real-world model.

The consequence of the modeling is therefore that the possible combinations of the three mentioned meta-classes need to be regulated by a constraint.

[constr_3641] Allowed combinations of `ServiceInterfaceDeployment`, `AdaptivePlatformServiceInstance`, `ServiceInstanceToMachineMapping`*Imposition time:* `IT_Mani`

	<code>DdsProvidedServiceInstance</code>	<code>ProvidedSomeipServiceInstance</code>	<code>ProvidedUserDefinedServiceInstance</code>	<code>DdsRequiredServiceInstance</code>	<code>RequiredSomeipServiceInstance</code>	<code>RequiredUserDefinedServiceInstance</code>
<code>DdsServiceInterfaceDeployment</code>	Yes	No	Yes	Yes	No	Yes
<code>SomeipServiceInterfaceDeployment</code>	No	Yes	Yes	No	Yes	Yes
<code>UserDefinedServiceInterfaceDeployment</code>	No	No	Yes	No	No	Yes
<code>DdsServiceInstanceToMachineMapping</code>	Yes	No	No	Yes	No	No
<code>SomeipServiceInstanceToMachineMapping</code>	No	Yes	No	No	Yes	No
<code>UserDefinedServiceInstanceToMachineMapping</code>	No	Yes	Yes	No	Yes	Yes

13.4 EndToEndProtection

AUTOSAR supports the protection of `events`, `methods`, `Field notifier`s, `Field get` methods and `Field set` methods with E2E Profiles that are defined in the E2E Communication Protection Library, see [40, SWS E2E Library].

[TPS_MANI_03127] Usage of `End2EndEventProtectionProps` [The `End2EndEventProtectionProps` element is used to define `event` specific E2E configuration settings in the context of an `AdaptivePlatformServiceInstance`.]

Please note that the E2E protection of a `field notifier` is possible with the `End2EndEventProtectionProps.event` reference since each specific `Service-FieldDeployment` element aggregates a `ServiceEventDeployment` in the role `notifier`.

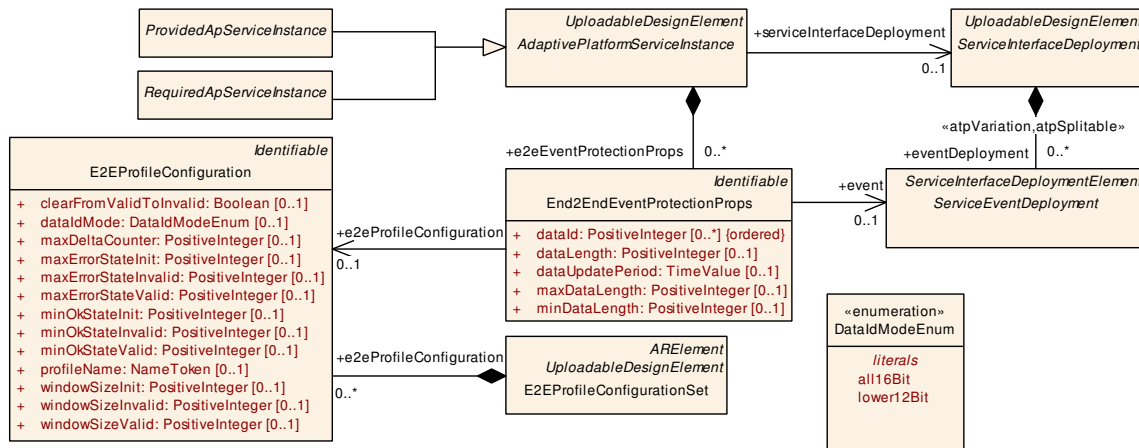


Figure 13.31: E2E EventProtection

If such an aggregated [ServiceEventDeployment](#) is referenced with the [End2EndEventProtectionProps.event](#) reference the E2E protection settings are valid for the `notifier` that is embedded by the [ServiceFieldDeployment](#).

Since the [End2EndEventProtectionProps](#) element is aggregated by the abstract [AdaptivePlatformServiceInstance](#) it can be used to describe the End-to-End protection on specific derived classes like [ProvidedSomeipServiceInstance](#) or [RequiredSomeipServiceInstance](#) that fit the underlying middleware.

With this approach it is possible to define different End-to-End protection settings for different used transport layer mechanisms in case of Multi-Binding.

[TPS_MANI_03228] Usage of [End2EndMethodProtectionProps](#) [The [End2EndMethodProtectionProps](#) element is used to define `method` specific E2E configuration settings in the context of an [AdaptivePlatformServiceInstance](#).]

Please note that the E2E protection of field `get` and `set` methods is possible with the [End2EndMethodProtectionProps.method](#) reference since each specific [ServiceFieldDeployment](#) element is allowed to aggregate a [ServiceMethodDeployment](#) in the role `get` and/or `set`.

If such an aggregated [ServiceMethodDeployment](#) is referenced with the [End2EndMethodProtectionProps.method](#) reference the E2E protection settings are valid for the `get` or `set` method that is embedded by the [ServiceFieldDeployment](#).

[TPS_MANI_03129] E2E profile [The E2E profile is defined by [E2EProfileConfiguration.profileName](#).]



Figure 13.32: E2E MethodProtection

[TPS_MANI_03130] Standardized values of the attribute `E2EProfileConfiguration.profileName` [The `E2EProfileConfiguration.profileName` that is referenced by an `End2EndEventProtectionProps` or by an `End2EndMethodProtectionProps` can have the following values that are standardized by AUTOSAR: `PROFILE_04`, `PROFILE_05`, `PROFILE_06`, `PROFILE_07`, `PROFILE_08`, `PROFILE_11`, `PROFILE_22`, `PROFILE_04m`, `PROFILE_07m`, `PROFILE_44`, `PROFILE_08m`, and `PROFILE_44m`.]

[TPS_MANI_03131] Non-Standardized values of attribute `E2EProfileConfiguration.profileName` [The values for the `profileName` of `E2EProfileConfiguration` mentioned in [TPS_MANI_03130] are standardized and reserved for being used in the way the AUTOSAR standard foresees.

`PROFILE_01` and `PROFILE_02` are also reserved by AUTOSAR but excluded for usage on the *AUTOSAR adaptive Platform*. In addition, it is positively possible to use other than the standardized values for the `profileName`.]

[TPS_MANI_03128] Usage of same `End2EndEventProtectionProps.dataId` in case of Multi-Binding [In case of Multi-Binding, i.e. if different `AdaptivePlatformServiceInstances` exist that are mapped by `ServiceInstanceToPortPrototypeMapping` to the same `PortPrototype`, the different `AdaptivePlatformServiceInstances` may contain the same `dataId` for the same event.]

In other words, if a `PortPrototype` contains two transport layer bindings, e.g. a `ProvidedSomeipServiceInstance` and a `ProvidedUserDefinedServiceInstance` representing an IPC communication, then an `event` is allowed to be protected with the same `dataId` in both `AdaptivePlatformServiceInstances` because the two `AdaptivePlatformServiceInstances` effectively represent the identical piece of data.

[TPS_MANI_03229] Usage of same [End2EndMethodProtectionProps.dataId](#) in case of Multi-Binding [In case of Multi-Binding, i.e. if different [AdaptivePlatformServiceInstances](#) exist that are mapped by [ServiceInstanceToPortPrototypeMapping](#) to the same [PortPrototype](#), the different [AdaptivePlatformServiceInstances](#) may contain the same [dataId](#) for the same [method](#).]

In other words if a [PortPrototype](#) contains two transport layer bindings, e.g. a [ProvidedSomeipServiceInstance](#) and a [ProvidedUserDefinedServiceInstance](#) representing an IPC communication then a [method](#) is allowed to be protected with the same [dataId](#) in both [AdaptivePlatformServiceInstances](#).

[TPS_MANI_03252] Usage of same [End2EndMethodProtectionProps.sourceId](#) in case of Multi-Binding [In case of Multi-Binding, i.e. if different [AdaptivePlatformServiceInstances](#) exist that are mapped by [ServiceInstanceToPortPrototypeMapping](#) to the same [PortPrototype](#), the different [AdaptivePlatformServiceInstances](#) may contain the same [sourceId](#) (for the same and even for a different [method](#)).]

In other words if a [PortPrototype](#) contains two transport layer bindings, e.g. a [ProvidedSomeipServiceInstance](#) and a [ProvidedUserDefinedServiceInstance](#) representing an IPC communication then a single as well as different [methods](#) are allowed to be protected with the same [sourceId](#) in both [AdaptivePlatformServiceInstances](#).

Class	End2EndEventProtectionProps			
Note	This element allows to protect an event or a field notifier with an E2E profile. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AdaptivePlatformServiceInstance.e2eEventProtectionProps			
Attribute	Type	Mult.	Kind	Note
dataId (ordered)	PositiveInteger	*	attr	This represents a unique numerical identifier for the referenced event or field notifier that is included in the CRC calculation. Note: ID is used for protection against masquerading. The details concerning the maximum number of values (this information is specific for each E2E profile) applicable for this attribute are controlled by a semantic constraint that depends on the category of the EndToEnd Protection.
dataLength	PositiveInteger	0..1	attr	Length of payload including E2E header in bits.
dataUpdate Period	TimeValue	0..1	attr	This attribute describes the period in which the applications are assumed to process E2E-protected messages. The middleware does not use this attribute at all.
e2eProfile Configuration	E2EProfileConfiguration	0..1	ref	Reference to E2E profile configuration settings that are valid to protect the referenced event or field notifier.
event	ServiceEvent Deployment	0..1	ref	Reference to an event that is protected by the E2E profile.
maxDataLength	PositiveInteger	0..1	attr	Maximum length of payload including E2E header in bits.
minDataLength	PositiveInteger	0..1	attr	Minimum length of payload including E2E header in bits.

Table 13.69: End2EndEventProtectionProps

Class	End2EndMethodProtectionProps			
Note	This element allows to protect a method, a field setter or a field getter with an E2E profile. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AdaptivePlatformServiceInstance.e2eMethodProtectionProps			
Attribute	Type	Mult.	Kind	Note
dataId (ordered)	PositiveInteger	*	attr	This represents a numerical identifier that is included in the CRC calculation. This dataId is used for call and response. Note: ID is used for protection against masquerading. The details concerning the maximum number of values (this information is specific for each E2E profile) applicable for this attribute are controlled by a semantic constraint that depends on the category of the EndToEnd Protection.
dataLength	PositiveInteger	0..1	attr	Length of payload including E2E header in bits.
dataUpdate Period	TimeValue	0..1	attr	This attribute describes the period in which the applications are assumed to process E2E-protected messages. The middleware does not use this attribute at all.
e2eProfile Configuration	E2EProfileConfiguration	0..1	ref	Reference to E2E profile configuration settings that are valid to protect the referenced method, field getter or field setter.
maxDataLength	PositiveInteger	0..1	attr	Maximum length of payload including E2E header in bits.
method	ServiceMethod Deployment	0..1	ref	Reference to a method, a field getter or a field setter that is protected by the E2E profile.
minDataLength	PositiveInteger	0..1	attr	Minimum length of payload including E2E header in bits.
sourceId	PositiveInteger	0..1	attr	This represents a unique numerical identifier identifying the source of a certain transmission. In case of C/S communication, this ID uniquely identifies the client. Note: ID is used for protection against masquerading. The details concerning the maximum number of values (this information is specific for each E2E profile) applicable for this attribute are controlled by a semantic constraint that depends on the category of the EndToEnd Protection.

Table 13.70: End2EndMethodProtectionProps

Class	E2EProfileConfigurationSet			
Note	This meta-class represents the ability to aggregate a collection of E2EProfileConfigurations. Tags: atp.recommendedPackage=E2EProfileConfigurationSets This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , Packageable Element , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
e2eProfile Configuration	E2EProfileConfiguration	*	aggr	This represents the collection of E2EProfileConfigurations aggregated at the E2EProfileConfigurationSet.

Table 13.71: E2EProfileConfigurationSet

Class	E2EProfileConfiguration			
Note	This element holds E2E profile specific configuration settings. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			





Class	E2EProfileConfiguration			
Aggregated by	E2EProfileConfigurationSet.e2eProfileConfiguration			
Attribute	Type	Mult.	Kind	Note
clearFromValidToInvalid	Boolean	0..1	attr	Clear monitoring window on transition from state Valid to state Invalid.
dataIdMode	DataIdModeEnum	0..1	attr	This attribute describes the inclusion mode that is used to include the implicit Data ID in the one-byte CRC.
e2eProfileCompatibilityProps	E2EProfileCompatibilityProps	0..1	ref	Reference to additional settings for the E2E state machine.
maxDeltaCounter	PositiveInteger	0..1	attr	Maximum allowed difference between two counter values of two consecutively received valid messages. For example, if the receiver gets data with counter 1 and Max DeltaCounter is 3, then at the next reception the receiver can accept Counters with values 2, 3 or 4.
maxErrorStateInit	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last Window Size checks, for the state E2E_SM_INIT.
maxErrorStateInvalid	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last Window Size checks, for the state E2E_SM_INVALID.
maxErrorStateValid	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last Window Size checks, for the state E2E_SM_VALID.
minOkStateInit	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_INIT.
minOkStateInvalid	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_INVALID.
minOkStateValid	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_VALID.
profileName	NameToken	0..1	attr	Definition of the E2E profile.
windowSizeInit	PositiveInteger	0..1	attr	Size of the monitoring window of state Init for the E2E state machine.
windowSizeInvalid	PositiveInteger	0..1	attr	Size of the monitoring window of state Invalid for the E2E state machine.
windowSizeValid	PositiveInteger	0..1	attr	Size of the monitoring window of state Valid for the E2E state machine.

Table 13.72: E2EProfileConfiguration

[constr_10226] Multiplicity of attribute **E2EProfileConfiguration.profileName**

Imposition time: IT_Mani

[For each E2EProfileConfiguration, the attribute profileName shall exist.]

Enumeration	DataIdModeEnum
Note	Supported inclusion modes to include the implicit two-byte Data ID in the one-byte CRC.
Aggregated by	E2EProfileConfiguration.dataIdMode, EndToEndTransformationDescription.dataIdMode
Literal	Description





Enumeration	DataldModeEnum
all16Bit	Two bytes are included in the CRC (double ID configuration). Tags: atp.EnumerationLiteralIndex=0
lower12Bit	The low byte is included in the implicit CRC calculation, the low nibble of the high byte is transmitted along with the data (i.e. it is explicitly included), the high nibble of the high byte is not used. This is applicable for the IDs up to 12 bits. Tags: atp.EnumerationLiteralIndex=2

Table 13.73: DataldModeEnum

Class	E2EProfileCompatibilityProps			
Note	This meta-class collects settings for configuration of the E2E state machine. Tags: atp.recommendedPackage=E2EProfileCompatibilityPropsCollection			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
combinedNoDataInitCount	Boolean	0..1	attr	E2E State machine behavior concerning counting of detected counter errors and missing messages in states NODATA and INIT - value = 0 (false) or not defined: counting of detected counter errors and missing messages in states NODATA and INIT are counted per state separated (Autosar R23-11 or former behavior) - value = 1 (true): counting of detected counter errors and missing messages in states NODATA and INIT are counted in total
transitToInvalidExtended	Boolean	0..1	attr	E2E State machine behavior concerning transition from NODATA/INIT to INVALID - value=0 (false): no direct transition from NODATA to INVALID, no transition from INIT to INVALID due to counter-related faults (Autosar R19-11 or former behavior) - value=1 (true): direct transition from NODATA to INVALID covered, transition from INIT to INVALID due to counter-related faults covered (state machine extended)

Table 13.74: E2EProfileCompatibilityProps

It is possible to overwrite the E2E state machine configuration settings that are defined in [E2EProfileConfiguration](#) at the [RPortPrototype](#) of a [SwComponentType](#) with settings available in the [ReceiverComSpec](#) as described in [TPS_MANI_03132]. With this approach it is possible to define individual E2E settings for different receivers of the event, or field notifiers.

Likewise, it is possible to overwrite the E2E state machine configuration settings that are defined in [E2EProfileConfiguration](#) at the [RPortPrototype](#) of a [SwComponentType](#) with settings available in the [ClientComSpec](#) as described in [TPS_MANI_01324].

With this approach it is possible to define individual E2E settings for different callers of a [method](#).

Finally, it is possible to overwrite the E2E state machine configuration settings that are defined in [E2EProfileConfiguration](#) at the [PPortPrototype](#) of a

`SwComponentType` with settings available in the `ServerComSpec` as described in [TPS_MANI_01325].

In `PROFILE_22`, the `dataId` is defined as a list of 16 `dataId` values, where a different value is transmitted depending on the counter value.

Please also note that the Classic Platform attributes `counterOffset`, `crcOffset` and `dataIdNibbleOffset` are not configurable on the *AUTOSAR adaptive Platform* and are set to fixed values by the AUTOSAR Standard.

[constr_3493] Applicable attributes for standardized E2E Profiles

Imposition time: IT_Mani

E2E Attributes	Root Element			Attribute Existence per Profile											
	End2EndEventProtectionProps	End2EndMethodProtectionProps	E2EProfileConfiguration	PROFILE_04	PROFILE_05	PROFILE_06	PROFILE_07	PROFILE_08	PROFILE_11	PROFILE_22	PROFILE_04m	PROFILE_07m	PROFILE_44	PROFILE_08m	PROFILE_44m
<code>dataId</code>	x	x		1	1	1	1	1	1	n	1	1	1	1	1
<code>dataLength</code>	x	x			x				x	x					
<code>minDataLength</code>	x	x		x		x	x	x			x	x	x	x	x
<code>maxDataLength</code>	x	x		x		x	x	x			x	x	x	x	x
<code>dataUpdatePeriod</code>	x	x		x	x	x	x	x	x	x	x	x	x	x	x
<code>sourceId</code>		x									x	x		x	x
<code>dataIdMode</code>			x						x						
<code>maxDeltaCounter</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>maxErrorStateInit</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>maxErrorStateInvalid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>maxErrorStateValid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>minOkStateInit</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>minOkStateInvalid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>minOkStateValid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>windowSizeValid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>windowSizeInvalid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>windowSizeInit</code>			x	x	x	x	x	x	x	x	x	x	x	x	x
<code>clearFromValidToInvalid</code>			x	x	x	x	x	x	x	x	x	x	x	x	x

[constr_5230] Attribute `E2EProfileCompatibilityProps.transitToInvalidExtended` shall exist for each `E2EProfileConfiguration`

Imposition time: `IT_Mani`

[For each `E2EProfileConfiguration`, a reference to `E2EProfileCompatibilityProps` in the role `e2eProfileCompatibilityProps` shall exist and the referenced `E2EProfileCompatibilityProps` shall define a value for the attribute `transitToInvalidExtended`.]

[constr_5250] Protection of `AdaptivePlatformServiceInstances` of the same `ServiceInterfaceDeployment`

Imposition time: `IT_Mani`

[If several `AdaptivePlatformServiceInstances` exist that are referencing the same `ServiceInterfaceDeployment` and these `AdaptivePlatformServiceInstances` contain aggregated `End2EndMethodProtectionProps` and/or `End2EndEventProtectionProps` then the `E2EProfileConfigurations` that are referenced by the `End2EndMethodProtectionProps` and `End2EndEventProtectionProps` shall have the same `profileName` defined.]

In other words it is not allowed to protect different `AdaptivePlatformServiceInstances` of the same `ServiceInterfaceDeployment` with different E2E Profiles. Please note that the `End2EndMethodProtectionProps` and/or `End2EndEventProtectionProps` in the different `AdaptivePlatformServiceInstances` are allowed to reference different `E2EProfileConfigurations` since the same E2E Profile may be configured with different E2E settings.

13.5 Secure Communication

AUTOSAR supports different protocols that provide communication security over a network. To configure the secured communication of `ServiceInterface` elements between a `ProvidedApServiceInstance` and a `RequiredApServiceInstance` the `ServiceInterfaceElementSecureComConfig` meta-class is defined.

[TPS_MANI_03133] Usage of `ServiceInterfaceElementSecureComConfig`

[The `ServiceInterfaceElementSecureComConfig` element is used to define `ServiceInterface` element specific secure communication configuration settings in the context of an `AdaptivePlatformServiceInstance`.]

The modeling allows protecting selected elements of a `ServiceInterface`, like particular `events` or `methods`.

Since the `ServiceInterfaceElementSecureComConfig` meta-class is aggregated by the abstract `AdaptivePlatformServiceInstance` it can be used to

configure the secure communication on specific derived classes like [ProvidedSomeipServiceInstance](#) or [RequiredSomeipServiceInstance](#) that fit the underlying middleware.

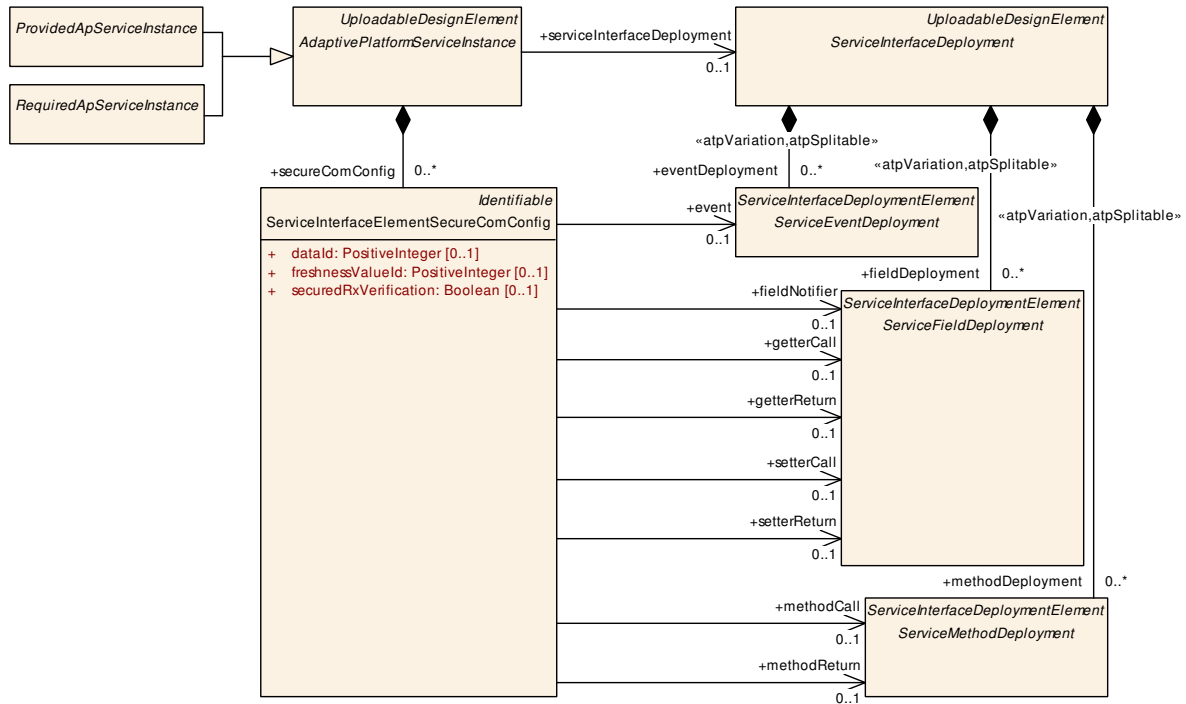


Figure 13.33: Secure Communication

With this approach it is possible to define different communication security protections for different used transport layer mechanisms in case of Multi-Binding.

Class	ServiceInterfaceElementSecureComConfig			
Note	This element allows to secure the communication of the referenced ServiceInterface element. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AdaptivePlatformServiceInstance.secureComConfig			
Attribute	Type	Mult.	Kind	Note
dataId	PositiveInteger	0..1	attr	This attribute defines a unique numerical identifier for the referenced ServiceInterface element.
event	ServiceEvent Deployment	0..1	ref	Reference to an event that is protected by a security protocol.
fieldNotifier	ServiceField Deployment	0..1	ref	Reference to a field notifier that is protected by a security protocol.
freshnessValueId	PositiveInteger	0..1	attr	This attribute defines the Id of the Freshness Value.
getterCall	ServiceField Deployment	0..1	ref	Reference to a field getter call message that is protected by a security protocol.
getterReturn	ServiceField Deployment	0..1	ref	Reference to a field getter return message that is protected by a security protocol.
methodCall	ServiceMethod Deployment	0..1	ref	Reference to a method call message that is protected by a security protocol.





Class	ServiceInterfaceElementSecureComConfig			
methodReturn	ServiceMethod Deployment	0..1	ref	Reference to a method return message that is protected by a security protocol.
securedRx Verification	Boolean	0..1	attr	This attribute defines whether the ServiceInterface element shall verify its security credentials during reception.
setterCall	ServiceField Deployment	0..1	ref	Reference to a field setter call message that is protected by a security protocol.
setterReturn	ServiceField Deployment	0..1	ref	Reference to a field setter return message that is protected by a security protocol.

Table 13.75: ServiceInterfaceElementSecureComConfig

[constr_3391] [ServiceInterfaceElementSecureComConfig](#) references to [ServiceInterfaceDeployment](#) elements

Imposition time: [IT_Mani](#)

[[ServiceInterfaceElementSecureComConfig](#) element shall be defined for exactly one [ServiceInterface](#) element and shall therefore contain only one single reference to an element defined in the scope of a [ServiceInterfaceDeployment](#).]

The attributes in the [ServiceInterfaceElementSecureComConfig](#) meta-class are defining security configuration settings that are specific for the referenced [ServiceInterface](#) element in the context of an [AdaptivePlatformServiceInstance](#). The used security protocol is defined in the [ServiceInstanceToMachineMapping](#).

[TPS_MANI_03199] Endpoint protection by [SecureComProps](#) [The [ServiceInstanceToMachineMapping](#) allows to assign a security protocol configuration settings that are defined in the referenced [SecureComProps](#) meta-class to protect endpoints that are defined by the Transport Protocol, Port and IP Address on which one or several [AdaptivePlatformServiceInstances](#) are provided or consumed.]

[TPS_MANI_03200] [SecureComProps](#) for udp, tcp and multicast communication

[The [ServiceInstanceToMachineMapping](#) allows to assign a security protocol configuration settings for:

- udp communication if the [ServiceInstanceToMachineMapping](#) refers to the [SecureComProps](#) in the role [secureComPropsForUdp](#)
- tcp communication in case the [ServiceInstanceToMachineMapping](#) refers to the [SecureComProps](#) in the role [secureComPropsForTcp](#)
- multicast communication in case the [ServiceInstanceToMachineMapping](#) refers to the [SecOcSecureComProps](#) in the role [secOcComPropsForMulticast](#)

]

With this modeling approach it is possible to configure different security protocol settings for the communication over TCP, UDP and multicast. For example it is allowed

to use different settings to protect the TCP communication of a [AdaptivePlatform-ServiceInstance](#) via TLS and UDP communication via DTLS.

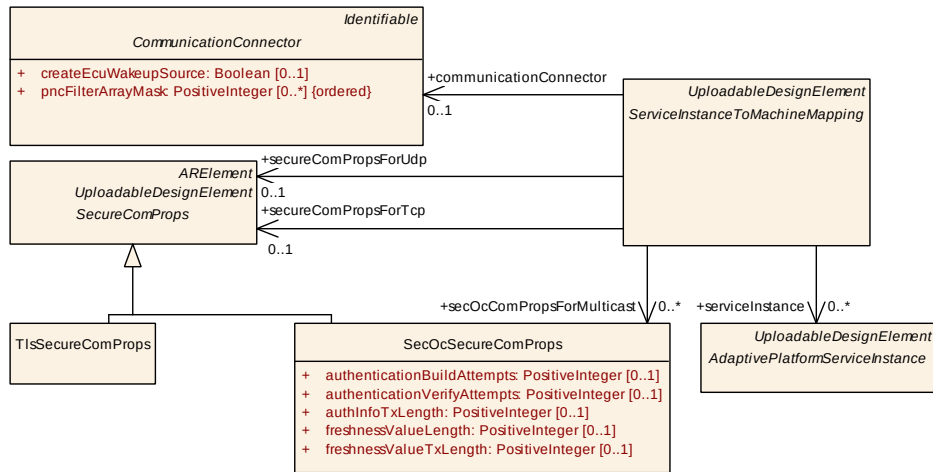


Figure 13.34: Security protocol configuration

Please note that protection of IP multicast traffic is only supported by SecOC and therefore the [ServiceInstanceToMachineMapping](#) refers directly the [SecOcSecureComProps](#) in the [secOcComPropsForMulticast](#) role.

Class	SecureComProps (abstract)			
Note	This meta-class defines a communication security protocol and its configuration settings.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Subclasses	DdsSecureComProps , SecOcSecureComProps , TlsSecureComProps			
Aggregated by	ARPackageElement			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 13.76: SecureComProps

[advisory_03003] Secure communication should not be lost by switching to multicast

Imposition time: IT_Mani

[If a [ProvidedSomeIpServiceInstance](#) that is referenced by a [ServiceInstanceToMachineMapping](#) provides at least one [SomeIpProvidedEventGroup](#) where [multicastThreshold](#) is not equal to 0 and containing at least one udp event then the [ProvidedSomeIpServiceInstance](#) should either:

- not reference [SecureComProps](#) in the role [secureComPropsForUdp](#) or [secureComPropsForTcp](#) or [secOcComPropsForMulticast](#) or
- reference [SecOcSecureComProps](#) in the role [secureComPropsForUdp](#) and [secOcComPropsForMulticast](#)

to make sure that the secure communication properties are consistent for the unicast and multicast communication.]

Please note that TLS is a point-to-point security protocol that does not support multicast. Please also note that a switch between secure communication with TLS for IP unicast and SecOC for IP multicast is not supported by AUTOSAR Classic Platform.

13.5.1 Secure Communication over TLS

The configuration of the Transport Layer Security (TLS) and Datagram Transport Layer Security (DTLS) protocols is supported with the `TlsSecureComProps` meta-class, which is a specialization of `SecureComProps`.

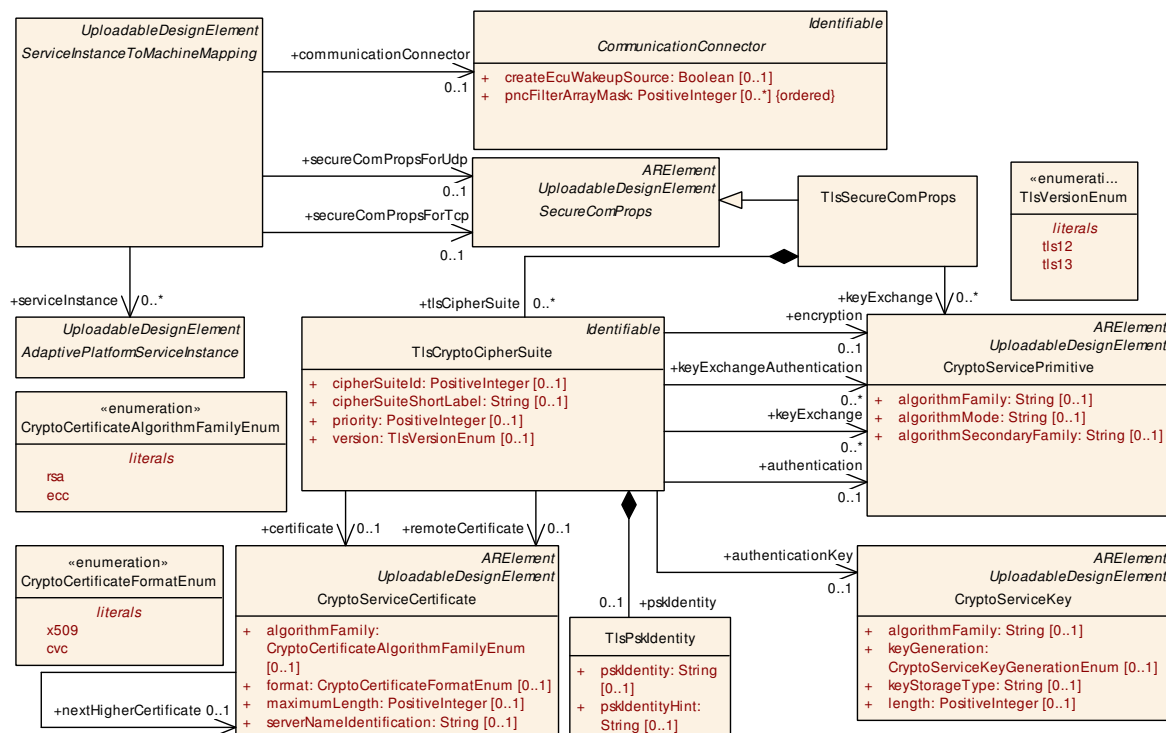


Figure 13.35: Secure Communication over TLS

It is a common use case that only one end of a TLS-based connection is actually modeled in an AUTOSAR model. It is therefore important that the modeling does not rely on or imply knowledge about both ends of such a TLS-based connection.

An AUTOSAR model that only describes one end of the communication is positively required to work, independently of the availability of a formal modeling of the other end.

Class	TlsSecureComProps
Note	Configuration of the Transport Layer Security protocol (TLS). Tags: atp.recommendedPackage=SecureComProps This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , SecureComProps , UploadableDesignElement , UploadablePackageElement



Class	TlsSecureComProps			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
keyExchange	CryptoServicePrimitive	*	ref	This reference identifies the shared (i.e. applicable for each of the aggregated cipher suites) crypto service primitive for the execution of key exchange during the handshake phase.
tlsCipherSuite	TlsCryptoCipherSuite	*	aggr	Collection of supported cipher suites that are used to negotiate the security settings for a network connection defined by the ServiceInstanceToMachineMapping.

Table 13.77: TlsSecureComProps

Enumeration	CryptoServiceKeyGenerationEnum
Note	This enumeration shall be taken to express the handling of a crypto key in terms of whether it is obtained from e.g. a diagnostic tester or whether it is created by derivation from a master key.
Aggregated by	CryptoServiceKey.keyGeneration
Literal	Description
keyDerivation	This means that the crypto key is created by derivation from a master key. Tags: atp.EnumerationLiteralIndex=0
keyStorage	This means that the crypto key is obtained from an external entity, e.g. a diagnostic tester. Tags: atp.EnumerationLiteralIndex=1

Table 13.78: CryptoServiceKeyGenerationEnum

TLS is composed of the TLS Record Protocol and the TLS Handshake Protocol. The Record Protocol provides connection security and encrypts and authenticates packets. The record layer functions can be called at any time after the handshake process is finished, when there is need to receive or send data.

The Handshake Protocol allows the server and client to authenticate each other and to negotiate encryption algorithms and cryptographic keys before any data is exchanged.

In order to establish a cryptographically secure data channel, the communication partners in form of [ServiceInstanceToMachineMappings](#) shall agree on cipher suites and on keys that will be used to encrypt the data.

The client sends a list of supported cipher suites to the server. The server decides on a cipher suite from the list provided by the client, and continues with the handshake.

Please note that the server and client roles cannot be swapped while the connection exists, i.e. a *server* remains the *server* for the full amount of time the connection exists.

[TPS_MANI_03213] Semantics of meta-class [TlsSecureComProps](#) [As a subclass of [SecureComProps](#), meta-class [TlsSecureComProps](#) has the ability to collect the TLS-related configuration aspects from either the perspective of the client or the server.

In the case of TLS, the collection boils down to the aggregation of meta-class [TlsCryptoCipherSuite](#) in the role [tlsCipherSuite](#) plus the ability (by means of the role [keyExchange](#)) to define handshake properties that are shared for each of the aggregated [tlsCipherSuite](#).]

[constr_5047] Supported values of `TlsSecureComProps.category`*Imposition time:* `IT_Mani`[The only supported values of attribute `TlsSecureComProps.category` are:

- **TLS_SERVER:** the `TlsSecureComProps` assumes the role of the *server* in the TLS connection.
- **TLS_CLIENT:** the `TlsSecureComProps` assumes the role of the *client* in the TLS connection.

]

[TPS_MANI_03134] Configuration of supported TLS ciphersuites [The creation of a TLS connection requires the usage of a suite of cryptographic operations in specific roles, also known as a *cipher suite*.

Meta-class `TlsCryptoCipherSuite` represents a given cipher suite for a TLS connection. `TlsCryptoCipherSuite` references meta-class `CryptoServicePrimitive` in three dedicated roles that represent the steps of the creation of a TLS connection.

More specifically, the cryptographic operations for setting up a TLS connection involve the following steps:

- **Key exchange:** these `CryptoServicePrimitives` may be used for the handshake phase of the TLS connection. Different alternatives exist for executing this phase and therefore the multiplicity of this reference is 0..*.
- **Authentication** of communication partners during the operational phase of the TLS connection. For this purpose a single `CryptoServicePrimitive` is used on each end of the communication.
- **Encryption** of content exchanged between the communication partners that have established the TLS connection. For this purpose a single `CryptoServicePrimitive` is used on each end of the communication.

]

If a certificate-based cipher suite is used, the `TlsCryptoCipherSuite.authenticationKey` references the private key used for authentication. For PSK cipher suites, the `TlsCryptoCipherSuite.authenticationKey` references the pre-shared (symmetric) key used for authentication.

Class	TlsCryptoCipherSuite			
Note	This meta-class represents a cipher suite for describing cryptographic operations in the context of establishing a connection of <code>ApplicationEndpoints</code> that is protected by TLS.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>TlsCryptoServiceMapping.tlsCipherSuite</code> , <code>TlsSecureComProps.tlsCipherSuite</code>			
Attribute	Type	Mult.	Kind	Note





Class	TlsCryptoCipherSuite			
authentication	CryptoServicePrimitive	0..1	ref	This reference identifies the crypto service primitive for the generation and verification of MACs.
authentication Key	CryptoServiceKey	0..1	ref	This reference identifies the private key or pre-shared key used for authentication.
certificate	CryptoServiceCertificate	0..1	ref	This reference identifies the applicable local certificate.
cipherSuiteId	PositiveInteger	0..1	attr	Identification of the CipherSuite according to the IANA assignments list.
cipherSuite ShortLabel	String	0..1	attr	Name of the CipherSuite according to the IANA assignments list.
ellipticCurve	CryptoEllipticCurve Props	*	ref	This references point to the properties of elliptic curves.
encryption	CryptoServicePrimitive	0..1	ref	This reference identifies the crypto service primitive for the execution of encryption.
keyExchange	CryptoServicePrimitive	*	ref	This reference identifies the individual (i.e. per cipher suite) crypto service primitive for the execution of key exchange during the handshake phase.
keyExchange Authentication	CryptoServicePrimitive	*	ref	This reference identifies the crypto service primitives for the generation and verification of signatures during the key exchange algorithm.
priority	PositiveInteger	0..1	attr	This attribute identifies the priority of the cipher suite. Range: 1..65535. Lower values represent higher priorities.
props	TlsCryptoCipherSuite Props	0..1	aggr	The aggregated TlsCryptoCipherSuiteProps provide details for the TLS Cipher Suite.
pskIdentity	TlsPskIdentity	0..1	aggr	Pre-shared key identity shared during the handshake among the communication parties, to establish a TLS connection if the handshake is based on the existence of a pre-shared key.
remote Certificate	CryptoServiceCertificate	0..1	ref	This reference identifies the applicable remote certificate.
signature Scheme	CryptoSignature Scheme	*	ref	This reference points to the properties of a TLS Signature Scheme.
version	TlsVersionEnum	0..1	attr	This attribute supports the definition of the applicable version of TLS.

Table 13.79: TlsCryptoCipherSuite

Please note that according to TLS each [TlsCryptoCipherSuite](#) may support multiple PSKs or certificates. The model restricts the multiplicity of references from [TlsCryptoCipherSuite](#) to [CryptoServiceCertificate](#) and [TlsPskIdentity](#) to 0..1.

A TLS configuration with multiple PSKs or Certificates per CipherSuite can be achieved by having multiple [TlsCryptoCipherSuite](#)'s that share the same set of parameters but reference different [CryptoServiceCertificate](#)'s or [TlsPskIdentity](#)'s, respectively.

Class	CryptoServicePrimitive			
Note	This meta-class has the ability to represent a crypto primitive. Tags: atp.recommendedPackage=CryptoPrimitives			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
algorithmFamily	String	0..1	attr	This attribute represents a description of the family (e.g. AES) of crypto algorithm implemented by the crypto primitive.
algorithmMode	String	0..1	attr	This attribute represents a description of the mode of the crypto algorithm implemented by the crypto primitive.
algorithmSecondaryFamily	String	0..1	attr	This attribute represents a further description of the secondary family of crypto algorithm implemented by the crypto primitive. The secondary family is needed for the specification of the hash algorithm for a signature check, e.g. using RSA.

Table 13.80: CryptoServicePrimitive

Class	CryptoEllipticCurveProps			
Note	This meta-class provides attributes to specify the properties of elliptic curves. Tags: atp.recommendedPackage=CryptoEllipticCurveProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
namedCurveId	PositiveInteger	0..1	attr	Defines the value of one specific NamedCurve Id.

Table 13.81: CryptoEllipticCurveProps

Class	TlsCryptoCipherSuiteProps			
Note	This meta-class provides attributes to specify details of TLS Cipher Suites.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	TlsCryptoCipherSuite.props			
Attribute	Type	Mult.	Kind	Note
tcplpTlsUseSecurityExtensionForceEncryptThenMac	Boolean	0..1	attr	Defines if the security extension according to IETF RFC 7366 shall be supported. This is useful for cipher suites using CBC mode.

Table 13.82: TlsCryptoCipherSuiteProps

Class	CryptoSignatureScheme			
Note	This meta-class provides attributes to specify the TLS Signature Scheme. Tags: atp.recommendedPackage=CryptoSignatureSchemas			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
signatureSchemeId	PositiveInteger	0..1	attr	Defines the value of one specific TLS Signature Scheme.

Table 13.83: CryptoSignatureScheme

Enumeration	TlsVersionEnum
Note	This meta-class has the ability to identify a specific version of the transport-layer security (TLS) protocol.
Aggregated by	TlsCryptoCipherSuite.version
Literal	Description
tls12	TLS version 1.2 Tags: atp.EnumerationLiteralIndex=0
tls13	TLS version 1.3 Tags: atp.EnumerationLiteralIndex=2

Table 13.84: TlsVersionEnum

Class	CryptoServiceKey			
Note	This meta-class has the ability to represent a crypto key. Tags: atp.recommendedPackage=CryptoDevelopmentKeys			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
algorithmFamily	String	0..1	attr	This attribute represent the description of the family of the applicable crypto algorithm.
development Value	ValueSpecification	0..1	aggr	This aggregation represents the ability to assign a specific value to the crypto key as part of the system description. This value can then be taken for the development of the respective ECU.
keyGeneration	CryptoServiceKeyGenerationEnum	0..1	attr	This attribute describes how a the specific cryptographic key is created.
keyStorageType	String	0..1	attr	This attribute describes where the enclosing cryptographic key shall be stored. AUTOSAR reserves specific values for this attributes but it is possible to insert custom values as well.
length	PositiveInteger	0..1	attr	This attribute describes the length of the cryptographic key in bits.

Table 13.85: CryptoServiceKey

[TPS_MANI_03214] Existence of [TlsCryptoCipherSuite.keyExchange](#) vs. [TlsSecureComProps.keyExchange](#) [The role [TlsSecureComProps.keyExchange](#) has been introduced as an optimization.

It is assumed that the references for key exchange look pretty similar if not identical for many concrete [TlsCryptoCipherSuites](#).

Adding these references in an identical form to a bunch of [TlsCryptoCipherSuites](#) does not really make sense. Therefore, [TlsSecureComProps](#) allows to define these references as well with the intention to make them valid for all [TlsSecureComProps.tlsCipherSuites](#).

A mixture of references in the role [TlsCryptoCipherSuite.keyExchange](#) and [TlsSecureComProps.keyExchange](#) is supported.]

[TPS_MANI_03215] Semantics of [CryptoServiceCertificate](#) [Meta-class [CryptoServiceCertificate](#) represents a cryptographic certificate needed for the creation of a TLS connection between *server* and *client*.]

Class	CryptoServiceCertificate			
Note	This meta-class represents the ability to model a cryptographic certificate. Tags: atp.recommendedPackage=CryptoServiceCertificates			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
algorithmFamily	CryptoCertificateAlgorithmFamilyEnum	0..1	attr	This attribute represents a description of the family of crypto algorithm used to generate public key and signature of the cryptographic certificate.
format	CryptoCertificateFormatEnum	0..1	attr	This attribute can be used to provide information about the format used to create the certificate
maximumLength	PositiveInteger	0..1	attr	This attribute represents the ability to define the maximum length of the certificate in bytes.
nextHigherCertificate	CryptoServiceCertificate	0..1	ref	The reference identifies the next higher certificate in the certificate chain.
serverNameIdentification	String	0..1	attr	Server Name Indication (SNI) is needed if the IP address hosts multiple servers (on the same port), each of them using a different certificate. If the client sends the SNI to the Server in the client hello, the server looks the SNI up in its certificate list and uses the certificate identified by the SNI.

Table 13.86: CryptoServiceCertificate

Enumeration	CryptoCertificateAlgorithmFamilyEnum
Note	This meta-class defines possible cryptographic algorithm families used to create public keys and signatures within the certificate.
Aggregated by	CryptoServiceCertificate.algorithmFamily
Literal	Description
ecc	The cryptographic operations in the certificate are executed using elliptic curves (ecc) Tags: atp.EnumerationLiteralIndex=2
rsa	The cryptographic operations in the certificate are executed using the RSA approach. Tags: atp.EnumerationLiteralIndex=1

Table 13.87: CryptoCertificateAlgorithmFamilyEnum

Enumeration	CryptoCertificateFormatEnum
Note	This meta-class defines possible formats of cryptographic certificates.
Aggregated by	CryptoServiceCertificate.format
Literal	Description
cvc	The certificate has been created in Card Verifiable Certificate (CVC) format Tags: atp.EnumerationLiteralIndex=2
x509	The certificate is created in X.509 format. Tags: atp.EnumerationLiteralIndex=1

Table 13.88: CryptoCertificateFormatEnum

[constr_5048] Existence of [TlsCryptoCipherSuite.certificate](#) and [TlsCryptoCipherSuite.pskIdentity](#) in the server role

Imposition time: [IT_Mani](#)

[Either

- the reference to `CryptoServiceCertificate` in the role `TlsCryptoCipherSuite.certificate`
- the aggregation of `TlsPskIdentity` in the role `TlsCryptoCipherSuite.pskIdentity`

shall exist if the `TlsCryptoCipherSuite` is aggregated by `TlsSecureComProps` that has the attribute `category` set to the value `TLS_SERVER`.]

In other words two different approaches are supported by TLS for the handling of key compromise: Pre-shared secret and certificate.

The server may optionally request a certificate from the *client*. If this option is not used then other documented approaches for completing the handshake phase is foreseen for the specific case.

[TPS_MANI_03216] Existence of `TlsCryptoCipherSuite.certificate` and `TlsCryptoCipherSuite.pskIdentity` in the *client* role [The client (`TlsSecureComProps` has set the value of attribute `category` to `TLS_CLIENT`) has the following authentication options:

- the reference to `CryptoServiceCertificate` in the role `TlsCryptoCipherSuite.certificate` exists,
- the aggregation of `TlsPskIdentity` in the role `TlsCryptoCipherSuite.pskIdentity` exists,
- neither one nor the other exists. In this case the handshake is provided on the basis of the server certificate only.

]

In the pre-shared key approach the client indicates which key to use by including a `pskIdentity` in the `ClientKeyExchange` message. To help the client in selecting which identity to use, the server can provide a `pskIdentityHint` in the `ServerKeyExchange` message.

The pre-shared key used for client authentication is identified by the reference `TlsCryptoCipherSuite.authenticationKey`.

Please note that the usage of `pskIdentityHints` is restricted for usage with TLS 1.2.

[TPS_MANI_03137] `ServiceInterfaceElementSecureComConfig` is not relevant in case of TLS communication [The element `ServiceInterfaceElementSecureComConfig` is not relevant in case of TLS communication.]

[constr_3485] UDP endpoint using DTLS SERVER role can only serve provided service instances

Imposition time: IT_Mani

[A [ServiceInstanceToMachineMapping](#) that refers to [TlsSecureComProps](#) in the role [secureComPropsForUdp](#) is only allowed to reference [ProvidedApServiceInstances](#) in the role [serviceInstance](#) if the [TlsSecureComProps](#) has the category [TLS_SERVER](#).]

[constr_3486] TCP endpoint using TLS SERVER role can only serve provided service instances

Imposition time: IT_Mani

[A [ServiceInstanceToMachineMapping](#) that refers to [TlsSecureComProps](#) in the role [secureComPropsForTcp](#) is only allowed to reference [ProvidedApServiceInstances](#) in the role [serviceInstance](#) if the [TlsSecureComProps](#) has the category [TLS_SERVER](#).]

[constr_5260] UDP endpoint using DTLS CLIENT role can only serve required service instances

Imposition time: IT_Mani

[A [ServiceInstanceToMachineMapping](#) that refers to [TlsSecureComProps](#) in the role [secureComPropsForUdp](#) is only allowed to reference [RequiredApServiceInstances](#) in the role [serviceInstance](#) if the [TlsSecureComProps](#) has the category [TLS_CLIENT](#).]

[constr_5261] TCP endpoint using TLS CLIENT role can only serve required service instances

Imposition time: IT_Mani

[A [ServiceInstanceToMachineMapping](#) that refers to [TlsSecureComProps](#) in the role [secureComPropsForTcp](#) is only allowed to reference [RequiredApServiceInstances](#) in the role [serviceInstance](#) if the [TlsSecureComProps](#) has the category [TLS_CLIENT](#).]

The reason for [\[constr_3485\]](#), [\[constr_3486\]](#), [\[constr_5260\]](#), [\[constr_5261\]](#) is that the (D)TLS client needs to establish the (D)TLS connection and a TCP/UDP endpoint that is described by the [ServiceInstanceToMachineMapping](#) can only take one role: (D)TLS client or (D)TLS server. If a [ServiceInstanceToMachineMapping](#) would act as (D)TLS client and would refer to a [ProvidedApServiceInstance](#) then this (D)TLS client would need to establish the (D)TLS connection. But in this case the (D)TLS client would not know to which remote service client a connection needs to be established since different [RequiredApServiceInstances](#) may directly call [methods](#) of the [ProvidedApServiceInstance](#) without any registration.

The same issue exists if the [ServiceInstanceToMachineMapping](#) acts as (D)TLS server and refers to [RequiredApServiceInstances](#). The (D)TLS client needs to establish the (D)TLS connection before any messages are exchanged. But the remote

service provider has no knowledge that this service consumer wants to call `methods` over a (D)TLS connection.

[constr_9350] All Provided Service Instances using the same UDP endpoint shall use the same DTLS SERVER configuration settings

Imposition time: IT_Mani

[If more than one `SomeipServiceInstanceToMachineMapping` is referencing a `ProvidedSomeipServiceInstance` and all these `SomeipServiceInstanceToMachineMappings` are referencing the same `ApApplicationEndpoint` in the role `udpPort` and the same `EthernetCommunicationConnector` in the role `communicationConnector` then all these `SomeipServiceInstanceToMachineMappings` shall reference the same `TlsSecureComProps` with category `TLS_SERVER` in the role `secureComPropsForUdp`.]

[constr_9351] All Provided Service Instances using the same TCP endpoint shall use the same TLS SERVER configuration settings

Imposition time: IT_Mani

[If more than one `SomeipServiceInstanceToMachineMapping` is referencing a `ProvidedSomeipServiceInstance` and all these `SomeipServiceInstanceToMachineMappings` are referencing the same `ApApplicationEndpoint` in the role `tcpPort` and the same `EthernetCommunicationConnector` in the role `communicationConnector` then all these `SomeipServiceInstanceToMachineMappings` shall reference the same `TlsSecureComProps` with category `TLS_SERVER` in the role `secureComPropsForTcp`.]

In other words, the mapping of secured and unsecured `ProvidedSomeipServiceInstances` to the same `ApApplicationEndpoint` and `NetworkEndpoint` combination is not allowed. If secured and unsecured `ProvidedSomeipServiceInstances` would exist on the same endpoint then TLS handshake data or unsecured data could be sent from a client to the server instance. The server would not be able to detect whether the first byte of the received data is a TLS handshake or a SOME/IP message.

13.5.2 Secure Communication over SecOC

AUTOSAR Secure Onboard Communication (SecOC) supports symmetric and asymmetric authentication approaches. To configure the SecOC secure protection of a message by a MAC or Signature the `ServiceInterfaceElementSecureComConfig` needs to be defined. This element contains the configuration settings for the individual `ServiceInterface` elements. In addition, the `ServiceInstanceToMachineMapping` needs to point to `SecOcSecureComProps` to configure the endpoint protection that is defined by the Transport Protocol, Port and IP Address.

[constr_3392] `ServiceInterfaceElementSecureComConfig.dataId` and `ServiceInterfaceElementSecureComConfig.freshnessValueId` are mandatory in case of SecOC communication

Imposition time: IT_Mani

[The attributes `ServiceInterfaceElementSecureComConfig.dataId` and `ServiceInterfaceElementSecureComConfig.freshnessValueId` are mandatory in case of SecOC communication.]

[TPS_MANI_03664] `ServiceInterfaceElementSecureComConfig.securedRxVerification` [The attribute `ServiceInterfaceElementSecureComConfig.securedRxVerification` defines whether a received SecOC message shall be verified with respect to the security credentials or not.

If the attribute `ServiceInterfaceElementSecureComConfig.securedRxVerification` is set to false, then security verification shall not be applied and the message payload shall be forwarded to the receivers.

If the attribute `ServiceInterfaceElementSecureComConfig.securedRxVerification` is set to true or is not defined, then security verification shall be applied.]

[constr_3691] Existence of `ServiceInterfaceElementSecureComConfig.securedRxVerification`

Imposition time: IT_Mani

[The attribute `ServiceInterfaceElementSecureComConfig.securedRxVerification` shall only be defined for a `ServiceInterfaceElementSecureComConfig` with the following definitions:

- The `ServiceInterfaceElementSecureComConfig` is aggregated by a `RequiredApServiceInstance` and defines at least one of the following roles:
 - `ServiceInterfaceElementSecureComConfig.event`
 - `ServiceInterfaceElementSecureComConfig.fieldNotifier`
 - `ServiceInterfaceElementSecureComConfig.getterReturn`
 - `ServiceInterfaceElementSecureComConfig.setterReturn`
 - `ServiceInterfaceElementSecureComConfig.methodReturn`
- The `ServiceInterfaceElementSecureComConfig` is aggregated by a `ProvidedApServiceInstance` and defines at least one of the following roles:
 - `ServiceInterfaceElementSecureComConfig.getterCall`
 - `ServiceInterfaceElementSecureComConfig.setterCall`
 - `ServiceInterfaceElementSecureComConfig.methodCall`

]

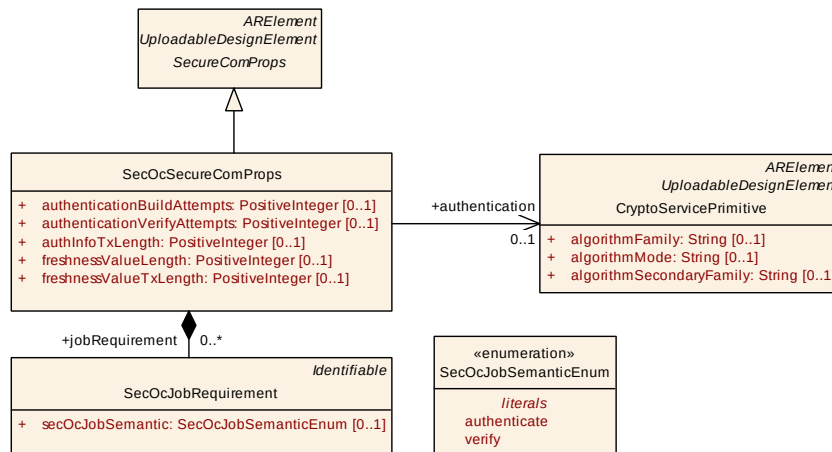


Figure 13.36: Secure Communication over SecOC

[TPS_MANI_03138] **SecOC Security Profile** [The SecOC security profile is defined by [SecOcSecureComProps.category](#).]

Class	SecOcSecureComProps			
Note	Configuration of AUTOSAR SecOC. Tags: atp.recommendedPackage=SecureComProps			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , SecureComProps , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
authentication	CryptoServicePrimitive	0..1	ref	This reference defines the authentication algorithm used for MAC generation and verification.
authentication BuildAttempts	PositiveInteger	0..1	attr	This attribute defines the additional number of authentication build attempts that are to be carried out when the generation of the authentication information failed for a given message. If zero is set then only one authentication attempt is done.
authentication VerifyAttempts	PositiveInteger	0..1	attr	This attribute defines the additional number of authentication attempts that are to be carried out when the generation of the authentication information failed for a given message. If zero is set then only one authentication attempt is done.
authInfoTx Length	PositiveInteger	0..1	attr	This attribute defines the length in bits of the authentication code to be included in the payload of the authenticated Message.
freshnessValue Length	PositiveInteger	0..1	attr	This attribute defines the complete length in bits of the Freshness Value.
freshnessValue TxLength	PositiveInteger	0..1	attr	This attribute defines the length in bits of the Freshness Value to be included in the payload of the secured message.
jobRequirement	SecOcJobRequirement	*	aggr	Collection of cryptographic job requirements.

Table 13.89: SecOcSecureComProps

[TPS_MANI_03139] **Standardized SecOC Security Profiles** [The SecOC security profile that is defined by [SecOcSecureComProps.category](#) can have the following values that are standardized by AUTOSAR: PROFILE_01, PROFILE_02, PROFILE_03.]

The attribute values for the predefined categories mentioned in [TPS_MANI_03139] are defined in [constr_3325] in [4, TPS System Template].

[constr_5347] Supported value range for attribute `SecOcSecureComProps.authenticationVerifyAttempts`

Imposition time: IT_Mani

[The supported value range of attribute `SecOcSecureComProps.authenticationVerifyAttempts` is limited to the interval [0..65535].]

[TPS_MANI_03140] Non-Standardized SecOC Security Profiles [The values for the `SecOcSecureComProps.category` mentioned in [TPS_MANI_03139] are standardized and reserved for being used in the way the AUTOSAR standard foresees. In addition, it is positively possible to use other than the standardized values for the `SecOcSecureComProps.category`.]

With the `SecOcJobRequirement` the cryptographic routines can be selected that need to be supported. In case of SecOC it can be selected whether the symmetric and/or asymmetric authentication approach is needed.

Class	SecOcJobRequirement			
Note	Requirements for the cryptographic job that need to be executed.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SecOcSecureComProps.jobRequirement			
Attribute	Type	Mult.	Kind	Note
secOcJobSemantic	SecOcJobSemanticEnum	0..1	attr	This attribute defines the cryptographic algorithm that needs to be supported.

Table 13.90: SecOcJobRequirement

[constr_10227] Multiplicity of attribute `SecOcJobRequirement.secOcJobSemantic`

Imposition time: IT_Mani

[For each `SecOcJobRequirement`, the attribute `secOcJobSemantic` shall exist.]

Enumeration	SecOcJobSemanticEnum
Note	List of cryptographic routines supported by SecOC.
Aggregated by	SecOcJobRequirement.secOcJobSemantic
Literal	Description
authenticate	Authentication algorithm for Authenticator generation/verification. Tags: atp.EnumerationLiteralIndex=0
verify	Asymmetric cryptographic algorithm to generate/verify a signature Tags: atp.EnumerationLiteralIndex=1

Table 13.91: SecOcJobSemanticEnum

13.5.3 Secure Communication over DDS

The configuration of participant identities for the [41, DDS Security] plugins is supported by the `DdsSecureComProps` meta-class, which is a specialization of `SecureComProps`.

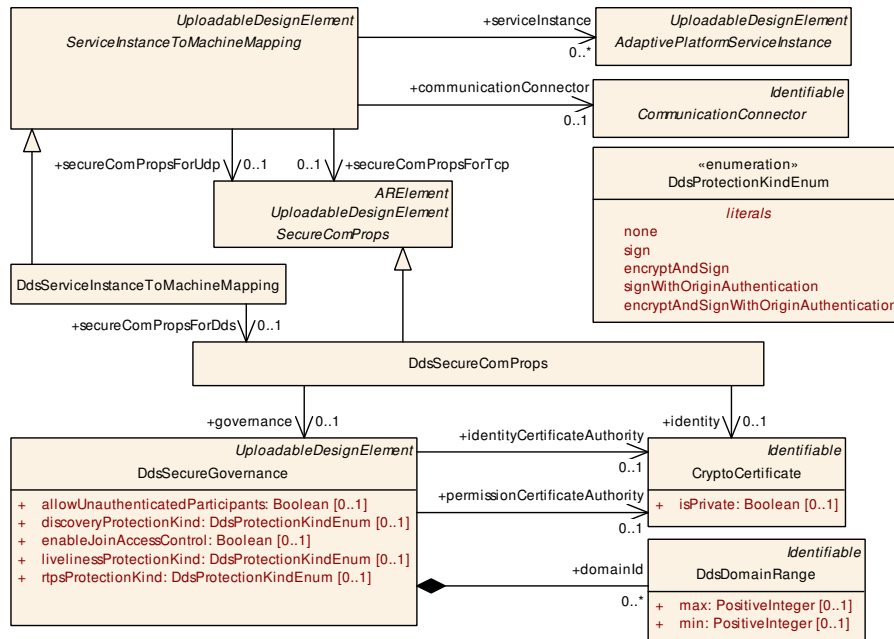


Figure 13.37: `DdsSecureComProps` at the `DdsServiceInstanceToMachineMapping`

Please note the following classes and constraints depict a structural specification of DDS Security deployment configuration. For functional details please refer to section “Secure Communication” of [23, SWS Communication Management].

These modeling elements affect only DDS Security (as defined by [41, DDS Security]) deployments via `DdsServiceInstanceToMachineMapping.secureComPropsForDds`. For DDS Transport Security over TCP (TLS) and UDP (DTLS) configuration please refer to `ServiceInstanceToMachineMapping.secureComPropsForTcp` and `ServiceInstanceToMachineMapping.secureComPropsForUdp`, respectively.

Class	DdsSecureComProps			
Note	Identity and governance information of participants in case of DDS Security. Tags: atp.recommendedPackage=SecureComProps This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , SecureComProps , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DdsSecureComProps			
governance	DdsSecureGovernance	0..1	ref	This attribute defines general DDS Security communication properties applicable to the DDS domain(s) in which the subject operates. Tags: atp.Status=candidate
identity	CryptoCertificate	0..1	ref	This attribute defines the cryptographic identity of the subject.

Table 13.92: DdsSecureComProps

[constr_3678] Existence of attributes for [DdsSecureComProps](#)*Status:* DRAFT*Imposition time:* [IT_Mani](#)[The following attributes of [DdsSecureComProps](#) shall exist:

- [identity](#)
- [governance](#)

]

[TPS_MANI_03661] Configuration of Governance in DDS Security*Status:* DRAFT

[The [DdsSecureGovernance](#) meta-class defines domain-wide rules determining relevant certificate authorities (for participant identities and permission manifests), constraints related to how participants may join such domain(s) and protection levels associated to each kind of communication (none, sign, encrypt+sign, with or without origin authentication).]

Class	DdsSecureGovernance			
Note	Configuration of DDS Security for all applications joining a specific set of DDS Domains. Tags: atp.Status=candidate atp.recommendedPackage=DdsSecureGovernances This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
allowUnauthenticatedParticipants	Boolean	0..1	attr	Defines whether unauthenticated participants can join this domain. Tags: atp.Status=candidate
discoveryProtectionKind	DdsProtectionKindEnum	0..1	attr	Defines the kind of cryptographic transformation to apply in DDS discovery communication. Tags: atp.Status=candidate
domainId	DdsDomainRange	*	aggr	Set of domains to be covered by this property set. Tags: atp.Status=candidate





Class	DdsSecureGovernance			
enableJoin AccessControl	Boolean	0..1	attr	Defines whether access control is to be enforced upon joining this domain. Tags: atp.Status=candidate
identity Certificate Authority	CryptoCertificate	0..1	ref	Certificate representing the identity certificate authority applicable to the domain(s) specified by domainslds. Tags: atp.Status=candidate
liveliness ProtectionKind	DdsProtectionKind Enum	0..1	attr	Defines the kind of cryptographic transformation to apply in DDS liveliness communication. Tags: atp.Status=candidate
permission Certificate Authority	CryptoCertificate	0..1	ref	Certificate representing the permissions certificate authority applicable to the domain(s) specified by domainslds. Tags: atp.Status=candidate
rtpsProtection Kind	DdsProtectionKind Enum	0..1	attr	Defines the kind of cryptographic transformation to apply to whole DDS RTPS. Tags: atp.Status=candidate

Table 13.93: DdsSecureGovernance

Class	DdsDomainRange			
Note	DDS Domain ID range. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DdsSecureGovernance.domainId			
Attribute	Type	Mult.	Kind	Note
max	PositiveInteger	0..1	attr	Upper bound of the DdsDomainRange.
min	PositiveInteger	0..1	attr	Lower bound of the DdsDomainRange.

Table 13.94: DdsDomainRange

Enumeration	DdsProtectionKindEnum			
Note	Supported cryptographic transformations (extended). This Enumeration is only used by the AUTOSAR Adaptive Platform.			
Aggregated by	DdsSecureGovernance.discoveryProtectionKind , DdsSecureGovernance.livelinessProtectionKind , DdsSecureGovernance.rtpsProtectionKind , DdsTopicAccessRule.dataProtectionKind , DdsTopicAccessRule.metadataProtectionKind			
Literal	Description			
encryptAndSign	encryption and MAC transformations (in that precise order) are applied Tags: atp.EnumerationLiteralIndex=2			
encryptAndSign WithOrigin Authentication	similar to "EncryptAndSign" but with additional authentication codes produced under different secret keys, which prevents receiving peers from impersonating a specific sender Tags: atp.EnumerationLiteralIndex=4			
none	no transformation is applied Tags: atp.EnumerationLiteralIndex=0			
sign	Message Authentication Code (MAC) is applied, no encryption Tags: atp.EnumerationLiteralIndex=1			
signWithOrigin Authentication	similar to "sign" but with additional authentication codes produced under different secret keys, which prevents receiving peers from impersonating a specific sender Tags: atp.EnumerationLiteralIndex=3			

Table 13.95: DdsProtectionKindEnum

[constr_3679] Existence of attributes for `DdsSecureGovernance`*Status:* DRAFT*Imposition time:* `IT_Mani`[The following attributes of `DdsSecureGovernance` shall exist:

- at least one `domainId`
- `identityCertificateAuthority`
- `permissionCertificateAuthority`
- `allowUnauthenticatedParticipants`
- `enableJoinAccessControl`
- `discoveryProtectionKind`
- `livelinessProtectionKind`
- `rtpsProtectionKind`

]

[constr_3682] Values of `DdsDomainRange.min` and `DdsDomainRange.max`*Imposition time:* `IT_Mani`[The value of `DdsDomainRange.min` shall be less than or equal to the value of `DdsDomainRange.max`.]

14 Raw Data Stream Manifest

The Raw Data Stream Manifest has initially been introduced for the support of IP based (TCP/UDP) Ethernet communication.

Later, further protocols have been added and the original (IP based) meta-class naming might not be expressive enough to reflect the dedicated IP binding. The descriptions have been updated to clarify to which specific network binding the respective meta-classes contribute.

14.1 Raw Data Stream Deployment

[TPS_MANI_01285] Purpose of meta-class **RawDataStreamDeployment** [Meta-class **RawDataStreamDeployment** has the ability to further qualify an existing **AbstractRawDataStreamInterface** on deployment level.]

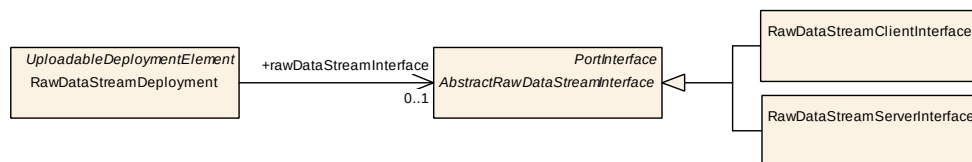


Figure 14.1: Modeling of the **RawDataStreamDeployment**

Class	RawDataStreamDeployment			
Note	This meta-class represents the ability to model deployment-level information for a raw data stream Tags: atp.recommendedPackage=RawDataStreamDeployments This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
rawDataStreamInterface	AbstractRawDataStreamInterface	0..1	ref	This reference identifies the corresponding RawData StreamInterface,

Table 14.1: RawDataStreamDeployment

14.2 Raw Data Stream Mapping

[TPS_MANI_01287] Semantics of **RawDataStreamMapping** [On the target-configuration side, the access to a raw data stream requires the provision of actual transport for the raw data.

It is possible to implement the raw data transport on top of various technologies.

Therefore, abstract meta-class **RawDataStreamMapping** exists to provide the principle ability to map to an **RPortPrototype** and to a **Process**.

The mapping to a concrete transport technology is left to sub-classes of `RawDataStreamMapping`.]

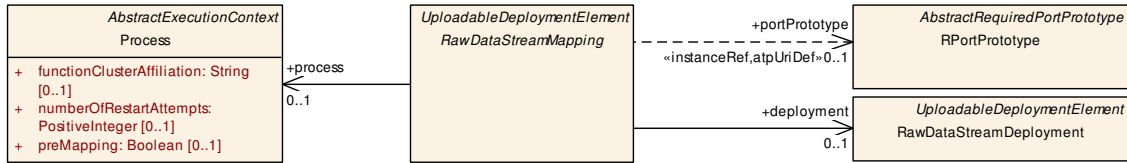


Figure 14.2: Modeling of the `RawDataStreamMapping`

Class	<code>RawDataStreamMapping</code> (abstract)			
Note	This meta-class acts as an abstract base class for mapping raw data streams to the application software. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code> , <code>UploadableDeploymentElement</code> , <code>UploadablePackageElement</code>			
Subclasses	<code>EthernetMacRawDataStreamMapping</code> , <code>EthernetRawDataStreamMapping</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
deployment	<code>RawDataStreamDeployment</code>	0..1	ref	This reference identifies the applicable <code>RawDataStreamDeployment</code> .
portPrototype	<code>RPortPrototype</code>	0..1	iref	Reference to a specific <code>PortPrototype</code> that represents the raw data stream to the application. Stereotypes: <code>atpUriDef</code> InstanceRef implemented by: <code>RPortPrototypeInExecutableInstanceRef</code>
process	<code>Process</code>	0..1	ref	Reference to the <code>Process</code> in which the Executable that contains the <code>SoftwareComponent</code> and the referenced <code>PortPrototype</code> is executed.

Table 14.2: `RawDataStreamMapping`

14.3 Raw Data Streams over Ethernet using IP based Protocol

The configuration of raw data streams over Ethernet using an IP based protocol is done by means of the subclasses of meta-class `AbstractRawDataStreamEthernetCredentials` as well as meta-class `EthernetRawDataStreamMapping`.

The obvious requirement to the configuration of the Ethernet credentials is that both ends of the communication have to be configured sufficiently, such that a connection between the two ends can be established.

The modeling of the configuration of Ethernet credentials uses different concepts for the description of the **local** end vs. the description of the **remote** end, see [TPS_MANI_01354].

[TPS_MANI_01354] Rationale for the existence of meta-class `AbstractRawDataStreamEthernetCredentials` [On the *AUTOSAR adaptive platform*, the configuration of Ethernet credentials is typically modeled by means of the combination of `NetworkEndpoint` and `ApApplicationEndpoint`.

This approach is also used for the unicast raw data stream communication, but only for the **local** configuration of unicast Ethernet credentials.

The credentials of the **remote** end (unicast and multicast) are configured in a simplified way by means of sub-classes of meta-class `AbstractRawDataStreamEthernetCredentials`.

This approach also supports the configuration of credentials for a remote end that is not running an AUTOSAR stack and that is therefore not contributing its credentials inside an AUTOSAR model in a more approachable way.]

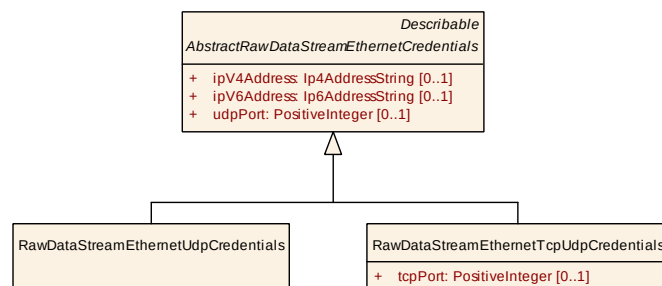


Figure 14.3: Modeling of the `AbstractRawDataStreamEthernetCredentials`

Please note that, from the point of view of the application software and in the case of raw data stream communication both communication ends, i.e. the client side **and** the server side are implemented using an `RPortPrototype`.

This (from an AUTOSAR perspective) seemingly counter-intuitive aspect is also depicted in [Figure 14.4](#), i.e. `RawDataStreamMapping` does only define a reference to an `RPortPrototype`.

Meta-class `AbstractRawDataStreamEthernetCredentials` and its subclasses (see [Figure 14.3](#)) have the ability to define IP addresses (either V4 or V6) and transport protocol (UDP and/or TCP).

[constr_10076] Existence of `RawDataStreamEthernetUdpCredentials.udpPort`

Imposition time: `IT_Mani`

[In the context of `RawDataStreamEthernetUdpCredentials`, the attribute `udpPort` shall exists.]

Class	<code>AbstractRawDataStreamEthernetCredentials</code> (abstract)			
Note	This meta-class serves as an abstract base class for the configuration of network credentials. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Describable</code>			
Subclasses	<code>RawDataStreamEthernetTcpUdpCredentials</code> , <code>RawDataStreamEthernetUdpCredentials</code>			
Attribute	Type	Mult.	Kind	Note
ipV4Address	<code>Ip4AddressString</code>	0..1	attr	This attribute describes the IP V4 address of the remote server.





Class	AbstractRawDataStreamEthernetCredentials (abstract)			
ipV6Address	Ip6AddressString	0..1	attr	This attribute describes the IP V6 address of the remote server.
udpPort	PositiveInteger	0..1	attr	This attribute represents the configuration of a UDP port number.

Table 14.3: AbstractRawDataStreamEthernetCredentials

Class	RawDataStreamEthernetUdpCredentials			
Note	This-meta-class represents the ability to create a configuration of network credentials for a raw data stream connection over UDP. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractRawDataStreamEthernetCredentials , Describable			
Aggregated by	EthernetRawDataStreamRemoteClientConfig.multicastCredentials , EthernetRawDataStreamRemoteClientConfig.unicastUdpCredentials , EthernetRawDataStreamRemoteServerConfig.multicastCredentials			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 14.4: RawDataStreamEthernetUdpCredentials

Class	RawDataStreamEthernetTcpUdpCredentials			
Note	This-meta-class represents the ability to create a configuration of network credentials for a raw data stream connection over TCP and UDP (inherited from base class). This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractRawDataStreamEthernetCredentials , Describable			
Aggregated by	EthernetRawDataStreamRemoteServerConfig.unicastCredentials			
Attribute	Type	Mult.	Kind	Note
tcpPort	PositiveInteger	0..1	attr	This attribute represents the configuration of a TCP port number.

Table 14.5: RawDataStreamEthernetTcpUdpCredentials

[constr_10077] Existence of [ipV4Address](#) and [ipV6Address](#) within [AbstractRawDataStreamEthernetCredentials](#)

Imposition time: [IT_Mani](#)

[Within the context of a [AbstractRawDataStreamEthernetCredentials](#), either the attribute [ipV4Address](#) or the attribute [ipV6Address](#) shall exist.]

[constr_10078] Existence of [RawDataStreamEthernetTcpUdpCredentials](#). [tcpPort](#) and [udpPort](#)

Imposition time: [IT_Mani](#)

[In the context of a [RawDataStreamEthernetTcpUdpCredentials](#), either the attribute [tcpPort](#) or [udpPort](#) shall exist.]

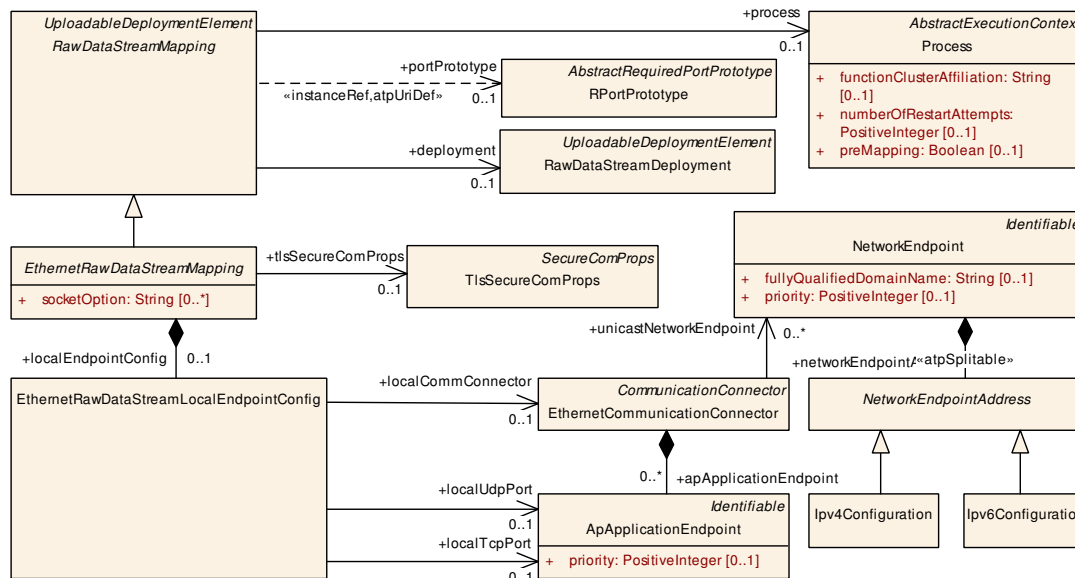


Figure 14.4: Modeling of the **EthernetRawDataStreamMapping**

[TPS_MANI_01355] Definition of local Ethernet credentials [The definition of the local Ethernet credentials is done by means of the aggregation of meta-class **EthernetRawDataStreamLocalEndpointConfig** in the role **localEndpointConfig**.

EthernetRawDataStreamLocalEndpointConfig, in turn, defines the following aggregations for the configuration of local Ethernet credentials:

- a reference to **EthernetCommunicationConnector** in the role **localCommConnector**, that in turn refers to **NetworkEndpoint**.
- references to **ApApplicationEndpoint** in the roles
 - **EthernetRawDataStreamLocalEndpointConfig.localUdpPort**
 - **EthernetRawDataStreamLocalEndpointConfig.localTcpPort**

]

Please note that the configuration of the corresponding remote end depends on the question whether the remote end represents a server (see [TPS_MANI_01356] in Chapter 14.3.1) or a client (see [TPS_MANI_01357] in Chapter 14.3.2).

Class	EthernetRawDataStreamMapping (abstract)			
Note	This meta-class serves as the abstract bases class for the ability to map a PortPrototype to a Ethernet-based communication channel. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageableElement			
Subclasses	EthernetRawDataStreamClientMapping , EthernetRawDataStreamServerMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	EthernetRawDataStreamMapping (abstract)			
localEndpointConfig	EthernetRawDataStreamLocalEndpointConfig	0..1	aggr	This aggregation is used to configure the credentials of the endpoint.
socketOption	String	*	attr	This attribute represents the ability to specify non-formal socket options that might only be valid for specific platforms. AUTOSAR does not define a standardized meaning for the possible values of this attribute.
tlsSecureComProps	TlsSecureComProps	0..1	ref	This reference provides the ability to define TLS-related properties for the enclosing SocketRawDataStreamMapping.

Table 14.6: EthernetRawDataStreamMapping

[constr_10079] Existence of [EthernetRawDataStreamMapping.localTcpPort](#) and [localUdpPort](#)

Imposition time: [IT_Mani](#)

[In the context of a [EthernetRawDataStreamMapping.localCommConnector](#), only **one** attribute out of

- [localTcpPort](#)
- [localUdpPort](#)

shall exist.]

Class	EthernetRawDataStreamLocalEndpointConfig			
Note	This meta-class has the ability to act as a wrapper for the configuration of the remote endpoint in the context of a raw data stream mapping. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	EthernetRawDataStreamMapping.localEndpointConfig			
Attribute	Type	Mult.	Kind	Note
localCommConnector	EthernetCommunicationConnector	0..1	ref	This attribute represents the CommunicationConnector taken for socket-based data communication.
localTcpPort	ApApplicationEndpoint	0..1	ref	This aggregation represents the configuration of a local TCP port number.
localUdpPort	ApApplicationEndpoint	0..1	ref	This aggregation represents the configuration of a local unicast UDP port number.

Table 14.7: EthernetRawDataStreamLocalEndpointConfig

14.3.1 Ethernet Raw Data Stream Client Mapping

A raw data stream client may be prepared to receive data via unicast or multicast communication, but it shall only send requests via unicast to exactly one server.

[TPS_MANI_01356] Definition of remote server's Ethernet credentials [The definition of the **remote** server's Ethernet credentials is done by means of attributes of meta-class [EthernetRawDataStreamRemoteServerConfig](#):

multicast If multicast configuration shall be supported, then the aggregation `EthernetRawDataStreamRemoteServerConfig.multicastCredentials` shall exist and the attribute `udpPort` shall be configured.

unicast If unicast configuration shall be supported, then the aggregation `EthernetRawDataStreamRemoteServerConfig.unicastUdpCredentials` shall exist and either the attribute `udpPort` or attribute `tcpPort` shall be configured.

]

The mutual existence of attributes `udpPort` and `tcpPort` is also addressed by [constr_10078].

Note that it is also possible for the client to use ephemeral ports for the communication. In this case, the `EthernetRawDataStreamLocalEndpointConfig.localTcpPort` – by convention – would be configured to value 0.

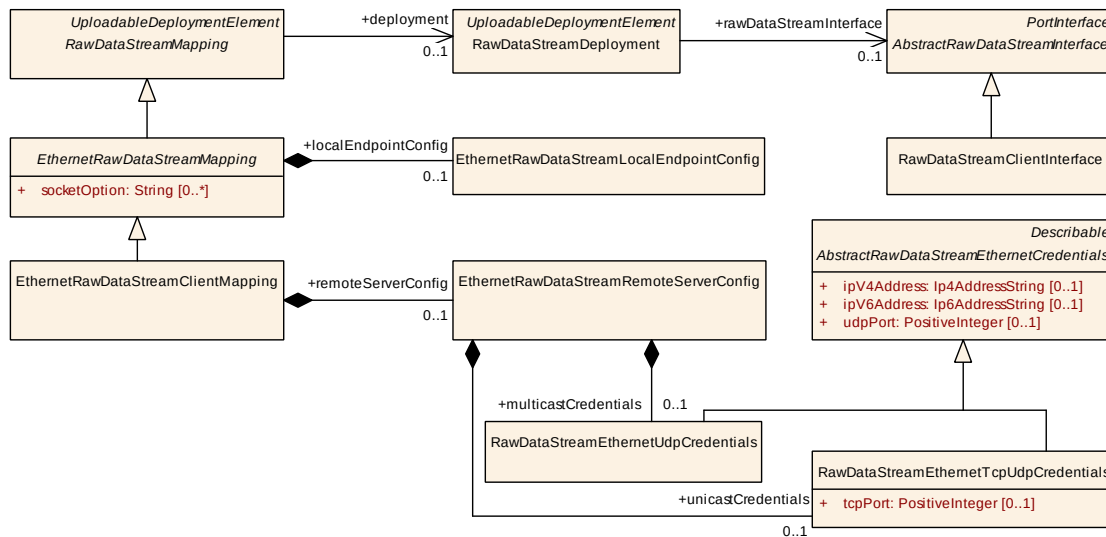


Figure 14.5: Modeling of the `EthernetRawDataStreamClientMapping`

Class	EthernetRawDataStreamClientMapping			
Note	This meta-class represents the ability to map a client PortPrototype to a Ethernet-based communication channel. Tags: atp.recommendedPackage=RawDataStreamingMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , EthernetRawDataStreamMapping , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
remoteServer Config	EthernetRawData StreamRemoteServer Config	0..1	aggr	This aggregation is used to configure the credentials of the remote server.

Table 14.8: EthernetRawDataStreamClientMapping

Class	EthernetRawDataStreamRemoteServerConfig			
Note	This meta-class has the ability to act as a wrapper for the configuration of the remote server in the context of a raw data stream client mapping. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	EthernetRawDataStreamClientMapping.remoteServerConfig			
Attribute	Type	Mult.	Kind	Note
multicast Credentials	RawDataStream EthernetUdpCredentials	0..1	aggr	This aggregation represents the configuration of multicast credentials for communication with a remote raw data stream server.
unicast Credentials	RawDataStream EthernetTcpUdp Credentials	0..1	aggr	This meta-class represents the ability to map a server PortPrototype to a Ethernet-based communication channel.

Table 14.9: EthernetRawDataStreamRemoteServerConfig

14.3.2 Ethernet Raw Data Stream Server Mapping

A raw data stream server shall *either* communicate via unicast *or* via multicast, as expressed in [constr_10086]. A switch between the two approaches depending on the evaluation of conditions at runtime, as possible in the SOME/IP communication, is not supported for raw data streams.

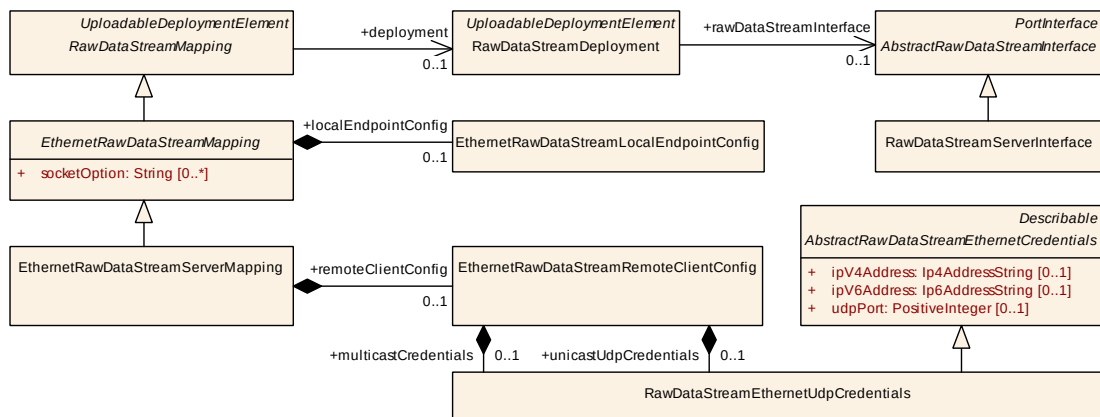


Figure 14.6: Modeling of the EthernetRawDataStreamServerMapping

[TPS_MANI_01357] Definition of remote client's Ethernet credentials [The definition of the **remote** client's Ethernet credentials is done by means of attributes of meta-class `EthernetRawDataStreamRemoteClientConfig`:

multicast If multicast configuration shall be supported, then the aggregation `EthernetRawDataStreamRemoteClientConfig.multicastCredentials` shall exist and the attribute `udpPort` shall be configured.

unicast If unicast configuration shall be supported, then the aggregation `EthernetRawDataStreamRemoteClientConfig.unicastUdpCredentials` shall exist and attribute `udpPort` shall be configured.

]

Please note that a raw data stream server does not need to configure a TCP port of the client because the information about the TCP port of the client is conveyed as part of the TCP protocol.

[constr_10086] Existence of `unicastUdpCredentials` and `multicastCredentials` in the context of a `EthernetRawDataStreamServerMapping`

Imposition time: `IT_Mani`

[In the context of a `EthernetRawDataStreamServerMapping`, only one aggregation out of

- `remoteClientConfig.multicastCredentials`
- `remoteClientConfig.unicastUdpCredentials`

shall exist.]

Class	EthernetRawDataStreamServerMapping			
Note	This meta-class represents the ability to map a server PortPrototype to a Ethernet-based communication channel. Tags: atp.recommendedPackage=RawDataStreamingMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , EthernetRawDataStreamMapping , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
remoteClient Config	EthernetRawDataStreamRemoteClientConfig	0..1	aggr	This aggregation is used to configure the credentials of the remote client.

Table 14.10: EthernetRawDataStreamServerMapping

Class	EthernetRawDataStreamRemoteClientConfig			
Note	This meta-class has the ability to act as a wrapper for the configuration of the remote server in the context of a raw data stream client mapping. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	EthernetRawDataStreamServerMapping.remoteClientConfig			
Attribute	Type	Mult.	Kind	Note
multicast Credentials	RawDataStreamEthernetUdpCredentials	0..1	aggr	This aggregation represents the configuration of multicast credentials for communication with a remote raw data stream client.
unicastUdp Credentials	RawDataStreamEthernetUdpCredentials	0..1	aggr	This aggregation represents the configuration of a remote raw data stream client that communicates via unicast over UDP.

Table 14.11: EthernetRawDataStreamRemoteClientConfig

Examples for the configuration of raw data streams can be found in [Chapter B.9](#).

14.4 Raw Data Streams over Ethernet using MAC Layer Protocol

The abstract class `EthernetMacRawDataStreamMapping` defines attributes applicable to MAC-based Ethernet communication.

[constr_3774] Existence of `EthernetMacRawDataStreamMapping.localCommConnector`

Status: DRAFT

Imposition time: IT_Mani

[The reference `EthernetMacRawDataStreamMapping.localCommConnector` shall exist.]

Class	<code>EthernetMacRawDataStreamMapping</code> (abstract)			
Note	This meta-class serves as the abstract bases class for the ability to map a PortPrototype to an Ethernet-Mac-layer based communication. Tags: atp.Status=candidate This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	IEEE1722RawDataStreamMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
localCommConnector	EthernetCommunicationConnector	0..1	ref	This reference represents the CommunicationConnector taken for Mac-based data communication. Tags: atp.Status=candidate
socketOption	String	*	attr	This attribute represents the ability to specify non-formal socket options that might only be valid for specific platforms. AUTOSAR does not define a standardized meaning for the possible values of this attribute. Tags: atp.Status=candidate

Table 14.12: EthernetMacRawDataStreamMapping

14.4.1 Raw Data Streams over Ethernet using IEEE1722 Protocol

The [19, IEEE 1722] protocol is capable of transporting a variety of content: audio and video streams, clock reference streams, control data streams.

The

- [IEEE1722RawDataStreamConsumerMapping](#) and
- [IEEE1722RawDataStreamProducerMapping](#)

are used to bind IEEE1722 streams to [RPortPrototypes](#) typed by an

- [IEEE1722RawDataStreamConsumerInterface](#) and
- [IEEE1722RawDataStreamProducerInterface](#),

respectively. The binding uses the [IEEE1722TpConnection](#) as defined in the [4, TPS System Template].

The actual stream Id is defined by the two attributes `IEEE1722TpConnection.communicationDirection` and `IEEE1722TpConnection.uniqueStreamId`. They are concatenated according to the [4, TPS System Template] as defined in [TPS_SYST_03098].

By referring to a specific `IEEE1722TpConnection`, the corresponding IEEE1722 stream is mapped to the `RPortPrototype`. Any messages sent (`IEEE1722RawDataStreamProducerMapping`) or received (`IEEE1722RawDataStreamConsumerMapping`) are handed through this `RPortPrototype`. Which parts of the messages are passed through the APIs on the `RPortPrototype` is defined in [20, SWS Raw Data Stream].

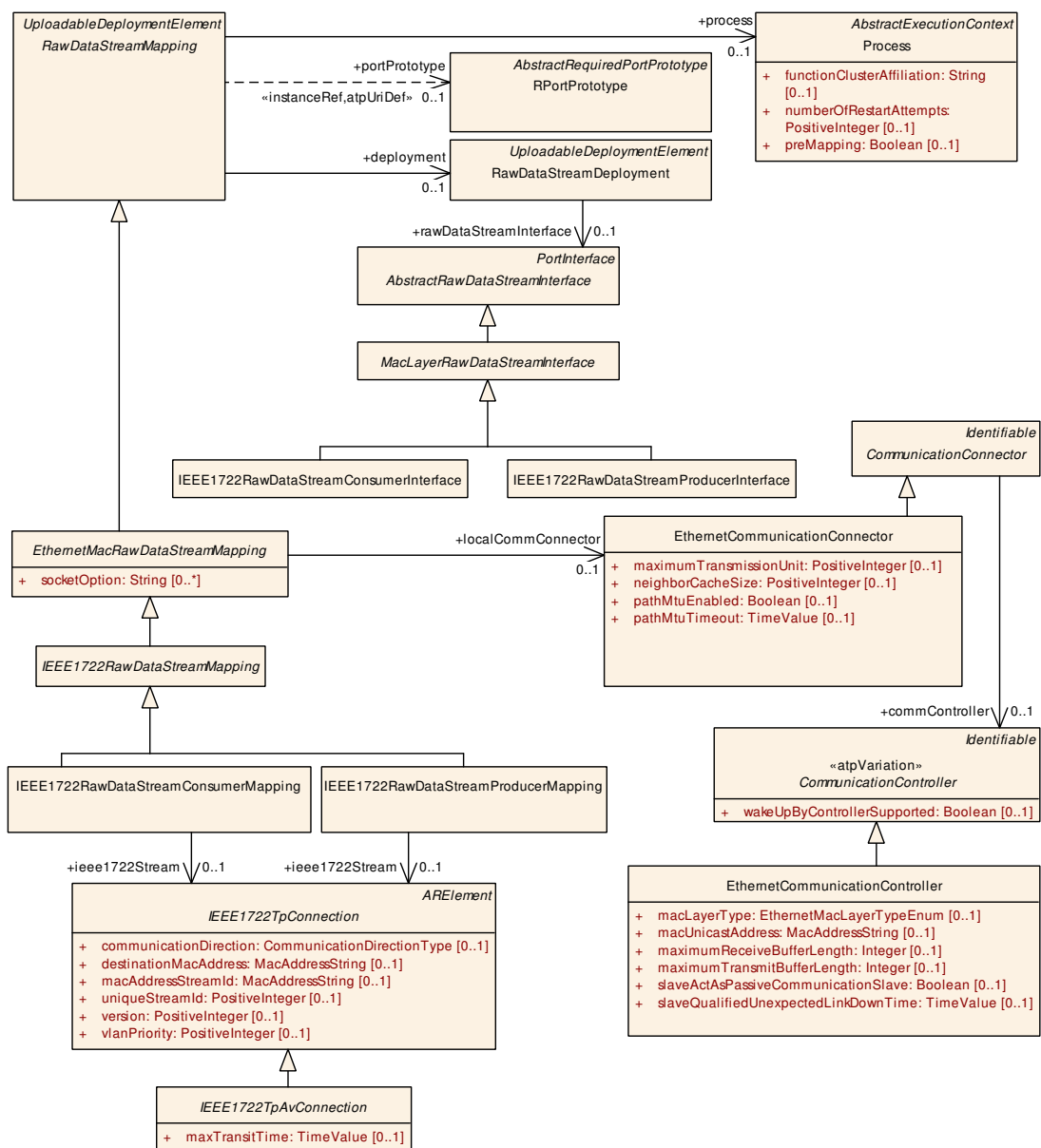


Figure 14.7: Modeling of the IEEE1722 Raw Data Stream mapping

[TPS_MANI_03675] Consuming an IEEE1722 stream*Status:* DRAFT

[The [IEEE1722RawDataStreamConsumerMapping](#) defines that all received payload of the referenced [ieee1722Stream](#) [IEEE1722TpConnection](#) shall be consumed at the mapped [IEEE1722RawDataStreamConsumerInterface](#) (defined via [IEEE1722RawDataStreamConsumerMapping.deployment.RawDataStreamDeployment.rawDataStreamInterface](#)).]

[TPS_MANI_03676] Producing an IEEE1722 stream*Status:* DRAFT

[The [IEEE1722RawDataStreamProducerMapping](#) defines that all payload provided to the mapped [IEEE1722RawDataStreamProducerInterface](#) (defined via [IEEE1722RawDataStreamProducerMapping.deployment.RawDataStreamDeployment.rawDataStreamInterface](#)) shall be sent to the [ieee1722Stream](#) [IEEE1722TpConnection](#).]

Class	IEEE1722RawDataStreamConsumerMapping			
Note	This meta-class represents the ability to map a consumer PortPrototype to an Ethernet-Mac-layer IEEE1722 based communication. Tags: atp.Status=candidate atp.recommendedPackage=RawDataStreamingMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , EthernetMacRawDataStreamMapping , IEEE1722RawDataStreamMapping , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
ieee1722Stream	IEEE1722TpConnection	0..1	ref	Reference to the IEEE1722TpConnection. Tags: atp.Status=candidate

Table 14.13: IEEE1722RawDataStreamConsumerMapping**[constr_3775] Existence of [IEEE1722RawDataStreamConsumerMapping. ieee1722Stream](#)***Status:* DRAFT*Imposition time:* [IT_Mani](#)

[The reference [IEEE1722RawDataStreamConsumerMapping. ieee1722Stream](#) shall exist.]

Class	IEEE1722RawDataStreamProducerMapping			
Note	This meta-class represents the ability to map a producer PortPrototype to an Ethernet-Mac-layer IEEE1722 based communication. Tags: atp.Status=candidate atp.recommendedPackage=RawDataStreamingMappings This Class is only used by the AUTOSAR Adaptive Platform.			





Class	IEEE1722RawDataStreamProducerMapping			
Base	ARElement , ARObject , CollectableElement , EthernetMacRawDataStreamMapping , IEEE1722RawDataStreamMapping , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
ieee1722Stream	IEEE1722TpConnection	0..1	ref	Reference to the IEEE1722TpConnection. Tags: atp.Status=candidate

Table 14.14: IEEE1722RawDataStreamProducerMapping

[constr_3776] Existence of [IEEE1722RawDataStreamProducerMapping.ieee1722Stream](#)

Status: DRAFT

Imposition time: [IT_Mani](#)

[The reference [IEEE1722RawDataStreamProducerMapping.ieee1722Stream](#) shall exist.]

14.4.2 Raw Data Streams for Control Messages over Ethernet using IEEE1722 ACF Protocol

The IEEE1722 ACF Protocol according to [19, IEEE 1722-2016] supports two kinds of message formats:

- Non-Time-Synchronous Control Format, where no presentation time is sent, and
- Time-Synchronous Control Format, where a presentation time is sent in the message.

The composition of the IEEE1722 ACF message is in control of the application producing the messages. Especially the accumulation of several CAN and/or LIN frames into one IEEE1722 ACF message has to be handled by the application.

Whether Non-Time-Synchronous Control Format or Time-Synchronous Control Format is actually used is defined by the attribute [IEEE1722TpAcfConnection.acfMaxTransitTime](#).

[TPS_MANI_03677] Producing a Non-Time-Synchronous Control Format messages

Status: DRAFT

[If an IEEE1722 ACF stream message shall be sent and the attribute [IEEE1722TpAcfConnection.acfMaxTransitTime](#) is not defined, then the IEEE1722 ACF stream message shall be sent according to the “Non-Time-Synchronous Control Format” of [19, IEEE 1722-2016].]

[TPS_MANI_03678] Producing a Time-Synchronous Control Format messages

Status: DRAFT

[If an IEEE1722 ACF stream message shall be sent and the attribute `IEEE1722TpAcfConnection.acfMaxTransitTime` is defined, then the IEEE1722 ACF stream message shall be sent according to the “Time-Synchronous Control Format” of [19, IEEE 1722-21016].

The value used for the presentation time shall be calculated by taking the current time from the `GlobalTimeDomain` referenced by `IEEE1722TpConnection.globalTimeDomain` and adding the value `IEEE1722TpAcfConnection.acfMaxTransitTime`.]

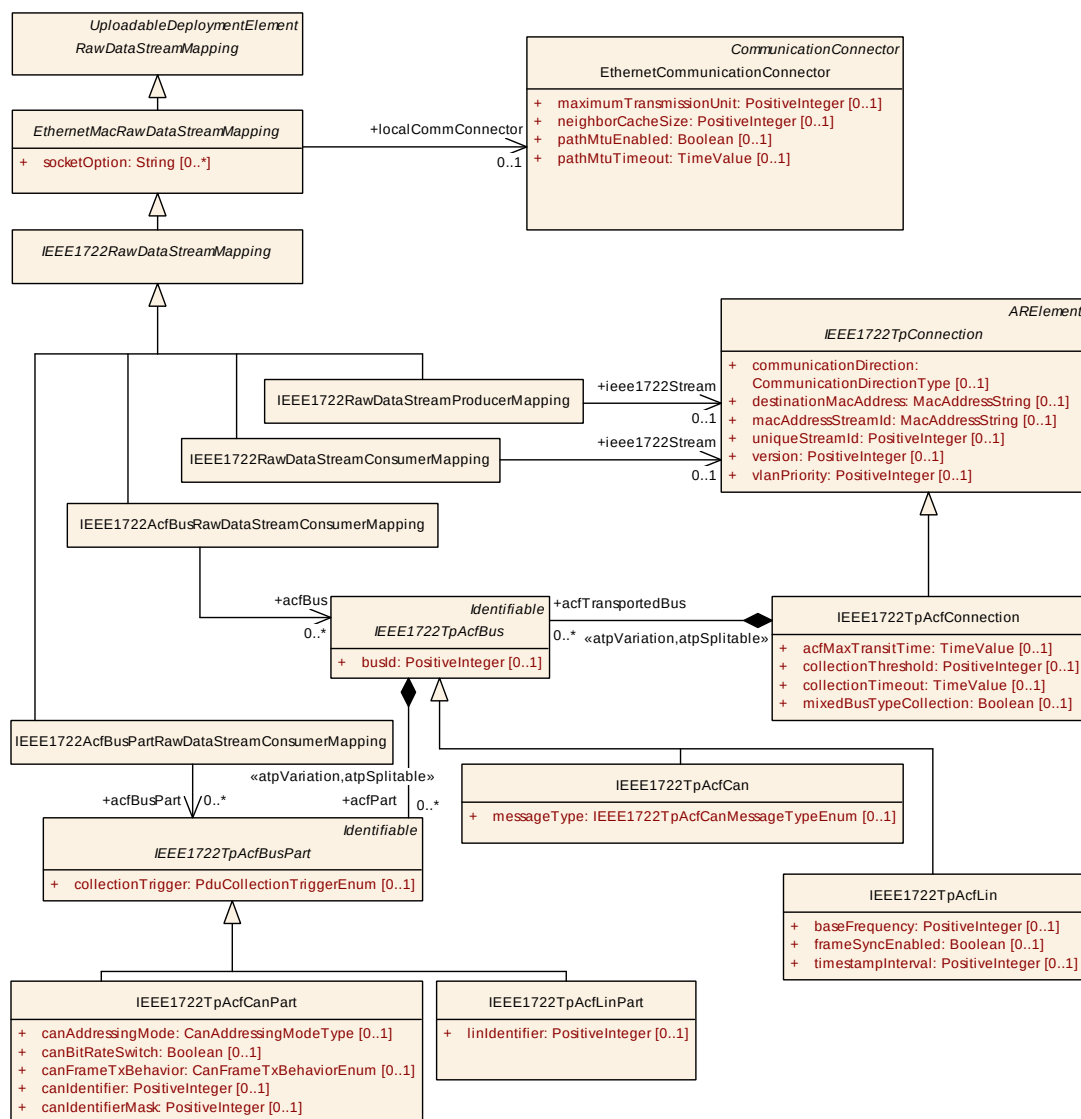


Figure 14.8: Modeling of the IEEE1722 Raw Data Stream ACF mapping

For the reception of IEEE1722 ACF messages there are several filters available to reduce the number of indicated CAN and/or LIN frames to the application.

[TPS_MANI_03679] Consuming all IEEE1722 ACF messages of an IEEE1722 ACF stream

Status: DRAFT

[If all CAN and/or LIN frames contained in a IEEE1722 ACF stream shall be consumed by the application, then an [IEEE1722RawDataStreamConsumerMapping](#) shall be defined to indicate that the whole IEEE1722 ACF stream shall be available to the application.]

[TPS_MANI_03680] Consuming a set of buses from an IEEE1722 ACF stream

Status: DRAFT

[If all frames from a set of CAN and/or LIN buses contained in an IEEE1722 ACF stream shall be consumed by the application, then an [IEEE1722AcfBusRawDataStreamConsumerMapping](#) shall be defined to indicate that all frames of the referenced [IEEE1722TpAcfBuses](#) ([IEEE1722AcfBusRawDataStreamConsumerMapping.acfBus](#)) shall be available to the application.]

[TPS_MANI_03681] Consuming a set of frames from an IEEE1722 ACF stream

Status: DRAFT

[If only a dedicated set of frames contained in an IEEE1722 ACF stream shall be consumed by the application, then an [IEEE1722AcfBusPartRawDataStreamConsumerMapping](#) shall be defined to indicate that only the frames ([IEEE1722TpAcfBusParts](#)) referenced by [IEEE1722AcfBusPartRawDataStreamConsumerMapping.acfBusPart](#) shall be available to the application.]

Class	IEEE1722AcfBusRawDataStreamConsumerMapping			
Note	This meta-class represents the ability to map a consumer PortPrototype to an Ethernet-Mac-layer IEEE1722 ACF based communication for a whole bus (Can or Lin). Tags: atp.Status=candidate atp.recommendedPackage=RawDataStreamingMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , EthernetMacRawDataStreamMapping , IEEE1722RawDataStreamMapping , Identifiable , MultilanguageReferrable , PackageableElement , RawDataStreamMapping , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
acfBus	IEEE1722TpAcfBus	*	ref	Reference to the ACF buses which shall be handled by this mapping. Tags: atp.Status=candidate

Table 14.15: IEEE1722AcfBusRawDataStreamConsumerMapping

**[constr_3777] Existence of IEEE1722AcfBusRawDataStreamConsumerMapping .
acfBus***Status:* DRAFT*Imposition time:* IT_Mani[At least one reference IEEE1722AcfBusRawDataStreamConsumerMapping .
acfBus shall exist.]

Class	IEEE1722AcfBusPartRawDataStreamConsumerMapping			
Note	This meta-class represents the ability to map a consumer PortPrototype to an Ethernet-Mac-layer IEEE1722 ACF based communication for a whole bus (Can or Lin). Tags: atp.Status=candidate atp.recommendedPackage=RawDataStreamingMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, EthernetMacRawDataStreamMapping, IEEE1722RawDataStreamMapping, Identifiable, MultilanguageReferrable, PackageableElement, RawDataStreamMapping, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
acfBusPart	IEEE1722TpAcfBusPart	*	ref	Reference to the ACF bus parts (Can or Lin frames) which shall be handled by this mapping. Tags: atp.Status=candidate

Table 14.16: IEEE1722AcfBusPartRawDataStreamConsumerMapping**[constr_3778] Existence of IEEE1722AcfBusPartRawDataStreamConsumerMapping .
acfBusPart***Status:* DRAFT*Imposition time:* IT_Mani[At least one reference IEEE1722AcfBusPartRawDataStreamConsumerMapping .
acfBusPart shall exist.]

15 Cross-FunctionalCluster interaction

[TPS_MANI_03268] Semantics of **FunctionalClusterInteractsWithFunctionalClusterMapping** [Abstract meta-class **FunctionalClusterInteractsWithFunctionalClusterMapping** provides an anchor for the specification of interaction between two functional clusters.

The identification of the interaction use case towards the functional cluster implementation is done by using an **InstanceSpecifier** of the concrete subclass of **FunctionalClusterInteractsWithFunctionalClusterMapping** that is used to define the concrete interaction.]

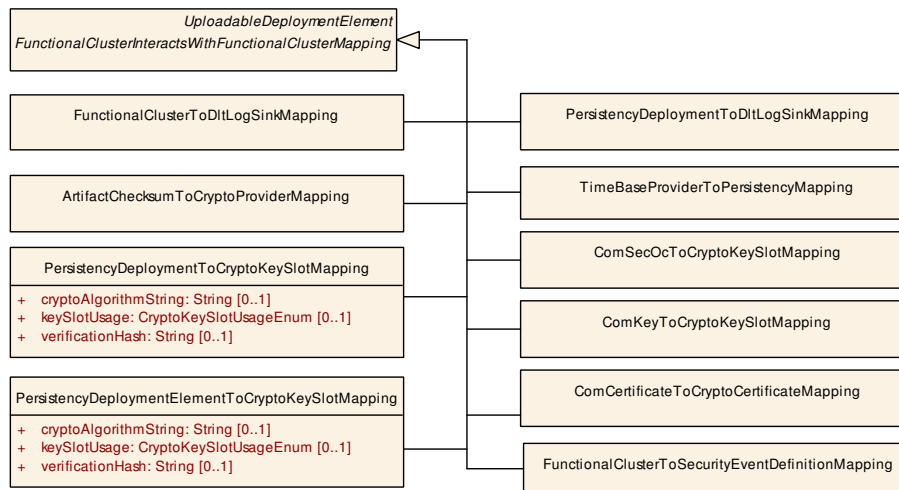


Figure 15.1: FunctionalClusterInteractsWithFunctionalClusterMapping Overview

Class	FunctionalClusterInteractsWithFunctionalClusterMapping (abstract)			
Note	This meta-class identifies a relation between functional clusters on the adaptive platform such one functional cluster can call APIs of the other functional cluster. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Subclasses	ArtifactChecksumToCryptoProviderMapping , ComCertificateToCryptoCertificateMapping , ComKeyToCryptoKeySlotMapping , ComSecOcToCryptoKeySlotMapping , FunctionalClusterInteractsWithDiagnosticEventMapping , FunctionalClusterInteractsWithPersistencyDeploymentMapping , FunctionalClusterToDltLogSinkMapping , FunctionalClusterToSecurityEventDefinitionMapping , NmInteractsWithSmMapping , PersistencyDeploymentElementToCryptoKeySlotMapping , PersistencyDeploymentToCryptoKeySlotMapping , PersistencyDeploymentToDltLogSinkMapping , SmInteractsWithNmMapping , TimeBaseProviderToPersistencyMapping , UcmToTimeBaseResourceMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 15.1: FunctionalClusterInteractsWithFunctionalClusterMapping

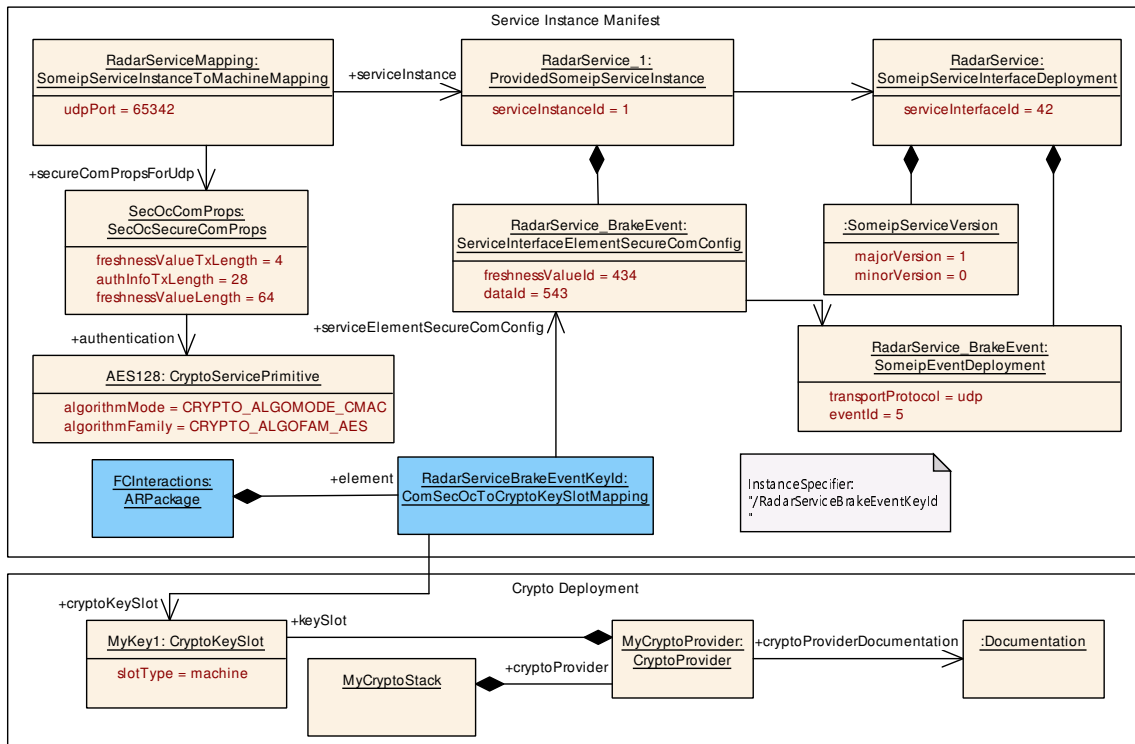


Figure 15.2: Example for the usage of **FunctionalClusterInteractsWithFunctionalClusterMapping**

In case of an application the model-path to an **PortPrototype** that is referencing a specific **PortInterface** defines the **InstanceSpecifier** that is used as identification towards the functional cluster implementation.

In case of a **FunctionalCluster** interaction the **PortPrototype** is not available. Therefore the path to a mapping element that is derived from **FunctionalClusterInteractsWithFunctionalClusterMapping** is used to define the **InstanceSpecifier** that is used in the API call.

The following figure shows the supported **FunctionalClusterInteractsWithFunctionalClusterMapping** subclasses that are available in the model.

The **Figure 15.2** shows an example for the usage of **FunctionalClusterInteractsWithFunctionalClusterMapping**. In this example, the Service Instance Manifest describes a configuration for a **ProvidedSomeipServiceInstance** that contains an **Event** that is protected by **SecOC**.

Inside of the Service Instance Manifest the “RadarServiceBrakeEventKeyId” represents the **FunctionalClusterInteractsWithFunctionalClusterMapping** that is located in the **ARPackage** “FCInteractions”.

These two elements in the manifest define the **InstanceSpecifier** “/RadarServiceBrakeEventKeyId” (see **Figure 15.2**) that is used in the Crypto API call from the Communication Management. This **InstanceSpecifier** is resolved to a concrete **CryptoKeySlot** with the information that is available in the Crypto target-configuration.

15.1 Com Certificate To Crypto Certificate Mapping

[TPS_MANI_03269] **Semantics of ComCertificateToCryptoCertificateMapping** [The meta-class `ComCertificateToCryptoCertificateMapping` provides an anchor for the specification of interaction between eligible `AdaptiveModuleInstantiations` (see [TPS_MANI_01458]) and the `CryptoModuleInstantiation` and is used to map a `CryptoServiceCertificate` to a `CryptoCertificate` defined in the Crypto Stack.]

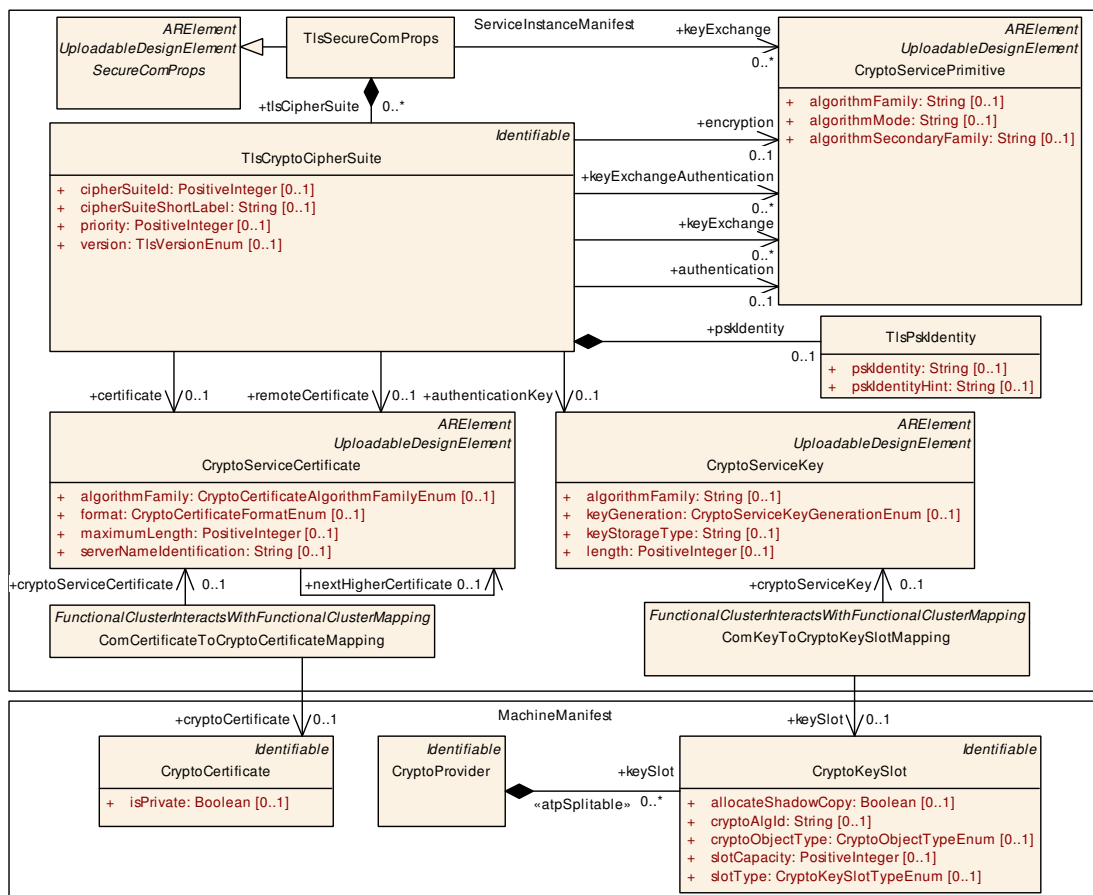


Figure 15.3: Mapping of TLS config elements to crypto objects in the crypto stack

Figure 15.3 shows the `ComCertificateToCryptoCertificateMapping` used to assign a `CryptoServiceCertificate` defined in the TLS configuration to a `CryptoCertificate` in the Crypto Stack.

[TPS_MANI_01458] **Usage of attribute ComCertificateToCryptoCertificateMapping.category** [The problem solved by `ComCertificateToCryptoCertificateMapping` is quite general and is **not** restricted to the `CmModuleInstantiation`.

The possibilities for reuse of `ComCertificateToCryptoCertificateMapping` for other `AdaptiveModuleInstantiations` are indicated by the value of the optional attribute `category`.

Standardized values of attribute `category` are:

- CM
- DOIP
- LOG_AND_TRACE
- SOVD

]

Class	ComCertificateToCryptoCertificateMapping			
Note	This meta-class maps the CryptoServiceCertificate defined in AdaptiveModuleInstantiation (see [TPS_MANI_01458]) to the Crypto Certificate defined in the Crypto Stack. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, FunctionalClusterInteractsWithFunctionalClusterMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoCertificate	CryptoCertificate	0..1	ref	Reference to the CryptoCertificate in the Crypto Stack.
cryptoServiceCertificate	CryptoServiceCertificate	0..1	ref	Reference to the CryptoServiceCertificate in eligible AdaptiveModuleInstantiation (see [TPS_MANI_01458]).

Table 15.2: ComCertificateToCryptoCertificateMapping

15.2 Com Key To Crypto Key Slot Mapping

[TPS_MANI_03270] **Semantics of ComKeyToCryptoKeySlotMapping** [The meta-class `ComKeyToCryptoKeySlotMapping` provides an anchor for the specification of interaction between eligible `AdaptiveModuleInstantiations` (see [TPS_MANI_01459]) and the `CryptoModuleInstantiation` and is used to map a `CryptoServiceKey` to a `CryptoKeySlot` defined in the Crypto Stack.]

[TPS_MANI_01459] **Usage of attribute ComKeyToCryptoKeySlotMapping.category** [The problem solved by `ComKeyToCryptoKeySlotMapping` is quite general and is **not** restricted to the `CmModuleInstantiation`.

The possibilities for reuse of `ComKeyToCryptoKeySlotMapping` for other `AdaptiveModuleInstantiations` are indicated by the value of the optional attribute `category`.

Standardized values of attribute `category` are:

- CM
- DOIP
- LOG_AND_TRACE

- SOVD

]

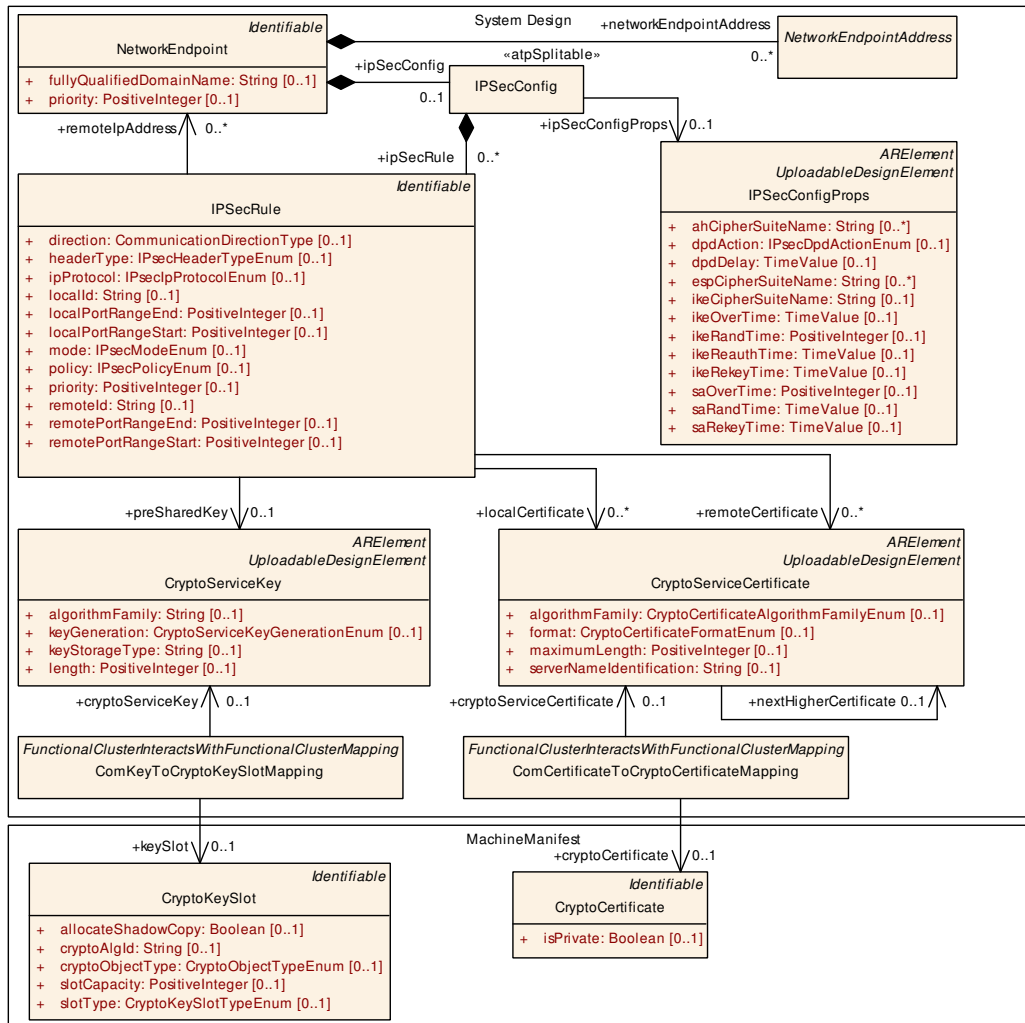


Figure 15.4: Mapping of IPsec config elements to crypto objects in the crypto stack

Class	ComKeyToCryptoKeySlotMapping			
Note	This meta-class maps the CryptoServiceKey defined in eligible AdaptiveModuleInstantiation (see [TPS_MANI_01459]) to the CryptoKeySlot defined in the Crypto Stack. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObjekt, CollectableElement, FunctionalClusterInteractsWithFunctionalClusterMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoServiceKey	CryptoServiceKey	0..1	ref	Reference to the CryptoServiceKey in eligible Adaptive ModuleInstantiation (see [TPS_MANI_01459])
keySlot	CryptoKeySlot	0..1	ref	Reference to the CryptoKeySlot in the Crypto Stack.

Table 15.3: ComKeyToCryptoKeySlotMapping

Figure 15.4 shows the `ComKeyToCryptoKeySlotMapping` used to assign a `CryptoServiceKey` defined in the IPsec configuration to `CryptoKeySlot` in the Crypto Stack.

15.3 Com SecOc To Crypto Key Slot Mapping

[TPS_MANI_03271] Semantics of ComSecOcToCryptoKeySlotMapping [The meta-class `ComSecOcToCryptoKeySlotMapping` provides an anchor for the specification of interaction between the COM FunctionalCluster and the Crypto FunctionalCluster and is used to map a `ServiceInterfaceElementSecureComConfig` defined in COM to a `CryptoKeySlot` defined in the Crypto Stack. |

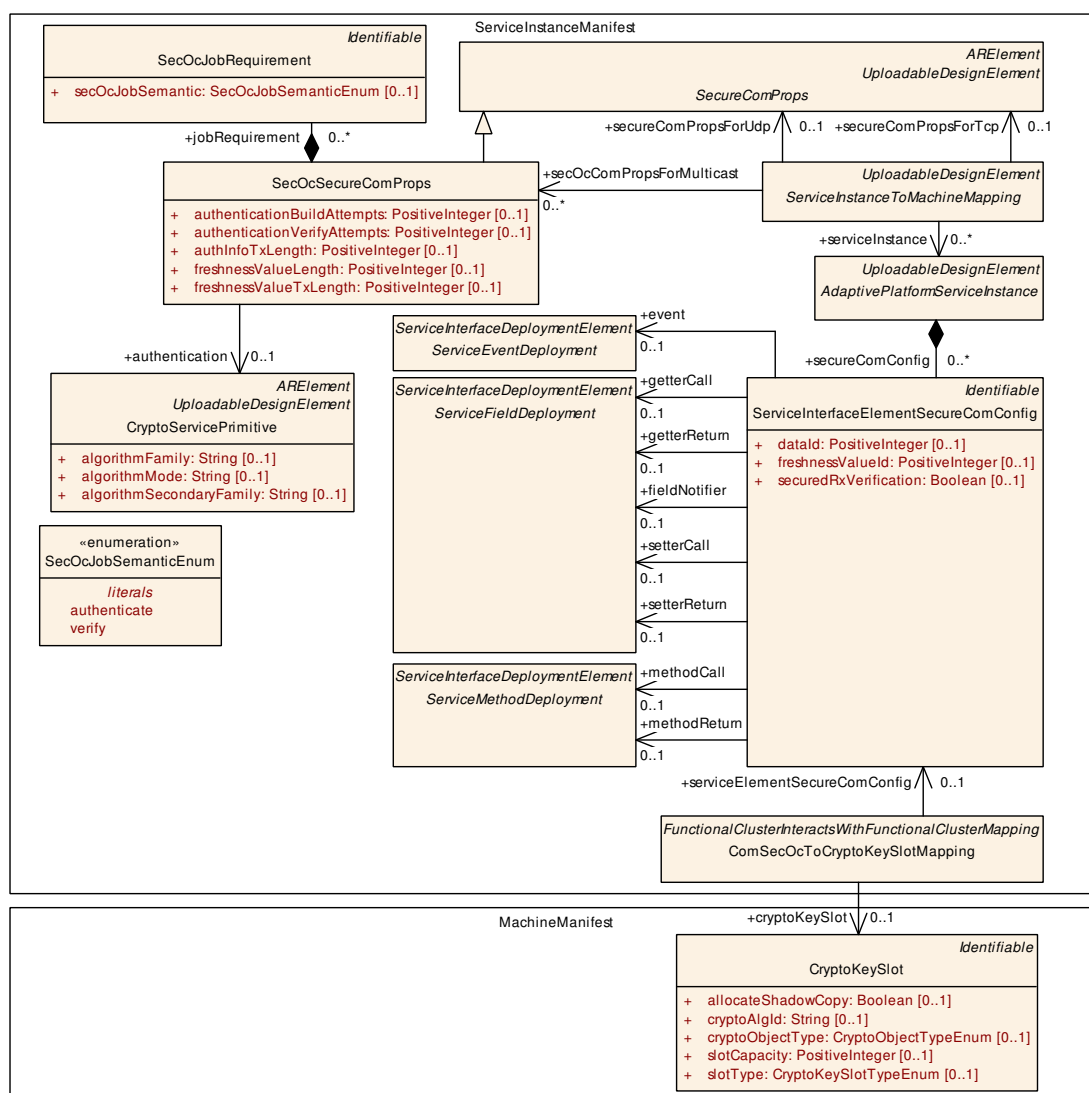


Figure 15.5: Mapping of SecOC config elements to crypto objects in the crypto stack

Figure 15.5 shows the `ComSecOcToCryptoKeySlotMapping` used to assign a `ServiceInterfaceElementSecureComConfig` defined in the SecOC configuration to `CryptoKeySlot` in the Crypto Stack.

Class	ComSecOcToCryptoKeySlotMapping			
Note	This meta-class maps the <code>ServiceElementSecureComConfig</code> defined in the COM deployment to the <code>CryptoKeySlot</code> defined in the Crypto Stack. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoKeySlot	CryptoKeySlot	0..1	ref	Reference to the <code>CryptoKeySlot</code> in the Crypto Stack.
serviceElementSecureComConfig	ServiceInterfaceElementSecureComConfig	0..1	ref	Reference to the <code>ServiceInterfaceElementSecureComConfig</code> element in the COM config.

Table 15.4: ComSecOcToCryptoKeySlotMapping

15.4 Persistency Deployment To Crypto Key Slot Mapping

[TPS_MANI_03272] **Semantics of `PersistencyDeploymentToCryptoKeySlotMapping`** [The meta-class `PersistencyDeploymentToCryptoKeySlotMapping` provides an anchor for the specification of interaction between the Persistency `FunctionalCluster` and the Crypto `FunctionalCluster` and is used to map a `PersistencyDeployment` defined in Persistency to a `CryptoKeySlot` defined in the Crypto Stack.]

Class	PersistencyDeploymentToCryptoKeySlotMapping			
Note	This meta-class represents the ability to define a mapping between the <code>PersistencyDeployment</code> and a <code>CryptoKeySlot</code> . Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoAlgorithmString	String	0..1	attr	This attribute defines the cryptographic algorithm used for hashing, encryption, decryption, signature/MAC verification, or MAC generation.
cryptoKeySlot	CryptoKeySlot	0..1	ref	This reference represents the mapped <code>CryptoKeySlot</code> .
keySlotUsage	CryptoKeySlotUsageEnum	0..1	attr	This attribute defines the role of the keySlot assignment.
persistencyDeployment	PersistencyDeployment	0..1	ref	This reference represents the mapped <code>PersistencyDeployment</code> .
verificationHash	String	0..1	attr	This attribute defines the hash of the storage used in case of verification.

Table 15.5: PersistencyDeploymentToCryptoKeySlotMapping

15.5 Persistency Deployment Element To Crypto Key Slot Mapping

[TPS_MANI_03273] Semantics of **PersistencyDeploymentElementToCryptoKeySlotMapping** [The meta-class **PersistencyDeploymentElementToCryptoKeySlotMapping** provides an anchor for the specification of interaction between the Persistency FunctionalCluster and the Crypto FunctionalCluster and is used to map a **PersistencyDeploymentElement** defined in Persistency to a **CryptoKeySlot** defined in the Crypto Stack.]

Class	PersistencyDeploymentElementToCryptoKeySlotMapping			
Note	This meta-class represents the ability to define a mapping between the PersistencyDeploymentElement and a CryptoKeySlot. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoAlgorithmString	String	0..1	attr	This attribute defines the cryptographic algorithm used for hashing, encryption, decryption, signature/MAC verification, or MAC generation.
cryptoKeySlot	CryptoKeySlot	0..1	ref	This reference represents the mapped CryptoKeySlot.
keySlotUsage	CryptoKeySlotUsageEnum	0..1	attr	This attribute defines the role of the keySlot assignment.
persistencyDeploymentElement	PersistencyDeploymentElement	0..1	ref	This reference represents the mapped Persistency Deployment.
verificationHash	String	0..1	attr	This attribute defines the hash of the storage used in case of verification.

Table 15.7: PersistencyDeploymentElementToCryptoKeySlotMapping

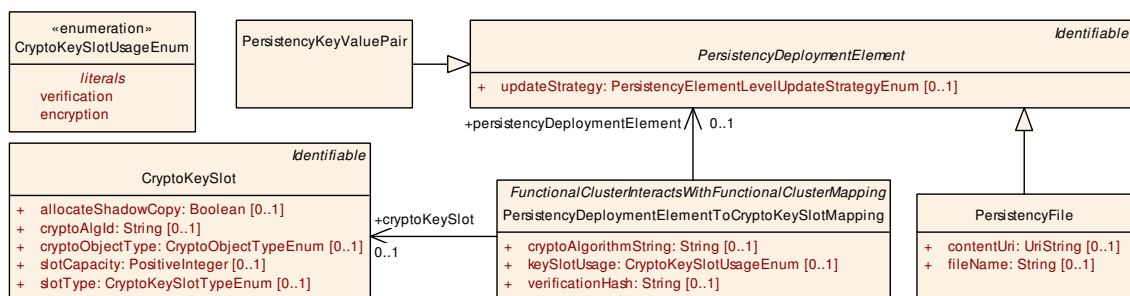


Figure 15.7: Mapping of PersistencyDeploymentElement to crypto objects in the crypto stack

15.6 Persistency Deployment To Dlt Log Sink Mapping

[TPS_MANI_03276] Semantics of meta-class **PersistencyDeploymentToDltLogSinkMapping** [The meta-class **PersistencyDeploymentToDltLogSinkMapping** provides an anchor for the specification of interaction between the Persistency FunctionalCluster and Log & Trace and is used to map a **PersistencyDeployment** defined in Persistency to a **DltLogSink** defined in the **LogAndTraceInstantiation**.]

Class	PersistencyDeploymentToDltLogSinkMapping			
Note	This meta-class represents the ability to define a mapping between the PersistencyDeployment and a DltLogSink. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dltContext	DltContext	0..1	ref	Reference to the DltContext to which this mapping belongs.
logSink	DltLogSink	0..1	ref	Reference to the DltLogSink to which the Persistency Deployment is mapped
persistency Deployment	PersistencyDeployment	0..1	ref	This reference represents the mapped Persistency Deployment.

Table 15.8: PersistencyDeploymentToDltLogSinkMapping

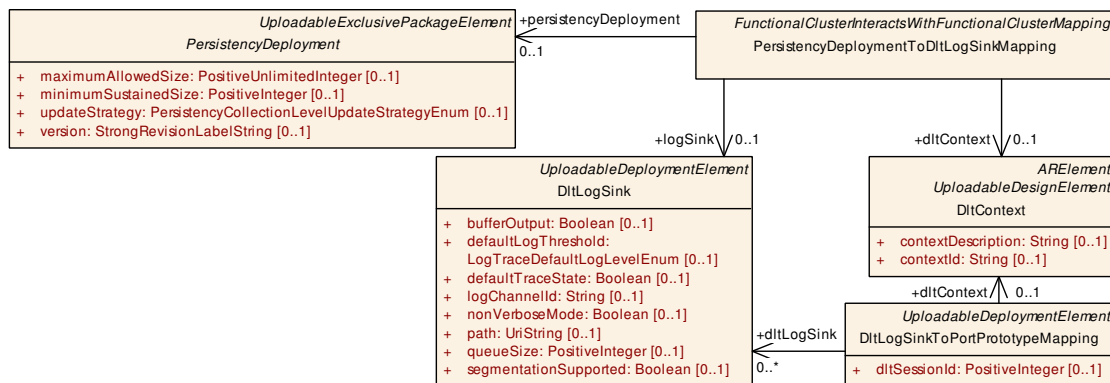


Figure 15.8: Mapping of PersistencyDeployment to DltLogSink

15.7 Functional Cluster To Dlt Log Sink Mapping

[TPS_MANI_01476] Semantics of meta-class **FunctionalClusterToDltLogSinkMapping** [The meta-class **FunctionalClusterToDltLogSinkMapping** provides an anchor for the specification of interaction between a given functional cluster and Log & Trace and is used to map a functional cluster to a **DltLogSink** defined in the **LogAndTraceInstantiation**.]

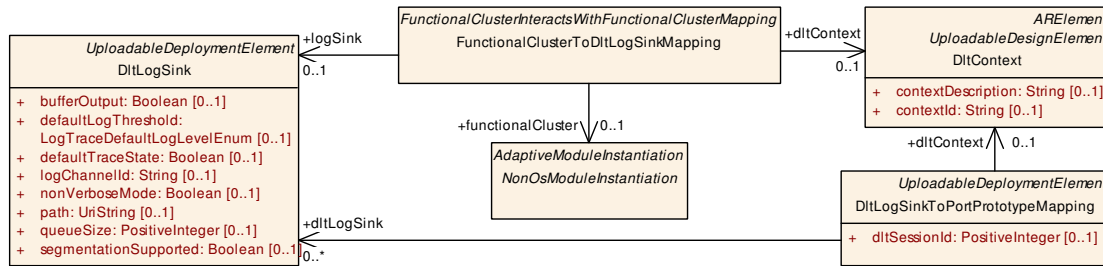


Figure 15.9: Mapping of functional cluster to DltLogSink

Class	FunctionalClusterToDltLogSinkMapping			
Note	This meta-class represents the ability to define a mapping between a functional cluster, represented by a NonOsModuleInstantiation, and a DltLogSink. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement, ARObject, CollectableElement, FunctionalClusterInteractsWithFunctionalClusterMapping, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDeploymentElement, UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dltContext	DltContext	0..1	ref	Reference to the DltContext to which this mapping belongs.
functional Cluster	NonOsModuleInstantiation	0..1	ref	This reeference indentifies the functional cluster that wants to utilize logging.
logSink	DltLogSink	0..1	ref	Reference to the DltLogSink to which the functional cluster is mapped.

Table 15.9: FunctionalClusterToDltLogSinkMapping

15.8 Ucm To Time Base Resource Mapping

[TPS_MANI_01374] Semantics of [UcmToTimeBaseResourceMapping](#) [The meta-class [UcmToTimeBaseResourceMapping](#) provides an anchor for the specification of interaction between the Ucm Functional Cluster and Time Sync Functional Cluster and is used to identify the source of timestamp-information in the UCM.]

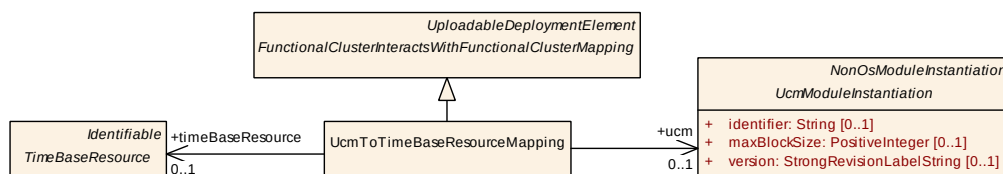


Figure 15.10: Mapping of the Ucm Functional Cluster to the Time Sync Functional Cluster

Class	UcmToTimeBaseResourceMapping			
Note	This meta-class maps the UCM Module Instantiation to the TimeSync Module Instantiation. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
timeBase Resource	TimeBaseResource	0..1	ref	This reference identifies the relevant TimeBaseResource.
ucm	UcmModuleInstantiation	0..1	ref	This reference identifies the relevant UcmModule Instantiation.

Table 15.10: UcmToTimeBaseResourceMapping

15.9 Functional Cluster Interacts With Persistency Deployment Mapping

[TPS_MANI_01379] Semantics of meta-class [FunctionalClusterInteractsWithPersistencyDeploymentMapping](#) [Meta-class [FunctionalClusterInteractsWithPersistencyDeploymentMapping](#) provides the ability to specify that (and how) a functional cluster that is implemented as a **library component** wants to access persistently stored data (formalized by meta-class [PersistencyDeployment](#)) on the target platform.]

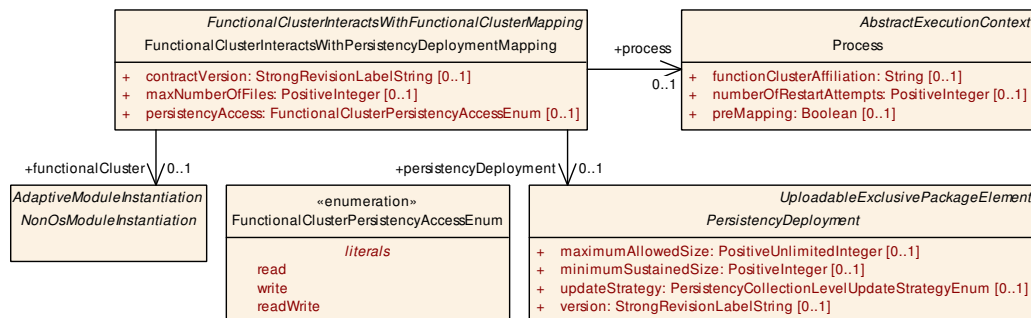


Figure 15.11: Mapping of any non-OS Functional Cluster to the Persistency Functional Cluster

Please note that the functional clusters are typically not dealing with modeled data types and therefore a formalized relation of [FunctionalClusterInteractsWithPersistencyDeploymentMapping](#) to a subclass of [CppImplementationDataType](#) is not foreseen.

Class	FunctionalClusterInteractsWithPersistencyDeploymentMapping			
Note	This meta-class represents the ability to define a mapping between any functional cluster modeled as a subclass of NonOsModuleInstantiation and a PersistencyDeployment. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
contractVersion	StrongRevisionLabelString	0..1	attr	This attribute represents the contract version that is used to determine whether the Persistency configuration experienced structural changes and is also used for the check for data type compatibility.
functional Cluster	NonOsModuleInstantiation	0..1	ref	This reference identifies the client functional cluster that wants to use persistency.
maxNumberOf Files	PositiveInteger	0..1	attr	This attribute represents the definition of an upper bound for the handling of files at run-time in the context of the enclosing FunctionalClusterInteractsWithPersistencyDeploymentMapping.
persistency Access	FunctionalClusterPersistencyAccessEnum	0..1	attr	This attribute represents the definition of the persistency access of all kinds of persisted data at run-time in the context of the enclosing FunctionalClusterInteractsWithPersistencyDeploymentMapping.
persistency Deployment	PersistencyDeployment	0..1	ref	This reference identifies the applicable Persistency Deployment.
process	Process	0..1	ref	"This reference identifies the applicable process.

Table 15.11: FunctionalClusterInteractsWithPersistencyDeploymentMapping

[constr_10484] Existence of [FunctionalClusterInteractsWithPersistencyDeploymentMapping.contractVersion](#)*Imposition time:* [IT_Mani](#)[In the context of [FunctionalClusterInteractsWithPersistencyDeploymentMapping](#), the attribute in the role [contractVersion](#) shall exist.]

Please note that the number of values of [FunctionalClusterPersistencyAccessEnum](#) intentionally (because of the existence of different use cases) differs from the number of values of the related [PersistencyAccessEnum](#).

Enumeration	FunctionalClusterPersistencyAccessEnum
Note	This meta-class provides possible values about how functional clusters may use persistency with respect to the direction of access. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	FunctionalClusterInteractsWithPersistencyDeploymentMapping.persistencyAccess
Literal	Description
read	Functional Cluster wants to access persistency with a read semantics. Tags: atp.EnumerationLiteralIndex=0
readWrite	Functional Cluster wants to access persistency with a read and write semantics. Tags: atp.EnumerationLiteralIndex=2
write	Functional Cluster wants to access persistency with a write semantics. Tags: atp.EnumerationLiteralIndex=1

Table 15.12: FunctionalClusterPersistencyAccessEnum

15.10 Adaptive Module Instantiation to Security Event Definition Mapping

[TPS_MANI_03324] Semantics of `FunctionalClusterToSecurityEventDefinitionMapping`

Status: DRAFT

[The meta-class `FunctionalClusterToSecurityEventDefinitionMapping` provides an anchor for the specification of interaction between a Functional Cluster that is modeled as a `AdaptiveModuleInstantiation` and the IDS (Intrusion Detection System Manager).

`FunctionalClusterToSecurityEventDefinitionMapping` is used to map a security event (formalized by meta-class `SecurityEventDefinition`) and the Functional Cluster that reports this security event.]

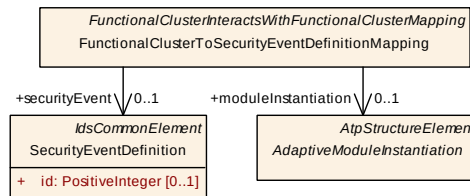


Figure 15.12: Mapping of the interaction between a Functional Cluster and the IdsM

Class	FunctionalClusterToSecurityEventDefinitionMapping			
Note	This meta-class represents the ability to define a mapping between the <code>SecurityEventDefinition</code> and the Module Instantiation that reports the security event. Tags: atp.recommendedPackage=FunctionalClusterToSecurityEventDefinitionMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>FunctionalClusterInteractsWithFunctionalClusterMapping</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code> , <code>UploadableDeploymentElement</code> , <code>UploadablePackageElement</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
module Instantiation	<code>AdaptiveModuleInstantiation</code>	0..1	ref	Reference to the <code>AdaptiveModuleInstantiation</code> that reports the <code>SecurityEvent</code> .
securityEvent	<code>SecurityEventDefinition</code>	0..1	ref	Reference to the <code>SecurityEvent</code> that is reported by the <code>AdaptiveModuleInstantiation</code> . Tags: atp.Status=candidate

Table 15.13: `FunctionalClusterToSecurityEventDefinitionMapping`

[constr_5381] Modeling of Security Event reports by `FunctionalCluster` shall not be done via `ProcessToMachineMapping`

Imposition time: `IT_Mani`

[If a `Process` is mapped by the `ProcessToMachineMapping` and this `ProcessToMachineMapping` references a `NonOsModuleInstantiation` in the role `nonOsModuleInstantiation`, then this `Process` shall not be referenced by a `SecurityEventMapping` in the role `process`.]

15.11 State Management interacts with Network Management and vice versa

The interaction between state management and network management is bi-directional, but the purpose of each direction is different enough that a dedicated modeling of the configuration of each direction makes sense.

15.11.1 State Management interacts with Network Management

State management interacts with network management to request the network management to switch to a specific communication state (see also [Chapter 12.14.5.4](#)).

In this interaction, state management acts like a functional cluster rather than an application and therefore the modeling of a subclass of [FunctionalClusterInteractsWithFunctionalClusterMapping](#) needs to be created: [SmInteractsWithNmMapping](#).

[TPS_MANI_01446] Semantics of meta-class [SmInteractsWithNmMapping](#)

Status: DRAFT

[Meta-class [SmInteractsWithNmMapping](#) supports the interaction between state management and network management by mapping a [StateManagementNmActionItem](#) (which obviously represents the state management) to an [NmNetworkHandle](#) (representing the network management).]

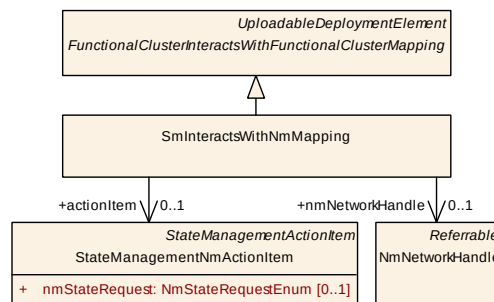


Figure 15.13: Mapping of the interaction between state management and network management

Class	SmInteractsWithNmMapping
Note	This mapping represents an interaction from state management to network management. Tags: atp.Status=draft atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement
Aggregated by	ARPackage.element





Class	SmInteractsWithNmMapping			
Attribute	Type	Mult.	Kind	Note
actionItem	StateManagementNmActionItem	0..1	ref	This reference identifies the action item with which the state management wants to interact with network management. Tags: atp.Status=draft
nmNetworkHandle	NmNetworkHandle	0..1	ref	This reference identifies the network management handle that is affected by the interaction with the state management. Tags: atp.Status=draft

Table 15.14: SmInteractsWithNmMapping

[constr_10513] Existence of the reference in the role `SmInteractsWithNmMapping.actionItem`

Status: DRAFT

Imposition time: IT_Mani

[For each `SmInteractsWithNmMapping`, the reference in the role `actionItem` shall exist.]

[constr_10514] Existence of the reference in the role `SmInteractsWithNmMapping.nmNetworkHandle`

Status: DRAFT

Imposition time: IT_Mani

[For each `SmInteractsWithNmMapping`, the reference in the role `nmNetworkHandle` shall exist.]

15.11.2 Network Management interacts with State Management

Network management interacts with state management to notify the state management that a specific communication state (see also [Chapter 12.14.5.4](#)) has been switched to.

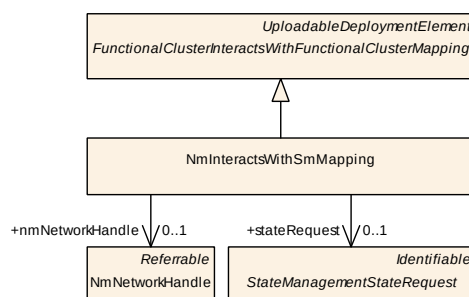


Figure 15.14: Mapping of the interaction between network management and state management

This may happen, for example, if the communication bus goes down unexpectedly and state management needs to react to this situation.

In this interaction, state management acts like a functional cluster rather than an application and therefore the modeling of a subclass of `FunctionalClusterInteractsWithFunctionalClusterMapping` needs to be created: `NmInteractsWithSmMapping`.

[TPS_MANI_01447] Semantics of meta-class `NmInteractsWithSmMapping`

Status: DRAFT

[Meta-class `NmInteractsWithSmMapping` supports the interaction between state management and network management by mapping an `NmNetworkHandle` (which obviously represents the network management) to a `StateManagementStateRequest` (representing the state management).]

Class	NmInteractsWithSmMapping			
Note	This mapping represents an interaction from network management to state management. Tags: atp.Status=draft atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
nmNetworkHandle	NmNetworkHandle	0..1	ref	This reference identifies the network management handle that wants to interact with state management. Tags: atp.Status=draft
stateRequest	StateManagementStateRequest	0..1	ref	This reference identifies the state management state request that is involved in the interaction with the network management. Tags: atp.Status=draft

Table 15.15: NmInteractsWithSmMapping

[constr_10515] Existence of the reference in the role `NmInteractsWithSmMapping.stateRequest`

Status: DRAFT

Imposition time: `IT_Mani`

[For each `NmInteractsWithSmMapping`, the reference in the role `stateRequest` shall exist.]

[constr_10516] Existence of the reference in the role `NmInteractsWithSmMapping.nmNetworkHandle`

Status: DRAFT

Imposition time: `IT_Mani`

[For each `NmInteractsWithSmMapping`, the reference in the role `nmNetworkHandle` shall exist.]

15.12 Functional Cluster reports Production Error

[TPS_MANI_01448] Semantics of **FunctionalClusterInteractsWithDiagnosticEventMapping** [The meta-class **FunctionalClusterInteractsWithDiagnosticEventMapping** provides an anchor for the specification of interaction between a functional cluster that is either represented as a **AdaptiveModuleInstantiation** or a **PersistencyDeployment** and the diagnostic management, specifically for the reporting of production errors from functional clusters.]

There is no sub-class of meta-class **AdaptiveModuleInstantiation** that represents the *persistency* functional cluster. This role is taken by **PersistencyDeployment**.

That's the reason why two references exist that are used mutually exclusive (see [constr_10518]):

- **persistencyDeployment**: use for persistency.
- **functionalCluster**: use for everything else.

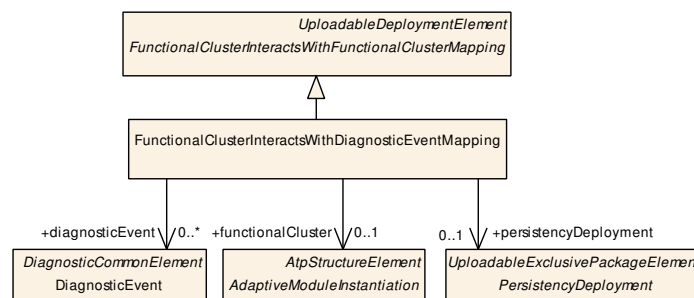


Figure 15.15: Functional Cluster reports production error

Class	FunctionalClusterInteractsWithDiagnosticEventMapping				
Note	This meta-class creates an association between a functional cluster and a diagnostic event that represents the diagnostic management by proxy. The purpose of this mapping is to support the reporting of production errors. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.				
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement				
Aggregated by	ARPackage.element				
Attribute	Type	Mult.	Kind	Note	
diagnosticEvent	DiagnosticEvent	*	ref	This reference identifies the collection of diagnostic events that can be reported by the mapped functional cluster.	
functional Cluster	AdaptiveModuleInstantiation	0..1	ref	This reference identifies the reporting functional cluster.	
persistency Deployment	PersistencyDeployment	0..1	ref	This reference identifies the reporting persistency deployment.	

Table 15.16: FunctionalClusterInteractsWithDiagnosticEventMapping

[constr_10518] Mutually exclusive existence of `FunctionalClusterInteractsWithDiagnosticEventMapping.persistencyDeployment` vs. `functionalCluster`

Imposition time: `IT_Mani`

[For each `FunctionalClusterInteractsWithDiagnosticEventMapping`, either the reference in the role

- `persistencyDeployment` or
- `functionalCluster`

shall exist.]

[constr_10519] Existence of reference `FunctionalClusterInteractsWithDiagnosticEventMapping.diagnosticEvent`

Imposition time: `IT_Mani`

[For each `FunctionalClusterInteractsWithDiagnosticEventMapping`, the reference in the role `diagnosticEvent` shall exist.]

16 Software Distribution

16.1 Overview

One of the key features of the *AUTOSAR adaptive platform* is the ability to extend the software on a given ECU without having to re-flash the entire ECU. Instead, software packages are uploaded to the ECU where the content is taken care of by responsible platform modules.

The reason why this topic is relevant for the modeling is the fact that an uploadable software package consists not only of software itself but also of manifest content required to support the integration of the uploaded software with the existing platform instance.

As far as the meta-model is concerned, the discussion about manifests and which manifest content needs to go with which other model elements doesn't care about the file granularity. In other words, it would not make sense to formalize the uploadable software package on the basis of references to files that carry model elements.

Instead, the view on the manifest topic from the modeling point of view focuses on model elements that make up manifest content.

Therefore, the modeling of an uploadable software package allows for putting references to all the required model elements that, in their entirety, make up the manifest of the corresponding application software that is also going to end up in the uploadable software package.

From the formal point of view, such an uploadable software package is modeled as a so-called `SoftwareCluster`. This meta-class is the root element that in turn describes all the necessary content of an uploadable software package.

However, the software package obviously isn't created out of thin air. It is the result of a workflow that starts from the formulation of requirements on the content of a `SoftwareCluster`.

These requirements are formalized by means of meta-class `SoftwareClusterDesigns`.

The relation between `SoftwareClusterDesign` and `SoftwareCluster` is depicted in [Figure 16.1](#).

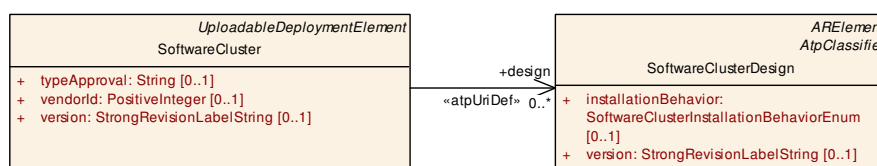


Figure 16.1: Relation of `SoftwareClusterDesign` to `SoftwareCluster`

16.2 Uploadable Package Element

[TPS_MANI_01109] **Semantics of `UploadablePackageElement`** [In order to keep the complexity of the modeling of `SoftwareCluster` as low as possible abstract meta-class `UploadablePackageElement` has been created.

This allows for the referencing of model elements derived from `UploadablePackageElement` that need to be considered in an uploadable software package from within a `SoftwareCluster` with just the reference `containedPackageElement`.]

Meta-class `UploadablePackageElement` that has two abstract sub-classes for model elements that are target-configuration-related (represented by meta-class `UploadableDeploymentElement`) and model elements that are design-related (represented by meta-class `UploadableDesignElement`), but still needed at configuration time on the target system as a dependency of the `UploadableDeploymentElements`.

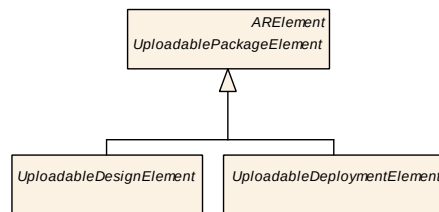


Figure 16.2: Overview of `UploadablePackageElement` and its direct sub-classes

Class	<i>UploadablePackageElement</i> (abstract)			
Note	This meta-class acts as an abstract base class for all meta-classes that need to be added to an uploadable software package in order to complete the manifest content. This applies for both design-level and deployment-level meta-classes.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ApmcDefinitionCollection , ApmcFunctionalClusterDef , ApmcFunctionalClusterValue , ApmcValueCollection , UploadableDeploymentElement , UploadableDesignElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 16.1: `UploadablePackageElement`

[TPS_MANI_01413] **Semantics of `UploadableDeploymentElement`** [As a refinement of the abstract base class `UploadablePackageElement`, meta-class `UploadableDeploymentElement` represents configuration information that is **related to the target-configuration phase** and which is expected to be **uploaded to the target system** and **needed for configuration** on the *AUTOSAR adaptive platform*.]

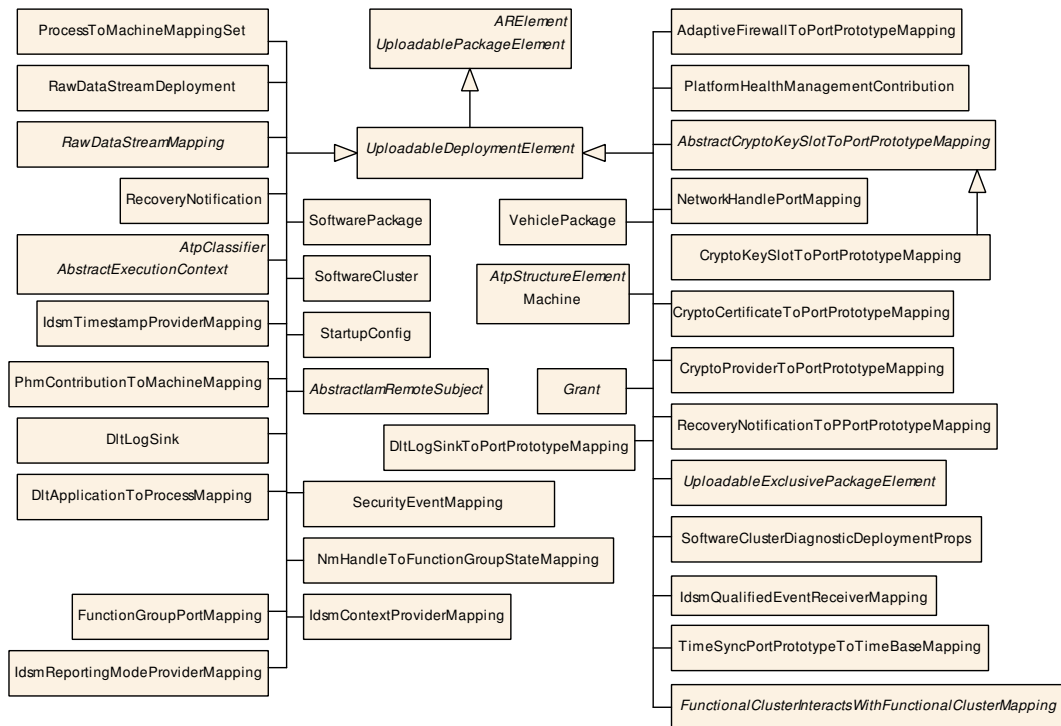


Figure 16.3: Overview of **UploadableDeploymentElement**

Class	UploadableDeploymentElement (abstract)			
Note	This meta-class acts as an abstract base class for all deployment-level meta-classes that need to be added to an uploadable software package in order to complete the manifest content.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadablePackageElement			
Subclasses	AbstractCryptoKeySlotToPortPrototypeMapping , AbstractExecutionContext , AbstractIamRemoteSubject , AbstractSuspendToRamMapping , AdaptiveFirewallToPortPrototypeMapping , CryptoCertificateGroupToPortPrototypeMapping , CryptoCertificateToPortPrototypeMapping , CryptoProviderToPortPrototypeMapping , DltApplicationToProcessMapping , DltLogSink , DltLogSinkToPortPrototypeMapping , FunctionGroupPortMapping , FunctionalClusterInteractsWithFunctionalClusterMapping , Grant , IdsmContextProviderMapping , IdsmQualifiedEventReceiverMapping , IdsmReportingModeProviderMapping , IdsmTimestampProviderMapping , Machine , NetworkHandlePortMapping , NmHandleToFunctionGroupStateMapping , PhmContributionToMachineMapping , PlatformHealthManagementContribution , ProcessToMachineMappingSet , RawDataStreamDeployment , RawDataStreamMapping , RecoveryNotification , RecoveryNotificationToPortPrototypeMapping , SecurityEventMapping , SoftwareClusterDiagnosticDeploymentProps , SoftwarePackage , StartupConfig , TimeSyncPortPrototypeToTimeBaseMapping , UploadableExclusivePackageElement , VehiclePackage			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table 16.2: **UploadableDeploymentElement**

[TPS_MANI_01414] **Semantics of [UploadableDesignElement](#)** [As a refinement of the abstract base class [UploadablePackageElement](#), meta-class [UploadableDesignElement](#) represents configuration information that is **related to the design phase** and which is nevertheless expected to be **uploaded to the target system** and **needed for configuration** (as a dependency) on the *AUTOSAR adaptive platform*.]

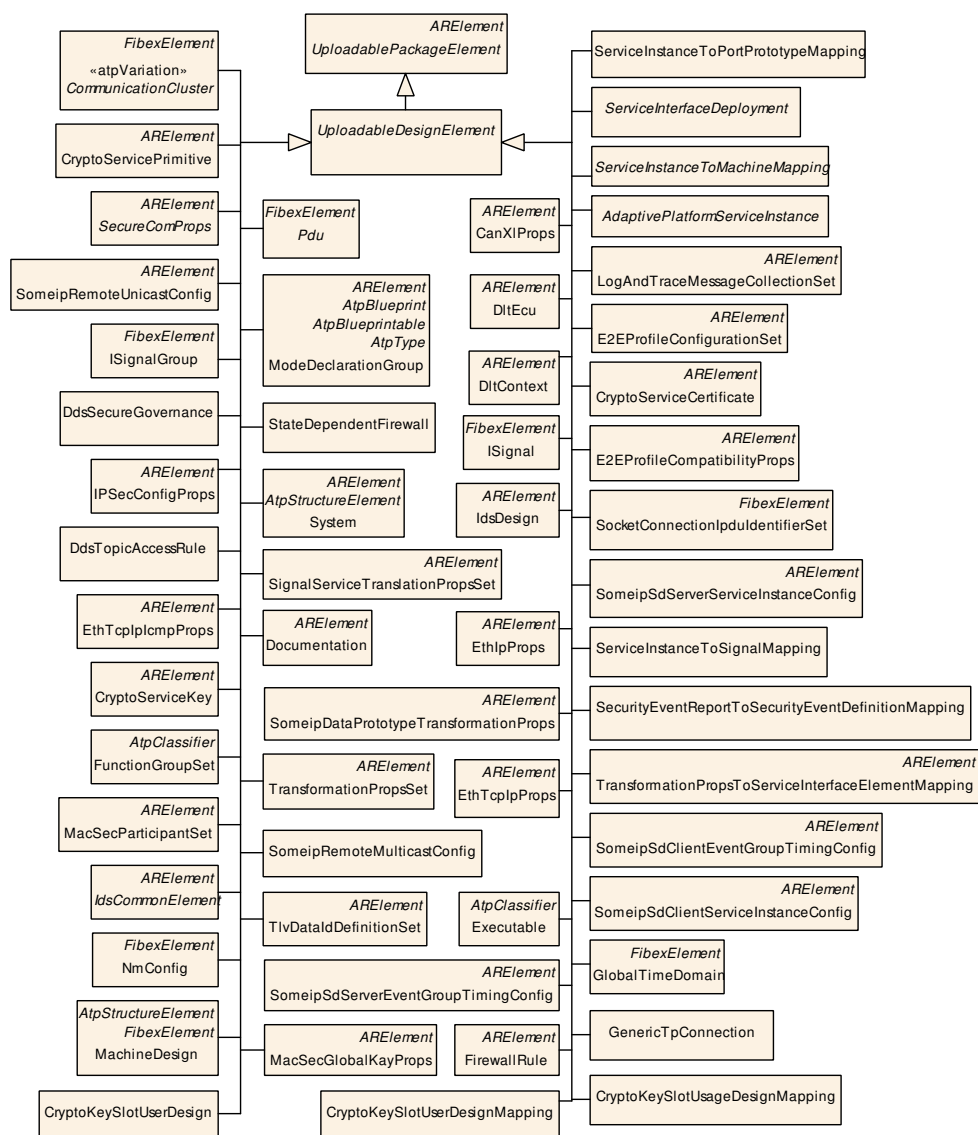


Figure 16.4: Overview of UploadableDesignElement

Class	UploadableDesignElement (abstract)
Note	This meta-class acts as an abstract base class for all design-level meta-classes that need to be added to an uploadable software package in order to complete the manifest content.
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadablePackageElement





Class	UploadableDesignElement (abstract)			
Subclasses	AdaptivePlatformServiceInstance , CanXIProps , CommunicationCluster , CryptoKeySlotUsageDesignMapping , CryptoKeySlotUserDesign , CryptoKeySlotUserDesignMapping , CryptoServiceCertificate , CryptoServiceKey , CryptoServicePrimitive , DdsSecureGovernance , DdsTopicAccessRule , DltContext , DltEcu , Documentation , E2EProfileCompatibilityProps , E2EProfileConfigurationSet , EthIpProps , EthTcpIpIcmpProps , EthTcpIpProps , Executable , FirewallRule , FunctionGroupSet , GenericTpConnection , GlobalTimeDomain , IPSecConfigProps , ISignal , ISignalGroup , IdsCommonElement , IdsDesign , LogAndTraceMessageCollectionSet , MacSecGlobalKeyProps , MacSecParticipantSet , MachineDesign , ModeDeclarationGroup , NmConfig , Pdu , SecureComProps , SecurityEventReportToSecurityEventDefinitionMapping , ServiceInstanceToMachineMapping , ServiceInstanceToPortPrototypeMapping , ServiceInstanceToSignalMapping , ServiceInterfaceDeployment , SignalServiceTranslationPropsSet , SocketConnectionIpduIdentifierSet , SomeipDataPrototypeTransformationProps , SomeipRemoteMulticastConfig , SomeipRemoteUnicastConfig , SomeipSdClientEventGroupTimingConfig , SomeipSdClientServiceInstanceConfig , SomeipSdServerEventGroupTimingConfig , SomeipSdServerServiceInstanceConfig , StateDependentFirewall , System , TlvDataIdDefinitionSet , TransformationPropsSet , TransformationPropsToServiceInterfaceElementMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 16.3: UploadableDesignElement

Please note that this approach to collecting elements is very similar in semantics to [System.fibexElement](#) or [DiagnosticContributionSet.element](#).

16.3 Software Cluster

16.3.1 Software Cluster General Modeling

[TPS_MANI_01110] **Semantics of [SoftwareCluster](#)** [The existence of a [SoftwareCluster](#) represents an uploadable software package.]

[TPS_MANI_01213] **Semantics of meta-class [StrongRevisionLabelString](#)** [Meta-class [StrongRevisionLabelString](#) supports the specification of a version number for a [SoftwareCluster](#) that consists of four components ([[constr_1747](#)] applies):

- Major version
- Minor version
- Patch version
- Additional labels for pre-release version and build metadata

]

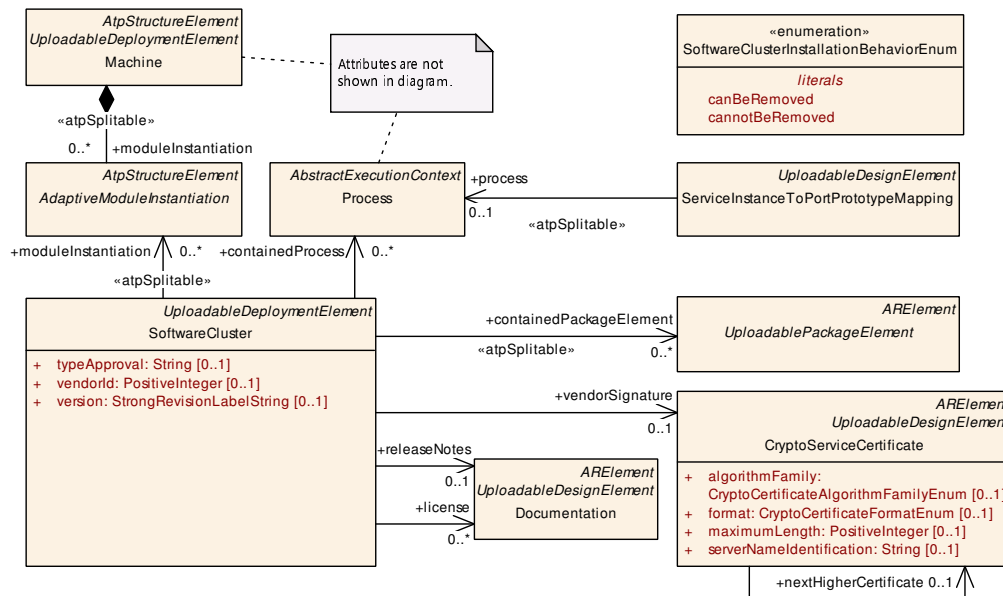


Figure 16.5: Modeling of `SoftwareCluster`

Class	SoftwareCluster			
Note	This meta-class represents the ability to define an uploadable software-package, i.e. the SoftwareCluster shall contain all software and configuration for a given purpose. Tags: atp.recommendedPackage=SoftwareClusters This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
artifact Checksum	ArtifactChecksum	*	aggr	This aggregation carries the checksums for artifacts contained in the enclosing SoftwareCluster. Please note that the value of these checksums is only applicable at the time of configuration. Stereotypes: atpSplittable Tags: atp.Splitkey=artifactChecksum.shortName
artifactLocator	ArtifactLocator	*	aggr	This aggregation represents the artifact locations that are relevant in the context of the enclosing SoftwareCluster
claimed FunctionGroup	ModeDeclarationGroup Prototype	*	ref	Each SoftwareCluster can reserve the usage of a given functionGroup such that no other SoftwareCluster is allowed to use it
contained ARElement	ARElement	*	ref	This reference represents the collection of model elements that cannot derive from UploadablePackageElement and that contribute to the completeness of the definition of the SoftwareCluster. Stereotypes: atpSplittable Tags: atp.Splitkey=containedARElement
contained Package Element	UploadablePackage Element	*	ref	This reference identifies model elements that are required to complete the manifest content. Stereotypes: atpSplittable Tags: atp.Splitkey=containedPackageElement
contained Process	Process	*	ref	This reference represent the processes contained in the enclosing SoftwareCluster.



Class	SoftwareCluster			
design	SoftwareClusterDesign	*	ref	This reference represents the identification of all SoftwareClusterDesigns applicable for the enclosing SoftwareCluster. Stereotypes: atpUriDef
diagnostic Deployment Props	SoftwareClusterDiagnosticDeploymentProps	0..1	ref	This reference identifies the applicable SoftwareClusterDiagnosticDeploymentProps that are applicable for the referencing SoftwareCluster.
license	Documentation	*	ref	This attribute allows for the inclusion of the full text of a license of the enclosing SoftwareCluster. In many cases open source licenses require the inclusion of the full license text to any software that is released under the respective license.
module Instantiation	AdaptiveModuleInstantiation	*	ref	This reference identifies AdaptiveModuleInstantiations that need to be included with the SoftwareCluster in order to establish infrastructure required for the installation of the SoftwareCluster. Stereotypes: atpSplitable Tags: atp.Splitkey=moduleInstantiation
releaseNotes	Documentation	0..1	ref	This attribute allows for the explanations of changes since the previous version. The list of changes might require the creation of multiple paragraphs of test.
typeApproval	String	0..1	attr	This attribute carries the homologation information that may be specific for a given country.
vendorId	PositiveInteger	0..1	attr	Vendor ID of this Implementation according to the AUTOSAR vendor list.
vendor Signature	CryptoServiceCertificate	0..1	ref	This reference identifies the certificate that represents the vendor's signature.
version	StrongRevisionLabelString	0..1	attr	This attribute can be used to describe a version information for the enclosing SoftwareCluster.

Table 16.4: SoftwareCluster

[constr_10233] Multiplicity of the reference in the role [SoftwareCluster.vendorSignature](#)*Imposition time:* IT_Mani[For each [SoftwareCluster](#), the reference in the role [vendorSignature](#) shall exist.]**[constr_10234] Multiplicity of attribute [SoftwareCluster.version](#)***Imposition time:* IT_Mani[For each [SoftwareCluster](#), the attribute [version](#) shall exist.]**[constr_10235] Multiplicity of attribute [SoftwareCluster.vendorId](#)***Imposition time:* IT_Mani[For each [SoftwareCluster](#), the attribute [vendorId](#) shall exist.]

The modeling of the relation [SoftwareCluster.claimedFunctionGroup](#) is modeled in [Figure 16.6](#).

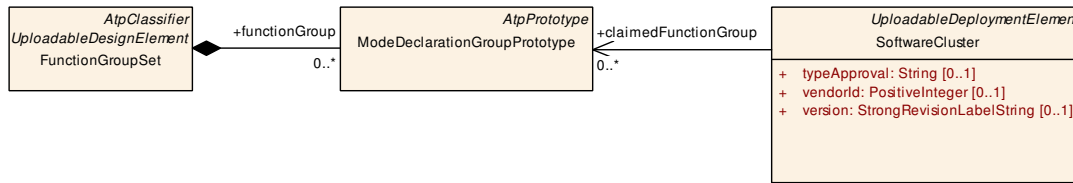


Figure 16.6: Modeling of the relation between `SoftwareCluster` and `Function Groups`

[constr_1747] Completeness of the `SoftwareCluster.version`

Imposition time: IT_Mani

[The `SoftwareCluster.version` shall contain all the following parts:

- Major version
- Minor version
- Patch version
- Additional labels for pre-release version and build metadata

]

Primitive	StrongRevisionLabelString
Note	This primitive represents a revision label which identifies an object under version control. It represents a pattern which requires three integer numbers separated by a dot, representing from left to right Major Version, MinorVersion, PatchVersion and additional labels for pre-release version and build metadata. Legal patterns are for example: 1.0.0-alpha+001 1.0.0+20130313144700 1.0.0-beta+exp.sha.5114f85 Tags: xml.xsd.customType=STRONG-REVISION-LABEL-STRING xml.xsd.pattern=(0 [1-9]\d*)\.(0 [1-9]\d*)\.(0 [1-9]\d*)(-((0 [1-9]\d*)\d*[a-zA-Z-][0-9a-zA-Z-]*)\.(0 [1-9]\d*)\d*[a-zA-Z-][0-9a-zA-Z-]*)*)?(\+([0-9a-zA-Z-]+\.(0 [1-9]\d*)\d*[a-zA-Z-][0-9a-zA-Z-]*)*)? xml.xsd.type=string

Table 16.5: StrongRevisionLabelString

Please note that the build number does not necessarily have to be consecutively incremented between two builds. In some cases the build number is created by creating a hash over the build.

In such a case it would not make sense to include the build number in a greater/less comparison while a comparison for equality/inequality may positively make sense. This aspect shall be taken into account when processing the value of an attribute types by a `StrongRevisionLabelString`.

Even if the AUTOSAR UCM is not used as the Update Management System on the Machine the `PLATFORM_CORE SoftwareCluster` shall be defined for Methodology reasons in the Manifest file. But in such a case it is allowed to define a single `PLATFORM_CORE SoftwareCluster` on the Machine that would contain all software that is deployed on this machine (platform software and application software).

Please also note that it is possible to (in addition to the standardized values) define custom values for attribute `SoftwareCluster.category`.

In this case, however, it is important to use custom values that don't clash with future extensions of the standardized values. A good way to avoid a clash is, for example, to use specific pre- or postfixes that identify a company or project name.

[constr_1788] Restriction to **SoftwareCluster** of category **PLATFORM_CORE**

Imposition time: IT_Mani

[On each **Machine**, exactly one **SoftwareCluster** of category **PLATFORM_CORE** shall be deployed.]

[TPS_MANI_01115] Specification of executable software within **SoftwareCluster** [One of the most prominent contents of an uploadable software package is the reference to the executable software.

Within the definition of a **SoftwareCluster**, this reference is implicitly given by means of the reference **SoftwareCluster.containedProcess**.

The target of **SoftwareCluster.containedProcess** is a **Process** that represents an instance of the corresponding executable program (the software image), formalized as **Executable**]

The prominence of the dedicated reference to **Process** is amplified by the fact that it would have been technically possible to let **Process** inherit from **UploadablePackageElement** and thus include the referenced **Process(es)** in the bulk of references to other required model elements.

These references are formalized in two different forms. For technical reasons it is not possible to let all model elements that need to be immediately referenced by a **SoftwareCluster** inherit from **UploadablePackageElement**.

The main reason is that further model elements need to be referenced by a **SoftwareCluster** that are also used on the *AUTOSAR classic platform*.

In other words, it would be very questionable to introduce the “useless” concept of an **UploadablePackageElement** into the scope of the *AUTOSAR classic platform* as a mere (and unwanted) side effect of providing a definition of the **SoftwareCluster** on the *AUTOSAR classic platform*.

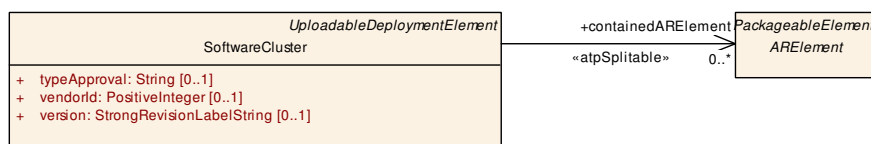


Figure 16.7: **SoftwareCluster can reference **ARElement****

The scope of a single **SoftwareCluster** in terms of a relation to a **Machine** is that all software contained in one **SoftwareCluster** is supposed to be uploaded to one and only one **Machine**.

The definition of **SoftwareCluster** shall never include multiple **Machines**. This is expressed in [constr_1536].

[constr_1536] Definition of `SoftwareCluster` applies for a single `Machine`*Imposition time:* `IT_Mani`

[Within the scope of a `SoftwareCluster`, each `Process` referenced in the role `containedProcess` shall be mapped (e.g. by means of the existence of a `ProcessToMachineMapping`) to the same `Machine`.]

[TPS_MANI_01116] Reference to model elements included in an uploadable software package [Beside the ability to explicitly reference a `Process` in the role `containedProcess` it is possible to define the following references to required model elements:

- references to meta-classes derived from `UploadablePackageElement` are formalized by way of `SoftwareCluster.containedPackageElement`.
- references to meta-classes derived from `ARElement` are formalized by way of `SoftwareCluster.containedARElement`.

Technically, an `UploadablePackageElement` is also an `ARElement`, but it is still mandated to use the dedicated reference specifically for `UploadablePackageElement`.]

To exemplify the reference to `UploadablePackageElement`, [Figure 16.5](#) contains a subclass of `UploadablePackageElement`: `ServiceInstanceToPortPrototypeMapping`.

It is obvious that the uploaded software needs to integrate with the communication stack and `ServiceInstanceToPortPrototypeMapping` is a prominent model element for this purpose.

[TPS_MANI_01202] Semantics of reference `SoftwareCluster.moduleInstantiation` [By means of the reference `SoftwareCluster.moduleInstantiation` it is possible to express the need for updates of the platform infrastructure along with other resources referenced by the enclosing `SoftwareCluster`.]

[TPS_MANI_01218] Cryptographic signature of `SoftwareCluster` [A `SoftwareCluster` also needs to be signed cryptographically. For this purpose, meta-class `CryptoServiceCertificate` is referenced in the role `vendorSignature`.]

[TPS_MANI_01219] License of software in included `SoftwareCluster` [It is possible to refer to licenses for software included in a `SoftwareCluster` by means of a reference to meta-class `Documentation` in the role `license`.]

Class	Documentation
Note	This meta-class represents the ability to handle a so called standalone documentation. Standalone means, that such a documentation is not embedded in another <code>ARElement</code> or identifiable object. The standalone documentation is an entity of its own which denotes its context by reference to other objects and instances. Tags: <code>atp.recommendedPackage=Documentations</code>





Class	Documentation			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
context	DocumentationContext	*	aggr	This is the context of the particular documentation.
documentation Content	PredefinedChapter	0..1	aggr	This is the content of the documentation related to the specified contexts. Tags: xml.sequenceOffset=200

Table 16.6: Documentation

Please note that [Documentation](#) is an [ARElement](#) that cannot be owned by a [SoftwareCluster](#). The latter can only refer to it.

This aspect also means that once a given [license](#) is formalized by means of a [Documentation](#) it is in general possible to refer to this formalization from within different [SoftwareClusters](#).

[TPS_MANI_01220] Release notes of software in included [SoftwareCluster](#) [It is possible to refer to release notes for software included in a [SoftwareCluster](#) by means of a reference to meta-class [Documentation](#) in the role [releaseNotes](#).]

[constr_1566] Usage of [SoftwareCluster.containedARElement](#)

Imposition time: [IT_Mani](#)

[The reference [SoftwareCluster.containedARElement](#) shall not be used to refer to a [SoftwareCluster](#) or a [SoftwareClusterDesign](#).]

The multiplicity of [SoftwareCluster.design](#) has been set to 0..* to support the following use cases:

- Both an OEM and a Tier-1 supplier want to provide a design for a [SoftwareCluster](#). But the OEM does not let the supplier extend their design.

The consequence is that the supplier would create an own [SoftwareClusterDesign](#) and let the [SoftwareCluster](#) refer to it. This means that the [SoftwareCluster](#) has two references in the role [SoftwareCluster.design](#).

- An integrator decides to implement several [SoftwareClusterDesigns](#) with one [SoftwareCluster](#).

16.3.2 Relevance of Software Cluster for Diagnostics

16.3.2.1 Diagnostic Props

[TPS_MANI_01349] Configuration of diagnostic-related properties of a [SoftwareCluster](#) [The diagnostics-related properties of a [SoftwareCluster](#) are

configured in the context of meta-class `SoftwareClusterDiagnosticDeploymentProps`, referenced in the role `SoftwareCluster.diagnosticDeploymentProps`.]

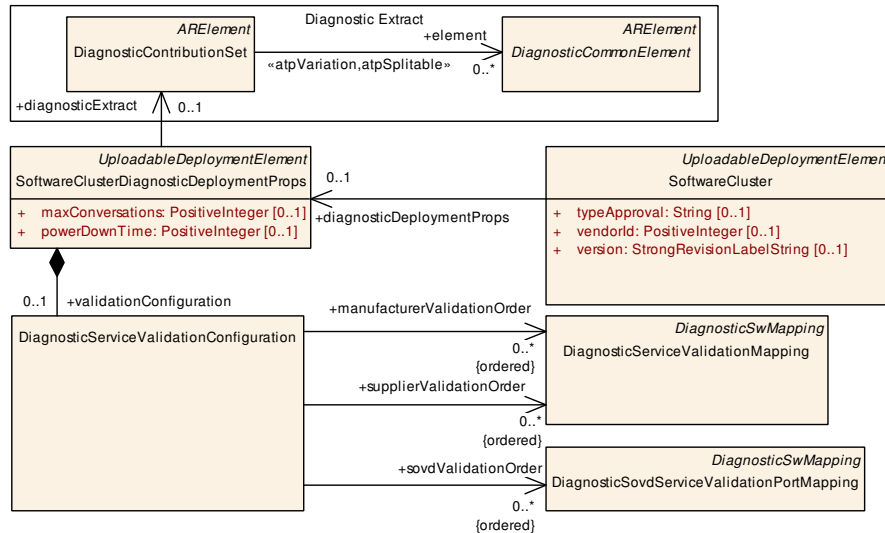


Figure 16.8: Modeling of diagnostic properties of a `SoftwareCluster`

[constr_10069] Existence of `SoftwareClusterDiagnosticDeploymentProps.powerDownTime`

Imposition time: `IT_Mani`

[The attribute `SoftwareClusterDiagnosticDeploymentProps.powerDownTime` shall exist and have a value between 0 and 254 if the referenced `diagnosticExtract` that in turn references in the role `element` a `DiagnosticEcuReset` where attribute `category` is set to the value `ENABLE_RAPID_POWER_SHUT_DOWN`.]

16.3.2.2 Relation to the Diagnostic Contribution Set

[TPS_MANI_01114] Relation of `DiagnosticContributionSet` to `SoftwareCluster` [In AUTOSAR, the formalization of the external behavior of the diagnostic stack is rooted in meta-class `DiagnosticContributionSet`.

On the *AUTOSAR classic platform* the scope of the “external behavior of the diagnostic stack” is represented by an entire ECU.

This relation changes on the *AUTOSAR adaptive platform* where each uploadable software package is shipped with the definition of the “external behavior of the diagnostic stack” **as far as the software in the scope of respective uploadable software package is concerned**.

To fully support the different approaches of *AUTOSAR classic platform* and *AUTOSAR adaptive platform* it is necessary to provide means for specifying a `DiagnosticContributionSet` for a given `SoftwareCluster`.

In particular, this relation is created by means of the reference `SoftwareCluster.diagnosticDeploymentProps.diagnosticExtract.`]

Please note that the placement of the reference to the `DiagnosticContributionSet` at the `SoftwareClusterDiagnosticDeploymentProps` follows the pattern on the *AUTOSAR adaptive platform* that target-configuration-related elements shall reference their corresponding design-level elements.

In addition, it is much easier to keep the definition of diagnostic target-configuration and diagnostic design in sync if the former has a direct reference to the latter.

Please note further that this approach works for all levels of granularity in the definition of diagnostics on the *AUTOSAR adaptive Platform*:

- One `SoftwareCluster` represents a separately diagnosable entity with its own diagnostic address.

In this case, the `DiagnosticContributionSet` referenced in the role `SoftwareCluster.diagnosticDeploymentProps.diagnosticExtract` is only referenced by this specific `SoftwareCluster`.

- All `SoftwareClusters` deployed to one Machine share the same `SoftwareClusterDiagnosticDeploymentProps` and therefore also the same `DiagnosticContributionSet`.

Class	SoftwareClusterDiagnosticDeploymentProps			
Note	This meta-class acts as the owner of all deployment-related diagnostic properties of a SoftwareCluster. Tags: atp.recommendedPackage=SoftwareClusterDiagnosticProps This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
diagnostic Extract	DiagnosticContributionSet	0..1	ref	This reference identifies the <code>DiagnosticContributionSet</code> that is applicable for the referencing <code>SoftwareCluster</code> .
max Conversations	PositiveInteger	0..1	attr	Maximum number of diagnostic Conversations supported by the Diagnostic Server Instance. This attribute has no relation to the definition of the maximum number of clients in DoIP context, configured by means of <code>DolpNetworkConfiguration.maxTesterConnections</code> .
powerDown Time	PositiveInteger	0..1	attr	This attribute indicates the minimum time of the stand-by sequence the server will remain in the power-down sequence. The unit is seconds.
validation Configuration	DiagnosticServiceValidationConfiguration	0..1	aggr	This aggregation represents the ability to define the order of manufacturer and supplier validations in diagnostic management.

Table 16.7: SoftwareClusterDiagnosticDeploymentProps

16.3.2.3 Diagnostic Service Validation

The configuration of the diagnostic management is mostly done on design level by means of the diagnostic extract (see [Chapter 4.9](#) and [Chapter 5](#)).

Some aspects, like the validation of service request by manufacturer-specific or supplier-specific checks, can only be decided on target-configuration level and in the context of the enclosing `SoftwareCluster`, see [Figure 16.8](#).

[TPS_MANI_01350] Semantics of `DiagnosticServiceValidationConfiguration` [For the specific purpose of the validation prior to the execution of diagnostic services, meta-class `DiagnosticServiceValidationConfiguration` is defined.

The main purpose of `DiagnosticServiceValidationConfiguration` is to define the order in which manufacturer-specific (by means of the reference in the role `manufacturerValidationOrder`) and (separately, via the reference in the role `supplierValidationOrder`) supplier-specific checks are executed.]

[TPS_MANI_01449] Service validation in SOVD context [In contrast to the service validation in UDS context, there is no separate handling of manufacturer and supplier validation tasks in the context of SOVD.

The configuration of service validation in an SOVD context can therefore be implemented in just one ordered collection of references in the role `DiagnosticServiceValidationConfiguration.sovdValidationOrder`.]

Class	DiagnosticServiceValidationConfiguration			
Note	This meta-class has the ability to configure the order of manufacturer/supplier-checks. Tags: atp.recommendedPackage=DiagnosticValueConfigurations This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	SoftwareClusterDiagnosticDeploymentProps.validationConfiguration			
Attribute	Type	Mult.	Kind	Note
manufacturer ValidationOrder (ordered)	DiagnosticServiceValidationMapping	*	ref	This reference defines the order in which validations created by manufacturer are executed.
sovValidation Order (ordered)	DiagnosticSovdServiceValidationPortMapping	*	ref	This reference defines the order in which validations of SOVD requests are executed.
supplier ValidationOrder (ordered)	DiagnosticServiceValidationMapping	*	ref	This reference defines the order in which validations created by supplier are executed.

Table 16.8: DiagnosticServiceValidationConfiguration

[constr_10065] Validity of `DiagnosticServiceValidationConfiguration.manufacturerValidationOrder`

Imposition time: IT_Mani

[Any `DiagnosticServiceValidationConfiguration.manufacturerValidationOrder` shall only refer to a `DiagnosticServiceValidationMapping` where attribute `category` has been set to `MANUFACTURER_VALIDATION`.]

[constr_10066] Validity of `DiagnosticServiceValidationConfiguration.supplierValidationOrder`

Imposition time: `IT_Mani`

[Any `DiagnosticServiceValidationConfiguration.supplierValidationOrder` shall only refer to a `DiagnosticServiceValidationMapping` where attribute `category` has been set to `SUPPLIER_VALIDATION`.]

16.3.3 Contract between Software Cluster and Software Cluster Design

As already mentioned in [TPS_MANI_01112], there is a **certain level of contractual obligation** in the relation between a `SoftwareClusterDesign` and a `SoftwareCluster` that references said `SoftwareClusterDesign` in the role `design`.

The reason for the existence of the contractual obligation is the definition of dependencies between `SoftwareClusterDesigns`, as described in Chapter 8.4. The definition of dependencies is usually based on some characteristics of the pair of `SoftwareClusterDesign` and `SoftwareCluster`.

If, for example, a `SoftwareClusterDesign` imposes a dependency on another `SoftwareClusterDesign`, then this relation could be based on the existence of a certain `ProcessDesign` that is referenced by the `SoftwareClusterDesign` that imposes the dependency.

But if the corresponding `SoftwareCluster` does not refer to a `Process` that corresponds to the `ProcessDesign` that sparked the existence of the `SoftwareClusterDependencyFormula`, then the dependency does not transfer to the `SoftwareCluster`.

On the other hand, if the dependency defined in the form of a `SoftwareClusterDependencyFormula` does not transfer, then the definition of the dependency on the level of `SoftwareClusterDesign` is worthless and only creates confusion in worst case.

However, the exact (formal) nature of the contract between `SoftwareCluster` and `SoftwareClusterDesign` is subject for future refinement.

16.3.4 References between Software Clusters

There are several strong use cases for the need of referencing into different `SoftwareClusters`, for example:

- Reference to a `ProvidedApServiceInstance` of `RequiredApServiceInstance` defined in the context of a “host” `SoftwareCluster`.
- Reference to `CommunicationConnectors` defined on `Machine` level from within application `SoftwareClusters`.

- Reference from a `Process` in one `SoftwareCluster` to an `Executable` in another `SoftwareCluster` with the semantics that the referencing `Process` is just another instance of the `Executable`.

To support such use cases, AUTOSAR provides the definition of dependencies among `SoftwareClusterDesigns` such that a `SoftwareClusterDesign` that contains a reference can define a dependency to another `SoftwareClusterDesign` that contains the referenced object.

[TPS_MANI_01329] Reference to model elements in different `SoftwareClusters` [If a model element inside a given `SoftwareCluster` defines a reference to another model element and the referenced model element is contained in a different `SoftwareCluster`, then the `SoftwareCluster` that contains the referencing model element shall establish a dependency to the other `SoftwareCluster` on the level of the respective `SoftwareClusterDesigns` by means of the aggregation of `SoftwareClusterDependencyFormula` in the role `SoftwareClusterDesign.dependsOn`.]

[constr_1784] Restriction for the reference to `UploadableExclusivePackageElement`

Imposition time: `IT_Mani`

[A reference to an `UploadableExclusivePackageElement` shall not cross the boundary of the enclosing `SoftwareCluster`, i.e. the target `UploadableExclusivePackageElement` of such a reference shall not be located in a different `SoftwareCluster` than the owner of the reference.]

Class	<code>UploadableExclusivePackageElement</code> (abstract)			
Note	This meta-class represents an abstract base class for an uploadable package element that is not supposed to be referenced from a different software cluster. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARElement</code> , <code>ARObject</code> , <code>CollectableElement</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>PackageableElement</code> , <code>Referrable</code> , <code>UploadableDeploymentElement</code> , <code>UploadablePackageElement</code>			
Subclasses	<code>PersistencyDeployment</code> , <code>PersistencyPortPrototypeToDeploymentMapping</code>			
Aggregated by	<code>ARPackage.element</code>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table 16.9: `UploadableExclusivePackageElement`

Note that [constr_1784] forbids a reference across `SoftwareClusters` to an `UploadableExclusivePackageElement`, regardless of whether there is a dependency relation defined or not.

Referencing from one `SoftwareCluster` into another `SoftwareCluster` is only allowed if the `design` of the referenced `SoftwareCluster` is in the list of dependent `SoftwareCluster.designs` for the referencing `SoftwareCluster`.

This restriction is formalized in [constr_1785].

[constr_1785] Restriction regarding the reference into another [SoftwareCluster](#)*Imposition time:* [IT_Mani](#)

[A reference from an element in one [SoftwareCluster](#) to an element located in another [SoftwareCluster](#) shall only exist if the [design](#) of the [SoftwareCluster](#) that owns the referenced element is referenced by a [SoftwareClusterDependencyCompareCondition](#) in the context of the mentioned [SoftwareClusterDependencyFormula](#) in the role `part.softwareClusterDesign`.

[[constr_1784](#)] applies.]

16.3.5 Software Cluster Artifact Checksum

[TPS_MANI_01345] Ability to attach checksums to [SoftwareCluster](#) [Meta-class [SoftwareCluster](#) supports the collection of checksums for artifacts like binary executable files, libraries, or persistency files by means of the aggregation of meta-class [ArtifactChecksum](#) in the role `artifactChecksum`.]

Class	ArtifactChecksum			
Note	This meta-class provides the ability to associate a checksum with a given artifact identified by its URI. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SoftwareCluster.artifactChecksum			
Attribute	Type	Mult.	Kind	Note
checksumValue	String	0..1	attr	This attributes carries the serialized checksum of the corresponding artifact.
uri	UriString	0..1	attr	This attribute represents the URI of the artifact on which the checksum shall be computed.

Table 16.10: ArtifactChecksum

[TPS_MANI_01346] No formal definition of checksum algorithm [The checksum algorithm used for computing the [ArtifactChecksum.checksumValue](#) is not formally defined.

A description of the algorithm shall be contained in the [CryptoProvider.cryptoProviderDocumentation](#) of the [CryptoProvider](#) that is associated with a specific [ArtifactChecksum](#) via the existence of [ArtifactChecksumToCryptoProviderMapping](#).]

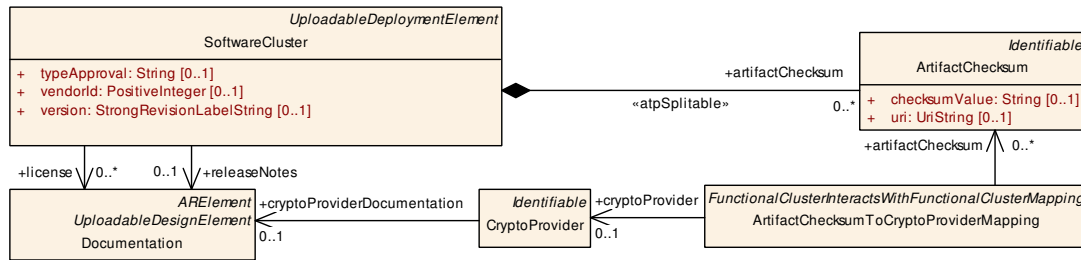


Figure 16.9: Modeling of the artifact checksum of a [SoftwareCluster](#)

Class	ArtifactChecksumToCryptoProviderMapping			
Note	This meta-class provides the ability to associate a CryptoProvider with a collection of the checksums computed for artifacts. Tags: atp.recommendedPackage=FCInteractions This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , FunctionalClusterInteractsWithFunctionalClusterMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
artifact Checksum	ArtifactChecksum	*	ref	This reference identifies the collection of Artifact Checksums associated with the corresponding Crypto Provider.
cryptoProvider	CryptoProvider	0..1	ref	This reference identifies the applicable CryptoProvider.

Table 16.11: ArtifactChecksumToCryptoProviderMapping

16.3.6 Software Cluster Artifact Locator

[TPS_MANI_01381] Semantics of meta-class [ArtifactLocator](#) [Meta-class [ArtifactLocator](#) represents a generic approach to configure a location of a referable model element in the role [representedModelElement](#) by means of attribute [uri](#).]

The modeling of meta-class [ArtifactLocator](#) as a generic concept is depicted in [Figure 16.10](#).

The association between an artifact and its location is a 1:1 relation. It is not allowed to associate a second (or more) location to a model element that is already the target of a reference in the role [ArtifactLocator.representedModelElement](#).

[constr_10380] Target of [ArtifactLocator.representedModelElement](#)

Imposition time: [IT_Mani](#)

[The target of a reference in the role [ArtifactLocator.representedModelElement](#) shall not be the target of another reference in the role [ArtifactLocator.representedModelElement](#).]

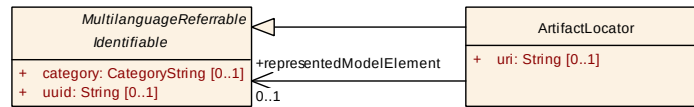


Figure 16.10: Modeling of the artifact location of a model element that belongs to a SoftwareCluster

Class	ArtifactLocator			
Note	This meta-class has the ability to define the location of an artifact that is represented by a model element, e.g. Executable. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	SoftwareCluster.artifactLocator, SoftwarePackage.artifactLocator			
Attribute	Type	Mult.	Kind	Note
represented ModelElement	Identifiable	0..1	ref	This reference identifies the model element that is represented by the artifact.
uri	String	0..1	attr	This attribute describes the location of the artifact.

Table 16.12: ArtifactLocator

[constr_10381] Existence of attribute **ArtifactLocator.uri**

Imposition time: IT_Mani

[For each **ArtifactLocator**, the attribute **uri** shall exist.]

[constr_10382] Existence of attribute **ArtifactLocator.representedModelElement**

Imposition time: IT_Mani

[For each **ArtifactLocator**, the attribute **representedModelElement** shall exist.]

Meta-class **ArtifactLocator** is used in the context of the modeling of a **SoftwareCluster** to facilitate the configuration of model elements that belong to the **SoftwareCluster** and for which a representation in the software exists that can have a “location” (e.g. a file that contains executable code).

Therefore, one example for the application of **ArtifactLocator** in the context of the modeling of a **SoftwareCluster** is the configuration of the location of binary executable code that corresponds to an **Executable**, which is claimed by a **SoftwareCluster** via the indirection of **SoftwareCluster.containedProcess** that in turn references the **Executable** in the role **executable**.

It is obviously assumed that the entire code represented by an **Executable** is locatable in one place described by the attribute **uri**.

This relation is depicted in **Figure 16.11**. The ability to refer to an **Executable** in the role **representedModelElement** is inherited to **Executable** by its superclass **Identifiable**.

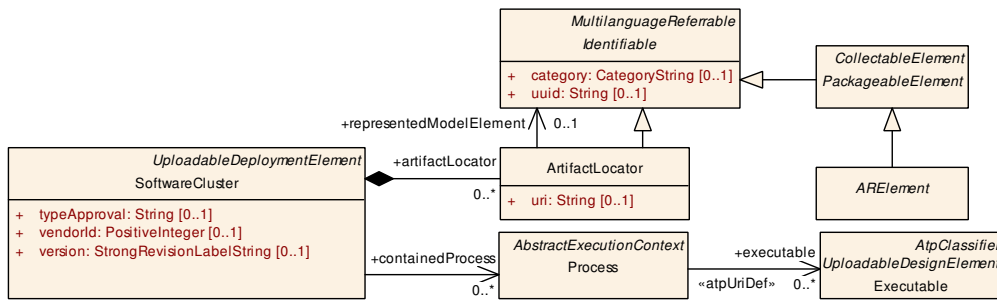


Figure 16.11: Modeling of the location of an Executable that (via a containedProcess) belongs to a SoftwareCluster

[TPS_MANI_01382] Location of artifact that contains executable code represented by Executable [The location of the executable code that is represented by Executable can be identified by means of the aggregation SoftwareCluster. artifactLocator where attribute ArtifactLocator.representedModelElement.dest is set to the value EXECUTABLE.]

16.4 Software Package

The existence of the SoftwareCluster by itself is not sufficient for installation. Actually, the SoftwareCluster gets wrapped into a so-called SoftwarePackage that comes with an own manifest format that is at least partly standardized.

The difference between the semantics of a SoftwareCluster and the semantics of SoftwarePackage is that a SoftwareCluster focuses on the structure of the software itself while the SoftwarePackage is created to handle the logistics aspect of the software installation.

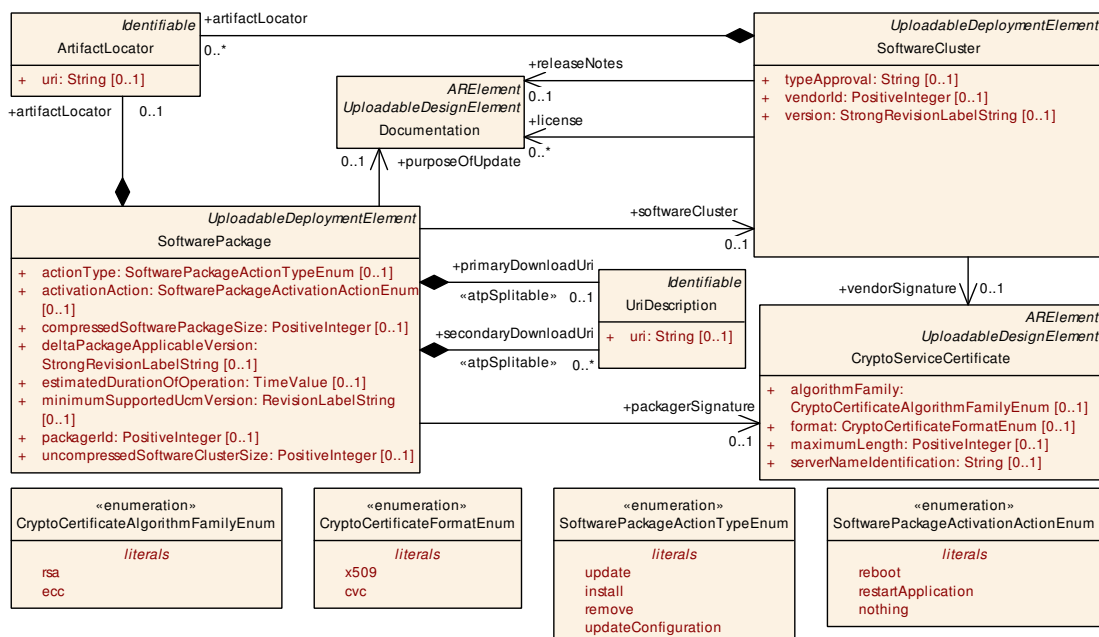


Figure 16.12: Modeling of SoftwarePackage

[TPS_MANI_01221] Semantics of meta-class SoftwarePackage [The purpose of meta-class `SoftwarePackage` is to cover the “logistics” aspect of the software installation procedure.]

Class	SoftwarePackage			
Note	This meta-class represents the ability to formalize the content of a software package. Tags: atp.recommendedPackage=SoftwarePackages This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
actionType	SoftwarePackageActionTypeEnum	0..1	attr	This attribute defines the action to be taken in the step of processing the enclosing SoftwarePackage.
activationAction	SoftwarePackageActivationActionEnum	0..1	attr	This attribute governs the action to be taken after the installation of the SoftwareCluster completed.
artifactLocator	ArtifactLocator	0..1	aggr	This attribute identifies the software package at configuration time, out of the context of an AUTOSAR model.
compressed Software PackageSize	PositiveInteger	0..1	attr	This size represents the size of the compressed Software Package.
deltaPackage Applicable Version	StrongRevisionLabelString	0..1	attr	This attribute identifies the version of the included SoftwareCluster for which the enclosing SoftwarePackage can be used as a delta update
estimated DurationOf Operation	TimeValue	0..1	attr	This attribute provides an estimation about how long the operation of the SoftwarePackage is going to take for its transfer, processing and activation when updated standalone (not within an update campaign)
minimum SupportedUcm Version	RevisionLabelString	0..1	attr	This attribute identifies the minimum supported version of the UCM for this SoftwarePackage.
packagerId	PositiveInteger	0..1	attr	This attribute identifies Id of the organization that provides the packager generating the SoftwarePackage.
packager Signature	CryptoServiceCertificate	0..1	ref	This reference identifies the certificate that represents the packager's signature.
primary DownloadUri	UriDescription	0..1	aggr	This attribute represents the description of the primary download location. Stereotypes: atpSplitable Tags: atp.Splitkey=primaryDownloadUri.shortName
purposeOf Update	Documentation	0..1	ref	The referenced Documentation is supposed to provide a description of the purpose of the update.
secondary DownloadUri	UriDescription	*	aggr	This attribute represents the description of the secondary download locations. Stereotypes: atpSplitable Tags: atp.Splitkey=secondaryDownloadUri.shortName
softwareCluster	SoftwareCluster	0..1	ref	This reference identifies the SoftwareCluster that belongs to the SoftwarePackage. The nature of this relation is actually more like an aggregation than a reference. But the relation is still modelled as a reference because two ARElements cannot aggregate each other.
uncompressed SoftwareCluster Size	PositiveInteger	0..1	attr	This attribute gives an indication about the storage that has to be available on the target.

Table 16.13: SoftwarePackage

[constr_10240] Multiplicity of attribute `SoftwarePackage.actionType`

Imposition time: IT_Mani

[For each `SoftwarePackage`, the attribute `actionType` shall exist.]

[constr_10242] Multiplicity of attribute `SoftwarePackage.minimumSupportedUcmVersion`

Imposition time: IT_Mani

[For each `SoftwarePackage`, the attribute `minimumSupportedUcmVersion` shall exist.]

[constr_10243] Multiplicity of attribute `SoftwarePackage.packagerId`

Imposition time: IT_Mani

[For each `SoftwarePackage`, the attribute `packagerId` shall exist.]

[constr_10244] Multiplicity of reference in the role `SoftwarePackage.packagerSignature`

Imposition time: IT_Mani

[For each `SoftwarePackage`, the reference in the role `packagerSignature` shall exist.]

[constr_10245] Multiplicity of reference in the role `SoftwarePackage.softwareCluster`

Imposition time: IT_Mani

[For each `SoftwarePackage`, the reference in the role `softwareCluster` shall exist.]

[constr_10246] Multiplicity of attribute `SoftwarePackage.uncompressedSoftwareClusterSize`

Imposition time: IT_Mani

[For each `SoftwarePackage`, the attribute `uncompressedSoftwareClusterSize` shall exist.]

However, a `SoftwareCluster` is derived from base class `PackageableElement` which is only aggregated by `ARPackage`. Subclasses of `PackageableElement` – by convention – shall not be aggregated by any other meta-class.

[TPS_MANI_01222] Cryptographic signature of `SoftwarePackage` [A `SoftwarePackage` also needs to be signed cryptographically. For this purpose, meta-class `CryptoServiceCertificate` is referenced in the role `packagerSignature`.]

[TPS_MANI_01223] Semantics of attribute `SoftwarePackage.packagerId` [Attribute `SoftwarePackage.packagerId` contains the value of the AUTOSAR vendor Id of the organization that created software tool that created the `SoftwarePackage`.]

Primitive	RevisionLabelString
Note	This primitive represents an internal AUTOSAR revision label which identifies an engineering object. It represents a pattern which • supports three integers representing from left to right MajorVersion, MinorVersion, PatchVersion. • may add an application specific suffix separated by one of ".", "_", ";". Legal patterns are for example: • 4.0.0 • 4.0.0.1234565 • 4.0.0_vendor specific;13 • 4.0.0;12 Tags: xml.xsd.customType=REVISION-LABEL-STRING xml.xsd.pattern=[0-9]+\.[0-9]+\.[0-9]+([\._;].*)? xml.xsd.type=string

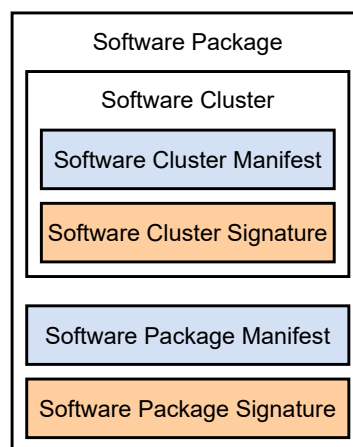
Table 16.14: RevisionLabelString

For clarification, a UCM can only accept packages that are generated by a packaging tool developed by the same organization that also developed the UCM itself. The vendor of the [SoftwareCluster](#) contained in the [SoftwarePackage](#) can obviously be different.

[TPS_MANI_01225] Actions taken during installation of a [SoftwarePackage](#) [It is necessary to define the concrete activity that shall be taken to handle the [SoftwarePackage](#) on the target machine. Possible actions are:

- Do a clean installation of a [SoftwareCluster](#).
- Update a previously installed [SoftwareCluster](#).
- Remove a [SoftwareCluster](#)

These options are formalized by means of meta-class [SoftwarePackageActionTypeEnum](#) and attribute [SoftwarePackage.actionType](#).]

**Figure 16.13: Conceptual relation of [SoftwarePackage](#) and [SoftwareCluster](#)**

Enumeration	SoftwarePackageActionTypeEnum
Note	This enumeration provides a choice of possible actions for the handling of a software package. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SoftwarePackage.actionType
Literal	Description
install	Do a clean installation of a SoftwareCluster. Tags: atp.EnumerationLiteralIndex=1
remove	Remove a SoftwareCluster. Tags: atp.EnumerationLiteralIndex=2
update	Update a previously installed SoftwareCluster. Tags: atp.EnumerationLiteralIndex=0
update Configuration	Execute a configuration update. Tags: atp.EnumerationLiteralIndex=3

Table 16.15: SoftwarePackageActionTypeEnum

[TPS_MANI_01344] **Actions taken after installation of a [SoftwarePackage](#)** [After a [SoftwarePackage](#) has been installed on the target machine it is possible to execute one of the following actions:

- Reboot the target platform.
- Restart the installed [SoftwareCluster](#).
- Do nothing.

These options are formalized by means of meta-class [SoftwarePackageActivationActionEnum](#) and attribute [SoftwarePackage.activationAction](#).]

Enumeration	SoftwarePackageActivationActionEnum
Note	This enumeration provides a choice of possible actions to be executed on installing a Software Package to a target Machine. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SoftwarePackage.activationAction
Literal	Description
nothing	The installation has no immediate consequences in terms of other software on the target. Tags: atp.EnumerationLiteralIndex=2
reboot	Reboot the whole Machine. Tags: atp.EnumerationLiteralIndex=0
restartApplication	Restart the application software on the target Machine. Tags: atp.EnumerationLiteralIndex=1

Table 16.16: SoftwarePackageActivationActionEnum

Class	UriDescription			
Note	This meta-class can be used to define a URI. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SoftwarePackage.primaryDownloadUri , SoftwarePackage.secondaryDownloadUri			
Attribute	Type	Mult.	Kind	Note





Class	UriDescription			
uri	String	0..1	attr	This attribute represents the actual URI. There are intentionally no format restrictions for how the URI shall be created.

Table 16.17: UriDescription

[constr_10653] Existence of attribute `UriDescription.uri`*Imposition time: IT_Mani*[For each `UriDescription`, the attribute `uri` shall exist.]

16.5 Vehicle Package

16.5.1 Overview

The ability to handle `SoftwarePackages` is the prerequisite for an important further step: the execution of an **update campaign that applies for the whole vehicle**. The basis for the update campaign is the definition of meta-class `VehiclePackage`.

[TPS_MANI_01290] `VehiclePackage` names affected UCMs [Meta-class `VehiclePackage` has the ability to describe the set of UCMs that are affected by the update campaign by means of aggregating meta-class `UcmDescription` in the role `ucm`.]

[TPS_MANI_01291] Identification of an actual UCM in the context of an update campaign [It is necessary to unambiguously identify the individual UCMs that are affected in the update campaign. For this purpose, meta-class `UcmDescription` defines attribute `identifier`.

By means of the reference to `UcmModuleInstantiation` in the role `ucmModuleInstantiation` it is in addition possible to identify the actual UCMs (represented by a `UcmModuleInstantiation`) that are relevant for the update campaign.

In order to be able to resolve the reference it is necessary to have access to the manifest model of the target `Machine`.]

[constr_1731] Value of `UcmDescription.identifier` in the scope of a `VehiclePackage`*Imposition time: IT_Mani*

[Within the scope of any given `VehiclePackage`, no two `UcmDescriptions` shall define the same value of attribute `identifier`.]

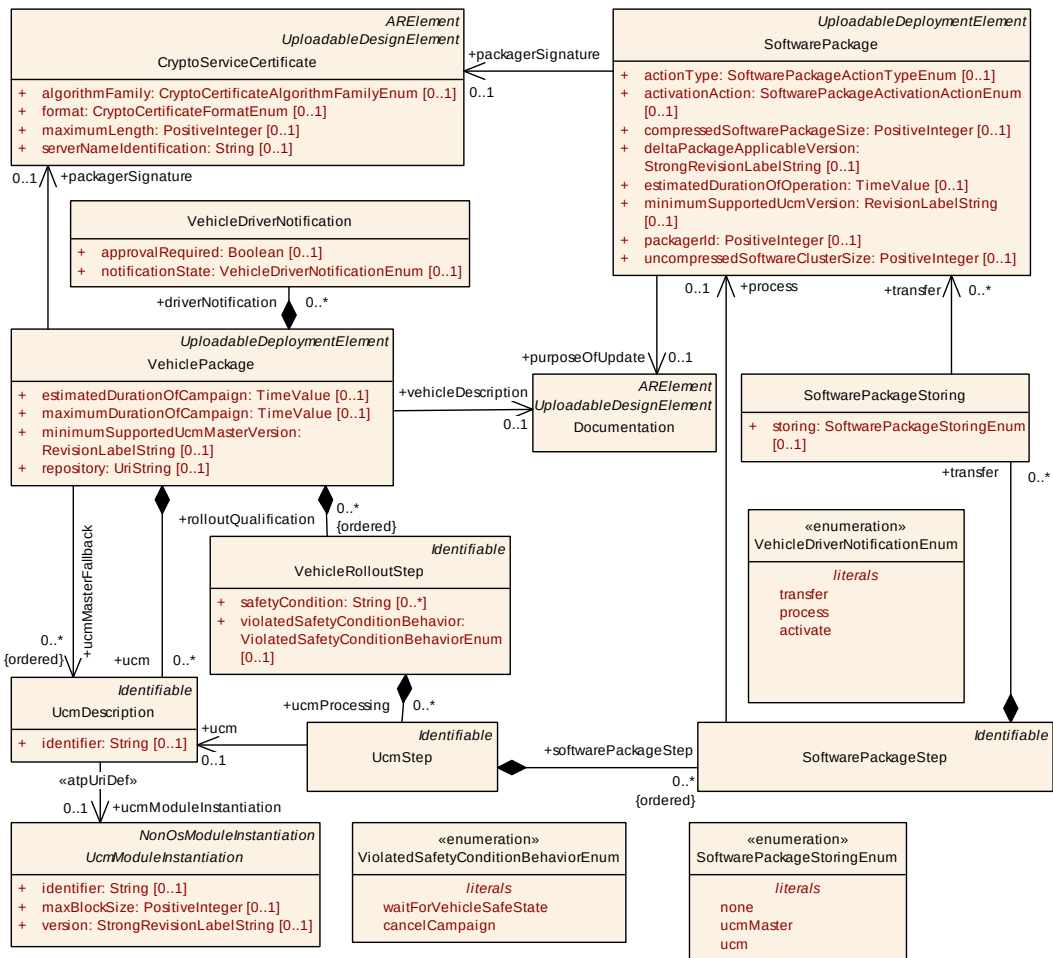


Figure 16.14: Modeling of **VehiclePackage**

[TPS_MANI_01292] Definition of fallback-order for UCM master [The update campaign is executed under the management of one UCM that acts as a “master UCM”.

If this UCM goes down for some reason, **VehiclePackage** has the ability to define an **ordered** list of other candidates for becoming the “master UCM” by means of the reference to meta-class **UcmDescription** in the role **ucmMasterFallback**.]

[TPS_MANI_01294] Update campaign depends on driver’s acceptance [For obvious reasons, it is not possible to arbitrarily trigger the execution of an update campaign at any time. It is the prerogative of the vehicle driver to decide about the amount and consequence of the UCM activities with respect to an update campaign.

For this purpose **VehiclePackage** aggregates meta-class **VehicleDriverNotification** in the role **driverNotification**.]

Class	VehiclePackage			
Note	This meta-class represents the ability to define a vehicle package for executing an update campaign. Tags: atp.recommendedPackage=VehiclePackages This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDeploymentElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
driver Notification	VehicleDriver Notification	*	aggr	This aggregation provides the ability to configure the necessary driver notifications.
estimated DurationOf Campaign	TimeValue	0..1	attr	This attribute provides an estimation about how long the campaign based on the VehiclePackage is going to take.
maximum DurationOf Campaign	TimeValue	0..1	attr	Maximum time allowed for the campaign to be active until UCM Master automatically cancels the campaign.
minimum SupportedUcm MasterVersion	RevisionLabelString	0..1	attr	This attribute identifies the minimum supported version of the UCM Master for this VehiclePackage.
packager Signature	CryptoService Certificate	0..1	ref	This reference identifies the certificate that represents the packager's signature.
repository	UriString	0..1	attr	This attribute identifies the repository where the Vehicle Package is stored.
rollout Qualification (ordered)	VehicleRolloutStep	*	aggr	This represents the rollout qualification.
ucm	UcmDescription	*	aggr	This aggregation represents the UcmDescriptions to be considered in the context of the VehiclePackage.
ucmMaster Fallback (ordered)	UcmDescription	*	ref	This reference lists the fallback order of Ucms that can take over the master role if the master goes down.
vehicle Description	Documentation	0..1	ref	This reference identifies the vehicle description.

Table 16.18: VehiclePackage

[constr_10247] Multiplicity of reference in the role [VehiclePackage.packagerSignature](#)

Imposition time: [IT_Mani](#)

[For each [VehiclePackage](#), the reference in the role [packagerSignature](#) shall exist.]

Class	UcmDescription			
Note	This meta-class represents the ability to define an identifier for a given UCM. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	VehiclePackage.ucm			
Attribute	Type	Mult.	Kind	Note
identifier	String	0..1	attr	This attribute represents the unique identification of the UcmIdentifier.





Class	UcmDescription			
ucmModule Instantiation	UcmModuleInstantiation	0..1	ref	This reference identifies the applicable UcmModule Instantiation. Stereotypes: atpUriDef

Table 16.19: UcmDescription

[constr_10248] Multiplicity of reference in the role [UcmDescription.identifier](#)

Imposition time: IT_Mani

[For each [UcmDescription](#), the reference in the role [identifier](#) shall exist.]

Class	VehicleDriverNotification			
Note	This meta-class provides the ability to configure a notification of the vehicle driver with respect to the update of vehicle software. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	VehiclePackage.driverNotification			
Attribute	Type	Mult.	Kind	Note
approval Required	Boolean	0..1	attr	This attribute controls whether approval is required for the driver notification.
notificationState	VehicleDriverNotificationEnum	0..1	attr	This attribute is used to configure the notification state.

Table 16.20: VehicleDriverNotification

[constr_10249] Multiplicity of reference in the role [VehicleDriverNotification.approvalRequired](#)

Imposition time: IT_Mani

[For each [VehicleDriverNotification](#), the reference in the role [approvalRequired](#) shall exist.]

[constr_10250] Multiplicity of reference in the role [VehicleDriverNotification.notificationState](#)

Imposition time: IT_Mani

[For each [VehicleDriverNotification](#), the reference in the role [notificationState](#) shall exist.]

Enumeration	VehicleDriverNotificationEnum
Note	This meta-class provides available options for vehicle driver notification. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	VehicleDriverNotification.notificationState
Literal	Description
activate	Software package shall be activated. Tags: atp.EnumerationLiteralIndex=2





Enumeration	VehicleDriverNotificationEnum
process	Processing of software package shall be executed Tags: atp.EnumerationLiteralIndex=1
transfer	Software shall be transferred to the vehicle. Tags: atp.EnumerationLiteralIndex=0

Table 16.21: VehicleDriverNotificationEnum

16.5.2 VehicleRolloutStep

[TPS_MANI_01295] Semantics of VehicleRolloutStep [The purpose of an update campaign is to roll out the installation or update of SoftwarePackages in the context of given UCMs. Each VehicleRolloutStep may apply to several UCMs at the same time.

The activation of the SoftwarePackages processed in the context of the enclosing VehiclePackage is triggered as the last element of the rolloutQualification is processed.]

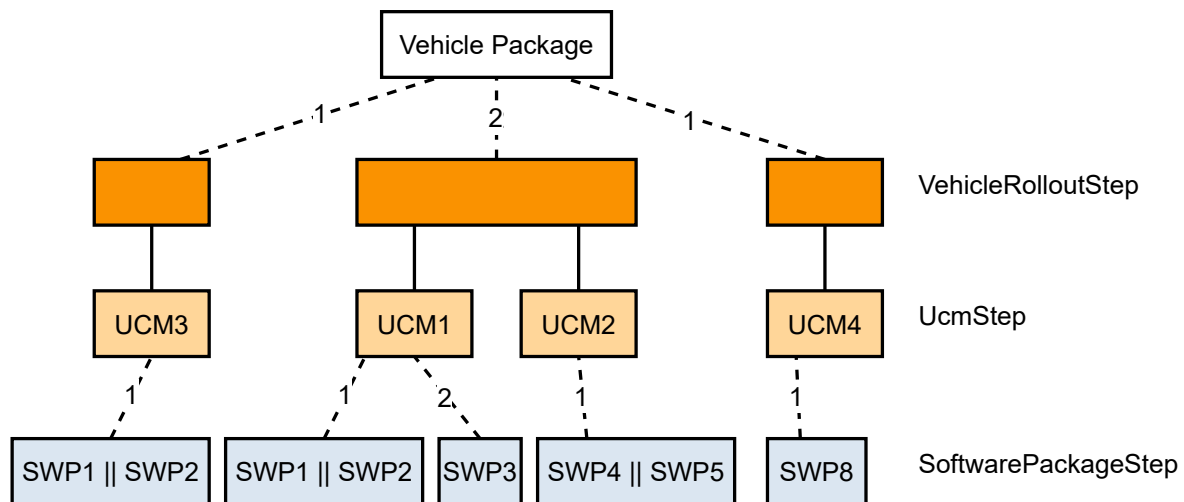


Figure 16.15: Conceptual view on an update campaign

Figure 16.15 takes a conceptual view on the structure of an update campaign and associates the relevant aspects of this view to meta-classes explained in this chapter. Associations that are labeled by a number indicate that an ordering is implied with the respective step.

For example, the execution of the update campaign happens in dedicated steps formalized as VehicleRolloutStep, as explained in [TPS_MANI_01295]. Each of the three steps sketched in the picture would be modeled as an individual VehicleRolloutStep.

The rollout action is formalized by UcmStep.softwarePackageStep. In other words, it is possible to specify a different softwarePackageStep for each individual UCM.

The individual `VehicleRolloutSteps` are executed in the order in which they are aggregated at the enclosing `VehiclePackage`. This aspect is in more detail explained by [TPS_MANI_01296].

[TPS_MANI_01296] Ordered execution of rollout steps in an update campaign

[The individual `VehicleRolloutSteps` defined in the context of a given `VehiclePackage` are executed in the defined order and therefore the aggregation of `VehicleRolloutStep` at `VehiclePackage` is ordered.]

Class	VehicleRolloutStep			
Note	This meta-class represents the ability to define a rollout-condition for a vehicle update campaign. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	VehiclePackage.rolloutQualification			
Attribute	Type	Mult.	Kind	Note
safetyCondition	String	*	attr	This attribute represents a list of textual safety conditions (e.g.: close the driver window) that need to be fulfilled before the rollout step can proceed and need to be maintained while the campaign's rolloutQualification is executed.
ucmProcessing	UcmStep	*	aggr	This aggregation collects the UcmProcessingSteps that make up the rollout step.
violatedSafetyConditionBehavior	ViolatedSafetyConditionBehaviorEnum	0..1	attr	This attribute provides options for the configuration of the reaction to a violated safety condition.

Table 16.22: VehicleRolloutStep

Enumeration	ViolatedSafetyConditionBehaviorEnum
Note	This enumeration provides formal options for the configuration of the reaction to a violated safety condition. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	VehicleRolloutStep.violatedSafetyConditionBehavior
Literal	Description
cancelCampaign	This enumerator supports the ability to cancel the update campaign in response to a violated safety condition. Tags: atp.EnumerationLiteralIndex=1
waitForVehicleSafeState	This enumerator supports the ability to wait for the vehicle to acquire a safe state in response to a violated safety condition. Tags: atp.EnumerationLiteralIndex=0

Table 16.23: ViolatedSafetyConditionBehaviorEnum

[constr_10429] Existence of attribute `VehicleRolloutStep.violatedSafetyConditionBehavior`

Imposition time: `IT_Mani`

[For each `VehicleRolloutStep`, the attribute `violatedSafetyConditionBehavior` shall exist.]

[constr_10547] Reference in the role `UcmStep.ucm` in the context of the enclosing `VehicleRolloutStep`

Imposition time: `IT_Mani`

[Each `VehiclePackage.ucm` shall be referenced in the role `UcmStep.ucm` **at most once** in the context of an enclosing `VehicleRolloutStep`.]

16.5.3 UcmStep

[TPS_MANI_01297] Semantics of meta-class `UcmStep` [Each `VehicleRolloutStep` consists of a number of `UcmSteps` (aggregated by `VehicleRolloutStep` in the role `ucmProcessing`). Each `UcmStep` refers to a specific UCM (represented by `UcmDescription`) in the role `ucm`.]

[TPS_MANI_01298] No ordering of `VehicleRolloutStep.ucmProcessing`
[Each `UcmStep` defined in the context of an enclosing `VehicleRolloutStep` can be handled without the consideration of a dedicated order. Therefore, the aggregation `VehicleRolloutStep.ucmProcessing` is not labeled as `ordered`.]

[constr_10530] Each Ucm shall process at least one software package

Imposition time: `IT_Mani`

[Within the context of all `UcmSteps` referencing a specific `UcmDescription` in the role `ucm`, **at least one** `SoftwarePackageStep` shall exist that defines a reference to a `SoftwarePackage` in the role `process`.]

Class	UcmStep			
Note	This meta-class represents one rollout step in which software packages are processed on a specific Ucm. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<code>ARObject</code> , <code>Identifiable</code> , <code>MultilanguageReferrable</code> , <code>Referrable</code>			
Aggregated by	<code>VehicleRolloutStep.ucmProcessing</code>			
Attribute	Type	Mult.	Kind	Note
software PackageStep (ordered)	<code>SoftwarePackageStep</code>	*	aggr	This aggregation represents the sequence of activities to be carried out in the context of the respective UCM.
ucm	<code>UcmDescription</code>	0..1	ref	This reference identifies the UCM for which the rollout step applies.

Table 16.24: UcmStep

16.5.4 SoftwarePackageStep

[TPS_MANI_01299] Aggregation of `SoftwarePackageSteps` at `UcmStep` [Each `UcmStep` consists of an `ordered` collection of `SoftwarePackageSteps`. This means that the order in which `SoftwarePackages` are handled in the scope of one `UcmStep` is significant.]

Class	SoftwarePackageStep			
Note	This meta-class represents the configuration of an activation step in the context of software package activation. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	UcmStep.softwarePackageStep			
Attribute	Type	Mult.	Kind	Note
process	SoftwarePackage	0..1	ref	This reference identifies the SoftwarePackage to be processed in the enclosing SoftwarePackageStep.
transfer	SoftwarePackage Storing	*	aggr	This aggregation clarifies the storing of the Software Package.

Table 16.25: SoftwarePackageStep

[TPS_MANI_01300] Semantics of reference [SoftwarePackageStep.transfer](#).
transfer [The reference [SoftwarePackageStep.transfer.transfer](#) identifies the [SoftwarePackages](#) that are supposed to be transferred in the context of the enclosing [SoftwarePackageStep](#).

It is positively supported that [SoftwarePackages](#) are transferred in parallel and therefore the multiplicity of the reference in the role [transfer](#) has been set to 0..*.]

[TPS_MANI_01301] Semantics of aggregation [SoftwarePackageStep.transfer](#) [By means of the aggregation of [SoftwarePackageStoring](#) it is possible to specify for each individual [SoftwarePackage](#) to specify whether and where the [SoftwarePackage](#) is stored in the vehicle.

This information is specifically provided by attribute [SoftwarePackageStoring.storing](#) of type [SoftwarePackageStoringEnum](#).]

Class	SoftwarePackageStoring			
Note	This meta-class provides the ability to specify whether and where the referenced SoftwarePackage is stored. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	SoftwarePackageStep.transfer			
Attribute	Type	Mult.	Kind	Note
storing	SoftwarePackage StoringEnum	0..1	attr	This attribute clarifies whether and where the referenced SoftwarePackage is stored.
transfer	SoftwarePackage	*	ref	This reference identifies the SoftwarePackage(s) to be transferred in the enclosing SoftwarePackageStep.

Table 16.26: SoftwarePackageStoring

[constr_10256] Multiplicity of reference in the role [SoftwarePackageStoring.storing](#)

Imposition time: [IT_Mani](#)

[For each [SoftwarePackageStoring](#), the reference in the role [storing](#) shall exist.]

Enumeration	SoftwarePackageStoringEnum
Note	This enumeration controls where software packages are stored. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	SoftwarePackageStoring.storing
Literal	Description
none	No storing in vehicle. Tags: atp.EnumerationLiteralIndex=0
ucm	Storing in UCM (subordinate). Tags: atp.EnumerationLiteralIndex=2
ucmMaster	Storing in Ucm Master. Tags: atp.EnumerationLiteralIndex=1

Table 16.27: SoftwarePackageStoringEnum

[TPS_MANI_01302] Semantics of reference [SoftwarePackageStep.process](#)

[The reference [SoftwarePackageStep.process](#) identifies the [SoftwarePackage](#) that is supposed to be processed in the context of the enclosing [SoftwarePackageStep](#).

The processing of [SoftwarePackages](#) happens strictly one after the other and therefore the reference [process](#) can only have the multiplicity 0..1. The strict order of processing is guaranteed by the aggregation of the [SoftwarePackageStep](#) at [UcmStep](#).]

[TPS_MANI_01306] Simultaneous existence of references in the role [SoftwarePackageStep.transfer](#) and [SoftwarePackageStep.process](#) [It is possible that the references [SoftwarePackageStep.transfer](#) and [SoftwarePackageStep.process](#) simultaneously exist to the identical [SoftwarePackage](#) in the context of the same [SoftwarePackageStep](#).

The semantics of such a configuration is that the [SoftwarePackage](#) that is referenced by the two roles owned by the same [SoftwarePackageStep](#) is “streamed”, i.e. transferred and processed in one step represented by the [SoftwarePackageStep](#).]

Examples for the usage of [SoftwarePackageStep](#) can be found in [Chapter B.11.2](#).

17 Interoperability between Classic Platform and Adaptive Platform

This chapter collects restrictions for interoperability between Classic Platform and Adaptive Platform.

17.1 Usage of majorVersion in the SOME/IP network binding

In case of a SOME/IP communication between Classic Platform and Adaptive Platform the usage of `SomeipServiceInterfaceDeployment.serviceInterfaceVersion.majorVersion` is restricted.

If several `ProvidedSomeipServiceInstances` are defined with the same `SomeipServiceInterfaceDeployment.serviceInterfaceId` and different `SomeipServiceInterfaceDeployment.serviceInterfaceVersion.majorVersions` and these `ProvidedSomeipServiceInstances` are mapped to the same Socket Address (UDP/TCP Port and IP Address) by `SomeipServiceInstanceToMachineMapping` then particular restrictions apply in case that the `ProvidedSomeipServiceInstances` **are consumed on a Classic Platform ECU**.

In such a scenario the same `MessageId` may be used for `ServiceInterface` elements like an `event` in the different `ProvidedSomeipServiceInstances` that have different `majorVersions`.

On the Classic Platform in the SoAd module, this will result in different `Pdus` that have the same `headerId` in the same `SocketConnection`. In the AUTOSAR Architecture of the Classic Platform one part of the SOME/IP Header is evaluated in the SOME/IP Transformer (`RequestId`, `Protocol Version`, `Interface Version`, `Message Type`, `Return Code`) and the other part in the `Socket Adaptor` (`MessageId`, `Length`).

This means that the `Socket Adaptor` is not able to evaluate the `MajorVersion` in the `Pdu` and can not determine the source of the `Pdu`.

The following restrictions apply in case that the `ServiceInterface` contains `methods` and/or `fields` with `hasGetter` or `hasSetter` set to true: If two or more `ProvidedSomeipServiceInstances` are defined using the same `serviceInterfaceId` and different `majorVersions` and these `ProvidedSomeipServiceInstances` are mapped to the same Socket Address (same UDP/TCP Port and IP Address) then the destination IP address, the destination port number, and the Level 4 protocol (Udp/Tcp) fields of header of IP packets containing calls that are sent to the `ProvidedSomeipServiceInstances` are identical.

In such a scenario, the `ProvidedSomeipServiceInstances` may still use identical `methodIds` if the following condition applies:

- (a) At any point in time only one of the `ProvidedSomeipServiceInstances` is active, and only clients of that `ProvidedSomeipServiceInstance` send requests to the `ProvidedSomeipServiceInstance`.

In all other cases, the `methodIds` of the two `ProvidedSomeipServiceInstances` should not overlap.

The following restrictions apply for `ServiceInterface` events and fields with `hasNotifier` set to true: If two or more `ProvidedSomeipServiceInstances` are defined using the same `serviceInterfaceId` and different `majorVersions` and these `ProvidedSomeipServiceInstances` are mapped to the same Socket Address (same UDP/TCP Port and IP Address), then the source IP address, the source port number, and the Level 4 protocol (Udp) fields of header of IP packets containing event PDUs that are sent to the clients of the `ProvidedSomeipServiceInstances` are identical.

In such a scenario, the `ProvidedSomeipServiceInstances` may use identical `eventId`s if at least one of the following conditions holds for any pair of the `ProvidedSomeipServiceInstances`:

- (a) At any point in time only one of the `ProvidedSomeipServiceInstances` is active
- (b) If two or more `ProvidedSomeipServiceInstances` can send events or Field notifiers at the same time, the `ProvidedSomeipServiceInstances` may still use identical `eventId`s if at least one of the following IP header fields of the IP packet containing the event is different for any pair of `SomeipEventDeployments` identified by the same `eventId`:
 - (b1) Destination IP address (== IP address of client)
 - (b2) Destination port number (== client port number)

A Reference Material

A.1 Terms and Abbreviations

The content of this appendix chapter is *informative* in nature and shall **not** be considered as *normative* content.

The main list of terms and abbreviations are defined in [42, TR Glossary]. The following table contains the list of terms and abbreviations used in the scope of this document which are not already defined in [42, TR Glossary] along with the spelled-out meaning of each of the abbreviations.

Abbreviation	Meaning
AES	Advanced Encryption Standard
ATP	AUTOSAR Template Profile
ARXML	AUTOSAR XML
CTM	Counter Mode
DDS	Data Distribution Service
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol
DM	Diagnostic Manager
DNS	Domain Name System
DTC	Diagnostic Trouble Code
ECB	Electronic Code Book
ECC	Elliptic Curve Cryptography
ECDSA	Elliptic Curve Digital Signature Algorithm
ECIES	Elliptic Curve Integrated Encryption Scheme
EDDSA	Edwards-Curve Digital Signature Algorithm
FQDN	Fully-Qualified Domain Name
GCM	Galios/Counter Mode
HMAC	Hash-based Message Authentication Code
HTTP	Hypertext Transport Protocol
IANA	Internet Assigned Numbers Authority
ICMP	Internet Control Message Protocol
ICV	MACsec Integrity Check Value
ID	Identifier
IP	Internet Protocol
ISO	International Standardization Organization
JSON	JavaScript Object Notation
KaY	MACsec Key Agreement Entity
LAN	Local Area Network
MAC	Media Access Control





Abbreviation	Meaning
MAC	Message Authentication Code
MACsec	Media Access Control security
MD	Message Digest
MTU	Maximum Transmission Unit
mDNS	Multicast DNS
NDP	Neighbor Discovery Protocol
NM	Network Management
NV	Non-Volatile
PAE	MACsec Port Access Entity
PHM	Platform Health Management
PKCS	Public Key Cryptography Standards
POSIX	Portable Operating System Interface
PQC	Post-Quantum Cryptography
PSK	Pre-Shared Key
ROM	Read-Only Memory
RSA	Cryptographic approach according to Rivest, Shamir, and Adleman
SAK	MACsec Secure Association key
SD	Service Discovery
SDG	Special Data Group
SecY	MACsec Security Entity
SHA	Secure Hash Algorithm
SOME/IP	Scalable service-Oriented MiddlewarE over IP
SOVD	Service-Oriented Vehicle Diagnostics
SWC	Software Component
TLS	Transport Layer Security
TLV	Tag Length Value
TLS	Transport Layer Security
TTL	Time to Live
UDP	User Datagram Protocol
UDS	Unified Diagnostic Services
UML	Unified Modeling Language
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
UUID	Universally Unique Identifier
VLAN	Virtual Local Area Network
VSA	Variable Size Array

Table A.1: Terms and Abbreviations used in the scope of this Document

A.2 Imposition Times of Constraints

The constraints formulated in this document have different *actual* imposition times which denote the steps in the workflow when the respective constraint has to be imposed.

The imposition times that are considered applicable in the scope of this document¹ are listed in [Table A.2](#).

Please note that the imposition times are intentionally rendered as technical terms such that it is possible to link back from each constraint to the definition of the affected imposition time in [Table A.2](#).

This document has been created to apply primarily for the *AUTOSAR adaptive platform* and therefore the discussed imposition times also apply exclusively to the *AUTOSAR adaptive platform*.

Imposition Time	Description	Motivation
IT_BefAraApiGen	Before the generation of the ara API starts	This imposition time is aimed at the time when a software-component is ready for generating the header files such that the implementation of the software-component can be started.
IT_DiagDes	Diagnostic design is completed	This imposition time denotes the step in the workflow, where the diagnostic design is about to be finished independent of the standard where it is applied. This includes the finalization, e.g., of the DEXT.
IT_GraDes	GrantDesign is completed	This imposition time is aimed at the time when a GrantDesign is finished, i.e. it shall be used in constraints that target the consistency of the modeling of GrantDesign .
IT_MachDes	Machine design is completed	This imposition time denotes the step in the workflow, where the machine design is about to be finished.
IT_Mani	Creation of the manifest is finished	This imposition time denotes the step in the workflow, where the manifest is considered complete such that the installation on a target platform can be started.
IT_ProDes	ProcessDesign is completed	This imposition time is aimed at the time when a ProcessDesign is finished, i.e. it shall be used in constraints that target the consistency of the modeling of ProcessDesign .
IT_SubSysDes	Sub-system design is completed	This imposition time denotes the step in the workflow, where the sub-system design is about to be finished.
IT_SysDes	System design is completed	This imposition time denotes the step in the workflow, where the system design is about to be finished.

Table A.2: Imposition Times of constraints in this document

¹Different imposition times may be defined in the context of other AUTOSAR standard documents

B Examples

The content of this appendix chapter is *informative* in nature and shall **not** be considered as *normative* content.

This chapter contains a collection of examples that reflect concepts described in different chapters of this document. The content of the chapter provides mere explanation and does not add anything to the model semantics.

B.1 Data Type

B.1.1 Definition of Map Data Type

Figure B.1 contains a graphical representation of an example model for `ApplicationAssocMapDataType`.

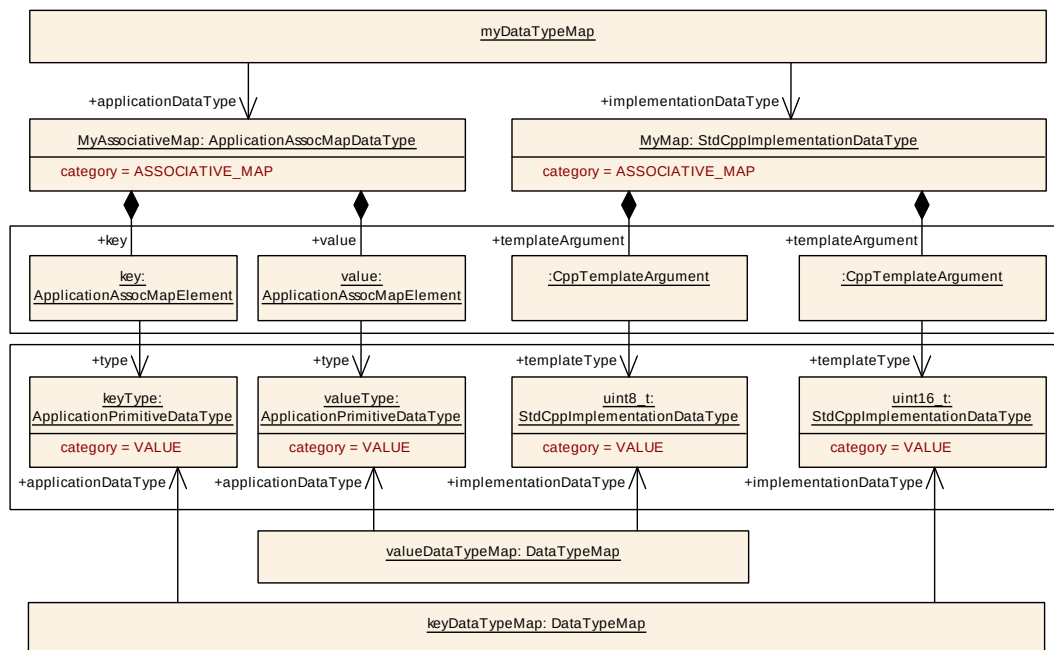


Figure B.1: Example of the model of an associative map

Listing B.1 provides the corresponding ARXML serialization of the example model of an `ApplicationAssocMapDataType` depicted in Figure B.1.

```
<APPLICATION-ASSOC-MAP-DATA-TYPE>
  <SHORT-NAME>MyAssociativeMap</SHORT-NAME>
  <KEY>
    <SHORT-NAME>MyKey</SHORT-NAME>
    <TYPE-TREF BASE="default" DEST="APPLICATION-PRIMITIVE-DATA-TYPE">keyType</TYPE-TREF>
  </KEY>
  <VALUE>
    <SHORT-NAME>MyValue</SHORT-NAME>
    <TYPE-TREF BASE="default" DEST="APPLICATION-PRIMITIVE-DATA-TYPE">valueType</TYPE-TREF>
  </VALUE>
</APPLICATION-ASSOC-MAP-DATA-TYPE>

<APPLICATION-PRIMITIVE-DATA-TYPE>
```

```

<SHORT-NAME>keyType</SHORT-NAME>
<CATEGORY>VALUE</CATEGORY>
</APPLICATION-PRIMITIVE-DATA-TYPE>

<APPLICATION-PRIMITIVE-DATA-TYPE>
  <SHORT-NAME>valueType</SHORT-NAME>
  <CATEGORY>VALUE</CATEGORY>
</APPLICATION-PRIMITIVE-DATA-TYPE>

```

Listing B.1: Example for the definition of an `ApplicationAssocMapDataType`

B.1.2 Definition of String Data Type

The example depicted in Figure B.2 contains the definition of both an `ApplicationDataType` as well as the definition of the corresponding `CppImplementationDataType`.

The latter obviously becomes significantly lighter to model thanks to the restriction that, as far as the C++ language binding is concerned, a `CppImplementationDataType` of category `STRING` shall only be implemented on the basis of an `ara::core::String`.

Another aspect of the example in Figure B.2 is that it defines the intended encoding of the modeled data type in the scope of the `ApplicationPrimitiveDataType`.

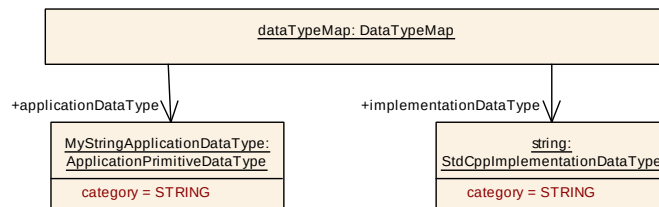


Figure B.2: Example of the model of a string with `UTF-8` encoding

B.1.3 Definition of String Data Type

Figure B.3 shows an example of an one-dimensional array of `uint16` elements with `arraySize = 5`.

Figure B.4 shows an example of a multidimensional array where a `CppImplementationDataType` of category `ARRAY` with `arraySize = 5` has a `templateArgument` that points to the inner `CppImplementationDataType` of category `ARRAY` in the role `templateType`.

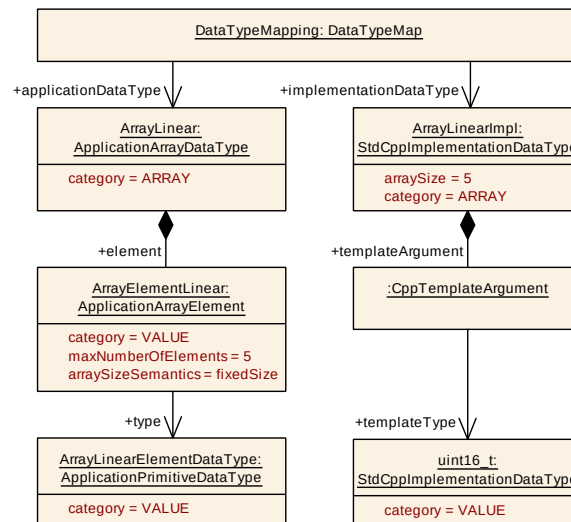


Figure B.3: Example of the model of a one-dimensional array

The inner `CppImplementationDataType` has a `templateArgument` that finally points with the `templateType` reference to a primitive type.

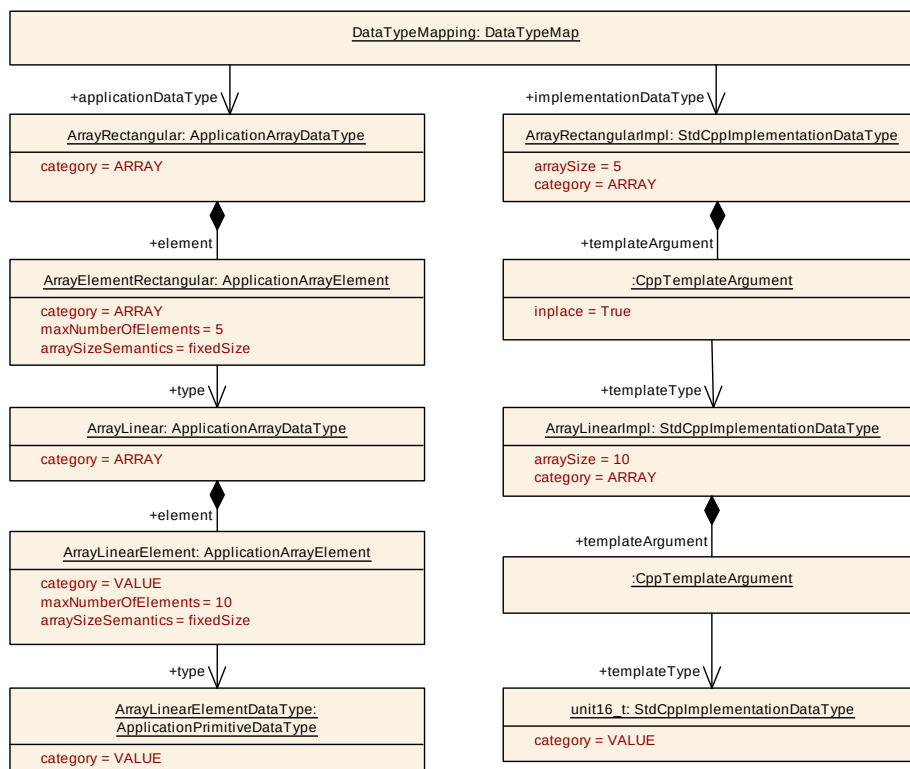


Figure B.4: Example of the model of a multidimensional array

B.1.4 Definition of Vector Data Type

Figure B.5 shows an example of an one-dimensional vector of uint16 elements.

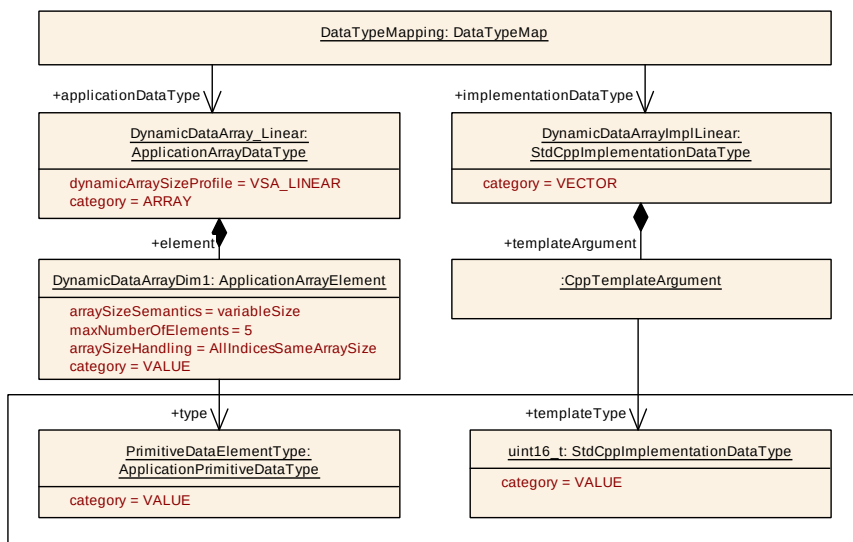


Figure B.5: Example of the model of a one-dimensional vector

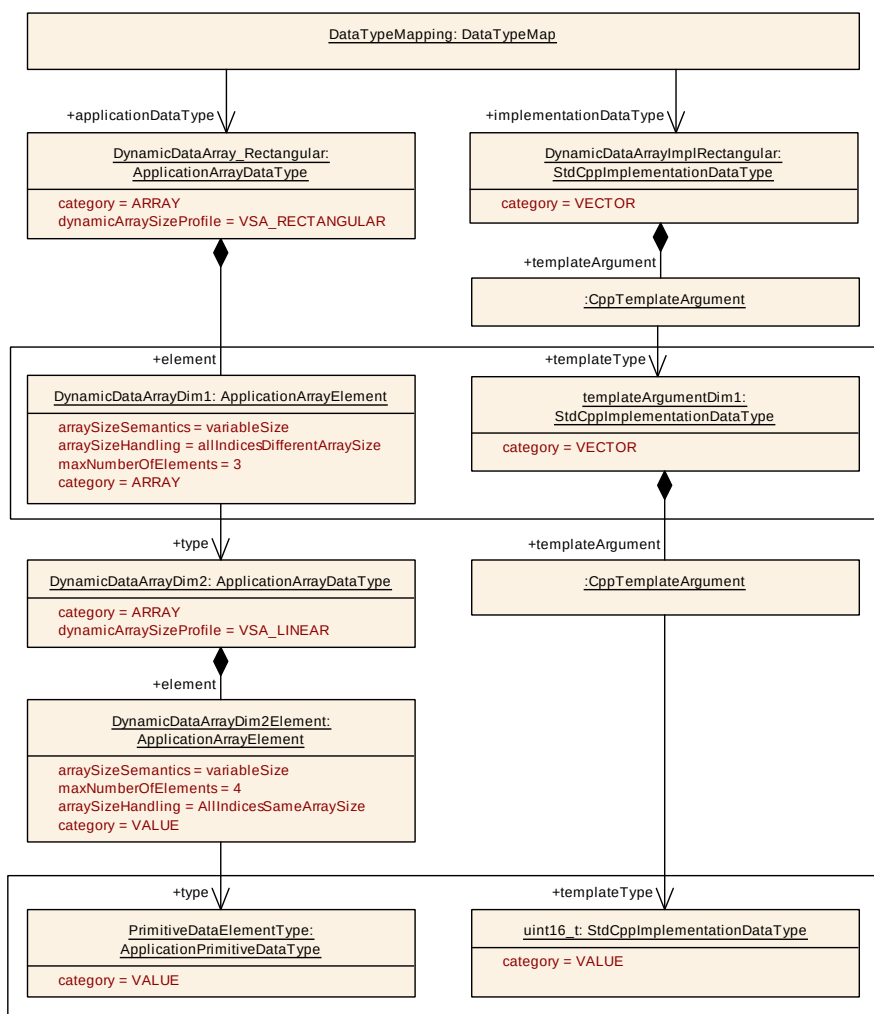


Figure B.6: Example of the model of a multidimensional vector

Figure B.6 shows an example of a multidimensional vector where a `CppImplementationDataType` of category `VECTOR` has a `templateArgument` that points to the inner `CppImplementationDataType` of category `VECTOR` in the role `templateType`. The inner `CppImplementationDataType` has a `templateArgument` that finally points with the `templateType` reference to a primitive type.

B.1.5 Definition of Struct Data Type

The example depicted in Figure B.7 shows the definition of a Structure, called `MyStruct`, that has two members. The `typeReference` of the `subElements` with the `shortName` `ArrayElement` is classified with `inplace = true`.

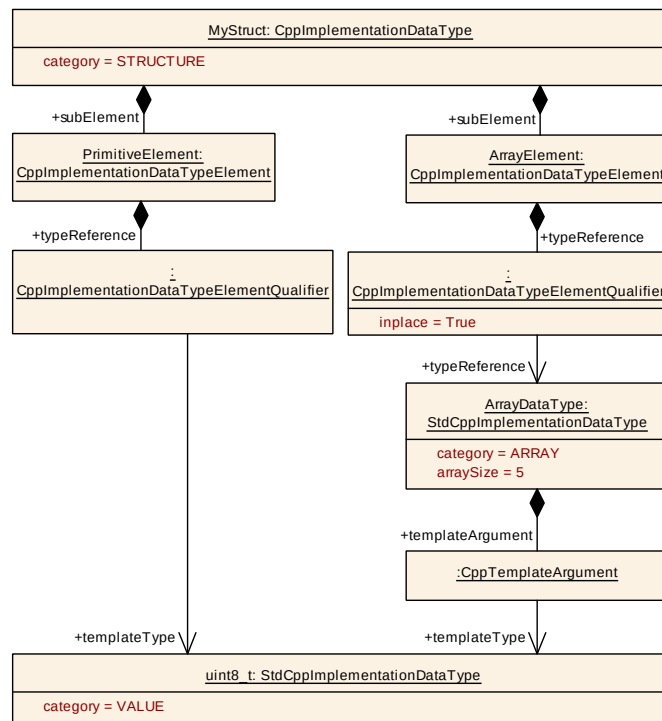


Figure B.7: Example of the model of a Struct

In case that the `inplace` attribute in the `typeReference` to the array is set to `false` the model results in a using-declaration of `ArrayDataType` that is defined outside `MyStruct`.

B.1.6 Definition of Enumeration Data Type

The following example illustrates how an enumeration is specified using a `CompuMethod`.

```

<COMPU-METHOD>
<SHORT-NAME>cylinders</SHORT-NAME>
<CATEGORY>TEXTTABLE</CATEGORY>
<COMPU-INTERNAL-TO-PHYS>
  <COMPU-SCALES>

```

```

<COMPU-SCALE>
  <LOWER-LIMIT INTERVAL-TYPE="CLOSED">0</LOWER-LIMIT>
  <UPPER-LIMIT INTERVAL-TYPE="CLOSED">0</UPPER-LIMIT>
  <COMPU-CONST>
    <VT>Cylinder1</VT>
  </COMPU-CONST>
</COMPU-SCALE>
<COMPU-SCALE>
  <LOWER-LIMIT INTERVAL-TYPE="CLOSED">1</LOWER-LIMIT>
  <UPPER-LIMIT INTERVAL-TYPE="CLOSED">1</UPPER-LIMIT>
  <COMPU-CONST>
    <VT>Cylinder2</VT>
  </COMPU-CONST>
</COMPU-SCALE>
<COMPU-SCALE>
  <LOWER-LIMIT INTERVAL-TYPE="CLOSED">2</LOWER-LIMIT>
  <UPPER-LIMIT INTERVAL-TYPE="CLOSED">2</UPPER-LIMIT>
  <COMPU-CONST>
    <VT>Cylinder3</VT>
  </COMPU-CONST>
</COMPU-SCALE>
<COMPU-SCALE>
  <LOWER-LIMIT INTERVAL-TYPE="CLOSED">3</LOWER-LIMIT>
  <UPPER-LIMIT INTERVAL-TYPE="CLOSED">3</UPPER-LIMIT>
  <COMPU-CONST>
    <VT>Cylinder4</VT>
  </COMPU-CONST>
</COMPU-SCALE>
</COMPU-SCALES>
</COMPU-INTERNAL-TO-PHYS>
</COMPU-METHOD>

```

Listing B.2: example for enumeration

B.1.7 Definition of Map Data Type

The example depicted in Figure B.8 shows the definition of a **ASSOCIATIVE_MAP** that has two **CppTypeTemplateArguments**, one for the key and one for the value.

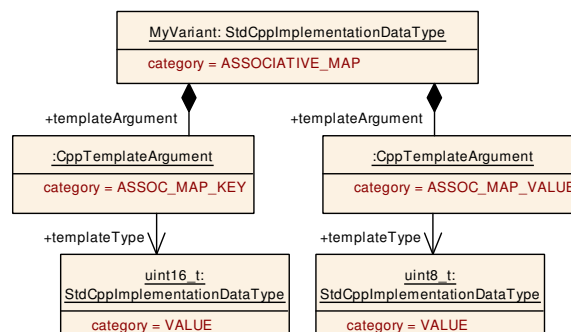


Figure B.8: Example of the model of an **ASSOCIATIVE_MAP**

B.1.8 Definition of Variant Data Type

The example depicted in Figure B.9 shows the definition of a **VARIANT** that has two **CppTypeTemplateArguments**. Each one represents one alternative type. Please note

that the `CppTemplateArguments` of a `CppImplementationDataType` are ordered in ARXML and this order is not visible in the object diagram.

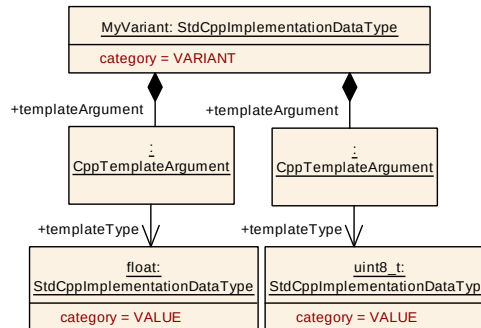


Figure B.9: Example of the model of an **VARIANT**

B.1.9 Scenarios to define a Vector

This section contains a non-comprehensive list of possible scenarios for the definition of a `CppImplementationDataType` of category **VECTOR**.

Please note that the general information contained in this chapter does not exclusively apply on to the vector data type. The latter has been picked as an arbitrary example for the visualization of the effect of configuration settings on the language binding.

Consequently, there is no further discussion of this topic with respect to a different kind of container data type.

Please note that for these example scenarios the namespace of a `CustomCppImplementationDataType` is assumed to be set to `x::y` and the `shortName` is assumed to be set to `CustVec`.

The `shortName` of a `StdCppImplementationDataType` is assumed to be set to `MyVec`.

If a custom `Allocator` is used in a scenario the value of `Allocator.shortName` shall be assumed to have the value `CustAlloc`.

Scenario	array size	custom allocator	custom type	Resulting C++ Code
I	No	No	No	<code>using MyVec = ara::core::Vector<std::uint8_t></code>
II	Yes	No	No	<code>using MyVec = ara::core::Vector<std::uint8_t> //generator warning</code>
III	Yes	Yes	No	<code>using MyVec = ara::core::Vector<std::uint8_t, CustAlloc<std::uint8_t, MaxSize>></code>
IV	No	Yes	No	<code>using MyVec = ara::core::Vector<std::uint8_t, CustAlloc<std::uint8_t>></code>





Scenario	array size	custom allocator	custom type	Resulting C++ Code
V	Yes	Yes	Yes	<code>x::y::CustVec<ara::core::uint8_t, CustAlloc<std::uint8_t, MaxSize>></code>
VI	Yes	No	Yes	<code>x::y::CustVec<std::uint8_t></code>
VII	No	Yes	Yes	<code>x::y::CustVec<std::uint8_t, CustAlloc<std::uint8_t>></code>
VIII	No	No	Yes	<code>x::y::CustVec<std::uint8_t></code>

Table B.1: Example definitions of a `CppImplementationDataType` of category VECTOR

B.2 Service-oriented Communication

B.2.1 Radar and Camera ServiceInterface example

The example in Figure B.10 shows a *Radar ServiceInterface* with a *BrakeEvent* and two *methods*: *Calibrate* and *Adjust*. The *Camera ServiceInterface* shown in Figure B.11 has two events: *LaneEvent* and *SpeedLimitEvent* and one *Calibrate* method.

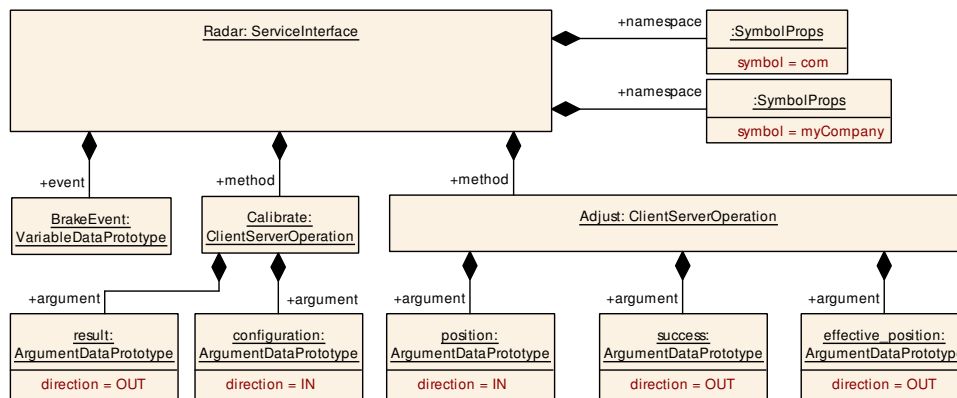


Figure B.10: Radar Service Interface

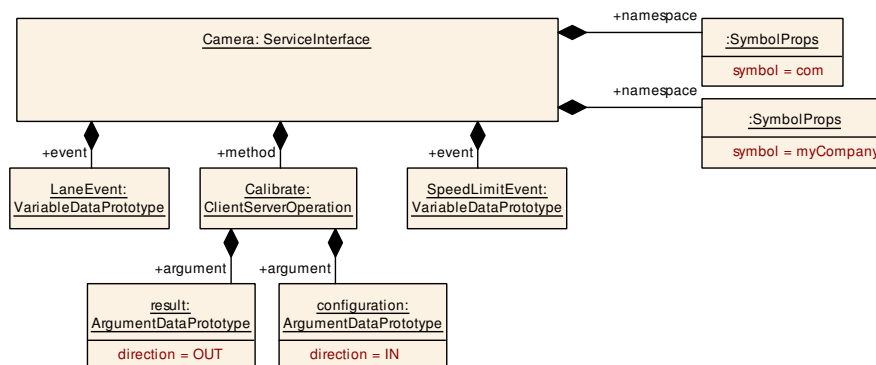


Figure B.11: Camera Service Interface

Both *ServiceInterfaces* *Radar* and *Camera* are mapped to a combined *RadarAndCamera ServiceInterface* with an *Service Interface Element Mapping* since both *ServiceInterfaces* have a *method* with the same name: *Calibrate*.

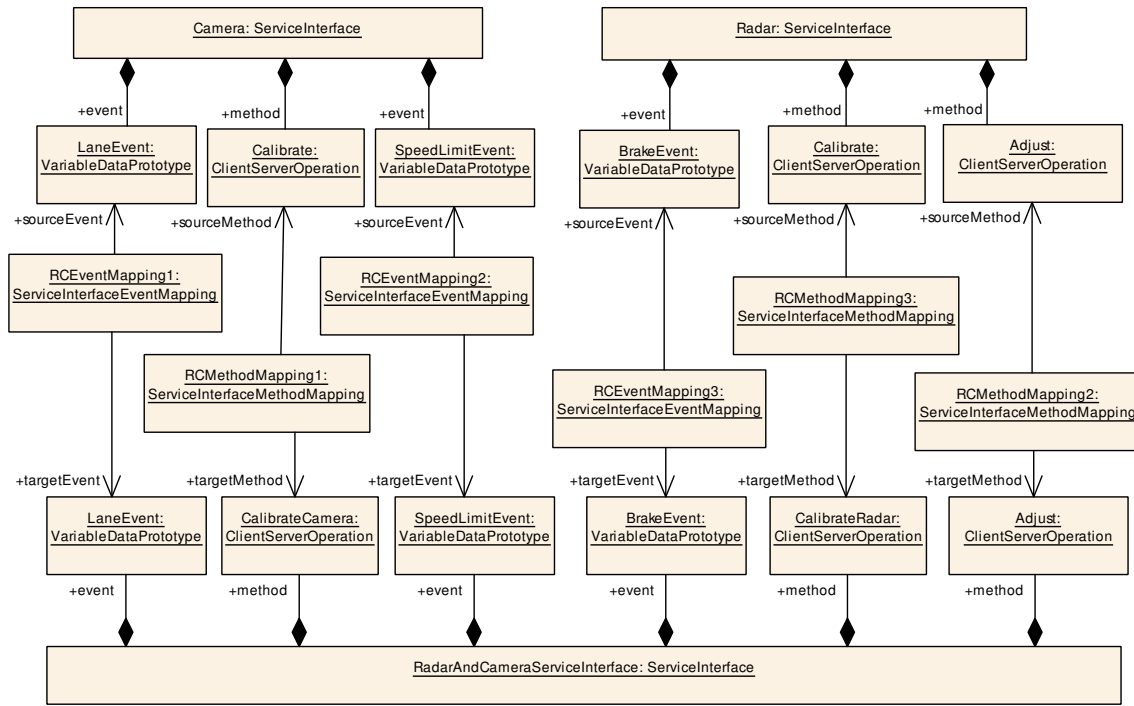


Figure B.12: Service Interface Element Mapping example

The combined *ServiceInterface* is offered over the network as a SOME/IP Service. *Figure B.13* shows the assignment of the SOME/IP *serviceInterfaceId* to 31.

In addition SOME/IP *eventIds* are assigned to the *events* and *methodIds* are assigned to the *methods*. Furthermore a single *SomeipEventGroup* is defined to which all *SomeipEventDeployments* of the *RadarAndCamera ServiceInterface* are assigned.

Figure B.14 shows a modeled *ProvidedSomeipServiceInstance* that is mapped to a *Machine*.

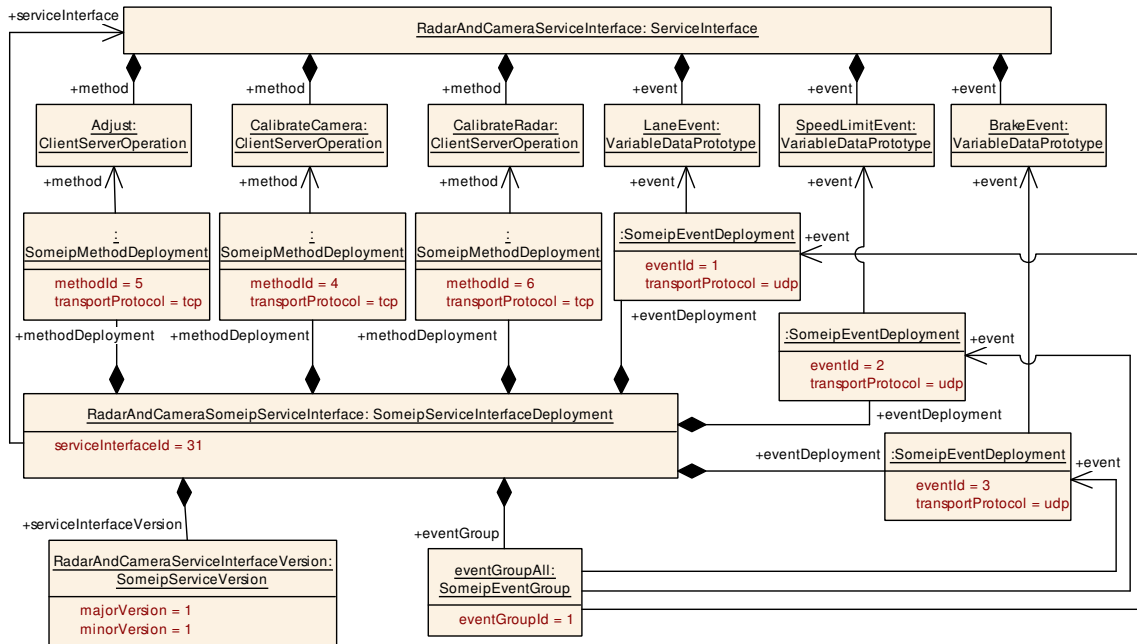


Figure B.13: SOME/IP Deployment

The displayed configuration in [Figure B.14](#) leads to a SOME/IP OfferService Message with the following content:

- ServiceId => `serviceInterfaceId = 31`
- InstanceId => `serviceInstanceId = 1`
- MajorVersion => 1
- MinorVersion => 1
- TTL => 3
- IPv4 Endpoint Option with IPv4 Address (170.88.199.94), Protocol (TCP), Port-Number (30567)
- IPv4 Endpoint Option with IPv4 Address (170.88.199.94), Protocol (UDP), Port-Number (30501)
- IP Multicast Endpoint Option with IPv4 Address (239.255.0.1), Protocol (UDP), PortNumber (30502)

An example of a `RequiredSomeipServiceInstance` is shown in [Figure B.15](#).

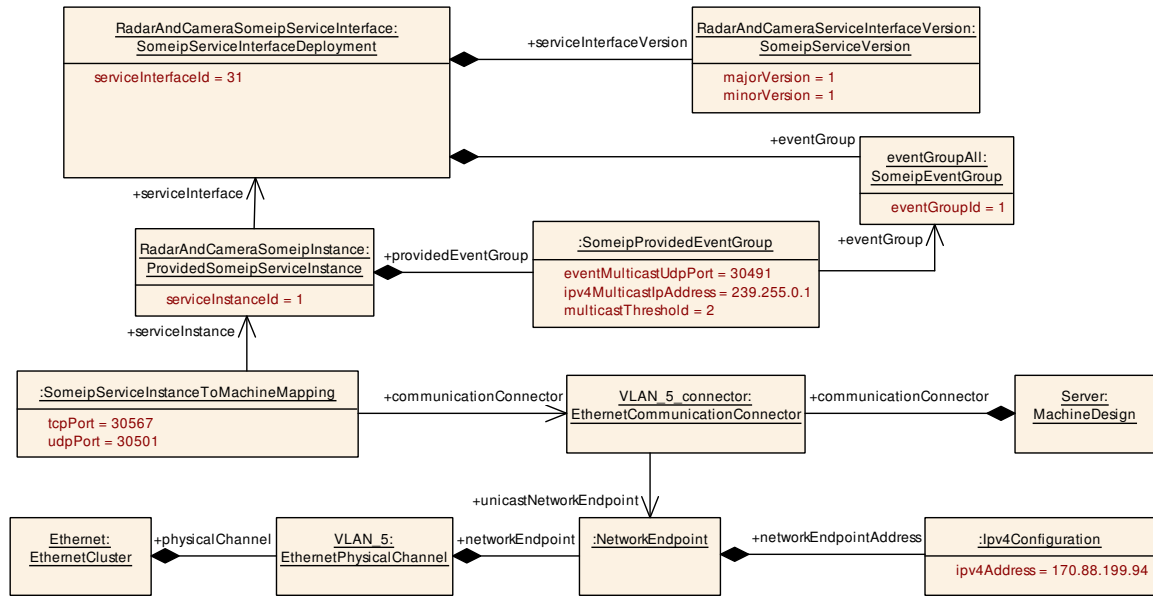


Figure B.14: SOME/IP Provided Service Instance

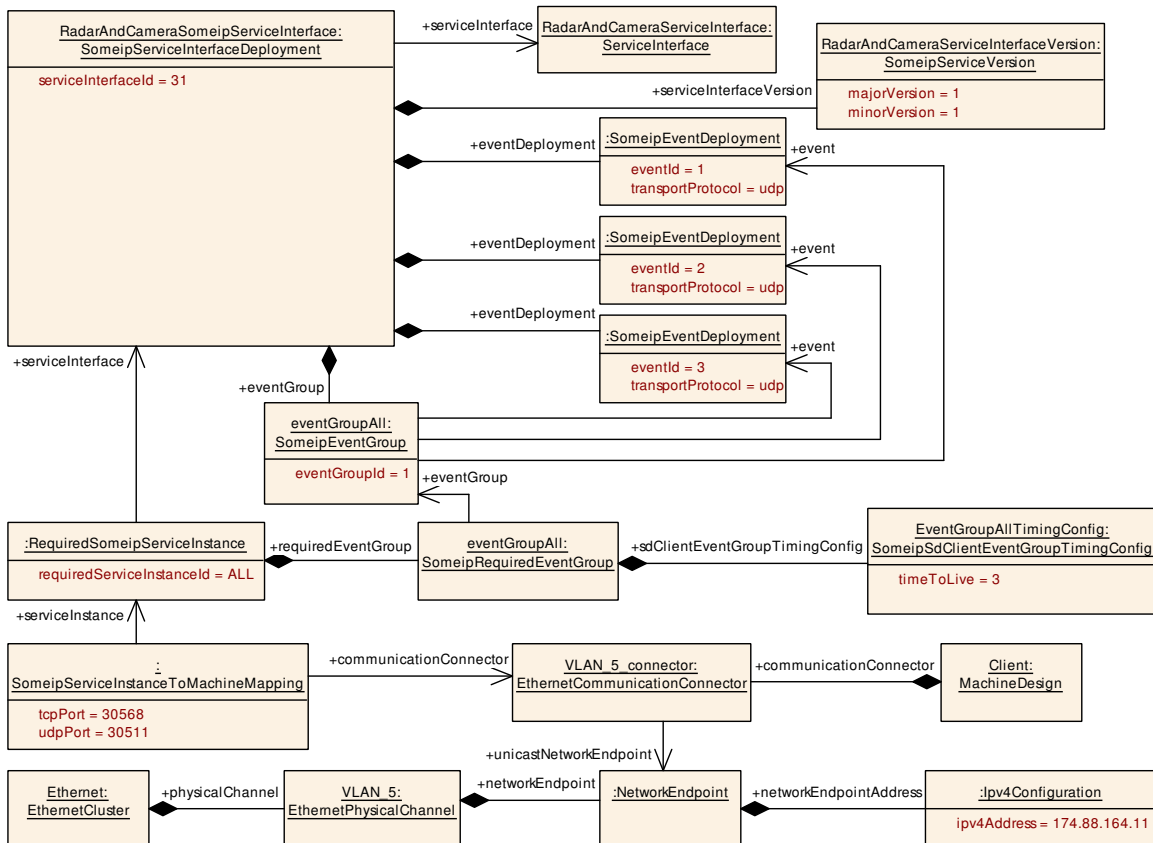


Figure B.15: SOME/IP Required Service Instance

The displayed configuration in [Figure B.15](#) leads to a SOME/IP Find Service Message with the following content:

- ServiceId => serviceInterfaceId = 31

- InstanceId => `RequiredSomeipServiceInstance.requiredServiceInstanceId` = ALL
- MajorVersion => `majorVersion` = 1
- MinorVersion => `minorVersion` = 1

The displayed configuration in [Figure B.14](#) also leads to a SOME/IP SubscribeEvent-Group Message content that is sent from the Service Requester to the Service Provider:

- ServiceId => taken from the OfferMessage
- InstanceId => taken from the OfferMessage
- MajorVersion => taken from the OfferMessage
- MinorVersion => taken from the OfferMessage
- Eventgroup ID => `RequiredSomeipServiceInstance.requiredEventGroup.eventGroup.eventGroupId` = 1
- TTL => `RequiredSomeipServiceInstance.requiredEventGroup.sd-ClientEventGroupTimingConfig.timeToLive` = 3
- IPv4 Endpoint Option with IPv4 Address (170.88.164.11), Protocol (UDP), Port-Number (30511)

B.2.2 Service Interface Mapping

B.2.2.1 Service Interface Element Mapping

[Figure B.16](#) provides an example of how a mapping on element basis looks like. Note that, in this example, both `ServiceInterface1` and `ServiceInterface2` aggregate a `field` with the `shortName` field1.

This configuration disqualifies the scenario from the application of the `ServiceInterfaceMapping`, as of [TPS_MANI_01003]. The element-wise mapping, however, is able to work around the existence of the `shortName` field1 in both “source” `ServiceInterfaces` quite nicely:

- `ServiceInterface1.field1` is mapped to `CompositeServiceInterface.leftField`
- `ServiceInterface2.field1` is mapped to `CompositeServiceInterface.rightField`

The formal modeling of the individual mappings is described in [Chapter 4.4](#).

Please note that it is **not intended** to mix a mapping of `ServiceInterfaces` with a mapping of elements of a `ServiceInterface`.

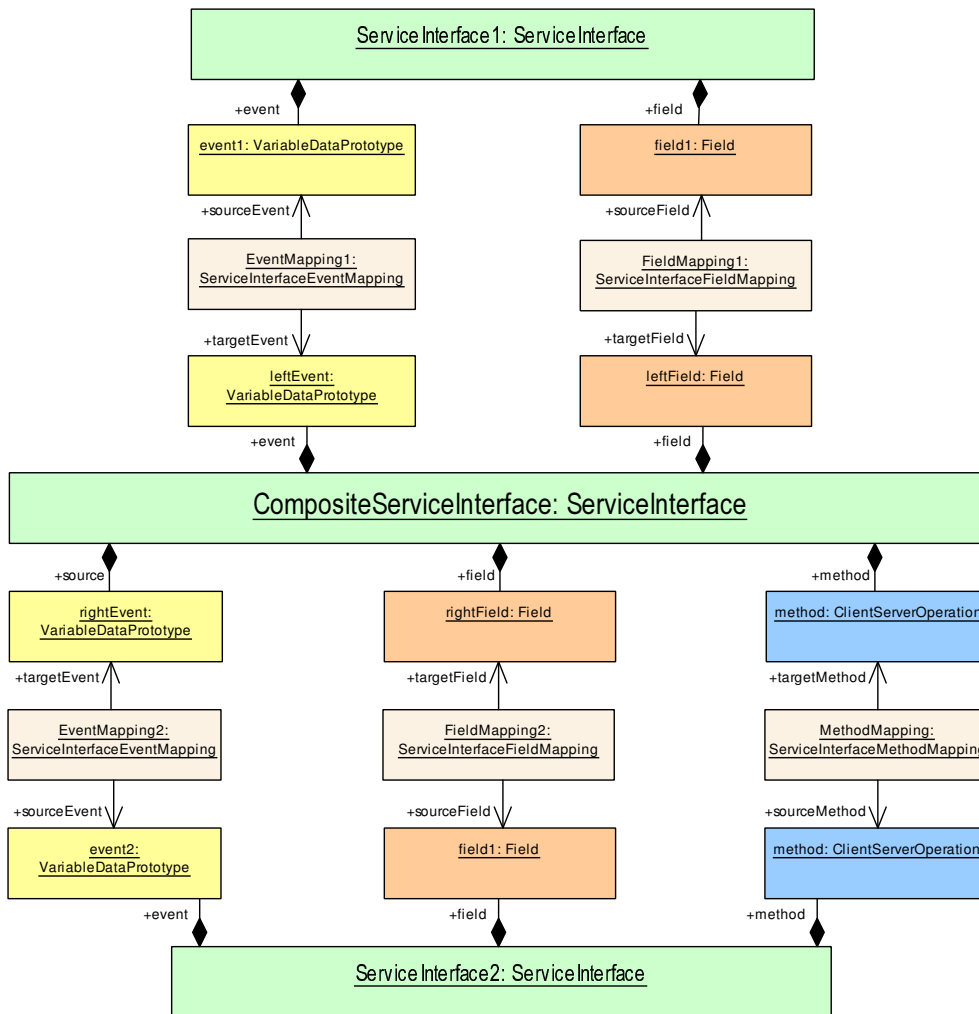


Figure B.16: Example for a mapping of elements of **ServiceInterface**

In other words, as soon as a mapping between two **ServiceInterface**s exists, it is not supported that a mapping between elements of the same pair of **ServiceInterface**s exists. This important restriction is formalized by [constr_1482].

B.2.2.2 Service Interface Event Mapping

It is possible to map a given **event** of a given **ServiceInterface** multiple times in different roles to the **ServiceInterface** that aggregates the **targetEvent**, as exemplified by Figure B.17.

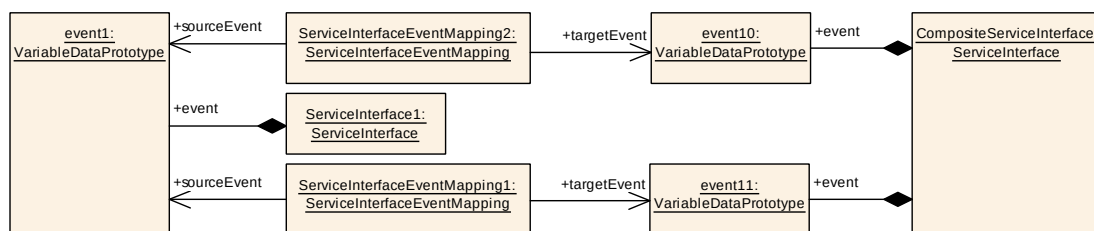


Figure B.17: Example for the application of a **ServiceInterfaceEventMapping**

B.2.2.3 Service Interface Field Mapping

It is possible to map a given `field` of a given `ServiceInterface` multiple times in different roles to the `ServiceInterface` that aggregates the `targetField`, as exemplified by Figure B.18.

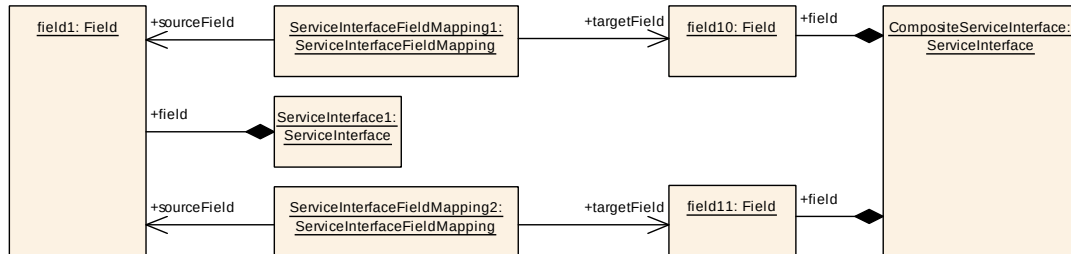


Figure B.18: Example for the application of a `ServiceInterfaceFieldMapping`

B.2.2.4 Service Interface Method Mapping

It is possible to map a given `method` of a given `ServiceInterface` multiple times in different roles to the `ServiceInterface` that aggregates the `targetMethod`, as exemplified by Figure B.19.

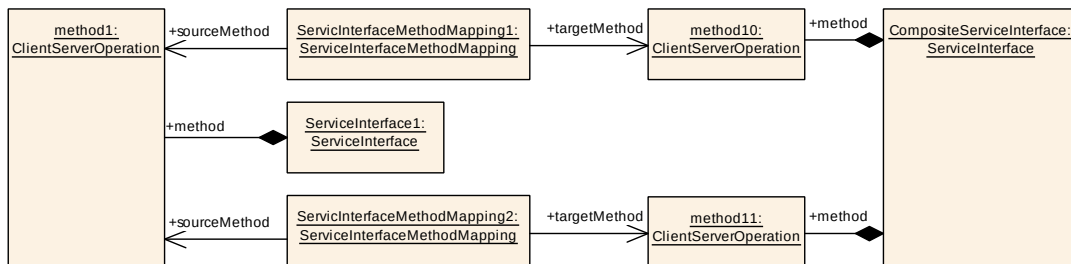


Figure B.19: Example for the application of a `ServiceInterfaceMethodMapping`

B.2.3 Service Instance Deployment

B.2.3.1 Service Instance Deployment by Service Interface Mapping

The example in Figure B.21 sketches the modeling of a `ProvidedSomeipService-Instance` in the presence of a `ServiceInterfaceMapping`, that references two `ServiceInterfaces` in the role `sourceServiceInterface`.

For support, Figure B.20 contains an excerpt from the meta-model that contains the relevant meta-classes that have been instantiated to create the example sketched in Figure B.21.

Note further that the example depicted in Figure B.21 is not limited to the explanation of the actual `ServiceInterfaceMapping`.

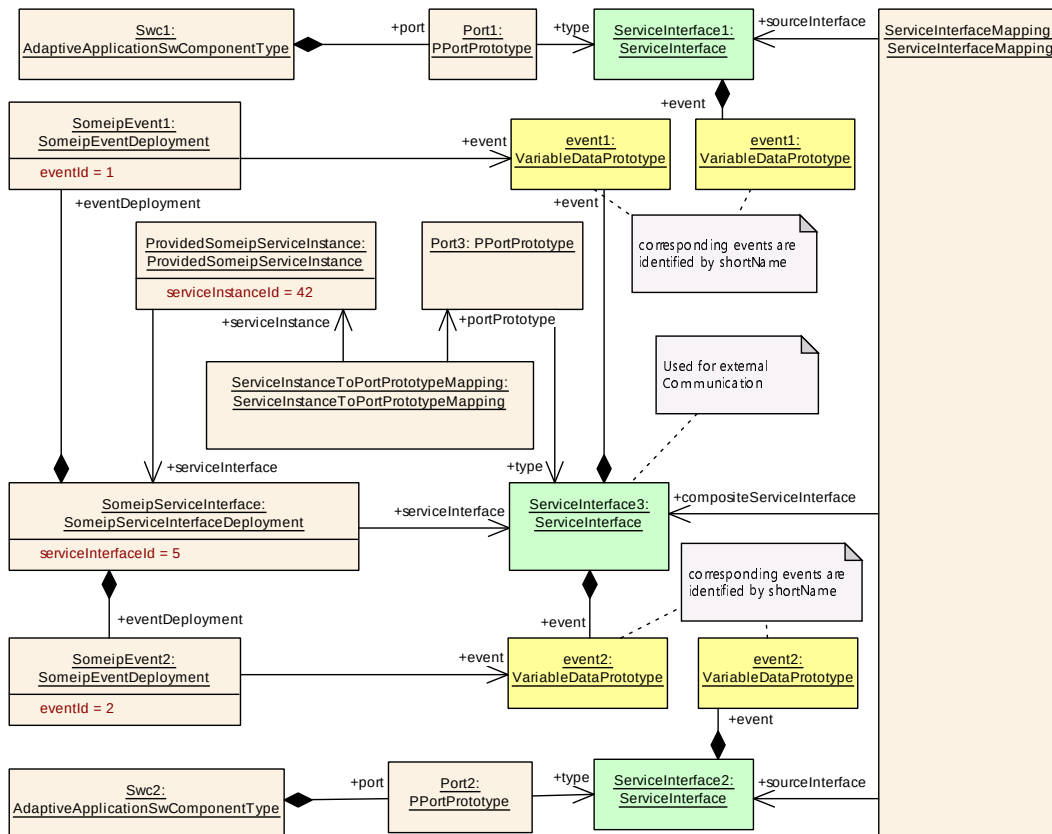


Figure B.21: Example for the deployments of a service in the presence of a [ServiceInterfaceMapping](#)

B.2.3.2 Service Instance Deployment by Service Interface Element Mapping

The example in [Figure B.23](#) sketches the modeling of a [ProvidedSomeipServiceInstance](#) in the presence of a [ServiceInterfaceEventMappings](#). In principle, this example is very close to the example described in [Figure B.21](#).

In contrast to the example sketched in [Figure B.21](#), the example depicted in [Figure B.23](#) uses a mapping to individual elements of a [ServiceInterface](#) instead of the entire [ServiceInterface](#).

Please find the corresponding excerpt of relevant meta-classes for the utilization of [ServiceInterfaceEventMapping](#) sketched in [Figure B.22](#).

Note further that the example depicted in [Figure B.22](#) is not limited to the explanation of the actual [ServiceInterfaceElementMapping](#).

As the main use case for this is the usage of [ServiceInterfaces](#) for the definition of an “outside” communication binding the example also contains the modeling of such a binding, in this case to SOME/IP.

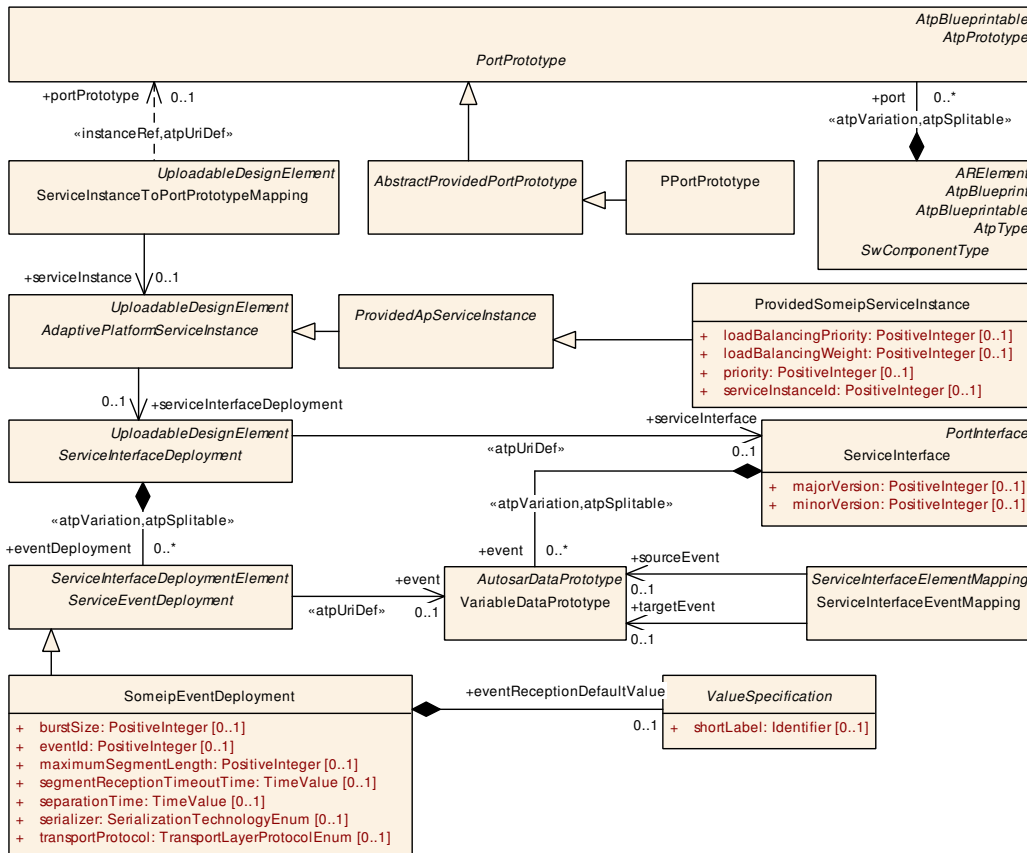


Figure B.22: Excerpt of the relevant meta-classes for the [ServiceInterfaceEventMapping](#) example

Please note that the modeling of the binding requires the existence of a [PortPrototype](#), which in turn is aggregated by an [SwComponentType](#) (not depicted).

This approach still contains some degrees of freedom with respect to the role of the [SwComponentType](#) that aggregates the mentioned [PortPrototype](#). This document does not go further in discussing the nature of such a configuration.

By mapping individual elements of [ServiceInterfaces](#), it is possible to map element with different [shortNames](#) to each other. In this example, the [event](#) with the [shortName](#) `event1` is mapped to another [event](#) with the [shortName](#) `eventLeft`.

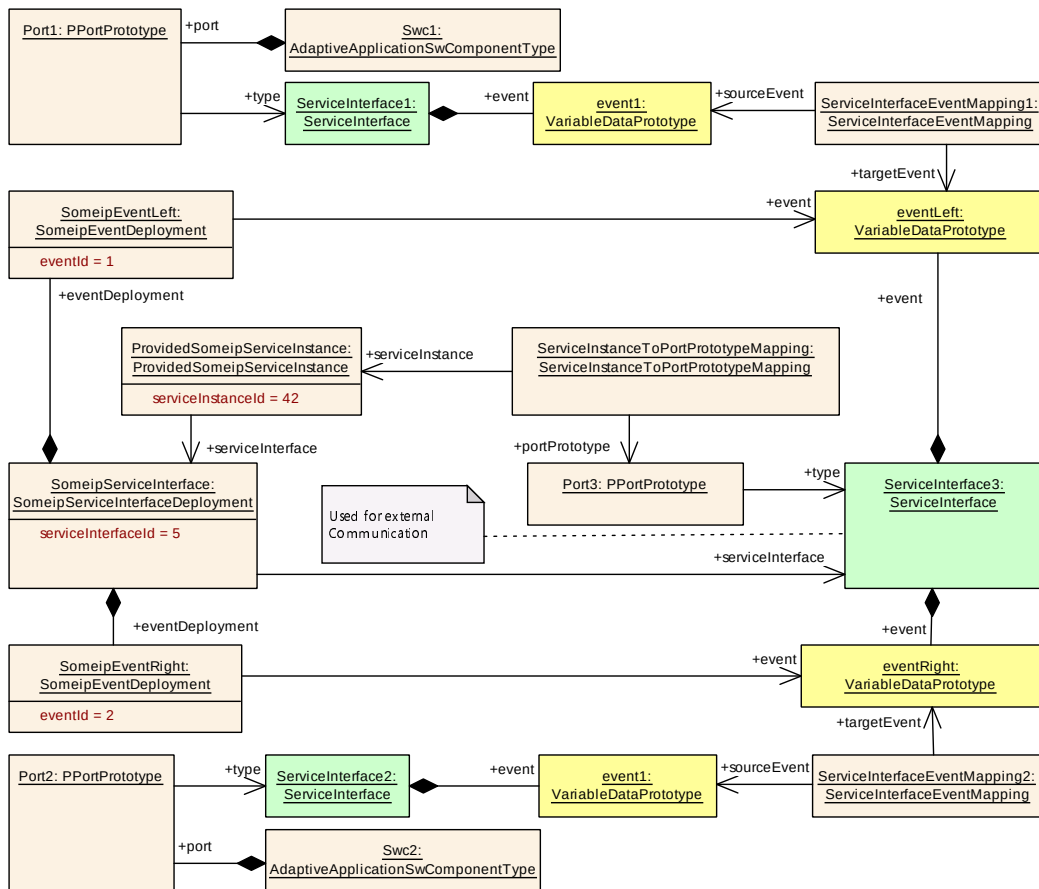


Figure B.23: Example for the deployment of a service in the presence of a `ServiceInterfaceEventMapping`

In Figure B.23, two different `ServiceInterfaces` exist that each aggregate an `event` with the identical `shortName`. This scenario **requires** the existence of `ServiceInterfaceElementMappings`.

As an extension to the scenario depicted in Figure B.23, Figure B.24 describes a model where the **same** `event` of a `ServiceInterface` is used in two different event deployments by means of two `ServiceInterfaceEventMappings` that each refer to said `event` in the role `ServiceInterfaceEventMapping.sourceEvent`.

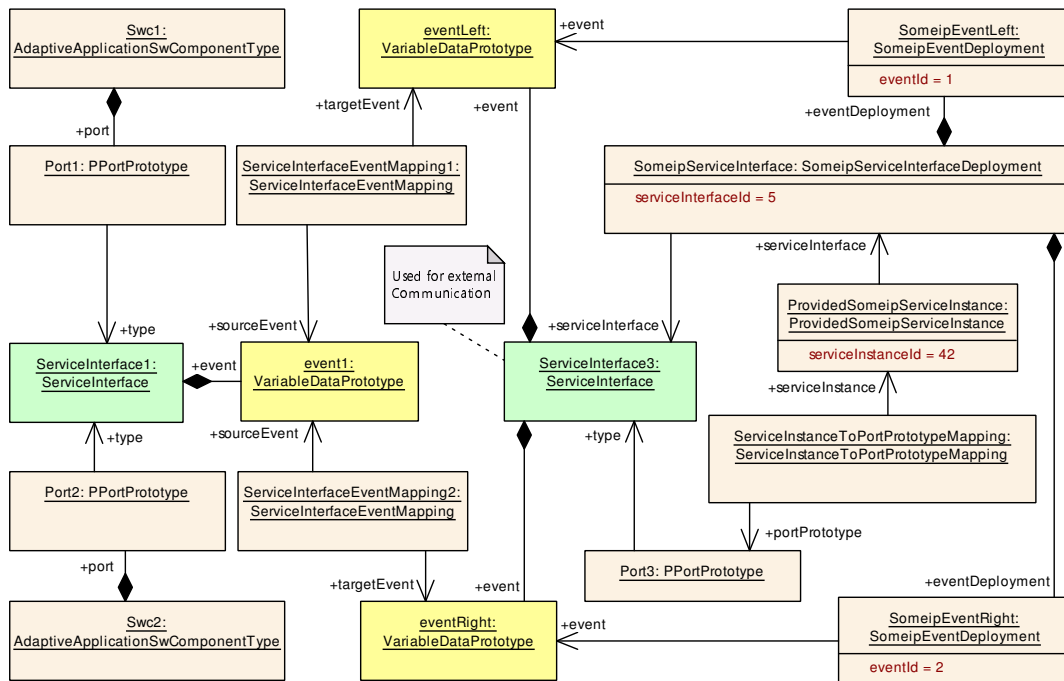


Figure B.24: Example for the deployment of a service in the presence of a **ServiceInterfaceEventMapping** to the same source **ServiceInterface**

Again, this scenario **requires** the existence of appropriately configured **ServiceInterfaceElementMappings**.

B.2.4 Service Instance Mapping

B.2.4.1 SOME/IP Service Instance Mapping

This section contains some examples that explain the modeling of a mapping between a service instance and the application. The examples have been created to show both the “find” and the “offer” side of the service binding.

In the first example, depicted in Figure B.25 shows the binding of **PortPrototypes** to a SOME/IP-based transport layer. The left part of the diagram contains the modeling of the “find” aspect and the right part contains the modeling of the “offer” aspect.

Please note that the **shortNames** of the two affected **PortPrototypes** are different. In other words, the **shortNames** of the **PortPrototypes** are not used as a way to identify the opposite end of the service binding.

Instead, the existence of a **ServiceInstanceToPortPrototypeMapping** that maps a **PortPrototype** to a **ProvidedSomeipServiceInstance** or **RequiredSomeipServiceInstance** with the **identical value** of attribute **serviceInstanceId** creates the actual binding between the “find” and the “offer” end.

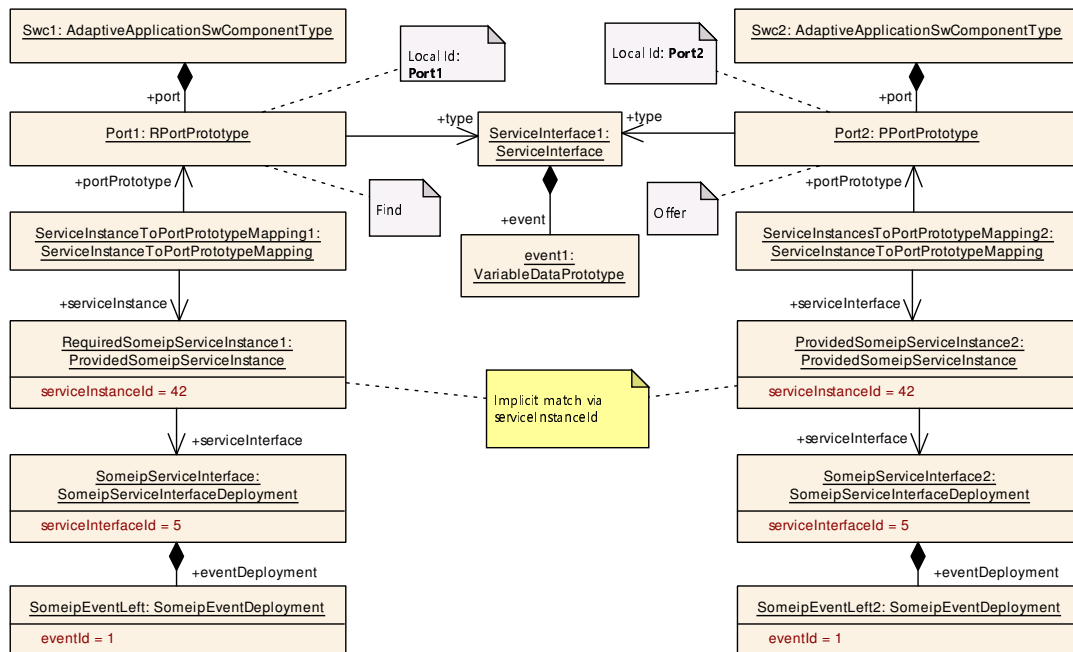


Figure B.25: Port-based binding of a service instance to the application using SOME/IP

B.2.4.2 User-Defined Service Instance Mapping

The next example (depicted in [Figure B.26](#)) shows a binding of [PortPrototypes](#) to a user-defined transport layer. The left part of the diagram contains the modeling of the “find” aspect and the right part contains the modeling of the “offer” aspect.

Because the binding is user-defined, there are no attributes modeled on the level of the meta-model available to identify an instance according to the user-defined service implementation. There is just no way to define attributes that are “needed anyway” for a user-defined binding.

Therefore, the only option in this case is the usage of [AdminData](#), [Sdg](#), and [Sd](#) to define an identification of the user-defined transport layer.

In order to support the comparison to the example depicted in [Figure B.25](#), the example described in [Figure B.26](#) uses a simple identification based on a numerical value. Again, this is an arbitrary scenario created just for the sake of explanation.

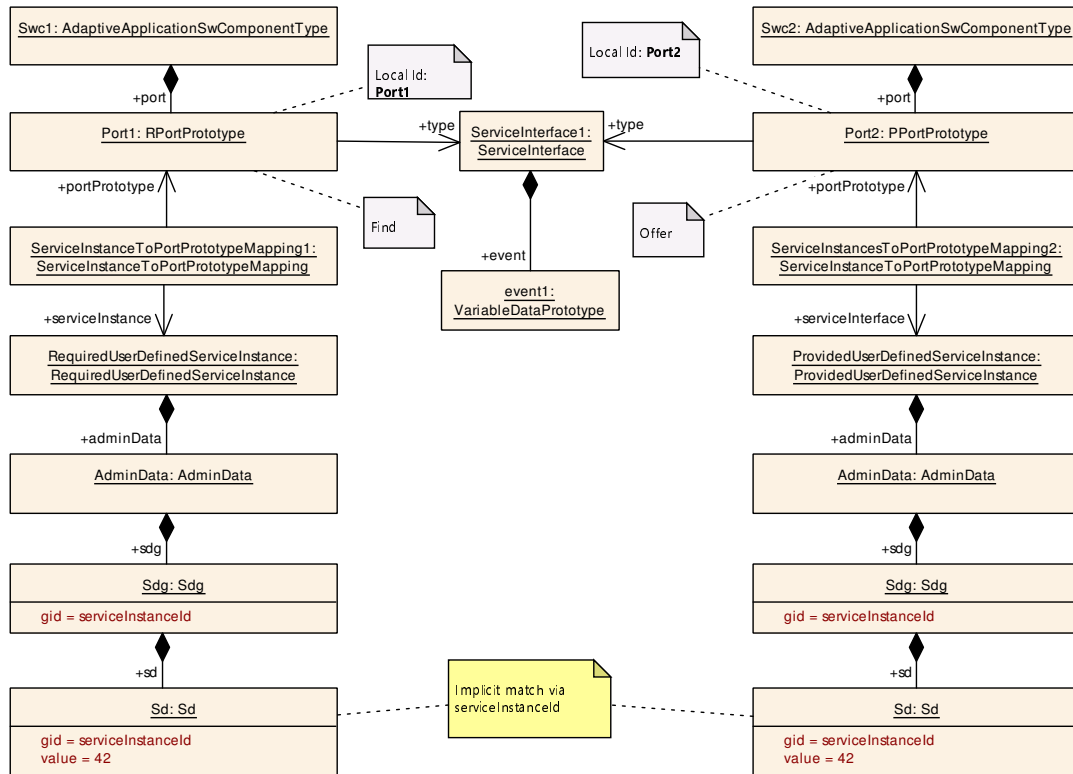


Figure B.26: Port-based binding of a service instance to the application using a user-defined binding

B.2.5 Definition of VLAN Priority

The following table shows an example for the usage of the VLAN priority (please find the background information in [Chapter 13.1.1](#)).

Port (Default Priority)	NetworkEndpoint (e.g. IP Address)	ApApplicationEndpoint (e.g. Tcp Port)
CouplingPort1: Prio. 0	NEP1.1: Prio. —	AEP 1.1.1: Prio. —
		AEP 1.1.2: Prio. 1
	NEP1.2: Prio. 0	AEP 1.2.1: Prio. —
		AEP 1.2.2: Prio. 1
CouplingPort2: Prio. 0	NEP2.1: Prio. 1	AEP 2.1.1: Prio. 2
		AEP 2.1.2: Prio. 3
	NEP2.2: Prio. 2	AEP 2.2.1: Prio. 1
		AEP 2.2.2: Prio. 0

Table B.2: VLAN Priority Example

Two [CouplingPort](#)s are defined and both have a reference to VLAN ([Ethernet-PhysicalChannel](#)) that defines two [NetworkEndpoint](#)s. The [CouplingPort](#) defines the default priority. This default priority can be overwritten on the [NetworkEndpoint](#) level, and again on the [ApApplicationEndpoint](#) level.

For [NetworkEndpoint](#) NEP1.1 no priority is defined. But since on [ApApplicationEndpoint](#) AEP 1.1.2 a priority is defined, all messages on CouplingPort1 have the Priority 0 (“best effort”), except for messages that are going over AEP 1.1.2. These messages have the priority 1 (higher priority).

On CouplingPort2, the priority is overwritten on several levels. Please note that [ApApplicationEndpoints](#) AEP 2.2.1 and AEP 2.2.2 are reducing the priority that is defined on the [NetworkEndpoint](#) NEP2.2.

B.2.6 Static Configuration of remote Peers

B.2.6.1 Provided Service Instance with remote Peers

The following example in [Figure B.27](#) shows the setup of a Service Provider with two statically defined remote peers. The [ServiceInstanceToMachineMapping](#) maps two [ProvidedSomeipServiceInstances](#) to [ApApplicationEndpoints](#): Camera and Radar_1.

Two remote peers are referenced by the same [ServiceInstanceToMachineMapping](#) in the role [remoteUnicastConfig](#): RemotePeer1 and RemotePeer2.

RemotePeer1 is subscribed to EG2 and EG3 of ServiceInstance Radar_1. RemotePeer2 is subscribed to EG1 and EG2 of ServiceInstance Radar_1.

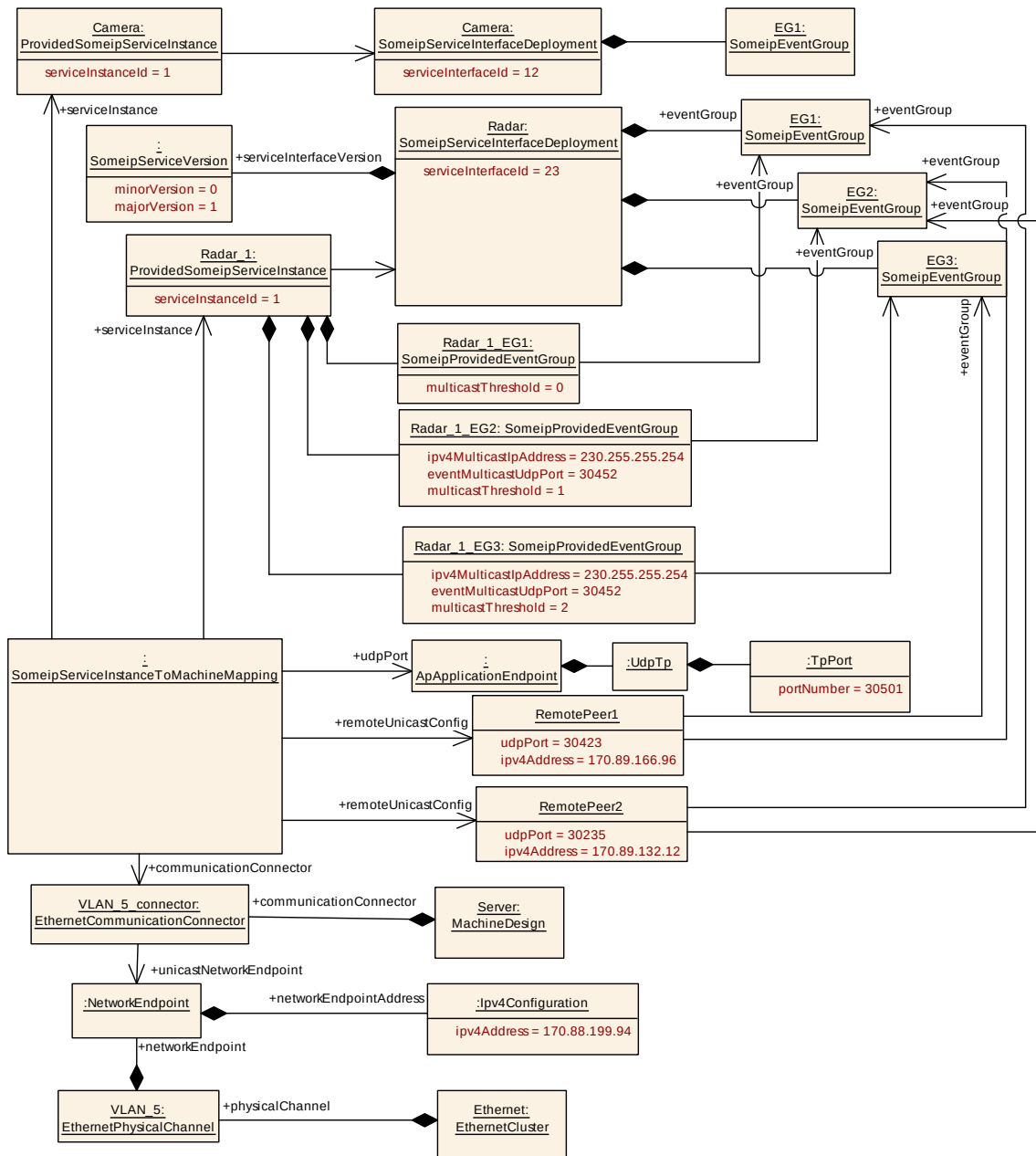


Figure B.27: Example of a Service Provider with static configured remote peers

B.2.6.2 Required Service Instance with remote Peers

The following example in [Figure B.28](#) shows the setup of a Service Consumer with a statically defined remote peer. The [ServiceInstanceToMachineMapping](#) maps the [Radar_CS11 RequiredSomeipServiceInstance](#) to an [ApApplicationEndpoint](#).

The remote peer is referenced by the same [ServiceInstanceToMachineMapping](#) in the role [remoteUnicastConfig](#).


```

<EXECUTION-DEPENDENCY>
  <PROCESS-STATE-IREF>
    <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-
      PROTOTYPE">/Processes/MWC/ProcessStateMachine</CONTEXT-MODE-DECLARATION-GROUP-
      PROTOTYPE-REF>
    <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
      ProcessStateMachine/Running</TARGET-MODE-DECLARATION-REF>
  </PROCESS-STATE-IREF>
</EXECUTION-DEPENDENCY>
<EXECUTION-DEPENDENCY>
  <PROCESS-STATE-IREF>
    <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-
      PROTOTYPE">/Processes/MSM/ProcessStateMachine</CONTEXT-MODE-DECLARATION-GROUP-
      PROTOTYPE-REF>
    <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
      ProcessStateMachine/Running</TARGET-MODE-DECLARATION-REF>
  </PROCESS-STATE-IREF>
</EXECUTION-DEPENDENCY>
</EXECUTION-DEPENDENCIES>
<FUNCTION-GROUP-STATE-IREFS>
  <FUNCTION-GROUP-STATE-IREF>
    <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-PROTOTYPE
      ">/FunctionGroupSets/ExampleFGS/ExampleFG</CONTEXT-MODE-DECLARATION-GROUP-
      PROTOTYPE-REF>
    <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
      ExampleFG/Running</TARGET-MODE-DECLARATION-REF>
  </FUNCTION-GROUP-STATE-IREF>
</FUNCTION-GROUP-STATE-IREFS>
<RESOURCE-GROUP-REF DEST="RESOURCE-GROUP">/Machines/ExampleMachine/Linux/resourceGroup2<
  /RESOURCE-GROUP-REF>
<STARTUP-CONFIG-REF DEST="STARTUP-CONFIG">/StartupConfigs/AA1_Startup</STARTUP-CONFIG-
  REF>
</STATE-DEPENDENT-STARTUP-CONFIG>
</STATE-DEPENDENT-STARTUP-CONFIGS>
</PROCESS>

```

Listing B.3: Example for the definition of the [StateDependentStartupConfig](#) owned by a [Process](#)

In this example, launch dependencies exist on two other [Processes](#). Both [Processes](#) MWC and MSM need to be in the ProcessState “Running” before AA1 is started.

The reference [StateDependentStartupConfig.functionGroupState](#) refers to a [ModeDeclaration](#) with the [shortName](#) “Running” within the [Function Group](#) “ExampleFG”.

In other words, the referenced [StartupConfig](#) that is defined in [Listing B.4](#) is valid if the [Function Group](#) “ExampleFG” is in state “Running”.

```

<STARTUP-CONFIG>
  <SHORT-NAME>AA1_Startup</SHORT-NAME>
  <PROCESS-ARGUMENTS>
    <PROCESS-ARGUMENT>
      <ARGUMENT>-a</ARGUMENT>
    </PROCESS-ARGUMENT>
    <PROCESS-ARGUMENT>
      <ARGUMENT>-b</ARGUMENT>
    </PROCESS-ARGUMENT>
    <PROCESS-ARGUMENT>
      <ARGUMENT>-d</ARGUMENT>
    </PROCESS-ARGUMENT>
    <PROCESS-ARGUMENT>
      <ARGUMENT>XYZ</ARGUMENT>
    </PROCESS-ARGUMENT>
  </PROCESS-ARGUMENTS>
  <SCHEDULING-POLICY>SCHEDULING-POLICY-FIFO</SCHEDULING-POLICY>
  <SCHEDULING-PRIORITY>20</SCHEDULING-PRIORITY>

```

```
</STARTUP-CONFIG>
```

Listing B.4: Example for a [StartupConfig](#)

The [StateDependentStartupConfig](#) of the [Process](#) is assigned to the [ResourceGroup](#) named “ResourceGroup2” that is defined in the Machine Manifest.

The corresponding definition of a [Machine](#) contains a [OsModuleInstantiation](#) that in turn owns the two [ResourceGroups](#) named “ResourceGroup1” and “ResourceGroup2”. This aspect can be found in [Listing B.5](#).

```
<MACHINE>
  <SHORT-NAME>ExampleMachine</SHORT-NAME>
  <MODULE-INSTANTIATIONS>
    <OS-MODULE-INSTANTIATION>
      <SHORT-NAME>Linux</SHORT-NAME>
      <RESOURCE-GROUPS>
        <RESOURCE-GROUP>
          <SHORT-NAME>resourceGroup1</SHORT-NAME>
          <CPU-USAGE>60</CPU-USAGE>
          <MEM-USAGE>1000000</MEM-USAGE>
        </RESOURCE-GROUP>
        <RESOURCE-GROUP>
          <SHORT-NAME>resourceGroup2</SHORT-NAME>
          <CPU-USAGE>70</CPU-USAGE>
          <MEM-USAGE>2000000</MEM-USAGE>
        </RESOURCE-GROUP>
      </RESOURCE-GROUPS>
    </OS-MODULE-INSTANTIATION>
  </MODULE-INSTANTIATIONS>
</MACHINE>
```

Listing B.5: Example for the definition of a [Machine](#)

The example definition of a [FunctionGroupSet](#) is sketched in [Listing B.6](#).

```
<FUNCTION-GROUP-SET>
  <SHORT-NAME>ExampleFGS</SHORT-NAME>
  <FUNCTION-GROUPS>
    <MODE-DECLARATION-GROUP-PROTOTYPE>
      <SHORT-NAME>ExampleFG</SHORT-NAME>
      <TYPE-TREF DEST="MODE-DECLARATION-GROUP">/ModeDeclarationGroups/ExampleFG</TYPE-TREF>
    </MODE-DECLARATION-GROUP-PROTOTYPE>
  </FUNCTION-GROUPS>
</FUNCTION-GROUP-SET>
```

Listing B.6: Example for the definition of a [FunctionGroupSet](#)

The definition of the [ModeDeclarationGroup](#) that represents the [Function Group](#) is contained in [Listing B.7](#).

```
<MODE-DECLARATION-GROUP>
  <SHORT-NAME>ExampleFG</SHORT-NAME>
  <INITIAL-MODE-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/ExampleFG/Off</INITIAL-MODE-REF>
  <MODE-DECLARATIONS>
    <MODE-DECLARATION>
      <SHORT-NAME>Off</SHORT-NAME>
    </MODE-DECLARATION>
    <MODE-DECLARATION>
      <SHORT-NAME>Running</SHORT-NAME>
    </MODE-DECLARATION>
    <MODE-DECLARATION>
      <SHORT-NAME>Fallback</SHORT-NAME>
    </MODE-DECLARATION>
  </MODE-DECLARATIONS>
```

```

    <SHORT-NAME>Diag</SHORT-NAME>
  </MODE-DECLARATION>
</MODE-DECLARATIONS>
</MODE-DECLARATION-GROUP>

```

Listing B.7: Example for the definition of `ModeDeclarationGroups`

The definition of the `ModeDeclarationGroup` that represents the process state machine is contained in [Listing B.8](#).

```

<MODE-DECLARATION-GROUP>
  <SHORT-NAME>ProcessStateMachine</SHORT-NAME>
  <INITIAL-MODE-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/ProcessStateMachine/
    Terminated</INITIAL-MODE-REF>
  <MODE-DECLARATIONS>
    <MODE-DECLARATION>
      <SHORT-NAME>Running</SHORT-NAME>
    </MODE-DECLARATION>
    <MODE-DECLARATION>
      <SHORT-NAME>Terminated</SHORT-NAME>
    </MODE-DECLARATION>
  </MODE-DECLARATIONS>
</MODE-DECLARATION-GROUP>

```

Listing B.8: Example for the definition of `ModeDeclarationGroups`

B.4 Persistency

B.4.1 Definition of Persistent Data

This chapter contains examples for the modeling of persistent data and file storage starting from the design aspect down to the definition of the persistent storage and the mapping between design and target configuration.

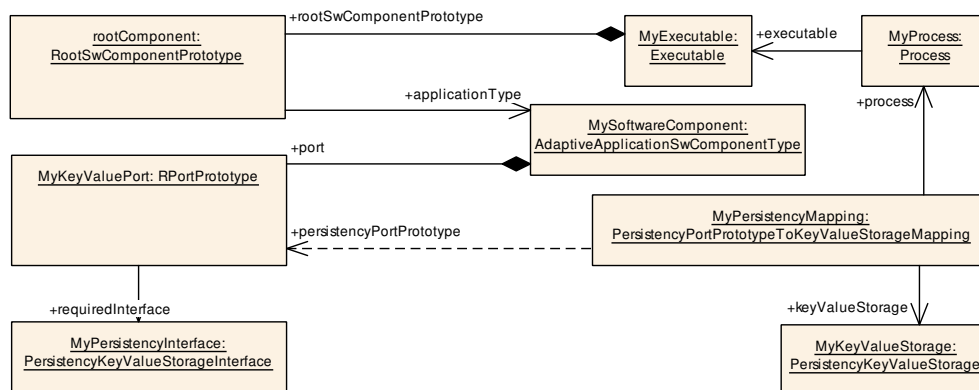


Figure B.29: Simple example modeling of persistent data (design + target configuration)

The setup presented in [Figure B.29](#) represents a case with reduced modeling of persistent data.

It is possible to extend the modeling to a deeper level of detail and also formally describe the individual data that is subject to persistency on both design and target configuration level, see [Figure B.30](#).

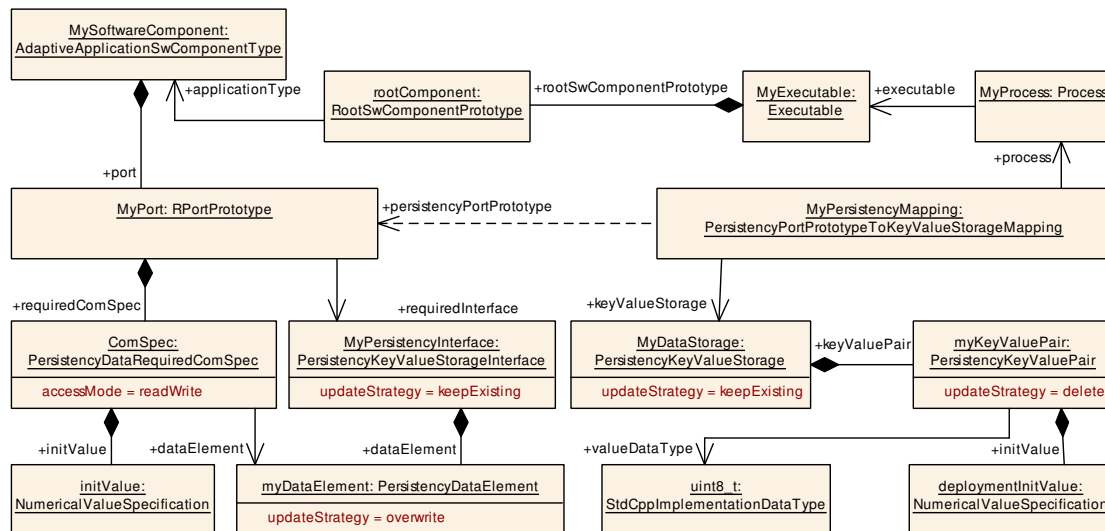


Figure B.30: Advanced example modeling of persistent data (design + target configuration)

B.4.2 Definition of Persistent File

Figure B.31 represents a case with reduced modeling of persistent files.

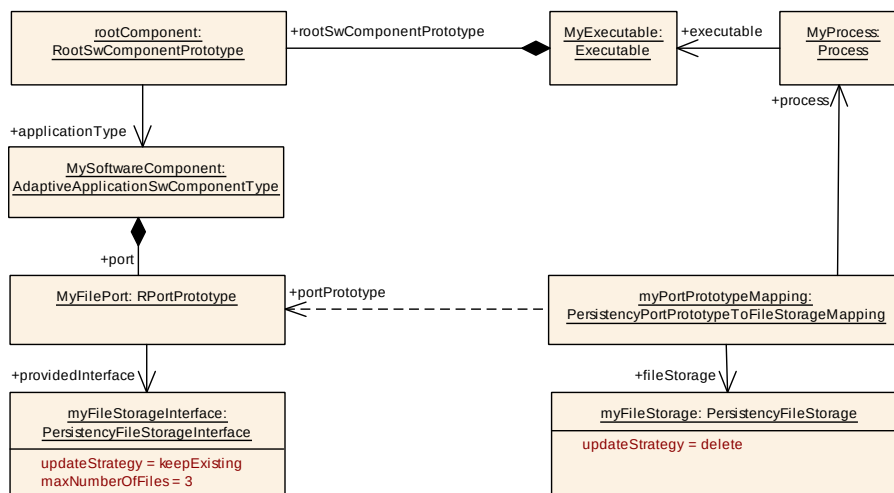


Figure B.31: Simple example modeling of persistent file (design + target configuration)

It is possible to extend the modeling to a deeper level of detail and also formally describe the individual file that is subject to persistency on both design and target configuration level, see Figure B.32.

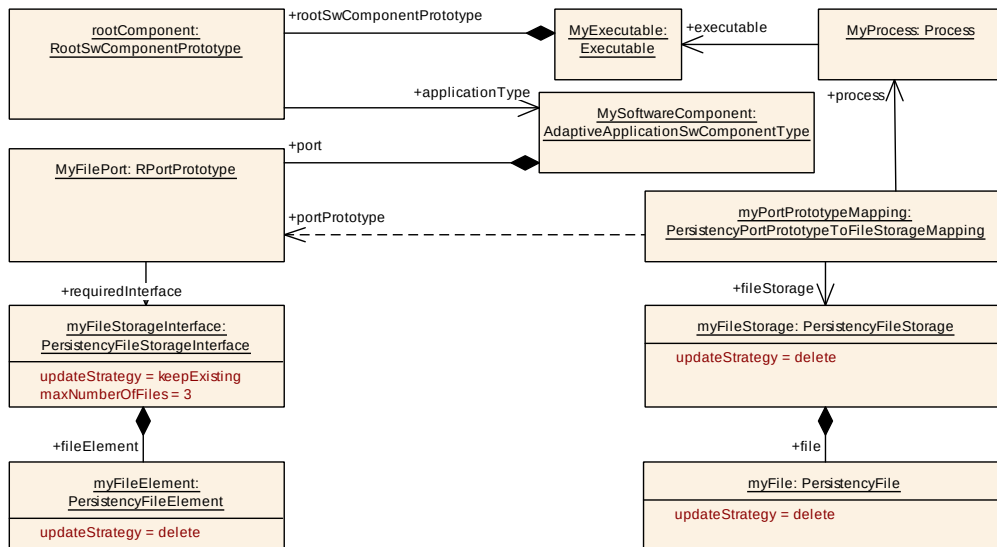


Figure B.32: Advanced example modeling of persistent file (design + target configuration)

B.5 Interaction with the PHM

This chapter contains examples for the modeling of platform health management. The example is structured into Application design and platform health management configuration.

B.5.1 Relation between Instance Specifier and Instance Ref

[Figure B.33](#) exemplifies the relation between an `InstanceSpecifier` and an `instanceRef`. If the `InstanceSpecifier` as well as the model structure is known then the `instanceRef` can be constructed on the base of the information contained in the `InstanceSpecifier` and vice versa.

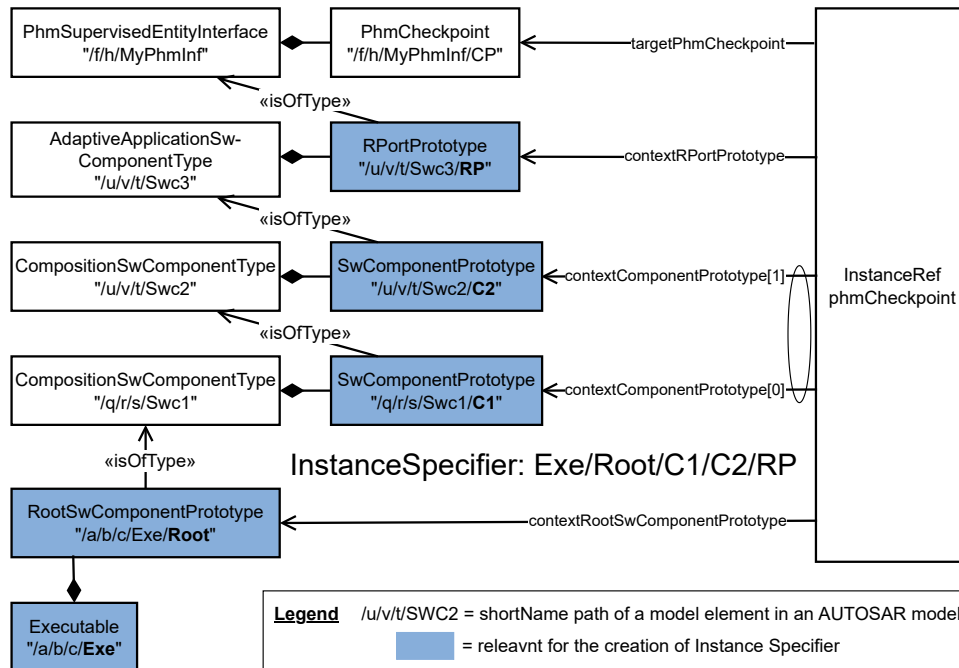


Figure B.33: Example for the creation of an InstanceSpecifier of a SupervisedEntity

B.5.2 Phm Application Design example

The simple example provided in Figure B.34 shows the definition of a **PhmSupervisedEntityInterface**. This example will also be used in the subsequent section to define the platform health management configuration.

The **PhmSupervisedEntityInterface** *SupervisedEntity_B* defines two checkpoints:

- CP1
- CP2

The **AdaptiveApplicationSwComponentType** *AdaptiveApplication* defines an **RPortPrototype** *Se_B* typed by *SupervisedEntity_B*.

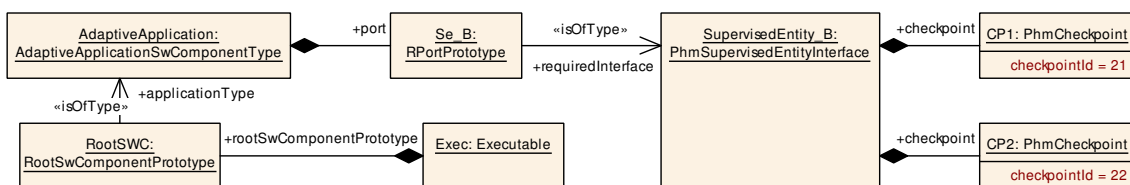


Figure B.34: Example modeling of Supervised Entity

B.5.3 Phm configuration example

When defining the configuration contribution for Phm it is required to first create representatives of the application design model artifacts (supervised entity checkpoints) in the Phm configuration context. This is shown in Figure B.35.

In this example the *PHM PlatformHealthManagementContribution* defines placeholder elements which refer to the respective application design model artifacts:

Example supervision checkpoint:

- *Se_B_Cp1* refers to the *CP1* checkpoint of *SupervisedEntity_B*
- *Se_B_Cp2* refers to the *CP2* checkpoint of *SupervisedEntity_B*

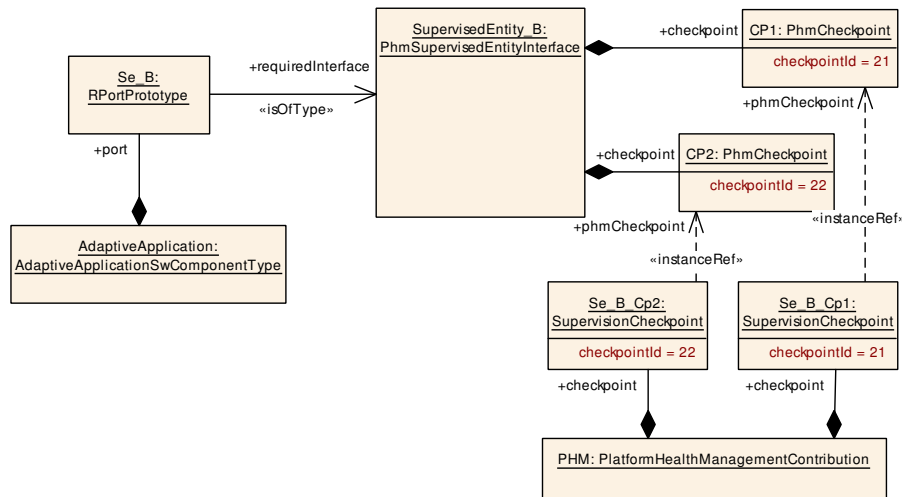


Figure B.35: Example modeling of Phm placeholder definition

Note how the numbers from the *PhmCheckpoint.checkpointId* have been replicated in *SupervisionCheckpoint.checkpointId*.

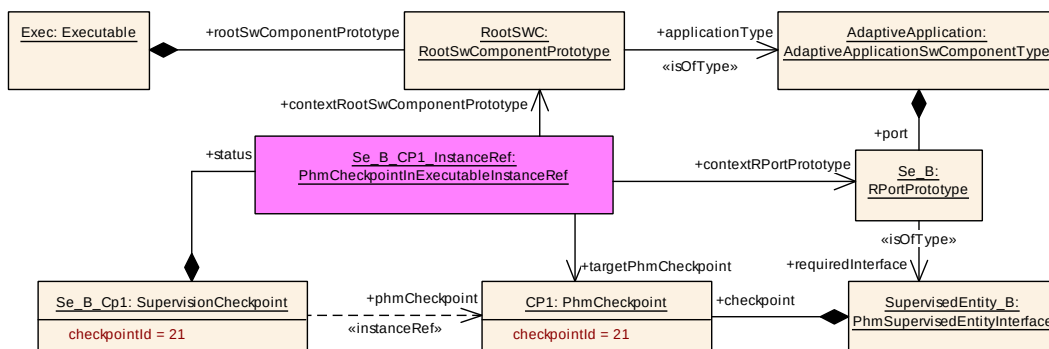


Figure B.36: Example modeling of Phm instance reference

Note that these instance references have a composite nature, which is shown in example Figure B.36. Here it is shown that in order to instance reference from the *SupervisionCheckpoint Se_B_Cp1* to the *PhmCheckpoint CP1* there is the structured reference required consisting of

- [contextRootSwComponentPrototype](#)
- [contextRPortPrototype](#)
- [targetPhmCheckpoint](#)

B.6 State Management

B.6.1 Consideration of User Perspective

The modeling of state management is described in [Chapter 4.5](#) and [Chapter 12.14](#).

Obviously, the definition of the meta-classes to serialize the state management configuration does not have to directly reflect the mental model which some creators of a specific state management instance have in mind.

This means that the design approach in the user domain might be entirely different from the definition of the respective meta-classes. Such a situation is manageable as long as the mental model applied on the side of the users can be mapped to the meta-classes and their relationships.

To be more concrete, some of the users who define state management configurations, **prefer to think in terms of tables that combine an input trigger or error value with a target state**, see [Table B.3](#) as an example.

This chapter exemplifies such an approach for how a table-based configuration of state changes could look like and how the table columns map to the meta-model.

B.6.2 Scenario for Trigger

For the definition of the response to triggers, some people define a table, which maps the *trigger value* to the assumed *current state* and the *next state*.

In other words, if the *trigger value* is found in one row and the value of the current state in the state machine is equal to the assumed *current state* in the applicable table row, then the state machine shall be switched to the *next state* listed in the table row.

Please note that the concrete table entries for the states might consist of numerals or literals, depending on the personal preference of the user.

Of course, the meta-model allows to create a connection between the table values either by means of the numerical [ModeDeclaration.value](#) or the textual [ModeDeclaration.shortName](#).

An example for such a table is listed in [Table B.3](#).

Trigger Value	Current State	Next State
1001	0	1
1000	1	0
1000	2	0
1000	3	0
1000	4	0

Table B.3: Example table for associating trigger with state changes using the [values](#)

It is important that it is possible to map this mental model of state management configuration to the existing meta-model.

Alternatively, it would be possible to create the table using the [shortName](#) of the respective [ModeDeclarations](#) and thereby create the exact same semantics, see [Table B.4](#).

Trigger Value	Current State	Next State
1001	StateOff	StateFull_primary
1000	StateFull_primary	StateOff
1000	State_Fallback	StateOff
1000	State3	StateOff
1000	State4	StateOff

Table B.4: Example table for associating trigger with state changes using the [shortName](#)

Thus, the correspondence of table columns to meta-model elements is documented in [Table B.5](#).

Table Column of Table B.3	Meta-Model Element, see Figure 12.73
Trigger Value	StateManagementCompareCondition.compareValue
Current State	StateManagementTriggerCompareRule.assumedCurrentState
Next State	StateManagementRequestRule.nextState

Table B.5: Correspondence of table columns and meta-model elements for triggers

In particular, the [Figure B.37](#) and, with more detail, [Listing B.9](#) depict the modeling of the relevant part for the first row of [Table B.3](#).

The relevant parts of the table row are located inside the red box in [Figure B.37](#).

The concrete usage of [StateManagementCompareCondition.compareValue](#) can be found in the listing as part of the STATE-MANAGEMENT-TRIGGER-COMPARE-RULE, specifically by COMPARE-TYPE and COMPARE-VALUE.

The `StateManagementTriggerCompareRule.assumedCurrentState` is represented by the ASSUMED-CURRENT-STATE-IREF.

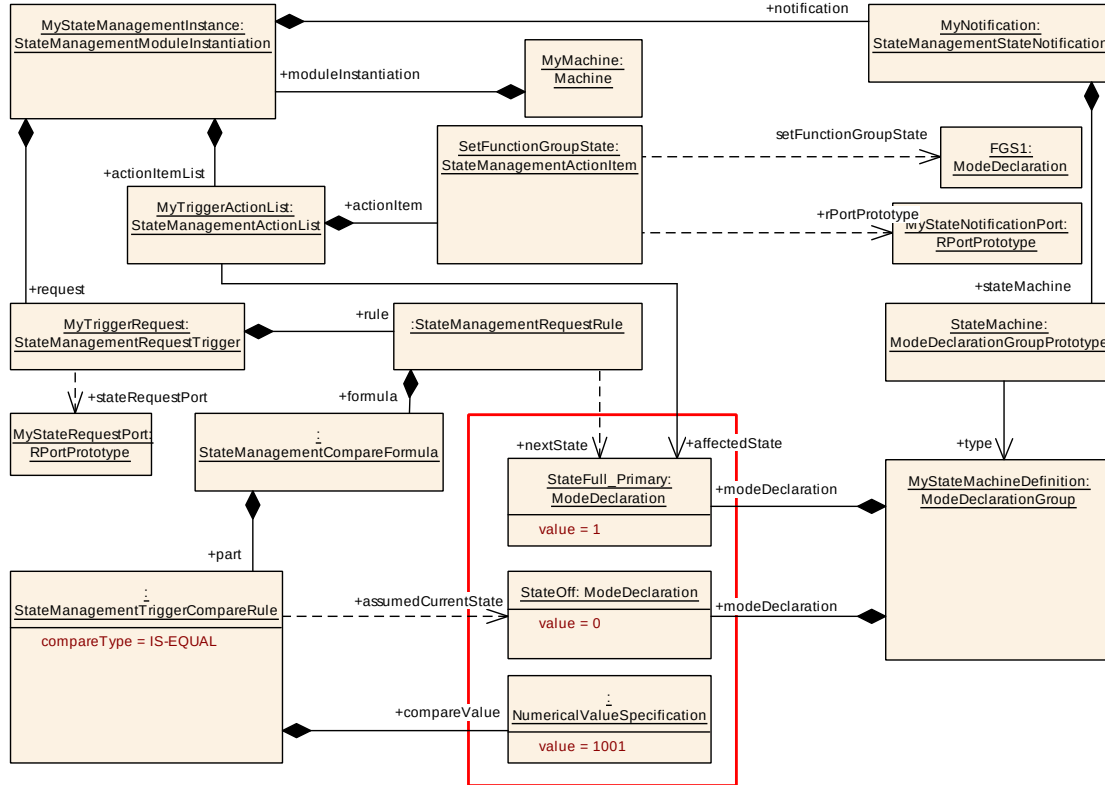


Figure B.37: Example state management modeling for a trigger request

And finally, the `StateManagementRequestRule.nextState` can be found at the NEXT-STATE-IREF inside the STATE-MANAGEMENT-RQUEST-RULE.

```
<STATE-MANAGEMENT-REQUEST-TRIGGER>
  <SHORT-NAME>MyTriggerRequest</SHORT-NAME>
  <STATE-REQUEST-PORT-IREF>
    <CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF DEST="ROOT-SW-COMPONENT-PROTOTYPE">/Executables/
      MyStateManager/MyRootComponent</CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF>
    <TARGET-R-PORT-PROTOTYPE-REF DEST="R-PORT-PROTOTYPE" DEST="SwComponentTypes/StateManagerComp/
      MyStateRequestPort</TARGET-R-PORT-PROTOTYPE-REF>
  </STATE-REQUEST-PORT-IREF>
  <RULES>
    <STATE-MANAGEMENT-REQUEST-RULE>
      <FORMULA>
        <PARTS>
          <STATE-MANAGEMENT-TRIGGER-COMPARE-RULE>
            <COMPARE-TYPE>IS-EQUAL</COMPARE-TYPE>
            <COMPARE-VALUE>
              <NUMERICAL-VALUE-SPECIFICATION>
                <VALUE>1001</VALUE>
              </NUMERICAL-VALUE-SPECIFICATION>
            </COMPARE-VALUE>
            <ASSUMED-CURRENT-STATE-IREF>
              <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-
                PROTOTYPE">/Machines/MyMachine/MyStateManagementInstance/MyNotification/
                StateMachine</CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF>
              <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
                MyStateMachineDefinition/StateOff</TARGET-MODE-DECLARATION-REF>
            </ASSUMED-CURRENT-STATE-IREF>
          </STATE-MANAGEMENT-TRIGGER-COMPARE-RULE>
        </PARTS>
      </FORMULA>
    </STATE-MANAGEMENT-REQUEST-RULE>
  </RULES>
</STATE-MANAGEMENT-REQUEST-TRIGGER>
```

```

</FORMULA>
<NEXT-STATE-IREF>
  <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-PROTOTYPE">
    /Machines/MyMachine/MyStateManagementInstance/MyNotification/StateMachine</CONTEXT-
    MODE-DECLARATION-GROUP-PROTOTYPE-REF>
  <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
    MyStateMachineDefinition/StateFull_primary</TARGET-MODE-DECLARATION-REF>
</NEXT-STATE-IREF>
</STATE-MANAGEMENT-REQUEST-RULE>
</RULES>
</STATE-MANAGEMENT-REQUEST-TRIGGER>

```

Listing B.9: Example for the definition of a `StateManagementRequestTrigger`

The `ModeDeclarationGroup` that types the internal state machine is depicted in [Listing B.10](#). The definition of values that represent the states in [Table B.3](#) are visible in the listing, see `VALUE`.

```

<MODE-DECLARATION-GROUP>
  <SHORT-NAME>MyStateMachineDefinition</SHORT-NAME>
  <MODE-DECLARATIONS>
    <MODE-DECLARATION>
      <SHORT-NAME>StateOff</SHORT-NAME>
      <VALUE>0</VALUE>
    </MODE-DECLARATION>
    <MODE-DECLARATION>
      <SHORT-NAME>StateFull_primary</SHORT-NAME>
      <VALUE>1</VALUE>
    </MODE-DECLARATION>
    <MODE-DECLARATION>
      <SHORT-NAME>State_Fallback</SHORT-NAME>
      <VALUE>2</VALUE>
    </MODE-DECLARATION>
  </MODE-DECLARATIONS>
</MODE-DECLARATION-GROUP>

```

Listing B.10: Example for the definition of a `ModeDeclarationGroup` to define the states of an internal state machine

The modeling of the applicable `StateManagementActionList` is sketched in [Listing B.11](#).

Please note that the modeling of the `PortPrototypes` and the internal structure of the `Executable` is not explicitly documented in this example because there are other example demonstrating this aspect already.

```

<STATE-MANAGEMENT-ACTION-LIST>
  <SHORT-NAME>MyTriggerActionList</SHORT-NAME>
  <ACTION-ITEMS>
    <STATE-MANAGEMENT-SET-FUNCTION-GROUP-STATE-ACTION-ITEM>
      <SHORT-NAME>SetFunctionGroupState</SHORT-NAME>
      <R-PORT-PROTOTYPE-IREF>
        <CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF DEST="ROOT-SW-COMPONENT-PROTOTYPE">/
          Executables/MyStateManager/MyRootComponent</CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF
          >
        <TARGET-R-PORT-PROTOTYPE-REF DEST="R-PORT-PROTOTYPE">/SwComponentTypes/
          StateManagerComp/MyStateNotificationPort</TARGET-R-PORT-PROTOTYPE-REF>
      </R-PORT-PROTOTYPE-IREF>
      <SET-FUNCTION-GROUP-STATE-IREF>
        <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-PROTOTYPE">
          /FunctionGroups/MyFunctionGroups/FG1</CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF>
        <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
          MyFunctionGroupStates/FGS1</TARGET-MODE-DECLARATION-REF>
      </SET-FUNCTION-GROUP-STATE-IREF>
    </STATE-MANAGEMENT-SET-FUNCTION-GROUP-STATE-ACTION-ITEM>
  </ACTION-ITEMS>

```

```
</STATE-MANAGEMENT-ACTION-LIST>
```

Listing B.11: Example for the definition of a [StateManagementActionList](#) for the trigger request

The modeling of the [FunctionGroupSet](#) mentioned in the example is sketched in [Listing B.12](#).

```
<FUNCTION-GROUP-SET>
  <SHORT-NAME>MyFunctionGroups</SHORT-NAME>
  <FUNCTION-GROUPS>
    <MODE-DECLARATION-GROUP-PROTOTYPE>
      <SHORT-NAME>FG1</SHORT-NAME>
      <TYPE-TREF DEST="MODE-DECLARATION-GROUP">/ModeDeclarationGroups/MyFunctionGroupStates</
        TYPE-TREF>
    </MODE-DECLARATION-GROUP-PROTOTYPE>
  </FUNCTION-GROUPS>
</FUNCTION-GROUP-SET>
```

Listing B.12: Example for the definition of a [FunctionGroupSet](#) for the discussed example

The modeling of the [ModeDeclarationGroup](#) that defines the [Function Group States](#) named “FGS1” and “FGS2” that are used in the example is sketched in [Listing B.13](#).

```
<MODE-DECLARATION-GROUP>
  <SHORT-NAME>MyFunctionGroupStates</SHORT-NAME>
  <MODE-DECLARATIONS>
    <MODE-DECLARATION>
      <SHORT-NAME>FGS1</SHORT-NAME>
    </MODE-DECLARATION>
    <MODE-DECLARATION>
      <SHORT-NAME>FGS2</SHORT-NAME>
    </MODE-DECLARATION>
  </MODE-DECLARATIONS>
</MODE-DECLARATION-GROUP>
```

Listing B.13: Example for the definition of a [ModeDeclarationGroup](#) for defining the [Function Group States](#) used in the discussed example

Finally, the modeling of the [StateManagementStateNotification](#) is sketched in [Listing B.14](#).

Please note that the definition of the STATE-MACHINE in [Listing B.14](#) relates to the definition of internal states (modeled as a MODE-DECLARATION-GROUP), as sketched in [Listing B.10](#).

```
<STATE-MANAGEMENT-STATE-NOTIFICATION>
  <SHORT-NAME>MyNotification</SHORT-NAME>
  <NOTIFICATION-PORT-IREF>
    <CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF DEST="ROOT-SW-COMPONENT-PROTOTYPE">/Executables/
      MyStateManager/MyRootComponent</CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF>
    <TARGET-P-PORT-PROTOTYPE-REF DEST="P-PORT-PROTOTYPE">/SwComponentTypes/StateManagerComp/
      MyStateChangeNotificationPort</TARGET-P-PORT-PROTOTYPE-REF>
  </NOTIFICATION-PORT-IREF>
  <STATE-MACHINE>
    <SHORT-NAME>StateMachine</SHORT-NAME>
    <TYPE-TREF DEST="MODE-DECLARATION-GROUP">/ModeDeclarationGroups/MyStateMachineDefinition</
      TYPE-TREF>
  </STATE-MACHINE>
</STATE-MANAGEMENT-STATE-NOTIFICATION>
```

Listing B.14: Example for the definition of a [StateManagementStateNotification](#) for communicating state changes within the discussed example

B.6.3 Scenario for Error

For the definition of the response to errors, some people define a table, which maps the *trigger value* and the *next state* that is to be switched to if the particular error value is received.

In other words, if the value of *error code* is found in one row, then the state machine shall be switched to the *next state* listed in the table row, **independently** of the values of the current state of the state machine.

An example for such a table is listed in [Table B.6](#).

Error Code	Next State
11	2
12	3
111	2
23	4
24	0
244	5

Table B.6: Example table for associating error with state changes

The correspondence of table columns to meta-model elements is documented in [Table B.7](#).

Table Column of Table B.6	Meta-Model Element, see Figure 12.74
ErrorCode	StateManagementCompareCondition.compareValue
Next State	StateManagementRequestRule.nextState

Table B.7: Correspondence of table columns and meta-model elements for errors

In particular, the [Figure B.38](#) and, with more detail, [Listing B.15](#) depict the modeling of the relevant part for the first row of [Table B.6](#).

The relevant parts of the table row are located inside the red box in [Figure B.38](#).

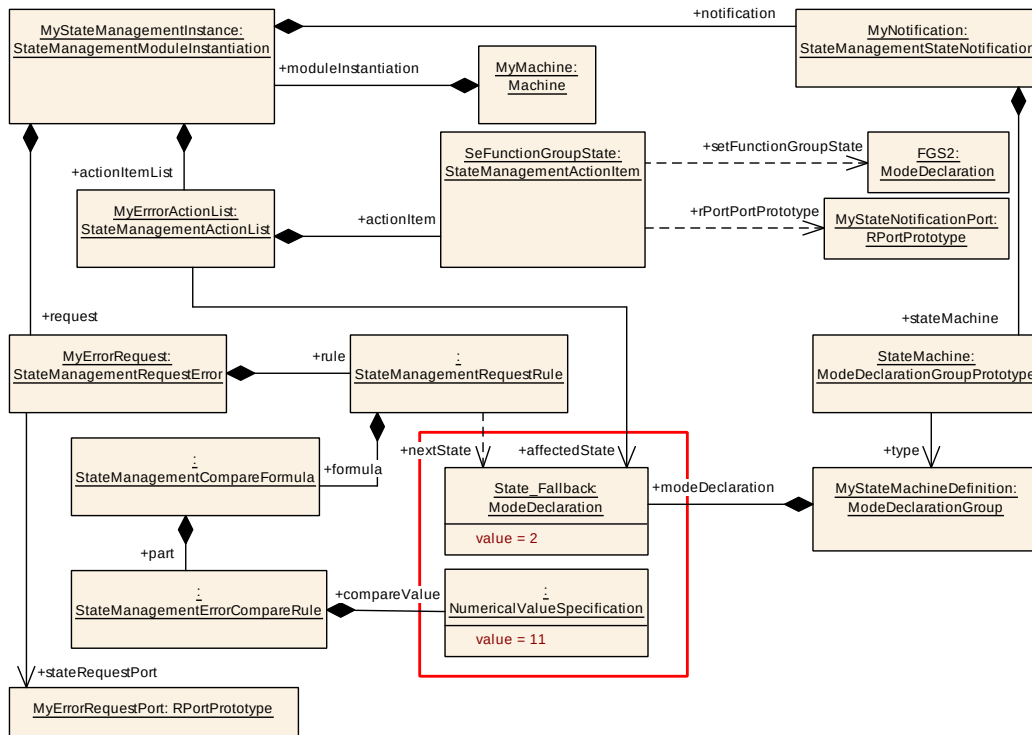


Figure B.38: Example state management modeling for an error request

This example features partly the same model elements as the previous trigger example.

But in this specific case, there is a different `StateManagementActionList` named “MyErrorActionList” that refers to different `modeDeclaration` named “State_Fallback” (that is represented by the numerical value 2) in the role `affectedState`.

Obviously, a `StateManagementRequestError` named “MyErrorRequest” exists that aggregates its own `rule`. The `StateManagementErrorCompareRule.compareValue` has the value 11.

This fits to the first row of Table B.6.

```
<STATE-MANAGEMENT-REQUEST-ERROR>
  <SHORT-NAME>MyErrorRequest</SHORT-NAME>
  <STATE-REQUEST-PORT-IREF>
    <CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF DEST="ROOT-SW-COMPONENT-PROTOTYPE">/Executables/
      MyStateManager/MyRootComponent</CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF>
    <TARGET-R-PORT-PROTOTYPE-REF DEST="R-PORT-PROTOTYPE">/SwComponentTypes/StateManagerComp/
      MyErrorRequestPort</TARGET-R-PORT-PROTOTYPE-REF>
  </STATE-REQUEST-PORT-IREF>
  <RULES>
    <STATE-MANAGEMENT-REQUEST-RULE>
      <FORMULA>
        <PARTS>
          <STATE-MANAGEMENT-ERROR-COMPARE-RULE>
            <COMPARE-TYPE>IS-EQUAL</COMPARE-TYPE>
            <COMPARE-VALUE>
              <NUMERICAL-VALUE-SPECIFICATION>
                <VALUE>11</VALUE>
              </NUMERICAL-VALUE-SPECIFICATION>
            </COMPARE-VALUE>
          </STATE-MANAGEMENT-ERROR-COMPARE-RULE>
        </PARTS>
      </FORMULA>
    </STATE-MANAGEMENT-REQUEST-RULE>
  </RULES>
</STATE-MANAGEMENT-REQUEST-ERROR>
```

```

    </PARTS>
  </FORMULA>
  <NEXT-STATE-IREF>
    <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-PROTOTYPE">
      /Machines/MyMachine/MyStateManagementInstance/MyNotification/StateMachine</CONTEXT-
        MODE-DECLARATION-GROUP-PROTOTYPE-REF>
    <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
      MyStateMachineDefinition/State_Fallback</TARGET-MODE-DECLARATION-REF>
  </NEXT-STATE-IREF>
</STATE-MANAGEMENT-REQUEST-RULE>
</RULES>
</STATE-MANAGEMENT-REQUEST-ERROR>

```

Listing B.15: Example for the definition of a [StateManagementRequestError](#)

The modeling of the applicable [StateManagementActionList](#) is sketched in [Listing B.16](#).

```

<STATE-MANAGEMENT-ACTION-LIST>
  <SHORT-NAME>MyErrorActionList</SHORT-NAME>
  <ACTION-ITEMS>
    <STATE-MANAGEMENT-SET-FUNCTION-GROUP-STATE-ACTION-ITEM>
      <SHORT-NAME>SetFunctionGroupState</SHORT-NAME>
      <R-PORT-PROTOTYPE-IREF>
        <CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF DEST="ROOT-SW-COMPONENT-PROTOTYPE">/
          Executables/MyStateManager/MyRootComponent</CONTEXT-ROOT-SW-COMPONENT-PROTOTYPE-REF
            >
        <TARGET-R-PORT-PROTOTYPE-REF DEST="R-PORT-PROTOTYPE">/SwComponentTypes/
          StateManagerComp/MyStateNotificationPort</TARGET-R-PORT-PROTOTYPE-REF>
      </R-PORT-PROTOTYPE-IREF>
      <SET-FUNCTION-GROUP-STATE-IREF>
        <CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF DEST="MODE-DECLARATION-GROUP-PROTOTYPE">
          /FunctionGroups/MyFunctionGroups/FG1</CONTEXT-MODE-DECLARATION-GROUP-PROTOTYPE-REF>
        <TARGET-MODE-DECLARATION-REF DEST="MODE-DECLARATION">/ModeDeclarationGroups/
          MyFunctionGroupStates/FGS2</TARGET-MODE-DECLARATION-REF>
      </SET-FUNCTION-GROUP-STATE-IREF>
    </STATE-MANAGEMENT-SET-FUNCTION-GROUP-STATE-ACTION-ITEM>
  </ACTION-ITEMS>
</STATE-MANAGEMENT-ACTION-LIST>

```

Listing B.16: Example for the definition of a [StateManagementActionList](#) for the error request

B.7 Crypto

B.7.1 Relation between a Crypto Certificate and a Crypto Key Slot

The following [Figure B.39](#) shows an example how the [SwcServiceDependency](#) is used to create a relation between a Crypto Certificate and a Crypto KeySlot.

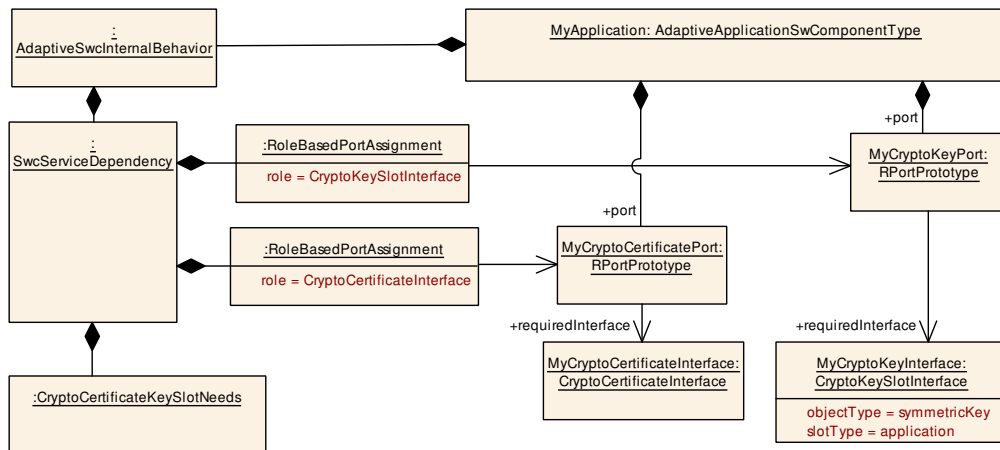


Figure B.39: Example that shows a link between a Port typed by **CryptoKeySlotInterface** and a Port typed by **CryptoCertificateInterface**

B.8 Machine Manifest

B.8.1 Distributed Definition of Environment Variables

The aggregation `Machine.environmentVariable` has been defined with the stereotype `<<atpSplitable>>`. The consequence of this modeling is that it is possible to contribute to the definition of environment variables (see [Chapter 11.2](#)) from **different sources**.

As an example, assume two partial models (sketched in [Listing B.17](#) and [Listing B.18](#)) which both add a folder to the search path of a machine running on an adaptive platform ECU.

```

<MACHINE>
  <SHORT-NAME>Machine</SHORT-NAME>
  <ENVIRONMENT-VARIABLES>
    <TAG-WITH-OPTIONAL-VALUE>
      <KEY>PATH</KEY>
      <SEQUENCE-OFFSET>10</SEQUENCE-OFFSET>
      <VALUE>/usr/application-x/bin</VALUE>
    </TAG-WITH-OPTIONAL-VALUE>
  </ENVIRONMENT-VARIABLES>
</MACHINE>

```

Listing B.17: Example for the definition of environmentVariable (file 1)

```

<MACHINE>
  <SHORT-NAME>Machine</SHORT-NAME>
  <ENVIRONMENT-VARIABLES>
    <TAG-WITH-OPTIONAL-VALUE>
      <KEY>PATH</KEY>
      <SEQUENCE-OFFSET>20</SEQUENCE-OFFSET>
      <VALUE>/usr/application-y/bin</VALUE>
    </TAG-WITH-OPTIONAL-VALUE>
  </ENVIRONMENT-VARIABLES>
</MACHINE>

```

Listing B.18: Example for the definition of environmentVariable (file 2)

Merging the splittable elements from the partial models results in the following content. Please note that the merged model exists only internally in the AUTOSAR tool. The [Listing B.19](#) is therefore shown **only for illustration**.

```
<MACHINE>
  <SHORT-NAME>Machine</SHORT-NAME>
  <ENVIRONMENT-VARIABLES>
    <TAG-WITH-OPTIONAL-VALUE>
      <KEY>PATH</KEY>
      <SEQUENCE-OFFSET>10</SEQUENCE-OFFSET>
      <VALUE>/usr/application-x/bin</VALUE>
    </TAG-WITH-OPTIONAL-VALUE>
    <TAG-WITH-OPTIONAL-VALUE>
      <KEY>PATH</KEY>
      <SEQUENCE-OFFSET>20</SEQUENCE-OFFSET>
      <VALUE>/usr/application-y/bin</VALUE>
    </TAG-WITH-OPTIONAL-VALUE>
  </ENVIRONMENT-VARIABLES>
</MACHINE>
```

Listing B.19: Example for the definition of environmentVariable (merged)

The generator for the target machine configuration may use this information to create the following environment variable:

```
PATH=/usr/application-x/bin;/usr/application-y/bin;
```

B.9 Ethernet Raw Data Stream Configuration

B.9.1 Preamble

The examples discussed in this section of the document are based on the modeling of two [EthernetCommunicationConnectors](#), one for the client (see [Listing B.20](#)) and one for the server (see [Listing B.21](#))

```
<ETHERNET-COMMUNICATION-CONNECTOR>
  <SHORT-NAME>ClientConn</SHORT-NAME>
  <AP-APPLICATION-ENDPOINTS>
    <AP-APPLICATION-ENDPOINT>
      <SHORT-NAME>ClientUnicastAEP</SHORT-NAME>
      <TP-CONFIGURATION>
        <UDP-TP>
          <UDP-TP-PORT>
            <PORT-NUMBER>3333</PORT-NUMBER>
          </UDP-TP-PORT>
        </UDP-TP>
      </TP-CONFIGURATION>
    </AP-APPLICATION-ENDPOINT>
    <AP-APPLICATION-ENDPOINT>
      <SHORT-NAME>ClientMulticastAEP</SHORT-NAME>
      <TP-CONFIGURATION>
        <UDP-TP>
          <UDP-TP-PORT>
            <PORT-NUMBER>7654</PORT-NUMBER>
          </UDP-TP-PORT>
        </UDP-TP>
      </TP-CONFIGURATION>
    </AP-APPLICATION-ENDPOINT>
  </AP-APPLICATION-ENDPOINTS>
  <UNICAST-NETWORK-ENDPOINT-REFS>
    <UNICAST-NETWORK-ENDPOINT-REF DEST="NETWORK-ENDPOINT">/CommunicationClusters/Ether/VLAN1/ClientEP</UNICAST-NETWORK-ENDPOINT-REF>
```

```
</UNICAST-NETWORK-ENDPOINT-REFS>
</ETHERNET-COMMUNICATION-CONNECTOR>
```

Listing B.20: Definition of [EthernetCommunicationConnector](#) for the client

```
<ETHERNET-COMMUNICATION-CONNECTOR>
  <SHORT-NAME>ServerConn</SHORT-NAME>
  <AP-APPLICATION-ENDPOINTS>
    <AP-APPLICATION-ENDPOINT>
      <SHORT-NAME>ServerUnicastAEP</SHORT-NAME>
      <TP-CONFIGURATION>
        <UDP-TP>
          <UDP-TP-PORT>
            <PORT-NUMBER>7777</PORT-NUMBER>
          </UDP-TP-PORT>
        </UDP-TP>
      </TP-CONFIGURATION>
    </AP-APPLICATION-ENDPOINT>
    <AP-APPLICATION-ENDPOINT>
      <SHORT-NAME>ServerMulticastAEP</SHORT-NAME>
      <TP-CONFIGURATION>
        <UDP-TP>
          <UDP-TP-PORT>
            <PORT-NUMBER>7654</PORT-NUMBER>
          </UDP-TP-PORT>
        </UDP-TP>
      </TP-CONFIGURATION>
    </AP-APPLICATION-ENDPOINT>
  </AP-APPLICATION-ENDPOINTS>
  <UNICAST-NETWORK-ENDPOINT-REFS>
    <UNICAST-NETWORK-ENDPOINT-REF DEST="NETWORK-ENDPOINT">/CommunicationClusters/Ether/VLAN1/
      ServerEP</UNICAST-NETWORK-ENDPOINT-REF>
  </UNICAST-NETWORK-ENDPOINT-REFS>
</ETHERNET-COMMUNICATION-CONNECTOR>
```

Listing B.21: Definition of [EthernetCommunicationConnector](#) for the server

On top of that, the definition of a [EthernetPhysicalChannel](#) is also considered, see [Listing B.22](#).

```
<ETHERNET-PHYSICAL-CHANNEL>
  <SHORT-NAME>VLAN1</SHORT-NAME>
  <NETWORK-ENDPOINTS>
    <NETWORK-ENDPOINT>
      <SHORT-NAME>ClientEP</SHORT-NAME>
      <NETWORK-ENDPOINT-ADDRESSES>
        <IPV-4-CONFIGURATION>
          <IPV-4-ADDRESS>192.168.2.240</IPV-4-ADDRESS>
        </IPV-4-CONFIGURATION>
      </NETWORK-ENDPOINT-ADDRESSES>
    </NETWORK-ENDPOINT>
    <NETWORK-ENDPOINT>
      <SHORT-NAME>ServerEP</SHORT-NAME>
      <NETWORK-ENDPOINT-ADDRESSES>
        <IPV-4-CONFIGURATION>
          <IPV-4-ADDRESS>192.168.2.223</IPV-4-ADDRESS>
        </IPV-4-CONFIGURATION>
      </NETWORK-ENDPOINT-ADDRESSES>
    </NETWORK-ENDPOINT>
  </NETWORK-ENDPOINTS>
</ETHERNET-PHYSICAL-CHANNEL>
```

Listing B.22: Definition of [EthernetPhysicalChannel](#) for connection between client and server

B.9.2 Fully formalized Model Example

A scenario where both the raw data stream client and raw data stream server are fully formalized inside an AUTOSAR model is depicted in [Figure B.40](#).

In the case of a fully formalized model it may be possible to derive the client configuration (that also consists of the credentials of the remote server) from the server's model if the server model is accessible.

The AUTOSAR meta-model foresees the specification of the server credentials in the client's configuration by means of the aggregation `EthernetRawDataStreamClientMapping.remoteServerConfig`.

If multicast communication from server to client is foreseen, then the aggregation in the role `EthernetRawDataStreamClientMapping.remoteServerConfig.multicastCredentials` also needs to exist.

For the sake of simplicity, this example has been created to communicate the general idea of the configuration approach rather than to demonstrate a true-to-the-meta-model representation.

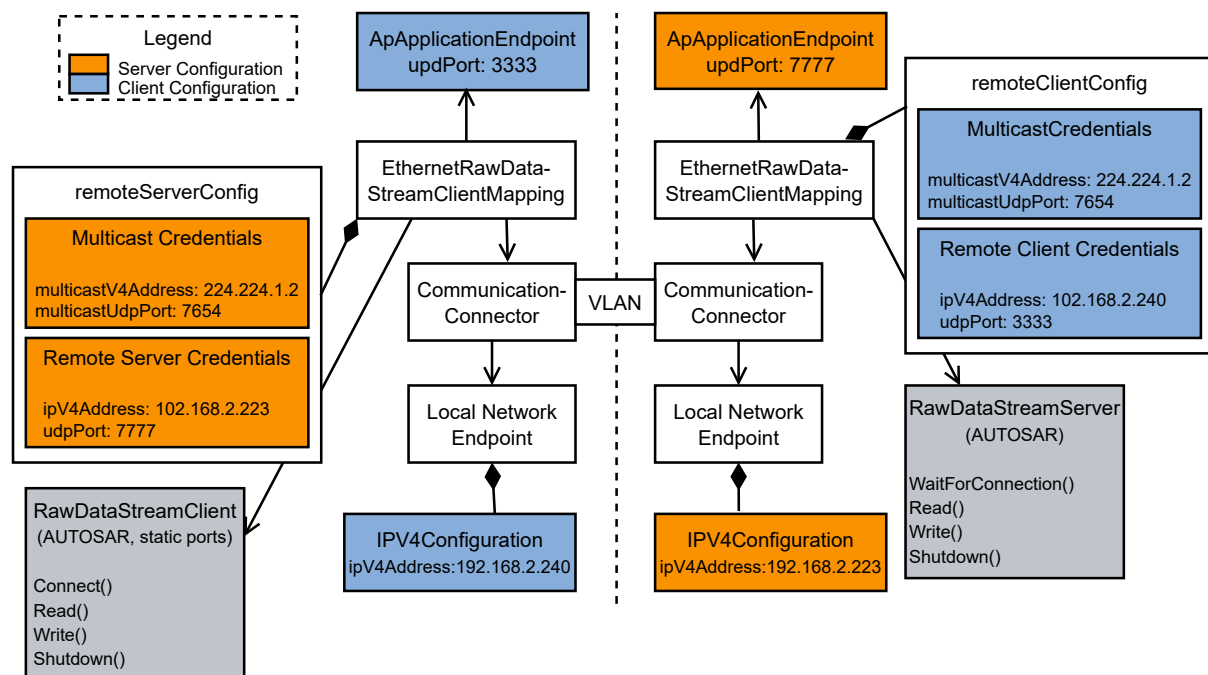


Figure B.40: Scenario where both the raw data stream client and raw data stream server are fully formalized inside an AUTOSAR model

Please note that this example utilizes UDP communication only. If the unicast communication were based on TCP, the server's configuration would (as mentioned in [Chapter 14.3.2](#)) not need the client's TCP credentials, i.e. `EthernetRawDataStreamServerMapping.remoteClientConfig` (the "Remote Client Credentials" in [Figure B.40](#)) would not exist.

In a fully formalized model, the configuration of the multicast credentials shall be identical for all affected communication ends. The simplified (the focus is on the Ethernet configuration, based on the modeling described in [Chapter B.9.1](#)) modeling of the client mapping is sketched in [Listing B.23](#).

```
<ETHERNET-RAW-DATA-STREAM-CLIENT-MAPPING>
  <SHORT-NAME>ClientMap</SHORT-NAME>
  <LOCAL-ENDPOINT-CONFIG>
    <LOCAL-COMM-CONNECTOR-REF DEST="ETHERNET-COMMUNICATION-CONNECTOR">/MachineDesigns/Mach/
      ClientConn</LOCAL-COMM-CONNECTOR-REF>
    <LOCAL-UDP-PORT-REF DEST="AP-APPLICATION-ENDPOINT">/MachineDesigns/Mach/ClientConn/
      ClientUnicastAEP</LOCAL-UDP-PORT-REF>
  </LOCAL-ENDPOINT-CONFIG>
  <REMOTE-SERVER-CONFIG>
    <MULTICAST-CREDENTIALS>
      <IP-V-4-ADDRESS>224.224.1.2</IP-V-4-ADDRESS>
      <UDP-PORT>7654</UDP-PORT>
    </MULTICAST-CREDENTIALS>
    <UNICAST-CREDENTIALS>
      <IP-V-4-ADDRESS>192.168.2.223</IP-V-4-ADDRESS>
      <UDP-PORT>7777</UDP-PORT>
    </UNICAST-CREDENTIALS>
  </REMOTE-SERVER-CONFIG>
</ETHERNET-RAW-DATA-STREAM-CLIENT-MAPPING>
```

Listing B.23: Modeling of the client mapping

The simplified (the focus is on the Ethernet configuration, based on the modeling described in [Chapter B.9.1](#)) modeling of the server mapping is sketched in [Listing B.24](#).

```
<ETHERNET-RAW-DATA-STREAM-SERVER-MAPPING>
  <SHORT-NAME>ServerMap</SHORT-NAME>
  <LOCAL-ENDPOINT-CONFIG>
    <LOCAL-COMM-CONNECTOR-REF DEST="ETHERNET-COMMUNICATION-CONNECTOR">/MachineDesigns/Mach/
      ServerConn</LOCAL-COMM-CONNECTOR-REF>
    <LOCAL-UDP-PORT-REF DEST="AP-APPLICATION-ENDPOINT">/MachineDesigns/Mach/ServerConn/
      ServerUnicastAEP</LOCAL-UDP-PORT-REF>
  </LOCAL-ENDPOINT-CONFIG>
  <REMOTE-CLIENT-CONFIG>
    <UNICAST-UDP-CREDENTIALS>
      <IP-V-4-ADDRESS>192.168.2.240</IP-V-4-ADDRESS>
      <UDP-PORT>3333</UDP-PORT>
    </UNICAST-UDP-CREDENTIALS>
  </REMOTE-CLIENT-CONFIG>
</ETHERNET-RAW-DATA-STREAM-SERVER-MAPPING>
```

Listing B.24: Modeling of the server mapping

B.9.3 Only Client is formalized

The case that **only** the client is formalized (and the server does not appear in the form of an [EthernetRawDataStreamServerMapping](#)) can be represented by a subset of the modeling described in [Chapter B.9.2](#) as well as the model sketched in [Listing B.23](#).

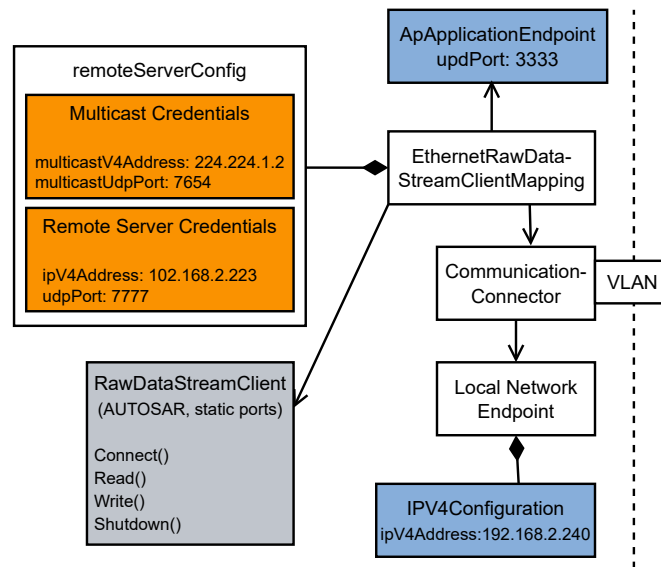


Figure B.41: Scenario where only the raw data stream client is fully formalized inside an AUTOSAR model

B.9.4 Only Server is formalized

The case that **only** the server is formalized (and the client does not appear in the form of an `EthernetRawDataStreamClientMapping`) can be represented by a subset of the modeling described in [Chapter B.9.2](#) as well as the model sketched in [Listing B.24](#).

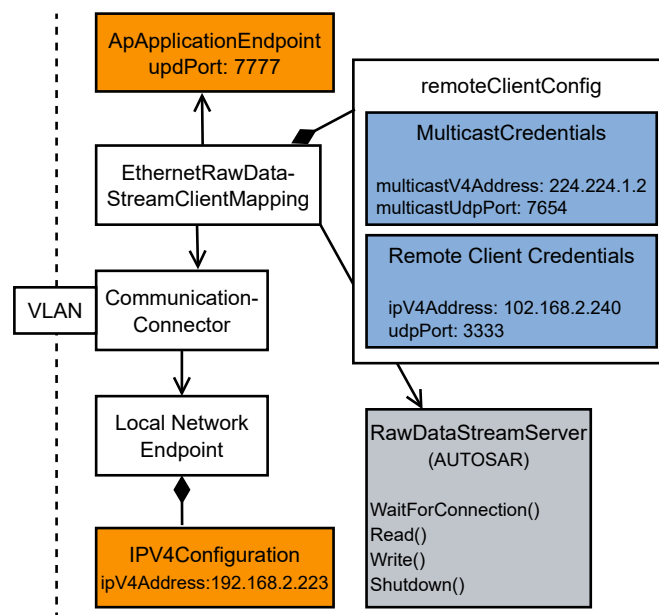


Figure B.42: Scenario where only the raw data stream server is fully formalized inside an AUTOSAR model

B.10 Signal/Service Translation

B.10.1 Signal/Service Mapping

B.10.1.1 Map Event to Signal

In the example sketched in [Figure B.43](#) the *TestEvent* in the *TestServiceInterface* is of type *struct1* that consists of a primitive element *a* and struct *b*. The struct *b* consists of the primitive elements *x*, *y* and *z*.

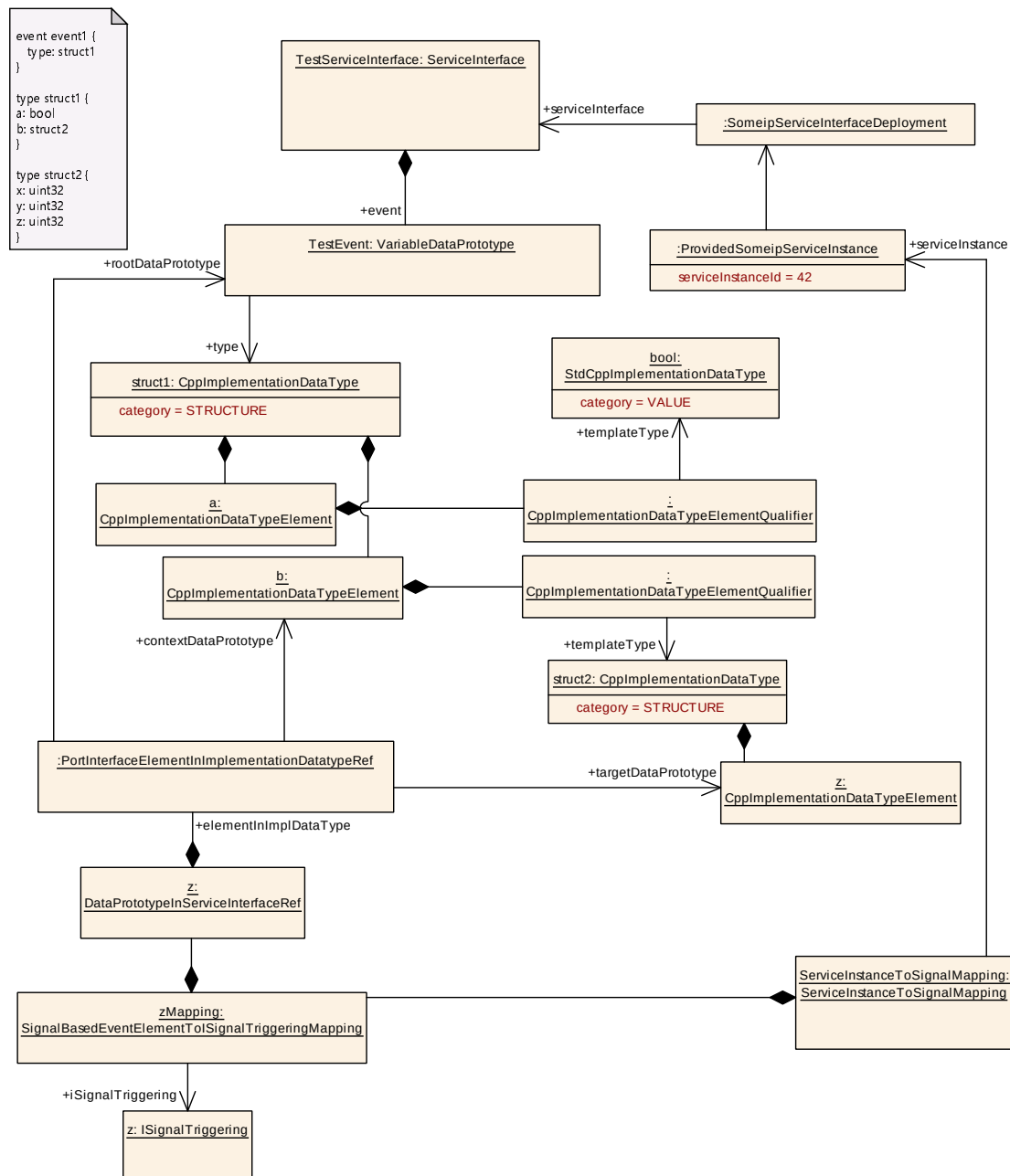


Figure B.43: Example for a mapping of event content to a Signal

Several `SignalBasedEventElementToISignalTriggeringMappings` are used to map the primitive `DataPrototypes` `a`, `x`, `y` and `z` to `ISignalTriggerings` of `ISignals` located in the `ISignalGroup` representing the `TestEvent`.

The example shows the mapping of `z` to the `ISignalTriggering`. Here, the `elementInImplDataType` role of `DataPrototypeInServiceInterfaceRef` is used to refer to the `targetDataPrototype` since it refers to the internal structure of an `AutosarDataPrototype` which is typed by a `CppImplementationDataType`. The context of this reference is defined by the `TestEvent` and struct `b`.

B.10.1.2 Map Field to Signal

In the example sketched in Figure B.44 the `testField` in the `testServiceInterface` is of type `struct1` that consists of the primitive elements `a` and `b`. The `testField` defines a notifier and a setter method.

One `SignalBasedFieldToISignalTriggeringMapping` maps the `TestField` to `ISignalTriggerings` for the Setter-Call and Setter-Return.

Here the `dataPrototype` role of `DataPrototypeInServiceInterfaceRef` is used to refer to the `targetDataPrototype` (`field`) according to the rules defined in [TPS_MANI_01136] and [TPS_MANI_01137].

Additional `SignalBasedFieldToISignalTriggeringMappings` are necessary to map the field notifier to the corresponding `ISignalTriggerings`.

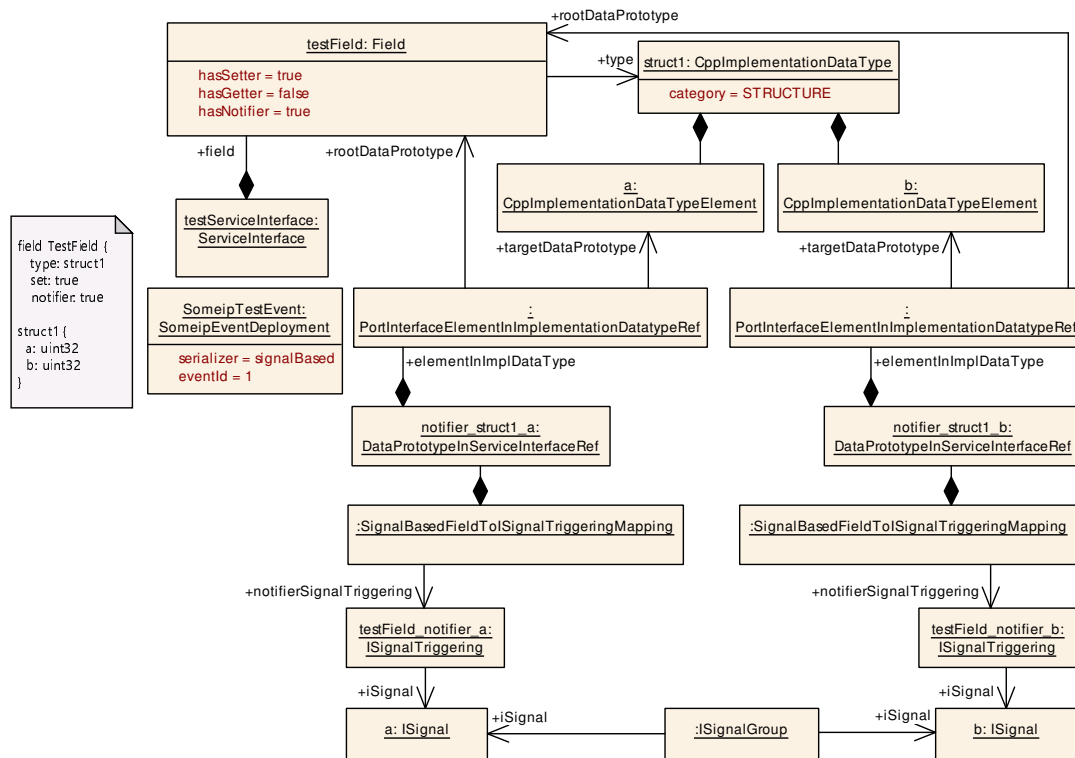


Figure B.44: Example for a mapping of a field to Signals

The primitive `DataPrototypes` *a* and *b* are mapped by additional `SignalBased-FieldToISignalTriggeringMappings` to `ISignalTriggerings` of `ISignals` located in the `ISignalGroup`.

Here, the `elementInImplDatatype` role of `DataPrototypeInServiceInterfaceRef` is used to refer to the `targetDataPrototype` since it refers to the internal structure of an `AutosarDataPrototype` which is typed by a `CppImplementation-Datatype`. The context of this reference is defined by the `testField`.

B.10.2 Signal/Service Translation Behavior

B.10.2.1 Optional Structure Element in the context of Signal/Service Translation

Figure B.45 illustrates the usage of update-bits in the source `ISignalIPdu` as the cause for the definition of `isOptional` members of the event.

The left part of Figure B.45 shows that the *signal group x1*, *signal y*, and *signal z* have update-bits defined and thus the resulting event definition for the `ServiceInterface` needs to respect this. In this example the event *xyz* is defined as an `Application-RecordDataType` containing 3 `ApplicationRecordElements` where each `element` has the attribute `isOptional` set to true.

The right part of Figure B.45 takes one specific `ISignalIPdu` instance with only the `updateBit_y` set to 1, thus only the *signal y* shall be considered as updated. Therefore the resulting event notification contains an event *xyz* where only the member *y* is defined. The other two members of *xyz* are not set in this example.

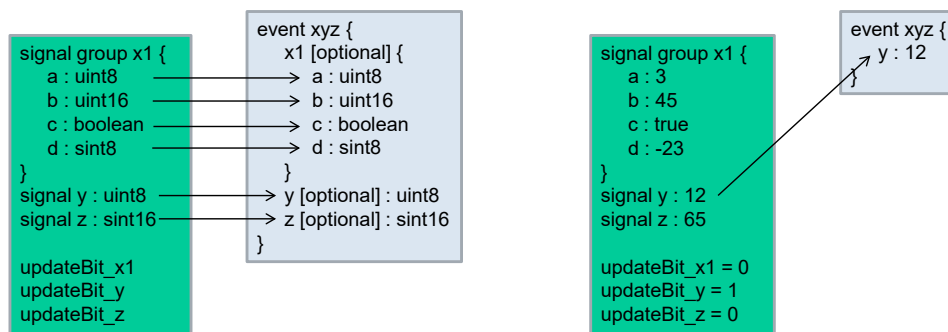


Figure B.45: Example of update-bits for `signal-service-translation`

B.10.2.2 Optional Structure Element in the context of Service/Signal Translation

Figure B.46 illustrates the usage of `isOptional` elements in the event / field definition as the cause for the definition of update-bits in the target `ISignalIPdu`.

The left part of Figure B.46 shows that the *event klm* has two optional members (*k* and *l*) and one mandatory member (*m*). These are mapped into an `ISignalIPdu` with two update-bits (`updateBit_k` and `updateBit_l`).

The right part of [Figure B.46](#) takes one specific *event klm* instance with values defined for *l* (which is optional but present) and *m* (which is not optional and therefore has to be present). There is no value defined for the optional member *k*. The resulting *ISignalIPdu* takes the values for *l* and *m* and sets the update-bits accordingly (*updateBit_k=0* and *updateBit_l=1*). The values for the not-set optional members stay unchanged.

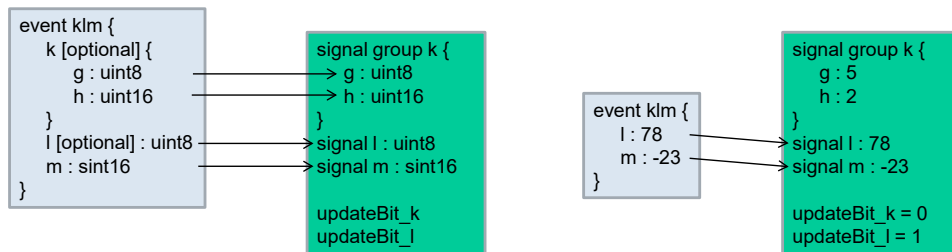


Figure B.46: Example of update-bits for [service-signal-translation](#)

B.10.2.3 Translation from different Sources

B.10.2.3.1 Signal/Service Translation from different Sources

The example in [Figure B.47](#) shows a setup where several sources of information are coming from [signal-service-translations](#).

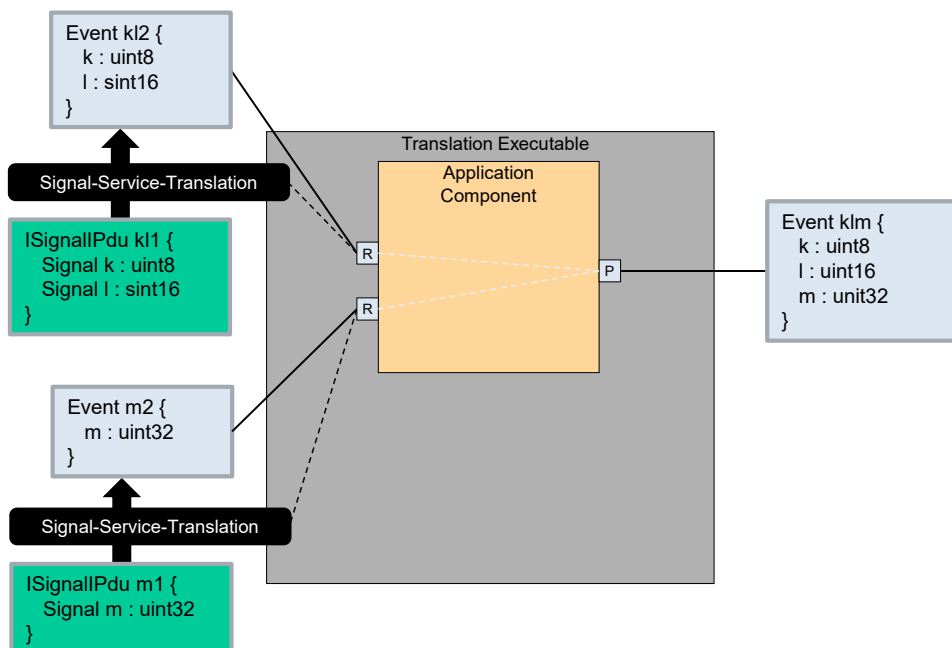


Figure B.47: Example [signal-service-translation](#) and forwarding from several sources

As the source information is accessed using `ara::com` APIs and the reception semantics is implementing a queue for each input source, the application component is responsible to fetch the data from the various sources and to decide which input data shall be put to the output event *klm*. As the output event *klm* does not have any optional members defined, it is required to provide all three members *k*, *l*, and *m* with valid values for each instance of *klm*.

B.10.2.3.2 ServiceSignalTranslation from different Sources

Figure B.48 shows an example for several sources coming from service-oriented communication. The task of the application component is to fetch the input information for the source events *x1*, *y*, and *z*. The output event *xyz1* does not have any optional members, also the output `ISignalIPdu xyz2` does not use any update bits, thus it is required for the application component to provide the full set of information for *a*, *b*, *y*, and *z* when the output event *xyz1* is produced.

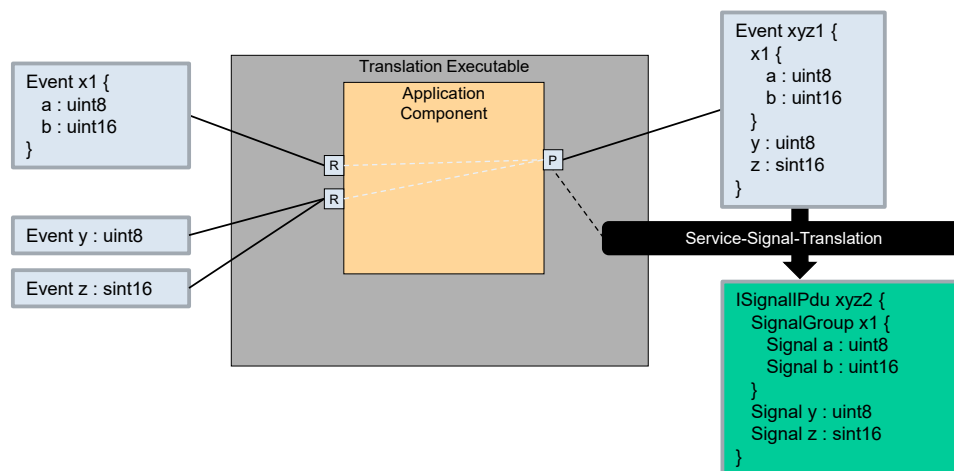


Figure B.48: Example `service-signal-translation` and forwarding from several sources

B.10.2.4 Translation to different Targets

An example of such a setup is illustrated in Figure B.49: The `ISignalIPdu xyz` consists of an end-to-end protected `ISignalGroup x1` and two not protected `ISignals y` and *z*.

It is essential for the application component to be able to check the end-to-end status for the event *x1* which holds the end-to-end protected `ISignalGroup` payload. The event *x1* covers just the end-to-end protected part of the `ISignalIPdu` and is handled according to the definitions in Chapter 9.9.1.

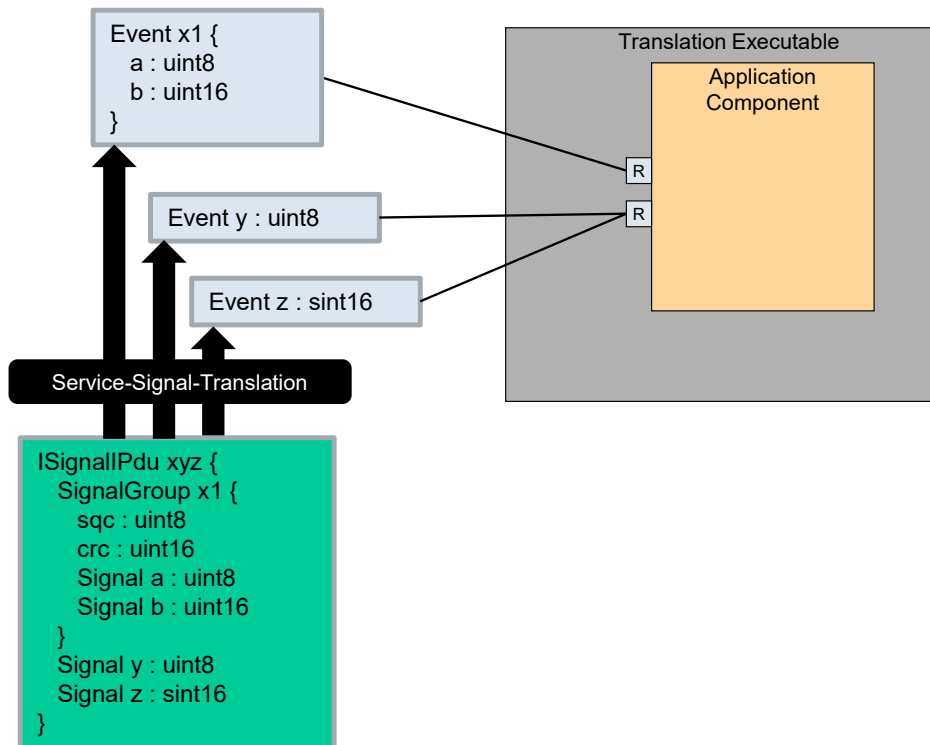


Figure B.49: Example **signal-service-translation** to several targets

The single **events** y and z are accessible individually and there is not end-to-end protection involved in their translation.

B.11 Software Cluster Design

B.11.1 Dependencies among Software Cluster Designs

The definition of dependencies among **SoftwareClusterDesigns** is exemplified by the sketch in Figure B.50 (where the orange ellipsis represent **SoftwareClusterDependencyFormula** and the blue ellipsis represent **SoftwareClusterDependencyCompareCondition**) and a corresponding ARXML formalization, see Listing B.25:

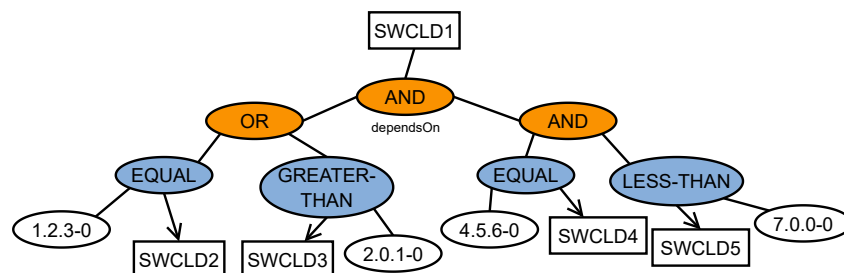


Figure B.50: Example how dependencies among **SoftwareClusters** can be defined

```

<SOFTWARE-CLUSTER-DESIGN>
  <SHORT-NAME>SWCL1</SHORT-NAME>

```

```

<DEPENDS-ON>
  <OPERATOR>LOGICAL-AND</OPERATOR>
  <PARTS>
    <SOFTWARE-CLUSTER-DEPENDENCY-FORMULA>
      <PARTS>
        <SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
          <COMPARE-TYPE>IS-EQUAL</COMPARE-TYPE>
          <SOFTWARE-CLUSTER-DESIGN-REF DEST="SOFTWARE-CLUSTER-DESIGN"/>/SoftwareClusters/
            SWCL2</SOFTWARE-CLUSTER-DESIGN-REF>
          <VERSION>1.2.3-0</VERSION>
        </SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
        <SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
          <COMPARE-TYPE>IS-GREATER-THAN</COMPARE-TYPE>
          <SOFTWARE-CLUSTER-DESIGN-REF DEST="SOFTWARE-CLUSTER-DESIGN"/>/SoftwareClusters/
            SWCL3</SOFTWARE-CLUSTER-DESIGN-REF>
          <VERSION>2.0.1-0</VERSION>
        </SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
      </PARTS>
    </SOFTWARE-CLUSTER-DEPENDENCY-FORMULA>
  <SOFTWARE-CLUSTER-DEPENDENCY-FORMULA>
    <OPERATOR>LOGICAL-AND</OPERATOR>
    <PARTS>
      <SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
        <COMPARE-TYPE>IS-EQUAL</COMPARE-TYPE>
        <SOFTWARE-CLUSTER-DESIGN-REF DEST="SOFTWARE-CLUSTER-DESIGN"/>/SoftwareClusters/
          SWCL4</SOFTWARE-CLUSTER-DESIGN-REF>
        <VERSION>4.5.6-0</VERSION>
      </SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
      <SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
        <COMPARE-TYPE>IS-LESS-THAN</COMPARE-TYPE>
        <SOFTWARE-CLUSTER-DESIGN-REF DEST="SOFTWARE-CLUSTER-DESIGN"/>/SoftwareClusters/
          SWCL5</SOFTWARE-CLUSTER-DESIGN-REF>
        <VERSION>7.0.0-0</VERSION>
      </SOFTWARE-CLUSTER-DEPENDENCY-COMPARE-CONDITION>
    </PARTS>
  </SOFTWARE-CLUSTER-DEPENDENCY-FORMULA>
</PARTS>
</DEPENDS-ON>
</SOFTWARE-CLUSTER-DESIGN>

```

Listing B.25: Example for the definition of a dependency between individual `SoftwareClusterDesigns`

B.11.2 Usage of `SoftwarePackageStep`

The semantics of the references `transfer` and `process` shall be explained along a set of examples.

B.11.2.1 Usage of transfer and process

The first example (as depicted in [Figure B.51](#)) assumes a scenario where three `SoftwarePackages` shall be activated and the three `SoftwarePackages` are transferred in parallel in the context of one `SoftwarePackageStep`.

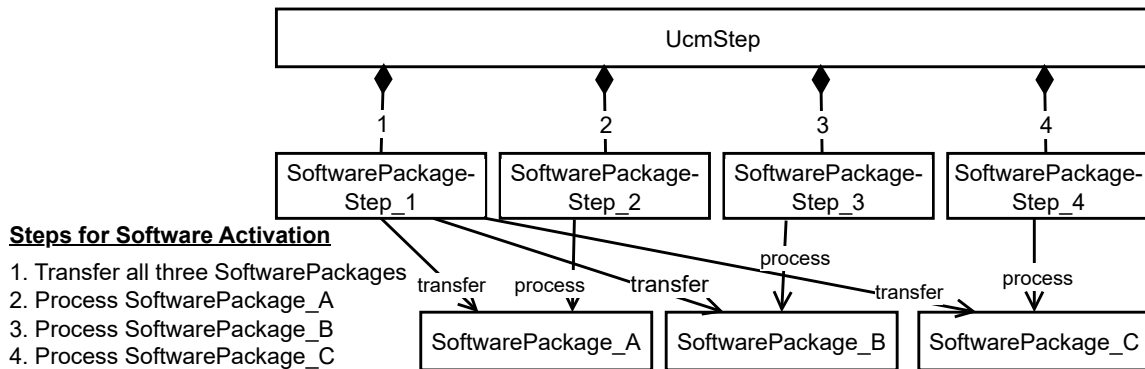


Figure B.51: Example 1 of the configuration of `SoftwarePackageStep`

After that, the three `SoftwarePackages` are processed one by one in the context of three further `SoftwarePackageSteps`.

The ordering of the `SoftwarePackageSteps` in the context of the enclosing `UcmStep` is depicted explicitly by assigning numerical values to the aggregation as well as naming the respective `SoftwarePackageStep` using the same numerical values.

The second example introduces a scenario where the three `SoftwarePackages` are transferred in the first `SoftwarePackageStep`. One of the `SoftwarePackages` is additionally referenced in the role `process` and this indicates that the respective `SoftwarePackage` is streamed.

Because the first `SoftwarePackage` is streamed, only three¹ `SoftwarePackageSteps` are needed to model the example.

The rest of the `SoftwarePackages` are processed in a dedicated `SoftwarePackageStep`. The example is depicted in Figure B.52.

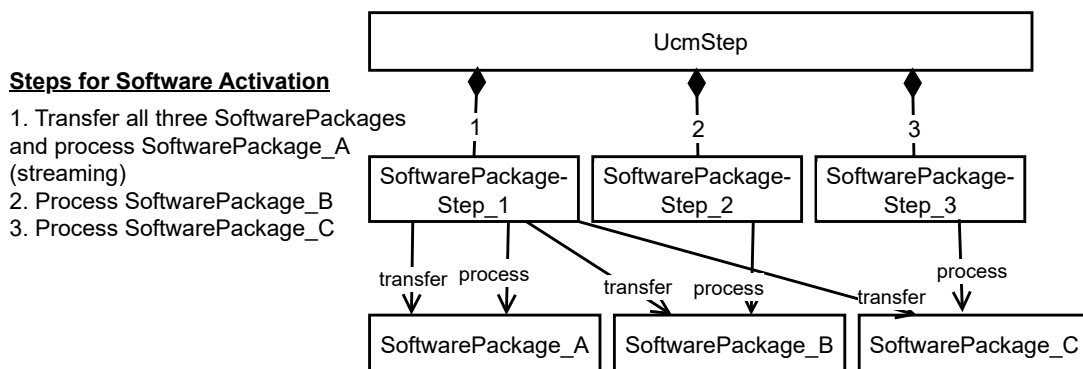


Figure B.52: Example 2 of the configuration of `SoftwarePackageStep`

The third example, depicted in Figure B.53, sketches a scenario where three `SoftwarePackages` are streamed one after the other.

¹As opposed to four `SoftwarePackageSteps` required to model the first example.

Consequently, this scenario requires the existence of three `SoftwarePackageSteps` that each reference the same `SoftwarePackage` in the roles `transfer` and `process`.

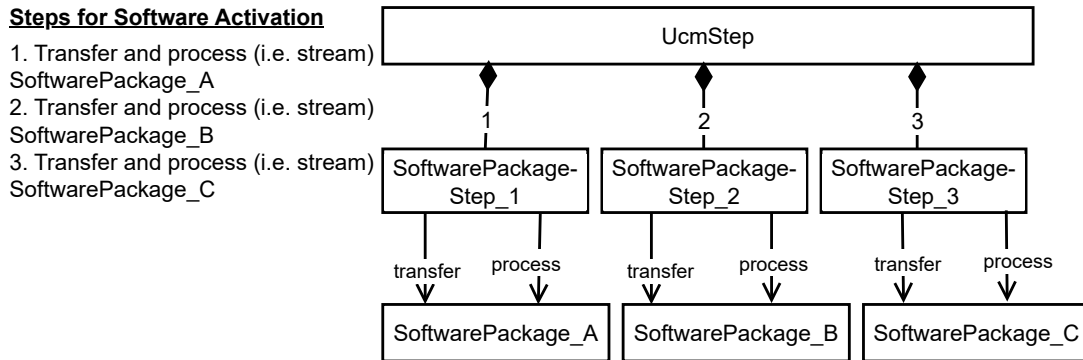


Figure B.53: Example 3 of the configuration of `SoftwarePackageStep`

B.12 Miscellaneous Examples

B.12.1 Relation of `ApApplicationError` and `ApApplicationErrorDomain`

This chapter contains examples for the clarification of the relation between `ApApplicationError` and `ApApplicationErrorDomain`.

The following example shows a configuration that fulfills [`constr_10574`]:

method. shortName	ApApplicationError. shortName	ApApplicationErrorDomain. shortName	ApApplicationErrorDomain. value
Method1	AppError1	ErrorDomain1	42
Method1	AppError2	ErrorDomain2	50
Method1	AppError3	ErrorDomain3	26

Table B.8: Valid example for the definition of `ApApplicationErrorDomain`

The following example does not fulfill the intended constraint (two different `ApApplicationErrorDomain`s carry the same value in attribute value):

method. shortName	ApApplicationError. shortName	ApApplicationErrorDomain. shortName	ApApplicationErrorDomain. value
Method1	AppError1	ErrorDomain1	42
Method1	AppError2	ErrorDomain2	50
Method1	AppError3	ErrorDomain3	50

Table B.9: Invalid example for the definition of `ApApplicationErrorDomain`

The typical solution for such a problem is to rely on the definition of *special data groups*, formalized as [Sdg](#). However, the direct usage of an [Sdg](#) with in a project comes with the risk that the [Sdg](#) is used slightly different in certain parts of the project.

Class	Sdg			
Note	Sdg (SpecialDataGroup) is a generic model which can be used to keep arbitrary information which is not explicitly modeled in the meta-model. Sdg can have various contents as defined by sdgContentsType . Special Data should only be used moderately since all elements should be defined in the meta-model. Thereby SDG should be considered as a temporary solution when no explicit model is available. If an sdgCaption is available, it is possible to establish a reference to the sdg structure.			
Base	ARObject			
Aggregated by	AdminData.sdg , BuildActionEnvironment.sdg , BuildActionInvoker.sdg , BuildActionIoElement.sdg , FileInfoComment.sdg , RptHook.sdg , SdgContents.sdg , VariationPoint.sdg			
Attribute	Type	Mult.	Kind	Note
gid	NameToken	1	attr	This attributes specifies an identifier. Gid comes from the SGML/XML-Term "Generic Identifier" which is the element name in XML. The role of this attribute is the same as the name of an XML - element. Tags: <code>xml.attribute=true</code>
sdgCaption	SdgCaption	0..1	aggr	This aggregation allows to assign the properties of Identifiable to the sdg . By this, a <code>shortName</code> etc. can be assigned to the Sdg . Stereotypes: <code>atpIdentityContributor</code> Tags: <code>xml.sequenceOffset=20</code>
sdgContentsType	SdgContents	0..1	aggr	This is the content of the Sdg . Tags: <code>xml.roleElement=false</code> <code>xml.roleWrapperElement=false</code> <code>xml.sequenceOffset=30</code> <code>xml.typeElement=false</code> <code>xml.typeWrapperElement=false</code>

Table C.1: Sdg

It would therefore be good if there were a way to describe in terms of the AUTOSAR meta-model how a [Sdg](#) is supposed to be used.

Fortunately, this is possible by means of a corner of the meta-model that had been created for exactly this purpose: [SdgClass](#) aggregates abstract class [SdgAttribute](#) that in turn inherits to a bunch of different sub-classes.

Class	SdgClass			
Note	An SdgClass specifies the name and structure of the SDG that may be used to store proprietary data in an AUTOSAR model. The SdgClass is similar to an UML stereotype.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable , SdgElementWithGid			
Aggregated by	SdgDef.sdgClass			
Attribute	Type	Mult.	Kind	Note
attribute (ordered)	SdgAttribute	*	aggr	Definition of the structure of the Sdg Tags: <code>xml.sequenceOffset=30</code>
caption	Boolean	0..1	attr	Specifies if a caption is required. Note: only Sdgs that have a caption can be referenced Tags: <code>xml.sequenceOffset=20</code>





Class	SdgClass			
extendsMetaClass	MetaClassName	0..1	attr	The AUTOSAR Meta-Class that may be extended by this SdgClass. Tags: xml.sequenceOffset=10
sdgConstraint	TraceableText	*	ref	Semantic constraints that restrict the structure of the special data group. Tags: xml.sequenceOffset=40

Table C.2: SdgClass

Class	SdgAttribute (abstract)			
Note	Describes the attributes of an Sdg.			
Base	ARObject, AbstractMultiplicityRestriction, Identifiable, MultilanguageReferrable, Referrable			
Subclasses	SdgAbstractForeignReference, SdgAbstractPrimitiveAttribute, SdgAggregationWithVariation, SdgReference			
Aggregated by	SdgClass.attribute			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table C.3: SdgAttribute

C.2 Custom Attribute Definition

C.2.1 Custom Primitive Attribute Definition

In other words, [SdgClass](#) and [SdgAttribute](#) mimic the pattern found in the meta-model itself: meta-classes have attributes of different kinds.

With this mechanism it is possible to extend meta-class [ProvidedUserDefinedServiceInstance](#) in order to e.g. add the ability to describe an instance Id. This chapter contains a comprehensive description of how the extension mechanism can be used to implement the instance Id.

The definition starts with an [SdgDef](#) that aggregates an [SdgClass](#) with the shortName [ProvidedUserDefinedServiceInstance](#). Attribute [extendsMetaClass](#) names meta-class [ProvidedUserDefinedServiceInstance](#) as the subject to extension.

The extension itself is modeled by an [SdgPrimitiveAttribute](#) named `instanceId` that is mandatory for the implementation of the user-defined service and thus has lower and upper multiplicity set to 1. The supported value interval ranges from 0..4294967295.

Class	SdgDef
Note	A SdgDef groups several SdgClasses which belong to the same extension. The concept of an SdgDef is similar to an UML Profile. Tags: atp.recommendedPackage=SdgDefs





Class	SdgDef			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
sdgClass	SdgClass	*	aggr	The owned sdgClasses which define the structure of the Sdgs Tags: xml.namePlural=SDG-CLASSES

Table C.4: SdgDef

Class	SdgPrimitiveAttribute			
Note	Describes primitive special data attributes without variation. This class accepts a special data "sd" attribute.			
Base	ARObject, AbstractMultiplicityRestriction, AbstractValueRestriction, Identifiable, MultilanguageReferrable, Referrable, SdgAbstractPrimitiveAttribute, SdgAttribute, SdgElementWithGid			
Aggregated by	SdgClass.attribute			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table C.5: SdgPrimitiveAttribute

```

<SDG-DEF>
  <SHORT-NAME>InstanceExtensions</SHORT-NAME>
  <SDG-CLASSES>
    <SDG-CLASS>
      <SHORT-NAME>ProvidedUserDefinedServiceInstance</SHORT-NAME>
      <GID>acme:instanceExtensions</GID>
      <EXTENDS-META-CLASS>ProvidedUserDefinedServiceInstance</EXTENDS-META-CLASS>
      <ATTRIBUTES>
        <SDG-PRIMITIVE-ATTRIBUTE>
          <SHORT-NAME>instanceId</SHORT-NAME>
          <CATEGORY>INTEGER</CATEGORY>
          <LOWER-MULTIPLICITY>1</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <GID>acme:instanceId</GID>
          <MAX>4294967295</MAX>
          <MIN>0</MIN>
        </SDG-PRIMITIVE-ATTRIBUTE>
      </ATTRIBUTES>
    </SDG-CLASS>
  </SDG-CLASSES>
</SDG-DEF>

```

Listing C.1: Example for the definition of a custom service instance id via SdgClass

Please note the definition of `gid` with value “acme:instanceExtensions” on the level of the `SdgPrimitiveAttribute` and the `gid` with value “acme:instanceId” on the level of the `SdgAttribute`.

The usage of the extension is summarized below. Note the usage of the `gid` that reflects the definition in the `SdgClass` and `SdgPrimitiveAttribute`.

Please note further that the definition of the `SdgPrimitiveAttribute` defines the “data type” of the

```

<PROVIDED-USER-DEFINED-SERVICE-INSTANCE>
  <SHORT-NAME>UDSI</SHORT-NAME>
  <ADMIN-DATA>

```

```

<SDGS>
  <SDG GID="acme:instanceExtensions">
    <SD GID="acme:instanceId">42</SD>
  </SDG>
</SDGS>
</ADMIN-DATA>
</PROVIDED-USER-DEFINED-SERVICE-INSTANCE>

```

Listing C.2: Example for the specification of the value of a custom service instance id

C.2.2 Custom Complex Attribute Definition

Other extensions, e.g. using [SdgAggregationWithVariation](#) can be used to implement the aggregation of a complex attribute (that in turn may own primitive attributes or references).

In this case it makes sense to put the role of the aggregation into the value of [SdgAggregationWithVariation.gid](#).

Note that the [SdgAggregationWithVariation](#) doesn't aggregate further elements but refers to an [SdgClass](#) that in turn contains the attributes and references.

Class	SdgAggregationWithVariation			
Note	Describes that the Sdg may contain another Sdg. The gid of the nested Sdg is defined by subSdg. Represents 'sdg'.			
Base	<i>ARObject</i> , <i>AbstractMultiplicityRestriction</i> , <i>AbstractVariationRestriction</i> , <i>Identifiable</i> , <i>Multilanguage Referrable</i> , <i>Referrable</i> , <i>SdgAttribute</i> , <i>SdgElementWithGid</i>			
Aggregated by	SdgClass.attribute			
Attribute	Type	Mult.	Kind	Note
subSdg	SdgClass	0..1	ref	Supported sub Sdg Class

Table C.6: SdgAggregationWithVariation

```

<SDG-DEF>
  <SHORT-NAME>DepExt</SHORT-NAME>
  <SDG-CLASSES>
    <SDG-CLASS>
      <SHORT-NAME>UserDefinedServiceInterfaceDeployment</SHORT-NAME>
      <GID>acme:deploymentExtensions</GID>
      <EXTENDS-META-CLASS>UserDefinedServiceInterfaceDeployment</EXTENDS-META-CLASS>
      <ATTRIBUTES>
        <SDG-AGGREGATION-WITH-VARIATION>
          <SHORT-NAME>Version</SHORT-NAME>
          <GID>acme:version</GID>
          <VARIATION>false</VARIATION>
          <SUB-SDG-REF DEST="SDG-CLASS">/CustomME/DepExt/VersionInformation</SUB-SDG-REF>
        </SDG-AGGREGATION-WITH-VARIATION>
      </ATTRIBUTES>
    </SDG-CLASS>
    <SDG-CLASS>
      <SHORT-NAME>VersionInformation</SHORT-NAME>
      <GID>acme:deploymentExtensions</GID>
      <ATTRIBUTES>
        <SDG-PRIMITIVE-ATTRIBUTE>
          <SHORT-NAME>MajorVersion</SHORT-NAME>
          <CATEGORY>INTEGER</CATEGORY>
          <LOWER-MULTIPLICITY>0</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <GID>acme:majorVersion</GID>
          <MAX>4294967295</MAX>
        </SDG-PRIMITIVE-ATTRIBUTE>
      </ATTRIBUTES>
    </SDG-CLASS>
  </SDG-CLASSES>
</SDG-DEF>

```

```

        <MIN>0</MIN>
    </SDG-PRIMITIVE-ATTRIBUTE>
    <SDG-PRIMITIVE-ATTRIBUTE>
        <SHORT-NAME>MinorVersion</SHORT-NAME>
        <CATEGORY>INTEGER</CATEGORY>
        <LOWER-MULTIPLICITY>1</LOWER-MULTIPLICITY>
        <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
        <GID>acme:minorVersion</GID>
        <MAX>4294967295</MAX>
        <MIN>0</MIN>
    </SDG-PRIMITIVE-ATTRIBUTE>
</ATTRIBUTES>
</SDG-CLASS>
</SDG-CLASSES>
</SDG-DEF>

```

Listing C.3: Example for the definition of a complex version information `SdgClass`

The modeling of the complex aggregation is sketched in [Listing C.3](#). An `SdgClass` with the `gid` set to “acme:deploymentExtensions” defines an attribute that is an `SdgAggregationWithVariation` with the `shortName` “Version” that has attribute `gid` set to “acme:version”.

This means that the `SdgAggregationWithVariation` with the `shortName` “Version” is aggregated in the role “version” (derived from the value of the `gid`) at the `SdgClass`.

The `SdgAggregationWithVariation` in turn references another `SdgClass` with the `shortName` set to “VersionInformation”. This `SdgClass` contains two `SdgPrimitiveAttributes` for carrying the optional major version and the minor version. The value range of both version information is from 0 to 4294967295.

The definition side of this example is sketched in [Listing C.3](#), the respective value side is provided in [Listing C.4](#).

```

<USER-DEFINED-SERVICE-INTERFACE-DEPLOYMENT>
    <SHORT-NAME>UDSID</SHORT-NAME>
    <ADMIN-DATA>
        <SDGS>
            <SDG GID="acme:deploymentExtensions">
                <SDG GID="acme:version">
                    <SD GID="acme:majorVersion">1</SD>
                    <SD GID="acme:minorVersion">0</SD>
                </SDG>
            </SDG>
        </SDGS>
    </ADMIN-DATA>
</USER-DEFINED-SERVICE-INTERFACE-DEPLOYMENT>

```

Listing C.4: Example for the specification of the value of a custom version information

C.3 Custom Foreign Reference Definition

Another aspect of custom modeling is the creation of references to meta-classes derived from `Referrable`. For this purpose, the meta-class `SdgForeignReference` resp. `SdgForeignReferenceWithVariation`.

Class	SdgForeignReference			
Note	A reference without variation support that can point to any referable object in an AUTOSAR Model. This class accepts the special data "Sdx" reference.			
Base	<i>ARObject</i> , <i>AbstractMultiplicityRestriction</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i> , <i>SdgAbstractForeignReference</i> , <i>SdgAttribute</i> , <i>SdgElementWithGid</i>			
Aggregated by	<i>SdgClass.attribute</i>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table C.7: SdgForeignReference

Class	SdgForeignReferenceWithVariation			
Note	A reference with variation support that can point to any referable object in an AUTOSAR Model. This class accepts the special data "Sdx" reference.			
Base	<i>ARObject</i> , <i>AbstractMultiplicityRestriction</i> , <i>AbstractVariationRestriction</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i> , <i>SdgAbstractForeignReference</i> , <i>SdgAttribute</i> , <i>SdgElementWithGid</i>			
Aggregated by	<i>SdgClass.attribute</i>			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table C.8: SdgForeignReferenceWithVariation

The particle “foreign” in the name of these classes represents a hint that the reference’s target is situated outside the custom modeling “bubble” depicted in [Figure C.1¹](#).

The creation of a reference to another meta-class obviously implies the specification of the role in which the reference shall be used.

In the case of the *SdgForeignReference* the role of the reference may be defined in the attribute *gid*, contributed by the inheritance from meta-class *SdgElementWithGid*.

Class	SdgElementWithGid (abstract)			
Note	A special data group element with gid is an abstract element that shall have a name (gid, "Generic Identifier").			
Base	<i>ARObject</i>			
Subclasses	<i>SdgAbstractForeignReference</i> , <i>SdgAbstractPrimitiveAttribute</i> , <i>SdgAggregationWithVariation</i> , <i>SdgClass</i>			
Attribute	Type	Mult.	Kind	Note
gid	<i>NameToken</i>	0..1	attr	Specifies the name that identifies the element.

Table C.9: SdgElementWithGid

In true AUTOSAR fashion, a reference should always announce the intended meta-class to which it refers to. In the case of the *SdgForeignReference*, this information can be explicitly provided by means of the attribute *destMetaClass*, inherited from *SdgAbstractForeignReference*.

¹Of course, this naming is also a hat tip to the meta-class *EcucForeignReferenceDef*

Class	SdgAbstractForeignReference (abstract)			
Note	An abstract reference that can point to any referable object in an AUTOSAR Model.			
Base	ARObject , AbstractMultiplicityRestriction , Identifiable , MultilanguageReferrable , Referrable , SdgAttribute , SdgElementWithGid			
Subclasses	SdgForeignReference , SdgForeignReferenceWithVariation			
Aggregated by	SdgClass.attribute			
Attribute	Type	Mult.	Kind	Note
destMetaClass	MetaClassName	0..1	attr	specifies the destination meta-class of the reference.

Table C.10: SdgAbstractForeignReference

The example created for the explanation of [SdgForeignReference](#) assumes that a [ProvidedUserDefinedServiceInstance](#) wants to re-use an existing configuration for SOME/IP SD.

For this purpose, a custom extension of the meta-class [ProvidedUserDefinedServiceInstance](#) with the ability to refer to at most one [SomeipSdServerServiceInstanceConfig](#) is created.

In particular, the extension consists of the definition of a [SdgForeignReference](#) with the `gid` set to the value “acme:sdServerTimeConfig” as the representation of the role of the reference is created.

The nature of the [SdgForeignReference](#) defined in this example is determined by means of the value of attribute `destMetaClass`, in this case “SomeipSdServerServiceInstanceConfig”.

The custom definition of the [SdgForeignReference](#) is sketched in [Listing C.5](#).

```

<SDG-DEF>
  <SHORT-NAME>InstanceExtensions</SHORT-NAME>
  <SDG-CLASSES>
    <SDG-CLASS>
      <SHORT-NAME>ProvidedUserDefinedServiceInstance</SHORT-NAME>
      <GID>acme:instanceExtensions</GID>
      <EXTENDS-META-CLASS>ProvidedUserDefinedServiceInstance</EXTENDS-META-CLASS>
      <ATTRIBUTES>
        <SDG-FOREIGN-REFERENCE>
          <SHORT-NAME>SdServerTimeConfig</SHORT-NAME>
          <LOWER-MULTIPLICITY>0</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <GID>acme:sdServerTimeConfig</GID>
          <DEST-META-CLASS>SomeipSdServerServiceInstanceConfig</DEST-META-CLASS>
        </SDG-FOREIGN-REFERENCE>
      </ATTRIBUTES>
    </SDG-CLASS>
  </SDG-CLASSES>
</SDG-DEF>

```

Listing C.5: Example for the specification of a custom foreign reference

The value side of the example in [Listing C.5](#) can be found in [Listing C.6](#). Note that the formalization of the reference to the respective [SomeipSdServerServiceInstanceConfig](#) is implemented by means of the reference [SdgContents.sdx](#), wrapped into an [Sdg](#) where the attribute `gid` is set to the role of the reference, in this case “acme:sdServerTimeConfig”.

Class	«atpMixed» SdgContents			
Note	This meta-class represents the possible contents of a special data group. It can be an arbitrary mix of references, of primitive special data and nested special data groups.			
Base	ARObject			
Aggregated by	Sdg.sdgContentsType			
Attribute	Type	Mult.	Kind	Note
sd	Sd	0..1	aggr	This is one particular special data element. Tags: xml.sequenceOffset=40
sdf	Sdf	0..1	aggr	This is one particular special data element. Tags: xml.sequenceOffset=60
sdg	Sdg	0..1	aggr	This aggregation allows to express nested special data groups. By this, any structure can be represented in SpeicalData. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild xml.sequenceOffset=50
sdx	Referrable	0..1	ref	Reference to any identifiable element. This allows to use Sdg even to establish arbitrary relationships.
sdxif	Referrable	0..1	ref	Additional reference with variant support. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=sdxif.referrable, sdxif.variationPoint.shortLabel vh.latestBindingTime=postBuild

Table C.11: SdgContents

```

<PROVIDED-USER-DEFINED-SERVICE-INSTANCE>
  <SHORT-NAME>UDSI</SHORT-NAME>
  <ADMIN-DATA>
    <SDGS>
      <SDG GID="acme:instanceExtensions">
        <SDG GID="acme:sdServerTimeConfig">
          <SDX-REF DEST="SOMEIP-SD-SERVER-SERVICE-INSTANCE-CONFIG">/SD/MyConf</SDX-REF>
        </SDG>
      </SDG>
    </SDGS>
  </ADMIN-DATA>
</PROVIDED-USER-DEFINED-SERVICE-INSTANCE>

```

Listing C.6: Example for the specification of the value of a custom foreign reference

C.4 Custom Subclass Configuration

Using the mechanism of custom model extensions it is also possible to mimic the creation of custom “subclasses”.

A possible candidate for the creation of a “subclass” outside the explicitly formalized meta-model could be the [ProvidedUserDefinedServiceInstance](#). The intention could, for example, be to provide a configuration for an IPC-specific “subclass”.

A simple example of how an extension that defines a “subclass” might look like is sketched in [Listing C.7](#).

The specific approach in this case is to define an [SdgClass](#) to extend [Provide-UserDefinedServiceInstance](#) and this extension refers - via the aggregation of

an `SdgAggregationWithVariation` - to another `SdgClass` (in this case with the `shortName` “`IpcProvidedServiceInstanceAttributes`”) where the attributes of the custom “subclass” are defined.

On the value side, the definition of the attribute values of the “subclass” are defined in a quite straight-forward manner (see [Listing C.8](#)).

Please note that the value side in this example does not reflect the definition side in terms of the usage of values of attribute `gid` 100%. The existence of the `SdgClass` with `shortName` “`IpcProvidedServiceInstanceAttributes`” is not represented on the value side.

But, on the other hand, the intended semantics of defining an instance identifier in the context of the custom model of a “`ProvidedIpcServiceInstance`” can be conveyed perfectly without it.

```
<SDG-DEF>
  <SHORT-NAME>SubclassConfiguration</SHORT-NAME>
  <SDG-CLASSES>
    <SDG-CLASS>
      <SHORT-NAME>ProvidedUserDefinedServiceInstance</SHORT-NAME>
      <GID>acme:providedIpcServiceInstance</GID>
      <EXTENDS-META-CLASS>ProvidedUserDefinedServiceInstance</EXTENDS-META-CLASS>
      <ATTRIBUTES>
        <SDG-AGGREGATION-WITH-VARIATION>
          <SHORT-NAME>IpcSubclass</SHORT-NAME>
          <LOWER-MULTIPLICITY>0</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <GID>acme:attributes</GID>
          <VARIATION>false</VARIATION>
          <SUB-SDG-REF DEST="SDG-CLASS">/CustomME/SubclassConfiguration/
            IpcProvidedServiceInstanceAttributes</SUB-SDG-REF>
        </SDG-AGGREGATION-WITH-VARIATION>
      </ATTRIBUTES>
    </SDG-CLASS>
    <SDG-CLASS>
      <SHORT-NAME>IpcProvidedServiceInstanceAttributes</SHORT-NAME>
      <GID>acme:ipcProvidedServiceInstanceAttributes</GID>
      <ATTRIBUTES>
        <SDG-PRIMITIVE-ATTRIBUTE>
          <SHORT-NAME>instanceId</SHORT-NAME>
          <CATEGORY>INTEGER</CATEGORY>
          <LOWER-MULTIPLICITY>1</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <GID>acme:instanceId</GID>
          <MAX>65535</MAX>
          <MIN>0</MIN>
        </SDG-PRIMITIVE-ATTRIBUTE>
      </ATTRIBUTES>
    </SDG-CLASS>
  </SDG-CLASSES>
```

Listing C.7: Example for the specification of a custom “subclass”

And since the point of the whole approach is the creation of a custom modeling anyway, the only relevant condition for the validity of such modeling is that the affected AUTOSAR tools know how to properly parse and interpret the resulting model.

```
<PROVIDED-USER-DEFINED-SERVICE-INSTANCE>
  <SHORT-NAME>ipcProvidedSI</SHORT-NAME>
  <ADMIN-DATA>
    <SDGS>
      <SDG GID="acme:providedIpcServiceInstance">
        <SDG GID="acme:attributes">
```

```

        <SD GID="acme:instanceId">3485</SD>
      </SDG>
    </SDG>
  </SDGS>
</ADMIN-DATA>
</PROVIDED-USER-DEFINED-SERVICE-INSTANCE>

```

Listing C.8: Example for the specification of a service instance in an IPC “subclass”

C.5 Custom Constraints

Another aspect that can be solved by means of model customizations is the definition of model constraints that go beyond the potentially existing constraints formulated in AUTOSAR.

In the example sketched in [Listing C.9](#) a constraint is formulated for attribute `Executable.minimumTimerGranularity`.

```

<SDG-DEF>
  <SHORT-NAME>ModelConstraint</SHORT-NAME>
  <SDG-CLASSES>
    <SDG-CLASS>
      <SHORT-NAME>Executable</SHORT-NAME>
      <GID>acme:executableExtensions</GID>
      <EXTENDS-META-CLASS>Executable</EXTENDS-META-CLASS>
      <ATTRIBUTES>
        <SDG-PRIMITIVE-ATTRIBUTE>
          <SHORT-NAME>minimumTimerGranularity</SHORT-NAME>
          <CATEGORY>FLOAT</CATEGORY>
          <LOWER-MULTIPLICITY>1</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <MAX>0.5</MAX>
          <MIN>0.001</MIN>
        </SDG-PRIMITIVE-ATTRIBUTE>
      </ATTRIBUTES>
    </SDG-CLASS>
  </SDG-CLASSES>
</SDG-DEF>

```

Listing C.9: Example for the specification of a custom model constraint

On the one hand, the example expresses the expectation that the attribute `Executable.minimumTimerGranularity` shall exist and the second aspect of the constraint is that it shall have a value that’s between 0.001 and 0.5.

C.6 Definition of Reference from SdgClass to SdgClass

Another case that could be relevant for a custom model extension is the creation of a reference between two `Sdg` elements on the value side.

Semi-formal support for this scenario can be defined by means of the definition of two `SdgClass` elements where one defines a reference to the other.

A caveat applies. Of course, two `SdgClass` elements could reference each other by means of their `shortName`-paths (because they are derived from `Identifiable`).

But that's not the point, the intended reference on the value side shall exist from one `Sdg` (that corresponds to one of the `SdgClass` elements on the definition side) to another `Sdg` (which corresponds to the other `SdgClass` element on the definition side).

`Sdg` itself is not derived from `Referrable` and therefore does not have a `shortName` that could be used for reference building purposes.

In order to support the creation of a reference from one `Sdg` to another a mechanism was created using a reference from an `Sdg` to an `SdgCaption` in the role `sdgx`.

In other words, an `Sdg` may aggregate an `SdgCaption` in the role `sdgCaption`. And if it does, it becomes (by extension) a valid target of a reference to this `SdgCaption`.

Class	SdgCaption			
Note	This meta-class represents the caption of a special data group. This allows to have some parts of special data as identifiable.			
Base	ARObject, MultilanguageReferrable, Referrable			
Aggregated by	Sdg.sdgCaption			
Attribute	Type	Mult.	Kind	Note
desc	MultiLanguageOverview Paragraph	0..1	aggr	This represents a general but brief (one paragraph) description what the special data in question is about. It is only one paragraph! Desc is intended to be collected into overview tables. This property helps a human reader to identify the special data in question.

Table C.12: SdgCaption

Therefore, the `SdgClass` that represents the `Sdg` on the target side of the reference shall define attribute `sdgCaption` and set it to `true`.

Class	SdgReference			
Note	Describes an attribute of a <code>SdgClass</code> which is used on the definition side to model a reference from one <code>Sdg</code> to another <code>Sdg</code> on the value side.			
Base	ARObject, AbstractMultiplicityRestriction, Identifiable, MultilanguageReferrable, Referrable, SdgAttribute			
Aggregated by	SdgClass.attribute			
Attribute	Type	Mult.	Kind	Note
destSdg	SdgClass	0..1	ref	Refers to a <code>SdgClass</code> which is used on the definition side to model the destination type of the referenced <code>Sdg</code> . On the value side the reference is realized by means of the originating <code>Sdg</code> defining an <code>sdgx</code> attribute which refers to the <code>sdgCaption</code> of the referenced <code>Sdg</code> .

Table C.13: SdgReference

The `SdgClass` on the source side of the reference shall define an `attribute` that is actually an `SdgReference` to the `SdgClass` that represents the target `Sdg` on the definition side by means of the reference in the role `destSdg`.

As a first step, the following model fragment defines a custom model extension of an IPC channel² (note that attribute `caption` is set to `true`):

```
<SDG-DEF>
```

²Please note that this example represents an incomplete model that does not care about details of the actual configuration of the hypothetical IPC Channel and is entirely focused on the referencing topic.

```
<SHORT-NAME>IpcChannels</SHORT-NAME>
<SDG-CLASSES>
  <SDG-CLASS>
    <SHORT-NAME>IpcChannel</SHORT-NAME>
    <GID>acme:ipcChannels</GID>
    <CAPTION>true</CAPTION>
  </SDG-CLASS>
</SDG-CLASSES>
</SDG-DEF>
```

Listing C.10: Example for the specification of a custom model extension that represents an IPC channel

This IPC channel (named “MyIpcChannel”) shall be referenced from the definition of an `SdgClass` that is supposed to extend the `ProvidedUserDefinedServiceInstance`:

```
<SDG-DEF>
  <SHORT-NAME>InstanceExtensions</SHORT-NAME>
  <SDG-CLASSES>
    <SDG-CLASS>
      <SHORT-NAME>ProvidedUserDefinedServiceInstance</SHORT-NAME>
      <GID>acme:instanceExtensions</GID>
      <EXTENDS-META-CLASS>ProvidedUserDefinedServiceInstance</EXTENDS-META-CLASS>
      <CAPTION>false</CAPTION>
      <ATTRIBUTES>
        <SDG-REFERENCE>
          <SHORT-NAME>IpcChannelRef</SHORT-NAME>
          <LOWER-MULTIPLICITY>0</LOWER-MULTIPLICITY>
          <UPPER-MULTIPLICITY>1</UPPER-MULTIPLICITY>
          <DEST-SDG-REF DEST="SDG-CLASS">/SdgClasses/IpcChannels/IpcChannel</DEST-SDG-REF>
        </SDG-REFERENCE>
      </ATTRIBUTES>
    </SDG-CLASS>
  </SDG-CLASSES>
</SDG-DEF>
```

Listing C.11: Example for the specification of a custom model extension for a `ProvidedUserDefinedServiceInstance` with a reference to an IPC channel

The model on the value side where the `ProvidedUserDefinedServiceInstance` references the IPC channel is sketched by the following model fragment:

```
<AR-PACKAGE>
  <SHORT-NAME>ServiceInstances</SHORT-NAME>
  <ELEMENTS>
    <PROVIDED-USER-DEFINED-SERVICE-INSTANCE>
      <SHORT-NAME>MyService</SHORT-NAME>
      <ADMIN-DATA>
        <SDGS>
          <SDG GID="acme:ipcChannelRef">
            <SDX-REF DEST="SDG-CAPTION">/IpcChannels/IpcChannel1</SDX-REF>
          </SDG>
        </SDGS>
      </ADMIN-DATA>
    </PROVIDED-USER-DEFINED-SERVICE-INSTANCE>
  </ELEMENTS>
</AR-PACKAGE>
<AR-PACKAGE>
  <SHORT-NAME>IpcChannels</SHORT-NAME>
  <ADMIN-DATA>
    <SDGS>
      <SDG GID="acme:ipcChannel1">
        <SDG-CAPTION>
          <SHORT-NAME>IpcChannel1</SHORT-NAME>
        </SDG-CAPTION>
      </SDG>
    </SDGS>
  </ADMIN-DATA>
</AR-PACKAGE>
```

```
</SDGS>  
</ADMIN-DATA>  
</AR-PACKAGE>
```

Listing C.12: Example for the specification of reference between [sdg](#)

D General Modeling

This chapter has been created to explain model elements that are not directly related to specific design or target configuration usage but have a more general scope. In other words, this chapter describes the structure and usage of some widely reusable modeling content.

D.1 Reference to a DataPrototype in a PortInterface

D.1.1 Reference to the inside of an [ApplicationDataType](#)

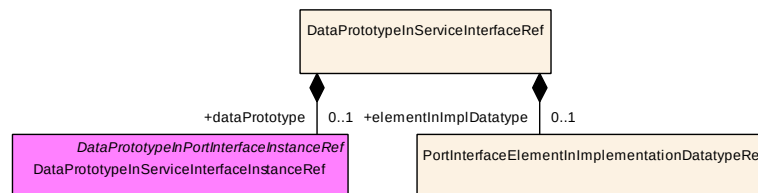


Figure D.1: Modeling of [DataPrototypeInServiceInterfaceRef](#)

Class	DataPrototypeInServiceInterfaceRef			
Note	This meta-class represents the ability to refer to an AUTOSAR DataPrototype in the context of a Service Interface. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	SignalBasedEventElementToSignalTriggeringMapping.dataPrototypeInServiceInterfaceRef , SignalBasedFieldToSignalTriggeringMapping.dataPrototypeInServiceInterfaceRef , SomeipDataPrototypeTransformationProps.dataPrototype			
Attribute	Type	Mult.	Kind	Note
dataPrototype	DataPrototype	0..1	iref	This element represents the ability to: - refer to a DataPrototype in the context of a Service Interface. - refer to the internal structure of a DataPrototype in which is typed by an ApplicationDatatype the context of a ServiceInterface. InstanceRef implemented by: DataPrototypeInServiceInterfaceInstanceRef
elementInImplDatatype	PortInterfaceElementInImplementationDatatypeRef	0..1	aggr	This element represents the ability to refer to the internal structure of an AutosarDataPrototype which is typed by an ImplementationDatatype in the context of a Service Interface.

Table D.1: DataPrototypeInServiceInterfaceRef

Please note that the modeling of the reference to a [DataPrototype](#) in the context of a [PortInterface](#) can only be executed as the abstract template for concrete specializations because the abstract meta-class [PortInterface](#) does not aggregate a [DataPrototype](#) directly.

The abstract modeling of meta-class [DataPrototypeInPortInterfaceInstanceRef](#) is depicted in [Figure D.2](#).

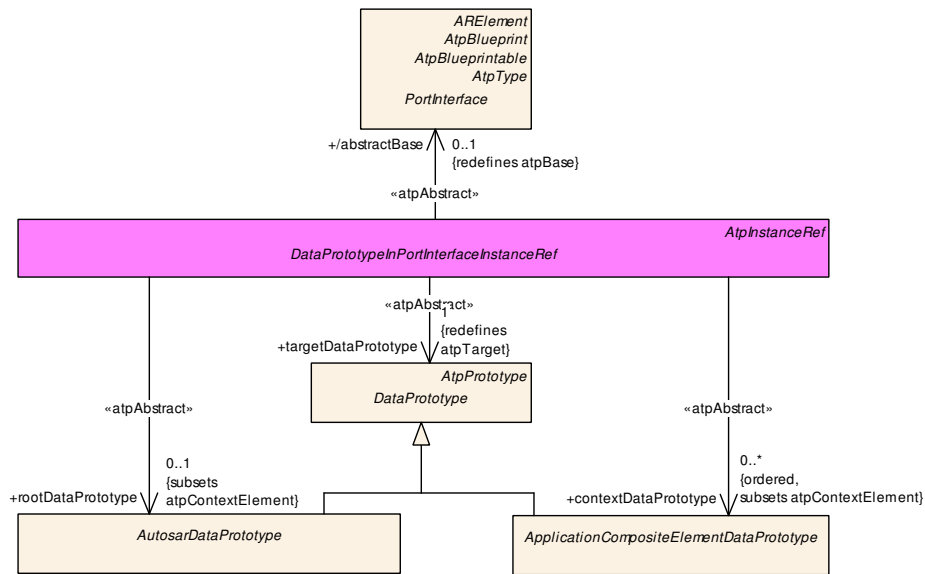


Figure D.2: Modeling of `DataPrototypeInPortInterfaceInstanceRef`

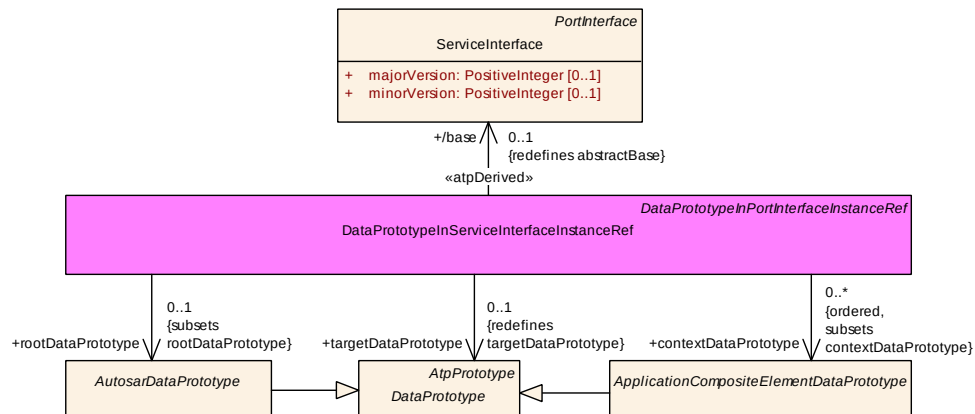
Class	<code>DataPrototypeInPortInterfaceInstanceRef</code> (abstract)			
Note	This meta-class represents the ability to: - refer to a <code>DataPrototype</code> in the context of a <code>PortInterface</code>. - refer to the internal structure of a <code>DataPrototype</code> which is typed by an <code>ApplicationDatatype</code> in the context of a <code>PortInterface</code>.			
Base	<code>ARObject</code> , <code>AtpInstanceRef</code>			
Subclasses	<code>DataPrototypeInServiceInterfaceInstanceRef</code>			
Attribute	Type	Mult.	Kind	Note
abstractBase	<code>PortInterface</code>	0..1	ref	Stereotypes: <code>atpAbstract</code>
contextData Prototype (ordered)	<code>ApplicationComposite ElementDataPrototype</code>	*	ref	Stereotypes: <code>atpAbstract</code> Tags: <code>xml.sequenceOffset=20</code>
rootData Prototype	<code>AutosarDataPrototype</code>	0..1	ref	Stereotypes: <code>atpAbstract</code> Tags: <code>xml.sequenceOffset=10</code>
targetData Prototype	<code>DataPrototype</code>	1	ref	Stereotypes: <code>atpAbstract</code> Tags: <code>xml.sequenceOffset=30</code>

Table D.2: `DataPrototypeInPortInterfaceInstanceRef`

The concrete specialization for the aggregation of a `DataPrototype` in the concrete `ServiceInterface` is depicted in Figure D.3.

The meta-class `DataPrototypeInServiceInterfaceInstanceRef` inherits from `DataPrototypeInPortInterfaceInstanceRef`.

The individual references modeled in the context of `DataPrototypeInServiceInterfaceInstanceRef` specialize the abstract structure defined in the context of `DataPrototypeInPortInterfaceInstanceRef`.

Figure D.3: Modeling of `DataPrototypeInServiceInterfaceInstanceRef`

Class	DataPrototypeInServiceInterfaceInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i> , <i>AtpInstanceRef</i> , <i>DataPrototypeInPortInterfaceInstanceRef</i>			
Aggregated by	<i>DataPrototypeInPortInterfaceRef.dataPrototypeInServiceInterface</i> , <i>DataPrototypeInServiceInterfaceRef.dataPrototype</i> , <i>SignalBasedFireAndForgetMethodToSignalTriggeringMapping.dataPrototypeInMethodArgumentInstanceRef</i>			
Attribute	Type	Mult.	Kind	Note
base	ServiceInterface	0..1	ref	Stereotypes: atpDerived
contextData Prototype (ordered)	<i>ApplicationComposite ElementDataPrototype</i>	*	ref	Tags: xml.sequenceOffset=20
rootData Prototype	AutosarDataPrototype	0..1	ref	Tags: xml.sequenceOffset=10
targetData Prototype	DataPrototype	0..1	ref	Tags: xml.sequenceOffset=30

Table D.3: `DataPrototypeInServiceInterfaceInstanceRef`

D.1.2 Reference to the inside of a `CppImplementationDataType`

Please note that the modeling of instanceRef-like references into the internals of a `CppImplementationDataType` differs from the way how internals of an `ImplementationDataType` could be referenced.

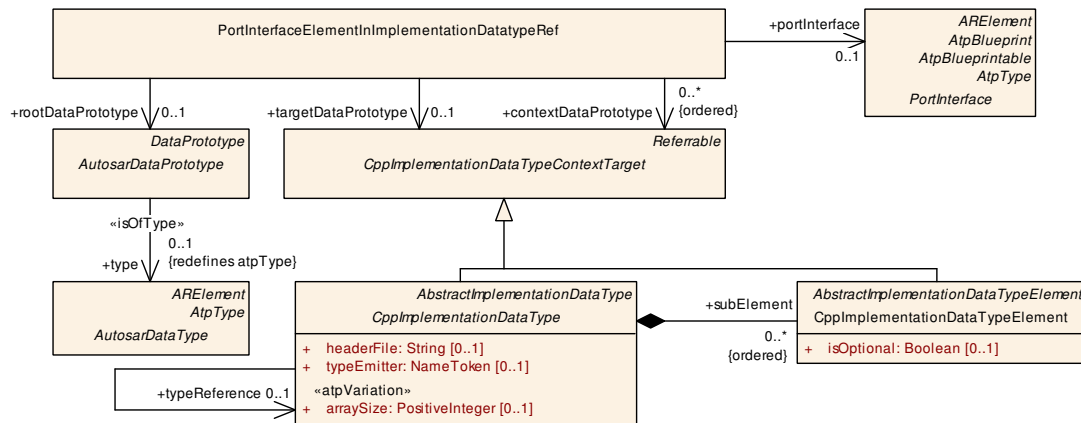


Figure D.4: Modeling of `PortInterfaceElementInImplementationDatatypeRef`

In particular, references to context elements can be directed to `ImplementationDataTypeElement` because both arrays and structures are modeled by means of `ImplementationDataTypeElement`.

This approach has changed with the advent of `CppImplementationDataType` and therefore the same approach is not possible for `CppImplementationDataTypeElement`.

In the case of `CppImplementationDataType`, both `CppImplementationDataTypeElement` and `CppImplementationDataType` can become the target of a context reference. And since the context reference is supposed to be ordered it is simply not possible to straight up model two context references, one for `CppImplementationDataType` and one for `CppImplementationDataTypeElement`.

Instead, it is necessary to introduce an abstract base class named `CppImplementationDataTypeContextTarget` for both `CppImplementationDataType` and `CppImplementationDataTypeElement` and then **direct context references at the abstract base class**.

Class	PortInterfaceElementInImplementationDatatypeRef			
Note	This meta-class represents the ability to refer to the internal structure of an AutosarDataPrototype which is typed by an implementationDatatype in the context of a PortInterface. In other words, this meta-class shall not be used to model a reference to the AutosarDataPrototype as a target itself, even if the AutosarDataPrototype is typed by an ImplementationDataType and even if that ImplementationDataType represents a composite data type. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	DataPrototypeInServiceInterfaceRef.elementInImplDatatype			
Attribute	Type	Mult.	Kind	Note
contextDataPrototype (ordered)	CppImplementationDataTypeContextTarget	*	ref	This is a context in case there are subelements with explicit types. The reference has to be ordered to properly reflect the nested structure.
portInterface	PortInterface	0..1	ref	This is the PortInterface that contains the rootData Prototype.





Class	PortInterfaceElementInImplementationDatatypeRef			
rootDataPrototype	AutosarDataPrototype	0..1	ref	This rootDataPrototype defines the AutosarDataPrototype in which the target can be found.
targetDataPrototype	CppImplementationDataTypeContextTarget	0..1	ref	This is the target reference to a subElement that is defined inside of the rootDataPrototype.

Table D.4: PortInterfaceElementInImplementationDatatypeRef

Class	<i>CppImplementationDataTypeContextTarget</i> (abstract)			
Note	This meta-class has the ability to serve as the context in instanceRef-like modeling for Cpp ImplementationDataType and CppImplementationDataTypeElement This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i> , <i>Referrable</i>			
Subclasses	CppImplementationDataType , CppImplementationDataTypeElement			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table D.5: CppImplementationDataTypeContextTarget

D.2 Reference to a AutosarDataPrototype in an Executable

The creation of the meta-model for creating a reference to an [AutosarDataPrototype](#) in the context of an [Executable](#) is executed in a two-step approach where first an abstract structure of the reference is created.

The abstract structure is the basis for the refinement with respect to specific roles of [AutosarDataPrototypes](#).

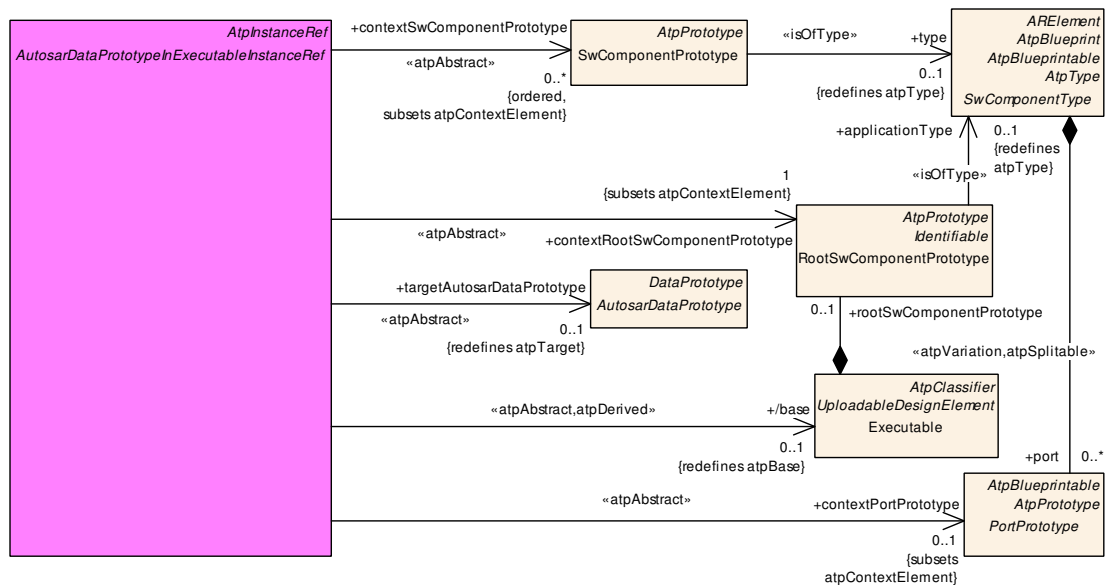


Figure D.5: Modeling of abstract [AutosarDataPrototypeInExecutableInstanceRef](#)

Class	AutosarDataPrototypeInExecutableInstanceRef (abstract)			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Subclasses	EventInExecutableInstanceRef, FieldInExecutableInstanceRef			
Attribute	Type	Mult.	Kind	Note
base	Executable	0..1	ref	Stereotypes: atpAbstract; atpDerived
contextPort Prototype	PortPrototype	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=30
contextRootSw Component Prototype	RootSwComponent Prototype	1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=10
contextSw Component Prototype (ordered)	SwComponent Prototype	*	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=20
targetAutosar DataPrototype	AutosarDataPrototype	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=40

Table D.6: AutosarDataPrototypeInExecutableInstanceRef

Two specializations of [AutosarDataPrototypeInExecutableInstanceRef](#) exist:

- [EventInExecutableInstanceRef](#)
- [FieldInExecutableInstanceRef](#)

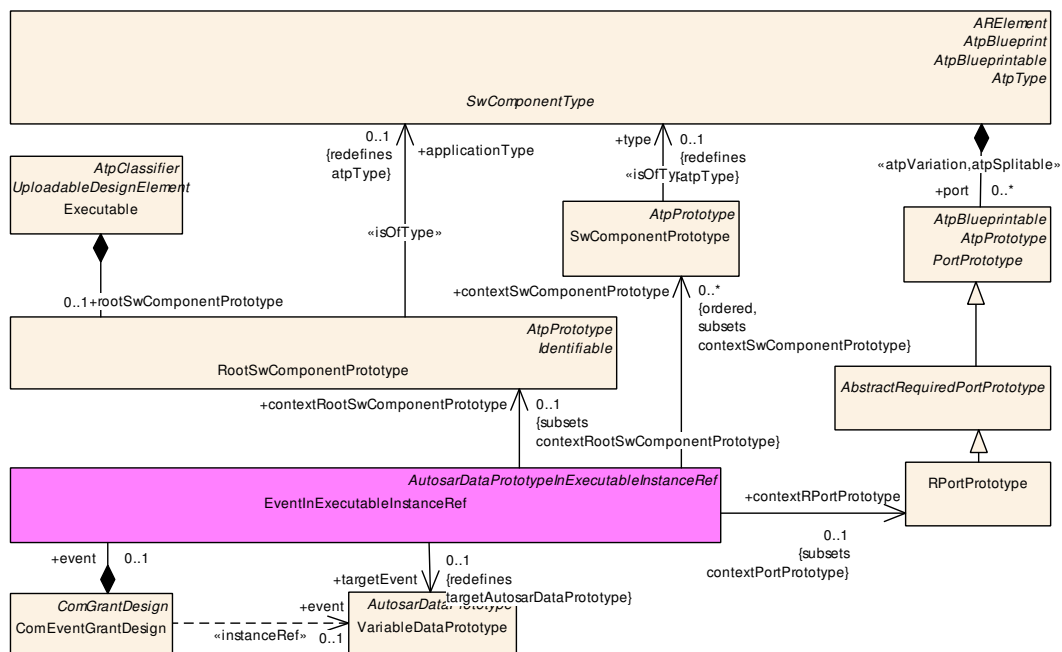


Figure D.6: Modeling of concrete [EventInExecutableInstanceRef](#) derived from [AutosarDataPrototypeInExecutableInstanceRef](#)

Class	EventInExecutableInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef, AutosarDataPrototypeInExecutableInstanceRef			
Aggregated by	ComEventGrantDesign.event			
Attribute	Type	Mult.	Kind	Note
contextRootSw Component Prototype	RootSwComponent Prototype	0..1	ref	Tags: xml.sequenceOffset=10
contextRPort Prototype	RPortPrototype	0..1	ref	Tags: xml.sequenceOffset=30
contextSw Component Prototype (ordered)	SwComponent Prototype	*	ref	Tags: xml.sequenceOffset=20
targetEvent	VariableDataPrototype	0..1	ref	Tags: xml.sequenceOffset=40

Table D.7: EventInExecutableInstanceRef

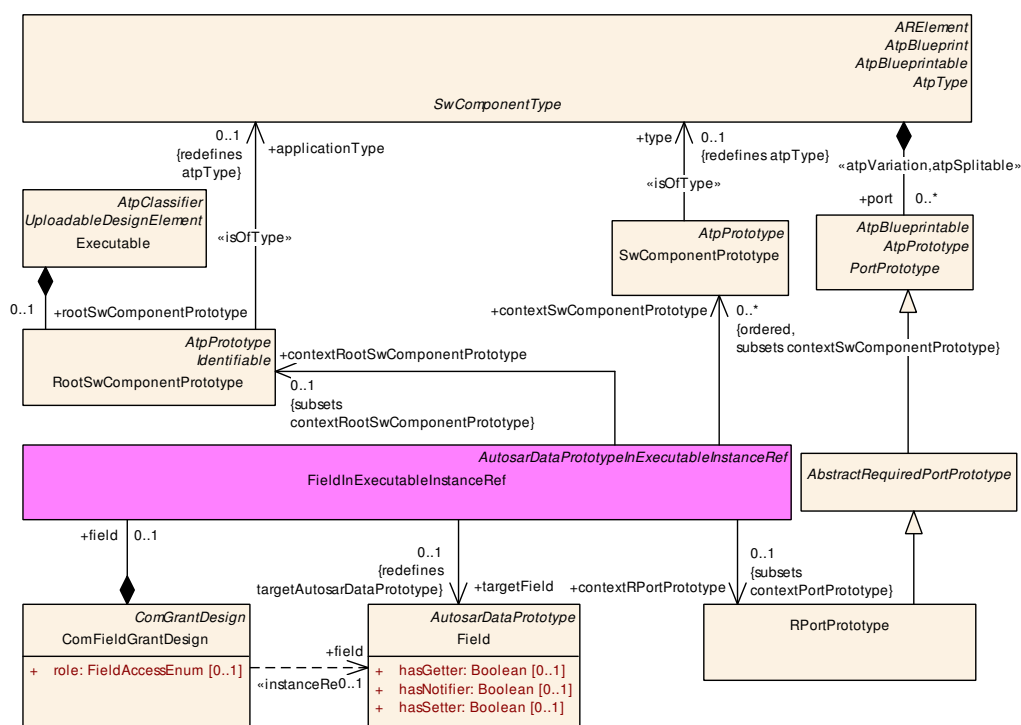


Figure D.7: Modeling of concrete `FieldInExecutableInstanceRef` derived from `AutosarDataPrototypeInExecutableInstanceRef`

Class	FieldInExecutableInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef, AutosarDataPrototypeInExecutableInstanceRef			
Aggregated by	ComFieldGrantDesign.field			
Attribute	Type	Mult.	Kind	Note
contextRootSw Component Prototype	RootSwComponent Prototype	0..1	ref	Tags: xml.sequenceOffset=10



Class	FieldInExecutableInstanceRef			
contextRPort Prototype	RPortPrototype	0..1	ref	Tags: xml.sequenceOffset=30
contextSw Component Prototype (ordered)	SwComponent Prototype	*	ref	Tags: xml.sequenceOffset=20
targetField	Field	0..1	ref	Tags: xml.sequenceOffset=40

Table D.8: FieldInExecutableInstanceRef

D.3 Reference to a PortPrototype in an Executable

The creation of the meta-model for creating a reference to a [PortPrototype](#) in the context of an [Executable](#) is executed in a two-step approach where first an abstract structure of the reference is created.

The abstract structure is the basis for the refinement with respect to specific roles of [PortPrototype](#)s.

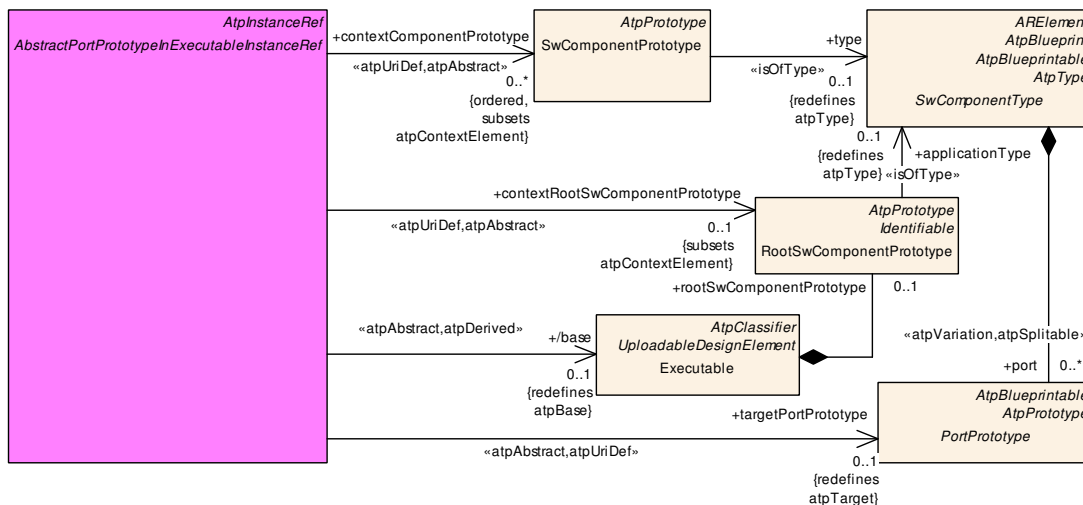


Figure D.8: Modeling of abstract [AbstractPortPrototypeInExecutableInstanceRef](#)

Class	AbstractPortPrototypeInExecutableInstanceRef (abstract)			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Subclasses	PPortPrototypeInExecutableInstanceRef, PortPrototypeInExecutableInstanceRef, RPortPrototypeInExecutableInstanceRef			
Attribute	Type	Mult.	Kind	Note
base	Executable	0..1	ref	Stereotypes: atpAbstract; atpDerived





Class	<i>AbstractPortPrototypeInExecutableInstanceRef</i> (abstract)			
context Component Prototype (ordered)	SwComponent Prototype	*	ref	Stereotypes: atpAbstract; atpUriDef Tags: xml.sequenceOffset=20
contextRootSw Component Prototype	RootSwComponent Prototype	0..1	ref	Stereotypes: atpAbstract; atpUriDef Tags: xml.sequenceOffset=10
targetPort Prototype	PortPrototype	0..1	ref	Stereotypes: atpAbstract; atpUriDef Tags: xml.sequenceOffset=30

Table D.9: AbstractPortPrototypeInExecutableInstanceRef

Three specializations of [AbstractPortPrototypeInExecutableInstanceRef](#) exist:

- [PPortPrototypeInExecutableInstanceRef](#)
- [RPortPrototypeInExecutableInstanceRef](#)
- [PortPrototypeInExecutableInstanceRef](#)

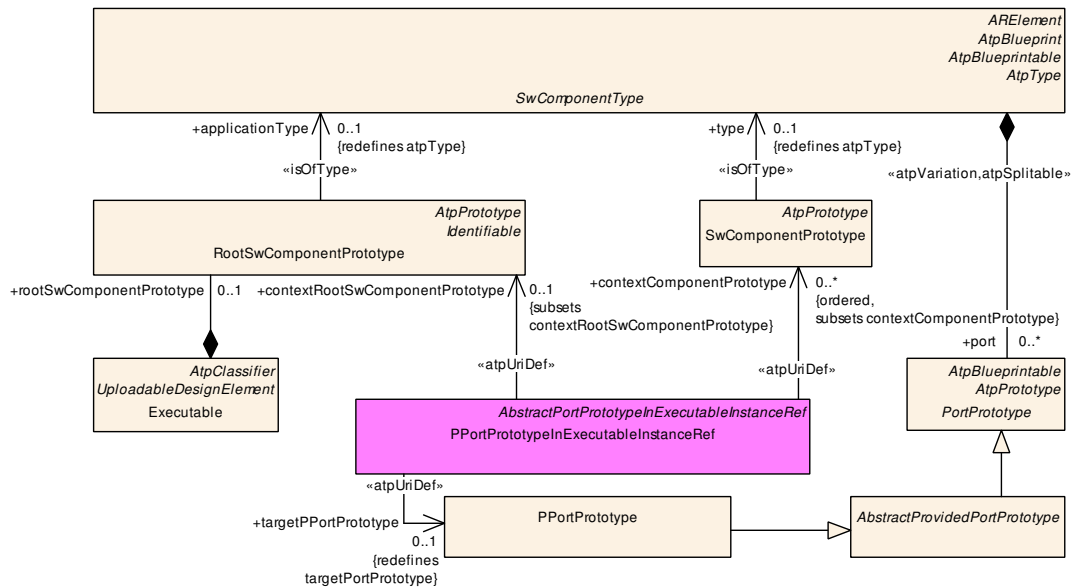
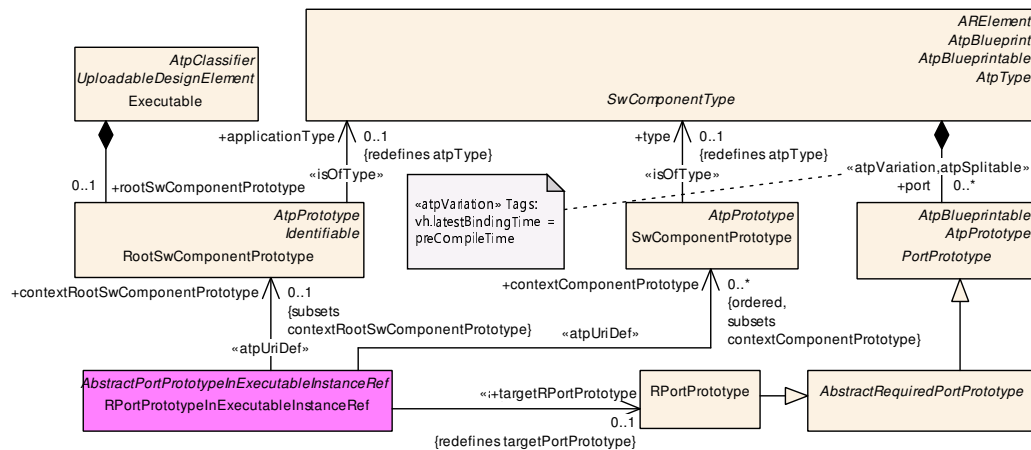


Figure D.9: Modeling of concrete [PPortPrototypeInExecutableInstanceRef](#) derived from [AbstractPortPrototypeInExecutableInstanceRef](#)

Class	PPortPrototypeInExecutableInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i> , <i>AbstractPortPrototypeInExecutableInstanceRef</i> , <i>AtpInstanceRef</i>			
Aggregated by	<i>AbstractDolpPortMapping.pPortPrototypeInExecutable</i> , <i>AbstractSuspendToRamMapping.pPortPrototypeInExecutable</i> , <i>ComOfferServiceGrantDesign.providedServicePort</i> , <i>CompositionPPortToExecutablePPortMapping.executableProvidedPort</i> , <i>DiagnosticAuthenticationPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticDataPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticEnvDataElementCondition.pPortPrototype</i> , <i>DiagnosticSecurityLevelPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticServiceGenericMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticServiceValidationMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdAuthorizationPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdBulkDataPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdConfigurationPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdContentPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdProximityChallengePortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdServiceValidationPortMapping.pPortPrototypeInExecutable</i> , <i>DiagnosticSovdUpdatePortMapping.pPortPrototypeInExecutable</i> , <i>DltLogSinkToPortPrototypeMapping.pPortPrototype</i> , <i>IdsmContextProviderMapping.pPortPrototypeInExecutable</i> , <i>IdsmTimestampProviderMapping.pPortPrototypeInExecutable</i> , <i>NetworkHandlePortMapping.pPortPrototypeInExecutable</i> , <i>RecoveryNotificationToPPortPrototypeMapping.recoveryAction</i> , <i>StateManagementStateNotification.notificationPort</i> , <i>TimeSyncPortPrototypeToTimeBaseMapping.timeSyncPPortPrototype</i>			
Attribute	Type	Mult.	Kind	Note
context Component Prototype (ordered)	<i>SwComponentPrototype</i>	*	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=20
contextRootSw Component Prototype	<i>RootSwComponentPrototype</i>	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=10
targetPPort Prototype	<i>PPortPrototype</i>	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=30

Table D.10: PPortPrototypeInExecutableInstanceRef


Figure D.10: Modeling of concrete **RPortPrototypeInExecutableInstanceRef** derived from **AbstractPortPrototypeInExecutableInstanceRef**

Class	RPortPrototypelnExecutableInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i> , AbstractPortPrototypelnExecutableInstanceRef , <i>AtpInstanceRef</i>			
Aggregated by	AbstractCryptoKeySlotToPortPrototypeMapping.portPrototype , AbstractDolpPortMapping.rPortPrototypeInExecutable , CompositionRPortToExecutableRPortMapping.executableRequiredPort , CryptoCertificateGroupToPortPrototypeMapping.portPrototype , CryptoCertificateToPortPrototypeMapping.portPrototype , CryptoProviderToPortPrototypeMapping.portPrototype , DiagnosticClearConditionPortMapping.rPortPrototypelnExecutable , DiagnosticEnableConditionPortMapping.rPortPrototypelnExecutable , DiagnosticEventPortMapping.rPortPrototypelnExecutable , DiagnosticExtendedDataRecordClientPortMapping.rPortPrototypelnExecutable , DiagnosticExternalAuthenticationPortMapping.rPortPrototypelnExecutable , DiagnosticIndicatorPortMapping.rPortPrototypelnExecutable , DiagnosticMemoryDestinationPortMapping.rPortPrototypelnExecutable , DiagnosticMonitorPortMapping.rPortPrototypelnExecutable , DiagnosticMultipleConditionPortMapping.rPortPrototypelnExecutable , DiagnosticMultipleEventPortMapping.rPortPrototypelnExecutable , DiagnosticMultipleMonitorPortMapping.rPortPrototypelnExecutable , DiagnosticOperationCyclePortMapping.rPortPrototypelnExecutable , DltLogSinkToPortPrototypeMapping.rPortPrototype , FunctionGroupPortMapping.rPortPrototypelnExecutable , IdsmQualifiedEventReceiverMapping.rPortPrototypelnExecutable , IdsmReportingModeProviderMapping.rPortPrototypelnExecutable , LTMessageCollectionToPortPrototypeMapping.rPort , NoSupervision.targetPbmSupervisedEntity , RawDataStreamMapping.portPrototype , SecurityEventMapping.reportingPortPrototype , StateManagementSetFunctionGroupStateActionItem.rPortPrototype , StateManagementStateRequest.stateRequestPort , TimeSyncPortPrototypeToTimeBaseMapping.timeSyncRPortPrototype			
Attribute	Type	Mult.	Kind	Note
context Component Prototype (ordered)	SwComponentPrototype	*	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=20
contextRootSw Component Prototype	RootSwComponentPrototype	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=10
targetRPort Prototype	RPortPrototype	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=30

Table D.11: RPortPrototypelnExecutableInstanceRef

Class	PortPrototypelnExecutableInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	<i>ARObject</i> , AbstractPortPrototypelnExecutableInstanceRef , <i>AtpInstanceRef</i>			
Aggregated by	PersistencyPortPrototypeToDeploymentMapping.portPrototype , ServiceInstanceToPortPrototypeMapping.portPrototype			
Attribute	Type	Mult.	Kind	Note
base	Executable	0..1	ref	Stereotypes: atpDerived Tags: xml.sequenceOffset=10
context Component Prototype (ordered)	SwComponentPrototype	*	ref	Tags: xml.sequenceOffset=30
contextRootSw Component Prototype	RootSwComponentPrototype	0..1	ref	Tags: xml.sequenceOffset=20
targetPort Prototype	PortPrototype	0..1	ref	Tags: xml.sequenceOffset=40

Table D.12: PortPrototypelnExecutableInstanceRef

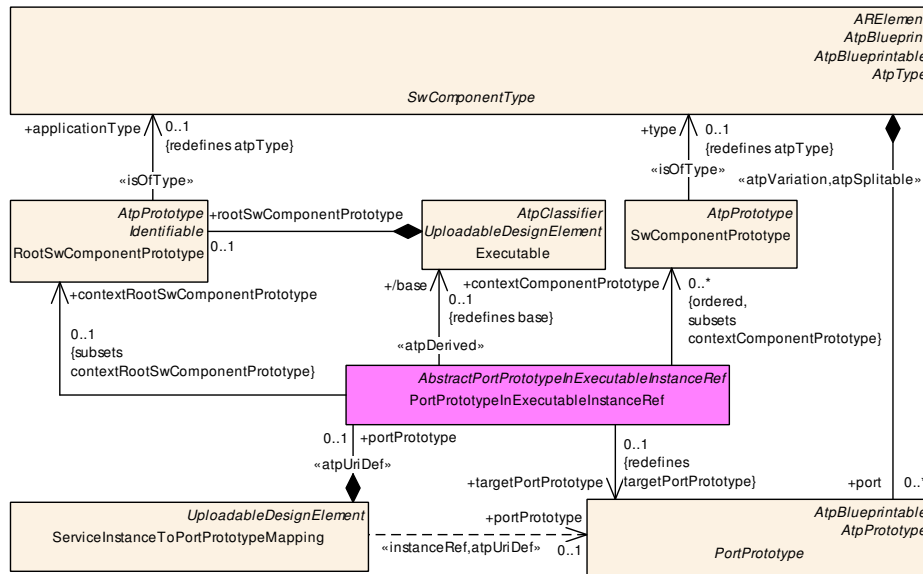


Figure D.11: Modeling of **PortPrototypeInExecutableInstanceRef**

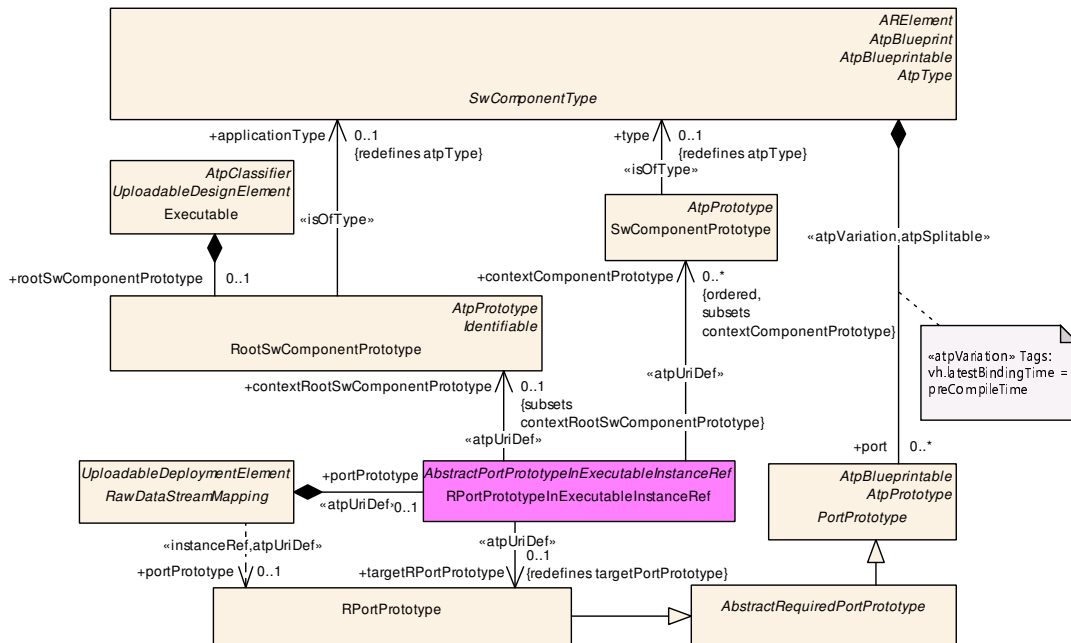


Figure D.12: Modeling of raw data streaming by means of an **RPortPrototype**

D.4 Modeling of a Method in an Executable

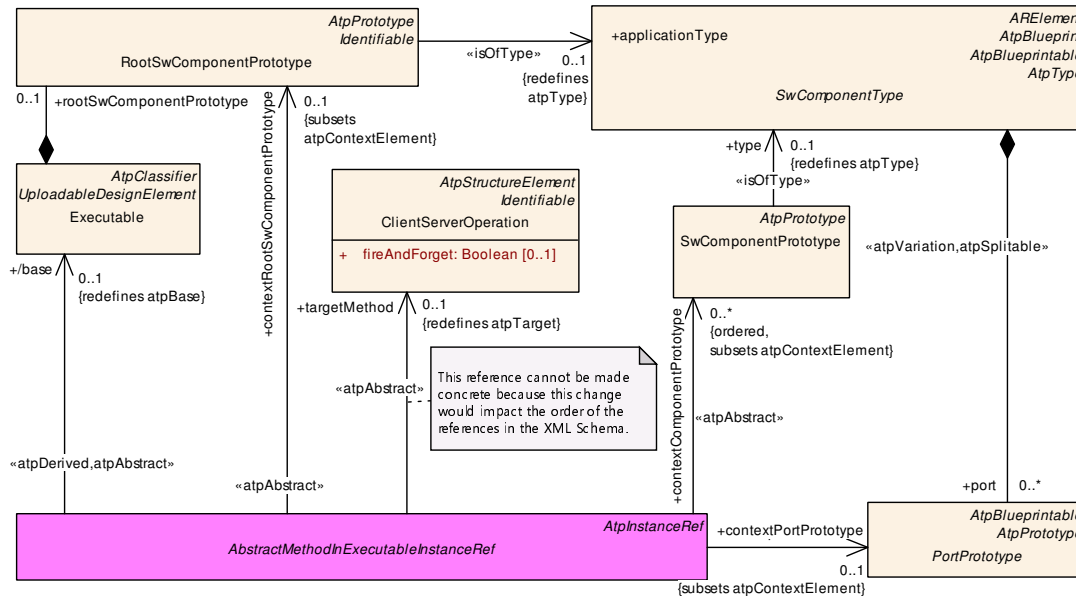


Figure D.13: Modeling of `AbstractMethodInExecutableInstanceRef`

Class	AbstractMethodInExecutableInstanceRef (abstract)			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Subclasses	RequiredMethodInExecutableInstanceRef			
Attribute	Type	Mult.	Kind	Note
base	Executable	0..1	ref	Stereotypes: atpAbstract; atpDerived
context Component Prototype (ordered)	SwComponent Prototype	*	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=20
contextPort Prototype	PortPrototype	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=30
contextRootSw Component Prototype	RootSwComponent Prototype	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=10
targetMethod	ClientServerOperation	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=40

Table D.13: AbstractMethodInExecutableInstanceRef

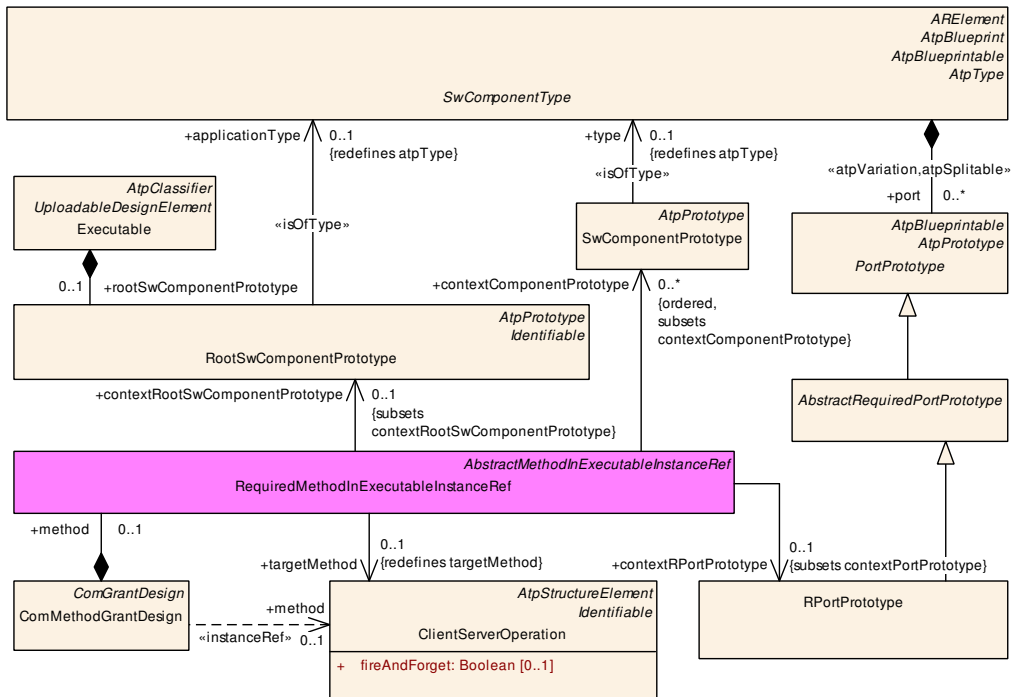


Figure D.14: Modeling of **RequiredMethodInExecutableInstanceRef**

Class	RequiredMethodInExecutableInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractMethodInExecutableInstanceRef , AtpInstanceRef			
Aggregated by	ComMethodGrantDesign.method			
Attribute	Type	Mult.	Kind	Note
context Component Prototype (ordered)	SwComponent Prototype	*	ref	Tags: xml.sequenceOffset=20
contextRootSw Component Prototype	RootSwComponent Prototype	0..1	ref	Tags: xml.sequenceOffset=10
contextRPort Prototype	RPortPrototype	0..1	ref	Tags: xml.sequenceOffset=30
targetMethod	ClientServerOperation	0..1	ref	Tags: xml.sequenceOffset=40

Table D.14: RequiredMethodInExecutableInstanceRef

D.5 Modeling of Diagnostic-related InstanceRefs

The wider context of the usage of the aggregations documented in [Figure D.15](#) can be viewed in [Figure 5.23](#), [Figure 5.18](#), [Figure 5.17](#), [Figure 5.16](#), [Figure 5.20](#), and [Figure 5.15](#).

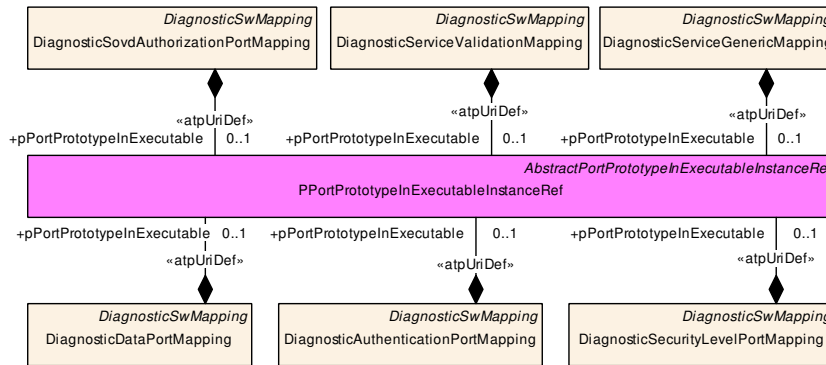


Figure D.15: Modeling of various [DiagnosticSwMappings](#) based on [PPortPrototypeInExecutableInstanceRef](#) (part 1)

The wider context of the usage of the aggregations documented in [Figure D.16](#) can be viewed in [Figure 5.25](#), [Figure 5.26](#), [Figure 5.24](#), [Figure 5.40](#), [Figure 5.22](#), and [Figure 5.27](#).

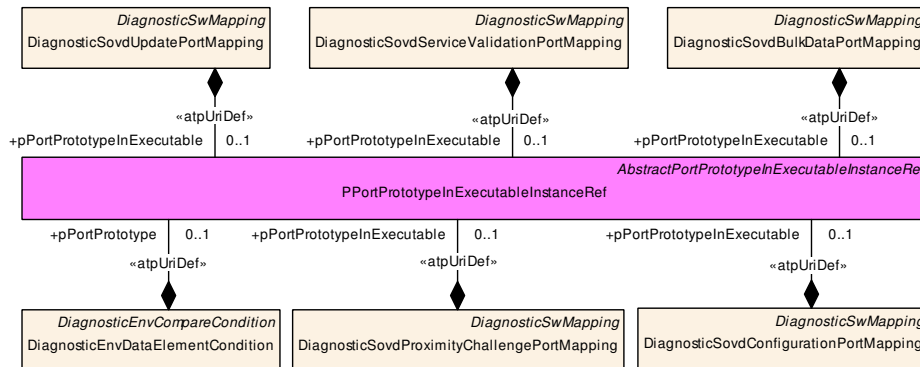


Figure D.16: Modeling of various [DiagnosticSwMappings](#) based on [PPortPrototypeInExecutableInstanceRef](#) (part 2)

The wider context of the usage of the aggregations documented in [Figure D.15](#) can be viewed in [Figure 5.4](#), [Figure 5.6](#), [Figure 5.10](#), [Figure 5.12](#), [Figure 5.8](#), [Figure 5.13](#), and [Figure 5.8](#).

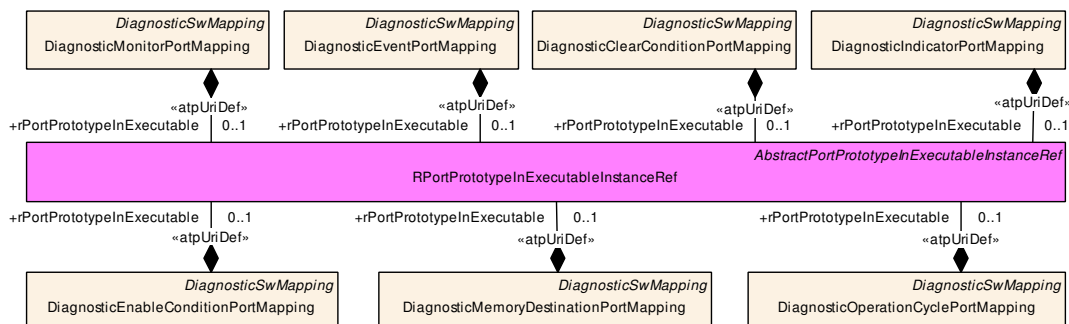


Figure D.17: Modeling of various [DiagnosticSwMappings](#) based on [RPortPrototypeInExecutableInstanceRef](#) (part 1)

The wider context of the usage of the aggregations documented in [Figure D.15](#) can be viewed in [Figure 5.21](#), [Figure 5.5](#), [Figure 5.7](#), and [Figure 5.11](#).

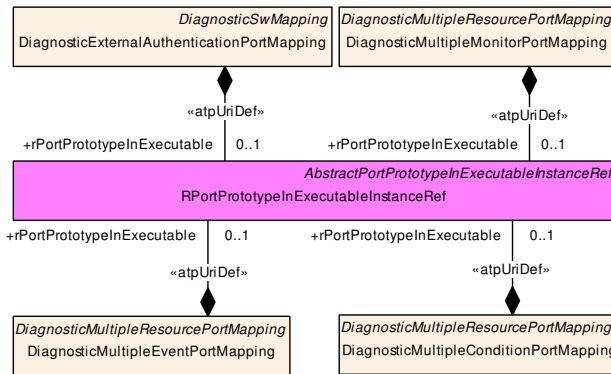


Figure D.18: Modeling of various **DiagnosticSwMappings** based on **RPortPrototypeInExecutableInstanceRef**(part 2)

D.6 Modeling of PHM-related InstanceRefs

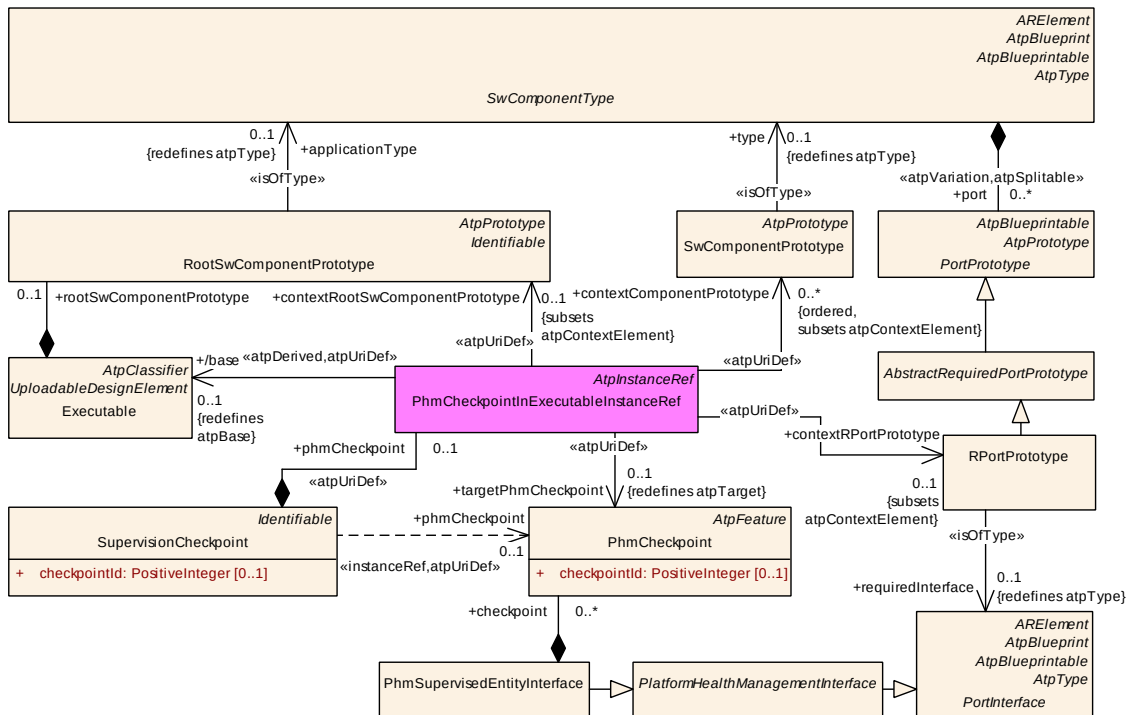


Figure D.19: Modeling of **PhmCheckpointInExecutableInstanceRef**

Class	PhmCheckpointInExecutableInstanceRef				
Note	This Class is only used by the AUTOSAR Adaptive Platform.				
Base	ARObject, AtpInstanceRef				
Aggregated by	SupervisionCheckpoint.phmCheckpoint				
Attribute	Type	Mult.	Kind	Note	





Class	PhmCheckpointInExecutableInstanceRef			
base	Executable	0..1	ref	Stereotypes: atpDerived; atpUriDef Tags: xml.sequenceOffset=10
context Component Prototype (ordered)	SwComponent Prototype	*	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=30
contextRootSw Component Prototype	RootSwComponent Prototype	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=20
contextRPort Prototype	RPortPrototype	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=40
targetPhm Checkpoint	PhmCheckpoint	0..1	ref	Stereotypes: atpUriDef Tags: xml.sequenceOffset=50

Table D.15: PhmCheckpointInExecutableInstanceRef

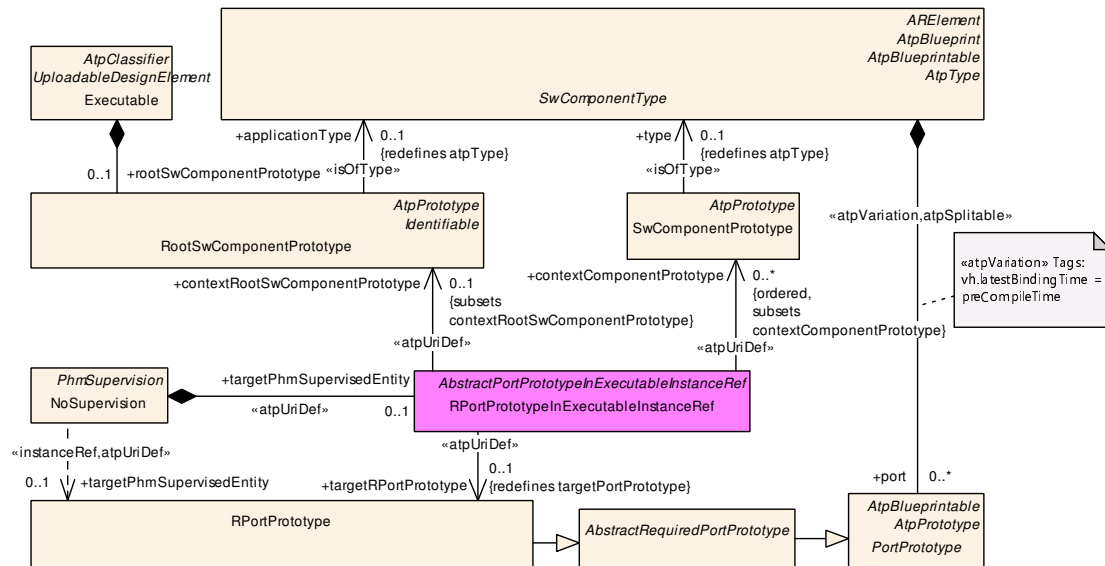


Figure D.20: Modeling of NoSupervision RPortPrototypeInExecutableInstanceRef

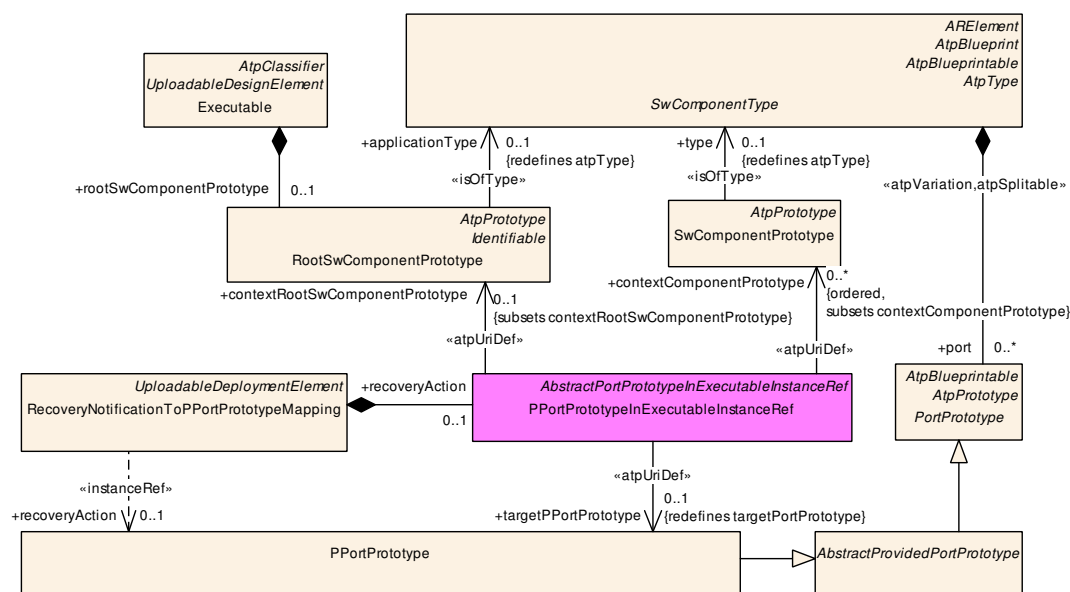


Figure D.21: Modeling of `RecoveryNotificationToPPortPrototypeMapping`

D.7 Modeling of Time-related InstanceRefs

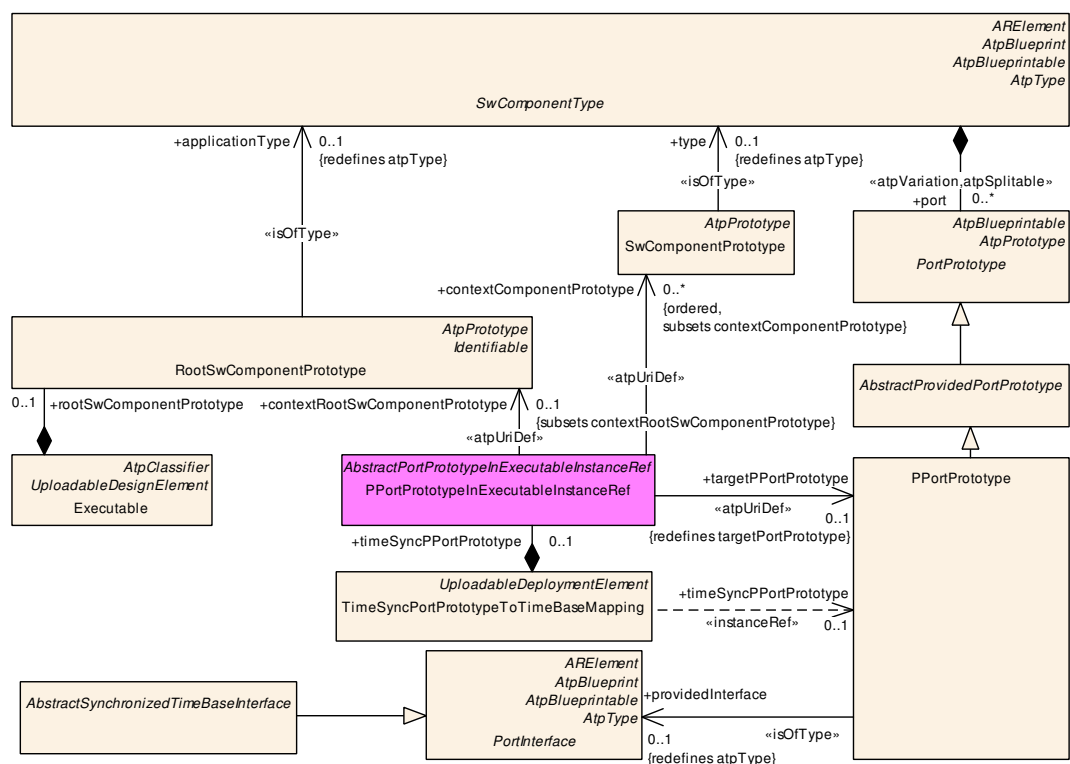


Figure D.22: Modeling of `TimeSyncPortPrototypeToTimeBaseMapping.timeSyncPortPrototype`

Class	AbstractPortPrototypeInSoftwareClusterDesignInstanceRef (abstract)			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Subclasses	PPortPrototypeInSoftwareClusterDesignInstanceRef, RPortPrototypeInSoftwareClusterDesignInstanceRef			
Attribute	Type	Mult.	Kind	Note
base	SoftwareClusterDesign	0..1	ref	Stereotypes: atpAbstract; atpDerived
contextRootSwClusterDesignComponentPrototype	RootSwClusterDesignComponentPrototype	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=10
contextSwComponentPrototype (ordered)	SwComponentPrototype	*	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=20
targetPortPrototype	PortPrototype	0..1	ref	Stereotypes: atpAbstract Tags: xml.sequenceOffset=30

Table D.16: AbstractPortPrototypeInSoftwareClusterDesignInstanceRef

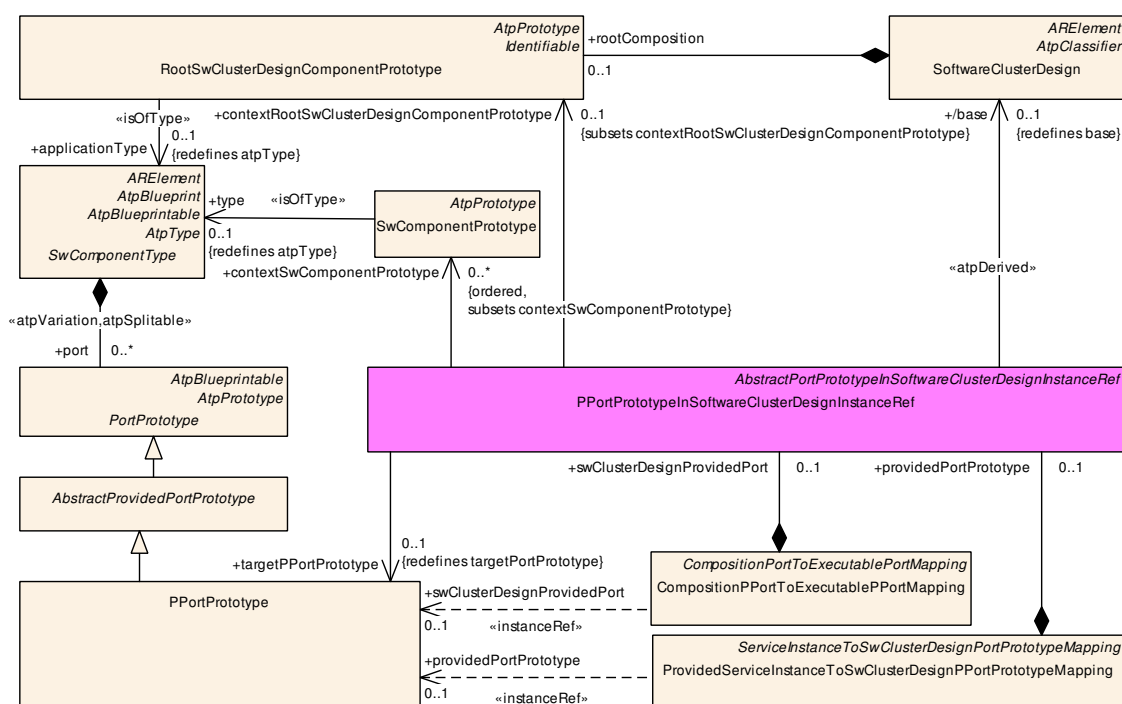


Figure D.25: Modeling of PPortPrototypeInSoftwareClusterDesignInstanceRef

Class	PPortPrototypeInSoftwareClusterDesignInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractPortPrototypeInSoftwareClusterDesignInstanceRef , AtpInstanceRef			
Aggregated by	CompositionPPortToExecutablePPortMapping.swClusterDesignProvidedPort , ProvidedServiceInstanceToSwClusterDesignPPortPrototypeMapping.providedPortPrototype			
Attribute	Type	Mult.	Kind	Note
base	SoftwareClusterDesign	0..1	ref	Stereotypes: atpDerived



Class	PPortPrototypeInSoftwareClusterDesignInstanceRef			
contextRootSw ClusterDesign Component Prototype	RootSwClusterDesign ComponentPrototype	0..1	ref	Tags: xml.sequenceOffset=10
contextSw Component Prototype (ordered)	SwComponent Prototype	*	ref	Tags: xml.sequenceOffset=20
targetPPort Prototype	PPortPrototype	0..1	ref	Tags: xml.sequenceOffset=30

Table D.17: PPortPrototypeInSoftwareClusterDesignInstanceRef

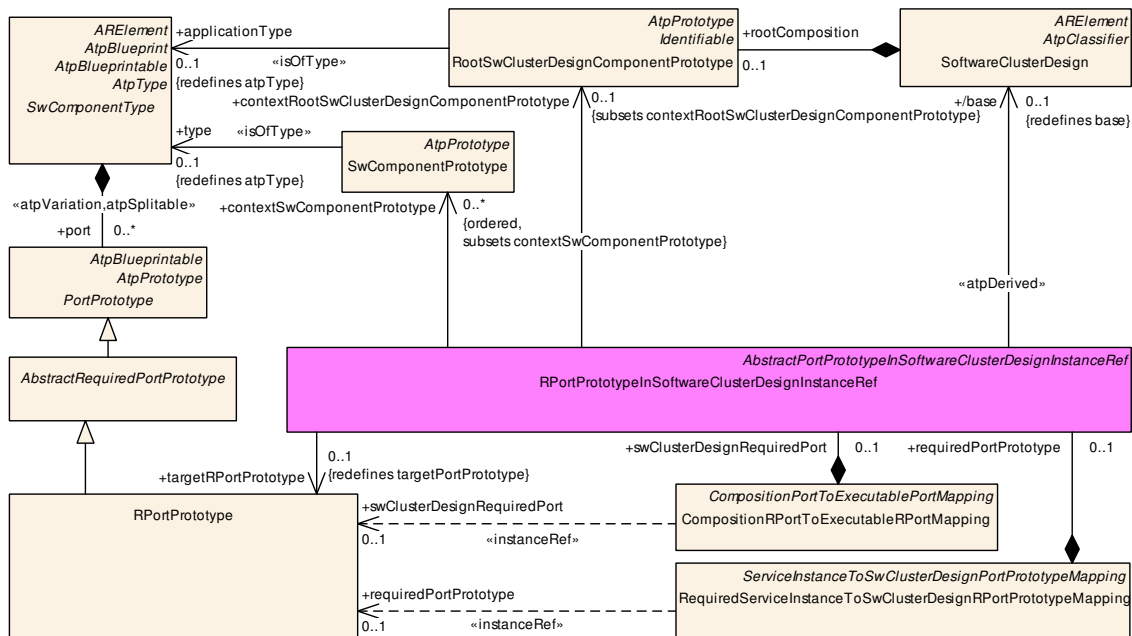


Figure D.26: Modeling of RPortPrototypeInSoftwareClusterDesignInstanceRef

Class	RPortPrototypeInSoftwareClusterDesignInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AbstractPortPrototypeInSoftwareClusterDesignInstanceRef , AtpInstanceRef			
Aggregated by	CompositionRPortToExecutableRPortMapping .swClusterDesignRequiredPort, RequiredServiceInstanceToSwClusterDesignRPortPrototypeMapping .requiredPortPrototype			
Attribute	Type	Mult.	Kind	Note
base	SoftwareClusterDesign	0..1	ref	Stereotypes: atpDerived
contextRootSw ClusterDesign Component Prototype	RootSwClusterDesign ComponentPrototype	0..1	ref	Tags: xml.sequenceOffset=10
contextSw Component Prototype (ordered)	SwComponent Prototype	*	ref	Tags: xml.sequenceOffset=20
targetRPort Prototype	RPortPrototype	0..1	ref	Tags: xml.sequenceOffset=30

Table D.18: RPortPrototypeInSoftwareClusterDesignInstanceRef

D.10 Modeling of State-Management-related InstanceRefs

This section illustrates the concrete modeling of the instance references used in the modeling of the state management deployment in this document.

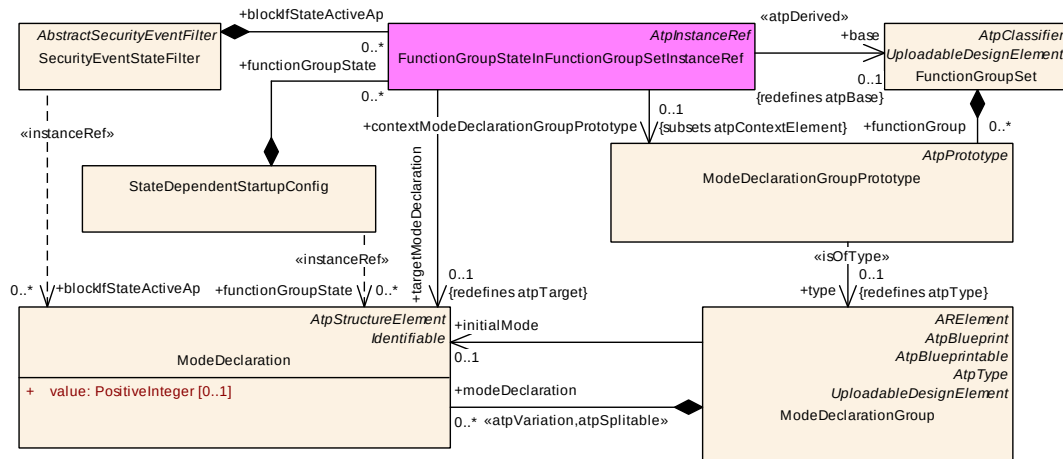


Figure D.27: Modeling of **FunctionGroupStateInFunctionGroupSetInstanceRef**

Class	FunctionGroupStateInFunctionGroupSetInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Aggregated by	FunctionGroupPhmStateReference.functionGroupState, NmHandleToFunctionGroupStateMapping.functionGroupState, SecurityEventStateFilter.blockIfStateActiveAp, StateDependentStartupConfig.functionGroupState, StateManagementSetFunctionGroupStateActionItem.setFunctionGroupState			
Attribute	Type	Mult.	Kind	Note
base	FunctionGroupSet	0..1	ref	Stereotypes: atpDerived
contextModeDeclarationGroupPrototype	ModeDeclarationGroupPrototype	0..1	ref	Tags: xml.sequenceOffset=10
targetModeDeclaration	ModeDeclaration	0..1	ref	Tags: xml.sequenceOffset=20

Table D.19: FunctionGroupStateInFunctionGroupSetInstanceRef

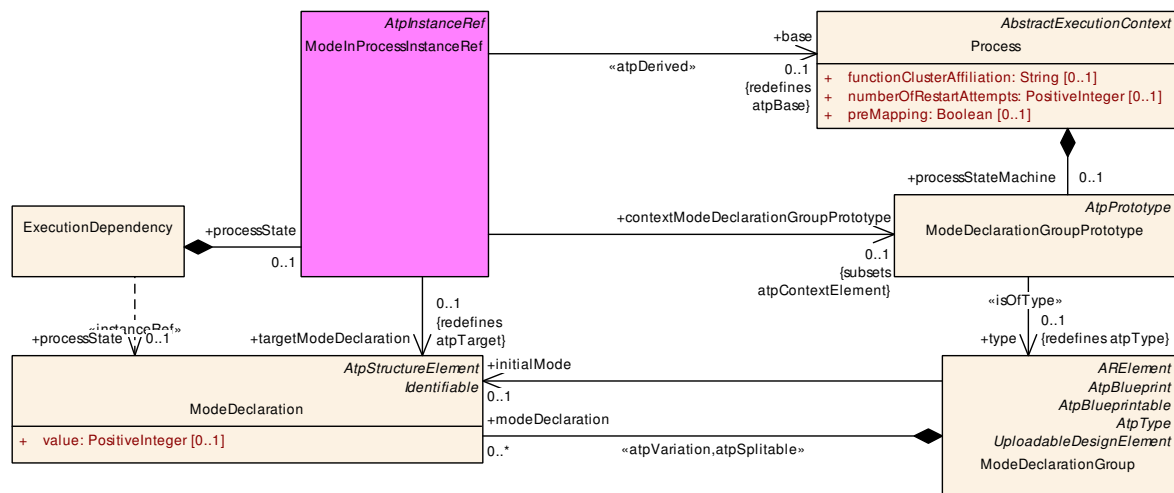


Figure D.28: Modeling of **ModeInProcessInstanceRef**

Class	ModelInProcessInstanceRef			
Note	This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Aggregated by	ExecutionDependency.processState			
Attribute	Type	Mult.	Kind	Note
base	Process	0..1	ref	Stereotypes: atpDerived Tags: xml.sequenceOffset=10
contextMode Declaration GroupPrototype	ModeDeclarationGroup Prototype	0..1	ref	Tags: xml.sequenceOffset=20
targetMode Declaration	ModeDeclaration	0..1	ref	Tags: xml.sequenceOffset=30

Table D.20: ModelInProcessInstanceRef

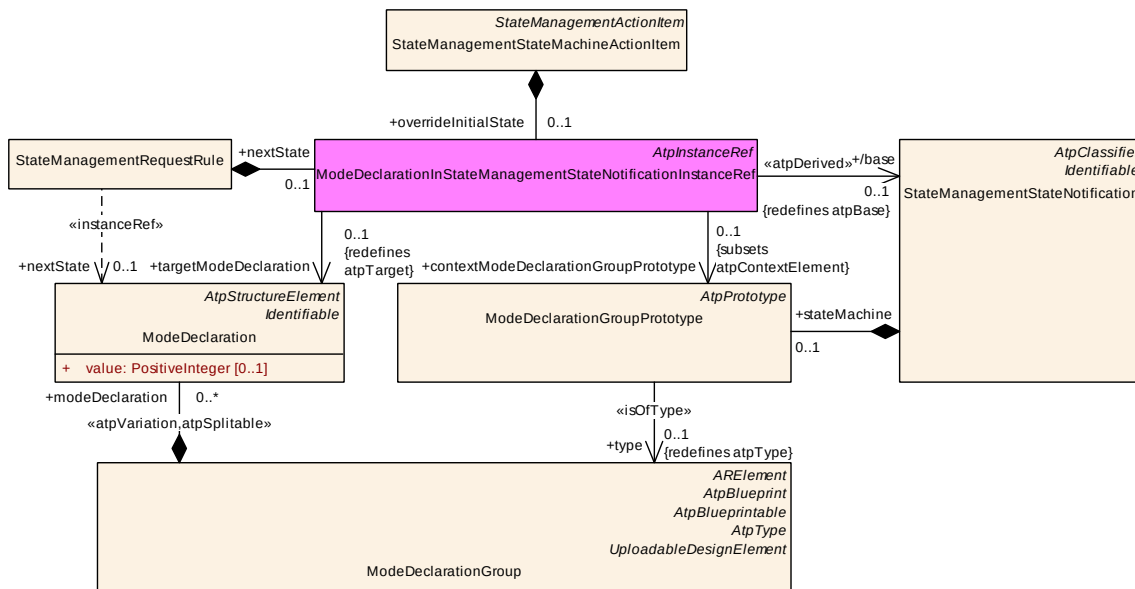


Figure D.29: Modeling of ModeDeclarationInStateManagementStateNotificationInstanceRef

Class	ModeDeclarationInStateManagementStateNotificationInstanceRef			
Note	Tags: atp.Status=draft This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, AtpInstanceRef			
Aggregated by	StateManagementActionList.affectedState, StateManagementRequestRule.nextState, StateManagementStateMachineActionItem.overrideInitialState, StateManagementTriggerCompareRule.assumedCurrentState			
Attribute	Type	Mult.	Kind	Note
base	StateManagementState Notification	0..1	ref	Stereotypes: atpDerived Tags: atp.Status=draft
contextMode Declaration GroupPrototype	ModeDeclarationGroup Prototype	0..1	ref	Tags: atp.Status=draft xml.sequenceOffset=10





Class	ModeDeclarationInStateManagementStateNotificationInstanceRef			
targetMode Declaration	ModeDeclaration	0..1	ref	Tags: atp.Status=draft xml.sequenceOffset=20

Table D.21: ModeDeclarationInStateManagementStateNotificationInstanceRef

D.11 Modeling of Intrusion-Detection-related InstanceRefs

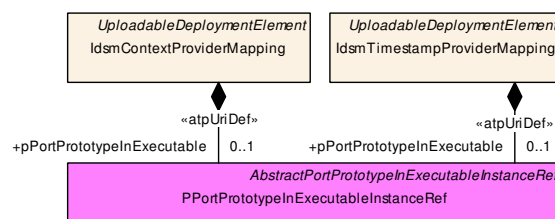


Figure D.30: Modeling of **PPortPrototypeInExecutableInstanceRef** in the context of intrusion detection management

The wider context of the usage of the aggregations documented in [Figure D.30](#) can be viewed in [Figure 12.53](#) and [Figure 12.52](#).

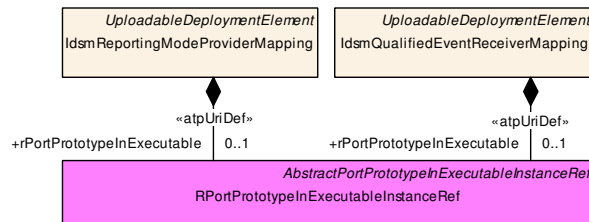


Figure D.31: Modeling of **RPortPrototypeInExecutableInstanceRef** in the context of intrusion detection management

The wider context of the usage of the aggregations documented in [Figure D.31](#) can be viewed in [Figure 12.54](#) and [Figure 12.55](#).

D.12 Modeling of Crypto-related InstanceRefs

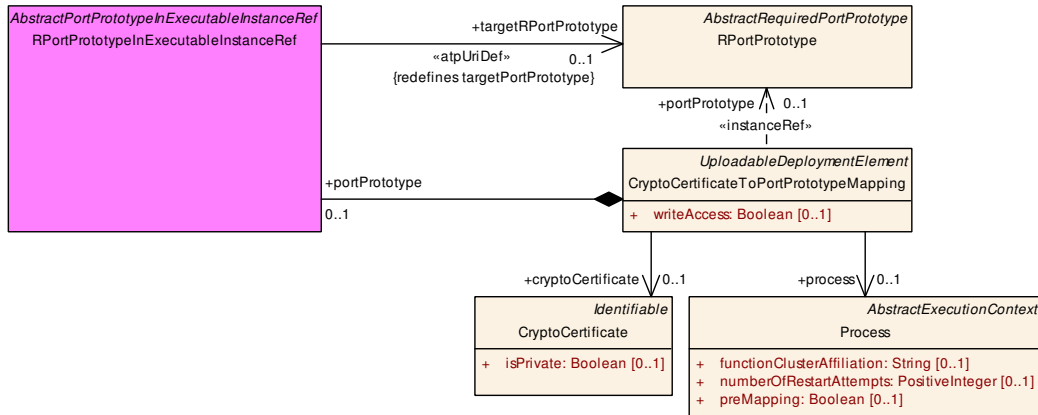


Figure D.32: Modeling of `RPortPrototypeInExecutableInstanceRef` in the context of crypto certificate management

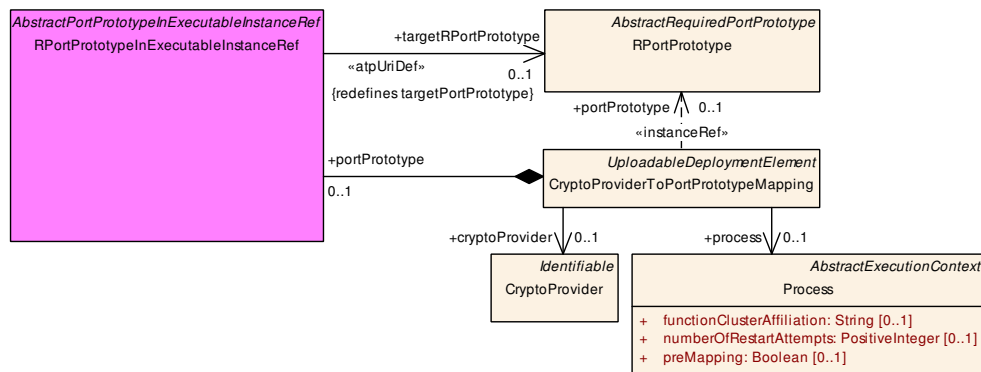


Figure D.33: Modeling of `RPortPrototypeInExecutableInstanceRef` in the context of crypto provider management

E Mentioned Class Tables

For the sake of completeness, this chapter contains a set of class tables representing meta-classes mentioned in the context of this document but which are not contained directly in the scope of describing specific meta-model semantics.

Class	ARElement (abstract)			
Note	An element that can be defined stand-alone, i.e. without being part of another element (except for packages of course).			
Base	<i>ARObject</i> , <i>CollectableElement</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>PackageableElement</i> , <i>Referrable</i>			
Subclasses	AclObjectSet, AclOperation, AclPermission, AclRole, AliasNameSet, Allocator , ApApplicationError , ApApplicationErrorDomain , ApApplicationErrorSet , ApplicabilityInfoSet, AutosarDataType , BaseType , BlueprintMappingSet, BuildActionManifest, CalibrationParameterValueSet, CanXIProps , ClientIdDefinitionSet, Collection, CompositionPortToExecutablePortMapping , CompuMethod , ConsistencyNeedsBlueprintSet, ConstantSpecification, ConstantSpecificationMappingSet, CryptoEllipticCurveProps , CryptoServiceCertificate , CryptoServiceKey , CryptoServicePrimitive , CryptoServiceQueue, CryptoSignatureScheme , DataConstr , DataTransformationSet, DataTypeMappingSet , DdsCpConfig, <i>DiagnosticCommonElement</i> , DiagnosticConnection, DiagnosticContributionSet , DltArgumentPropsSet, DltContext , DltEcu , Documentation , E2EProfileCompatibilityProps , E2EProfileConfigurationSet , EthIpProps , EthTcpIpIcmpProps , EthTcpIpProps , EvaluatedVariantSet, FMFeature, FMFeatureMap, FMFeatureModel, FMFeatureSelectionSet, FirewallRule , GeneralPurposeConnection, GrantDesign , HwCategory, HwElement, HwType, IEEE1722TpConnection , IPSecConfigProps , <i>IdsCommonElement</i> , IdsDesign, ImpositionTimeDefinitionGroup, InterfaceMapping , InterpolationRoutineMappingSet, KeywordSet, LTMessageCollectionToPortPrototypeMapping , LifeCycleInfoSet, LifeCycleStateDefinitionGroup, LogAndTraceMessageCollectionSet , MacSecGlobalKeyProps , MacSecParticipantSet , McFunction, McGroup, ModeDeclarationGroup , ModeDeclarationMappingSet , PhysicalDimension, PhysicalDimensionMappingSet, PlatformModuleEndpointConfiguration , PortInterface , PortInterfaceMappingSet, PortInterfaceToDataTypeMapping , PortPrototypeBlueprint, PostBuildVariantCriterion, PostBuildVariantCriterionValueSet, PredefinedVariant, ProcessDesign , ProcessDesignToMachineDesignMapping , RapidPrototypingScenario, SdgDef , SecureComProps , ServiceInstanceToSwClusterDesignPortPrototypeMapping , ServiceInterfaceElementMapping , ServiceInterfacePedigree, SignalServiceTranslationPropsSet, SoftwareClusterDesign, SomeipDataPrototypeTransformationProps, SomeipRemoteUnicastConfig, SomeipSdClientEventGroupTimingConfig, SomeipSdClientServiceInstanceConfig, SomeipSdServerEventGroupTimingConfig, SomeipSdServerServiceInstanceConfig, SwAddrMethod, SwAxisType, SwComponentType , SwRecordLayout, SwSystemconst, SwSystemconstantValueSet, System , SystemComSpecDefinitionSet, SystemSignal , SystemSignalGroup, TimingExtension , TlsConnectionGroup, TlvDataIdDefinitionSet , TraceSwitchConfig , TransformationPropsSet , TransformationPropsToServiceInterfaceElementMapping , Unit, UnitGroup, UploadablePackageElement , ViewMapSet			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.1: ARElement

Class	ARPackage			
Note	AUTOSAR package, allowing to create top level packages to structure the contained ARElements. ARPackages are open sets. This means that in a file based description system multiple files can be used to partially describe the contents of a package. This is an extended version of MSR's SW-SYSTEM.			
Base	<i>ARObject</i> , <i>AtpBlueprint</i> , <i>AtpBlueprintable</i> , <i>CollectableElement</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	ARPackage.arPackage , AUTOSAR.arPackage			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–





Class	ARPackage			
arPackage	ARPackage	*	aggr	This represents a sub package within an ARPackage, thus allowing for an unlimited package hierarchy. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=arPackage.shortName, arPackage.variation Point.shortLabel vh.latestBindingTime=blueprintDerivationTime xml.sequenceOffset=30
element	PackageableElement	*	aggr	Elements that are part of this package Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=element.shortName, element.variation Point.shortLabel vh.latestBindingTime=systemDesignTime xml.sequenceOffset=20
referenceBase	ReferenceBase	*	aggr	This denotes the reference bases for the package. This is the basis for all relative references within the package. The base needs to be selected according to the base attribute within the references. Stereotypes: atpSplitable Tags: atp.Splitkey=referenceBase.shortLabel xml.sequenceOffset=10

Table E.2: ARPackage

Class	AUTOSAR			
Note	Root element of an AUTOSAR description, also the root element in corresponding XML documents. Tags: xml.globalElement=true			
Base	ARObject			
Attribute	Type	Mult.	Kind	Note
adminData	AdminData	0..1	aggr	This represents the administrative data of an Autosar file. Stereotypes: atpSplitable Tags: atp.Splitkey=adminData xml.sequenceOffset=10
arPackage	ARPackage	*	aggr	This is the top level package in an AUTOSAR model. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=arPackage.shortName, arPackage.variation Point.shortLabel vh.latestBindingTime=blueprintDerivationTime xml.sequenceOffset=30
fileInfo Comment	FileInfoComment	0..1	aggr	This represents a possibility to provide a structured comment in an AUTOSAR file. Stereotypes: atpStructuredComment Tags: xml.roleElement=true xml.sequenceOffset=-10 xml.typeElement=false
introduction	DocumentationBlock	0..1	aggr	This represents an introduction on the Autosar file. It is intended for example to represent disclaimers and legal notes. Tags: xml.sequenceOffset=20

Table E.3: AUTOSAR

Class	AbstractProvidedPortPrototype (abstract)			
Note	This abstract class provides the ability to become a provided PortPrototype.			
Base	ARObject, AtpBlueprintable, AtpFeature, AtpPrototype, Identifiable , MultilanguageReferrable, Port Prototype , Referrable			
Subclasses	PPortPrototype , PRPortPrototype			
Aggregated by	AtpClassifier.atpFeature, SwComponentType.port			
Attribute	Type	Mult.	Kind	Note
providedComSpec	PPortComSpec	*	aggr	Provided communication attributes per interface element (data element or operation). Stereotypes: atpSplitable Tags: atp.Splitkey=providedComSpec.dataElement, providedComSpec.getter, providedComSpec.modeGroup, providedComSpec.operation, providedComSpec.parameter, providedComSpec.setter, providedComSpec.variable

Table E.4: AbstractProvidedPortPrototype

Class	AbstractRequiredPortPrototype (abstract)			
Note	This abstract class provides the ability to become a required PortPrototype.			
Base	ARObject, AtpBlueprintable, AtpFeature, AtpPrototype, Identifiable , MultilanguageReferrable, Port Prototype , Referrable			
Subclasses	PRPortPrototype , RPortPrototype			
Aggregated by	AtpClassifier.atpFeature, SwComponentType.port			
Attribute	Type	Mult.	Kind	Note
requiredComSpec	RPortComSpec	*	aggr	Required communication attributes, one for each interface element. Stereotypes: atpSplitable Tags: atp.Splitkey=requiredComSpec.dataElement, requiredComSpec.getter, requiredComSpec.modeGroup, requiredComSpec.operation, requiredComSpec.parameter, requiredComSpec.setter, requiredComSpec.variable

Table E.5: AbstractRequiredPortPrototype

Class	AbstractServiceInstance (abstract)			
Note	Provided and Consumed Ethernet Service Instances that are available at the ApplicationEndpoint.			
Base	ARObject, Identifiable , MultilanguageReferrable, Referrable			
Subclasses	ConsumedServiceInstance , DdsCpServiceInstance , ProvidedServiceInstance			
Aggregated by	ServiceInstanceCollectionSet.serviceInstance			
Attribute	Type	Mult.	Kind	Note
capabilityRecord	TagWithOptionalValue	*	aggr	A sequence of records to store arbitrary name/value pairs conveying additional information about the named service. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=capabilityRecord, capabilityRecord.variationPoint.shortLabel vh.latestBindingTime=postBuild
majorVersion	PositiveInteger	0..1	attr	Major Version of the ServiceInterface. Value can be set to a number that represents the Major Version of the service.





Class	AbstractServiceInstance (abstract)			
method Activation RoutingGroup	PduActivationRouting Group	0..1	aggr	The ServiceDiscovery module is able to activate and deactivate the PDU routing for ClientServerOperations (SOME/IP methods). Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=methodActivationRoutingGroup.shortName, methodActivationRoutingGroup.variationPoint.shortLabel vh.latestBindingTime=postBuild

Table E.6: AbstractServiceInstance

Class	AdminData			
Note	AdminData represents the ability to express administrative information and custom extensions for an element. This administration information is to be treated as meta-data such as revision id or state of the file. There are basically the following kinds of meta-data - The language and/or used languages. - Revision information covering e.g. revision number, state, release date, changes. Note that this information can be given in general as well as related to a particular company. - Document meta-data specific for a company Beside that a custom extension of model-data is possible by - Special data			
Base	ARObject			
Aggregated by	AUTOSAR.adminData, Describable.adminData, Identifiable.adminData			
Attribute	Type	Mult.	Kind	Note
docRevision (ordered)	DocRevision	*	aggr	This allows to denote information about the current revision of the object. Note that information about previous revisions can also be logged here. The entries shall be sorted descendant by date in order to reflect the history. Therefore the most recent entry representing the current version is denoted first. Tags: xml.roleElement=true xml.roleWrapperElement=true xml.sequenceOffset=50 xml.typeElement=false xml.typeWrapperElement=false
language	LEnum	0..1	attr	This attribute specifies the master language of the document or the document fragment. The master language is the one in which the document is maintained and from which the other languages are derived from. In particular in case of inconsistencies, the information in the master language is priority. Tags: xml.sequenceOffset=20
sdg	Sdg	*	aggr	This property allows to keep special data which is not represented by the standard model. It can be utilized to keep e.g. tool specific data. Stereotypes: atpSplitable Tags: atp.Splitkey=sdg.sdgCaption.shortName xml.roleElement=true xml.roleWrapperElement=true xml.sequenceOffset=60 xml.typeElement=false xml.typeWrapperElement=false





Class	AdminData			
usedLanguages	MultiLanguagePlainText	0..1	aggr	This property specifies the languages which are provided in the document. Therefore it should only be specified in the top level admin data. For each language provided in the document there is one entry in MultiLanguagePlainText. The content of each entry can be used for illustration of the language. The used language itself depends on the language attribute in the entry. Tags: xml.sequenceOffset=30

Table E.7: AdminData

Class	ApplicationArrayDataType			
Note	An application data type which is an array, each element is of the same application data type. Tags: atp.recommendedPackage=ApplicationDataTypes			
Base	ARElement , ARObject , ApplicationCompositeDataType , ApplicationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dynamicArraySizeProfile	String	0..1	attr	Specifies the profile which the array will follow if it is a variable size array.
element	ApplicationArrayElement	0..1	aggr	This association implements the concept of an array element. That is, in some cases it is necessary to be able to identify single array elements, e.g. as input values for an interpolation routine.

Table E.8: ApplicationArrayDataType

Class	ApplicationArrayElement			
Note	Describes the properties of the elements of an application array data type.			
Base	ARObject , ApplicationCompositeElementDataPrototype , AtpFeature , AtpPrototype , DataPrototype , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ApplicationArrayDataType.element , AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
arraySizeHandling	ArraySizeHandlingEnum	0..1	attr	The way how the size of the array is handled.
arraySizeSemantics	ArraySizeSemanticsEnum	0..1	attr	This attribute controls how the information about the array size shall be interpreted.
indexDataType	ApplicationPrimitiveDataType	0..1	ref	This reference can be taken to assign a CompuMethod of category <code>TEXTTABLE</code> to the array. The texttable entries associate a textual value to an index number such that the element with that index number is represented by a symbolic name.
maxNumberOfElements	PositiveInteger	0..1	attr	The maximum number of elements that the array can contain. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime

Table E.9: ApplicationArrayElement

Class	ApplicationCompositeDataType (abstract)			
Note	Abstract base class for all application data types composed of other data types.			
Base	ARElement , ARObject , ApplicationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	ApplicationArrayDataType , ApplicationAssocMapDataType , ApplicationRecordDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.10: ApplicationCompositeDataType

Class	ApplicationError			
Note	This is a user-defined error that is associated with an element of an AUTOSAR interface. It is specific for the particular functionality or service provided by the AUTOSAR software component.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ClientServerInterface.possibleError			
Attribute	Type	Mult.	Kind	Note
errorCode	Integer	0..1	attr	The RTE generator is forced to assign this value to the corresponding error symbol. Note that for error codes certain ranges are predefined (see RTE specification).

Table E.11: ApplicationError

Class	ApplicationSwComponentType			
Note	The <code>ApplicationSwComponentType</code> is used to represent the application software. Tags: <code>atp.recommendedPackage=SwComponentTypes</code>			
Base	ARElement , ARObject , AtomicSwComponentType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , SwComponentType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.12: ApplicationSwComponentType

Class	ApplicationValueSpecification			
Note	This meta-class represents values for DataPrototypes typed by ApplicationDataTypes (this includes in particular compound primitives). For further details refer to ASAM CDF 2.0. This meta-class corresponds to some extent with SW-INSTANCE in ASAM CDF 2.0.			
Base	ARObject , CompositeRuleBasedValueArgument , ValueSpecification			





Class	ApplicationValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key, ApplicationAssocMapElementValueSpecification.value, ArrayValueSpecification.element, CalibrationParameterValue.applInitValue, CalibrationParameterValue.implInitValue, CompositeRuleBasedValueSpecification.compoundPrimitiveArgument, ConstantSpecification.valueSpec, CryptoServiceKey.developmentValue, DiagnosticEnvDataCondition.compareValue, DiagnosticEnvDataElementCondition.compareValue, DiagnosticEnvSovdDataCondition.compareValue, FieldSenderComSpec.initValue, ISignal.initValue, ISignal.receptionDefaultValue, ISignal.timeoutSubstitutionValue, NonqueuedReceiverComSpec.initValue, NonqueuedReceiverComSpec.timeoutSubstitutionValue, NonqueuedSenderComSpec.initValue, NvProvideComSpec.ramBlockInitValue, NvProvideComSpec.romBlockInitValue, NvRequireComSpec.initValue, ParameterDataPrototype.initValue, ParameterProvideComSpec.initValue, ParameterRequireComSpec.initValue, PersistencyDataRequiredComSpec.initValue, PersistencyKeyValuePair.initValue, PortDefinedArgumentValue.value, PortPrototypeBlueprintInitValue.value, RecordValueSpecification.field, SomeipEventDeployment.eventReceptionDefaultValue, StateManagementCompareCondition.compareValue, SwDataDefProps.invalidValue, UserDefinedEventDeployment.eventReceptionDefaultValue, VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
category	Identifier	0..1	attr	Specifies to which category of ApplicationDataType this ApplicationValueSpecification can be applied (e.g. as an initial value), thus imposing constraints on the structure and semantics of the contained values, see [constr_1006] and [constr_1519].
swAxisCont (ordered)	SwAxisCont	*	aggr	This represents the axis values of a Compound Primitive Data Type (curve or map). The first swAxisCont describes the x-axis, the second swAxisCont describes the y-axis, the third swAxisCont describes the z-axis. In addition to this, the axis can be denoted in swAxisIndex.
swValueCont	SwValueCont	0..1	aggr	This represents the values of a Compound Primitive Data Type.

Table E.13: ApplicationValueSpecification

Class	ArgumentDataPrototype			
Note	An argument of an operation, carries direction and implementation information.			
Base	ARObject, AtpFeature, AtpPrototype, AutosarDataPrototype, DataPrototype, Identifiable, Multilanguage Referrable, Referrable			
Aggregated by	AtpClassifier.atpFeature, ClientServerOperation.argument			
Attribute	Type	Mult.	Kind	Note
direction	ArgumentDirection Enum	0..1	attr	This attribute specifies the direction of the argument.
serverArgument ImplPolicy	ServerArgumentImpl PolicyEnum	0..1	attr	This defines how the argument type of the servers RunnableEntity is implemented. If the attribute is not defined this has the same semantics as if the attribute is set to the value useArgumentType for primitive arguments and structures.

Table E.14: ArgumentDataPrototype

Enumeration	ArgumentDirectionEnum			
Note	Use cases: - Arguments in ClientServerOperation can have different directions that need to be formally indicated because they have an impact on how the function signature looks like eventually. - Arguments in BswModuleEntry already determine a function signature, but the direction is used to specify the semantics, especially of pointer arguments.			
Aggregated by	ArgumentDataPrototype.direction, DiagnosticSovdAccessArgument.direction, RunnableEntity Argument.direction, SwServiceArg.direction			





Enumeration	ArgumentDirectionEnum
Literal	Description
in	The argument value is passed to the callee. Tags: atp.EnumerationLiteralIndex=0
inout	The argument value is passed to the callee but also passed back from the callee to the caller. Tags: atp.EnumerationLiteralIndex=1
out	The argument value is passed from the callee to the caller. Tags: atp.EnumerationLiteralIndex=2

Table E.15: ArgumentDirectionEnum

Class	ArrayValueSpecification			
Note	Specifies the values for an array.			
Base	ARObject, CompositeValueSpecification, ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key, ApplicationAssocMapElementValueSpecification.value, ArrayValueSpecification.element, CalibrationParameterValue.applInitValue, CalibrationParameterValue.implInitValue, CompositeRuleBasedValueSpecification.argument, ConstantSpecification.valueSpec, CryptoServiceKey.developmentValue, DiagnosticEnvDataCondition.compareValue, DiagnosticEnvDataElementCondition.compareValue, DiagnosticEnvSovdDataCondition.compareValue, FieldSenderComSpec.initValue, ISignal.initValue, ISignal.receptionDefaultValue, ISignal.timeoutSubstitutionValue, NonqueuedReceiverComSpec.initValue, NonqueuedReceiverComSpec.timeoutSubstitutionValue, NonqueuedSenderComSpec.initValue, NvProvideComSpec.ramBlockInitValue, NvProvideComSpec.romBlockInitValue, NvRequireComSpec.initValue, ParameterDataPrototype.initValue, ParameterProvideComSpec.initValue, ParameterRequireComSpec.initValue, PersistencyDataRequiredComSpec.initValue, PersistencyKeyValuePair.initValue, PortDefinedArgumentValue.value, PortPrototypeBlueprintInitValue.value, RecordValueSpecification.field, SomeipEventDeployment.eventReceptionDefaultValue, StateManagementCompareCondition.compareValue, SwDataDefProps.invalidValue, UserDefinedEventDeployment.eventReceptionDefaultValue, VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
element (ordered)	ValueSpecification	*	aggr	The value for a single array element. All Value Specifications aggregated by ArrayValueSpecification shall have the same structure. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=element, element.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
intendedPartialInitializationCount	PositiveInteger	0..1	attr	This attribute shall only have a meaning for dynamic arrays and shall be taken as a sanity check: the number filled in the attribute shall be identical to the number of ArrayValueSpecification.element. If the attribute does not exist it means that no partial initialization is intended.

Table E.16: ArrayValueSpecification

Class	AssemblySwConnector			
Note	AssemblySwConnectors are exclusively used to connect SwComponentPrototypes in the context of a CompositionSwComponentType.			
Base	ARObject, AtpClassifier, AtpFeature, AtpStructureElement, Identifiable, MultilanguageReferrable, Referrable, SwConnector			
Aggregated by	AtpClassifier.atpFeature, CompositionSwComponentType.connector			
Attribute	Type	Mult.	Kind	Note
provider	AbstractProvidedPortPrototype	0..1	iref	Instance of providing port. InstanceRef implemented by: PPortInComposition InstanceRef





Class	AssemblySwConnector			
requester	AbstractRequiredPort Prototype	0..1	iref	Instance of requiring port. InstanceRef implemented by: RPortInComposition InstanceRef

Table E.17: AssemblySwConnector

Class	AutosarDataPrototype (abstract)			
Note	Base class for prototypical roles of an AutosarDataType .			
Base	ARObject , AtpFeature , AtpPrototype , DataPrototype , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	ArgumentDataPrototype , Field , ParameterDataPrototype , PersistencyDataElement , VariableDataPrototype			
Aggregated by	AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
type	AutosarDataType	0..1	tref	This represents the corresponding data type. Stereotypes: isOfType

Table E.18: AutosarDataPrototype

Class	AutosarDataType (abstract)			
Note	Abstract base class for user defined AUTOSAR data types for software.			
Base	ARElement , ARObject , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	AbstractImplementationDataType , ApplicationDataType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
swDataDef Props	SwDataDefProps	0..1	aggr	The properties of this AutosarDataType. Stereotypes: atpSplittable Tags: atp.Splitkey=swDataDefProps

Table E.19: AutosarDataType

Class	BaseType (abstract)			
Note	This abstract meta-class represents the ability to specify a platform dependent base type.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	SwBaseType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
baseType Definition	BaseTypeDefinition	1	aggr	This is the actual definition of the base type. Tags: xml.roleElement=false xml.roleWrapperElement=false xml.sequenceOffset=20 xml.typeElement=false xml.typeWrapperElement=false

Table E.20: BaseType

Class	BaseTypeDirectDefinition			
Note	This BaseType is defined directly (as opposite to a derived BaseType)			
Base	ARObject, BaseTypeDefinition			
Aggregated by	BaseType.baseTypeDefinition			
Attribute	Type	Mult.	Kind	Note
baseTypeEncoding	BaseTypeEncodingString	0..1	attr	This specifies, how an object of the current BaseType is encoded, e.g. in an ECU within a message sequence. Tags: xml.sequenceOffset=90
baseTypeSize	PositiveInteger	0..1	attr	Describes the length of the data type specified in the container in bits. Tags: xml.sequenceOffset=70
byteOrder	ByteOrderEnum	0..1	attr	This attribute specifies the byte order of the base type. Tags: xml.sequenceOffset=110
memAlignment	PositiveInteger	0..1	attr	This attribute describes the alignment of the memory object in bits. E.g. "8" specifies, that the object in question is aligned to a byte while "32" specifies that it is aligned four byte. If the value is set to "0" the meaning shall be interpreted as "unspecified". Tags: xml.sequenceOffset=100
nativeDeclaration	NativeDeclarationString	0..1	attr	This attribute describes the declaration of such a base type in the native programming language, primarily in the Programming language C. This can then be used by a code generator to include the necessary declarations into a header file. For example BaseType with shortName: "MyUnsignedInt" native Declaration: "unsigned short" Results in typedef unsigned short MyUnsignedInt; If the attribute is not defined the referring Implementation DataTypes will not be generated as a typedef by RTE. If a nativeDeclaration type is given it shall fulfill the characteristic given by basetypeEncoding and baseTypeSize. This is required to ensure the consistent handling and interpretation by software components, RTE, COM and MCM systems. Tags: xml.sequenceOffset=120

Table E.21: BaseTypeDirectDefinition

Class	CanControllerXIConfiguration			
Note	This meta-class represents the CAN XL-specific controller attributes.			
Base	ARObject			
Aggregated by	AbstractCanCommunicationControllerAttributes.canControllerXIAttributes, CanXIProps.canXIConfig			
Attribute	Type	Mult.	Kind	Note
errorSignalingEnabled	Boolean	0..1	attr	Specifies if error signaling shall be enabled. This is not possible when the transceiver is switched to PWM mode (trcvPwmModeEnabled set to TRUE). TRUE: Error signaling shall be enabled. FALSE: Error signaling shall be disabled.
propSeg	PositiveInteger	0..1	attr	Specifies propagation delay in time quantas.
pwmL	PositiveInteger	0..1	attr	Specifies the PWM long phase length.
pwmO	PositiveInteger	0..1	attr	Specifies the PWM time offset.
pwmS	PositiveInteger	0..1	attr	Specifies the PWM short phase length.





Class	CanControllerXIConfiguration			
sspOffset	PositiveInteger	0..1	attr	Specifies the Transmitter Delay Compensation Offset in minimum time quanta. Transmitter Delay Compensation Offset is used to adjust the position of the Secondary Sample Point (SSP), relative to the beginning of the received bit. If this parameter is configured, the Transmitter Delay Compensation is done by measurement of the CAN controller. If not specified Transmitter Delay Compensation is disabled.
syncJumpWidth	PositiveInteger	0..1	attr	Specifies the synchronization jump width for the controller in time quantas.
timeSeg1	PositiveInteger	0..1	attr	Specifies phase segment 1 in time quantas.
timeSeg2	PositiveInteger	0..1	attr	Specifies phase segment 2 in time quantas.
trcvPwmMode Enabled	Boolean	0..1	attr	Specifies if the transceiver shall be set to the PWM mode. TRUE: The transceiver shall be switched to PWM mode. FALSE: The transceiver shall work in classic CAN mode.

Table E.22: CanControllerXIConfiguration

Class	CanControllerXIConfigurationRequirements			
Note	This element allows the specification of ranges for the CAN XL configuration parameters. These ranges are taken as requirements and have to be respected by the ECU developer.			
Base	ARObject			
Aggregated by	AbstractCanCommunicationControllerAttributes.canControllerXIRequirements, CanXIProps.canXIConfig Reqs			
Attribute	Type	Mult.	Kind	Note
errorSignaling Enabled	Boolean	0..1	attr	Specifies if error signaling shall be enabled. This is not possible when the transceiver is switched to PWM mode (trcvPwmModeEnabled set to TRUE). TRUE: Error signaling shall be enabled. FALSE: Error signaling shall be disabled.
maxNumberOfTimeQuantaPerBit	Integer	0..1	attr	Maximum number of time quanta in the bit time.
maxPwmL	PositiveInteger	0..1	attr	Specifies the maximum PWM long phase length.
maxPwmO	PositiveInteger	0..1	attr	Specifies the minimum PWM time offset.
maxPwmS	PositiveInteger	0..1	attr	Specifies the maximum PWM short phase length.
maxSamplePoint	Float	0..1	attr	The max. value of the sample point as a percentage of the total bit time.
maxSyncJumpWidth	Float	0..1	attr	The max. Synchronization Jump Width value as a percentage of the total bit time. The (Re-)Synchronization Jump Width (SJW) defines how far a resynchronization may move the Sample Point inside the limits defined by the Phase Buffer Segments to compensate for edge phase errors.
maxTrcvDelayCompensationOffset	TimeValue	0..1	attr	Specifies the maximum Transceiver Delay Compensation Offset in seconds. If not specified Transceiver Delay Compensation is disabled.
minNumberOfTimeQuantaPerBit	Integer	0..1	attr	Minimum number of time quanta in the bit time.
minPwmL	PositiveInteger	0..1	attr	Specifies the minimum PWM long phase length.
minPwmO	PositiveInteger	0..1	attr	Specifies the maximum PWM time offset.
minPwmS	PositiveInteger	0..1	attr	Specifies the minimum PWM short phase length.





Class	CanControllerXConfigurationRequirements				
minSamplePoint	Float	0..1	attr	The min. value of the sample point as a percentage of the total bit time.	
minSyncJump Width	Float	0..1	attr	The min. Synchronization Jump Width value as a percentage of the total bit time. The (Re-)Synchronization Jump Width (SJW) defines how far a resynchronization may move the Sample Point inside the limits defined by the Phase Buffer Segments to compensate for edge phase errors.	
minTrcvDelay Compensation Offset	TimeValue	0..1	attr	Specifies the minimum Transceiver Delay Compensation Offset in seconds. If not specified Transceiver Delay Compensation is disabled.	
trcvPwmMode Enabled	Boolean	0..1	attr	Specifies if the transceiver shall be set to the PWM mode. TRUE: The transceiver shall be switched to PWM mode. FALSE: The transceiver shall work in classic CAN mode.	

Table E.23: CanControllerXConfigurationRequirements

Class	ClientServerInterface				
Note	A client/server interface declares a number of operations that can be invoked on a server by a client. Tags: atp.recommendedPackage=PortInterfaces				
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable				
Aggregated by	ARPackage.element				
Attribute	Type	Mult.	Kind	Note	
possibleError	ApplicationError	*	aggr	Application errors that are defined as part of this interface.	

Table E.24: ClientServerInterface

Class	CommConnectorPort (abstract)				
Note	The Ecu communication relationship defines which signals, Pdus and frames are actually received and transmitted by this ECU. For each signal, Pdu or Frame that is transmitted or received and used by the Ecu an association between an ISignalPort, IPduPort or FramePort with the corresponding Triggering shall be created. An ISignalPort shall be created only if the corresponding signal is handled by COM (RTE or Signal Gateway). If a Pdu Gateway ECU only routes the Pdu without being interested in the content only a FramePort and an IPduPort needs to be created.				
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable				
Subclasses	FramePort , IPduPort , ISignalPort				
Aggregated by	CommunicationConnector.ecuCommPortInstance				
Attribute	Type	Mult.	Kind	Note	
communication Direction	CommunicationDirectionType	0..1	attr	Communication Direction of the Connector Port (input or output Port).	

Table E.25: CommConnectorPort

Enumeration	CommunicationDirectionType				
Note	Describes the communication direction.				
Aggregated by	CommConnectorPort.communicationDirection , IEEE1722TpConnection.communicationDirection , IPSecRule.direction , ISignalIPduGroup.communicationDirection				
Literal	Description				





Enumeration	CommunicationDirectionType
in	Reception (Input) Tags: atp.EnumerationLiteralIndex=0
out	Transmission (Output) Tags: atp.EnumerationLiteralIndex=1

Table E.26: CommunicationDirectionType

Class	CompuConst			
Note	This meta-class represents the fact that the value of a computation method scale is constant.			
Base	ARObject			
Aggregated by	Compu.compuDefaultValue, CompuScale.compuInverseValue , CompuScaleConstantContents.compuConst			
Attribute	Type	Mult.	Kind	Note
compuConstContentType	CompuConstContent	0..1	aggr	This is the actual content of the constant compu method scale. Tags: xml.roleElement=false xml.roleWrapperElement=false xml.sequenceOffset=10 xml.typeElement=false xml.typeWrapperElement=false

Table E.27: CompuConst

Class	CompuConstTextContent			
Note	This meta-class represents the textual content of a scale.			
Base	ARObject, CompuConstContent			
Aggregated by	CompuConst.compuConstContentType			
Attribute	Type	Mult.	Kind	Note
vt	VerbatimString	0..1	attr	This represents a textual constant in the computation method.

Table E.28: CompuConstTextContent

Class	CompuMethod			
Note	This meta-class represents the ability to express the relationship between a physical value and the mathematical representation. Note that this is still independent of the technical implementation in data types. It only specifies the formula how the internal value corresponds to its physical pendant. Tags: atp.recommendedPackage=CompuMethods			
Base	ARElement , ARObject, AtpBlueprint, AtpBlueprintable, CollectableElement, Identifiable , MultilanguageReferrable, PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
compuInternalToPhys	Compu	0..1	aggr	This specifies the computation from internal values to physical values. Stereotypes: atp.Splittable Tags: atp.Splitkey=compuInternalToPhys xml.sequenceOffset=80





Class	CompuMethod			
compuPhysToInternal	Compu	0..1	aggr	This represents the computation from physical values to the internal values. Stereotypes: atpSplittable Tags: atp.Splitkey=compuPhysToInternal xml.sequenceOffset=90
displayFormat	DisplayFormatString	0..1	attr	This property specifies, how the physical value shall be displayed e.g. in documents or measurement and calibration tools. Tags: xml.sequenceOffset=20
unit	Unit	0..1	ref	This is the physical unit of the Physical values for which the CompuMethod applies. Tags: xml.sequenceOffset=30

Table E.29: CompuMethod

Class	CompuScale			
Note	This meta-class represents the ability to specify one segment of a segmented computation method.			
Base	ARObject			
Aggregated by	CompuScales.compuScale			
Attribute	Type	Mult.	Kind	Note
a2lDisplayText	String	0..1	attr	The value of this attribute shall be taken for generating one display text (specifically the OutVal) within the equivalent of the enclosing CompuMethod in A2L.
compuInverseValue	CompuConst	0..1	aggr	This is the inverse value of the constraint. This supports the case that the scale is not reversible per se. Tags: xml.sequenceOffset=60
compuScaleContents	CompuScaleContents	0..1	aggr	This represents the computation details of the scale. Tags: xml.roleElement=false xml.roleWrapperElement=false xml.sequenceOffset=70 xml.typeElement=false xml.typeWrapperElement=false
desc	MultiLanguageOverviewParagraph	0..1	aggr	<desc> represents a general but brief description of the object in question. Tags: xml.sequenceOffset=30
lowerLimit	Limit	0..1	attr	This specifies the lower limit of the scale. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime xml.sequenceOffset=40
mask	PositiveUnlimitedInteger	0..1	attr	In difference to all the other computational methods every COMPU-SCALE will be applied including the bit MASK. Therefore it is allowed for this type of COMPU-METHOD, that COMPU-SCALES overlap. To calculate the string reverse to a value, the string has to be split and the according value for each substring has to be summed up. The sum is finally transmitted. The processing has to be done in order of the COMPU-SCALE elements. Tags: xml.sequenceOffset=35
shortLabel	Identifier	0..1	attr	This element specifies a short name for the particular scale. The name can for example be used to derive a programming language identifier. Tags: xml.sequenceOffset=20





Class	CompuScale			
symbol	CIdentifier	0..1	attr	The symbol, if provided, is used by code generators to get a C identifier for the CompuScale. The name will be used as is for the code generation, therefore it needs to be unique within the generation context. Tags: xml.sequenceOffset=25
upperLimit	Limit	0..1	attr	This specifies the upper limit of a of the scale. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime xml.sequenceOffset=50

Table E.30: CompuScale

Class	ConstantReference			
Note	Instead of defining this value inline, a constant is referenced.			
Base	ARObject, ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key , ApplicationAssocMapElementValueSpecification.value , ArrayValueSpecification.element , CalibrationParameterValue.applInitValue , CalibrationParameterValue.implInitValue , ConstantSpecification.valueSpec , CryptoServiceKey.developmentValue , DiagnosticEnvDataCondition.compareValue , DiagnosticEnvDataCondition.compareValue , FieldSenderComSpec.initValue , ISignal.initValue , ISignal.receptionDefaultValue , ISignal.timeoutSubstitutionValue , NonqueuedReceiverComSpec.initValue , NonqueuedReceiverComSpec.timeoutSubstitutionValue , NonqueuedSenderComSpec.initValue , NvProvideComSpec.ramBlockInitValue , NvProvideComSpec.ramBlockInitValue , NvRequireComSpec.initValue , ParameterDataPrototype.initValue , ParameterProvideComSpec.initValue , ParameterRequireComSpec.initValue , PersistencyDataRequiredComSpec.initValue , PersistencyKeyValuePair.initValue , PortDefinedArgumentValue.value , PortPrototypeBlueprintInitValue.value , RecordValueSpecification.field , SomeipEventDeployment.eventReceptionDefaultValue , StateManagementCompareCondition.compareValue , SwDataDefProps.invalidValue , UserDefinedEventDeployment.eventReceptionDefaultValue , VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
constant	ConstantSpecification	0..1	ref	The referenced constant.

Table E.31: ConstantReference

Class	ConsumedServiceInstance			
Note	Service instances that are consumed by the ECU that is connected via the ApplicationEndpoint to a CommunicationConnector.			
Base	ARObject, AbstractServiceInstance , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ServiceInstanceCollectionSet.serviceInstance			
Attribute	Type	Mult.	Kind	Note
allowedServiceProvider	NetworkEndpoint	*	ref	NetworkEndpoint on which the ProvidedServiceInstance that is communicating with this ConsumedServiceInstance is allowed to be located so that the ACL check in the ServiceDiscovery is successful and the connection is allowed to be established. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=allowedServiceProvider.networkEndpoint, allowedServiceProvider.variationPoint.shortLabel atp.Status=draft vh.latestBindingTime=postBuild
autoRequire	Boolean	0..1	attr	Defines that this ConsumedServiceInstance shall be required (searched for) by the service discovery at ECU start.





Class	ConsumedServiceInstance			
blocklisted Version	SomeipServiceVersion	*	aggr	Collection of blocklisted versions Tags: atp.Status=draft
consumedEvent Group	ConsumedEventGroup	*	aggr	Selection of event-groups the consumer wants to subscribe for. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=consumedEventGroup.shortName, consumedEventGroup.variationPoint.shortLabel vh.latestBindingTime=postBuild
eventMulticast Subscription Address	ApplicationEndpoint	0..1	ref	Multicast Address that is used by the client to subscribe to the server: This enables the multicast subscription feature. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=eventMulticastSubscription Address.applicationEndpoint, eventMulticastSubscription Address.variationPoint.shortLabel vh.latestBindingTime=postBuild
instance Identifier	AnyServiceInstanceId	0..1	attr	This attribute represents the ability to describe the required service instance ID.
localUnicast Address	ApplicationEndpoint	0..2	ref	The local address over which the CSI is consumed (udp, tcp or both). Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=localUnicastAddress.applicationEndpoint, localUnicastAddress.variationPoint.shortLabel vh.latestBindingTime=postBuild
minorVersion	AnyVersionString	0..1	attr	Minor Version of the ServiceInterface. Value can be set to a number that represents the Minor Version of the searched service or to ANY.
remoteUnicast Address	ApplicationEndpoint	0..2	ref	This reference defines the remote address where the service provider is located. This reference shall ONLY be used if the remote address is determined from the configuration and not at runtime from the Service Discovery. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=remoteUnicastAddress.applicationEndpoint, remoteUnicastAddress.variationPoint.shortLabel vh.latestBindingTime=postBuild
sdClientTimer Config	SomeipSdClientService InstanceConfig	0..1	ref	Client specific configuration settings relevant for the SOME/IP service discovery. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=sdClientTimerConfig.someipSdClientService InstanceConfig, sdClientTimerConfig.variationPoint.short Label vh.latestBindingTime=postBuild
serviceIdentifier	PositiveInteger	0..1	attr	This attribute represents the ability to describe the SOME/IP service ID that is searched.
versionDriven FindBehavior	ServiceVersion AcceptanceKindEnum	0..1	attr	Defines the service discovery find behavior. Tags: atp.Status=draft

Table E.32: ConsumedServiceInstance

Class	CouplingElement			
Note	A CouplingElement is used to connect EcuInstances to the VLAN of an EthernetCluster. Coupling Elements can reach from a simple hub to a complex managed switch or even devices with functionalities in higher layers. A CouplingElement that is not related to an EcuInstance occurs as a dedicated single device. Tags: atp.recommendedPackage=CouplingElements			
Base	ARObject, CollectableElement, FibexElement, Identifiable , MultilanguageReferrable, Packageable Element , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
communication Cluster	EthernetCluster	0..1	ref	This relationship defines to which cluster the Coupling Element belongs.
couplingPort	CouplingPort	*	aggr	Hardware Port of the CouplingElement that is used to connect this CouplingPort to EcuInstances or other CouplingElements. Stereotypes: atp.Splittable; atp.Variation Tags: atp.Splitkey=couplingPort.shortName, coupling Port.variationPoint.shortLabel vh.latestBindingTime=postBuild
couplingType	CouplingElementEnum	0..1	attr	Describes the coupling type of this CouplingElement.
ecuInstance	EcuInstance	0..1	ref	Optional reference to the ECU where the Coupling Element is located.
firewallRule	StateDependentFirewall	*	ref	Firewall rules defined in the context of a Coupling Element. Tags: atp.Status=candidate
switchMac Address LearningMode	SwitchMacAddress LearningEnum	0..1	attr	Defines the MAC address learning mode of the Ethernet switch.

Table E.33: CouplingElement

Class	CouplingPort			
Note	A CouplingPort is used to connect a CouplingElement with an EcuInstance or two CouplingElements with each other via a CouplingPortConnection. Optionally, the CouplingPort may also have a reference to a macMulticastGroup and a defaultVLAN.			
Base	ARObject, Identifiable , MultilanguageReferrable, Referrable			
Aggregated by	CouplingElement.couplingPort , EthernetCommunicationController.couplingPort			
Attribute	Type	Mult.	Kind	Note
connection Negotiation Behavior	EthernetConnection NegotiationEnum	0..1	attr	Specifies the connection negotiation of the CouplingPort.
couplingPort Details	CouplingPortDetails	0..1	aggr	Defines more details of a CouplingPort in case a more specific configuration is required.
couplingPort Role	CouplingPortRoleEnum	0..1	attr	Defines the role this CouplingPort takes in the context of the CouplingElement.





Class	CouplingPort			
defaultVlan	EthernetPhysicalChannel	0..1	ref	The vLanIdentifier of the referenced VLAN is the Default-PVID (port VLAN ID). A Port VLAN ID is a default VLAN ID that is assigned to an access CouplingPort to designate the VLAN segment to which this port is connected. Also, if a CouplingPort has not been configured with any VLAN memberships, the virtual switch's Port VLAN ID (pvid) becomes the default VLAN ID for the ports connection. This identifier/tag is added for incoming untagged messages at the port (ingress tagging). For outgoing messages with this identifier, the tag is removed at the port (egress untagging, depending on the Vlan Membership.sendActivity).
macAddressVlanAssignment	MacAddressVlanMembership	*	aggr	Statically defines the assignment of MAC-Multicast-Addresses, optionally together with VLANs, to this CouplingPort. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=macAddressVlanAssignment.shortName, macAddressVlanAssignment.variationPoint.shortLabel vh.latestBindingTime=postBuild
macLayerType	EthernetMacLayerTypeEnum	0..1	attr	Specifies the mac layer type of the CouplingPort.
macSecProps	MacSecProps	*	aggr	Properties to configure MACsec (Media access control security) and the MKA (MACsec Key Agreement) for the CouplingPort (PHY). Tags: atp.Status=candidate
physicalLayerType	EthernetPhysicalLayerTypeEnum	0..1	attr	Specifies the physical layer type of the CouplingPort.
plcaProps	PlcaProps	0..1	aggr	Optional properties for configuration of PLCA (Physical Layer Collision Avoidance) in case 10-BASE-T1S Ethernet is used and PLCA is enabled on the Coupling Port (PHY).
pncMapping	PncMappingIdent	*	ref	Reference to the partial networks this CouplingPort participates in. Stereotypes: atpSplitable Tags: atp.Splitkey=pncMapping
receiveActivity	EthernetSwitchVlanIngressTagEnum	0..1	attr	Defines the handling of frames at the ingress port.
vlanMembership	VlanMembership	*	aggr	Messages of VLANs that are defined here can be communicated via the CouplingPort.
wakeupSleepOnDatalineConfig	EthernetWakeupSleepOnDatalineConfig	0..1	ref	Optional reference to EthernetWakeupSleepOnDatalineConfig.

Table E.34: CouplingPort

Class	CouplingPortConnection			
Note	Connection between two CouplingPorts (firstPort and secondPort) or between a collection of Ports that are all referenced by the portCollection reference.			
Base	ARObject			
Aggregated by	EthernetCluster.couplingPortConnection			
Attribute	Type	Mult.	Kind	Note
firstPort	CouplingPort	0..1	ref	Reference to the first CouplingPort that is connected via the CouplingPortConnection.





Class	CouplingPortConnection			
nodePort	CouplingPort	*	ref	Reference to a number of CouplingPorts that are connected via the CouplingPortConnection. This reference shall be used to describe a 10BASE-T1S topology architecture where several CouplingPorts of EthernetCommunicationControllers are connected via one CouplingPortConnection. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=nodePort.couplingPort, nodePort.variation Point.shortLabel vh.latestBindingTime=postBuild
plcaLocalNodeCount	PositiveInteger	0..1	attr	Defines the number of communication participants in case 10BASE-T1S and the nodePort reference is used.
plcaTransmitOpportunityTimer	PositiveInteger	0..1	attr	Timer for the transmission in bit time to evaluate if a Transmission Opportunity is yield or not.
secondPort	CouplingPort	0..1	ref	Reference to the second CouplingPort that is connected via the CouplingPortConnection.

Table E.35: CouplingPortConnection

Class	CryptoKeySlotUsageDesignMapping			
Note	This meta-class represents the ability to map a CryptoKeySlotUsageDesign (on the system design level) to a PortPrototype (on the application design level). Tags: atp.recommendedPackage=CryptoKeySlotDesignMappings This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
cryptoKeySlotUsageDesign	CryptoKeySlotUsageDesign	0..1	ref	This reference identifies the applicable CryptoKeySlot UsageDesign on system design level.
portPrototype	RPortPrototype	0..1	ref	This reference identifies the applicable PortPrototype on application design level.

Table E.36: CryptoKeySlotUsageDesignMapping

Class	DataConstr			
Note	This meta-class represents the ability to specify constraints on data. Tags: atp.recommendedPackage=DataConstrs			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataConstrRule	DataConstrRule	*	aggr	This is one particular rule within the data constraints. Tags: xml.roleElement=true xml.roleWrapperElement=true xml.sequenceOffset=30 xml.typeElement=false xml.typeWrapperElement=false

Table E.37: DataConstr

Class	DataConstrRule			
Note	This meta-class represents the ability to express one specific data constraint rule.			
Base	<i>ARObject</i>			
Aggregated by	DataConstr.dataConstrRule			
Attribute	Type	Mult.	Kind	Note
constrLevel	Integer	0..1	attr	This attribute describes the category of a constraint. One of its functions is in the area of constraint violation, where it can be used from a certain level, to produce error messages. The lower the level, the more stringent the check. Used to distinguish hard or soft limits. Tags: xml.sequenceOffset=20
internalConstrs	InternalConstrs	0..1	aggr	Describes the limitations applicable on the internal domain (as opposed to the physical domain). Tags: xml.sequenceOffset=40
physConstrs	PhysConstrs	0..1	aggr	Describes the limitations applicable on the physical domain (as opposed to the internal domain). Tags: xml.sequenceOffset=30

Table E.38: DataConstrRule

Class	DataFilter			
Note	Base class for data filters. The type of the filter is specified in attribute dataFilterType. Some of the filter types require additional arguments which are specified as attributes of this class.			
Base	<i>ARObject</i>			
Aggregated by	ISignalPort.dataFilter , NonqueuedReceiverComSpec.filter , NonqueuedSenderComSpec.dataFilter , SignalBasedEventElementToSignalTriggeringMapping.filter , SignalBasedFieldToSignalTriggeringMapping.filter , SignalServiceTranslationElementProps.filter , TransmissionModeCondition.dataFilter			
Attribute	Type	Mult.	Kind	Note
dataFilterType	DataFilterTypeEnum	0..1	attr	This attribute specifies the type of the filter.
mask	UnlimitedInteger	0..1	attr	Mask for old and new value.
max	UnlimitedInteger	0..1	attr	Value to specify the upper boundary
min	UnlimitedInteger	0..1	attr	Value to specify the lower boundary
offset	PositiveInteger	0..1	attr	Specifies the initial number of messages to occur before the first message is passed
period	PositiveInteger	0..1	attr	Specifies number of messages to occur before the message is passed again
x	UnlimitedInteger	0..1	attr	Value to compare with

Table E.39: DataFilter

Enumeration	DataFilterTypeEnum
Note	This enum specifies the supported DataFilterTypes.
Aggregated by	DataFilter.dataFilterType
Literal	Description
always	No filtering is performed so that the message always passes. Tags: atp.EnumerationLiteralIndex=0
maskedNewDiffers MaskedOld	Pass messages where the masked value has changed. (new_value&mask) !=(old_value&mask) new_value: current value of the message old_value: last value of the message (initialized with the initial value of the message, updated with new_value if the new message value is not filtered out) Tags: atp.EnumerationLiteralIndex=1





Enumeration	DataFilterTypeEnum
maskedNewDiffers X	Pass messages whose masked value is not equal to a specific value x (new_value&mask) != x new_value: current value of the message Tags: atp.EnumerationLiteralIndex=2
maskedNewEquals X	Pass messages whose masked value is equal to a specific value x (new_value&mask) == x new_value: current value of the message Tags: atp.EnumerationLiteralIndex=3
never	The filter removes all messages. Tags: atp.EnumerationLiteralIndex=4
newIsOutside	Pass a message if its value is outside a predefined boundary. (min > new_value) OR (new_value > max) Tags: atp.EnumerationLiteralIndex=5
newIsWithin	Pass a message if its value is within a predefined boundary. min <= new_value <= max Tags: atp.EnumerationLiteralIndex=6
oneEveryN	Pass a message once every N message occurrences. Algorithm: occurrence % period == offset Start: occurrence = 0. Each time the message is received or transmitted, occurrence is incremented by 1 after filtering. Length of occurrence is 8 bit (minimum). Tags: atp.EnumerationLiteralIndex=7

Table E.40: DataFilterTypeEnum

Class	DataPrototype (abstract)			
Note	Base class for prototypical roles of any data type.			
Base	ARObject, AtpFeature, AtpPrototype, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	ApplicationCompositeElementDataPrototype, AutosarDataPrototype			
Aggregated by	AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
swDataDef Props	SwDataDefProps	0..1	aggr	This property allows to specify data definition properties which apply on data prototype level. Stereotypes: atp.Splitable Tags: atp.Splitkey=swDataDefProps

Table E.41: DataPrototype

Class	DataPrototypeReference (abstract)			
Note	This meta-class provides the ability to reference a DataPrototype.			
Base	ARObject			
Subclasses	DataPrototypeInPortInterfaceRef , ImplementationDataTypeElementInPortInterfaceRef			
Aggregated by	DataPrototypeTransformationProps.dataPrototypeInPortInterfaceRef, SignalServiceTranslationElement Props.element, TransmissionComSpecProps.onChangeDataPrototype			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table E.42: DataPrototypeReference

Class	DataTransformation			
Note	A DataTransformation represents a transformer chain. It is an ordered list of transformers.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DataTransformationSet.dataTransformation			
Attribute	Type	Mult.	Kind	Note
dataTransformationKind	DataTransformationKind Enum	0..1	attr	This attribute controls the kind of DataTransformation to be applied.
executeDespiteDataUnavailability	Boolean	0..1	attr	Specifies whether the transformer chain is executed even if no input data are available.
transformerChain (ordered)	Transformation Technology	*	ref	This attribute represents the definition of a chain of transformers that are supposed to be executed according to the order of being referenced from DataTransformation.

Table E.43: DataTransformation

Class	DiagnosticAbstractParameter (abstract)			
Note	This meta-class represents an abstract base class for modeling a diagnostic parameter.			
Base	ARObject			
Subclasses	DiagnosticParameter , DiagnosticParameterElement			
Attribute	Type	Mult.	Kind	Note
bitOffset	PositiveInteger	0..1	attr	This represents the bitOffset of the DiagnosticParameter. The value of the bitOffset shall always be interpreted as relative to the start of the enclosing DiagnosticDataIdentifier, DiagnosticParameterIdentifier, or DiagnosticRoutineSubfunction. Stereotypes: atpIdentityContributor Tags: atp.Status=candidate
dataElement	DiagnosticDataElement	0..1	aggr	This represents the related dataElement of the DiagnosticParameter Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=dataElement.shortName, dataElement.variationPoint.shortLabel vh.latestBindingTime=postBuild
parameterSize	PositiveInteger	0..1	attr	This attribute allows for the specification of the parameter size. This information is relevant if there is a gap between one diagnostic parameter and the following diagnostic parameter (or the tail of the telegram). The unit is bit and the values shall be multiples of 8. Tags: atp.Status=candidate

Table E.44: DiagnosticAbstractParameter

Class	DiagnosticAccessPermission			
Note	This represents the specification of whether a given service can be accessed according to the existence of meta-classes referenced by a particular DiagnosticAccessPermission. In other words, this meta-class acts as a mapping element between several (otherwise unrelated) pieces of information that are put into context for the purpose of checking for access rights. Tags: atp.recommendedPackage=DiagnosticAccessPermissions			
Base	ARElement , ARObject, CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticAccessPermission			
authentication Enabled	DiagnosticAuthRole Proxy	0..1	aggr	The existence of this aggregation indicates that an authentication is foreseen. The details are clarified by the aggregated class. Stereotypes: atpSplitable Tags: atp.Splitkey=authenticationEnabled
diagnostic Session	DiagnosticSession	*	ref	This represents the associated DiagnosticSessions Stereotypes: atpSplitable Tags: atp.Splitkey=diagnosticSession
environmental Condition	DiagnosticEnvironmentalCondition	0..1	ref	This represents the environmental conditions associated with the access permission. Stereotypes: atpSplitable Tags: atp.Splitkey=environmentalCondition
securityLevel	DiagnosticSecurityLevel	*	ref	This represents the associated DiagnosticSecurityLevels Stereotypes: atpSplitable Tags: atp.Splitkey=securityLevel
sovdLock	DiagnosticSovdLock	0..1	ref	This represents the associated SOVD lock. Stereotypes: atpSplitable Tags: atp.Splitkey=sovdLock This Attribute is only used by the AUTOSAR Adaptive Platform.

Table E.45: DiagnosticAccessPermission

Class	DiagnosticAuthTransmitCertificate			
Note	This meta-class represents the sub-function to transmit a certificate Tags: atp.recommendedPackage=DiagnosticAuthTransmitCertificates			
Base	ARElement , ARObject , CollectableElement , DiagnosticAuthentication , DiagnosticCommonElement , DiagnosticServiceInstance , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
certificate Evaluation	DiagnosticAuthTransmitCertificateEvaluation	*	aggr	This aggregation represents a collection of certificate evaluation configurations.

Table E.46: DiagnosticAuthTransmitCertificate

Class	DiagnosticAuthTransmitCertificateEvaluation			
Note	This meta-class represents the ability to configure a certificate evaluation in the context of a diagnostic authentication.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DiagnosticAuthTransmitCertificate.certificateEvaluation			
Attribute	Type	Mult.	Kind	Note
evaluationId	PositiveInteger	0..1	attr	This attributes represents the ID of the certificate evaluation.

Table E.47: DiagnosticAuthTransmitCertificateEvaluation

Class	<i>DiagnosticCondition</i> (abstract)			
Note	Abstract element for StorageConditions and EnableConditions.			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticClearCondition , DiagnosticEnableCondition , DiagnosticStorageCondition			





Class	DiagnosticCondition (abstract)			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
initValue	Boolean	0..1	attr	Defines the initial status for enable or disable of acceptance/storage of event reports of a diagnostic event. The value is the initialization after power up (before this condition is reported the first time). true: acceptance/storage of a diagnostic event enabled false: acceptance/storage of a diagnostic event disabled

Table E.48: DiagnosticCondition

Class	DiagnosticContributionSet			
Note	This meta-class represents a root node of a diagnostic extract. It bundles a given set of diagnostic model elements. The granularity of the DiagnosticContributionSet is arbitrary in order to support the aspect of decentralized configuration, i.e. different contributors can come up with an own DiagnosticContributionSet. Tags: atp.recommendedPackage=DiagnosticContributionSets			
Base	ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
common Properties	DiagnosticCommon Props	0..1	aggr	This attribute represents a collection of diagnostic properties that are shared among the entire DiagnosticContributionSet. Stereotypes: atpSplitable Tags: atp.Splitkey=commonProperties
element	DiagnosticCommon Element	*	ref	This represents a DiagnosticCommonElement considered in the context of the DiagnosticContributionSet Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=element.diagnosticCommonElement, element.variationPoint.shortLabel vh.latestBindingTime=postBuild
serviceTable	DiagnosticServiceTable	*	ref	This represents the collection of DiagnosticServiceTables to be considered in the scope of this DiagnosticContributionSet. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=serviceTable.diagnosticServiceTable, serviceTable.variationPoint.shortLabel vh.latestBindingTime=postBuild

Table E.49: DiagnosticContributionSet

Class	DiagnosticDataTransfer			
Note	This represents an instance of the "Data Transfer" diagnostic service. Tags: atp.recommendedPackage=DiagnosticMemoryByAdresss			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMemoryByAddress, DiagnosticServiceInstance, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	DiagnosticDataTransfer			
dataTransfer Class	DiagnosticDataTransfer Class	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticDataTransfer in the given context.

Table E.50: DiagnosticDataTransfer

Class	DiagnosticEdrDataProviderMapping			
Note	This meta-class represents the definition of a data provider for the content of an extended data record. Tags: atp.recommendedPackage=DiagnosticDataProviders			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticMapping , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataProvider	NameToken	0..1	attr	This attribute defines the kind of data that is associated with the referenced DiagnosticExtendedDataRecord Element.
extendedData RecordElement	DiagnosticExtendedDataRecordElement	0..1	ref	This reference identifies the DiagnosticExtendedData RecordElement to which the data provider is associated with.

Table E.51: DiagnosticEdrDataProviderMapping

Class	DiagnosticExtendedDataRecord			
Note	Description of an extended data record. Tags: atp.recommendedPackage=DiagnosticExtendedDataRecords			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
customTrigger	String	0..1	attr	This attribute shall be taken to verbally describe the nature of the custom trigger.
element (ordered)	DiagnosticExtendedDataRecordElement	*	aggr	This aggregation represents the collection of elements of the enclosing Extended Data Record.
recordNumber	PositiveInteger	0..1	attr	This attribute specifies an unique identifier for an extended data record.
trigger	DiagnosticRecord TriggerEnum	0..1	attr	This attribute specifies the primary trigger to allocate an event memory entry.
update	Boolean	0..1	attr	This attribute defines when an extended data record is captured. true: This extended data record is captured every time. false: This extended data record is only captured for new event memory entries.

Table E.52: DiagnosticExtendedDataRecord

Class	DiagnosticExtendedDataRecordElement			
Note	This meta-class represents an element of an extended data record. Such an element represents a primitive data object or a fixed-size array of primitive data objects without further internal structure (no structure allowed).			





Class	DiagnosticExtendedDataRecordElement			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DiagnosticExtendedDataRecord.element			
Attribute	Type	Mult.	Kind	Note
numberOfElements	PositiveInteger	0..1	attr	The existence of this attribute turns the data instance into a fixed-size array of data. The attribute determines the size of the array in terms of how many elements the array shall take. The aggregation of SwDataDefProps (especially with respect to SwBaseType) applies specifically to an element of the array (as a representation of all array elements) instead of the entire array itself!
swDataDefProps	SwDataDefProps	0..1	aggr	This aggregation allows for the specification of various properties for the enclosing element.

Table E.53: DiagnosticExtendedDataRecordElement

Class	DiagnosticIndicator			
Note	Definition of an indicator. Tags: atp.recommendedPackage=DiagnosticIndicators			
Base	ARElement , ARObject, CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
type	DiagnosticIndicatorType Enum	0..1	attr	Defines the type of the indicator. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime

Table E.54: DiagnosticIndicator

Class	DiagnosticMapping (abstract)			
Note	Abstract element for different kinds of diagnostic mappings.			
Base	ARElement , ARObject, CollectableElement , DiagnosticCommonElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	DiagnosticEdrDataProviderMapping , DiagnosticEventToDebounceAlgorithmMapping , DiagnosticEventToEnableConditionGroupMapping , DiagnosticEventToOperationCycleMapping , DiagnosticEventToSecurityEventMapping , DiagnosticEventToTroubleCodeUdsMapping , DiagnosticFimAliasEventGroupMapping , DiagnosticFimAliasEventMapping , DiagnosticInhibitSourceEventMapping , DiagnosticMasterToSlaveEventMapping , DiagnosticProvidedDataMapping , DiagnosticSecureCodingMapping , DiagnosticSovdConfigContentMapping , DiagnosticSwMapping , DiagnosticTroubleCodeUdsToClearConditionGroupMapping , DiagnosticTroubleCodeUdsToTroubleCodeObdMapping			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table E.55: DiagnosticMapping

Class	DiagnosticParameter			
Note	This meta-class represents the ability to describe information relevant for the execution of a specific diagnostic service, i.e. it can be taken to parameterize the service.			
Base	ARObject, DiagnosticAbstractParameter			





Class	DiagnosticParameter			
Aggregated by	DiagnosticDataIdentifier.dataElement, DiagnosticInfoType.dataElement, DiagnosticParameterIdentifier.dataElement, DiagnosticRequestRoutineResults.request, DiagnosticRequestRoutineResults.response, DiagnosticStartRoutine.request, DiagnosticStartRoutine.response, DiagnosticStopRoutine.request, DiagnosticStopRoutine.response			
Attribute	Type	Mult.	Kind	Note
ident	DiagnosticParameterIdent	0..1	aggr	The aggregation in the role ident provides the ability to make the DiagnosticAbstractParameter identifiable. From the semantical point of view, the AbstractDiagnosticParameter is considered a first-class Identifiable and therefore the aggregation in the role ident shall always exist (until it may be possible to let AbstractDiagnosticParameter directly inherit from Identifiable). Stereotypes: atpIdentityContributor
supportInfo	DiagnosticParameterSupportInfo	0..1	aggr	This attribute represents the ability to define which bit of the support info byte is representing this part of the PID.

Table E.56: DiagnosticParameter

Class	DiagnosticServiceInstance (abstract)			
Note	This represents a concrete instance of a diagnostic service.			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Subclasses	DiagnosticAuthentication, DiagnosticClearDiagnosticInformation, DiagnosticClearResetEmissionRelatedInfo, DiagnosticComControl, DiagnosticControlDTCSetting, DiagnosticCustomServiceInstance, DiagnosticDataByIdentifier, DiagnosticDynamicallyDefineDataIdentifier, DiagnosticEcuReset, DiagnosticIOControl, DiagnosticMemoryByAddress, DiagnosticReadDTCInformation, DiagnosticReadDataByPeriodicID, DiagnosticRequestControlOfOnBoardDevice, DiagnosticRequestCurrentPowertrainData, DiagnosticRequestEmissionRelatedDTC, DiagnosticRequestEmissionRelatedDTCPermanentStatus, DiagnosticRequestFileTransfer, DiagnosticRequestOnBoardMonitoringTestResults, DiagnosticRequestPowertrainFreezeFrameData, DiagnosticRequestVehicleInfo, DiagnosticResponseOnEvent, DiagnosticRoutineControl, DiagnosticSecurityAccess, DiagnosticSessionControl			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
accessPermission	DiagnosticAccessPermission	0..1	ref	This represents the collection of DiagnosticAccessPermissions that allow for the execution of the referencing DiagnosticServiceInstance.. Stereotypes: atpSplitable Tags: atp.Splitkey=accessPermission
serviceClass	DiagnosticServiceClass	0..1	ref	This represents the corresponding "class", i.e. this meta-class provides properties that are shared among all instances of applicable sub-classes of DiagnosticServiceInstance. The subclasses that affected by this pattern implement references to the applicable "class"-role that substantiate this abstract reference. Stereotypes: atpAbstract

Table E.57: DiagnosticServiceInstance

Class	DiagnosticTransferExit			
Note	This represents an instance of the "Transfer Exit" diagnostic service. Tags: atp.recommendedPackage=DiagnosticMemoryByAdresss			
Base	ARElement, ARObject, CollectableElement, DiagnosticCommonElement, DiagnosticMemoryByAddress, DiagnosticServiceInstance, Identifiable, MultilanguageReferrable, PackageableElement, Referrable			
Aggregated by	ARPackage.element			





Class	DiagnosticTransferExit			
Attribute	Type	Mult.	Kind	Note
transferExit Class	DiagnosticTransferExit Class	0..1	ref	This reference substantiates that abstract reference in the role serviceClass for this specific concrete class. Thereby, the reference represents the ability to access shared attributes among all DiagnosticTransferExit in the given context.

Table E.58: DiagnosticTransferExit

Class	DiagnosticTroubleCodeProps			
Note	This element defines common Dtc properties that can be reused by different DTCs. Tags: atp.recommendedPackage=DiagnosticTroubleCodePropss			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , Identifiable , Multilanguage , Referrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
aging	DiagnosticAging	0..1	ref	Reference to an aging algorithm in case that an aging/unlearning of the event is allowed. Stereotypes: atp.Splitable Tags: atp.Splitkey=aging
diagnostic Memory	DiagnosticMemory Destination	0..1	ref	Reference to the applicable DiagnosticMemory Destination. Stereotypes: atp.Splitable Tags: atp.Splitkey=diagnosticMemory
extendedData Record	DiagnosticExtended DataRecord	*	ref	Defines the links to an extended data class sampler. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=extendedDataRecord.diagnosticExtendedDataRecord, extendedDataRecord.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
freezeFrame	DiagnosticFreezeFrame	*	ref	Define the links to a freeze frame class sampler. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=freezeFrame.diagnosticFreezeFrame, freezeFrame.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
immediateNv DataStorage	Boolean	0..1	attr	Change description for Class immediateNvDataStorage in table "Table A.111: DiagnosticTroubleCodeProps": Switch to enable immediate storage triggering of an according event memory entry persistently to NVRAM. true: immediate non-volatile storage triggering on first occurrence and shutdown. false: immediate non-volatile storage triggering on shutdown.
legislated FreezeFrame ContentUdsObd	DiagnosticDataIdentifier Set	0..1	ref	This reference identifies the layout of legislated freeze frames used for emission related diagnostics over the UDS protocol such as OBD on UDS or WWH-OBD. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=legislatedFreezeFrameContentUdsObd.diagnosticDataIdentifierSet, legislatedFreezeFrameContentUdsObd.variationPoint.shortLabel vh.latestBindingTime=preCompileTime





Class	DiagnosticTroubleCodeProps			
legislatedSovdFreezeFrameContent	DiagnosticSovdContentGroup	0..1	ref	This reference identifies the layout of legislated freeze frames used for emission related diagnostics over the SOVD protocol. This Attribute is only used by the AUTOSAR Adaptive Platform.
maxNumberFreezeFrameRecords	PositiveInteger	0..1	attr	This attribute defines the number of according freeze frame records, which can maximal be stored for this event. Therefore all these freeze frame records have the same freeze frame class.
obdRelevance	Boolean	0..1	attr	The attribute controls whether the enclosing DTC is relevant for OBD. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
priority	PositiveInteger	0..1	attr	Priority of the event, in view of full event buffer. A lower value means higher priority. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
significance	DiagnosticSignificanceEnum	0..1	attr	Significance of the event, which indicates additional information concerning fault classification and resolution.
snapshotRecordContent	DiagnosticDataIdentifierSet	0..1	ref	This represents the freeze frame layout as a set of DIDs. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=snapshotRecordContent.diagnosticDataIdentifierSet, snapshotRecordContent.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
sovdsnapshotContent	DiagnosticSovdContentGroup	0..1	ref	This represents the freeze frame layout as a set of SOVD Content. This Attribute is only used by the AUTOSAR Adaptive Platform.

Table E.59: DiagnosticTroubleCodeProps

Class	DiagnosticTroubleCodeUds			
Note	This element is used to describe diagnostic trouble codes (DTCs). Tags: atp.recommendedPackage=DiagnosticTroubleCodes			
Base	ARElement , ARObject , CollectableElement , DiagnosticCommonElement , DiagnosticTroubleCode , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
considerPtoStatus	Boolean	0..1	attr	This attribute describes the affection of the event by the Dem PTO handling. true: the event is affected by the Dem PTO handling. false: the event is not affected by the Dem PTO handling. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
eventReadinessGroup	EventObdReadinessGroup	0..1	aggr	This attribute specifies the Event OBD Readiness group for PID \$01 and PID \$41 computation. This attribute is only applicable for emission-related ECUs. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=eventReadinessGroup.eventObdReadinessGroup, eventReadinessGroup.variationPoint.shortLabel vh.latestBindingTime=postBuild





Class	DiagnosticTroubleCodeUds			
functionalUnit	PositiveInteger	0..1	attr	This attribute specifies a 1-byte value which identifies the corresponding basic vehicle / system function which reports the DTC. This parameter is necessary for the report of severity information. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
obdDtcValue3 Byte	PositiveInteger	0..1	attr	3 Byte OBD DTC value based on the definition from SAE J2012. The existence of this attribute is only required if separated UDS and OBD DTC values are used for SAE J1979-2. If this attribute does not exist, then UDS DTC values are used with J1979-2. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
severity	DiagnosticUdsSeverity Enum	0..1	attr	DTC severity according to ISO 14229-1. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
troubleCode Props	DiagnosticTroubleCode Props	0..1	ref	Defined properties associated with the DemDTC. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=troubleCodeProps.diagnosticTroubleCode Props, troubleCodeProps.variationPoint.shortLabel vh.latestBindingTime=postBuild
udsDtcValue	PositiveInteger	0..1	attr	Unique Diagnostic Trouble Code value for UDS. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
wwhObdDtc Class	DiagnosticWwhObdDtc ClassEnum	0..1	attr	This attribute is used to identify (if applicable) the corresponding severity class of an WWH-OB DTC. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild

Table E.60: DiagnosticTroubleCodeUds

Class	DltApplication			
Note	This meta-class represents the application from which the log and trace message originates.			
Base	ARObject, Identifiable , MultilanguageReferrable, Referrable			
Aggregated by	DltEcu.application			
Attribute	Type	Mult.	Kind	Note
application Description	String	0..1	attr	This attribute can be used to describe the applicationId that is used in the log and trace message in more detail.
applicationId	String	0..1	attr	This attribute identifies the SW-C/BSW module in the log and trace message.
context	DltContext	*	ref	Definition of ContextIds for the Application. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=context.dltContext, context.variationPoint.shortLabel vh.latestBindingTime=systemDesignTime

Table E.61: DltApplication

Class	DltContext
Note	This meta-class represents the Context that groups Log and Trace Messages that are generated by an application. Tags: atp.recommendedPackage=DltContexts





Class	DltContext			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
contextDescription	String	0..1	attr	This attribute can be used to describe the contextId that is used in the log and trace message in more detail.
contextId	String	0..1	attr	This attribute is used to group log and trace messages produced by an application to distinguish functionality.
dltMessage	DltMessage	*	ref	Group of Log and Trace Messages assigned to the Dlt Context Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=dltMessage.dltMessage, dltMessage.variationPoint.shortLabel vh.latestBindingTime=systemDesignTime

Table E.62: DltContext

Class	DltEcu			
Note	This element represents an Ecu or Machine that produces logging and tracing information. Tags: atp.recommendedPackage=DltEcus			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
application	DltApplication	*	aggr	Application on DltEcu that provides log or trace data. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=application.shortName, application.variationPoint.shortLabel vh.latestBindingTime=systemDesignTime
eculd	String	0..1	attr	This attribute defines the name of the ECU for use within the Dlt protocol.

Table E.63: DltEcu

Class	DltMessage			
Note	This element defines a DltMessage.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	LogAndTraceMessageCollectionSet.dltMessage			
Attribute	Type	Mult.	Kind	Note
dltArgument (ordered)	DltArgument	*	aggr	Ordered collection of DltArguments in the DltMessage.
messageId	PositiveInteger	0..1	attr	This attribute defines the unique Id for the DltMessage.
messageLineNumber	PositiveInteger	0..1	attr	This attribute describes the position in the source file in which this log message was called.
messageSourceFile	String	0..1	attr	This attribute describes the source file in which this log message was called.
messageTypeInfo	String	0..1	attr	This attribute describes the message Type
privacyLevel	PrivacyLevel	0..1	aggr	The Privacy Level helps to identify the Log and Trace content towards the degree of privacy to it.

Table E.64: DltMessage

Enumeration	DolpEidRetrievalEnum
Note	Enumeration with options to retrieve EID. This Enumeration is only used by the AUTOSAR Adaptive Platform.
Aggregated by	DolpNetworkConfiguration.eidRetrieval , DolpNetworkConfigurationDesign.eidRetrieval
Literal	Description
eidUseApi	API DiagnosticDoIPEntityIdentification is used to retrieve eid Tags: atp.EnumerationLiteralIndex=1
eidUseConfigValue	eid is configured manually by DolpInstantiation.eid Tags: atp.EnumerationLiteralIndex=2
eidUseMac	MAC of the network interface is used as eid Tags: atp.EnumerationLiteralIndex=0

Table E.65: DolpEidRetrievalEnum

Class	DolpLogicalAddress			
Note	This meta-class describes the DoIP logical address. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	DolpFunctionalClusterDesign.dolpLogicalAddress			
Attribute	Type	Mult.	Kind	Note
logicalAddress	PositiveInteger	0..1	attr	This attribute holds the DoIP logical address.

Table E.66: DolpLogicalAddress

Class	EcuInstance			
Note	ECUInstances are used to define the ECUs used in the topology. The type of the ECU is defined by a reference to an ECU specified with the ECU resource description. Tags: atp.recommendedPackage=EcuInstances			
Base	ARObject, CollectableElement , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
associatedConsumedProvidedServiceInstanceGroup	ConsumedProvidedServiceInstanceGroup	*	ref	With this reference it is possible to identify which ConsumedProvidedServiceInstanceGroups are applicable for which ECUInstance. Stereotypes: atp.Splittable; atp.Variation Tags: atp.Splitkey=associatedConsumedProvidedServiceInstanceGroup.consumedProvidedServiceInstanceGroup, associatedConsumedProvidedServiceInstanceGroup.variationPoint.shortLabel vh.latestBindingTime=postBuild
associatedPdurIPduGroup	PdurIPduGroup	*	ref	With this reference it is possible to identify which PdurIPdu Groups are applicable for which Communication Connector/ ECU.
channelSynchronousWakeup	Boolean	0..1	attr	If this parameter is available and set to true, then all available channels will be woken up as soon as at least one channel wakeup occurs. If PNCs are configured, then all PNCs will be requested upon a channel wakeup.
clientIdRange	ClientIdRange	0..1	aggr	Restriction of the Client Identifier for this Ecu to an allowed range of numerical values. The Client Identifier of the transaction handle is generated by the client RTE for inter-Ecu Client/Server communication.





Class	EcuInstance			
commController	Communication Controller	*	aggr	CommunicationControllers of the ECU. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=commController.shortName, commController.variationPoint.shortLabel vh.latestBindingTime=postBuild
connector	Communication Connector	*	aggr	All channels controlled by a single controller. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=connector.shortName, connector.variationPoint.shortLabel vh.latestBindingTime=postBuild
firewallRule	StateDependentFirewall	*	ref	Firewall rules defined in the context of an EcuInstance. Tags: atp.Status=candidate
pncNmRequest	Boolean	0..1	attr	Defines if this EcuInstance shall request Nm on all its PhysicalChannels which have Nm variant set to FULL each time a PNC is requested.
pncPrepareSleepTimer	TimeValue	0..1	attr	Time in seconds the PNC state machine shall wait in PNC_PREPARE_SLEEP.
pncSynchronousWakeup	Boolean	0..1	attr	If this parameter is available and set to true then all available PNCs will be woken up as soon as a channel wakeup occurs. This is ensured by adding all PNCs to all channel wakeup sources during upstream mapping.
pnResetTime	TimeValue	0..1	attr	Specifies the runtime of the reset timer in seconds. This reset time is valid for the reset of PN requests in the EIRA and in the ERA.

Table E.67: EcuInstance

Class	EndToEndTransformationDescription			
Note	EndToEndTransformationDescription holds these attributes which are profile specific and have the same value for all E2E transformers.			
Base	ARObject, Describable, TransformationDescription			
Aggregated by	TransformationTechnology.transformationDescription			
Attribute	Type	Mult.	Kind	Note
clearFromValidToInvalid	Boolean	0..1	attr	Clear monitoring window on transition from state Valid to state Invalid.
counterOffset	PositiveInteger	0..1	attr	Offset of the counter in the Data[] array in bits.
crcOffset	PositiveInteger	0..1	attr	Offset of the CRC in the Data[] array in bits.
dataIdMode	DataIdModeEnum	0..1	attr	This attribute describes the inclusion mode that is used to include the implicit two-byte Data ID in the one-byte CRC.
dataIdNibbleOffset	PositiveInteger	0..1	attr	Offset of the Data ID nibble in the Data[] array in bits.
e2eProfileCompatibilityProps	E2EProfileCompatibility Props	0..1	ref	Reference to additional settings for the E2E state machine.
maxDeltaCounter	PositiveInteger	0..1	attr	Maximum allowed difference between two counter values of two consecutively received valid messages. For example, if the receiver gets data with counter 1 and MaxDeltaCounter is 3, then at the next reception the receiver can accept Counters with values 2, 3 or 4.
maxErrorStateInit	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last WindowSize checks, for the state E2E_SM_INIT.





Class	EndToEndTransformationDescription			
maxErrorStateInvalid	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last Window Size checks, for the state E2E_SM_INVALID.
maxErrorStateValid	PositiveInteger	0..1	attr	Maximal number of checks in which ProfileStatus equal to E2E_P_ERROR was determined, within the last Window Size checks, for the state E2E_SM_VALID.
maxNoNewOrRepeatedData	PositiveInteger	0..1	attr	The maximum allowed amount of consecutive failed counter checks.
minOkStateInit	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_INIT.
minOkStateInvalid	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_INVALID.
minOkStateValid	PositiveInteger	0..1	attr	Minimal number of checks in which ProfileStatus equal to E2E_P_OK was determined, within the last WindowSize checks, for the state E2E_SM_VALID.
offset	PositiveInteger	0..1	attr	Offset of the E2E header in the Data[] array in bits.
profileBehavior	EndToEndProfileBehaviorEnum	0..1	attr	Behavior of the check functionality
profileName	NameToken	0..1	attr	Definition of the E2E profile.
syncCounterInit	PositiveInteger	0..1	attr	Number of checks required for validating the consistency of the counter that shall be received with a valid counter (i.e. counter within the allowed lock-in range) after the detection of an unexpected behavior of a received counter.
upperHeaderBitsToShift	PositiveInteger	0..1	attr	This attribute describes the number of upper-header bits to be shifted. value = 0 or not present: shift of upper header is NOT performed. value > 0: the E2E Transformer on the protect-side, takes the first upperHeaderBitsToShift bits from the upper buffer (e.g. SOME/IP header part generated by SOME/IP transformer) and shifts them towards the lower bytes and bits within the Data[] for the length of the E2E header (e.g. 12 bytes in case of E2E Profile 4). This means the shift distance is fixed - it depends on the E2E header size - what is configured here is the number of bits that are to be shifted. This option is defined because the Some/IP header generated by SOME/IP transformer shall be, due to compatibility between non-protected and E2E-protected communication, at the same position, which is before E2E header.
windowSizeInit	PositiveInteger	0..1	attr	Size of the monitoring window of state Init for the E2E state machine.
windowSizeInvalid	PositiveInteger	0..1	attr	Size of the monitoring window of state Invalid for the E2E state machine.
windowSizeValid	PositiveInteger	0..1	attr	Size of the monitoring window of state Valid for the E2E state machine.

Table E.68: EndToEndTransformationDescription

Class	«atpVariation» EthernetCommunicationController
Note	Ethernet specific communication port attributes.
Base	ARObject, CommunicationController, Identifiable, MultilanguageReferrable, Referrable
Aggregated by	EcuInstance.commController, MachineDesign.communicationController





Class	«atpVariation» EthernetCommunicationController			
Attribute	Type	Mult.	Kind	Note
canXIConfig	AbstractCanCommunicationController	0..1	ref	If the Ethernet frames handled by this EthernetCommunicationController are to be tunneled through CAN XL, then this reference shall refer to the AbstractCanCommunicationController that aggregates the CanControllerXIConfiguration of the physical CAN XL channel to be used for tunneling.
couplingPort	CouplingPort	*	aggr	Optional CouplingPort that can be used to connect the ECU to a CouplingElement (e.g. a switch).
macLayerType	EthernetMacLayerTypeEnum	0..1	attr	Specifies the mac layer type of the ethernet controller.
macUnicastAddress	MacAddressString	0..1	attr	Media Access Control address (MAC address) that uniquely identifies each EthernetCommunicationController in the network.
maximumReceiveBufferLength	Integer	0..1	attr	Determines the maximum receive buffer length (frame length) in bytes.
maximumTransmitBufferLength	Integer	0..1	attr	Determines the maximum transmit buffer length (frame length) in bytes.
slaveActAsPassiveCommunicationSlave	Boolean	0..1	attr	This attribute specifies if the EcuInstance is acting as a passive communication slave on the connected PhysicalChannel. This is used for EthernetCommunicationControllers that use Ethernet hardware which supports wake-up and sleep on the network (e.g. Open Alliance TC10 compliant Ethernet hardware).
slaveQualifiedUnexpectedLinkDownTime	TimeValue	0..1	attr	This attribute specifies time when an unexpected link down is evaluated as link down and indicated to the AUTOSAR communication stack.

Table E.69: EthernetCommunicationController

Class	EthernetPhysicalChannel			
Note	The EthernetPhysicalChannel represents a VLAN or an untagged channel. An untagged channel is modeled as an EthernetPhysicalChannel without an aggregated VLAN.			
Base	ARObject, Identifiable , MultilanguageReferrable , PhysicalChannel , Referrable			
Aggregated by	CommunicationCluster.physicalChannel			
Attribute	Type	Mult.	Kind	Note
networkEndpoint	NetworkEndpoint	*	aggr	Collection of NetworkEndpoints that are used in the VLAN. Stereotypes: atpSplittable Tags: atp.Splitkey=networkEndpoint.shortName
vlan	VlanConfig	0..1	aggr	VLAN Configuration.

Table E.70: EthernetPhysicalChannel

Class	ExecutionDependency			
Note	This element defines a ProcessState in which a dependent process needs to be before the process that aggregates the ExecutionDependency element can be started. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Aggregated by	StateDependentStartupConfig.executionDependency			
Attribute	Type	Mult.	Kind	Note





Class	ExecutionDependency			
processState	ModeDeclaration	0..1	iref	This represent the applicable modeDeclaration that represents an ProcessState. InstanceRef implemented by: ModeInProcessInstanceRef

Table E.71: ExecutionDependency

Class	GlobalTimeCorrectionProps			
Note	This meta-class defines the attributes for rate and offset correction.			
Base	ARObject			
Aggregated by	GlobalTimeDomain.globalTimeCorrectionProps			
Attribute	Type	Mult.	Kind	Note
allowProviderRateCorrection	Boolean	0..1	attr	Defines whether the rate correction value of a Time Base can be set by means of the method <code>setRateCorrection()</code> . false: rate correction cannot be set by method <code>setRateCorrection()</code> . true: rate correction can be set by method <code>setRateCorrection()</code> .
offsetCorrectionAdaptionInterval	TimeValue	0..1	attr	Defines the interval during which the adaptive rate correction cancels out the rate- and time deviation.
offsetCorrectionJumpThreshold	TimeValue	0..1	attr	Threshold for the correction method. Deviations below this value will be corrected by a linear reduction over a defined timespan. Values equal- and greater than this value will be corrected by immediately setting the correct time- and rate in form of a jump.
providerRateDeviationMax	PositiveInteger	0..1	attr	This attribute describes the maximum allowed absolute value of the rate deviation value [unit: ppm].
rateCorrectionMeasurementDuration	TimeValue	0..1	attr	Definition of the time span which is used to calculate the rate deviation.
rateCorrectionsPerMeasurementDuration	PositiveInteger	0..1	attr	Defines the number of simultaneous rate measurements to determine the current rate deviation.
rateCorrectionThreshold	PositiveInteger	0..1	attr	This attribute defines the threshold for rate correction calculation to determine whether the absolute value of the calculated rate deviation exceeds the accepted range. The value is given in ppm. A value of 0 deactivates the check.
rateDeviationMeasurementDuration	TimeValue	0..1	attr	Time span used to calculate the rate deviation. Unit: seconds.

Table E.72: GlobalTimeCorrectionProps

Class	GlobalTimeDomain			
Note	This represents the ability to define a global time domain. Tags: atp.recommendedPackage=GlobalTimeDomains			
Base	ARElement , ARObject , CollectableElement , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
debounceTime	TimeValue	0..1	attr	Defines the minimum amount of time between two time sync messages are transmitted.





Class	GlobalTimeDomain			
domainId	PositiveInteger	0..1	attr	This represents the ID of the GlobalTimeDomain used in the network messages sent on behalf of global time management. Stereotypes: atpVariation Tags: vh.latestBindingTime=postBuild
gateway	GlobalTimeGateway	*	aggr	A GlobalTimeGateway may exist in the context of a GlobalTimeDomain to actively update the global time information as it is routed from one GlobalTimeDomain to another. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=gateway.shortName, gateway.variationPoint.shortLabel vh.latestBindingTime=postBuild
globalTimeCorrectionProps	GlobalTimeCorrectionProps	0..1	aggr	Defintion of attributes for rate and offset correction.
globalTimeDomainProperty	AbstractGlobalTimeDomainProps	0..1	aggr	Additional properties of the GlobalTimeDomain. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=globalTimeDomainProperty, globalTimeDomainProperty.variationPoint.shortLabel vh.latestBindingTime=postBuild
globalTimeMaster	GlobalTimeMaster	0..1	aggr	This represents the single master of a GlobalTimeDomain. A GlobalTimeDomain may have no GlobalTimeDomain.master, e.g. when it gets its time from a GPS receiver. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=globalTimeMaster.shortName, globalTimeMaster.variationPoint.shortLabel vh.latestBindingTime=postBuild
globalTimeSubDomain	GlobalTimeDomain	*	ref	By this means it is possible to create a hierarchy of sub Domains where one global time domain can declare one or more other global time domains as its subDomains. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=globalTimeSubDomain.globalTimeDomain, globalTimeSubDomain.variationPoint.shortLabel vh.latestBindingTime=postBuild
icvFreshnessValueId	PositiveInteger	0..1	attr	This attribute defines the Id of the Freshness Value for the Integrity Check Value (ICV) calculation and verification.
icvSecureComProps	SecOcSecureComProps	0..1	ref	Reference to a SecureComProps definition to be used for the Integrity Check Value (ICV) calculation and verification. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=icvSecureComProps.secOcSecureComProps, icvSecureComProps.variationPoint.shortLabel vh.latestBindingTime=postBuild
maxProgressionMismatchThreshold	TimeValue	0..1	attr	This attribute defines the maximum allowed difference between local time and fallback time of the time base in seconds.
networkSegmentId	NetworkSegmentIdentification	0..1	aggr	Defines the numerical identification of a GlobalTime sub domain.





Class	GlobalTimeDomain			
pduTriggering	PduTriggering	0..1	ref	This PduTriggering will be taken to transmit the global time information from a GlobalTimeMaster to a the associated GlobalTimeSlaves. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=pduTriggering.pduTriggering, pduTriggering.variationPoint.shortLabel vh.latestBindingTime=postBuild
slave	GlobalTimeSlave	*	aggr	This represents the collections of slaves of the Global TimeDomain. A GlobalTimeDomain may have no Global TimeDomain.slaves, e.g. when it propagates its time directly to sub domains. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=slave.shortName, slave.variationPoint.shortLabel vh.latestBindingTime=postBuild
syncLoss Timeout	TimeValue	0..1	attr	This attribute describes the timeout for the situation that the time synchronization gets lost in the scope of the time domain.

Table E.73: GlobalTimeDomain

Class	GlobalTimeMaster (abstract)			
Note	This represents the generic concept of a global time master.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	GlobalTimeCanMaster, GlobalTimeEthMaster , GlobalTimeFrMaster, UserDefinedGlobalTimeMaster			
Aggregated by	GlobalTimeDomain.globalTimeMaster			
Attribute	Type	Mult.	Kind	Note
communication Connector	Communication Connector	0..1	ref	The GlobalTimeMaster is bound to the Communication Connector.
immediate ResumeTime	TimeValue	0..1	attr	Defines the minimum time between an "immediate" message and the next periodic message.
isSystemWide GlobalTime Master	Boolean	0..1	attr	If set to TRUE, the GlobalTimeMaster is supposed to act as the root of global time information.
syncPeriod	TimeValue	0..1	attr	This represents the period. Unit: seconds

Table E.74: GlobalTimeMaster

Class	GlobalTimeSlave (abstract)			
Note	This represents the generic concept of a global time slave.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	GlobalTimeCanSlave, GlobalTimeEthSlave , GlobalTimeFrSlave, UserDefinedGlobalTimeSlave			
Aggregated by	GlobalTimeDomain.slave			
Attribute	Type	Mult.	Kind	Note
communication Connector	Communication Connector	0..1	ref	The GlobalTimeSlave is bound to the Communication Connector.
followUp TimeoutValue	TimeValue	0..1	attr	Rx timeout for the follow-up message.
timeLeapFuture Threshold	TimeValue	0..1	attr	Defines the maximum allowed positive difference between the current Local Time Base value and a newly received Global Time Base value.





Class	GlobalTimeSlave (abstract)			
timeLeapHealingCounter	PositiveInteger	0..1	attr	Defines the required number of updates to the Time Base where the time difference to the previous received value has to remain within the bounds of timeLeapFutureThreshold and timeLeapPastThreshold until that Time Base is considered healed.
timeLeapPastThreshold	TimeValue	0..1	attr	Defines the maximum allowed negative difference between the current Local Time Base value and a newly received Global Time Base value.

Table E.75: GlobalTimeSlave

Enumeration	HandleInvalidEnum
Note	Strategies of handling the reception of invalidValue.
Aggregated by	InvalidationPolicy.handleInvalid, ISignalPort.handleInvalid
Literal	Description
dontInvalidate	Invalidation is switched off. Tags: atp.EnumerationLiteralIndex=0
externalReplacement	Replace a received invalidValue. The replacement value is sourced from the aggregation in the role replaceWith. Tags: atp.EnumerationLiteralIndex=1
keep	The application software is supposed to handle signal invalidation on RTE API level either by Data ReceiveErrorEvent or check of error code on read access. Tags: atp.EnumerationLiteralIndex=2
replace	Replace a received invalidValue. The replacement value is specified by the initValue. Tags: atp.EnumerationLiteralIndex=3

Table E.76: HandleInvalidEnum

Class	IEEE1722TpAcfBus (abstract)			
Note	Abstract class to define various busses to be transported over a IEEE1722TP ACF connection. Tags: atp.Status=candidate			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	IEEE1722TpAcfCan , IEEE1722TpAcfLin			
Aggregated by	IEEE1722TpAcfConnection.acfTransportedBus			
Attribute	Type	Mult.	Kind	Note
acfPart	IEEE1722TpAcfBusPart	*	aggr	One part transported over IEEE1722Tp channel. Stereotypes: atp.Splittable; atp.Variation Tags: atp.Splitkey=acfPart.shortName, acfPart.variationPoint.shortLabel atp.Status=candidate vh.latestBindingTime=postBuild
busId	PositiveInteger	0..1	attr	Id of the transported bus over the ACF connection.

Table E.77: IEEE1722TpAcfBus

Class	IEEE1722TpAcfBusPart (abstract)			
Note	Definition of one IEEE1722Tp ACF part transported over the IEEE1722Tp channel. Tags: atp.Status=candidate			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	IEEE1722TpAcfCanPart , IEEE1722TpAcfLinPart			





Class	IEEE1722TpAcfBusPart (abstract)			
Aggregated by	IEEE1722TpAcfBus.acfPart			
Attribute	Type	Mult.	Kind	Note
collectionTrigger	PduCollectionTrigger Enum	0..1	attr	Defines whether putting this AcfPart to the IEEE1722Tp ACF message triggers immediate sending of the IEEE1722Tp ACF message.

Table E.78: IEEE1722TpAcfBusPart

Class	IEEE1722TpAcfCan			
Note	ACF IEEE1722Tp bus used for CAN transport. Tags: atp.Status=candidate atp.recommendedPackage=IEEE1722TpConnections			
Base	ARObject, IEEE1722TpAcfBus , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	IEEE1722TpAcfConnection.acfTransportedBus			
Attribute	Type	Mult.	Kind	Note
messageType	IEEE1722TpAcfCan MessageTypeEnum	0..1	attr	Definition of the ACF CAN stream message type.

Table E.79: IEEE1722TpAcfCan

Class	IEEE1722TpAcfCanPart			
Note	Definition of one CAN part (frame or frame range) transported over the IEEE1722Tp channel. Tags: atp.Status=candidate			
Base	ARObject, IEEE1722TpAcfBusPart , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	IEEE1722TpAcfBus.acfPart			
Attribute	Type	Mult.	Kind	Note
canAddressing Mode	CanAddressingMode Type	0..1	attr	Defines whether standard or extended address format shall be used.
canBitRate Switch	Boolean	0..1	attr	Defines whether the bit rate switch bit shall be set.
canFrameTx Behavior	CanFrameTxBehavior Enum	0..1	attr	Defines which CAN protocol shall be used for frame transmission.
canIdentifier	PositiveInteger	0..1	attr	Optional Can Id defined in case the Can Id can not be determined during runtime.
canIdentifier Mask	PositiveInteger	0..1	attr	CAN identifier mask which denotes relevant bits in the CAN Identifier. This attribute defines a CAN Identifier range in an alternative way to canIdentifierRange. It identifies the bits of the configured CAN Identifier that must match the received CAN Identifier.
canIdentifier Range	RxIdentifierRange	0..1	aggr	Definition of the identifier range for IEEE1722Tp ACF Can messages. Tags: atp.Status=candidate
sdu	PduTriggering	0..1	ref	Reference to the Pdu transported in the IEEE1722Tp channel. Tags: atp.Status=candidate

Table E.80: IEEE1722TpAcfCanPart

Class	IEEE1722TpAcfConnection			
Note	ACF IEEE1722Tp connection. Tags: atp.Status=candidate atp.recommendedPackage=IEEE1722TpConnections			
Base	ARElement , ARObject , CollectableElement , IEEE1722TpConnection , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
acfMaxTransitTime	TimeValue	0..1	attr	Defines the time offset that is added to the current time at the producer in order to get the "presentation time" (in seconds) when content shall be presented at the consumers.
acfTransportedBus	IEEE1722TpAcfBus	*	aggr	Definition of the transported busses over this ACF connection. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=acfTransportedBus.shortName, acfTransportedBus.variationPoint.shortLabel atp.Status=candidate vh.latestBindingTime=postBuild
collectionThreshold	PositiveInteger	0..1	attr	Defines the size threshold in bytes which, when exceeded, triggers the sending of the IEEE1722Tp ACF message, even when the maximum IEEE1722Tp ACF message size has not been reached yet.
collectionTimeout	TimeValue	0..1	attr	When this timeout expires the IEEE1722Tp ACF message is triggered for sending. The respective timer is started when the first Pdu is put into the IEEE1722Tp ACF message. Defined in seconds.
mixedBusTypeCollection	Boolean	0..1	attr	Defines if this ACF-stream is allowed to collect ACF-messages of different bus kinds (i.e. whether it is allowed to collect CAN and LIN ACF-messages in one ACF-stream message).

Table E.81: IEEE1722TpAcfConnection

Class	IEEE1722TpAcfLin			
Note	ACF IEEE1722Tp bus used for LIN transport. Tags: atp.Status=candidate atp.recommendedPackage=IEEE1722TpConnections			
Base	ARObject , IEEE1722TpAcfBus , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	IEEE1722TpAcfConnection.acfTransportedBus			
Attribute	Type	Mult.	Kind	Note
baseFrequency	PositiveInteger	0..1	attr	CRF base frequency in Hz.
frameSyncEnabled	Boolean	0..1	attr	Defines whether the "fs" (frame sync) shall be enabled.
timestampInterval	PositiveInteger	0..1	attr	CRF timestamp interval as multiple of the baseFrequency.

Table E.82: IEEE1722TpAcfLin

Class	IEEE1722TpAcfLinPart			
Note	Definition of one LIN part transported over the IEEE1722Tp channel. Tags: atp.Status=candidate			
Base	ARObject, IEEE1722TpAcfBusPart , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	IEEE1722TpAcfBus.acfPart			
Attribute	Type	Mult.	Kind	Note
linIdentifier	PositiveInteger	0..1	attr	Optional Lin Id defined in case the Lin Id can not be determined during runtime. Tags: atp.Status=candidate

Table E.83: IEEE1722TpAcfLinPart

Class	IEEE1722TpConnection (abstract)			
Note	Definition of the IEEE1722Tp protocol. Tags: atp.Status=candidate			
Base	ARElement , ARObject, CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Subclasses	IEEE1722TpAcfConnection , IEEE1722TpAvConnection			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
communicationDirection	CommunicationDirectionType	0..1	attr	Communication Direction of the IEEE1722TpConnection. Tags: atp.Status=candidate This Attribute is only used by the AUTOSAR Adaptive Platform.
destinationMacAddress	MacAddressString	0..1	attr	Optional definition of the destination MAC address for this stream. If no given then macAddressStreamId is used as destination MAC address. Tags: atp.Status=candidate
globalTimeDomain	GlobalTimeDomain	0..1	ref	Reference to the GlobalTimeDomain this IEEE1722TpConnection shall be synchronized with. Stereotypes: atp.Splitable; atp.Variation Tags: atp.Splitkey=globalTimeDomain.globalTimeDomain, globalTimeDomain.variationPoint.shortLabel vh.latestBindingTime=systemDesignTime
macAddressStreamId	MacAddressString	0..1	attr	MAC Address part of the Stream Id. Tags: atp.Status=candidate
uniqueStreamId	PositiveInteger	0..1	attr	Unique Id part of the Stream Id. Tags: atp.Status=candidate
version	PositiveInteger	0..1	attr	Version of the IEEE1722TP stream. Tags: atp.Status=candidate
vlanPriority	PositiveInteger	0..1	attr	Optional definition of the VLAN priority for this stream.

Table E.84: IEEE1722TpConnection

Class	IPduPort			
Note	Connectors reception or send port on the referenced channel referenced by a PduTriggering.			
Base	ARObject, CommConnectorPort , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	CommunicationConnector .ecuCommPortInstance			
Attribute	Type	Mult.	Kind	Note
iPduSignalProcessing	IPduSignalProcessingEnum	0..1	attr	Definition of the two signal processing modes Immediate and Deferred for both Tx and Rx IPdus.





Class	IPduPort			
rxSecurityVerification	Boolean	0..1	attr	This attribute defines the bypassing of signature authentication or MAC verification in the receiving ECU. If not defined or set to true the signature authentication or MAC verification shall be performed for the SecuredIPdu. If set to false the signature authentication or MAC verification shall not be performed for the SecuredIPdu.
timestampRxAcceptanceWindow	TimeValue	0..1	attr	This attribute is used to define the maximum allowed deviation in seconds from the expected timestamp for which a SecuredIPdu is still deemed authentic. Please note that this attribute is for documentation only to allow the configuration of required freshness value manager and no upstream mapping is defined for it.
useAuthDataFreshness	Boolean	0..1	attr	This attribute describes whether a part of AuthenticPdu contained in a SecuredIPdu shall be passed on to the SWC that verifies and generates the Freshness. The part of the Authentic-PDU is defined by the authDataFreshnessStartPosition and authDataFreshnessLength.

Table E.85: IPduPort

Class	IPduTiming			
Note	AUTOSAR COM provides the possibility to define two different TRANSMISSION MODES for each IPdu. The Transmission Mode of an IPdu that is valid at a specific point in time is selected using the values of the signals that are mapped to this IPdu. For each IPdu a Transmission Mode Selector is defined. The Transmission Mode Selector is calculated by evaluating the conditions for a subset of signals (class TransmissionModeCondition in the System Template). The Transmission Mode Selector is defined to be true, if at least one Condition evaluates to true and is defined to be false, if all Conditions evaluate to false.			
Base	ARObject, Describable			
Aggregated by	ISignalIPdu.iPduTimingSpecification			
Attribute	Type	Mult.	Kind	Note
minimumDelay	TimeValue	0..1	attr	Minimum Delay in seconds between successive transmissions of this I-PDU, independent of the Transmission Mode.
transmissionModeDeclaration	TransmissionModeDeclaration	0..1	aggr	AUTOSAR COM allows configuring statically two different transmission modes for each I-PDU (True and False). The Transmission Mode Selector evaluates the conditions for a subset of signals and decides the transmission mode. It is possible to switch between the transmission modes during runtime.

Table E.86: IPduTiming

Class	ISignal
Note	Signal of the Interaction Layer. The RTE supports a "signal fan-out" where the same System Signal is sent in different SignalIPdus to multiple receivers. To support the RTE "signal fan-out" each SignalIPdu contains ISignals. If the same System Signal is to be mapped into several SignalIPdus there is one ISignal needed for each ISignalToIPduMapping. ISignals describe the Interface between the Precompile configured RTE and the potentially Postbuild configured Com Stack (see ECUC Parameter Mapping). In case of the SystemSignalGroup an ISignal shall be created for each SystemSignal contained in the SystemSignalGroup. Tags: atp.recommendedPackage=ISignals
Base	ARElement, ARObject, CollectableElement, FibexElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement
Aggregated by	ARPackage.element





Class	ISignal			
Attribute	Type	Mult.	Kind	Note
dataTransformation	DataTransformation	0..1	ref	Optional reference to a DataTransformation which represents the transformer chain that is used to transform the data that shall be placed inside this ISignal. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=dataTransformation.dataTransformation, dataTransformation.variationPoint.shortLabel vh.latestBindingTime=codeGenerationTime
dataTypePolicy	DataTypePolicyEnum	0..1	attr	With the aggregation of SwDataDefProps an ISignal specifies how it is represented on the network. This representation follows a particular policy. Note that this causes some redundancy which is intended and can be used to support flexible development methodology as well as subsequent integrity checks. If the policy "networkRepresentationFromComSpec" is chosen the network representation from the ComSpec that is aggregated by the PortPrototype shall be used. If the "override" policy is chosen the requirements specified in the PortInterface and in the ComSpec are not fulfilled by the networkRepresentationProps. In case the System Description doesn't use a complete Software Component Description (VFB View) the "legacy" policy can be chosen.
initValue	ValueSpecification	0..1	aggr	Optional definition of a ISignal's initValue in case the System Description doesn't use a complete Software Component Description (VFB View). This supports the inclusion of legacy system signals. This value can be used to configure the Signal's "Init Value". If a full DataMapping exist for the SystemSignal this information may be available from a configured Sender ComSpec and ReceiverComSpec. In this case the initvalues in SenderComSpec and/or ReceiverComSpec override this optional value specification. Further restrictions apply from the RTE specification.
iSignalProps	ISignalProps	0..1	aggr	Additional optional ISignal properties that may be stored in different files. Stereotypes: atpSplitable Tags: atp.Splitkey=iSignalProps
iSignalType	ISignalTypeEnum	0..1	attr	This attribute defines whether this iSignal is an array that results in a UINT8_N / UINT8_DYN ComSignalType in the COM configuration or a primitive type.
length	UnlimitedInteger	0..1	attr	Size of the signal in bits. The size needs to be derived from the mapped VariableDataPrototype according to the mapping of primitive DataTypes to BaseTypes as used in the RTE. Indicates maximum size for dynamic length signals. The ISignal length of zero bits is allowed.





Class	ISignal			
network Representation Props	SwDataDefProps	0..1	aggr	Specification of the actual network representation. The usage of SwDataDefProps for this purpose is restricted to the attributes compuMethod and baseType. The optional baseType attributes "memAlignment" and "byteOrder" shall not be used. The attribute "dataPolicy" in the SystemTemplate element defines whether this network representation shall be ignored and the information shall be taken over from the network representation of the ComSpec. If "override" is chosen by the system integrator the network representation can violate against the requirements defined in the PortInterface and in the network representation of the ComSpec. In case that the System Description doesn't use a complete Software Component Description (VFB View) this element is used to configure "ComSignalDataInvalid Value" and the Data Semantics. Stereotypes: atp.Splitable Tags: atp.Splitkey=networkRepresentationProps
reception DefaultValue (ordered)	ValueSpecification	*	aggr	Value used to fill data on the receiver side, if less then expected data is received. The value is expected to cover the entire expected ISignal network payload. Tags: atp.Status=obsolete
systemSignal	SystemSignal	0..1	ref	Reference to the System Signal that is supposed to be transmitted in the ISignal.
timeout Substitution Value	ValueSpecification	0..1	aggr	Defines and enables the ComTimeoutSubstitution for this ISignal.
transformation ISignalProps	TransformationISignal Props	*	aggr	A transformer chain consists of an ordered list of transformers. The ISignal specific configuration properties for each transformer are defined in the TransformationISignalProps class. The transformer configuration properties that are common for all ISignals are described in the TransformationTechnology class. Stereotypes: atp.Splitable Tags: atp.Splitkey=transformationISignalProps

Table E.87: ISignal

Class	ISignalGroup			
Note	SignalGroup of the Interaction Layer. The RTE supports a "signal fan-out" where the same System Signal Group is sent in different SignalPdus to multiple receivers. An ISignalGroup refers to a set of ISignals that shall always be kept together. A ISignalGroup represents a COM Signal Group. Therefore it is recommended to put the ISignalGroup in the same Package as ISignals (see atp.recommendedPackage) Tags: atp.recommendedPackage=ISignalGroups			
Base	ARElement , ARObject , CollectableElement , FibexElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note





Class	ISignalGroup			
comBasedSignalGroupTransformation	DataTransformation	0..1	ref	Optional reference to a DataTransformation which represents the transformer chain that is used to transform the data that shall be placed inside this ISignalGroup based on the COMBasedTransformer approach. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=comBasedSignalGroupTransformation.dataTransformation, comBasedSignalGroupTransformation.variationPoint.shortLabel vh.latestBindingTime=codeGenerationTime
iSignal	ISignal	*	ref	Reference to a set of ISignals that shall always be kept together.
systemSignalGroup	SystemSignalGroup	0..1	ref	Reference to the SystemSignalGroup that is defined on VFB level and that is supposed to be transmitted in the ISignalGroup.
transformationISignalProps	TransformationISignalProps	*	aggr	A transformer chain consists of an ordered list of transformers. The ISignalGroup specific configuration properties for each transformer are defined in the TransformationISignalProps class. The transformer configuration properties that are common for all ISignalGroups are described in the TransformationTechnology class. Stereotypes: atpSplitable Tags: atp.Splitkey=transformationISignalProps

Table E.88: ISignalGroup

Class	ISignalIPdu			
Note	Represents the IPdus handled by Com. The ISignalIPdu assembled and disassembled in AUTOSAR COM consists of one or more signals. In case no multiplexing is performed this IPdu is routed to/from the Interface Layer. A maximum of one dynamic length signal per IPdu is allowed. Tags: atp.recommendedPackage=Pdus			
Base	ARElement , ARObject , CollectableElement , FibexElement , IPdu , Identifiable , MultilanguageReferrable , PackageableElement , Pdu , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
iPduTimingSpecification	IPduTiming	0..1	aggr	Timing specification for Com IPdus (Transmission Modes). This information is mandatory for the sender in a System Extract. This information may be omitted on receivers in a System Extract. atpVariation: The timing of a Pdu can vary. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=iPduTimingSpecification, iPduTimingSpecification.variationPoint.shortLabel vh.latestBindingTime=postBuild
iSignalToPduMapping	ISignalToIPduMapping	*	aggr	Definition of SignalToIPduMappings included in the Signal IPdu. atpVariation: The content of a PDU can be variable. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=iSignalToPduMapping.shortName, iSignalToPduMapping.variationPoint.shortLabel vh.latestBindingTime=postBuild





Class	ISignalIPdu			
unusedBitPattern	Integer	0..1	attr	AUTOSAR COM and AUTOSAR IPDUM are filling not used areas of an IPDU with this bit-pattern. This attribute is mandatory to avoid undefined behavior. This byte-pattern will be repeated throughout the IPdu.

Table E.89: ISignalIPdu

Class	ISignalPort			
Note	Connectors reception or send port on the referenced channel referenced by an ISignalTriggering. If different timeouts or DataFilters for ISignals need to be specified several ISignalPorts may be created.			
Base	ARObject, CommConnectorPort , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	CommunicationConnector .ecuCommPortInstance			
Attribute	Type	Mult.	Kind	Note
dataFilter	DataFilter	0..1	aggr	Optional specification of a signal COM filter at the receiver side in case that the System Description doesn't use a complete Software Component Description (VFB View). This supports the inclusion of legacy system signals. If a full DataMapping exist for the SystemSignal this information may be available from a configured ReceiverComSpec. In this case the ReceiverComSpec overrides this optional specification.
ddsQosProfile	DdsCpQosProfile	0..1	ref	Reference to the DDS Qos profile used for this ISignal. Tags: atp.Status=candidate
firstTimeout	TimeValue	0..1	attr	- ISignalPort with communicationDirection = in: Optional first timeout value in seconds for the reception of the ISignal. - ISignalPort with communicationDirection = out: Optional first timeout value in seconds for transmission deadline monitoring.
handleInvalid	HandleInvalidEnum	0..1	attr	This attribute defines how invalidation is applied to the ISignals received in the context of this ISignalPort.
timeout	TimeValue	0..1	attr	- ISignalPort with communicationDirection = in: Optional timeout value in seconds for the reception of the ISignal. The attribute value is used to configure the Com Timeout in the COM module. The RTE ignores this attribute. The timeout can also be specified with the NonqueuedReceiverComSpec.aliveTimeout attribute. If a full DataMapping exists for the SystemSignal and the value is available in the configured ReceiverComSpec, then the timeout value in the ReceiverComSpec overrides this optional timeout specification during the creation of the Base Ecu Configuration of the COM module. - ISignalPort with communicationDirection = out: Optional timeout value in seconds for the transmission of the ISignal. The attribute value is used to configure the ComTimeout in the COM module. The RTE ignores this attribute. The timeout can also be specified with the SenderComSpec.transmissionAcknowledge.timeout attribute. If a full DataMapping exists for the SystemSignal and the value is available in the configured SenderComSpec, then the timeout value in the SenderComSpec overrides this optional timeout specification during the creation of the Base Ecu Configuration of the COM module.





Class	ISignalPort			
				This attribute can be used in the following cases: • legacy signal where the System Description doesn't use a complete Software Component Description (VFB View) and where the DataMapping is missing. • bus monitoring use cases in which the DataMapping is ignored.

Table E.90: ISignalPort

Class	ISignalToIPduMapping			
Note	An ISignalToIPduMapping describes the mapping of ISignals to ISignalIPdus and defines the position of the ISignal within an ISignalIPdu.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	ISignalIPdu.iSignalToPduMapping , NmPdu.iSignalToIPduMapping			
Attribute	Type	Mult.	Kind	Note
iSignal	ISignal	0..1	ref	Reference to a ISignal that is mapped into the ISignalIPdu. Each ISignal contained in the ISignalGroup shall be mapped into an IPdu by an own ISignalToIPduMapping. The references to the ISignal and to the ISignalGroup in an ISignalToIPduMapping are mutually exclusive.
iSignalGroup	ISignalGroup	0..1	ref	Reference to an ISignalGroup that is mapped into the SignalIPdu. If an ISignalToIPduMapping for an ISignal Group is defined, only the UpdateIndicationBitPosition and the transferProperty is relevant. The startPosition and the packingByteOrder shall be ignored. Each ISignal contained in the ISignalGroup shall be mapped into an IPdu by an own ISignalToIPduMapping. The references to the ISignal and to the ISignalGroup in an ISignalToIPduMapping are mutually exclusive.
packingByteOrder	ByteOrderEnum	0..1	attr	This parameter defines the order of the bytes of the signal and the packing into the SignalIPdu. The byte ordering "Little Endian" (MostSignificantByteLast), "Big Endian" (MostSignificantByteFirst) and "Opaque" can be selected. For opaque data endianness conversion shall be configured to Opaque. The value of this attribute impacts the absolute position of the signal into the SignalIPdu (see the startPosition attribute description). For an ISignalGroup the packingByteOrder is irrelevant and shall be ignored.
startPosition	UnlimitedInteger	0..1	attr	This parameter is necessary to describe the bitposition of a signal within an SignalIPdu. It denotes the least significant bit for "Little Endian" and the most significant bit for "Big Endian" packed signals within the IPdu (see the description of the packingByteOrder attribute). In AUTOSAR the bit counting is always set to "sawtooth" and the bit order is set to "Decreasing". The bit counting in byte 0 starts with bit 0 (least significant bit). The most significant bit in byte 0 is bit 7. Please note that the way the bytes will be actually sent on the bus does not impact this representation: they will always be seen by the software as a byte array. If a mapping for the ISignalGroup is defined, this attribute is irrelevant and shall be ignored.
transferProperty	TransferPropertyEnum	0..1	attr	Defines how the referenced ISignal contributes to the send triggering of the ISignalIPdu.





Class	ISignalToIPduMapping			
updateIndicationBitPosition	UnlimitedInteger	0..1	attr	The UpdateIndicationBit indicates to the receivers that the signal (or the signal group) was updated by the sender. Length is always one bit. The UpdateIndicationBitPosition attribute describes the position of the update bit within the SignalIPdu. For Signals of a ISignalGroup this attribute is irrelevant and shall be ignored. Note that the exact bit position of the updateIndicationBitPosition is linked to the value of the attribute packingByteOrder because the method of finding the bit position is different for the values mostSignificantByteFirst and mostSignificantByteLast. This means that if the value of packingByteOrder is changed while the value of updateIndicationBitPosition remains unchanged the exact bit position of updateIndicationBitPosition within the enclosing ISignalIPdu still undergoes a change. This attribute denotes the least significant bit for "Little Endian" and the most significant bit for "Big Endian" packed signals within the IPdu (see the description of the packingByteOrder attribute). In AUTOSAR the bit counting is always set to "sawtooth" and the bit order is set to "Decreasing". The bit counting in byte 0 starts with bit 0 (least significant bit). The most significant bit in byte 0 is bit 7.

Table E.91: ISignalToIPduMapping

Class	ISignalTriggering			
Note	A ISignalTriggering allows an assignment of ISignals to physical channels.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	PhysicalChannel .ISignalTriggering			
Attribute	Type	Mult.	Kind	Note
iSignal	ISignal	0..1	ref	This reference shall be used if an ISignal is transported on the PhysicalChannel. This reference forms an XOR relationship with the ISignalTriggering-ISignalGroup reference.
iSignalGroup	ISignalGroup	0..1	ref	This reference shall be used if an ISignalGroup is transported on the PhysicalChannel. This reference forms an XOR relationship with the ISignalTriggering-ISignal reference.
iSignalPort	ISignalPort	*	ref	References to the ISignalPort on every ECU of the system which sends and/or receives the ISignal. References for both the sender and the receiver side shall be included when the system is completely defined.

Table E.92: ISignalTriggering

Class	Identifiable (abstract)
Note	Instances of this class can be referred to by their identifier (within the namespace borders). In addition to this, Identifiables are objects which contribute significantly to the overall structure of an AUTOSAR description. In particular, Identifiables might contain Identifiables.
Base	ARObject, MultilanguageReferrable , Referrable





Class	Identifiable (abstract)			
Subclasses	ARPackage, AbstractDolpLogicAddressProps, AbstractEvent, AbstractFunctionalClusterDesign, AbstractImplementationDataTypeElement, AbstractSecurityEventFilter, AbstractSecurityIdsmInstanceFilter, AbstractServiceInstance, AbstractSignalBasedToSignalTriggeringMapping, AdaptiveSwcInternalBehavior, ApApplicationEndpoint, ApmcAbstractDefinition, ApmcConfigurationElementDef, ApmcContainerElementValue, ApmcContainerValue, ApmcEnumerationLiteralDef, ApplicationEndpoint, ApplicationError, AppliedStandard, ArtifactChecksum, ArtifactLocator, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpFeature, AutosarOperationArgumentInstance, AutosarVariableInstance, BuildActionEntity, BuildActionEnvironment, Chapter, CheckpointTransition, ClientIdDefinition, ClientServerOperation, Code, CollectableElement, ComManagementMapping, CommConnectorPort, CommunicationConnector, CommunicationController, Compiler, ConsistencyNeeds, ConsumedEventGroup, CouplingPort, CouplingPortAbstractShaper, CouplingPortStructuralElement, CryptoCertificate, CryptoCertificateGroup, CryptoKeySlot, CryptoKeySlotDesign, CryptoKeySlotUsageDesign, CryptoProvider, CryptoServiceMapping, DataPrototypeGroup, DataPrototypeTransformationPropsIdent, DataTransformation, DdsAbstractServiceInstanceElementCp, DdsCpDomain, DdsCpPartition, DdsCpQosProfile, DdsCpTopic, DdsDomainRange, DependencyOnArtifact, DiagEventDebounceAlgorithm, DiagnosticAbstractSovdContent, DiagnosticAuthTransmitCertificateEvaluation, DiagnosticConnectedIndicator, DiagnosticDataElement, DiagnosticDebounceAlgorithmProps, DiagnosticExtendedDataRecordElement, DiagnosticFunctionInhibitSource, DiagnosticParameterElement, DiagnosticRoutineSubfunction, DiagnosticSovdMethodPrimitive, DltApplication, DltArgument, DltArgumentProps, DltMessage, DolpInterface, DolpLogicAddress, DolpLogicalAddress, DolpNetworkConfigurationDesign, DolpRoutingActivation, E2EProfileConfiguration, End2EndEventProtectionProps, End2EndMethodProtectionProps, EthernetWakeupSleepOnDataLineConfig, EventHandler, EventMapping, ExclusiveArea, ExecutableEntity, ExecutionTime, FMAttributeDef, FMFeatureMapAssertion, FMFeatureMapCondition, FMFeatureMapElement, FMFeatureRelation, FMFeatureRestriction, FMFeatureSelection, FieldMapping, FireAndForgetMethodMapping, FlexrayArTpNode, FlexrayTpPduPool, FrameTriggering, GeneralParameter, GlobalSupervision, GlobalTimeGateway, GlobalTimeMaster, GlobalTimeSlave, HealthChannel, HeapUsage, HwAttributeDef, HwAttributeLiteralDef, HwPin, HwPinGroup, IEEE1722TpAcfBus, IEEE1722TpAcfBusPart, IPSecRule, IPv6ExtHeaderFilterList, ISignalToIPduMapping, ISignalTriggering, IdentCaption, ImpositionTime, InternalTriggeringPoint, Keyword, LifeCycleState, Linker, MacAddressVlanMembership, MacMulticastGroup, MacSecKayParticipant, McDataInstance, MemorySection, MemoryUsage, MethodMapping, ModeDeclaration, ModeDeclarationMapping, ModeSwitchPoint, ModeSwitchSenderComSpecProps, NetworkEndpoint, NmCluster, NmNode, PackageableElement, ParameterAccess, PduActivationRoutingGroup, PduToFrameMapping, PduTriggering, PerInstanceMemory, PersistencyDeploymentElement, PersistencyInterfaceElement, PhmSupervision, PhysicalChannel, PortGroup, PortInterfaceMapping, ProcessToMachineMapping, Processor, ProcessorCore, PskIdentityToKeySlotMapping, QueuedReceiverComSpecProps, ResourceConsumption, ResourceGroup, RootSwClusterDesignComponentPrototype, RootSwComponentPrototype, RootSwCompositionPrototype, RptComponent, RptContainer, RptExecutableEntity, RptExecutableEntityEvent, RptExecutionContext, RptProfile, RptServicePoint, RunnableEntityGroup, SdgAttribute, SdgClass, SecOcJobMapping, SecOcJobRequirement, SecureCommunicationAuthenticationProps, SecureCommunicationDeployment, SecureCommunicationFreshnessProps, SecurityEventContextDataElement, SecurityEventContextProps, ServerComSpecProps, ServiceInterfaceDeploymentElement, ServiceInterfaceElementSecureComConfig, ServiceNeeds, SignalServiceTranslationEventProps, SignalServiceTranslationProps, SocketAddress, SoftwarePackageStep, SomeipEventGroup, SomeipProvidedEventGroup, SomeipTpChannel, StackUsage, StateManagementActionItem, StateManagementActionList, StateManagementStateNotification, StateManagementStateRequest, StaticSocketConnection, StructuredReq, SupervisionCheckpoint, SupervisionMode, SupervisionModeCondition, SwGenericAxisParamType, SwServiceArg, SwcServiceDependency, SystemMapping, TimeBaseResource, TimingClock, TimingClockSyncAccuracy, TimingCondition, TimingConstraint, TimingDescription, TimingExtensionResource, TimingModelInstance, TlsCryptoCipherSuite, TlsCryptoCipherSuiteProps, TlsJobMapping, Topic1, TpAddress, TraceableTable, TraceableText, TracedFailure, TransformationISignalPropsIdent, TransformationProps, TransformationTechnology, Trigger, UcmDescription, UcmRetryStrategy, UcmStep, UriDescription, VariableAccess, VariationPointProxy, VehicleRolloutStep, ViewMap, VlanConfig, WaitPoint			
Attribute	Type	Mult.	Kind	Note
adminData	AdminData	0..1	aggr	This represents the administrative data for the identifiable object. Stereotypes: atpSplittable Tags: atp.Splitkey=adminData xml.sequenceOffset=-40





Class	Identifiable (abstract)			
annotation	Annotation	*	aggr	Possibility to provide additional notes while defining a model element (e.g. the ECU Configuration Parameter Values). These are not intended as documentation but are mere design notes. Tags: xml.sequenceOffset=-25
category	CategoryString	0..1	attr	The category is a keyword that specializes the semantics of the Identifiable. It affects the expected existence of attributes and the applicability of constraints. Tags: xml.sequenceOffset=-50
desc	MultiLanguageOverviewParagraph	0..1	aggr	This represents a general but brief (one paragraph) description what the object in question is about. It is only one paragraph! Desc is intended to be collected into overview tables. This property helps a human reader to identify the object in question. More elaborate documentation, (in particular how the object is built or used) should go to "introduction". Tags: xml.sequenceOffset=-60
introduction	DocumentationBlock	0..1	aggr	This represents more information about how the object in question is built or is used. Therefore it is a DocumentationBlock. Tags: xml.sequenceOffset=-30
uuid	String	0..1	attr	The purpose of this attribute is to provide a globally unique identifier for an instance of a meta-class. The values of this attribute should be globally unique strings prefixed by the type of identifier. For example, to include a DCE UUID as defined by The Open Group, the UUID would be preceded by "DCE:". The values of this attribute may be used to support merging of different AUTOSAR models. The form of the UUID (Universally Unique Identifier) is taken from a standard defined by the Open Group (was Open Software Foundation). This standard is widely used, including by Microsoft for COM (GUIDs) and by many companies for DCE, which is based on CORBA. The method for generating these 128-bit IDs is published in the standard and the effectiveness and uniqueness of the IDs is not in practice disputed. If the id namespace is omitted, DCE is assumed. An example is "DCE:2fac1234-31f8-11b4-a222-08002b34c003". The uuid attribute has no semantic meaning for an AUTOSAR model and there is no requirement for AUTOSAR tools to manage the timestamp. Tags: xml.attribute=true

Table E.93: Identifiable

Class	ImplementationDataType			
Note	Describes a reusable data type on the implementation level. This will typically correspond to a typedef in C-code. Tags: atp.recommendedPackage=ImplementationDataTypes			
Base	ARElement , ARObject , AbstractImplementationDataType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , AutosarDataType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dynamicArraySizeProfile	String	0..1	attr	Specifies the profile which the array will follow in case this data type is a variable size array.





Class	ImplementationDataType			
isStructWithOptionalElement	Boolean	0..1	attr	This attribute is only valid if the attribute category is set to STRUCTURE. If set to true, this attribute indicates that the ImplementationDataType has been created with the intention to define at least one element of the structure as optional.
subElement (ordered)	ImplementationDataTypeElement	*	aggr	Specifies an element of an array, struct, or union data type. The aggregation of ImplementationDataTypeElement is subject to variability with the purpose to support the conditional existence of elements inside a ImplementationDataType representing a structure. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=subElement.shortName, subElement.variationPoint.shortLabel vh.latestBindingTime=preCompileTime
symbolProps	SymbolProps	0..1	aggr	This represents the SymbolProps for the ImplementationDataType. Stereotypes: atpSplittable Tags: atp.Splitkey=symbolProps.shortName
typeEmitter	NameToken	0..1	attr	This attribute is used to control which part of the AUTOSAR toolchain is supposed to trigger data type definitions.

Table E.94: ImplementationDataType

Class	ImplementationDataTypeElement			
Note	Declares a data object which is locally aggregated. Such an element can only be used within the scope where it is aggregated. This element either consists of further subElements or it is further defined via its swDataDefProps. There are several use cases within the system of ImplementationDataTypes for such a local declaration: • It can represent the elements of an array, defining the element type and array size • It can represent an element of a struct, defining its type • It can be the local declaration of a debug element.			
Base	ARObject, AbstractImplementationDataTypeElement, AtpClassifier, AtpFeature, AtpStructureElement, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	AtpClassifier.atpFeature, ImplementationDataType.subElement, ImplementationDataTypeElement.subElement			
Attribute	Type	Mult.	Kind	Note
arrayImplPolicy	ArrayImplPolicyEnum	0..1	attr	This attribute controls the implementation of the payload of an array. It shall only be used if the enclosing ImplementationDataType constitutes an array.
arraySize	PositiveInteger	0..1	attr	The existence of this attributes (if bigger than 0) defines the size of an array and declares that this ImplementationDataTypeElement represents the type of each single array element. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime
arraySizeHandling	ArraySizeHandlingEnum	0..1	attr	The way how the size of the array is handled in case of a variable size array.
arraySizeSemantics	ArraySizeSemanticsEnum	0..1	attr	This attribute controls the meaning of the value of the array size.





Class	ImplementationDataTypeElement			
isOptional	Boolean	0..1	attr	This attribute represents the ability to declare the enclosing <code>ImplementationDataTypeElement</code> as optional. This means that, at runtime, the <code>ImplementationDataTypeElement</code> may or may not have a valid value and shall therefore be ignored. The underlying runtime software provides means to set the <code>CppImplementationDataTypeElement</code> as not valid at the sending end of a communication and determine its validity at the receiving end.
subElement (ordered)	ImplementationDataTypeElement	*	aggr	Element of an array, struct, or union in case of a nested declaration (i.e. without using "typedefs"). The aggregation of <code>ImplementationDataTypeElement</code> is subject to variability with the purpose to support the conditional existence of elements inside a <code>ImplementationDataType</code> representing a structure. Stereotypes: <code>atpSplitable</code> ; <code>atpVariation</code> Tags: <code>atp.Splitkey=subElement.shortName</code> , <code>subElement.variationPoint.shortLabel</code> <code>vh.latestBindingTime=preCompileTime</code>
swDataDef Props	SwDataDefProps	0..1	aggr	The properties of this <code>ImplementationDataTypeElement</code> .

Table E.95: ImplementationDataTypeElement

Class	InternalConstrs			
Note	This meta-class represents the ability to express internal constraints.			
Base	ARObject			
Aggregated by	DataConstrRule.internalConstrs			
Attribute	Type	Mult.	Kind	Note
lowerLimit	Limit	0..1	attr	This specifies the lower limit of the constraint. Stereotypes: <code>atpVariation</code> Tags: <code>vh.latestBindingTime=preCompileTime</code> <code>xml.sequenceOffset=20</code>
maxDiff	Numerical	0..1	attr	Maximum difference that is permitted between two consecutive values if the constraint is applied to an axis. Tags: <code>xml.sequenceOffset=60</code>
maxGradient	Numerical	0..1	attr	This element specifies the maximum slope that may be used in maps and curves. Tags: <code>xml.sequenceOffset=50</code>
monotony	MonotonyEnum	0..1	attr	This element specifies the monotony characteristics of the current internal or physical limits. The following table shows the monotony characteristics which are to be filled through the corresponding values. If the element has no contents or if it is omitted, "no Monotony" is the default content. Tags: <code>xml.sequenceOffset=70</code>
upperLimit	Limit	0..1	attr	This specifies the upper limit defined by the constraint. Stereotypes: <code>atpVariation</code> Tags: <code>vh.latestBindingTime=preCompileTime</code> <code>xml.sequenceOffset=30</code>

Table E.96: InternalConstrs

Class	MacMulticastConfiguration			
Note	References a per cluster globally defined MAC-Multicast-Group.			
Base	ARObject, NetworkEndpointAddress			
Aggregated by	NetworkEndpoint.networkEndpointAddress			
Attribute	Type	Mult.	Kind	Note
macMulticastGroup	MacMulticastGroup	0..1	ref	Reference to a macMulticastGroup. Stereotypes: atpIdentityContributor

Table E.97: MacMulticastConfiguration

Class	ModeSwitchInterface			
Note	A mode switch interface declares a ModeDeclarationGroupPrototype to be sent and received. Tags: atp.recommendedPackage=PortInterfaces			
Base	ARElement , ARObject, AtpBlueprint, AtpBlueprintable, AtpClassifier, AtpType, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
modeGroup	ModeDeclarationGroupPrototype	0..1	aggr	The ModeDeclarationGroupPrototype of this mode interface.

Table E.98: ModeSwitchInterface

Class	MultiplexedIPdu			
Note	A MultiplexedPdu (i.e. NOT a COM I-PDU) contains a DynamicPart, an optional StaticPart and a selector Field. In case of multiplexing this IPdu is routed between the Pdu Multiplexer and the Interface Layer. A multiplexer is used to define variable parts within an IPdu that may carry different signals. The receivers of such a IPdu can determine which signalPdu are transmitted by evaluating the selector field, which carries a unique selector code for each sub-part. Tags: atp.recommendedPackage=Pdus			
Base	ARElement , ARObject, CollectableElement, FibexElement, IPdu, Identifiable , MultilanguageReferrable, PackageableElement , Pdu , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dynamicPart	DynamicPart	0..1	aggr	According to the value of the selector field some parts of the IPdu have a different layout. In a complete System Description a MultiplexedIPdu shall contain a Dynamic Part. The following use cases support the multiplicity to be 0..1: • If a MultiplexedIPdu is received by a Pdu Gateway and is not delivered to the IPduM but routed directly to a bus interface then the content of the MultiplexedIPdu doesn't need to be described in the System Extract/Ecu Extract. • If a MultiplexedIPdu is received by an ECU which is only interested in the static part of the MultiplexedIPdu then the dynamicPart does not need to be described in the System Extract/Ecu Extract. atpVariation: Content of a multiplexed PDU can vary. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=dynamicPart, dynamicPart.variation Point.shortLabel vh.latestBindingTime=postBuild





Class	MultiplexedIPdu			
selectorField ByteOrder	ByteOrderEnum	0..1	attr	This attribute defines the order of the bytes of the selector field and the packing into the MultiplexedIPdu. Please consider that [constr_3247] and [constr_3223] are restricting the usage of this attribute. In a complete System Description this attribute is mandatory. If a MultiplexedPdu is received by a Pdu Gateway and is not delivered to the IPduM but routed directly to a bus interface then the content of the MultiplexedPdu doesn't need to be described in the System Extract/Ecu Extract. To support this use case the multiplicity is set to 0..1.
selectorField Length	Integer	0..1	attr	The size in bits of the selector field shall be configurable in a range of 1-16 bits. In a complete System Description this attribute is mandatory. If a MultiplexedPdu is received by a Pdu Gateway and is not delivered to the IPduM but routed directly to a bus interface then the content of the MultiplexedPdu doesn't need to be described in the System Extract/Ecu Extract. To support this use case the multiplicity is set to 0..1.
selectorField StartPosition	Integer	0..1	attr	This parameter is necessary to describe the position of the selector field within the IPdu. Note that the absolute position of the selectorField in the MultiplexedIPdu is determined by the definition of the selectorFieldByteOrder attribute of the Multiplexed Pdu. If Big Endian is specified, the start position indicates the bit position of the most significant bit in the IPdu. If Little Endian is specified, the start position indicates the bit position of the least significant bit in the IPdu. In AUTOSAR the bit counting is always set to "sawtooth" and the bit order is set to "Decreasing". The bit counting in byte 0 starts with bit 0 (least significant bit). The most significant bit in byte 0 is bit 7. In a complete System Description this attribute is mandatory. If a MultiplexedPdu is received by a Pdu Gateway and is not delivered to the IPduM but routed directly to a bus interface then the content of the MultiplexedPdu doesn't need to be described in the System Extract/Ecu Extract. To support this use case the multiplicity is set to 0..1.
staticPart	StaticPart	0..1	aggr	The static part of the multiplexed IPdu is the same regardless of the selector field. The static part is optional. atpVariation: Content of a multiplexed PDU can vary. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=staticPart, staticPart.variationPoint.short Label vh.latestBindingTime=postBuild
triggerMode	TriggerMode	0..1	attr	IPduM can be configured to send a transmission request for the new multiplexed IPdu to the PDU-Router because of the trigger conditions/ modes that are described in the TriggerMode enumeration. In a complete System Description this attribute is mandatory. If a MultiplexedPdu is received by a Pdu Gateway and is not delivered to the IPduM but routed directly to a bus interface then the content of the MultiplexedPdu doesn't need to be described in the System Extract/Ecu Extract. To support this use case the multiplicity is set to 0..1.





Class	MultiplexedIPdu			
unusedBit Pattern	Integer	0..1	attr	AUTOSAR COM and AUTOSAR IPDUM are filling not used areas of an IPdu with this bit-pattern. This attribute is mandatory to avoid undefined behavior. This byte-pattern will be repeated throughout the IPdu. In a complete System Description this attribute is mandatory. If a MultiplexedPdu is received by a Pdu Gateway and is not delivered to the IPduM but routed directly to a bus interface then the content of the MultiplexedPdu doesn't need to be described in the System Extract/Ecu Extract. To support this use case the multiplicity is set to 0..1.

Table E.99: MultiplexedIPdu

Primitive	NameToken
Note	This is an identifier as used in xml, e.g. xml-names. Typical usages are, for example, the names of type emitters, protocols, or profiles. For details see NMTOKEN definition on the W3C website (https://www.w3.org/TR/xml/#NT-Nmtoken). Note: Although NameToken supports a wide range of characters, the actually allowed patterns for a certain attribute typed by NameToken may be further restricted by the specification of that attribute. Tags: xml.xsd.customType=NMTOKEN-STRING xml.xsd.type=NMTOKEN

Table E.100: NameToken

Class	NotAvailableValueSpecification			
Note	This meta-class provides the ability to specify a ValueSpecification to state that the respective element is not available. This ability is needed to support the existence of ApplicationRecordElements where attribute isOptional ist set to the value true.			
Base	ARObject, ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key, ApplicationAssocMapElementValueSpecification.value, ArrayValueSpecification.element, CalibrationParameterValue.applInitValue, CalibrationParameterValue.implInitValue, ConstantSpecification.valueSpec, CryptoServiceKey.developmentValue, DiagnosticEnvDataCondition.compareValue, DiagnosticEnvDataElementCondition.compareValue, DiagnosticEnvSovdDataCondition.compareValue, FieldSenderComSpec.initValue, ISignal.initValue, ISignal.receptionDefaultValue, ISignal.timeoutSubstitutionValue, NonqueuedReceiverComSpec.initValue, NonqueuedReceiverComSpec.timeoutSubstitutionValue, NonqueuedSenderComSpec.initValue, NvProvideComSpec.ramBlockInitValue, NvProvideComSpec.romBlockInitValue, NvRequireComSpec.initValue, ParameterDataPrototype.initValue, ParameterProvideComSpec.initValue, ParameterRequireComSpec.initValue, PersistencyDataRequiredComSpec.initValue, PersistencyKeyValuePair.initValue, PortDefinedArgumentValue.value, PortPrototypeBlueprintInitValue.value, RecordValueSpecification.field, SomeipEventDeployment.eventReceptionDefaultValue, StateManagementCompareCondition.compareValue, SwDataDefProps.invalidValue, UserDefinedEventDeployment.eventReceptionDefaultValue, VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
defaultPattern	PositiveInteger	0..1	attr	The content of this attribute shall be used to initialize gaps in the memory occupied by a structured data type in the case that an NotAvailableValueSpecification is used. Note that this pattern is only applied during initialization!

Table E.101: NotAvailableValueSpecification

Class	NumericalValueSpecification			
Note	A numerical ValueSpecification which is intended to be assigned to a Primitive data element. Note that the numerical value is a variant, it can be computed by a formula.			
Base	ARObject, ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key, ApplicationAssocMapElementValueSpecification.value, ArrayValueSpecification.element, CalibrationParameterValue.applInitValue, CalibrationParameterValue.implInitValue, ConstantSpecification.valueSpec, CryptoServiceKey.developmentValue , DiagnosticEnvDataCondition.compareValue, DiagnosticEnvDataElementCondition.compareValue , DiagnosticEnvSovdDataCondition.compareValue , FieldSenderComSpec.initValue, ISignal.initValue, ISignal.receptionDefaultValue, ISignal.timeoutSubstitutionValue, NonqueuedReceiverComSpec.initValue, NonqueuedReceiverComSpec.timeoutSubstitutionValue, NonqueuedSenderComSpec.initValue, NvProvideComSpec.ramBlockInitValue, NvProvideComSpec.romBlockInitValue, NvRequireComSpec.initValue, ParameterDataPrototype.initValue, ParameterProvideComSpec.initValue, ParameterRequireComSpec.initValue, PersistencyDataRequiredComSpec.initValue , PersistencyKeyValuePair.initValue , PortDefinedArgumentValue.value, PortPrototypeBlueprintInitValue.value, RecordValueSpecification.field , SomeipEventDeployment.eventReceptionDefaultValue , StateManagementCompareCondition.compareValue , SwDataDefProps.invalidValue, UserDefinedEventDeployment.eventReceptionDefaultValue, VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
value	Numerical	0..1	attr	This is the value itself. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime

Table E.102: NumericalValueSpecification

Class	PPortComSpec (abstract)			
Note	Communication attributes of a provided PortPrototype . This class will contain attributes that are valid for all kinds of provide ports, independent of client-server or sender-receiver communication patterns.			
Base	ARObject			
Subclasses	ModeSwitchSenderComSpec, NvProvideComSpec, ParameterProvideComSpec, SenderComSpec , ServerComSpec			
Aggregated by	AbstractProvidedPortPrototype.providedComSpec , PortPrototypeBlueprint.providedComSpec			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table E.103: PPortComSpec

Class	PPortPrototype			
Note	Component port providing a certain port interface.			
Base	ARObject, AbstractProvidedPortPrototype , AtpBlueprintable, AtpFeature, AtpPrototype, Identifiable , MultilanguageReferrable, PortPrototype , Referrable			
Aggregated by	AtpClassifier.atpFeature, SwComponentType.port			
Attribute	Type	Mult.	Kind	Note
provided interface	PortInterface	0..1	tref	The interface that this port provides. Stereotypes: isOfType

Table E.104: PPortPrototype

Class	PRPortPrototype			
Note	This kind of PortPrototype can take the role of both a required and a provided PortPrototype.			
Base	ARObject, AbstractProvidedPortPrototype , AbstractRequiredPortPrototype , AtpBlueprintable, AtpFeature, AtpPrototype, Identifiable , MultilanguageReferrable, PortPrototype , Referrable			
Aggregated by	AtpClassifier.atpFeature, SwComponentType.port			





Class	PRPortPrototype			
Attribute	Type	Mult.	Kind	Note
provided Required Interface	PortInterface	0..1	tref	This represents the PortInterface used to type the PRPortPrototype. Stereotypes: isOfType

Table E.105: PRPortPrototype

Class	PackageableElement (abstract)			
Note	This meta-class specifies the ability to be a member of an AUTOSAR package.			
Base	ARObject, CollectableElement, Identifiable, MultilanguageReferrable, Referrable			
Subclasses	ARElement, EnumerationMappingTable, FibexElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.106: PackageableElement

Class	Pdu (abstract)			
Note	Collection of all Pdus that can be routed through a bus interface.			
Base	ARElement, ARObject, CollectableElement, FibexElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement			
Subclasses	GeneralPurposePdu, IPdu, NmPdu, UserDefinedPdu			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
hasDynamic Length	Boolean	0..1	attr	This attribute defines whether the Pdu has dynamic length (true) or not (false). Please note that the usage of this attribute is restricted by [constr_3448].
length	UnlimitedInteger	0..1	attr	Pdu length in bytes. In case of dynamic length IPdus (containing a dynamical length signal), this value indicates the maximum data length. It should be noted that in former AUTOSAR releases (Rel 2.1, Rel 3.0, Rel 3.1, Rel 4.0 Rev. 1) this parameter was defined in bits. The Pdu length of zero bytes is allowed.

Table E.107: Pdu

Class	PduTriggering			
Note	The PduTriggering describes on which channel the IPdu is transmitted. The Pdu routing by the PduR is only allowed for subclasses of IPdu. Depending on its relation to entities such channels and clusters it can be unambiguously deduced whether a fan-out is handled by the Pdu router or the Bus Interface. If the fan-out is specified between different clusters it shall be handled by the Pdu Router. If the fan-out is specified between different channels of the same cluster it shall be handled by the Bus Interface.			
Base	ARObject, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	PhysicalChannel.pduTriggering			
Attribute	Type	Mult.	Kind	Note





Class	PduTriggering			
iPdu	Pdu	0..1	ref	Reference to the Pdu for which the PduTriggering is defined. One I-Pdu can be triggered on different channels (PduR fan-out). The Pdu routing by the PduR is only allowed for subclasses of iPdu. Nevertheless is the reference to the Pdu element necessary since the PduTriggering element is also used to specify the sending and receiving connections to Ecu Ports.
iPduPort	IPduPort	*	ref	References to the IPduPort on every ECU of the system which sends and/or receives the I-PDU. References for both the sender and the receiver side shall be included when the system is completely defined.
iSignalTriggering	ISignalTriggering	*	ref	This reference provides the relationship to the ISignalTriggerings that are implemented by the PduTriggering. The reference is optional since no ISignalTriggering can be defined for DCM and Multiplexed Pdus. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=iSignalTriggering.iSignalTriggering, iSignalTriggering.variationPoint.shortLabel vh.latestBindingTime=postBuild
secOcCryptoMapping	SecOcCryptoServiceMapping	0..1	ref	This reference identifies the crypto profile applicable to the usage (send, receive) of the also referenced Secured IPdu. Obviously, this reference is only applicable if the PduTriggering also references a SecuredIPdu in the role i Pdu. Tags: atp.Status=obsolete
secOcCryptoServiceMapping	SecOcCryptoServiceMapping	0..1	ref	This reference identifies the crypto profile applicable to the usage (send, receive) of the also referenced Secured IPdu. Obviously, this reference is only applicable if the PduTriggering also references a SecuredIPdu in the role i Pdu. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=secOcCryptoServiceMapping.secOcCryptoServiceMapping, secOcCryptoServiceMapping.variationPoint.shortLabel vh.latestBindingTime=postBuild
triggerIPduSendCondition	TriggerIPduSendCondition	*	aggr	Defines the trigger for the Com_TriggerIPDUSend API call. Only if all defined TriggerIPduSendConditions evaluate to true (AND associated) the Com_TriggerIPDUSend API shall be called.

Table E.108: PduTriggering

Class	PhmStateReference (abstract)			
Note	Definition of state dependency. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject			
Subclasses	FunctionGroupPhmStateReference			
Aggregated by	SupervisionModeCondition.stateReference			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table E.109: PhmStateReference

Class	PhmSupervision (abstract)			
Note	Defines explicitly that NO supervision shall be applied for a set of SupervisionCheckpoints. This Class is only used by the AUTOSAR Adaptive Platform.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Subclasses	AliveSupervision , DeadlineSupervision , LogicalSupervision , NoCheckpointSupervision , NoSupervision			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.110: PhmSupervision

Class	PortGroup			
Note	Group of ports which share a common functionality. Example: need specific network resources. This information shall be available on the VFB level in order to delegate it properly via compositions. When propagated into the ECU extract, this information is used as input for the configuration of Services like the Communication Manager. A PortGroup is defined locally in a component (which can be a composition) and refers to the "outer" ports belonging to the group as well as to the "inner" groups which propagate this group into the components which are part of a composition. A PortGroup within an atomic SWC cannot be linked to inner groups.			
Base	ARObject, AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AtpClassifier.atpFeature , SwComponentType.portGroup			
Attribute	Type	Mult.	Kind	Note
innerGroup	PortGroup	*	iref	Links a PortGroup in a composition to another PortGroup, that is defined in a component which is part of this CompositionSwComponentType. InstanceRef implemented by: InnerPortGroupInCompositionInstanceRef
outerPort	PortPrototype	*	ref	Outer PortPrototype of this AtomicSwComponentType which belongs to the group. A port can belong to several groups or to no group at all. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=outerPort.portPrototype, outerPort.variationPoint.shortLabel vh.latestBindingTime=preCompileTime

Table E.111: PortGroup

Class	PortPrototype (abstract)			
Note	Base class for the ports of an AUTOSAR software component. The aggregation of PortPrototypes is subject to variability with the purpose to support the conditional existence of ports.			
Base	ARObject, AtpBlueprintable , AtpFeature , AtpPrototype , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	AbstractProvidedPortPrototype , AbstractRequiredPortPrototype			
Aggregated by	AtpClassifier.atpFeature , SwComponentType.port			
Attribute	Type	Mult.	Kind	Note
clientServerAnnotation	ClientServerAnnotation	*	aggr	Annotation of this PortPrototype with respect to client/server communication.
delegatedPortAnnotation	DelegatedPortAnnotation	0..1	aggr	Annotations on this delegated port.
ioHwAbstractionServerAnnotation	IoHwAbstractionServerAnnotation	*	aggr	Annotations on this IO Hardware Abstraction port.
modePortAnnotation	ModePortAnnotation	*	aggr	Annotations on this mode port.





Class	PortPrototype (abstract)			
nvDataPort Annotation	NvDataPortAnnotation	*	aggr	Annotations on this non volatile data port.
parameterPort Annotation	ParameterPort Annotation	*	aggr	Annotations on this parameter port.
portPrototype Props	PortPrototypeProps	0..1	aggr	This attribute allows for the definition of further qualification of the semantics of a PortPrototype. This Attribute is only used by the AUTOSAR Adaptive Platform.
senderReceiver Annotation	SenderReceiver Annotation	*	aggr	Collection of annotations of this ports sender/receiver communication. Stereotypes: atpSplitable Tags: atp.Splitkey=senderReceiverAnnotation
triggerPort Annotation	TriggerPortAnnotation	*	aggr	Annotations on this trigger port.

Table E.112: PortPrototype

Class	ProvidedServiceInstance			
Note	Service instances that are provided by the ECU that is connected via the ApplicationEndpoint to a CommunicationConnector.			
Base	ARObject, AbstractServiceInstance, Identifiable, MultilanguageReferrable, Referrable			
Aggregated by	ServiceInstanceCollectionSet.serviceInstance			
Attribute	Type	Mult.	Kind	Note
allowedService Consumer	NetworkEndpoint	*	ref	NetworkEndpoints on which the ConsumedService Instances that are communicating with this Provided ServiceInstance are allowed to be located so that the ACL check in the ServiceDiscovery is successful and the connection is allowed to be established. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=allowedServiceConsumer.networkEndpoint, allowedServiceConsumer.variationPoint.shortLabel atp.Status=draft vh.latestBindingTime=postBuild
autoAvailable	Boolean	0..1	attr	Defines that this ProvidedServiceInstance shall be offered by the service discovery at ECU start.
eventHandler	EventHandler	*	aggr	Collection of event groups provided by the Provided ServiceInstance Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=eventHandler.shortName, event Handler.variationPoint.shortLabel vh.latestBindingTime=postBuild
instance Identifier	PositiveInteger	0..1	attr	Instance identifier. Can be used for e.g. service discovery to identify the instance of the service.
loadBalancing Priority	PositiveInteger	0..1	attr	Defines the value to be used for load balancing priority in the service offer. Lower value means higher priority.
loadBalancing Weight	PositiveInteger	0..1	attr	Defines the value to be used for load balancing weight in the service offer. Higher value means higher probability to be chosen.





Class	ProvidedServiceInstance			
localUnicastAddress	ApplicationEndpoint	0..2	ref	The local address over which the PSI is provided (udp, tcp or both). Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=localUnicastAddress.applicationEndpoint, localUnicastAddress.variationPoint.shortLabel vh.latestBindingTime=postBuild
minorVersion	PositiveInteger	0..1	attr	Minor Version of the Service that is provided by this ProvidedServiceInstance.
priority	PositiveInteger	0..1	attr	Defines the frame priority where values from 0 (best effort) to 7 (highest) are allowed.
remoteMulticastSubscriptionAddress	ApplicationEndpoint	*	ref	This reference defines the remote multicast subscribed addresses of service consumers. This reference shall ONLY be used if the remote address of the clients is determined from the configuration and not at runtime. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=remoteMulticastSubscriptionAddress.applicationEndpoint, remoteMulticastSubscriptionAddress.variationPoint.shortLabel vh.latestBindingTime=postBuild
remoteUnicastAddress	ApplicationEndpoint	*	ref	This reference defines the remote addresses of service consumers. This reference shall ONLY be used if the remote address of the clients is determined from the configuration and not at runtime. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=remoteUnicastAddress.applicationEndpoint, remoteUnicastAddress.variationPoint.shortLabel vh.latestBindingTime=postBuild
sdServerTimerConfig	SomeipSdServerServiceInstanceConfig	0..1	ref	Server specific configuration settings relevant for the SOME/IP service discovery. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=sdServerTimerConfig.someipSdServerServiceInstanceConfig, sdServerTimerConfig.variationPoint.shortLabel vh.latestBindingTime=postBuild
serviceIdentifier	PositiveInteger	0..1	attr	This attribute represents the ability to describe the SOME/IP service ID that is offered.

Table E.113: ProvidedServiceInstance

Class	RPortComSpec (abstract)			
Note	Communication attributes of a required PortPrototype. This class will contain attributes that are valid for all kinds of require-ports, independent of client-server or sender-receiver communication patterns.			
Base	ARObject			
Subclasses	AbstractPersistenceRequireComSpec , ClientComSpec , ModeSwitchReceiverComSpec, NvRequireComSpec, ParameterRequireComSpec, ReceiverComSpec			
Aggregated by	AbstractRequiredPortPrototype.requiredComSpec , PortPrototypeBlueprint.requiredComSpec			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table E.114: RPortComSpec

Class	RPortPrototype			
Note	Component port requiring a certain port interface.			
Base	ARObject, AbstractRequiredPortPrototype , AtpBlueprintable , AtpFeature , AtpPrototype , Identifiable , MultilanguageReferrable , PortPrototype , Referrable			
Aggregated by	AtpClassifier.atpFeature , SwComponentType.port			
Attribute	Type	Mult.	Kind	Note
required Interface	PortInterface	0..1	tref	The interface that this port requires. Stereotypes: isOfType

Table E.115: RPortPrototype

Class	RecordValueSpecification			
Note	Specifies the values for a record.			
Base	ARObject, CompositeValueSpecification , ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key , ApplicationAssocMapElementValueSpecification.value , ArrayValueSpecification.element , CalibrationParameterValue.applInitValue , CalibrationParameterValue.implInitValue , CompositeRuleBasedValueSpecification.argument , ConstantSpecification.valueSpec , CryptoServiceKey.developmentValue , DiagnosticEnvDataCondition.compareValue , DiagnosticEnvDataElementCondition.compareValue , DiagnosticEnvSovdDataCondition.compareValue , FieldSenderComSpec.initValue , ISignal.initValue , ISignal.receptionDefaultValue , ISignal.timeoutSubstitutionValue , NonqueuedReceiverComSpec.initValue , NonqueuedReceiverComSpec.timeoutSubstitutionValue , NonqueuedSenderComSpec.initValue , NvProvideComSpec.ramBlockInitValue , NvProvideComSpec.romBlockInitValue , NvRequireComSpec.initValue , ParameterDataPrototype.initValue , ParameterProvideComSpec.initValue , ParameterRequireComSpec.initValue , PersistencyDataRequiredComSpec.initValue , PersistencyKeyValuePair.initValue , PortDefinedArgumentValue.value , PortPrototypeBlueprintInitValue.value , RecordValueSpecification.field , SomeipEventDeployment.eventReceptionDefaultValue , StateManagementCompareCondition.compareValue , SwDataDefProps.invalidValue , UserDefinedEventDeployment.eventReceptionDefaultValue , VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
field (ordered)	ValueSpecification	*	aggr	The value for a single record field. This could also be mapped explicitly to a record element of the data type using the shortName of the ValueSpecification. But this would introduce a relationship to the data type that is too strong. As of now, it is only important that the structure of the data type matches the structure of the ValueSpecification independently of the shortNames. Stereotypes: atpSplitable; atpVariation Tags: atp.Splitkey=field, field.variationPoint.shortLabel vh.latestBindingTime=preCompileTime

Table E.116: RecordValueSpecification

Primitive	Ref			
Note	This primitive denotes a name based reference. For detailed syntax see the xsd.pattern. • first slash (relative or absolute reference) [optional] • Identifier [required] • a sequence of slashes and Identifiers [optional] This primitive is used by the meta-model tools to create the references. Tags: xml.xsd.customType=REF xml.xsd.pattern=/?[a-zA-Z][a-zA-Z0-9_]{0,127}/([a-zA-Z][a-zA-Z0-9_]{0,127})* xml.xsd.type=string			
Attribute	Type	Mult.	Kind	Note





Primitive	Ref			
base	Identifier	0..1	attr	This attribute reflects the base to be used for this reference. Tags: xml.attribute=true
blueprintValue	String	0..1	attr	This represents a description that documents how the value shall be defined when deriving objects from the blueprint. Tags: atp.Status=valid xml.attribute=true
index	PositiveInteger	0..1	attr	This attribute supports the use case to point on specific elements in an array. This is in particular required if arrays are used to implement particular data objects. The counting of array indices starts with the value 0, i.e. the index of the first array element is 0. Tags: xml.attribute=true

Table E.117: Ref

Class	ReferenceValueSpecification			
Note	Specifies a reference to a data prototype to be used as an initial value for a pointer in the software.			
Base	ARObject, ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key, ApplicationAssocMapElementValueSpecification.value, ArrayValueSpecification.element, CalibrationParameterValue.applInitValue, CalibrationParameterValue.implInitValue, ConstantSpecification.valueSpec, CryptoServiceKey.developmentValue, DiagnosticEnvDataCondition.compareValue, DiagnosticEnvDataElementCondition.compareValue, DiagnosticEnvSovdDataCondition.compareValue, FieldSenderComSpec.initValue, ISignal.initValue, ISignal.receptionDefaultValue, ISignal.timeoutSubstitutionValue, NonqueuedReceiverComSpec.initValue, NonqueuedReceiverComSpec.timeoutSubstitutionValue, NonqueuedSenderComSpec.initValue, NvProvideComSpec.ramBlockInitValue, NvProvideComSpec.romBlockInitValue, NvRequireComSpec.initValue, ParameterDataPrototype.initValue, ParameterProvideComSpec.initValue, ParameterRequireComSpec.initValue, PersistencyDataRequiredComSpec.initValue, PersistencyKeyValuePair.initValue, PortDefinedArgumentValue.value, PortPrototypeBlueprintInitValue.value, RecordValueSpecification.field, SomeipEventDeployment.eventReceptionDefaultValue, StateManagementCompareCondition.compareValue, SwDataDefProps.invalidValue, UserDefinedEventDeployment.eventReceptionDefaultValue, VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
referenceValue	DataPrototype	0..1	ref	The referenced data prototype.

Table E.118: ReferenceValueSpecification

Class	Referrable (abstract)			
Note	Instances of this class can be referred to by their identifier (while adhering to namespace borders).			
Base	ARObject			
Subclasses	AtpDefinition, BswDistinguishedPartition, BswModuleCallPoint, BswModuleClientServerEntry, BswVariableAccess, CouplingPortTrafficClassAssignment, CpplImplementationData TypeContextTarget , DiagnosticEnvModeElement , EthernetPriorityRegeneration, ExclusiveAreaNestingOrder, HwDescriptionEntity, ImplementationProps, ModeTransition, MultilanguageReferrable, NmNetworkHandle, PncMappingIdent, SingleLanguageReferrable, SoConIPdulIdentifier, SomeipRequiredEventGroup, TpConnectionIdent			
Attribute	Type	Mult.	Kind	Note





Class	Referrable (abstract)			
shortName	Identifier	1	attr	This specifies an identifying shortName for the object. It needs to be unique within its context and is intended for humans but even more for technical reference. Stereotypes: atpIdentityContributor Tags: xml.enforceMinMultiplicity=true xml.sequenceOffset=-100
shortName Fragment	ShortNameFragment	*	aggr	This specifies how the Referrable.shortName is composed of several shortNameFragments. Tags: xml.sequenceOffset=-90

Table E.119: Referrable

Class	RoleBasedPortAssignment			
Note	This class specifies an assignment of a role to a particular service port (RPortPrototype or PPort Prototype) of an AtomicSwComponentType. With this assignment, the role of the service port can be mapped to a specific ServiceNeeds element, so that a tool is able to create the correct connector.			
Base	ARObject			
Aggregated by	NvBlockDescriptor.clientServerPort, SwcServiceDependency.assignedPort			
Attribute	Type	Mult.	Kind	Note
portPrototype	PortPrototype	0..1	ref	Service PortPrototype used in the assigned role. This PortPrototype shall either belong to the same AtomicSw ComponentType as the SwcInternalBehavior which owns the ServiceDependency or to the same NvBlockSw ComponentType as the NvBlockDescriptor.
role	Identifier	0..1	attr	This is the role of the assigned Port in the given context. The value shall be a shortName of the Blueprint of a Port Interface as standardized in the Software Specification of the related AUTOSAR Service.

Table E.120: RoleBasedPortAssignment

Class	Sd			
Note	This class represents a primitive element in a special data group.			
Base	ARObject			
Aggregated by	SdgContents.sd			
Attribute	Type	Mult.	Kind	Note
gid	NameToken	1	attr	This attributes specifies an identifier. Gid comes from the SGML/XML-Term "Generic Identifier" which is the element name in XML. The role of this attribute is the same as the name of an XML - element. Tags: xml.attribute=true
value	VerbatimStringPlain	1	attr	This is the value of the special data. Tags: xml.roleElement=false xml.roleWrapperElement=false xml.typeElement=false xml.typeWrapperElement=false





Class	Sd			
xmlSpace	XmlSpaceEnum	0..1	attr	This attribute is used to signal an intention that in that element, white space should be preserved by applications. It is defined according to xml:space as declared by W3C. Tags: xml.attribute=true xml.attributeRef=true xml.enforceMinMultiplicity=true xml.name=space xml.nsPrefix=xml

Table E.121: Sd

Class	SecOcCryptoServiceMapping			
Note	This meta-class has the ability to represent a crypto service mapping for the Pdu-based communication via SecOC.			
Base	ARObject, CryptoServiceMapping , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SystemMapping .cryptoServiceMapping			
Attribute	Type	Mult.	Kind	Note
authentication	CryptoServicePrimitive	0..1	ref	This reference identifies the applicable crypto primitive for the authentication.
cryptoServiceKey	CryptoServiceKey	0..1	ref	This reference identifies the applicable crypto key.
cryptoServiceQueue	CryptoServiceQueue	0..1	ref	This reference identifies the CryptoServiceQueue the processing of this SecOcCryptoServiceMapping shall be performed in.

Table E.122: SecOcCryptoServiceMapping

Class	SecureCommunicationAuthenticationProps			
Note	Authentication properties used to configure SecuredIPdus.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SecureCommunicationPropsSet.authenticationProps			
Attribute	Type	Mult.	Kind	Note
authInfoTxLength	PositiveInteger	0..1	attr	This attribute defines the length in bits of the authentication code to be included in the payload of the authenticated Pdu.

Table E.123: SecureCommunicationAuthenticationProps

Class	SecureCommunicationFreshnessProps			
Note	Freshness properties used to configure SecuredIPdus.			
Base	ARObject, Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	SecureCommunicationPropsSet.freshnessProps			
Attribute	Type	Mult.	Kind	Note





Class	SecureCommunicationFreshnessProps			
freshnessCounterSyncAttempts	PositiveInteger	0..1	attr	This attribute defines the number of Freshness Counter re-synchronization attempts when a verification failed for a Secured I-PDU. If the value is zero, there will be no additional verification attempt to synchronize with a potentially better fitting Freshness Counter value. This attribute is only applicable if useFreshnessTimestamp is FALSE.
freshnessTimestampTimePeriodFactor	PositiveInteger	0..1	attr	This attribute defines a factor that specifies the time period for the Freshness Timestamp. It holds a multiplication factor that specifies the concrete meaning of a Freshness Timestamp increment by one on basis of microseconds.
freshnessValueLength	PositiveInteger	0..1	attr	This attribute defines the complete length in bits of the Freshness Value. As long as the key doesn't change the counter shall not overflow. The length of the counter shall be determined based on the expected life time of the corresponding key and frequency of usage of the counter.
freshnessValueTxLength	PositiveInteger	0..1	attr	This attribute defines the length in bits of the Freshness Value to be included in the payload of the Secured I-PDU. This length is specific to the least significant bits of the complete Freshness Counter. If the attribute is 0 no Freshness Value is included in the Secured I-PDU.
useFreshnessTimestamp	Boolean	0..1	attr	This attribute specifies whether the Freshness Value is generated through individual Freshness Counters or by a Timestamps. The value is set to TRUE when Timestamps are used.

Table E.124: SecureCommunicationFreshnessProps

Class	SecuredIPdu			
Note	If useAsCryptographicPdu is not set or set to false this IPdu contains the payload of an Authentic IPdu supplemented by additional Authentication Information (Freshness Counter and an Authenticator). If useAsCryptographicPdu is set to true this IPdu contains the Authenticator for a payload that is transported in a separate message. The separate Authentic IPdu is described by the Pdu that is referenced with the payload reference from this SecuredIPdu. Tags: atp.recommendedPackage=Pdus			
Base	ARElement , ARObject , CollectableElement , FibexElement , IPdu , Identifiable , MultilanguageReferrable , PackageableElement , Pdu , Referrable , UploadableDesignElement , UploadablePackageElement			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
authenticationProps	SecureCommunicationAuthenticationProps	0..1	ref	Reference to authentication properties that are valid for this SecuredIPdu.
dynamicRuntimeLengthHandling	Boolean	0..1	attr	Defines whether the length information for handling this SecuredIPdu with SecuredIPdu.useSecuredPduHeader=noHeader is taken from the configuration or from the actually provided length information during runtime. true: SecuredIPdu length information is taken from the actually provided length information during runtime. false: SecuredIPdu length information is taken from the configuration.
freshnessProps	SecureCommunicationFreshnessProps	0..1	ref	Reference to freshness properties that are valid for this SecuredIPdu.
payload	PduTriggering	0..1	ref	Reference to a Pdu that will be protected against unauthorized manipulation and replay attacks.
secureCommunicationProps	SecureCommunicationProps	0..1	aggr	Specific configuration properties for this SecuredIPdu.





Class	SecuredIPdu			
useAsCryptographicIPdu	Boolean	0..1	attr	If this attribute is set to true the SecuredIPdu contains the Authentication Information for an AuthenticIPdu that is transmitted in a separate message. The AuthenticIPdu contains the original payload, i.e. the secured data. If this attribute is set to false this SecuredIPdu contains the payload of an Authentic IPdu supplemented by additional Authentication Information.
useSecuredPduHeader	SecuredPduHeaderEnum	0..1	attr	This attribute defines the size of the header which is inserted into the SecuredIPdu. If this attribute is set to anything but noHeader, the SecuredIPdu contains the Secured I-PDU Header to indicate the length of the AuthenticIPdu. The AuthenticIPdu contains the original payload, i.e. the secured data.

Table E.125: SecuredIPdu

Class	SenderReceiverInterface			
Note	A sender/receiver interface declares a number of data elements to be sent and received. Tags: atp.recommendedPackage=PortInterfaces			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , DataInterface , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dataElement	VariableDataPrototype	*	aggr	The data elements of this <code>SenderReceiverInterface</code> .
invalidationPolicy	InvalidationPolicy	*	aggr	InvalidationPolicy for a particular dataElement
metaDataItemSet	MetaDataItemSet	*	aggr	This aggregation defines fixed sets of meta-data items associated with dataElements of the enclosing <code>SenderReceiverInterface</code>

Table E.126: SenderReceiverInterface

Class	ServiceNeeds (abstract)			
Note	This expresses the abstract needs that a Software Component or Basic Software Module has on the configuration of an AUTOSAR Service to which it will be connected. "Abstract needs" means that the model abstracts from the Configuration Parameters of the underlying Basic Software.			
Base	ARObject , Identifiable , MultilanguageReferrable , Referrable			
Subclasses	BswMgrNeeds, ChargeManagerNeeds, ComMgrUserNeeds, CryptoKeyManagementNeeds, CryptoNeeds , CryptoServiceJobNeeds, CryptoServiceNeeds, DiagnosticCapabilityElement , DltUserNeeds, DoIpServiceNeeds , EcuStateMgrUserNeeds, ErrorTracerNeeds, FunctionInhibitionAvailabilityNeeds, FunctionInhibitionNeeds, GeneralPurposeTimerServiceNeeds, GlobalSupervisionNeeds, IdsMgrCustomTimestampNeeds, IdsMgrNeeds, IndicatorStatusNeeds, J1939DcmDm19Support, J1939RmIncomingRequestServiceNeeds, J1939RmOutgoingRequestServiceNeeds, NvBlockNeeds, SecureOnBoardCommunicationNeeds, SupervisedEntityCheckpointNeeds, SupervisedEntityNeeds, SyncTimeBaseMgrUserNeeds, V2xDataManagerNeeds, V2xFacUserNeeds, V2xMUserNeeds, VendorSpecificServiceNeeds			
Aggregated by	BswServiceDependency.serviceNeeds, SwcServiceDependency.serviceNeeds			
Attribute	Type	Mult.	Kind	Note
—	—	—	—	—

Table E.127: ServiceNeeds

Class	ServiceSwComponentType			
Note	ServiceSwComponentType is used for configuring services for a given ECU. Instances of this class are only to be created in ECU Configuration phase for the specific purpose of the service configuration. Tags: atp.recommendedPackage=SwComponentTypes			
Base	ARElement , ARObject , AtomicSwComponentType , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable , SwComponentType			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.128: ServiceSwComponentType

Class	SoConIPdulIdentifier			
Note	Identification of Pdu content on a socket connection. This Identifier is required in case that multiple Pdus are transmitted over the same socket connection.			
Base	ARObject , Referrable			
Aggregated by	SocketConnectionIpdulIdentifierSet.iPdulIdentifier			
Attribute	Type	Mult.	Kind	Note
headerId	PositiveInteger	0..1	attr	If multiple Pdus are transmitted over the same connection this headerId can be used to distinguish between the different Pdus. For the constraints on constructing the headerId for SOME/IP also see PRS_SOMEIP_00245.
pduCollection PduTimeout	TimeValue	0..1	attr	Defines the timeout in seconds the PDU collection shall be transmitted at the latest after this PDU has been put into the buffer.
pduCollection Semantics	PduCollection SemanticsEnum	0..1	attr	Specifies if the referenced PduTriggering shall be collected using a queued (i.e. all PDU instances) or last-is-best (i.e. only the last PDU instance) semantics. If this attribute is not present the behavior of "queued" is assumed.
pduCollection Trigger	PduCollectionTrigger Enum	0..1	attr	Defines whether the referenced Pdu contributes to the triggering of the socket transmission if Pdu collection is enabled for this socket.
pduTriggering	PduTriggering	0..1	ref	Reference to a Pdu that is transmitted over a socket connection.

Table E.129: SoConIPdulIdentifier

Class	SwComponentPrototype			
Note	Role of a software component within a composition.			
Base	ARObject , AtpFeature , AtpPrototype , Identifiable , MultilanguageReferrable , Referrable			
Aggregated by	AtpClassifier.atpFeature , CompositionSwComponentType.component			
Attribute	Type	Mult.	Kind	Note
type	SwComponentType	0..1	tref	Type of the instance. Stereotypes: isOfType

Table E.130: SwComponentPrototype

Class	SwConnector (abstract)			
Note	The base class for connectors between ports. Connectors have to be identifiable to allow references from the system constraint template.			
Base	<i>ARObject</i> , <i>AtpClassifier</i> , <i>AtpFeature</i> , <i>AtpStructureElement</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Subclasses	<i>AssemblySwConnector</i> , <i>DelegationSwConnector</i> , <i>PassThroughSwConnector</i>			
Aggregated by	<i>AtpClassifier.atpFeature</i> , <i>CompositionSwComponentType.connector</i>			
Attribute	Type	Mult.	Kind	Note
mapping	PortInterfaceMapping	0..1	ref	Reference to a <i>PortInterfaceMapping</i> specifying the mapping of unequal named <i>PortInterface</i> elements of the two different <i>PortInterfaces</i> typing the two <i>PortPrototypes</i> which are referenced by the <i>SwConnector</i> .

Table E.131: SwConnector

Class	«atpVariation» SwDataDefProps			
Note	This class is a collection of properties relevant for data objects under various aspects. One could consider this class as a "pattern of inheritance by aggregation". The properties can be applied to all objects of all classes in which <i>SwDataDefProps</i> is aggregated. Note that not all of the attributes or associated elements are useful all of the time. Hence, the process definition (e.g. expressed with an OCL or a Document Control Instance MSR-DCI) has the task of implementing limitations. <i>SwDataDefProps</i> covers various aspects: - Structure of the data element for calibration use cases: is it a single value, a curve, or a map, but also the recordLayouts which specify how such elements are mapped/converted to the <i>DataTypes</i> in the programming language (or in AUTOSAR). This is mainly expressed by properties like <i>swRecordLayout</i> and <i>swCalprmAxisSet</i> - Implementation aspects, mainly expressed by <i>swImplPolicy</i>, <i>swVariableAccessImplPolicy</i>, <i>swAddrMethod</i>, <i>swPointerTargetProps</i>, <i>baseType</i>, <i>implementationDataType</i> and <i>additionalNativeTypeQualifier</i> - Access policy for the MCD system, mainly expressed by <i>swCalibrationAccess</i> - Semantics of the data element, mainly expressed by <i>compuMethod</i> and/or <i>unit</i>, <i>dataConstr</i>, <i>invalidValue</i> - Code generation policy provided by <i>swRecordLayout</i> Tags: vh.latestBindingTime=codeGenerationTime			
Base	<i>ARObject</i>			
Aggregated by	<i>AutosarDataType.swDataDefProps</i> , <i>CompositeNetworkRepresentation.networkRepresentation</i> , <i>CppImplementationDataTypeElement.swDataDefProps</i> , <i>DataPrototype.swDataDefProps</i> , <i>DataPrototypeTransformationProps.networkRepresentationProps</i> , <i>DiagnosticDataElement.swDataDefProps</i> , <i>DiagnosticEnvDataElementCondition.swDataDefProps</i> , <i>DiagnosticExtendedDataRecordElement.swDataDefProps</i> , <i>DiagnosticSovdPrimitiveContentElement.swDataDefProps</i> , <i>DltArgumentProps.networkRepresentation</i> , <i>FlatInstanceDescriptor.swDataDefProps</i> , <i>ImplementationDataTypeElement.swDataDefProps</i> , <i>InstantiationDataDefProps.swDataDefProps</i> , <i>ISignal.networkRepresentationProps</i> , <i>McDataInstance.resultingProperties</i> , <i>ParameterAccess.swDataDefProps</i> , <i>PerInstanceMemory.swDataDefProps</i> , <i>ReceiverComSpec.networkRepresentation</i> , <i>SecurityEventContextDataElement.networkRepresentation</i> , <i>SenderComSpec.networkRepresentation</i> , <i>SomeipDataPrototypeTransformationProps.networkRepresentation</i> , <i>SwPointerTargetProps.swDataDefProps</i> , <i>SwServiceArg.swDataDefProps</i> , <i>SwSystemconst.swDataDefProps</i> , <i>SystemSignal.physicalProps</i>			
Attribute	Type	Mult.	Kind	Note
additionalNativeTypeQualifier	NativeDeclarationString	0..1	attr	This attribute is used to declare native qualifiers of the programming language which can neither be deduced from the <i>baseType</i> (e.g. because the data object describes a pointer) nor from other more abstract attributes. Examples are qualifiers like "volatile", "strict" or "enum" of the C-language. All such declarations have to be put into one string. Tags: xml.sequenceOffset=235





Class	«atpVariation» SwDataDefProps			
annotation	Annotation	*	aggr	This aggregation allows to add annotations (yellow pads ...) related to the current data object. Tags: xml.roleElement=true xml.roleWrapperElement=true xml.sequenceOffset=20 xml.typeElement=false xml.typeWrapperElement=false
baseType	SwBaseType	0..1	ref	Base type associated with the containing data object. Tags: xml.sequenceOffset=50
compuMethod	CompuMethod	0..1	ref	Computation method associated with the semantics of this data object. Tags: xml.sequenceOffset=180
dataConstr	DataConstr	0..1	ref	Data constraint for this data object. Tags: xml.sequenceOffset=190
displayFormat	DisplayFormatString	0..1	attr	This property describes how a number is to be rendered e.g. in documents or in a measurement and calibration system. Tags: xml.sequenceOffset=210
display Presentation	DisplayPresentation Enum	0..1	attr	This attribute controls the presentation of the related data for measurement and calibration tools.
implementation DataType	AbstractImplementation DataType	0..1	ref	This association denotes the ImplementationDataType of a data declaration via its aggregated SwDataDefProps. It is used whenever a data declaration is not directly referring to a base type. Especially • redefinition of an ImplementationDataType via a "typedef" to another ImplementationDatatype • the target type of a pointer (see SwPointerTarget Props), if it does not refer to a base type directly • the data type of an array or record element within an ImplementationDataType, if it does not refer to a base type directly • the data type of an SwServiceArg, if it does not refer to a base type directly Tags: xml.sequenceOffset=215
invalidValue	ValueSpecification	0..1	aggr	Optional value to express invalidity of the actual data element. Tags: xml.sequenceOffset=255
stepSize	Float	0..1	attr	This attribute can be used to define a value which is added to or subtracted from the value of a DataPrototype when using up/down keys while calibrating.
swAddrMethod	SwAddrMethod	0..1	ref	Addressing method related to this data object. Via an association to the same SwAddrMethod it can be specified that several DataPrototypes shall be located in the same memory without already specifying the memory section itself. Tags: xml.sequenceOffset=30
swAlignment	AlignmentType	0..1	attr	The attribute describes the intended typical alignment of the DataPrototype. If the attribute is not defined the alignment is determined by the swBaseType size and the memoryAllocationKeywordPolicy of the referenced Sw AddrMethod. Tags: xml.sequenceOffset=33
swBit Representation	SwBitRepresentation	0..1	aggr	Description of the binary representation in case of a bit variable. Tags: xml.sequenceOffset=60





Class	«atpVariation» SwDataDefProps			
swCalibrationAccess	SwCalibrationAccessEnum	0..1	attr	Specifies the read or write access by MCD tools for this data object. Tags: xml.sequenceOffset=70
swCalprmAxisSet	SwCalprmAxisSet	0..1	aggr	This specifies the properties of the axes in case of a curve or map etc. This is mainly applicable to calibration parameters. Tags: xml.sequenceOffset=90
swComparisonVariable	SwVariableRefProxy	*	aggr	Variables used for comparison in an MCD process. Tags: xml.sequenceOffset=170 xml.typeElement=false
swDataDependency	SwDataDependency	0..1	aggr	Describes how the value of the data object has to be calculated from the value of another data object (by the MCD system). Tags: xml.sequenceOffset=200
swHostVariable	SwVariableRefProxy	0..1	aggr	Contains a reference to a variable which serves as a host-variable for a bit variable. Only applicable to bit objects. Tags: xml.sequenceOffset=220 xml.typeElement=false
swImplPolicy	SwImplPolicyEnum	0..1	attr	Implementation policy for this data object. Tags: xml.sequenceOffset=230
swIntendedResolution	Numerical	0..1	attr	The purpose of this element is to describe the requested quantization of data objects early on in the design process. The resolution ultimately occurs via the conversion formula present (compuMethod), which specifies the transition from the physical world to the standardized world (and vice-versa) (here, "the slope per bit" is present implicitly in the conversion formula). In the case of a development phase without a fixed conversion formula, a pre-specification can occur through swIntendedResolution. The resolution is specified in the physical domain according to the property "unit". Tags: xml.sequenceOffset=240
swInterpolationMethod	Identifier	0..1	attr	This is a keyword identifying the mathematical method to be applied for interpolation. The keyword needs to be related to the interpolation routine which needs to be invoked. Tags: xml.sequenceOffset=250
swIsVirtual	Boolean	0..1	attr	This element distinguishes virtual objects. Virtual objects do not appear in the memory, their derivation is much more dependent on other objects and hence they shall have a swDataDependency . Tags: xml.sequenceOffset=260
swPointerTargetProps	SwPointerTargetProps	0..1	aggr	Specifies that the containing data object is a pointer to another data object. Tags: xml.sequenceOffset=280
swRecordLayout	SwRecordLayout	0..1	ref	Record layout for this data object. Tags: xml.sequenceOffset=290





Class	«atpVariation» SwDataDefProps			
swRefreshTiming	MultidimensionalTime	0..1	aggr	This element specifies the frequency in which the object involved shall be or is called or calculated. This timing can be collected from the task in which write access processes to the variable run. But this cannot be done by the MCD system. So this attribute can be used in an early phase to express the desired refresh timing and later on to specify the real refresh timing. Tags: xml.sequenceOffset=300
swTextProps	SwTextProps	0..1	aggr	the specific properties if the data object is a text object. Tags: xml.sequenceOffset=120
swValueBlockSize	Numerical	0..1	attr	This represents the size of a Value Block Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime xml.sequenceOffset=80
swValueBlockSizeMult (ordered)	Numerical	*	attr	This attribute is used to specify the dimensions of a value block (VAL_BLK) for the case that that value block has more than one dimension. The dimensions given in this attribute are ordered such that the first entry represents the first dimension, the second entry represents the second dimension, and so on. For one-dimensional value blocks the attribute swValueBlockSize shall be used and this attribute shall not exist. Stereotypes: atpVariation Tags: vh.latestBindingTime=preCompileTime
unit	Unit	0..1	ref	Physical unit associated with the semantics of this data object. This attribute applies if no compuMethod is specified. If both units (this as well as via compuMethod) are specified the units shall be compatible. Tags: xml.sequenceOffset=350
valueAxisDataType	ApplicationPrimitiveDataType	0..1	ref	The referenced ApplicationPrimitiveDataType represents the primitive data type of the value axis within a compound primitive (e.g. curve, map). It supersedes CompuMethod, Unit, and BaseType. Tags: xml.sequenceOffset=355

Table E.132: SwDataDefProps

Class	SwPointerTargetProps			
Note	This element defines, that the data object (which is specified by the aggregating element) contains a reference to another data object or to a function in the CPU code. This corresponds to a pointer in the C-language. The attributes of this element describe the category and the detailed properties of the target which is either a data description or a function signature.			
Base	ARObject			
Aggregated by	SwDataDefProps.swPointerTargetProps			
Attribute	Type	Mult.	Kind	Note
swDataDefProps	SwDataDefProps	0..1	aggr	The properties of the target data type. Tags: xml.sequenceOffset=30





Class	SwPointerTargetProps			
targetCategory	Identifier	0..1	attr	This specifies the category of the target: - In case of a data pointer, it shall specify the category of the referenced data. - In case of a function pointer, it could be used to denote the category of the referenced BswModuleEntry. Tags: xml.sequenceOffset=5

Table E.133: SwPointerTargetProps

Class	SwRecordLayout			
Note	Defines how the data objects (variables, calibration parameters etc.) are to be stored in the ECU memory. As an example, this definition specifies the sequence of axis points in the ECU memory. Iterations through axis values are stored within the sub-elements swRecordLayoutGroup. Tags: atp.recommendedPackage=SwRecordLayouts			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
swRecordLayoutGroup	SwRecordLayoutGroup	0..1	aggr	This is the top level record layout group. Tags: xml.roleElement=true xml.roleWrapperElement=false xml.sequenceOffset=20 xml.typeElement=false xml.typeWrapperElement=false

Table E.134: SwRecordLayout

Class	SwcServiceDependency			
Note	Specialization of ServiceDependency in the context of an SwcInternalBehavior. It allows to associate ports, port groups and (in special cases) data defined for an atomic software component to a given ServiceNeeds element.			
Base	ARObject , AtpClassifier , AtpFeature , AtpStructureElement , Identifiable , MultilanguageReferrable , Referrable , ServiceDependency			
Aggregated by	AdaptiveSwcInternalBehavior.serviceDependency , AtpClassifier.atpFeature , SwcInternalBehavior.serviceDependency			
Attribute	Type	Mult.	Kind	Note
assignedData	RoleBasedData Assignment	*	aggr	Defines the role of an associated data object of the same component. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=assignedData, assignedData.variation Point.shortLabel vh.latestBindingTime=preCompileTime
assignedPort	RoleBasedPort Assignment	*	aggr	Defines the role of an associated port of the same component. Stereotypes: atpSplittable; atpVariation Tags: atp.Splitkey=assignedPort, assignedPort.variation Point.shortLabel vh.latestBindingTime=preCompileTime





Class	SwcServiceDependency			
representedPort Group	PortGroup	0..1	ref	This reference specifies an association between the ServiceNeeds and a PortGroup, for example to request a communication mode which applies for communication via these ports. The referred PortGroup shall be local to this atomic SWC, but via the links between the Port Groups, a tool can evaluate this information such that all the ports linked via this port group on the same ECU can be found.
serviceNeeds	ServiceNeeds	0..1	aggr	The associated ServiceNeeds.

Table E.135: SwcServiceDependency

Class	SystemSignal			
Note	The system signal represents the communication system's view of data exchanged between SW components which reside on different ECUs. The system signals allow to represent this communication in a flattened structure, with exactly one system signal defined for each data element prototype sent and received by connected SW component instances. Tags: atp.recommendedPackage=SystemSignals			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
dynamicLength	Boolean	0..1	attr	The length of dynamic length signals is variable in run-time. Only a maximum length of such a signal is specified in the configuration (attribute length in ISignal element).
physicalProps	SwDataDefProps	0..1	aggr	Specification of the physical representation. Stereotypes: atp.Splittable Tags: atp.Splitkey=physicalProps

Table E.136: SystemSignal

Class	TextValueSpecification			
Note	The purpose of TextValueSpecification is to define the labels that correspond to enumeration values.			
Base	ARObject , ValueSpecification			
Aggregated by	ApplicationAssocMapElementValueSpecification.key , ApplicationAssocMapElementValueSpecification.value , ArrayValueSpecification.element , CalibrationParameterValue.applInitValue , CalibrationParameterValue.implInitValue , ConstantSpecification.valueSpec , CryptoServiceKey.developmentValue , DiagnosticEnvDataCondition.compareValue , DiagnosticEnvDataElementCondition.compareValue , DiagnosticEnvSovdDataCondition.compareValue , FieldSenderComSpec.initValue , ISignal.initValue , ISignal.receptionDefaultValue , ISignal.timeoutSubstitutionValue , MetaDataItem.metaDataItemType , NonqueuedReceiverComSpec.initValue , NonqueuedReceiverComSpec.timeoutSubstitutionValue , NonqueuedSenderComSpec.initValue , NvProvideComSpec.ramBlockInitValue , NvProvideComSpec.romBlockInitValue , NvRequireComSpec.initValue , ParameterDataPrototype.initValue , ParameterProvideComSpec.initValue , ParameterRequireComSpec.initValue , PersistencyDataRequiredComSpec.initValue , PersistencyKeyValuePair.initValue , PortDefinedArgumentValue.value , PortPrototypeBlueprintInitValue.value , RecordValueSpecification.field , SomeipEventDeployment.eventReceptionDefaultValue , StateManagementCompareCondition.compareValue , SwDataDefProps.invalidValue , UserDefinedEventDeployment.eventReceptionDefaultValue , VariableDataPrototype.initValue			
Attribute	Type	Mult.	Kind	Note
value	VerbatimString	0..1	attr	This is the value itself. Note that vt uses the operator to separate the values for the different bitfield masks in case that the semantics of the related DataPrototype is described by means of a BITFIELD_TEXTTABLE in the associated CompuMethod.

Table E.137: TextValueSpecification

Class	TlsCryptoServiceMapping			
Note	This meta-class has the ability to represent a crypto service mapping for the socket-based configuration of Transport Layer Security (TLS).			
Base	<i>ARObject</i> , <i>CryptoServiceMapping</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	SystemMapping.cryptoServiceMapping			
Attribute	Type	Mult.	Kind	Note
keyExchange	CryptoServicePrimitive	*	ref	This reference identifies the shared(i.e. applicable for each of the aggregated cipher suites) crypto service primitive for the execution of key exchange during the handshake phase.
tlsCipherSuite	TlsCryptoCipherSuite	*	aggr	This aggregation represents the collection of supported cipher suites.
useClient Authentication Request	Boolean	0..1	attr	Defines if client authentication shall be applied for this TLS connection.
useSecurity Extension RecordSize Limit	Boolean	0..1	attr	Defines if the security extension for max_fragment_length shall be supported as defined in IETF RFC 8449, chapter 4.1.

Table E.138: TlsCryptoServiceMapping

Class	TlsPskIdentity			
Note	This element is used to describe the pre-shared key shared during the handshake among the communication parties, to establish a TLS connection if the handshake is based on the existence of a pre-shared key.			
Base	<i>ARObject</i>			
Aggregated by	TlsCryptoCipherSuite.pskIdentity			
Attribute	Type	Mult.	Kind	Note
pskIdentity	String	0..1	attr	This attribute provides the key identification.
pskIdentityHint	String	0..1	attr	This attribute provides the identity hint for a pre-shared key.

Table E.139: TlsPskIdentity

Class	TransformationProps (abstract)			
Note	This meta-class represents a abstract base class for transformation settings.			
Base	<i>ARObject</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Subclasses	ApSomeipTransformationProps , <i>SOMEIPTransformationProps</i> , UserDefinedTransformationProps			
Aggregated by	TransformationPropsSet.transformationProps			
Attribute	Type	Mult.	Kind	Note
–	–	–	–	–

Table E.140: TransformationProps

Enumeration	TransportLayerProtocolEnum			
Note	This enumeration allows to choose a TCP/IP transport layer protocol. This Enumeration is only used by the AUTOSAR Adaptive Platform.			
Aggregated by	SomeipEventDeployment.transportProtocol , SomeipMethodDeployment.transportProtocol			
Literal	Description			





Enumeration	TransportLayerProtocolEnum
tcp	Transmission control protocol Tags: atp.EnumerationLiteralIndex=1
udp	User datagram protocol Tags: atp.EnumerationLiteralIndex=0

Table E.141: TransportLayerProtocolEnum

Class	TriggerInterface			
Note	A trigger interface declares a number of triggers that can be sent by an trigger source. Tags: atp.recommendedPackage=PortInterfaces			
Base	ARElement , ARObject , AtpBlueprint , AtpBlueprintable , AtpClassifier , AtpType , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , PortInterface , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
trigger	Trigger	*	aggr	The Trigger of this trigger interface.

Table E.142: TriggerInterface

Class	Unit			
Note	This is a physical measurement unit. All units that might be defined should stem from SI units. In order to convert one unit into another factor and offset are defined. For the calculation from SI-unit to the defined unit the factor (factorSiToUnit) and the offset (offsetSiToUnit) are applied as follows: $x \{[unit]\} := y * \{[siUnit]\} * factorSiToUnit \{[unit]/\{[siUnit]\}\} + offsetSiToUnit \{[unit]\}$ For the calculation from a unit to SI-unit the reciprocal of the factor (factorSiToUnit) and the negation of the offset (offsetSiToUnit) are applied. $y \{[siUnit]\} := (x * \{[unit]\} - offsetSiToUnit \{[unit]\}) / factorSiToUnit \{[unit]/\{[siUnit]\}\}$ Tags: atp.recommendedPackage=Units			
Base	ARElement , ARObject , CollectableElement , Identifiable , MultilanguageReferrable , PackageableElement , Referrable			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
displayName	SingleLanguageUnit Names	0..1	aggr	This specifies how the unit shall be displayed in documents or in user interfaces of tools.The displayName corresponds to the Unit.Display in an ASAM MCD-2MC file. Tags: xml.sequenceOffset=20
factorSiToUnit	Float	0..1	attr	This is the factor for the conversion from SI Units to units. The inverse is used for conversion from units to SI Units. Tags: xml.sequenceOffset=30
offsetSiToUnit	Float	0..1	attr	This is the offset for the conversion from and to siUnits. Tags: xml.sequenceOffset=40
physical Dimension	PhysicalDimension	0..1	ref	This association represents the physical dimension to which the unit belongs to. Note that only values with units of the same physical dimensions might be converted. Tags: xml.sequenceOffset=50

Table E.143: Unit

Class	ValueSpecification (abstract)			
Note	Base class for expressions leading to a value which can be used to initialize a data object.			
Base	<i>ARObject</i>			
Subclasses	<i>AbstractRuleBasedValueSpecification</i> , <i>ApplicationValueSpecification</i> , <i>CompositeValueSpecification</i> , <i>ConstantReference</i> , <i>NotAvailableValueSpecification</i> , <i>NumericalValueSpecification</i> , <i>ReferenceValueSpecification</i> , <i>TextValueSpecification</i>			
Aggregated by	<i>ApplicationAssocMapElementValueSpecification.key</i> , <i>ApplicationAssocMapElementValueSpecification.value</i> , <i>ArrayValueSpecification.element</i> , <i>CalibrationParameterValue.applInitValue</i> , <i>CalibrationParameterValue.implInitValue</i> , <i>ConstantSpecification.valueSpec</i> , <i>CryptoServiceKey.developmentValue</i> , <i>DiagnosticEnvDataCondition.compareValue</i> , <i>DiagnosticEnvDataElementCondition.compareValue</i> , <i>DiagnosticEnvSovdDataCondition.compareValue</i> , <i>FieldSenderComSpec.initValue</i> , <i>ISignal.initValue</i> , <i>ISignal.receptionDefaultValue</i> , <i>ISignal.timeoutSubstitutionValue</i> , <i>NonqueuedReceiverComSpec.initValue</i> , <i>NonqueuedReceiverComSpec.timeoutSubstitutionValue</i> , <i>NonqueuedSenderComSpec.initValue</i> , <i>NvProvideComSpec.ramBlockInitValue</i> , <i>NvProvideComSpec.romBlockInitValue</i> , <i>NvRequireComSpec.initValue</i> , <i>ParameterDataPrototype.initValue</i> , <i>ParameterProvideComSpec.initValue</i> , <i>ParameterRequireComSpec.initValue</i> , <i>PersistencyDataRequiredComSpec.initValue</i> , <i>PersistencyKeyValuePair.initValue</i> , <i>PortDefinedArgumentValue.value</i> , <i>PortPrototypeBlueprintInitValue.value</i> , <i>RecordValueSpecification.field</i> , <i>SomeipEventDeployment.eventReceptionDefaultValue</i> , <i>StateManagementCompareCondition.compareValue</i> , <i>SwDataDefProps.invalidValue</i> , <i>UserDefinedEventDeployment.eventReceptionDefaultValue</i> , <i>VariableDataPrototype.initValue</i>			
Attribute	Type	Mult.	Kind	Note
shortLabel	Identifier	0..1	attr	This can be used to identify particular value specifications for human readers, for example elements of a record type.

Table E.144: ValueSpecification

Class	VlanConfig			
Note	VLAN Configuration attributes			
Base	<i>ARObject</i> , <i>Identifiable</i> , <i>MultilanguageReferrable</i> , <i>Referrable</i>			
Aggregated by	<i>EthernetPhysicalChannel.vlan</i>			
Attribute	Type	Mult.	Kind	Note
vlanIdentifier	PositiveInteger	0..1	attr	A VLAN is identified by this attribute according to IEEE 802.1Q. The allowed values range is from 0..4095.

Table E.145: VlanConfig

Class	VlanMembership			
Note	Static logical channel or VLAN binding to a switch-port. The reference to an EthernetPhysicalChannel without a VLAN defined represents the handling of untagged frames.			
Base	<i>ARObject</i>			
Aggregated by	<i>CouplingPort.vlanMembership</i>			
Attribute	Type	Mult.	Kind	Note
defaultPriority	PositiveInteger	0..1	attr	Standard output-priority outgoing Frames will be tagged with. Defines the priority that received frames are assigned together with the VLAN Id (defaultVlan). The values from 0 (best effort) to 7 (highest) are allowed. In case modifyVlan and an already tagged received frame, the actual priority of the received frame is not modified.
dhcpAddress Assignment	DhcpServer Configuration	0..1	aggr	Specifies the IP Address which will be assigned to a DHCP Client at this SwitchPort. If no dhcpAddress Assignment is provided all DHCP-Discover messages received at this Port will be discarded by the DHCP Server.





Class	VlanMembership			
sendActivity	EthernetSwitchVlanEgressTaggingEnum	0..1	attr	Attribute denotes whether a VLAN tagged ethernet frame will be 1. sent with its VLAN tag (sentTagged) 2. sent without a VLAN tag (sentUntagged) 3. will be dropped at this port (notSent or VLAN not member of this list)
vlan	EthernetPhysicalChannel	0..1	ref	References a channel that represents a VLAN or an untagged channel.

Table E.146: VlanMembership

F Change History of AUTOSAR Traceable Items

The content of this appendix chapter is *informative* in nature and shall **not** be considered as *normative* content.

Please note that the lists in this chapter also include constraints and specification items that have been removed from the specification in a later version. These constraints and specification items do not appear as hyperlinks in the document.

F.1 Traceable item history of this document according to AUTOSAR Release R17-03 (original version)

F.1.1 Created Constraints in R17-03

Number	Heading
[constr_1473]	No support for <code>PRPortPrototype</code>
[constr_1474]	<code>SwDataDefProps</code> applicable to <code>ImplementationDataTypes</code> exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1475]	<code>ImplementationDataType</code> of category <code>STRING</code> is limited
[constr_1476]	<code>ImplementationDataType</code> of category <code>VECTOR</code> is limited
[constr_1477]	<code>ImplementationDataType</code> of category <code>ASSOCIATIVE_MAP</code> is limited
[constr_1478]	<code>SwDataDefProps</code> applicable to <code>ApplicationDataTypes</code> exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1479]	No support for certain values of <code>ImplementationDataType.category</code>
[constr_1480]	Mutual existence of <code>CompositionDataPrototypeRef.elementInImpl-Datatype</code> vs. attributes of <code>CompositionDataPrototypeRef.dataPrototype</code>
[constr_1481]	Usage of <code>CompositionDataPrototypeRef</code> in the <i>AUTOSAR adaptive platform</i>
[constr_1482]	Mapping of service interfaces vs. mapping of service interface elements
[constr_1483]	Applicability of a <code>ServiceInterface</code>
[constr_1484]	Applicability of <code>ModeDependentStartupConfig.executionDependency</code>
[constr_1485]	No <code>subElement</code> for <code>ImplementationDataType</code> of category <code>STRING</code>
[constr_1486]	<code>ImplementationDataType</code> of category <code>STRING</code> and <code>SwBaseType</code>
[constr_1487]	Number of <code>subElements</code> of an <code>ImplementationDataType</code> of category <code>ASSOCIATIVE_MAP</code>
[constr_1488]	Initialization of a <code>DataPrototype</code> typed by an <code>ApplicationAssocMapDataType</code>
[constr_1489]	Uniqueness of <code>ApplicationAssocMapValueSpecification.mapElement-Tuple.key</code>
[constr_1490]	Allowed value of category for reference <code>AdaptiveModuleInstantiation.process.executable</code>
[constr_1491]	Reference to <code>ApplicationError</code>
[constr_1492]	<code>SwComponentType</code> referenced as <code>Executable.rootSwComponentPrototype.applicationType</code>





Number	Heading
[constr_1493]	ArgumentDataPrototype referenced in the role ApplicationError.errorContext
[constr_1494]	Initial value for event
[constr_1495]	Initial value for field
[constr_1496]	DiagnosticServiceDataMapping.mappedApDataElement shall only refer to specific sub-classes of DataPrototype
[constr_1497]	Attribute optionKind set to commandLineSimpleForm
[constr_1498]	Attribute optionKind set to commandLineShortForm or commandLineLongForm
[constr_1499]	Target SwcServiceDependency of DiagnosticServiceSwMapping.mappedSwcServiceDependencyInExecutable
[constr_1500]	Target SwcServiceDependency of DiagnosticEventPortMapping.swcServiceDependencyInExecutable
[constr_1501]	Target SwcServiceDependency of DiagnosticOperationCyclePortMapping.swcServiceDependencyInExecutable
[constr_1502]	Target SwcServiceDependency of DiagnosticEnableConditionPortMapping.swcServiceDependencyInExecutable
[constr_1503]	Target SwcServiceDependency of DiagnosticStorageConditionPortMapping.swcServiceDependencyInExecutable
[constr_1504]	Number of Process.modeDependentStartupConfig that refer to the same ModeDeclaration
[constr_1505]	Number of Process.modeDependentStartupConfig that do not refer to a ModeDeclaration
[constr_1507]	PortInterfaceToDataTypeMapping is only applicable to ServiceInterface
[constr_1508]	BaseTypeDirectDefinition.nativeDeclaration shall not be set to the value enum
[constr_3320]	Aggregation of CommunicationConnector by Machine
[constr_3287]	Mandatory information of a ProvidedSomeipServiceInstance
[constr_3288]	IP configuration restriction for unicastNetworkEndpoints
[constr_3290]	Usage of ServiceInstancePortConfig defined for a ProvidedSomeipServiceInstance
[constr_3291]	SomeipServiceInstanceToMachineMapping.portConfig aggregation restriction
[constr_3293]	Mandatory information of a RequiredSomeipServiceInstance
[constr_3296]	Usage of ServiceInstancePortConfig defined for a RequiredSomeipServiceInstance
[constr_5155]	SomeipServiceInstanceToMachineMapping only supports a single AddressFamily
[constr_3300]	Allowed ServiceMethodDeployment.method references
[constr_3301]	Allowed ServiceEventDeployment.event references
[constr_3302]	Allowed ServiceFieldDeployment.field references
[constr_3303]	ANY not allowed for SomeipServiceInterface.serviceInterfaceVersion
[constr_3304]	Value of attribute SomeipEventGroup.eventGroupId shall be unique
[constr_3305]	Value of attribute SomeipEvent.eventId shall be unique
[constr_3306]	Value of attribute SomeipMethod.methodId shall be unique





Number	Heading
[constr_5156]	SomeipEvent.transportProtocol setting to udp and the impact on Provided-SomeipServiceInstances
[constr_3308]	SomeipEvent.transportProtocol setting to tcp and the impact on Provided-SomeipServiceInstances
[constr_3309]	SomeipMethod.transportProtocol setting to udp and the impact on Provided-SomeipServiceInstances
[constr_3310]	SomeipMethod.transportProtocol setting to tcp and the impact on Provided-SomeipServiceInstances
[constr_3320]	Aggregation of CommunicationConnector by Machine
[constr_3349]	Usage of ApplicationAssocMapDataType is limited
[constr_3350]	Consistent value of category for AdaptiveAutosarApplications referencing an Executable
[constr_3351]	SOME/IP segmentation allowed for udp SomeipEvents
[constr_3352]	SOME/IP segmentation allowed for udp SomeipMethods
[constr_3353]	Restriction in usage of ApSomeipTransformationProps.sizeOfArrayLengthField
[constr_3354]	Restriction in usage of ApSomeipTransformationProps.sizeOfStructLengthField
[constr_3355]	Restriction in usage of ApSomeipTransformationProps.sizeOfUnionLengthField
[constr_3356]	Restriction in usage of ApSomeipTransformationProps.alignment
[constr_3357]	Restriction in usage of ApSomeipTransformationProps.sizeOfUnionTypeSelectorField
[constr_3358]	Usage of PortPrototype and TransportLayerIndependentInstanceId to define the same Service Instance is not allowed.
[constr_3359]	RPortPrototypeProps are related only to RPortPrototypes .
[constr_3360]	RPortPrototypeProps are related only to TransportLayerIndependentInstanceIds representing a consumer Service Instance.
[constr_3361]	Selective definition of serialization settings.
[constr_3362]	SomeipEvents aggregated by a SomeipField
[constr_3363]	SomeipMethods aggregated by a SomeipField

Table F.1: Added Constraints in original version

F.1.2 Created Specification Items in R17-03

Number	Heading
[TPS_MANI_01000]	Definition of the term Manifest
[TPS_MANI_01001]	Meaning of ServiceInterface
[TPS_MANI_01002]	Semantics of a ServiceInterfaceMapping
[TPS_MANI_01003]	Limitations of the applicability of ServiceInterfaceMapping





Number	Heading
[TPS_MANI_01004]	Semantics of ServiceInterface.namespace
[TPS_MANI_01005]	The definition of the namespace of a ServiceInterface may follow a hierarchical pattern
[TPS_MANI_01006]	Ordered definition of ServiceInterface.namespace
[TPS_MANI_01007]	Service-oriented communication and service discovery
[TPS_MANI_01008]	Semantics of AdaptiveAutosarApplication
[TPS_MANI_01009]	Standardized values of AdaptiveAutosarApplication.category
[TPS_MANI_01010]	Root element for a hierarchical software-component
[TPS_MANI_01011]	Connection between application design and application deployment
[TPS_MANI_01012]	Formal modeling of application startup behavior
[TPS_MANI_01013]	Semantics of meta-class ModeDependentStartupConfig
[TPS_MANI_01014]	Semantics of meta-class StartupConfigSet
[TPS_MANI_01015]	Semantics of meta-class StartupOption
[TPS_MANI_01016]	Category of ApplicationAssocMapDataType
[TPS_MANI_01017]	Relation of startup configuration to resource groups
[TPS_MANI_01018]	ImplementationDataType of category VECTOR
[TPS_MANI_01019]	Manifest content may apply to different aspects of the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01020]	Serialization format of the <i>Manifest</i> in AUTOSAR
[TPS_MANI_01021]	Serialization format of <i>Manifest</i> content on a machine
[TPS_MANI_01022]	Concept behind ServiceInterfaceMapping
[TPS_MANI_01024]	Semantics of ServiceInterfaceEventMapping
[TPS_MANI_01025]	Semantics of ServiceInterfaceFieldMapping
[TPS_MANI_01026]	Semantics of ServiceInterfaceMethodMapping
[TPS_MANI_01027]	Semantics of ApplicationAssocMapDataType
[TPS_MANI_01028]	ImplementationDataType of category ASSOCIATIVE_MAP
[TPS_MANI_01029]	Usage of ImplementationDataType
[TPS_MANI_01030]	ImplementationDataType of category STRING
[TPS_MANI_01031]	Semantics of CompositionDataPrototypeRef
[TPS_MANI_01032]	Usage of ServiceInterfaceMapping
[TPS_MANI_01033]	Semantics of ServiceInterface.event
[TPS_MANI_01034]	Semantics of ServiceInterface.field
[TPS_MANI_01035]	Semantics of ServiceInterface.method
[TPS_MANI_01037]	Diagnostic data mapping on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01038]	Diagnostic software mapping on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01039]	Representation of provided service
[TPS_MANI_01040]	Representation of required service
[TPS_MANI_01041]	Startup configuration supports the definition of a launch dependency
[TPS_MANI_01042]	Definition of a linear ImplementationDataType of category VECTOR





Number	Heading
[TPS_MANI_01043]	Definition of a rectangular <code>ImplementationDataType</code> of category <code>VECTOR</code>
[TPS_MANI_01044]	Structure of an <code>ImplementationDataType</code> of category <code>ASSOCIATIVE_MAP</code>
[TPS_MANI_01045]	<code>Process.modeDependentStartupConfig</code> that does not refer to a <code>ModeDeclaration</code>
[TPS_MANI_01046]	Semantics of <code>ModeDependentStartupConfig.machineMode</code>
[TPS_MANI_01047]	Existence of <code>SwRecordLayout</code> for an <code>ApplicationPrimitiveDataType</code> of category <code>STRING</code>
[TPS_MANI_01048]	Mapping of <code>DiagnosticEvent</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01049]	Mapping of <code>DiagnosticOperationCycle</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01050]	Mapping of <code>DiagnosticEnableCondition</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01051]	Mapping of <code>DiagnosticStorageCondition</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01052]	Semantics of <code>RPortPrototypeProps.portInstantiationBehavior</code>
[TPS_MANI_01053]	Usage of <code>ComSpecs</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01054]	Definition of the queue length of an <code>event</code>
[TPS_MANI_01055]	Semantics of <code>ServiceInterface.possibleError</code>
[TPS_MANI_01056]	Semantics of <code>ApplicationError.errorContext</code>
[TPS_MANI_01057]	Semantics of <code>RPortPrototypeProps.searchIntention</code>
[TPS_MANI_01058]	Ability to create a mapping of <code>ApplicationErrors</code> aggregated in the role <code>possibleError</code>
[TPS_MANI_01059]	Different values of <code>optionKind</code> within a <code>StartupConfig.startupOption</code>
[TPS_MANI_01060]	Use cases for the application of <code>DiagnosticServiceDataMapping</code>
[TPS_MANI_01061]	Requirements on scheduling
[TPS_MANI_01062]	<code>ImplementationDataType</code> to generate a C++ <code>enum</code>
[TPS_MANI_01063]	Sharing of <code>ImplementationDataType</code> with enumeration semantics
[TPS_MANI_03000]	Mapping of <code>AdaptivePlatformServiceInstance</code> to <code>PortPrototypes</code>
[TPS_MANI_03001]	Mapping of <code>AdaptivePlatformServiceInstance</code> to a <code>Machine</code>
[TPS_MANI_03002]	IP configuration for a <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03003]	<code>ProvidedSomeipServiceInstance</code> Fanout
[TPS_MANI_03004]	IPv4 Multicast event destination address
[TPS_MANI_03005]	IPv4 Multicast address range
[TPS_MANI_03006]	IPv6 Multicast address range
[TPS_MANI_03007]	Udp Transport Protocol Configuration for <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03008]	Tcp Transport Protocol Configuration for <code>ProvidedSomeipServiceInstance</code>





Number	Heading
[TPS_MANI_03009]	Tcp and Udp Transport Protocol Configuration for ProvidedSomeipServiceInstance
[TPS_MANI_03010]	Udp Transport Protocol Configuration in case of IP-Multicast
[TPS_MANI_03011]	Server Timing configuration for a ProvidedSomeipServiceInstance
[TPS_MANI_03012]	Initial Wait Phase configuration for a ProvidedSomeipServiceInstance
[TPS_MANI_03013]	Repetition Wait Phase configuration for a ProvidedSomeipServiceInstance
[TPS_MANI_03014]	Main Phase configuration for a ProvidedSomeipServiceInstance
[TPS_MANI_03015]	TTL for Offer Service Entries
[TPS_MANI_03016]	Servers RequestResponseDelay for received FindService entries
[TPS_MANI_03017]	Server Capability Records
[TPS_MANI_03018]	Usage of SomeipProvidedEventGroup.multicastThreshold
[TPS_MANI_03019]	TTL for SubscribeEventGroupAck Entries
[TPS_MANI_03020]	Servers RequestResponseDelay for received SubscribeEventGroup entries
[TPS_MANI_03021]	Requirements on the service version from the client's point of view
[TPS_MANI_03022]	Context of RequiredSomeipServiceInstance
[TPS_MANI_03023]	Udp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03024]	Tcp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03025]	Client Timing configuration for a RequiredSomeipServiceInstance
[TPS_MANI_03026]	Initial Wait Phase configuration for a RequiredSomeipServiceInstance
[TPS_MANI_03027]	Repetition Wait Phase configuration for a RequiredSomeipServiceInstance
[TPS_MANI_03028]	TTL for Find Service Entries
[TPS_MANI_03029]	Client Capability Records
[TPS_MANI_03030]	SomeipSdClientEventGroupTimingConfig.timeToLive for SubscribeEventGroup Entries
[TPS_MANI_03031]	Clients RequestResponseDelay for received ServiceOffer entries
[TPS_MANI_03032]	Description of middleware technologies not standardized by AUTOSAR
[TPS_MANI_03035]	Content of the Machine configuration
[TPS_MANI_03036]	ServiceInterface deployment to a middleware transport layer
[TPS_MANI_03037]	Purpose of ServiceMethodDeployment
[TPS_MANI_03038]	Purpose of ServiceEventDeployment
[TPS_MANI_03039]	Purpose of ServiceFieldDeployment
[TPS_MANI_03040]	SOME/IP ServiceInterface binding
[TPS_MANI_03041]	Definition of SOME/IP EventGroups
[TPS_MANI_03042]	Definition of SOME/IP Service Version
[TPS_MANI_03043]	SOME/IP VariableDataPrototype binding
[TPS_MANI_03044]	SOME/IP ClientServerOperation binding





Number	Heading
[TPS_MANI_03045]	UserDefined ServiceInterface binding
[TPS_MANI_03046]	User defined VariableDataPrototype binding
[TPS_MANI_03047]	User defined ClientServerOperation binding
[TPS_MANI_03048]	User defined Field binding
[TPS_MANI_03049]	Tcp and Udp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03050]	Tcp and Udp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03051]	Usage of SomeipMethod.transportProtocol
[TPS_MANI_03052]	Static IPv4 configuration
[TPS_MANI_03053]	Static IPv6 configuration
[TPS_MANI_03056]	Usage of SomeipEvent.transportProtocol
[TPS_MANI_03057]	SOME/IP Field binding
[TPS_MANI_03059]	RequiredSomeipServiceInstance.requiredServiceInstanceId
[TPS_MANI_03061]	IPv6 Multicast event destination address
[TPS_MANI_03064]	SOME/IP Service Discovery message exchange configuration
[TPS_MANI_03065]	Hardware resources of the machine
[TPS_MANI_03066]	Description of machine states
[TPS_MANI_03067]	SOME/IP segmentation of udp SomeipEvents
[TPS_MANI_03068]	SOME/IP segmentation of SomeipMethod Calls
[TPS_MANI_03069]	SOME/IP segmentation of SomeipMethod Responses
[TPS_MANI_03070]	Size of a length field for a chosen array
[TPS_MANI_03071]	Size of a length field for a chosen structure
[TPS_MANI_03072]	Size of a length field for a chosen union
[TPS_MANI_03073]	Alignment of a dynamic DataPrototype
[TPS_MANI_03074]	Size of a type selector field for a chosen union
[TPS_MANI_03075]	Byte Order of chosen DataPrototype in the serialized data stream
[TPS_MANI_03094]	Machine -specific platform configuration settings
[TPS_MANI_03095]	Implementation-specific platform configuration settings
[TPS_MANI_03096]	Machine -specific configuration settings for a generic module
[TPS_MANI_03097]	Implementation-specific configuration settings for a generic module
[TPS_MANI_03098]	Machine -specific configuration settings for the OS module
[TPS_MANI_03099]	Implementation-specific configuration settings for the OS module
[TPS_MANI_03100]	Transport layer independent TransportLayerIndependentInstanceIds
[TPS_MANI_03101]	SOME/IP serialization
[TPS_MANI_03102]	UserDefined serialization
[TPS_MANI_03103]	Default size for all array length fields
[TPS_MANI_03104]	Default size for all structure length fields
[TPS_MANI_03105]	Default size for all union length fields





Number	Heading
[TPS_MANI_03106]	Default size for all union type selector fields
[TPS_MANI_03107]	Default alignment for all dynamic DataPrototypes
[TPS_MANI_03108]	Default Byte Order for all DataPrototypes
[TPS_MANI_03109]	TransformationProps on the level of DataPrototypes overwrites TransformationProps settings on the level of a ServiceInterface

Table F.2: Added Specification Items in original Version

F.2 Traceable item history of this document according to AUTOSAR Release R17-10

F.2.1 Added Specification Items in R17-10

Number	Heading
[TPS_MANI_01064]	Semantics of attribute method.fireAndForget
[TPS_MANI_01065]	Purpose of PersistencyKeyValueDatabaseInterface
[TPS_MANI_01067]	Purpose of PersistencyFileProxyInterface
[TPS_MANI_01068]	Semantics of PersistencyFileProxyInterface.maxNumberOfFiles
[TPS_MANI_01069]	Further qualification of properties of PortPrototypes typed by PersistencyKeyValueDatabaseInterfaces
[TPS_MANI_01073]	Semantics of PortPrototype typed by PersistencyKeyValueDatabaseInterface
[TPS_MANI_01074]	Specification of encryption of persistent data
[TPS_MANI_01075]	Specification of redundancy of persistent data
[TPS_MANI_01077]	Specification of file encryption
[TPS_MANI_01078]	Semantics of PersistencyPortPrototypeToKeyValueDatabaseMapping
[TPS_MANI_01079]	Semantics of PersistencyKeyValueDatabase
[TPS_MANI_01080]	Semantics of PersistencyFileProxyToFileMapping
[TPS_MANI_01081]	Semantics of PortPrototype typed by PersistencyFileProxyInterface
[TPS_MANI_01082]	Eligibility of DataPrototypes for the definition of optionality
[TPS_MANI_01083]	Optionality is supported for ApplicationDataType as well as ImplementationDataType
[TPS_MANI_01084]	Optionality for a DataPrototype typed by an ApplicationDataType
[TPS_MANI_01085]	Definition of optionality for a DataPrototype typed by an ImplementationDataType
[TPS_MANI_01087]	Interaction with crypto software
[TPS_MANI_01088]	Semantics of CryptoNeed





Number	Heading
[TPS_MANI_01089]	Relation between <code>CryptoNeed</code> and <code>PortPrototype</code>
[TPS_MANI_01090]	Modeling of crypto software as a platform module
[TPS_MANI_01091]	Semantics of <code>CryptoJob</code>
[TPS_MANI_01092]	Mapping between <code>CryptoNeed</code> and <code>CryptoJob</code>
[TPS_MANI_01093]	Semantics of <code>CryptoDriver</code>
[TPS_MANI_01094]	Scope of <code>CryptoDriver</code>
[TPS_MANI_01095]	Semantics of <code>CryptoKeySlot</code>
[TPS_MANI_01096]	Semantics of the <code>CryptoPrimitive</code>
[TPS_MANI_01097]	Assignment of TLV data ids for data structures with optional members
[TPS_MANI_01098]	Constraints on the definition of an <code>ImplementationDataType</code> of <code>category</code> VECTOR
[TPS_MANI_01099]	Semantics of <code>ImplementationDataTypeElementExtension</code>
[TPS_MANI_01100]	Semantics of <code>Allocator</code>
[TPS_MANI_01101]	Size-constrained allocation of memory
[TPS_MANI_01102]	Specification of a namespace for an <code>ImplementationDataType</code> of <code>category</code> VECTOR
[TPS_MANI_01103]	Three-level approach to REST modeling
[TPS_MANI_01105]	Semantics of <code>RestServiceInterface</code>
[TPS_MANI_01106]	Specification of capabilities for the receiver of <code>events</code> or <code>field</code> notifiers
[TPS_MANI_01107]	Specification of capabilities for the sender of <code>events</code> or <code>field</code> notifiers
[TPS_MANI_01108]	Specification of capabilities for the caller of a <code>methods</code> or <code>field</code> setter/getter
[TPS_MANI_01109]	Semantics of <code>UploadablePackageElement</code>
[TPS_MANI_01110]	Semantics of <code>SoftwareCluster</code>
[TPS_MANI_01111]	Diagnostic Address of a <code>SoftwareCluster</code>
[TPS_MANI_01112]	Semantics of <code>SoftwareClusterDesign</code>
[TPS_MANI_01113]	Semantics of <code>SoftwareClusterDesign.diagnosticAddress</code>
[TPS_MANI_01114]	Relation of <code>DiagnosticContributionSet</code> to <code>SoftwareCluster</code>
[TPS_MANI_01115]	Specification of executable software within <code>SoftwareCluster</code>
[TPS_MANI_01116]	Reference to model elements included in an uploadable software package
[TPS_MANI_01117]	Semantics of <code>SoftwareClusterDesign.intendedTargetMachine</code>
[TPS_MANI_01118]	Relation between <code>SoftwareClusterDesign</code> and <code>DiagnosticContributionSet</code>
[TPS_MANI_01119]	Reference to model elements from <code>SoftwareClusterDesign</code>
[TPS_MANI_01120]	Recursive definition of <code>RestResourceDef</code>
[TPS_MANI_01121]	Semantics of <code>RestResourceDef.endpoint</code>
[TPS_MANI_01122]	Arguments to endpoints
[TPS_MANI_01123]	System Triggered Event
[TPS_MANI_01124]	Semantics of <code>RestElementDef</code>
[TPS_MANI_01125]	Properties of REST elements can either be primitive or have array semantics





Number	Heading
[TPS_MANI_01126]	Definition of string properties
[TPS_MANI_01127]	Limited support for data semantics in <code>RestAbstractNumericalPropertyDef</code>
[TPS_MANI_01128]	Difference between <code>RestIntegerPropertyDef</code> and <code>RestNumberPropertyDef</code>
[TPS_MANI_01129]	<code>RestObjectRef</code> is only needed for specific implementations of REST-based communication
[TPS_MANI_01130]	Structure of a typical <code>URI</code> for a REST service
[TPS_MANI_01131]	Impact of nested REST resources on the structure of REST URI
[TPS_MANI_01132]	Semantics of <code>CompositionDataPrototypeRef</code>
[TPS_MANI_01133]	Optional element of an <code>event</code>
[TPS_MANI_01134]	Optional element in the context of a <code>method</code>
[TPS_MANI_03110]	Allowed components in system description with category <code>category SOFTWARE_COMPONENT_SYSTEM_DESIGN_DESCRIPTION</code> .
[TPS_MANI_03111]	Mapping between <code>method</code> and <code>operation</code>
[TPS_MANI_03112]	Mapping between an <code>event</code> and a <code>dataElement</code>
[TPS_MANI_03113]	Mapping between a <code>field</code> and elements of Classic Platform <code>PortInterfaces</code>
[TPS_MANI_03114]	Usage of <code>AssemblySwConnectors</code> in the System Design model
[TPS_MANI_03115]	Mapping between a fire and forget <code>method</code> and elements of Classic Platform <code>PortInterfaces</code>
[TPS_MANI_03116]	Size of a length field for a chosen string
[TPS_MANI_03117]	Default size for all string length fields
[TPS_MANI_03118]	Semantics of <code>ServiceInterface.method</code> with <code>fireAndForget</code> set to true
[TPS_MANI_03119]	Default value for the attribute <code>fireAndForget</code> of meta-class <code>ClientServerOperation</code>
[TPS_MANI_03120]	Signal-based <code>ServiceInterface</code> binding
[TPS_MANI_03121]	Signal-based <code>VariableDataPrototype</code> binding
[TPS_MANI_03122]	Signal-based <code>Field</code> binding
[TPS_MANI_03123]	Signal-based <code>ClientServerOperation</code> binding
[TPS_MANI_03124]	<code>SignalBasedEventDeployment</code> to <code>ISignalTriggering</code> mapping
[TPS_MANI_03125]	<code>SignalBasedMethodDeployment</code> to <code>ISignalTriggerings</code> mapping
[TPS_MANI_03126]	<code>SignalBasedFieldDeployment</code> to <code>ISignalTriggerings</code> mapping
[TPS_MANI_03127]	Usage of <code>End2EndEventProtectionProps</code>
[TPS_MANI_03128]	Usage of same <code>dataId</code> in case of Multi-Binding
[TPS_MANI_03129]	E2E profile
[TPS_MANI_03130]	Standardized <code>E2EProfileConfiguration.profileName</code> values
[TPS_MANI_03131]	Non-Standardized <code>E2EProfileConfiguration.profileName</code> values
[TPS_MANI_03132]	Semantics of E2E attributes in <code>ReceiverComSpec</code>
[TPS_MANI_03133]	Usage of <code>ServiceInterfaceElementSecureComConfig</code>





Number	Heading
[TPS_MANI_03134]	Configuration of supported TLS ciphersuites
[TPS_MANI_03135]	Configuration of TLS PSK Identity
[TPS_MANI_03136]	Configuration of requirements for the TLS cryptographic job
[TPS_MANI_03137]	<code>ServiceInterfaceElementSecureComConfig.dataId</code> and <code>ServiceInterfaceElementSecureComConfig.freshnessValueId</code> are not relevant in case of TLS communication
[TPS_MANI_03138]	SecOC Security Profile
[TPS_MANI_03139]	Standardized SecOC Security Profiles
[TPS_MANI_03140]	Non-Standardized SecOC Security Profiles
[TPS_MANI_03141]	Mapping between <code>SecOcJobRequirement</code> and <code>CryptoJob</code>
[TPS_MANI_03142]	Mapping between <code>TlsJobRequirement</code> and <code>CryptoJob</code>
[TPS_MANI_03143]	Mapping between <code>PresharedKeyIdentity</code> and <code>CryptoKeySlot</code>
[TPS_MANI_03144]	C++ language binding of <code>ImplementationDataTypes</code> of category <code>STRING</code>
[TPS_MANI_03145]	Description of a function group
[TPS_MANI_03146]	Configuration of timeouts for a selected machine state or function group state
[TPS_MANI_03147]	Mapping of a <code>Process</code> to a <code>Machine</code>
[TPS_MANI_03148]	Description of Core affinity
[TPS_MANI_03149]	Definition of a start-up timeout for a <code>Process</code>
[TPS_MANI_03150]	Definition of a termination timeout for a <code>Process</code>
[TPS_MANI_03151]	Default value for termination timeout
[TPS_MANI_03152]	Assignment of a <code>StateDependentStartupConfig</code> to a function group state
[TPS_MANI_03153]	Semantics of <code>ModeDependentStartupConfig.functionGroupMode</code>
[TPS_MANI_03500]	Definition of platform health management checkpoints
[TPS_MANI_03501]	Definition of platform health management supervised entities
[TPS_MANI_03502]	Enabling of <code>PlatformHealthManagementContribution</code> on a <code>Machine</code>
[TPS_MANI_03503]	Applicability of supervision to a specific <code>Process</code>
[TPS_MANI_03504]	Existence of <code>SupervisionEntity</code>
[TPS_MANI_03505]	Existence of <code>PhmCheckpoint</code>
[TPS_MANI_03506]	Optionality of <code>SupervisionEntity</code> and <code>PhmCheckpoint</code>
[TPS_MANI_03508]	Definition of an <code>AliveSupervision</code> for a <code>PhmCheckpoint</code>
[TPS_MANI_03509]	Definition of a <code>CheckpointTransition</code>
[TPS_MANI_03510]	Definition of <code>LogicalSupervision</code>
[TPS_MANI_03511]	Definition of <code>DeadlineSupervision</code>
[TPS_MANI_03512]	Applicability of global supervision to a specific <code>Process</code>
[TPS_MANI_03513]	Collection of <code>SupervisionEntity</code> s into a global supervision
[TPS_MANI_03514]	Expiration tolerance for <code>GlobalSupervisionEntity</code>
[TPS_MANI_03515]	Expiration tolerance for <code>SupervisionEntity</code>





Number	Heading
[TPS_MANI_03516]	Condition evaluation for HealthChannelSupervision
[TPS_MANI_03517]	Condition evaluation for HealthChannelExternalMode
[TPS_MANI_03518]	LogicalExpression definition
[TPS_MANI_03519]	Rule definition
[TPS_MANI_03520]	Execution of PhmActionList with actionListExecution=triggeredOnEvaluation
[TPS_MANI_03521]	Execution of PhmActionList with actionListExecution=triggeredOnChange
[TPS_MANI_03522]	Definition of actions for application software
[TPS_MANI_03523]	Definition of actions for Platform Instance
[TPS_MANI_03524]	Definition of actions for Watchdog

Table F.3: Added Specification Items in R17-10

F.2.2 Changed Specification Items in R17-10

Number	Heading
[TPS_MANI_01004]	Semantics of ServiceInterface.namespace
[TPS_MANI_01006]	Ordered definition of ServiceInterface.namespace
[TPS_MANI_01017]	Relation of startup configuration to resource group
[TPS_MANI_01018]	ImplementationDataType of category VECTOR
[TPS_MANI_01030]	ImplementationDataType of category STRING
[TPS_MANI_03000]	Mapping of AdaptivePlatformServiceInstance to PortPrototypes
[TPS_MANI_03007]	Udp Transport Protocol Configuration for ProvidedSomeipServiceInstance
[TPS_MANI_03008]	Tcp Transport Protocol Configuration for ProvidedSomeipServiceInstance
[TPS_MANI_03009]	Tcp and Udp Transport Protocol Configuration for ProvidedSomeipServiceInstance
[TPS_MANI_03010]	Udp Transport Protocol Configuration in case of IP-Multicast
[TPS_MANI_03018]	Usage of SomeipProvidedEventGroup.multicastThreshold
[TPS_MANI_03023]	Udp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03024]	Tcp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03049]	Tcp and Udp Transport Protocol Configuration for RequiredSomeipServiceInstance
[TPS_MANI_03101]	SOME/IP serialization
[TPS_MANI_03102]	UserDefined serialization
[TPS_MANI_03103]	Default size for all array length fields





Number	Heading
[TPS_MANI_03104]	Default size for all structure length fields
[TPS_MANI_03105]	Default size for all union length fields
[TPS_MANI_03106]	Default size for all union type selector fields
[TPS_MANI_03107]	Default alignment for all dynamic DataPrototypes
[TPS_MANI_03108]	Default Byte Order for all DataPrototypes
[TPS_MANI_03109]	TransformationProps on the level of DataPrototypes overwrites TransformationProps settings on the level of a ServiceInterface

Table F.4: Changed Specification Items in R17-10

F.2.3 Deleted Specification Items in R17-10

Number	Heading
[TPS_MANI_03100]	Transport layer independent TransportLayerIndependentInstanceIds

Table F.5: Deleted Specification Items in R17-10

F.2.4 Added Constraints in R17-10

Number	Heading
[constr_1522]	Semantics of ClientServerOperation.possibleError
[constr_1524]	Standardized values of PersistencyFileProxyInterface.category
[constr_1525]	Standardized values of PersistencyFile.category
[constr_1526]	Values of PersistencyFileArray.file.category
[constr_1527]	ImplementationDataTypeElement finally referenced as the target element in the context of an ImplementationDataTypeElementInAutosarDataPrototypeRef
[constr_1528]	Definition of optionality for multiple DataPrototypes typed by the same AutosarDataType
[constr_1529]	Standardized values of CryptoNeed.category
[constr_1530]	Standardized values of CryptoPrimitive.algorithmFamily and CryptoKeySlot.algorithmFamily
[constr_1531]	Standardized values of CryptoPrimitive.algorithmMode
[constr_1532]	Consistent assignment of TLV data ids to data structures with optional members
[constr_1533]	Applicability of ImplementationDataTypeElementExtension
[constr_1534]	Existence of DiagnosticSoftwareClusterProps
[constr_1535]	Existence of DiagnosticSoftwareClusterProps in the context of a DiagnosticContributionSet





Number	Heading
[constr_1536]	Definition of <code>SoftwareCluster</code> applies for a single <code>Machine</code>
[constr_1537]	Consistent assignment of TLV data ids to arguments of a given <code>ClientServerOperation</code>
[constr_1542]	No nested definition of <code>SoftwareCluster</code>
[constr_1543]	Only one physical address per <code>SoftwareCluster</code>
[constr_3366]	System <code>category</code> for a system description with Adaptive Platform components
[constr_3367]	<code>FieldMapping.notifierDataElement</code> reference
[constr_3368]	<code>FieldMapping.getterOperation</code> reference
[constr_3369]	<code>FieldMapping.setterOperation</code> reference
[constr_3370]	<code>InterfaceMapping</code> shall map all elements of a single <code>ServiceInterface</code>
[constr_3371]	Mutually exclusive existence of <code>FireAndForgetMapping.dataElement</code> reference and <code>FireAndForgetMapping.trigger</code> reference
[constr_3372]	Restriction in usage of <code>ApSomeipTransformationProps.sizeOfStringLengthField</code>
[constr_3374]	<code>method</code> with attribute <code>fireAndForget</code> set to true shall not have any inout or out arguments
[constr_3375]	<code>method</code> with attribute <code>fireAndForget</code> set to true shall not reference an <code>ApplicationError</code>
[constr_3376]	<code>FireAndForgetMapping</code> shall reference only fire and forget <code>methods</code>
[constr_3377]	Restriction of <code>ISignalTriggering</code> references in <code>SignalBasedFieldToISignalTriggeringMapping</code>
[constr_3380]	<code>End2EndEventProtectionProps</code> shall not reference an <code>event</code> and a <code>notifier</code> at the same time
[constr_3387]	Compatibility of <code>PortPrototypes</code> of different <code>ServiceInterfaces</code>
[constr_3388]	Compatibility of <code>events</code>
[constr_3389]	Compatibility of <code>methods</code>
[constr_3390]	Compatibility of <code>fields</code>
[constr_3391]	<code>ServiceInterfaceElementSecureComConfig</code> references to <code>ServiceInterfaceDeployment</code> elements
[constr_3392]	<code>ServiceInterfaceElementSecureComConfig.dataId</code> and <code>ServiceInterfaceElementSecureComConfig.freshnessValueId</code> are mandatory in case of SecOC communication
[constr_3393]	Usage of <code>shallRunOn</code> and <code>shallNotRunOn</code> references
[constr_3394]	Default value for start-up timeout on the <code>Machine</code> is not configurable
[constr_3395]	<code>TransformationPropsToServiceInterfaceElementMapping</code> is restricted to one single <code>ServiceInterface</code>
[constr_3396]	Number of <code>Process.modeDependentStartupConfig</code> that refer to the same <code>functionGroupMode</code>
[constr_3397]	<code>ModeDependentStartupConfig</code> that refers to a <code>functionGroupMode</code> and to a <code>machineMode</code>
[constr_3398]	<code>ModeDependentStartupConfig</code> that refers to function group modes of different function groups





Number	Heading
[constr_3527]	LogicalExpression referenced by one PhmRule

Table F.6: Added Constraints in R17-10

F.2.5 Changed Constraints in R17-10

Number	Heading
[constr_1486]	ImplementationDataType of category STRING and SwBaseType
[constr_1490]	Allowed value of category for reference ProcessToMachineMapping.process.executable
[constr_3290]	Transport Protocol attributes defined for a ProvidedSomeipServiceInstance
[constr_3296]	Transport Protocol attributes defined for a RequiredSomeipServiceInstance
[constr_3307]	SomeipEventDeployment.transportProtocol setting to udp and the impact on ProvidedSomeipServiceInstances
[constr_3308]	SomeipEventDeployment.transportProtocol setting to tcp and the impact on ProvidedSomeipServiceInstances
[constr_3309]	SomeipMethodDeployment.transportProtocol setting to udp and the impact on ProvidedSomeipServiceInstances
[constr_3310]	SomeipMethodDeployment.transportProtocol setting to tcp and the impact on ProvidedSomeipServiceInstances
[constr_3361]	Selective definition of serialization settings

Table F.7: Changed Constraints in R17-10

F.2.6 Deleted Constraints in R17-10

Number	Heading
[constr_3291]	SomeipServiceInstanceToMachineMapping.portConfig aggregation restriction
[constr_3358]	Usage of PortPrototype and TransportLayerIndependentInstanceId to define the same Service Instance is not allowed
[constr_3360]	RPortPrototypeProps are related only to TransportLayerIndependentInstanceIds representing a consumer Service Instance

Table F.8: Deleted Constraints in R17-10

F.3 Traceable item history of this document according to AUTOSAR Release R18-03

F.3.1 Added Specification Items in R18-03

Number	Heading
[TPS_MANI_01135]	Semantics of <code>PersistencyKeyValueDatabaseInterface.dataTypeForSerialization</code>
[TPS_MANI_01136]	<code>AutosarDataPrototype</code> is the target of the <code>CompositionDataPrototypeRef</code>
[TPS_MANI_01137]	Applicable use cases for <code>CompositionDataPrototypeRef</code>
[TPS_MANI_01138]	Semantics of <code>PersistencyKeyValueDatabaseInterface.dataElement</code>
[TPS_MANI_01139]	Semantics of <code>PersistencyKeyValueDatabaseInterface.updateStrategy</code>
[TPS_MANI_01140]	Semantics of <code>PersistencyDataElement.updateStrategy</code>
[TPS_MANI_01141]	Semantics of <code>PersistencyFileProxyInterface.updateStrategy</code>
[TPS_MANI_01142]	Semantics of <code>PersistencyFileProxy</code>
[TPS_MANI_01143]	Semantics of <code>PersistencyFileProxy.updateStrategy</code>
[TPS_MANI_01144]	Semantics of <code>PersistencyKeyValuePair</code>
[TPS_MANI_01146]	Initial value for <code>PersistencyKeyValuePair</code>
[TPS_MANI_01147]	Semantics of <code>PersistencyKeyValueDatabase.updateStrategy</code>
[TPS_MANI_01148]	Semantics of <code>PersistencyKeyValuePair.updateStrategy</code>
[TPS_MANI_01149]	Semantics of <code>PersistencyFileArray.file</code>
[TPS_MANI_01150]	Semantics of <code>PersistencyFileArray</code>
[TPS_MANI_01151]	Semantics of <code>PersistencyFileArray.updateStrategy</code>
[TPS_MANI_01152]	Semantics of <code>PersistencyFile.updateStrategy</code>
[TPS_MANI_01154]	<code>PersistencyFileArray.updateStrategy</code> overrides <code>PersistencyFileProxyInterface.updateStrategy</code>
[TPS_MANI_01155]	<code>PersistencyKeyValueDatabase.updateStrategy</code> overrides <code>PersistencyKeyValueDatabaseInterface.updateStrategy</code>
[TPS_MANI_01156]	<code>PersistencyKeyValuePair.updateStrategy</code> overrides <code>PersistencyKeyValueDatabase.updateStrategy</code>
[TPS_MANI_01157]	Semantics of <code>updateStrategy</code> on collection level
[TPS_MANI_01158]	<code>PersistencyFile.updateStrategy</code> overrides <code>PersistencyFileArray.updateStrategy</code>
[TPS_MANI_01159]	Semantics of <code>updateStrategy</code> on element level
[TPS_MANI_01160]	Definition of initial value for <code>PersistencyDataElement</code>
[TPS_MANI_01161]	Impact of values of <code>category</code> on the semantics of <code>SoftwareClusterDesign</code>
[TPS_MANI_01162]	Semantics of <code>SoftwareClusterDesign.dependsOn</code>
[TPS_MANI_01163]	Impact of values of <code>category</code> on the semantics of <code>SoftwareCluster</code>





Number	Heading
[TPS_MANI_01164]	Semantics of <code>SoftwareCluster.dependsOn</code>
[TPS_MANI_01165]	Standardized value of <code>UserDefinedServiceInterfaceDeployment.category</code>
[TPS_MANI_01166]	Semantics of <code>CppImplementationDataType</code>
[TPS_MANI_01167]	<code>AbstractImplementationDataType</code>
[TPS_MANI_01168]	Specification of a namespace for a <code>CppImplementationDataType</code>
[TPS_MANI_01169]	Support for template data types
[TPS_MANI_01170]	Semantics of <code>CppTemplateArgument.isVariadicTemplate</code>
[TPS_MANI_01171]	Modeling of structured data types
[TPS_MANI_01172]	Description of type references in the scope of <code>CppImplementation-DataType</code>
[TPS_MANI_01173]	Description of type references in the scope of <code>CppImplementation-DataTypeElement</code>
[TPS_MANI_01174]	Semantics of reference in the role <code>CppTemplateArgument.templateType</code>
[TPS_MANI_01175]	Semantics of reference in the role <code>CppTemplateArgument allocator</code>
[TPS_MANI_01176]	Standardized value for attribute <code>CppImplementationDataType.type- Emitter</code>
[TPS_MANI_01177]	Semantics of <code>CppImplementationDataType.typeEmitter</code>
[TPS_MANI_01178]	Semantics of <code>RestHttpPortPrototypeMapping.acceptsEncoding</code>
[TPS_MANI_01179]	Semantics of <code>PersistencyFileProxy.contentUri/PersistencyFile.contentUri</code> vs. <code>PersistencyFileArray.uri</code> and <code>Persistency-FileProxy.fileName/PersistencyFile.fileName</code>
[TPS_MANI_01180]	Collection of data types that requires serialization support
[TPS_MANI_01181]	Use cases for the application of <code>DiagnosticServiceSwMapping</code>
[TPS_MANI_01182]	<code>PersistencyKeyValuePair.updateStrategy</code> overrides <code>Persisten- cyDataElement.updateStrategy</code>
[TPS_MANI_01183]	<code>PersistencyFile.updateStrategy</code> overrides <code>Persistency-FileProxy.updateStrategy</code>
[TPS_MANI_03154]	<code>ProvidedSomeipServiceInstance</code> related configuration settings for events
[TPS_MANI_03155]	<code>ProvidedSomeipServiceInstance</code> related configuration settings for methods
[TPS_MANI_03156]	<code>RequiredSomeipServiceInstance</code> related configuration settings for methods
[TPS_MANI_03157]	Enabling of data accumulation for upd data transmission
[TPS_MANI_03158]	Configuration of a data accumulation on a <code>ProvidedServiceInstance</code> for transmission over udp
[TPS_MANI_03159]	Configuration of a data accumulation on a <code>RequiredSomeipServiceIn- stance</code> for transmission over udp
[TPS_MANI_03160]	Log and Trace configuration options in the Application Manifest
[TPS_MANI_03161]	Log and Trace configuration options in the Service Instance Manifest
[TPS_MANI_03162]	<code>Machine</code> -specific configuration settings for the Log and Trace functional cluster





Number	Heading
[TPS_MANI_03163]	Network configuration for Log and Trace messages
[TPS_MANI_03164]	Machine-specific configuration settings for DoIP
[TPS_MANI_03165]	Network configuration for DoIP
[TPS_MANI_03166]	Machine-specific configuration settings for NM module
[TPS_MANI_03167]	Network configuration for Nm
[TPS_MANI_03168]	Configuration of the SOME/IP load balancing option
[TPS_MANI_03169]	CppImplementationDataType with fixed size array semantics
[TPS_MANI_03170]	CppImplementationDataType of category ARRAY
[TPS_MANI_03171]	Value type of a CppImplementationDataType of category ARRAY
[TPS_MANI_03172]	Size of a CppImplementationDataType of category ARRAY
[TPS_MANI_03173]	multidimensional Array
[TPS_MANI_03174]	CppImplementationDataType with variable size array semantics
[TPS_MANI_03175]	CppImplementationDataType of category VECTOR
[TPS_MANI_03176]	Value type of a CppImplementationDataType of category VECTOR
[TPS_MANI_03177]	multidimensional Vector
[TPS_MANI_03178]	CppImplementationDataType of category STRING
[TPS_MANI_03179]	C++ language binding of CppImplementationDataTypes of category STRING
[TPS_MANI_03180]	Definition of Structures
[TPS_MANI_03181]	Definition of members in CppImplementationDataType of category STRUCTURE
[TPS_MANI_03182]	Definition of members in CppImplementationDataTypeElement of category STRUCTURE
[TPS_MANI_03183]	CppImplementationDataType of category ASSOCIATIVE_MAP
[TPS_MANI_03184]	CppImplementationDataType of category ASSOCIATIVE_MAP
[TPS_MANI_03185]	Structure of an CppImplementationDataType of category ASSOCIATIVE_MAP
[TPS_MANI_03186]	Usage of arraySize in case of a Vector
[TPS_MANI_03187]	Definition of enumeration types
[TPS_MANI_03188]	Usage of an Allocator for a CppImplementationDataType of category STRING
[TPS_MANI_03189]	Definition of CppImplementationDataType of category VARIANT
[TPS_MANI_03190]	CppImplementationDataType of category VARIANT
[TPS_MANI_03191]	Definition of type alternatives stored in a VARIANT
[TPS_MANI_03192]	CppImplementationDataType of category VALUE
[TPS_MANI_03193]	CppImplementationDataType or CppImplementationDataTypeElement of category TYPE_REFERENCE
[TPS_MANI_03194]	Function Group State
[TPS_MANI_03195]	Off state in Function Group
[TPS_MANI_03196]	Semantics of CppImplementationDataTypeElementQualifier. anonymous attribute





Number	Heading
[TPS_MANI_03525]	DDS ServiceInterface binding
[TPS_MANI_03526]	DDS VariableDataPrototype binding
[TPS_MANI_03527]	Definition of ProvidedDdsServiceInstance
[TPS_MANI_03528]	Definition of ProvidedDdsEventQosProps
[TPS_MANI_03529]	Definition of RequiredDdsServiceInstance
[TPS_MANI_03530]	Definition of RequiredDdsEventQosProps
[TPS_MANI_03531]	qosProfile of ProvidedDdsEventQosProps is optional
[TPS_MANI_03532]	qosProfile of RequiredDdsEventQosProps is optional
[TPS_MANI_03533]	DdsServiceInstanceToMachineMapping
[TPS_MANI_03534]	Definition of Platform Health Management Health Channel
[TPS_MANI_03535]	Definition of Time Synchronization interaction
[TPS_MANI_03536]	Time Synchronization interaction in a master role
[TPS_MANI_03537]	Time Synchronization interaction in a slave role
[TPS_MANI_03538]	Time Synchronization interaction with a local Time Base
[TPS_MANI_03539]	Definition of Time Bases
[TPS_MANI_03540]	Definition of PureLocalTimeBase
[TPS_MANI_03541]	Definition of SynchronizedSlaveTimeBase
[TPS_MANI_03542]	Definition of SynchronizedMasterTimeBase
[TPS_MANI_03543]	Definition of time sync correction attributes
[TPS_MANI_03544]	Definition of PlatformHealthManagementContribution
[TPS_MANI_03545]	Existence of HealthChannelExternalStatus
[TPS_MANI_03546]	Definition of reported health status RPortPrototype
[TPS_MANI_03547]	Definition of <i>offset</i> time domains
[TPS_MANI_03548]	Definition of TimeSyncPortPrototypeToTimeBaseMapping
[TPS_MANI_03549]	Usage of RPortPrototype for the interaction with Time Synchronization
[TPS_MANI_03550]	Usage of RPortPrototype for the interaction with Platform Health Management
[TPS_MANI_03551]	Definition of Time Base kind
[TPS_MANI_03552]	Supervision cycle for GlobalSupervision

Table F.9: Added Specification Items in R18-03

F.3.2 Changed Specification Items in R18-03

Number	Heading
[TPS_MANI_01006]	Ordered definition of ServiceInterface.namespace
[TPS_MANI_01008]	Semantics of ExecutableGroup
[TPS_MANI_01009]	Standardized values of ExecutableGroup.category





Number	Heading
[TPS_MANI_01013]	Semantics of meta-class <code>ModeDependentStartupConfig</code>
[TPS_MANI_01017]	Relation of startup configuration to resource group
[TPS_MANI_01041]	Startup configuration supports the definition of a launch sequence dependency
[TPS_MANI_01042]	Definition of a linear <code>ImplementationDataType</code> of category <code>VECTOR</code>
[TPS_MANI_01044]	Structure of an <code>ImplementationDataType</code> of category <code>ASSOCIATIVE_MAP</code>
[TPS_MANI_01060]	Use cases for the application of <code>DiagnosticServiceDataMapping</code>
[TPS_MANI_01068]	Semantics of <code>PersistencyFileProxyInterface.maxNumberOfFiles</code>
[TPS_MANI_01069]	Further qualification of properties of <code>PortPrototypes</code> typed by <code>PersistencyKeyValueDatabaseInterfaces</code>
[TPS_MANI_01075]	Specification of redundancy of persistent data
[TPS_MANI_01078]	Semantics of <code>PersistencyPortPrototypeToKeyValueDatabaseMapping</code>
[TPS_MANI_01080]	Semantics of <code>PersistencyPortPrototypeToFileArrayMapping</code>
[TPS_MANI_01097]	Assignment of TLV data ids for data structures with optional members
[TPS_MANI_01100]	Semantics of <code>Allocator</code>
[TPS_MANI_01109]	Semantics of <code>UploadablePackageElement</code>
[TPS_MANI_01112]	Semantics of <code>SoftwareClusterDesign</code>
[TPS_MANI_01113]	Semantics of <code>SoftwareClusterDesign.diagnosticAddress</code>
[TPS_MANI_01116]	Reference to model elements included in an uploadable software package
[TPS_MANI_01117]	Semantics of <code>SoftwareClusterDesign.intendedTargetMachine</code>
[TPS_MANI_01118]	Relation between <code>SoftwareClusterDesign</code> and <code>DiagnosticContributionSet</code>
[TPS_MANI_01119]	Reference to model elements from <code>SoftwareClusterDesign</code>
[TPS_MANI_01133]	Optional element of an <code>event</code>
[TPS_MANI_01134]	Optional element in the context of a <code>method</code>
[TPS_MANI_03001]	Mapping of <code>AdaptivePlatformServiceInstance</code> to a <code>MachineDesign</code>
[TPS_MANI_03002]	IP configuration for a <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03003]	<code>ProvidedSomeipServiceInstance</code> Fanout
[TPS_MANI_03022]	Context of <code>RequiredSomeipServiceInstance</code>
[TPS_MANI_03110]	Allowed components in system description with category <code>SYSTEM_DESIGN_DESCRIPTION</code> .
[TPS_MANI_03114]	Usage of <code>AssemblySwConnectors</code> in the System Design model
[TPS_MANI_03145]	Description of a function group
[TPS_MANI_03152]	Assignment of a <code>ModeDependentStartupConfig</code> to a function group state
[TPS_MANI_03153]	Semantics of <code>ModeDependentStartupConfig.functionGroupMode</code>
[TPS_MANI_03500]	Definition of Platform Health Management Supervision and Checkpoints
[TPS_MANI_03503]	Applicability of supervision to a specific <code>Process</code>
[TPS_MANI_03505]	Existence of <code>SupervisionCheckpoint</code>





Number	Heading
[TPS_MANI_03506]	Optionality of SupervisionCheckpoint
[TPS_MANI_03508]	Definition of an AliveSupervision for a SupervisionCheckpoint
[TPS_MANI_03509]	Definition of a CheckpointTransition
[TPS_MANI_03510]	Definition of LogicalSupervision
[TPS_MANI_03512]	Applicability of global supervision to a specific Process
[TPS_MANI_03513]	Collection of LocalSupervisions into a global supervision
[TPS_MANI_03514]	Expiration tolerance for GlobalSupervision
[TPS_MANI_03515]	Expiration tolerance for LocalSupervision
[TPS_MANI_03516]	Condition evaluation for HealthChannelSupervision
[TPS_MANI_03517]	Condition evaluation for HealthChannelExternalStatus

Table F.10: Changed Specification Items in R18-03

F.3.3 Deleted Specification Items in R18-03

Number	Heading
[TPS_MANI_01031]	Semantics of CompositionDataPrototypeRef
[TPS_MANI_01045]	Process.modeDependentStartupConfig that does not refer to a ModeDeclaration
[TPS_MANI_01132]	Semantics of CompositionDataPrototypeRef
[TPS_MANI_03019]	TTL for SubscribeEventGroupAck Entries
[TPS_MANI_03501]	Definition of platform health management supervised entities
[TPS_MANI_03504]	Existence of SupervisionEntity

Table F.11: Deleted Specification Items in R18-03

F.3.4 Added Constraints in R18-03

Number	Heading
[constr_1546]	Existence of attributes of ServiceInterfaceSubElement
[constr_1547]	Reference from ImplementationDataTypeExtension to ImplementationDataType
[constr_1548]	Reference from ImplementationDataTypeElementExtension to ImplementationDataTypeElement
[constr_1549]	Value of ProcessorCore.coreId
[constr_1550]	Reference from Process to ProcessDesign
[constr_1551]	Existence of CompositionDataPrototypeRef.dataPrototype vs. CompositionDataPrototypeRef.elementInImplDatatype





Number	Heading
[constr_1553]	Restriction for <code>ProcessToMachineMapping</code>
[constr_1554]	Restriction regarding <code>PersistencyKeyValuePair.initValue</code>
[constr_1555]	Restriction applicable for <code>PersistencyPortPrototypeToKeyValue-DatabaseMapping.portPrototype</code>
[constr_1556]	Restriction applicable for <code>PersistencyPortPrototypeToFileArrayMapping.portPrototype</code>
[constr_1557]	Standardized values of <code>SoftwareClusterDesign.category</code> and <code>SoftwareCluster.category</code>
[constr_1558]	Existence of <code>SoftwareClusterDesign.diagnosticAddress</code>
[constr_1559]	Existence of <code>SoftwareClusterDesign.subSoftwareCluster</code>
[constr_1560]	Usage of <code>SoftwareClusterDesign.requiredARElement</code>
[constr_1561]	Existence of <code>SoftwareClusterDesign.subSoftwareCluster</code> and <code>SoftwareClusterDesign.dependsOn.dependentSoftwareClusterDesign</code>
[constr_1562]	Existence of <code>SoftwareClusterDesign.diagnosticContribution</code>
[constr_1563]	Standardized values of <code>SoftwareClusterDesign.category</code> and <code>SoftwareCluster.category</code>
[constr_1564]	Existence of <code>SoftwareCluster.diagnosticAddress</code>
[constr_1565]	Existence of <code>SoftwareCluster.subSoftwareCluster</code>
[constr_1566]	Usage of <code>SoftwareCluster.containedARElement</code>
[constr_1567]	Existence of <code>SoftwareCluster.subSoftwareCluster</code> and <code>SoftwareCluster.dependsOn.dependentSoftwareCluster</code>
[constr_1568]	Existence of <code>SoftwareCluster.diagnosticExtract</code>
[constr_1569]	Restriction for the scope of <code>RestHttpPortPrototypeMapping.acceptsEncoding</code>
[constr_1570]	Restriction for <code>UserDefinedServiceInterfaceDeployment</code> of category <code>SERVICE_INTERFACE_DEPLOYMENT_IPC</code>
[constr_1571]	<code>CppImplementationDataType</code> is limited
[constr_1572]	Usage of <code>SwDataDefProps.implementationDataType</code> within a <code>CppImplementationDataType</code>
[constr_1573]	<code>CppTemplateArgument.isVariadicTemplate</code> is set to True
[constr_1574]	Number of <code>CppTemplateArguments</code> with <code>isVariadicTemplate</code> set to True
[constr_1575]	Position of <code>CppTemplateArgument</code> with <code>isVariadicTemplate</code> set to True
[constr_1576]	Existence of <code>CppTemplateArgument.templateType</code> vs. <code>CppTemplateArgument allocator</code>
[constr_1577]	Specification of a <code>nativeDeclaration</code> for a <code>CppImplementationDataType</code>
[constr_1578]	applicable data categories
[constr_1579]	<code>SwDataDefProps</code> applicable to <code>CppImplementationDataTypes</code> exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1580]	Restriction for the usage of <code>RestHttpPortPrototypeMapping.acceptsEncoding</code>
[constr_1581]	Value of <code>fileProxy.fileName</code>





Number	Heading
[constr_1582]	PersistencyKeyValuePair.valueDataType shall match to ImplementationDataType for the corresponding PersistencyDataElement
[constr_1585]	Standardized values of attribute DiagnosticServiceSwMapping.category
[constr_1586]	DiagnosticServiceSwMapping.category set to DATA_ELEMENT
[constr_1587]	DiagnosticServiceSwMapping.category set to DATA_IDENTIFIER
[constr_1588]	DiagnosticServiceSwMapping.category set to GENERIC_UDS_SERVICE
[constr_1589]	Value of file.fileName
[constr_3408]	Value range of SomeipEventDeployment.eventId
[constr_3409]	Value range of SomeipMethodDeployment.methodId
[constr_3410]	Value range of SomeipServiceInterfaceDeployment.serviceInterfaceId
[constr_3411]	eventMulticastUdpPort, ipv4MulticastIpAddress and ipv6MulticastIpAddress not relevant for RequiredSomeipServiceInstances
[constr_3412]	OsModuleInstantiation shall have at least one ResourceGroup
[constr_3413]	ModeDependentStartupConfig of a Process is mapped to exactly one ResourceGroup
[constr_3414]	Allowed usage of EthernetNetworkConfiguration attributes
[constr_3415]	Value range of loadBalancingPriority
[constr_3416]	Value range of loadBalancingWeight
[constr_3417]	UserDefinedEventDeployments aggregated by a UserDefinedFieldDeployment
[constr_3418]	UserDefinedMethodDeployments aggregated by a UserDefinedFieldDeployment
[constr_3419]	Allowed usage of EthernetNetworkConfiguration attributes
[constr_3420]	System category for a design description that has one single Adaptive Machine in scope
[constr_3421]	Fibex elements applicable for a MACHINE_DESIGN_EXTRACT
[constr_3422]	CppImplementationDataType of category STRING and SwBaseType
[constr_3423]	ModeDependentStartupConfig of a Process shall reference a functionGroupMode or machineMode
[constr_3424]	ModeDependentStartupConfig shall never reference the functionGroupMode Off
[constr_3425]	Restriction of DoIpInstantiations on a Machine
[constr_3426]	The logTraceFilePath is mandatory in case that logTraceLogMode is set to file
[constr_3427]	The logTraceFilePath is only relevant if logTraceLogMode is set to file
[constr_3428]	Structure shall own at least one element
[constr_3429]	No allocator usage for CppImplementationDataTypes of category VARIANT
[constr_3432]	Allowed subElements for Structures
[constr_3433]	Aggregation of templateArguments for a ARRAY
[constr_3434]	Aggregation of templateArguments for a VECTOR
[constr_3528]	Value range of domainId





Number	Heading
[constr_3529]	Value range of <code>serviceInstanceId</code>
[constr_3530]	Mandatory definition of <code>checkpointId</code>
[constr_3531]	Mandatory definition of <code>healthChannelId</code>
[constr_3532]	Mandatory definition of <code>statusId</code>
[constr_3536]	Mandatory definition of <code>supervisedEntityId</code>

Table F.12: Added Constraints in R18-03

F.3.5 Changed Constraints in R18-03

Number	Heading
[constr_1484]	Applicability of <code>ModeDependentStartupConfig.executionDependency</code>
[constr_1507]	<code>PortInterfaceToDataTypeMapping</code> is only applicable to <code>ServiceInterface</code>
[constr_1532]	Consistent assignment of TLV data ids to data structures with optional members
[constr_1537]	Consistent assignment of TLV data ids to arguments of a given <code>ClientServerOperation</code>
[constr_3307]	<code>SomeipEventDeployment.transportProtocol</code> setting to <code>udp</code> and the impact on <code>ProvidedSomeipServiceInstances</code>
[constr_3308]	<code>SomeipEventDeployment.transportProtocol</code> setting to <code>tcp</code> and the impact on <code>ProvidedSomeipServiceInstances</code>
[constr_3309]	<code>SomeipMethodDeployment.transportProtocol</code> setting to <code>udp</code> and the impact on <code>ProvidedSomeipServiceInstances</code>
[constr_3310]	<code>SomeipMethodDeployment.transportProtocol</code> setting to <code>tcp</code> and the impact on <code>ProvidedSomeipServiceInstances</code>
[constr_3320]	Aggregation of <code>CommunicationConnector</code> by <code>MachineDesign</code>
[constr_3350]	Consistent value of <code>category</code> for <code>ExecutableGroups</code> referencing an <code>Executable</code>
[constr_3366]	System <code>category</code> for a system design description with Adaptive Platform and Classic Platform content

Table F.13: Changed Constraints in R18-03

F.3.6 Deleted Constraints in R18-03

Number	Heading
[constr_1480]	Mutual existence of <code>CompositionDataPrototypeRef.elementInImpl-Datatype</code> vs. attributes of <code>CompositionDataPrototypeRef.dataPrototype</code>
[constr_1505]	Number of <code>Process.modeDependentStartupConfig</code> that do not refer to a <code>ModeDeclaration</code>





Number	Heading
[constr_1525]	Standardized values of PersistencyFile.category
[constr_1526]	Values of PersistencyFileArray.file.category
[constr_1533]	Applicability of ImplementationDataTypeElementExtension

Table F.14: Deleted Constraints in R18-03

F.4 Traceable item history of this document according to AUTOSAR Release R18-10

F.4.1 Added Specification Items in R18-10

Number	Heading
[TPS_MANI_01184]	Definition of optional elements on the level of ApplicationDataType
[TPS_MANI_01185]	Definition of optional elements on the level of CppImplementationDataType
[TPS_MANI_01186]	Definition of the applicable wire type
[TPS_MANI_01187]	Matching pairs of PersistencyFileProxy and PersistencyFile
[TPS_MANI_01188]	Semantics of attribute schedulingPriority
[TPS_MANI_01189]	Software Cluster and DiagnosticContributionSet.category
[TPS_MANI_01190]	Semantics of ApApplicationError
[TPS_MANI_01191]	Modeling of possible errors
[TPS_MANI_01192]	Semantics of ApApplicationErrorDomain
[TPS_MANI_01193]	Combination of ModeDependentStartupConfig.machineMode and ModeDependentStartupConfig.functionGroupMode
[TPS_MANI_01194]	Semantics of PersistencyKeyValueDatabaseInterface.minimumSustainedSize
[TPS_MANI_01195]	Semantics of PersistencyFileProxyInterface.minimumSustainedSize
[TPS_MANI_01196]	Semantics of PersistencyKeyValueDatabase.minimumSustainedSize
[TPS_MANI_01197]	Semantics of PersistencyKeyValueDatabase.maximumAllowedSize
[TPS_MANI_01198]	Semantics of ApApplicationErrorSet
[TPS_MANI_01199]	Semantics of DeterministicClientResourceNeeds
[TPS_MANI_01200]	Semantics of meta-class DeterministicClientResource
[TPS_MANI_01201]	Standardized values for attribute CppTemplateArgument.category
[TPS_MANI_01202]	Semantics of reference SoftwareCluster.moduleInstantiation
[TPS_MANI_01203]	Semantics of DeterministicClient
[TPS_MANI_01204]	Specification of redundancy of persistent data
[TPS_MANI_01205]	Semantics of meta-class PersistencyDeployment





Number	Heading
[TPS_MANI_01206]	Modeling of redundancy in the context of <code>PersistencyDeployment</code>
[TPS_MANI_01207]	Standardized values of attribute <code>PersistencyRedundancyCrc.algorithmFamily</code>
[TPS_MANI_01208]	Definition of environment variables in the scope of a <code>Machine</code>
[TPS_MANI_01209]	Definition of environment variables in process scope
[TPS_MANI_01210]	Default encoding for all <code>DataPrototypes</code> typed by <code>CppImplementationDataType</code> of category <code>STRING</code>
[TPS_MANI_03197]	Semantics of <code>StdCppImplementationDataType</code>
[TPS_MANI_03198]	Semantics of <code>CustomCppImplementationDataType</code>
[TPS_MANI_03199]	Endpoint protection by <code>SecureComProps</code>
[TPS_MANI_03200]	<code>SecureComProps</code> for udp, tcp and multicast communication
[TPS_MANI_03201]	Semantics of <code>CppTemplateArgument.inplace</code> attribute
[TPS_MANI_03202]	Definition of bitfield types
[TPS_MANI_03203]	Configuration of IPsec
[TPS_MANI_03204]	Definition of <code>IPSecRules</code>
[TPS_MANI_03205]	IPsec connection type
[TPS_MANI_03206]	IPsec AH and ESP protocol configuration
[TPS_MANI_03207]	IPsec Internet Key Exchange protocol configuration
[TPS_MANI_03208]	Protection of <code>AdaptivePlatformServiceInstance</code> by IPsec
[TPS_MANI_03209]	The meaning of <code>MachineDesign.accessControl</code>
[TPS_MANI_03210]	Specification of <code>event</code> specific communication attributes
[TPS_MANI_03211]	Specification of <code>field</code> specific communication attributes
[TPS_MANI_03212]	Specification of initial value for a <code>field</code>
[TPS_MANI_03213]	Semantics of meta-class <code>TlsSecureComProps</code>
[TPS_MANI_03214]	Existence of <code>TlsCryptoCipherSuite.keyExchange</code> vs. <code>TlsSecureComProps.keyExchange</code>
[TPS_MANI_03215]	Semantics of <code>CryptoServiceCertificate</code>
[TPS_MANI_03216]	Existence of <code>TlsCryptoCipherSuite.certificate</code> in the <i>client</i> role
[TPS_MANI_03217]	On-the-wire encoding for a chosen string
[TPS_MANI_03218]	Default value for the attribute <code>tcpInitialInactivityTime</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03219]	Default value for the attribute <code>tcpGeneralInactivityTime</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03220]	Default value for the attribute <code>vehicleAnnouncementCount</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03221]	Default value for the attribute <code>vehicleAnnouncementInterval</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03222]	Default value for the attribute <code>tcpAliveCheckResponseTimeout</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03553]	Applicability of health channel to a specific <code>Process</code>





Number	Heading
[TPS_MANI_03554]	Several SomeipServiceInstanceToMachineMappings with equal settings
[TPS_MANI_03555]	Mix of SomeipServiceInstanceToMachineMapping and signal-based communication
[TPS_MANI_03556]	DDS-RPC Service Binding
[TPS_MANI_03557]	DDS ClientServerOperation Binding
[TPS_MANI_03558]	DDS Field Binding
[TPS_MANI_03559]	Definition of DdsProvidedServiceInstance.methodQosProps
[TPS_MANI_03560]	qosProfile of DdsProvidedServiceInstance.methodQosProps is optional
[TPS_MANI_03561]	Definition of DdsProvidedServiceInstance.fieldNotifierQosProps
[TPS_MANI_03562]	qosProfile of DdsProvidedServiceInstance.fieldNotifierQosProps is optional
[TPS_MANI_03563]	Definition of DdsProvidedServiceInstance.fieldGetSetQosProps
[TPS_MANI_03564]	qosProfile of DdsProvidedServiceInstance.fieldGetSetQosProps is optional
[TPS_MANI_03565]	Definition of DdsRequiredServiceInstance.methodQosProps
[TPS_MANI_03566]	qosProfile of DdsRequiredServiceInstance.methodQosProps is optional
[TPS_MANI_03567]	Definition of DdsRequiredServiceInstance.fieldNotifierQosProps
[TPS_MANI_03568]	qosProfile of DdsRequiredServiceInstance.fieldNotifierQosProps is optional
[TPS_MANI_03569]	Definition of DdsRequiredServiceInstance.fieldGetSetQosProps
[TPS_MANI_03570]	qosProfile of DdsRequiredServiceInstance.fieldGetSetQosProps is optional
[TPS_MANI_03571]	transportPlugin for DdsProvidedServiceInstance
[TPS_MANI_03572]	transportPlugin for DdsRequiredServiceInstance

Table F.15: Added Specification Items in R18-10

F.4.2 Changed Specification Items in R18-10

Number	Heading
[TPS_MANI_01001]	Meaning of ServiceInterface
[TPS_MANI_01041]	Startup configuration supports the definition of a launch sequence dependency
[TPS_MANI_01097]	Assignment of TLV data ids
[TPS_MANI_01100]	Semantics of Allocator





Number	Heading
[TPS_MANI_01147]	Semantics of <code>PersistencyKeyValueDatabase.updateStrategy</code>
[TPS_MANI_01151]	Semantics of <code>PersistencyFileArray.updateStrategy</code>
[TPS_MANI_01166]	Semantics of <code>CppImplementationDataType</code>
[TPS_MANI_01176]	Standardized value for attribute <code>CppImplementationDataType.type-Emitter</code>
[TPS_MANI_01177]	Semantics of <code>CppImplementationDataType.typeEmitter</code>
[TPS_MANI_01180]	Collection of data types that requires serialization support
[TPS_MANI_03001]	Mapping of <code>AdaptivePlatformServiceInstance</code> to a <code>MachineDesign</code>
[TPS_MANI_03011]	Server Timing configuration for a <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03021]	Requirements on the searched minor version from the client's point of view
[TPS_MANI_03025]	Client Timing configuration for a <code>RequiredSomeipServiceInstance</code>
[TPS_MANI_03070]	Size of a length field for a chosen array or map
[TPS_MANI_03103]	Default size for all array and map length fields
[TPS_MANI_03124]	<code>ServiceInterface.event</code> to <code>ISignalTriggering</code> mapping
[TPS_MANI_03125]	<code>ServiceInterface.method</code> to <code>ISignalTriggerings</code> mapping
[TPS_MANI_03126]	<code>ServiceInterface.field</code> mapping to <code>ISignalTriggerings</code>
[TPS_MANI_03134]	Configuration of supported TLS ciphersuites
[TPS_MANI_03137]	<code>ServiceInterfaceElementSecureComConfig</code> is not relevant in case of TLS communication
[TPS_MANI_03157]	Enabling of data collection for upd data transmission
[TPS_MANI_03158]	Configuration of a data collection on a <code>ProvidedServiceInstance</code> for transmission over udp
[TPS_MANI_03165]	Network Interface configuration for DoIP
[TPS_MANI_03170]	<code>CppImplementationDataType</code> of category ARRAY
[TPS_MANI_03173]	Definition of a multidimensional Array
[TPS_MANI_03175]	<code>CppImplementationDataType</code> of category VECTOR
[TPS_MANI_03177]	Definition of a multidimensional Vector
[TPS_MANI_03178]	<code>StdCppImplementationDataType</code> of category STRING
[TPS_MANI_03179]	C++ language binding of <code>StdCppImplementationDataTypes</code> of category STRING
[TPS_MANI_03180]	Definition of Structures
[TPS_MANI_03181]	Definition of members in <code>StdCppImplementationDataType</code> of category STRUCTURE
[TPS_MANI_03184]	<code>CppImplementationDataType</code> of category ASSOCIATIVE_MAP
[TPS_MANI_03185]	Structure of an <code>CppImplementationDataType</code> of category ASSOCIATIVE_MAP
[TPS_MANI_03187]	Definition of enumeration types
[TPS_MANI_03193]	<code>CppImplementationDataType</code> of category TYPE_REFERENCE
[TPS_MANI_03196]	Semantics of <code>CppImplementationDataTypeElementQualifier.in-place</code> attribute





Number	Heading
[TPS_MANI_03503]	Applicability of checkpoints to a specific Process
[TPS_MANI_03512]	Applicability of global supervision without Process context
[TPS_MANI_03516]	Condition evaluation for HealthChannelSupervision
[TPS_MANI_03518]	PhmLogicalExpression definition
[TPS_MANI_03519]	PhmRule definition
[TPS_MANI_03520]	Execution of PhmActionList with actionListExecution=triggeredOnEvaluation
[TPS_MANI_03521]	Execution of PhmActionList with actionListExecution=triggeredOnChange
[TPS_MANI_03522]	Definition of actions for application software
[TPS_MANI_03523]	Definition of actions for Platform Instance
[TPS_MANI_03524]	Definition of actions for Watchdog
[TPS_MANI_03526]	DDS VariableDataPrototype binding
[TPS_MANI_03527]	Definition of DdsProvidedServiceInstance
[TPS_MANI_03528]	Definition of DdsProvidedServiceInstance.eventQosProps
[TPS_MANI_03529]	Definition of DdsRequiredServiceInstance
[TPS_MANI_03530]	Definition of DdsRequiredServiceInstance.eventQosProps
[TPS_MANI_03531]	qosProfile of DdsProvidedServiceInstance.eventQosProps is optional
[TPS_MANI_03532]	qosProfile of DdsRequiredServiceInstance.eventQosProps is optional
[TPS_MANI_03533]	DdsServiceInstanceToMachineMapping
[TPS_MANI_03552]	Supervision cycle for GlobalSupervision

Table F.16: Changed Specification Items in R18-10

F.4.3 Deleted Specification Items in R18-10

Number	Heading
[TPS_MANI_01008]	Semantics of ExecutableGroup
[TPS_MANI_01009]	Standardized values of ExecutableGroup.category
[TPS_MANI_01018]	ImplementationDataType of category VECTOR
[TPS_MANI_01028]	ImplementationDataType of category ASSOCIATIVE_MAP
[TPS_MANI_01029]	Usage of ImplementationDataType
[TPS_MANI_01030]	ImplementationDataType of category STRING
[TPS_MANI_01042]	Definition of a linear ImplementationDataType of category VECTOR
[TPS_MANI_01043]	Definition of a rectangular ImplementationDataType of category VECTOR
[TPS_MANI_01044]	Structure of an ImplementationDataType of category ASSOCIATIVE_MAP





Number	Heading
[TPS_MANI_01055]	Definition of application-level errors
[TPS_MANI_01056]	Semantics of <code>ApplicationError.errorContext</code>
[TPS_MANI_01058]	Ability to create a mapping of <code>ApplicationErrors</code> aggregated in the role <code>possibleError</code>
[TPS_MANI_01062]	<code>ImplementationDataType</code> to generate a C++ enum
[TPS_MANI_01063]	Sharing of <code>ImplementationDataType</code> with enumeration semantics
[TPS_MANI_01074]	Specification of encryption of persistent data
[TPS_MANI_01075]	Specification of redundancy of persistent data
[TPS_MANI_01077]	Specification of file encryption
[TPS_MANI_01082]	Eligibility of <code>DataPrototypes</code> for the definition of optionality
[TPS_MANI_01083]	Optionality is supported for <code>ApplicationDataType</code> as well as <code>ImplementationDataType</code>
[TPS_MANI_01084]	Optionality for a <code>DataPrototype</code> typed by an <code>ApplicationDataType</code>
[TPS_MANI_01085]	Definition of optionality for a <code>DataPrototype</code> typed by an <code>ImplementationDataType</code>
[TPS_MANI_01087]	Interaction with crypto software
[TPS_MANI_01088]	Semantics of <code>CryptoNeed</code>
[TPS_MANI_01089]	Relation between <code>CryptoNeed</code> and <code>PortPrototype</code>
[TPS_MANI_01090]	Modeling of crypto software as a platform module
[TPS_MANI_01091]	Semantics of <code>CryptoJob</code>
[TPS_MANI_01092]	Mapping between <code>CryptoNeed</code> and <code>CryptoJob</code>
[TPS_MANI_01093]	Semantics of <code>CryptoDriver</code>
[TPS_MANI_01094]	Scope of <code>CryptoDriver</code>
[TPS_MANI_01095]	Semantics of <code>CryptoKeySlot</code>
[TPS_MANI_01096]	Semantics of the <code>CryptoPrimitive</code>
[TPS_MANI_01098]	Constraints on the definition of an <code>ImplementationDataType</code> of <code>category VECTOR</code>
[TPS_MANI_01099]	Semantics of <code>ImplementationDataTypeElementExtension</code>
[TPS_MANI_01101]	Size-constrained allocation of memory
[TPS_MANI_01102]	Specification of a namespace for an <code>ImplementationDataType</code> of <code>category VECTOR</code>
[TPS_MANI_01133]	Optional element of an <code>event</code>
[TPS_MANI_01134]	Optional element in the context of a <code>method</code>
[TPS_MANI_03121]	Signal-based <code>VariableDataPrototype</code> binding
[TPS_MANI_03122]	Signal-based <code>Field</code> binding
[TPS_MANI_03123]	Signal-based <code>ClientServerOperation</code> binding
[TPS_MANI_03135]	Configuration of TLS PSK Identity
[TPS_MANI_03136]	Configuration of requirements for the TLS cryptographic job
[TPS_MANI_03141]	Mapping between <code>SecOcJobRequirement</code> and <code>CryptoJob</code>





Number	Heading
[TPS_MANI_03142]	Mapping between <code>TlsJobRequirement</code> and <code>CryptoJob</code>
[TPS_MANI_03143]	Mapping between <code>PresharedKeyIdentity</code> and <code>CryptoKeySlot</code>
[TPS_MANI_03144]	C++ language binding of <code>ImplementationDataTypes</code> of category <code>STRING</code>
[TPS_MANI_03182]	Definition of members in <code>CppImplementationDataTypeElement</code> of category <code>STRUCTURE</code>

Table F.17: Deleted Specification Items in R18-10

F.4.4 Added Constraints in R18-10

Number	Heading
[constr_1593]	Completeness of the existence of a set of <code>TlvDataIdDefinition.tlvArguments</code>
[constr_1594]	Consistent assignment of TLV data ids to <code>ApplicationRecordDataType</code>
[constr_1595]	Consistent assignment of TLV data ids to <code>CppImplementationDataType</code> or <code>CppImplementationDataTypeElement</code>
[constr_1596]	Scope of the uniqueness of the value of <code>TlvDataIdDefinition.id</code> for references to <code>ArgumentDataPrototype</code>
[constr_1597]	Scope of the uniqueness of the value of <code>TlvDataIdDefinition.id</code> for references to <code>ApplicationRecordElement</code>
[constr_1598]	Scope of the uniqueness of the value of <code>TlvDataIdDefinition.id</code> for references to <code>CppImplementationDataTypeElement</code>
[constr_1599]	<code>TlvDataIdDefinition</code> referencing <code>ArgumentDataPrototype</code>
[constr_1600]	<code>TlvDataIdDefinition</code> referencing <code>ApplicationRecordElement</code>
[constr_1601]	<code>TlvDataIdDefinition</code> referencing <code>CppImplementationDataTypeElement</code>
[constr_1603]	Completeness of the existence of a set of <code>TlvDataIdDefinition.tlvRecordElements</code>
[constr_1604]	Completeness of the existence of a set of <code>TlvDataIdDefinition.tlvSubElements</code>
[constr_1605]	Standardized values of attribute <code>Executable.category</code>
[constr_1606]	<code>Processes</code> with mutual <code>ExecutionDependency</code> s
[constr_1613]	File name of matching pairs of <code>PersistencyFileProxy</code> and <code>PersistencyFile</code>
[constr_1614]	Existence of attribute <code>TransformationPropsToServiceInterfaceElementMapping.transformationProps.sessionHandling</code>
[constr_1615]	Existence of attribute <code>SomeipDataPrototypeTransformationProps.someipTransformationProps.sessionHandling</code>
[constr_1618]	Ability to shut down
[constr_1619]	Ability to restart
[constr_1620]	Value of <code>schedulingPriority</code> if <code>schedulingPolicy</code> is set to <code>schedulingPolicyFifo</code> or <code>schedulingPolicyRoundRobin</code>





Number	Heading
[constr_1621]	Value of <code>schedulingPriority</code> if <code>StartupConfig.schedulingPolicy</code> is set to <code>schedulingPolicyOther</code>
[constr_1625]	Existence of reference <code>ApApplicationError.errorDomain</code>
[constr_1627]	Supported value range for attribute <code>ApApplicationErrorDomain.value</code>
[constr_1628]	Definition of static length field sizes in case of TLV usage
[constr_1629]	Identical sizes of length fields in case of TLV usage
[constr_1630]	No definition of length field sizes on <code>DataPrototype</code> level in case of TLV usage
[constr_1658]	Number of <code>DiagnosticTroubleCodeUdsToClearConditionGroupMapping</code> elements per <code>DiagnosticTroubleCodeUds</code>
[constr_1659]	Restriction for the usage of <code>CppImplementationDataTypeElementQualifier.inplace</code>
[constr_1660]	Restriction for the usage of <code>CppTemplateArgument.inplace</code>
[constr_1661]	Multiplicity of <code>OsModuleInstantiation.resourceGroup</code>
[constr_1663]	Standardized values of attribute <code>DiagnosticServiceDataIdentifier-PortMapping.category</code>
[constr_1664]	Unique <code>ApApplicationError.shortName</code>
[constr_1665]	Unique <code>ApApplicationError.errorCode</code>
[constr_1666]	References from <code>PersistencyPortPrototypeToKeyValueDatabaseMapping</code> to <code>PersistencyKeyValueDatabase</code>
[constr_1667]	References from <code>PersistencyPortPrototypeToFileArrayMapping</code> to <code>PersistencyFileArray</code>
[constr_1668]	Allowed combinations of <code>PersistencyRedundancyCrc.length</code> and <code>algorithmFamily</code>
[constr_1673]	Existence of attributes <code>hasGetter</code> , <code>hasSetter</code> , and <code>hasNotifier</code>
[constr_1674]	Supported encoding of <code>StdCppImplementationDataType</code> of category <code>STRING</code>
[constr_1675]	Existence of attribute <code>ApSomeipTransformationProps.stringEncoding</code>
[constr_1676]	Consistency of references <code>shallRunOn</code> and <code>shallNotRunOn</code>
[constr_1677]	Mutual exclusive existence of references <code>shallRunOn</code> and <code>shallNotRunOn</code>
[constr_1678]	Allowed values for attribute <code>ApSomeipTransformationProps.stringEncoding</code>
[constr_3443]	Specification of a namespace for a <code>StdCppImplementationDataType</code>
[constr_3446]	<code>CppTemplateArgument</code> with <code>allocator</code> reference and the <code>inplace</code> flag
[constr_3447]	<code>ApSomeipTransformationProps.sizeOfArrayLengthField</code> that equals 0
[constr_3462]	<code>CppTemplateArgument.templateType</code> reference to <code>StdCppImplementationDataType</code> of category <code>STRUCTURE</code> and the <code>inplace</code> flag
[constr_3485]	UDP endpoint using DTLS can only serve provided or required service instances exclusively
[constr_3486]	TCP endpoint using TLS can only serve provided or required service instances exclusively.
[constr_3487]	TCP endpoint can only serve provided or required service instances exclusively
[constr_3492]	<code>DoIpInstantiation.logicalAddress</code> shall be defined as member in the <code>DoIpRequestConfiguration</code>





Number	Heading
[constr_3493]	Applicable attributes for standardized E2E Profiles
[constr_3494]	Mandatory Machine States
[constr_3495]	Supported value range for attribute <code>DoIpInstantiation.eid</code>
[constr_3496]	Supported value range for attribute <code>DoIpInstantiation.gid</code>
[constr_3497]	Supported value range for attribute <code>DoIpInstantiation.maxRequestBytes</code>
[constr_3498]	Supported value range for attribute <code>DoIpInstantiation.logicalAddress</code>
[constr_3499]	Supported value range for attribute <code>DoIpRequestConfiguration.startAddress</code>
[constr_3537]	<code>LocalSupervision</code> referenced once in the context of a <code>GlobalSupervision</code>
[constr_3538]	Only one <code>ServiceInstanceToMachineMapping</code> per technology and <code>CommunicationConnector</code>
[constr_3539]	Only one <code>AliveSupervision</code> per <code>SupervisionCheckpoint</code>
[constr_3540]	<code>SupervisionCheckpoint</code> in supervision graph
[constr_3541]	<code>qosProfile</code> mandatory for <code>DdsProvidedServiceInstance</code>
[constr_3542]	<code>qosProfile</code> mandatory for <code>DdsRequiredServiceInstance</code>
[constr_3543]	At least one <code>transportPlugin</code> definition required for each <code>DdsProvidedServiceInstance</code>
[constr_3544]	At least one <code>transportPlugin</code> definition required for each <code>DdsRequiredServiceInstance</code>
[constr_5000]	Supported value range for attribute <code>DoIpRequestConfiguration.endAddress</code>
[constr_5001]	Usage of <code>DoIpNetworkConfiguration.eidUseMac</code>
[constr_5002]	Supported values of <code>ServiceInstanceToMachineMapping.category</code>
[constr_5003]	Existence of <code>TlsCryptoCipherSuite.certificate</code> in the <i>server</i> role
[constr_5004]	Mapping of a <code>Process</code> to a <code>Machine</code> is mandatory in the Execution Manifest

Table F.18: Added Constraints in R18-10

F.4.5 Changed Constraints in R18-10

Number	Heading
[constr_1490]	Allowed value of <code>category</code> for reference <code>ProcessToMachineMapping.process.executable</code>
[constr_1551]	Existence of <code>DataPrototypeInServiceInterfaceRef.dataPrototype</code> vs. <code>DataPrototypeInServiceInterfaceRef.elementInImplDatatype</code>
[constr_1572]	Usage of <code>SwDataDefProps.implementationDataType</code> within a <code>CppImplementationDataType</code>
[constr_1573]	<code>CppTemplateArgument.isVariadicTemplate</code> is set to <code>True</code>
[constr_1582]	<code>PersistencyKeyValuePair.valueDataType</code> shall match to <code>AbstractImplementationDataType</code> for the corresponding <code>PersistencyDataElement</code>
[constr_1585]	Standardized values of attribute <code>DiagnosticServiceSwMapping.category</code>





Number	Heading
[constr_1589]	Value of <code>file.fileName</code>
[constr_3375]	<code>method</code> with attribute <code>fireAndForget</code> set to true shall not reference an <code>ApApplicationError</code>
[constr_3392]	<code>ServiceInterfaceElementSecureComConfig.dataId</code> and <code>ServiceInterfaceElementSecureComConfig.freshnessValueId</code> are mandatory in case of SecOC communication
[constr_3433]	Aggregation of <code>templateArguments</code> for an ARRAY
[constr_3434]	Aggregation of <code>templateArguments</code> for a VECTOR
[constr_3527]	<code>PhmLogicalExpression</code> referenced by one <code>PhmRule</code>
[constr_3528]	Value range of <code>domainId</code>
[constr_3529]	Value range of <code>serviceInstanceId</code>

Table F.19: Changed Constraints in R18-10

F.4.6 Deleted Constraints in R18-10

Number	Heading
[constr_1474]	<code>SwDataDefProps</code> applicable to <code>ImplementationDataTypes</code> exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1475]	<code>ImplementationDataType</code> of category <code>STRING</code> is limited
[constr_1476]	<code>ImplementationDataType</code> of category <code>VECTOR</code> is limited
[constr_1477]	<code>ImplementationDataType</code> of category <code>ASSOCIATIVE_MAP</code> is limited
[constr_1479]	No support for certain values of <code>ImplementationDataType.category</code>
[constr_1484]	Applicability of <code>ModeDependentStartupConfig.executionDependency</code>
[constr_1485]	No <code>subElement</code> for <code>ImplementationDataType</code> of category <code>STRING</code>
[constr_1486]	<code>ImplementationDataType</code> of category <code>STRING</code> and <code>SwBaseType</code>
[constr_1487]	Number of <code>subElements</code> of an <code>ImplementationDataType</code> of category <code>ASSOCIATIVE_MAP</code>
[constr_1491]	Semantics of <code>ServiceInterface.possibleError</code>
[constr_1493]	<code>ArgumentDataPrototype</code> referenced in the role <code>ApplicationError.errorContext</code>
[constr_1495]	Initial value for <code>field</code>
[constr_1506]	<code>ImplementationDataType</code> of category <code>VECTOR</code> shall not define <code>dynamicArraySizeProfile</code>
[constr_1508]	<code>BaseTypeDirectDefinition.nativeDeclaration</code> shall not be set to the value <code>enum</code>
[constr_1522]	Semantics of <code>ClientServerOperation.possibleError</code>
[constr_1527]	<code>ImplementationDataTypeElement</code> finally referenced as the target element in the context of an <code>ImplementationDataTypeElementInAutosarDataPrototypeRef</code>





Number	Heading
[constr_1528]	Definition of optionality for multiple DataPrototypes typed by the same Autosar-DataType
[constr_1529]	Standardized values of CryptoNeed.category
[constr_1530]	Standardized values of CryptoPrimitive.algorithmFamily and CryptoKeySlot.algorithmFamily
[constr_1531]	Standardized values of CryptoPrimitive.algorithmMode
[constr_1532]	Consistent assignment of TLV data ids to data structures with optional members
[constr_1537]	Consistent assignment of TLV data ids to arguments of a given ClientServerOperation
[constr_1546]	Existence of attributes of ServiceInterfaceSubElement
[constr_1547]	Reference from ImplementationDataTypeExtension to ImplementationDataType
[constr_1548]	Reference from ImplementationDataTypeElementExtension to ImplementationDataTypeElement
[constr_1577]	Specification of a nativeDeclaration for a CppImplementationDataType
[constr_1587]	DiagnosticServiceSwMapping.category set to DATA_IDENTIFIER
[constr_1588]	DiagnosticServiceSwMapping.category set to GENERIC_UDS_SERVICE
[constr_3293]	Mandatory information of a RequiredSomeipServiceInstance
[constr_3303]	ANY not allowed for SomeipServiceInterfaceDeployment.serviceInterfaceVersion
[constr_3350]	Consistent value of category for ExecutableGroups referencing an Executable
[constr_3377]	Restriction of ISignalTriggering references in SignalBasedFieldToISignalTriggeringMapping
[constr_3422]	CppImplementationDataType of category STRING and SwBaseType
[constr_3428]	Structure shall own at least one element
[constr_3432]	Allowed subElements for Structures

Table F.20: Deleted Constraints in R18-10

F.5 Traceable item history of this document according to AUTOSAR Release R19-03

F.5.1 Added Specification Items in R19-03

Number	Heading
[TPS_MANI_01211]	Specification of executable software within SoftwareClusterDesign
[TPS_MANI_01212]	Usage of attribute typeEmitter in the context of a CustomCppImplementationDataType
[TPS_MANI_01213]	Semantics of meta-class StrongRevisionLabelString





Number	Heading
[TPS_MANI_01214]	Semantics of SoftwareCluster.conflictsTo
[TPS_MANI_01215]	Semantics of meta-class SoftwareActivationDependencyFormula
[TPS_MANI_01216]	Semantics of meta-class SoftwareActivationDependencyFormula-Part
[TPS_MANI_01217]	Semantics of metaclass SoftwareActivationDependencyCompare-Condition
[TPS_MANI_01218]	Cryptographic signature of SoftwareCluster
[TPS_MANI_01219]	License of software in included SoftwareCluster
[TPS_MANI_01220]	Release notes of software in included SoftwareCluster
[TPS_MANI_01221]	Semantics of meta-class SoftwarePackage
[TPS_MANI_01222]	Cryptographic signature of SoftwarePackage
[TPS_MANI_01223]	Semantics of attribute SoftwarePackage.packagerId
[TPS_MANI_01224]	Actions taken after installation of a SoftwarePackage
[TPS_MANI_01225]	Actions taken during installation of a SoftwarePackage
[TPS_MANI_01226]	Machine-specific configuration settings for the UCM module
[TPS_MANI_01227]	Semantics of attribute UcmModuleInstantiation.identifier
[TPS_MANI_01228]	Semantics of meta-class ProcessDesign
[TPS_MANI_01229]	Pre-allocation of a given ProcessDesign on a specific MachineDesign
[TPS_MANI_01230]	Semantics of DiagnosticProvidedDataMapping
[TPS_MANI_01231]	GrantDesign references ProcessDesign
[TPS_MANI_01232]	Semantics of meta-class ComOfferServiceGrantDesign
[TPS_MANI_01233]	Semantics of meta-class ComFindServiceGrantDesign
[TPS_MANI_01234]	Semantics of ComFieldGrantDesign
[TPS_MANI_01235]	Semantics of ComEventGrantDesign
[TPS_MANI_01236]	Semantics of ComMethodGrantDesign
[TPS_MANI_01237]	Semantics of meta-class ComFieldGrant
[TPS_MANI_01238]	Semantics of meta-class ComMethodGrant
[TPS_MANI_01239]	Semantics of meta-class ComEventGrant
[TPS_MANI_01240]	Semantics of meta-class ComOfferServiceGrant
[TPS_MANI_01241]	Semantics of meta-class ComFindServiceGrant
[TPS_MANI_01242]	PortInterfaces used for communication with the AUTOSAR Diagnostic Manager
[TPS_MANI_01243]	Semantics of DiagnosticDataIdentifierInterface
[TPS_MANI_01244]	Semantics of DiagnosticDataElementInterface
[TPS_MANI_01245]	Semantics of DiagnosticDataIdentifierGenericInterface
[TPS_MANI_01246]	Semantics of DiagnosticMonitorInterface
[TPS_MANI_01247]	Semantics of DiagnosticDTCInformationInterface
[TPS_MANI_01248]	Semantics of DiagnosticEventInterface
[TPS_MANI_01249]	Semantics of DiagnosticConditionInterface





Number	Heading
[TPS_MANI_01250]	Semantics of DiagnosticIndicatorInterface
[TPS_MANI_01251]	Semantics of DiagnosticSecurityLevelInterface
[TPS_MANI_01252]	Semantics of DiagnosticServiceValidationInterface
[TPS_MANI_01253]	Semantics of DiagnosticOperationCycleInterface
[TPS_MANI_01254]	Semantics of DiagnosticGenericUdsInterface
[TPS_MANI_01255]	Semantics of DiagnosticGenericUdsInterface
[TPS_MANI_01256]	AdaptiveApplicationSwComponentType offers a PPortPrototype typed by DiagnosticIndicatorInterface
[TPS_MANI_01257]	AdaptiveApplicationSwComponentType offers a PPortPrototype typed by DiagnosticConditionInterface
[TPS_MANI_01258]	AdaptiveApplicationSwComponentType offers a PPortPrototype typed by DiagnosticGenericUdsInterface
[TPS_MANI_01259]	Mapping of DiagnosticClearCondition to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01260]	Mapping of DiagnosticIndicator to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01261]	Mapping of DiagnosticMemoryDestination to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01262]	Mapping of DiagnosticSecurityLevel to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01263]	Mapping of DiagnosticDataIdentifier to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01264]	Mapping of DiagnosticServiceInstance to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01265]	Semantics of DiagnosticDownloadInterface and DiagnosticDownloadInterface
[TPS_MANI_01266]	Mapping of DiagnosticServiceInstance for upload/download to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_03223]	Existence of CppImplementationDataType
[TPS_MANI_03224]	Modeling of a Partial Network Cluster
[TPS_MANI_03225]	References to vlans in PncMapping
[TPS_MANI_03226]	Collection of partialNetworks and vlans in NmNetworkHandle

Table F.21: Added Specification Items in R19-03

F.5.2 Changed Specification Items in R19-03

Number	Heading
[TPS_MANI_01012]	Formal modeling of application startup behavior
[TPS_MANI_01013]	Semantics of meta-class StateDependentStartupConfig
[TPS_MANI_01017]	Relation of startup configuration to resource group
[TPS_MANI_01041]	Startup configuration supports the definition of a launch sequence dependency
[TPS_MANI_01046]	Semantics of StateDependentStartupConfig.functionGroupState
[TPS_MANI_01049]	Mapping of DiagnosticOperationCycle to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01050]	Mapping of DiagnosticEnableCondition to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01051]	Mapping of DiagnosticStorageCondition to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01136]	AutosarDataPrototype is the target of the DataPrototypeInServiceInterfaceRef
[TPS_MANI_01137]	Applicable use cases for DataPrototypeInServiceInterfaceRef
[TPS_MANI_01164]	Semantics of SoftwareCluster.dependsOn
[TPS_MANI_01177]	Semantics of CppImplementationDataType.typeEmitter
[TPS_MANI_01207]	Standardized values of attribute PersistencyRedundancyCrc.algorithmFamily
[TPS_MANI_03070]	Size of a length field for a chosen array or map
[TPS_MANI_03071]	Size of a length field for a chosen structure
[TPS_MANI_03072]	Size of a length field for a chosen union
[TPS_MANI_03073]	Alignment of a dynamic DataPrototype
[TPS_MANI_03074]	Size of a type selector field for a chosen union
[TPS_MANI_03075]	Byte Order of chosen DataPrototype in the serialized data stream
[TPS_MANI_03116]	Size of a length field for a chosen string
[TPS_MANI_03127]	Usage of End2EndEventProtectionProps
[TPS_MANI_03128]	Usage of same dataId in case of Multi-Binding
[TPS_MANI_03152]	Assignment of a StateDependentStartupConfig to a function group state
[TPS_MANI_03187]	Definition of enumeration types
[TPS_MANI_03190]	CppImplementationDataType of category VARIANT
[TPS_MANI_03202]	Definition of bitfield types
[TPS_MANI_03217]	On-the-wire encoding for a chosen string

Table F.22: Changed Specification Items in R19-03

F.5.3 Deleted Specification Items in R19-03

Number	Heading
[TPS_MANI_01038]	Diagnostic software mapping on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01170]	Semantics of <code>CppTypeArgument.isVariadicTemplate</code>
[TPS_MANI_01181]	Use cases for the application of <code>DiagnosticServiceSwMapping</code>
[TPS_MANI_01193]	Combination of <code>ModeDependentStartupConfig.machineMode</code> and <code>ModeDependentStartupConfig.functionGroupMode</code>
[TPS_MANI_03066]	Description of machine states
[TPS_MANI_03153]	Semantics of <code>ModeDependentStartupConfig.functionGroupMode</code>

Table F.23: Deleted Specification Items in R19-03

F.5.4 Added Constraints in R19-03

Number	Heading
[constr_1687]	Definition of machine state
[constr_1688]	<code>StateDependentStartupConfig</code> shall only refer to function group states of the same function group
[constr_1689]	Modeling of a startup dependency between different <code>Processes</code>
[constr_1690]	<code>SoftwareCluster</code> shall only be referenced by a single <code>SoftwarePackage</code> .
[constr_1691]	<code>UcmModuleInstantiation.identifier</code> shall be unique
[constr_1692]	Value of <code>schedulingPriority</code>
[constr_1693]	Relation of <code>Executable</code> , <code>ProcessDesign</code> , and <code>Process</code>
[constr_1695]	Semantics of a <code>Grant</code> depends on the existence of <code>IamModuleInstantiation</code>
[constr_1696]	<code>ClientServerOperation</code> aggregated by <code>DiagnosticRoutineInterface</code>
[constr_1697]	Restriction for <code>ClientServerOperation</code> aggregated by a <code>DiagnosticDataIdentifierInterface</code> or <code>DiagnosticDataElementInterface</code>
[constr_1698]	Target <code>SwcServiceDependency</code> of <code>DiagnosticClearConditionPortMapping.swcServiceDependencyInExecutable</code>
[constr_1699]	Target <code>SwcServiceDependency</code> of <code>DiagnosticIndicatorPortMapping.swcServiceDependencyInExecutable</code>
[constr_1700]	Target <code>SwcServiceDependency</code> of <code>DiagnosticMemoryDestinationPortMapping.swcServiceDependencyInExecutable</code>
[constr_1701]	Target <code>SwcServiceDependency</code> of <code>DiagnosticSecurityLevelPortMapping.swcServiceDependencyInExecutable</code>
[constr_1702]	Target <code>SwcServiceDependency</code> of <code>DiagnosticServiceDataIdentifierPortMapping.swcServiceDependencyInExecutable</code>
[constr_1703]	Target <code>SwcServiceDependency</code> of <code>DiagnosticGenericUdsPortMapping.swcServiceDependencyInExecutable</code>
[constr_1704]	Target <code>SwcServiceDependency</code> of <code>DiagnosticUploadDownloadPortMapping.swcServiceDependencyInExecutable</code>





Number	Heading
[constr_5033]	Compatibility of data types with category VALUE
[constr_5034]	Compatibility of data types with category BOOLEAN
[constr_5035]	Compatibility of data types with category STRING
[constr_5036]	Compatibility of data types with category ARRAY
[constr_5037]	Compatibility of data types with category ARRAY with variableSize
[constr_5038]	Compatibility of data types with category ARRAY with fixedSize
[constr_5039]	Compatibility of data types with category STRUCTURE
[constr_5040]	Compatibility of ApplicationRecordDataType and CppImplementationDataType that both represent an Optional Element Structure
[constr_5041]	Compatibility of data types with category ASSOCIATIVE_MAP
[constr_5042]	No data type mapping for CppImplementationDataType of category VARIANT
[constr_5043]	Forbidden mappings to CppImplementationDataType
[constr_5044]	DataTypeMap for composite data types
[constr_5045]	Only one SomeipServiceDiscovery configuration per VLAN is allowed
[constr_5046]	Usage of DoIpNetworkConfiguration.eidUseMac
[constr_5047]	Supported values of ServiceInstanceToMachineMapping.category
[constr_5048]	Existence of TlsCryptoCipherSuite.certificate in the <i>server</i> role

Table F.24: Added Constraints in R19-03

F.5.5 Changed Constraints in R19-03

Number	Heading
[constr_1481]	Usage of DataPrototypeInServiceInterfaceRef in the <i>AUTOSAR adaptive platform</i>
[constr_1500]	Target SwcServiceDependency of DiagnosticEventPortMapping.swcServiceDependencyInExecutable
[constr_1501]	Target SwcServiceDependency of DiagnosticOperationCyclePortMapping.swcServiceDependencyInExecutable
[constr_1502]	Target SwcServiceDependency of DiagnosticEnableConditionPortMapping.swcServiceDependencyInExecutable
[constr_1503]	Target SwcServiceDependency of DiagnosticStorageConditionPortMapping.swcServiceDependencyInExecutable
[constr_1551]	Existence of DataPrototypeInServiceInterfaceRef.dataPrototype vs. DataPrototypeInServiceInterfaceRef.elementInImplDatatype
[constr_1567]	Existence of SoftwareCluster.subSoftwareCluster and SoftwareCluster.dependsOn/conflictsTo
[constr_1595]	Consistent assignment of TLV data ids to CppImplementationDataType or CppImplementationDataTypeElement
[constr_1606]	Processes with mutual ExecutionDependency s





Number	Heading
[constr_1615]	Existence of attribute <code>SomeipDataPrototypeTransformationProps.someipTransformationProps.sessionHandling</code>
[constr_1618]	Ability to shut down
[constr_1619]	Ability to restart
[constr_3396]	Number of <code>Process.stateDependentStartupConfig</code> that refer to the same <code>functionGroupState</code>
[constr_3413]	<code>StateDependentStartupConfig</code> of a <code>Process</code> is mapped to exactly one <code>ResourceGroup</code>
[constr_3421]	Fibex elements applicable for a <code>System</code> of category <code>MACHINE_DESIGN_EXTRACT</code>
[constr_3423]	<code>StateDependentStartupConfig</code> of a <code>Process</code> shall reference a <code>functionGroupState</code>
[constr_3424]	<code>StateDependentStartupConfig</code> shall never reference the <code>functionGroupState</code> <code>Off</code>
[constr_3447]	<code>ApSomeipTransformationProps.sizeOfArrayLengthField</code> that equals 0

Table F.25: Changed Constraints in R19-03

F.5.6 Deleted Constraints in R19-03

Number	Heading
[constr_1499]	Target <code>SwcServiceDependency</code> of <code>DiagnosticServiceSwMapping.mappedSwcServiceDependencyInExecutable</code>
[constr_1504]	Number of <code>Process.modeDependentStartupConfig</code> that refer to the same <code>machineMode</code>
[constr_1573]	<code>CppTemplateArgument.isVariadicTemplate</code> is set to <code>True</code>
[constr_1574]	Number of <code>CppTemplateArguments</code> with <code>isVariadicTemplate</code> set to <code>True</code>
[constr_1575]	Position of <code>CppTemplateArgument</code> with <code>isVariadicTemplate</code> set to <code>True</code>
[constr_1585]	Standardized values of attribute <code>DiagnosticServiceSwMapping.category</code>
[constr_1586]	<code>DiagnosticServiceSwMapping.category</code> set to <code>DATA_ELEMENT</code>
[constr_1620]	Value of <code>schedulingPriority</code> if <code>schedulingPolicy</code> is set to <code>schedulingPolicyFifo</code> or <code>schedulingPolicyRoundRobin</code>
[constr_1621]	Value of <code>schedulingPriority</code> if <code>StartupConfig.schedulingPolicy</code> is set to <code>schedulingPolicyOther</code>
[constr_1663]	Standardized values of attribute <code>DiagnosticServiceDataIdentifierMapping.category</code>
[constr_3380]	<code>End2EndEventProtectionProps</code> shall not reference an <code>event</code> and a <code>notifier</code> at the same time
[constr_3397]	<code>ModeDependentStartupConfig</code> that refers to a <code>functionGroupMode</code> and to a <code>machineMode</code>
[constr_3398]	<code>ModeDependentStartupConfig</code> that refers to function group modes of different function groups





Number	Heading
[constr_3494]	Mandatory Machine States
[constr_3531]	Mandatory definition of <code>healthChannelId</code>
[constr_3536]	Mandatory definition of <code>supervisedEntityId</code>
[constr_5001]	Usage of <code>DoIpNetworkConfiguration.eidUseMac</code>
[constr_5002]	Supported values of <code>ServiceInstanceToMachineMapping.category</code>
[constr_5003]	Existence of <code>TlsCryptoCipherSuite.certificate</code> in the <i>server</i> role

Table F.26: Deleted Constraints in R19-03

F.6 Traceable item history of this document according to AUTOSAR Release R19-11

F.6.1 Added Specification Items in R19-11

Number	Heading
[TPS_MAIN_01281]	Usage of meta-class <code>RecoveryViaApplicationAction</code>
[TPS_MANI_01267]	Semantics of attribute <code>SoftwareClusterDesign.dependsOn</code>
[TPS_MANI_01268]	Semantics of attribute <code>SoftwareClusterDesign.conflictsTo</code>
[TPS_MANI_01269]	Specification of boundaries for resource consumption
[TPS_MANI_01270]	Reference from <code>TransformationPropsToServiceInterfaceElementMapping</code> to <code>TlvDataIdDefinitionSet</code>
[TPS_MANI_01271]	Semantics of <code>Executable.loggingBehavior</code>
[TPS_MANI_01272]	Duplicate entries in <code>logTraceLogMode</code>
[TPS_MANI_01273]	Support for trusted Platform
[TPS_MANI_01274]	System <code>category</code> for a design description that has one single <i>Adaptive Machine</i> in scope
[TPS_MANI_01275]	Semantics of meta-class <code>ServiceInstanceToSwClusterDesignPort-PrototypeMapping</code>
[TPS_MANI_01276]	Semantics of <code>CompositionRPortToExecutableRPortMapping</code> and <code>CompositionPPortToExecutablePPortMapping</code>
[TPS_MANI_01277]	Definition of a start-up timeout for a <code>StartupConfig</code> of a <code>Process</code>
[TPS_MANI_01278]	Definition of a termination timeout for a <code>StartupConfig</code> of a <code>Process</code>
[TPS_MANI_01279]	Semantics of <code>Executable.reportingBehavior</code>
[TPS_MANI_01280]	Semantics of meta-class <code>PhmRecoveryActionInterface</code>
[TPS_MANI_01282]	Semantics of reference <code>CompositionPortToExecutablePortMapping.processDesign</code>
[TPS_MANI_01283]	Semantics of meta-class <code>RawDataStreamInterface</code>
[TPS_MANI_01284]	Granularity of meta-class <code>RawDataStreamGrantDesign</code>
[TPS_MANI_01285]	Purpose of meta-class <code>RawDataStreamDeployment</code>





Number	Heading
[TPS_MANI_01286]	Semantics of attribute <code>RawDataStreamMethodDeployment.callTime-out</code>
[TPS_MANI_01287]	Semantics of <code>RawDataStreamMapping</code>
[TPS_MANI_01288]	Impact of the <code>SoftwarePackage</code> on the value of function group states on the target platform
[TPS_MANI_01289]	Order of function group states is relevant
[TPS_MANI_01290]	<code>VehiclePackage</code> names affected UCMs
[TPS_MANI_01291]	Identification of an actual UCM in the context of an update campaign
[TPS_MANI_01292]	Definition of fallback-order for UCM master
[TPS_MANI_01294]	Update campaign depends on driver's acceptance
[TPS_MANI_01295]	Semantics of <code>VehicleRolloutStep</code>
[TPS_MANI_01296]	Ordered execution of rollout steps in an update campaign
[TPS_MANI_01297]	Semantics of meta-class <code>UcmStep</code>
[TPS_MANI_01298]	No ordering of <code>VehicleRolloutStep.ucmProcessing</code>
[TPS_MANI_01299]	Aggregation of <code>SoftwarePackageSteps</code> at <code>UcmStep</code>
[TPS_MANI_01300]	Semantics of reference <code>SoftwarePackageStep.transfer.transfer</code>
[TPS_MANI_01301]	Semantics of aggregation <code>SoftwarePackageStep.transfer</code>
[TPS_MANI_01302]	Semantics of reference <code>SoftwarePackageStep.process</code>
[TPS_MANI_01303]	Semantics of reference <code>SoftwarePackageStep.preActivate</code>
[TPS_MANI_01304]	Semantics of reference <code>SoftwarePackageStep.verify</code>
[TPS_MANI_01305]	Semantics of attribute <code>SoftwarePackageStep.activationSwitch</code>
[TPS_MANI_01306]	Simultaneous existence of attributes <code>SoftwarePackageStep.transfer</code> and <code>SoftwarePackageStep.process</code>
[TPS_MANI_01307]	Semantics of meta-class <code>EthernetRawDataStreamGrant</code>
[TPS_MANI_03227]	Usage of ephemeral ports
[TPS_MANI_03228]	Usage of <code>End2EndMethodProtectionProps</code>
[TPS_MANI_03229]	Usage of same <code>End2EndMethodProtectionProps.dataId</code> in case of Multi-Binding
[TPS_MANI_03230]	Sharing timers for <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03231]	Sharing timers for <code>RequiredSomeipServiceInstance</code>
[TPS_MANI_03232]	Definition of general IPsec configuration settings
[TPS_MANI_03233]	IPsec mode
[TPS_MANI_03234]	IPsec AH and ESP CipherSuites
[TPS_MANI_03573]	Definition of no minimum deadline supervision
[TPS_MANI_03574]	Definition of no maximum deadline supervision
[TPS_MANI_03575]	Definition of no minimum alive supervision
[TPS_MANI_03576]	Definition of no maximum alive supervision
[TPS_MANI_03577]	<code>headerId</code> required for signal-service-translation
[TPS_MANI_03578]	Signal-based <code>ServiceInterface</code> binding over <code>Ethernet</code>





Number	Heading
[TPS_MANI_03579]	Signal-based <code>ServiceEventDeployment</code> over Ethernet
[TPS_MANI_03580]	Service offer at startup
[TPS_MANI_03581]	Service find at startup
[TPS_MANI_03582]	Service find for required signal
[TPS_MANI_03583]	Service subscribe for required signal
[TPS_MANI_03584]	Definition of transmission triggers for translations with different sources
[TPS_MANI_03585]	Processing order of COM-Stack features
[TPS_MANI_03586]	No transmission trigger for translations with different sources
[TPS_MANI_03587]	Transmission trigger for translations with different sources
[TPS_MANI_03588]	Full translation before transmission triggering
[TPS_MANI_03589]	Reception data filter of COM-Stack
[TPS_MANI_03590]	Transfer properties and transmission modes of COM-Stack
[TPS_MANI_03591]	<code>SomeipEventDeployment.serializer</code> equals <code>signalBased</code>
[TPS_MANI_03592]	<code>ISignal</code> invalidation of COM-Stack
[TPS_MANI_03593]	<code>handleInvalid</code> = <code>dontInvalidate</code> behavior of COM-Stack
[TPS_MANI_03594]	<code>handleInvalid</code> = <code>replace</code> behavior of COM-Stack
[TPS_MANI_03595]	Update Bit support for <code>ISignal</code>
[TPS_MANI_03596]	Update Bit support for <code>ISignalIPdu</code>
[TPS_MANI_03597]	Support for <code>MultiplexedIPdu</code>
[TPS_MANI_03598]	Expected check period of E2E-Protected payload
[TPS_MANI_03599]	Expected update period of E2E-Protected payload
[TPS_MANI_03600]	Signal-service-translation of E2E protected payload
[TPS_MANI_03601]	Signal-service-translation of E2E protected payload - timeout handling
[TPS_MANI_03602]	Signal-service-translation of E2E protected payload - error handling
[TPS_MANI_03603]	Service-signal-translation of E2E protected payload
[TPS_MANI_03604]	Service-signal-translation of E2E protected payload - timeout handling
[TPS_MANI_03605]	Service-signal-translation of E2E protected payload - error handling
[TPS_MANI_03606]	Service offer for provided signal
[TPS_MANI_03607]	Handling of safe signal-service-translation in one <code>Executable</code>
[TPS_MANI_03608]	Support for safe signal-service-translation and service-signal-translation
[TPS_MANI_03609]	Support for safe signal-service-translation with same or different E2E profiles
[TPS_MANI_03610]	1:n mapping for E2E protected data
[TPS_MANI_03611]	E2E protected target out of E2E protected sources
[TPS_MANI_03612]	Sufficient ASIL level of translation software
[TPS_MANI_03614]	No translation of not OK E2E protected data out of several sources
[TPS_MANI_03615]	<code>SomeipEventDeployment.serializer</code> equals <code>someip</code>
[TPS_MANI_03616]	Semantic versioning of <code>ServiceInterface.majorVersion</code> and <code>ServiceInterface.minorVersion</code>





Number	Heading
[TPS_MANI_03617]	Version mapping between ServiceInterface and ServiceInterfaceDeployment
[TPS_MANI_03618]	Usage of RequiredSomeipServiceInstance.blacklistedVersion
[TPS_MANI_03619]	SOME/IP Service search for requiredMinorVersion
[TPS_MANI_03620]	Service discovery control
[TPS_MANI_03621]	Data filter inside the signal-service-translation

Table F.27: Added Specification Items in R19-11

F.6.2 Changed Specification Items in R19-11

Number	Heading
[TPS_MANI_01032]	Usage of ServiceInterfaceMapping
[TPS_MANI_01057]	Semantics of RPortPrototypeProps.searchIntention
[TPS_MANI_01164]	Semantics of SoftwareCluster.dependsOn
[TPS_MANI_01196]	Semantics of PersistencyDeployment.minimumSustainedSize
[TPS_MANI_01197]	Semantics of PersistencyDeployment.maximumAllowedSize
[TPS_MANI_01214]	Semantics of SoftwareCluster.conflictsTo
[TPS_MANI_01215]	Semantics of meta-class SoftwareActivationDependencyFormula
[TPS_MANI_01216]	Semantics of meta-class SoftwareActivationDependencyFormula-Part
[TPS_MANI_01217]	Semantics of metaclass SoftwareActivationDependencyCompare-Condition
[TPS_MANI_01249]	Semantics of DiagnosticConditionInterface
[TPS_MANI_01255]	Semantics of DoIP DiagnosticPortInterfaces
[TPS_MANI_03004]	IPv4 Multicast event destination address
[TPS_MANI_03010]	Udp Transport Protocol Configuration in case of IP-Multicast
[TPS_MANI_03061]	IPv6 Multicast event destination address
[TPS_MANI_03114]	Usage of AssemblySwConnectors in the System Design model
[TPS_MANI_03130]	Standardized E2EProfileConfiguration.profileName values
[TPS_MANI_03160]	Log and Trace configuration options in the Execution Manifest
[TPS_MANI_03161]	Log and Trace configuration options in the Service Instance Manifest
[TPS_MANI_03167]	Network configuration for Nm
[TPS_MANI_03205]	IPsec policy
[TPS_MANI_03206]	IPsec AH and ESP protocol configuration
[TPS_MANI_03207]	IPsec Internet Key Exchange protocol configuration





Number	Heading
[TPS_MANI_03216]	Existence of <code>TlsCryptoCipherSuite.certificate</code> and <code>TlsCryptoCipherSuite.pskIdentity</code> in the <i>client</i> role

Table F.28: Changed Specification Items in R19-11

F.6.3 Deleted Specification Items in R19-11

Number	Heading
[TPS_MANI_01051]	Mapping of <code>DiagnosticStorageCondition</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01052]	Semantics of <code>RPortPrototypeProps.portInstantiationBehavior</code>
[TPS_MANI_01162]	Semantics of <code>SoftwareClusterDesign.dependsOn</code>
[TPS_MANI_03120]	Signal-based <code>ServiceInterface</code> binding
[TPS_MANI_03146]	Configuration of timeouts for a selected machine state or function group state
[TPS_MANI_03149]	Definition of a start-up timeout for a <code>Process</code>
[TPS_MANI_03150]	Definition of a termination timeout for a <code>Process</code>
[TPS_MANI_03550]	Usage of <code>RPortPrototype</code> for the interaction with Platform Health Management

Table F.29: Deleted Specification Items in R19-11

F.6.4 Added Constraints in R19-11

Number	Heading
[constr_1705]	Target of reference <code>SoftwareActivationDependencyCompareCondition.softwareActivationDependency</code>
[constr_1707]	Eligible subclasses of <code>HeapUsage</code> in the context of <code>StateDependentStartupConfig.resourceConsumption</code>
[constr_1708]	Combination of <code>CppImplementationDataTypeElement.isOptional</code> and <code>CppImplementationDataTypeElementQualifier.inplace</code>
[constr_1709]	Applicability of attribute <code>PersistencyRedundancyEnum.redundantPerKey</code>
[constr_1710]	Consistency of values of attributes <code>PersistencyInterface.redundancy</code> and <code>PersistencyRedundancyHandling.scope</code>
[constr_1723]	<code>ProvidedSomeipServiceInstance</code> shall be unique in respect of <code>serviceInstanceId</code> , <code>serviceInterfaceId</code> and <code>majorVersion</code>
[constr_1727]	Qualified combinations of <code>PortPrototypes</code> and <code>PhmSupervisedEntityInterface</code> on application software level
[constr_1728]	Qualified combinations of <code>PortPrototypes</code> and <code>PhmHealthChannelInterface</code> on application software level





Number	Heading
[constr_1729]	Qualified combinations of PortPrototypes and PhmRecoveryActionInterface on application software level
[constr_1730]	Restriction regarding the modeling of the PhmRecoveryActionInterface.recovery
[constr_1731]	Value of UcmDescription.identifier in the scope of a VehiclePackage
[constr_1732]	Existence of attribute activationSwitch set to True in the context of the enclosing UcmStep
[constr_1733]	Simultaneous existence of SoftwarePackageStep.preActivate and SoftwarePackageStep.verify
[constr_1734]	Restriction for attribute SoftwarePackageStep.activationSwitch
[constr_1736]	Multiplicity of reference LogicalSupervision.initialCheckpoint
[constr_1737]	Multiplicity of reference LogicalSupervision.finalCheckpoint
[constr_1738]	Multiplicity of reference GlobalSupervision.localSupervision
[constr_1739]	Multiplicity of aggregation LocalSupervision.transition
[constr_1740]	Multiplicity of reference LogicalSupervision.transition
[constr_1742]	Multiplicity of reference SupervisionCheckpoint.phmCheckpoint
[constr_3550]	Existence of ServiceInstanceToSignalMapping for an event with signal-Based serialization
[constr_3551]	Full mapping of target ISignalGroup
[constr_3552]	Full mapping of target event
[constr_3553]	Existence of ServiceInstanceToSignalMapping for an field with signal-Based serialization
[constr_3554]	E2E protection configuration check
[constr_3555]	No support for useAsCryptographicIPdu is true
[constr_3556]	Unique transport layer mapping
[constr_3557]	Mandatory majorVersion at SomeipServiceInterfaceDeployment.serviceInterfaceVersion
[constr_3558]	RequiredSomeipServiceInstance.blacklistedVersion is restricted to the usage of minorVersion
[constr_3561]	minimumMinorVersion and RequiredSomeipServiceInstance.requiredMinorVersion value
[constr_3562]	Existence of NonqueuedReceiverComSpec.filter
[constr_5052]	SOME/IP ServiceInstances of the same serviceInterface on one Machine
[constr_5056]	Restriction of CompositionSwComponentType.connector usage in AP
[constr_5057]	PassThroughSwConnector and ServiceInterfaceMapping
[constr_5102]	Usage of remote port ranges in IPSecRule is not allowed
[constr_5103]	Usage of local port ranges in IPSecRule is not allowed

Table F.30: Added Constraints in R19-11

F.6.5 Changed Constraints in R19-11

Number	Heading
[constr_1561]	Existence of <code>SoftwareClusterDesign.subSoftwareCluster</code> and <code>SoftwareClusterDesign.dependsOn.dependentSoftwareClusterDesign</code>
[constr_1567]	Existence of <code>SoftwareCluster.subSoftwareCluster</code> and <code>SoftwareCluster.dependsOn/conflictsTo</code>
[constr_1570]	Restriction for <code>UserDefinedServiceInterfaceDeployment</code> of category <code>SERVICE_INTERFACE_DEPLOYMENT_IPC</code>
[constr_1579]	<code>SwDataDefProps</code> applicable to <code>CppImplementationDataTypes</code> exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1630]	No definition of length field sizes on <code>DataPrototype</code> level in case of TLV usage
[constr_3375]	<code>method</code> with attribute <code>fireAndForget</code> set to true shall not reference an <code>ApApplicationError</code>
[constr_3419]	Allowed usage of <code>UdpNmNetworkConfiguration</code> attributes
[constr_3426]	The <code>logTraceFilePath</code> is mandatory in case that <code>logTraceLogMode</code> is set to <code>file</code>
[constr_3427]	The <code>logTraceFilePath</code> is only relevant if <code>logTraceLogMode</code> is set to <code>file</code>
[constr_3493]	Applicable attributes for standardized E2E Profiles
[constr_5048]	Existence of <code>TlsCryptoCipherSuite.certificate</code> and <code>TlsCryptoCipherSuite.pskIdentity</code> in the <i>server</i> role

Table F.31: Changed Constraints in R19-11

F.6.6 Deleted Constraints in R19-11

Number	Heading
[constr_1503]	Target <code>SwcServiceDependency</code> of <code>DiagnosticStorageConditionPortMapping.swcServiceDependencyInExecutable</code>
[constr_3387]	Compatibility of <code>PortPrototypes</code> of different <code>ServiceInterfaces</code>
[constr_3388]	Compatibility of <code>events</code>
[constr_3389]	Compatibility of <code>methods</code>
[constr_3390]	Compatibility of <code>fields</code>
[constr_3411]	<code>eventMulticastUdpPort</code> , <code>ipv4MulticastIpAddress</code> and <code>ipv6MulticastIpAddress</code> not relevant for <code>RequiredSomeipServiceInstances</code>
[constr_3420]	System <code>category</code> for a design description that has one single Adaptive <code>Machine</code> in scope

Table F.32: Deleted Constraints in R19-11

F.7 Traceable item history of this document according to AUTOSAR Release R20-11

F.7.1 Added Specification Items in R20-11

Number	Heading
[TPS_MANI_01308]	<code>Process</code> is not designed for re-usability
[TPS_MANI_01309]	Semantics of attribute <code>CppImplementationDataType.headerFile</code>
[TPS_MANI_01310]	Semantics of <code>SoftwareClusterDesign.dependsOn</code>
[TPS_MANI_01311]	Handling of manufacturer checks
[TPS_MANI_01312]	Handling of supplier checks
[TPS_MANI_01313]	Definition of <code>updateStrategy</code> on element level
[TPS_MANI_01314]	Further qualification of properties of <code>PortPrototypes</code> typed by <code>PersistencyKeyValueStorageInterfaces</code>
[TPS_MANI_01315]	<code>PersistencyKeyValuePair.initValue</code> overrides <code>PersistencyDataRequiredComSpec.initValue</code>
[TPS_MANI_01316]	Existence of <code>ServiceInstanceToPortPrototypeMapping.processDesign</code>
[TPS_MANI_01317]	Existence of <code>ServiceInstanceToPortPrototypeMapping.process</code>
[TPS_MANI_01319]	Modeling of redundancy in the context of <code>PersistencyInterface</code>
[TPS_MANI_01320]	Definition of redundancy on interface level may be overruled in deployment
[TPS_MANI_01321]	Semantics of meta-class <code>PersistencyDeploymentElement</code>
[TPS_MANI_01322]	Semantics of meta-class <code>PersistencyPortPrototypeToDeploymentMapping</code>
[TPS_MANI_01323]	Matching pairs of <code>PersistencyDataElement</code> and <code>PersistencyKeyValuePair</code>
[TPS_MANI_01324]	Semantics of E2E attributes in <code>ClientComSpec</code>
[TPS_MANI_01325]	Semantics of E2E attributes in <code>ServerComSpec</code>
[TPS_MANI_01326]	Generic Mapping to a <code>DiagnosticServiceInstance</code> on the AUTOSAR Adaptive Platform
[TPS_MANI_01327]	Value of <code>EndToEndTransformationComSpecProps.disableEndToEndCheck</code> vs. value of <code>EndToEndTransformationComSpecProps.disableEndToEndStateMachine</code>
[TPS_MANI_01328]	Standardized values for attribute <code>StartupConfig.schedulingPolicy</code>
[TPS_MANI_01329]	Reference to model elements in different <code>SoftwareClusters</code>
[TPS_MANI_01330]	Definition of machine function group
[TPS_MANI_01331]	Standardized values of attribute <code>SoftwareCluster.category</code>
[TPS_MANI_01332]	Semantics of <code>DiagnosticEcuResetInterface</code>
[TPS_MANI_01333]	Attribute <code>NotAvailableValueSpecification.defaultPattern</code> is not applicable
[TPS_MANI_01334]	Semantics of <code>StartupConfig.terminationBehavior</code>





Number	Heading
[TPS_MANI_01335]	Semantics of SoftwareClusterDependencyFormula.category
[TPS_MANI_01336]	Two use cases for using the DiagnosticEventPortMapping
[TPS_MANI_01337]	Standardized values for attribute Process.functionClusterAffiliation
[TPS_MANI_01338]	Semantics of SecurityEventReportToSecurityEventDefinitionMapping
[TPS_MANI_01339]	Existence of the SecurityEventReportToSecurityEventDefinitionMapping is motivated by the AUTOSAR methodology
[TPS_MANI_01340]	Semantics of SecurityEventReportInterface
[TPS_MANI_01341]	Security events that are actually reported by a local IdsM
[TPS_MANI_01342]	Semantics of SecurityEventMapping
[TPS_MANI_03235]	Usage of ApSomeipTransformationProps.sessionHandling
[TPS_MANI_03236]	Mapping of ProvidedSomeipServiceInstance to different PPortPrototypes
[TPS_MANI_03237]	Transport Protocol attributes defined for a RequiredSomeipServiceInstance
[TPS_MANI_03238]	Definition of ComMethodGrantDesign.remoteSubject
[TPS_MANI_03239]	Definition of ComEventGrantDesign.remoteSubject
[TPS_MANI_03240]	Modeling of a remote peer in case of TLS-based secure channel
[TPS_MANI_03241]	Modeling of relevant TlsSecureComProps for TlsIamRemoteSubject
[TPS_MANI_03242]	Modeling of a remote peer in case of IPsec-based secure channel
[TPS_MANI_03244]	Modeling of a remote peer in case of a general IP communication
[TPS_MANI_03245]	Definition of ComMethodGrant.remoteSubjects on server side
[TPS_MANI_03246]	Definition of ComMethodGrant.remoteSubjects on client side
[TPS_MANI_03247]	Definition of ComEventGrant.remoteSubjects on provider side
[TPS_MANI_03248]	Definition of ComEventGrant.remoteSubjects on receiver side
[TPS_MANI_03249]	Definition of ComFieldGrant.remoteSubjects on provider side
[TPS_MANI_03250]	Definition of ComFieldGrant.remoteSubjects on client side
[TPS_MANI_03251]	Definition of ComFieldGrantDesign.remoteSubject
[TPS_MANI_03252]	Usage of same End2EndMethodProtectionProps.sourceId in case of Multi-Binding
[TPS_MANI_03253]	Interaction with crypto software
[TPS_MANI_03254]	Modeling of application that uses and modifies a Crypto Key
[TPS_MANI_03255]	Modeling of Key Manager application that manages a Crypto Key that is used by Stack Services
[TPS_MANI_03256]	Modeling of application that accesses a Crypto Certificate
[TPS_MANI_03257]	Modeling of application that accesses a Crypto Provider
[TPS_MANI_03258]	Modeling of application designed as trust-master
[TPS_MANI_03259]	Linking of Crypto Certificate to a Crypto Key Slot
[TPS_MANI_03260]	Semantics of meta-class CryptoModuleInstantiation





Number	Heading
[TPS_MANI_03261]	Support of CryptoProviders
[TPS_MANI_03262]	Semantics of CryptoProviderToPortPrototypeMapping
[TPS_MANI_03263]	Assignment of CryptoKeySlots to CryptoProviders
[TPS_MANI_03264]	Semantics of CryptoKeySlotToPortPrototypeMapping
[TPS_MANI_03265]	Support of CryptoCertificates
[TPS_MANI_03266]	Semantics of CryptoCertificateToCryptoKeySlotMapping
[TPS_MANI_03267]	Semantics of CryptoCertificateToPortPrototypeMapping
[TPS_MANI_03268]	Semantics of FunctionalClusterInteractsWithFunctionalClusterMapping
[TPS_MANI_03269]	Semantics of ComCertificateToCryptoCertificateMapping
[TPS_MANI_03270]	Semantics of ComKeyToCryptoKeySlotMapping
[TPS_MANI_03271]	Semantics of ComSecOcToCryptoKeySlotMapping
[TPS_MANI_03272]	Semantics of PersistencyDeploymentToCryptoKeySlotMapping
[TPS_MANI_03273]	Semantics of PersistencyDeploymentElementToCryptoKeySlotMapping
[TPS_MANI_03274]	Configuration of log and trace message source
[TPS_MANI_03275]	Configuration of log and trace message source on design level
[TPS_MANI_03276]	Semantics of PersistencyDeploymentToDltLogChannelMapping
[TPS_MANI_03622]	DDS Transport Protocols are up to the stack implementer
[TPS_MANI_03623]	Usage of checkpointId in application code
[TPS_MANI_03624]	Usage of statusId in application code
[TPS_MANI_03625]	Consistency of HealthChannelExternalReportedStatus.statusId and PhmHealthChannelStatus.statusId
[TPS_MANI_03626]	Consistency of SupervisionCheckpoint.phmCheckpoint and PhmCheckpoint.checkpointId
[TPS_MANI_03627]	No signal-service-translation for methods
[TPS_MANI_03628]	Standardized values of ServiceInterface.category
[TPS_MANI_03629]	Relation of ServiceInstanceToSignalMapping and CommunicationConnector
[TPS_MANI_03630]	Semantics of triggersRecoveryNotification
[TPS_MANI_03631]	Semantics of meta-class PhmHealthChannelRecoveryNotificationInterface
[TPS_MANI_03632]	Semantics of TimeBaseProviderToPersistencyMapping

Table F.33: Added Specification Items in R20-11

F.7.2 Changed Specification Items in R20-11

Number	Heading
[TPS_MANI_01061]	Requirements on scheduling
[TPS_MANI_01065]	Purpose of PersistencyKeyValueStorageInterface
[TPS_MANI_01067]	Purpose of PersistencyFileStorageInterface
[TPS_MANI_01068]	Semantics of PersistencyFileStorageInterface.maxNumberOfFiles
[TPS_MANI_01073]	Semantics of PortPrototype typed by PersistencyKeyValueStorageInterface
[TPS_MANI_01078]	Semantics of PersistencyPortPrototypeToKeyValueStorageMapping
[TPS_MANI_01079]	Semantics of PersistencyKeyValueStorage
[TPS_MANI_01080]	Semantics of meta-class PersistencyPortPrototypeToFileStorageMapping
[TPS_MANI_01081]	Semantics of PortPrototype typed by PersistencyFileStorageInterface
[TPS_MANI_01106]	Specification of intentions for the receiver of events or field notifiers
[TPS_MANI_01107]	Specification of intentions for the sender of events or field notifiers
[TPS_MANI_01108]	Specification of intentions for the caller of a methods or field setter/getter
[TPS_MANI_01135]	Semantics of PersistencyKeyValueStorageInterface.dataTypeForSerialization
[TPS_MANI_01138]	Semantics of PersistencyKeyValueStorageInterface.dataElement
[TPS_MANI_01139]	Semantics of PersistencyInterface.updateStrategy
[TPS_MANI_01140]	Semantics of PersistencyInterfaceElement.updateStrategy
[TPS_MANI_01142]	Semantics of PersistencyFileElement
[TPS_MANI_01144]	Semantics of PersistencyKeyValuePair
[TPS_MANI_01147]	Semantics of PersistencyDeployment.updateStrategy
[TPS_MANI_01148]	Semantics of PersistencyDeploymentElement.updateStrategy
[TPS_MANI_01149]	Semantics of PersistencyFileStorage.file
[TPS_MANI_01150]	Semantics of PersistencyFileStorage
[TPS_MANI_01155]	PersistencyDeployment.updateStrategy overrides PersistencyInterface.updateStrategy
[TPS_MANI_01156]	PersistencyDeploymentElement.updateStrategy overrides PersistencyDeployment.updateStrategy
[TPS_MANI_01157]	Semantics of updateStrategy on collection level
[TPS_MANI_01159]	Semantics of updateStrategy on element level
[TPS_MANI_01160]	Definition of initial value for PersistencyDataElement
[TPS_MANI_01164]	Semantics of SoftwareCluster.dependsOn
[TPS_MANI_01176]	Standardized value for attribute CppImplementationDataType.typeEmitter
[TPS_MANI_01177]	Semantics of attribute CppImplementationDataType.typeEmitter





Number	Heading
[TPS_MANI_01179]	Semantics of <code>PersistencyFileElement.contentUri/PersistencyFile.contentUri</code> vs. <code>PersistencyFileStorage.uri</code> and <code>PersistencyFileElement.fileName/PersistencyFile.fileName</code>
[TPS_MANI_01180]	Collection of data types that requires serialization support
[TPS_MANI_01182]	Value of <code>PersistencyDeploymentElement.updateStrategy</code> overrides <code>PersistencyInterfaceElement.updateStrategy</code>
[TPS_MANI_01187]	Matching pairs of <code>PersistencyFileElement</code> and <code>PersistencyFile</code>
[TPS_MANI_01194]	Semantics of <code>PersistencyInterface.minimumSustainedSize</code>
[TPS_MANI_01196]	Semantics of <code>PersistencyDeployment.minimumSustainedSize</code>
[TPS_MANI_01197]	Semantics of <code>PersistencyDeployment.maximumAllowedSize</code>
[TPS_MANI_01204]	Specification of redundancy of persistent data
[TPS_MANI_01206]	Modeling of redundancy in the context of <code>PersistencyDeployment</code>
[TPS_MANI_01207]	Standardized values of attribute <code>PersistencyRedundancyChecksum.algorithmFamily</code>
[TPS_MANI_01213]	Semantics of meta-class <code>StrongRevisionLabelString</code>
[TPS_MANI_01214]	Semantics of <code>SoftwareCluster.conflictsTo</code>
[TPS_MANI_01215]	Semantics of meta-class <code>SoftwareClusterDependencyFormula</code>
[TPS_MANI_01216]	Semantics of meta-class <code>SoftwareClusterDependencyFormulaPart</code>
[TPS_MANI_01217]	Semantics of meta-class <code>SoftwareClusterDependencyCompareCondition</code>
[TPS_MANI_01263]	Mapping of <code>DiagnosticDataIdentifier</code> or <code>DiagnosticDataElement</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01272]	Duplicate entries in <code>logTraceLogMode</code>
[TPS_MANI_01280]	Semantics of meta-class <code>PhmSupervisionRecoveryNotificationInterface</code>
[TPS_MANI_01284]	Granularity of meta-class <code>RawDataStreamGrantDesign</code>
[TPS_MANI_01285]	Purpose of meta-class <code>RawDataStreamDeployment</code>
[TPS_MANI_01300]	Semantics of reference <code>SoftwarePackageStep.transfer.transfer</code>
[TPS_MANI_03059]	<code>RequiredSomeipServiceInstance.requiredServiceInstanceId</code>
[TPS_MANI_03111]	Mapping between <code>method</code> and <code>operation</code> located in a <code>ClientServerInterface</code>
[TPS_MANI_03113]	Mapping between a <code>field</code> and elements of Classic Platform <code>PortInterfaces</code>
[TPS_MANI_03130]	Standardized <code>E2EProfileConfiguration.profileName</code> values
[TPS_MANI_03145]	Description of a function group
[TPS_MANI_03160]	Further configuration options in <code>DltLogChannel</code>
[TPS_MANI_03163]	Network configuration for Log and Trace messages
[TPS_MANI_03165]	Network Interface configuration for DoIP
[TPS_MANI_03194]	Function Group State
[TPS_MANI_03195]	Off state in Function Group
[TPS_MANI_03207]	IPsec Internet Key Exchange protocol configuration





Number	Heading
[TPS_MANI_03209]	The meaning of <code>MachineDesign.accessControl</code>
[TPS_MANI_03516]	Status for <code>HealthChannelSupervision</code>
[TPS_MANI_03517]	Evaluation of <code>HealthChannelExternalStatus</code>
[TPS_MANI_03535]	Definition of Time Synchronization interaction
[TPS_MANI_03536]	Time Synchronization interaction in a provider role
[TPS_MANI_03537]	Time Synchronization interaction in a consumer role
[TPS_MANI_03539]	Definition of Time-Base Resources
[TPS_MANI_03541]	Definition of <code>SynchronizedTimeBaseConsumer</code>
[TPS_MANI_03542]	Definition of <code>SynchronizedTimeBaseProvider</code>
[TPS_MANI_03543]	Definition of time sync correction attributes
[TPS_MANI_03546]	Definition of reported health status <code>RPortPrototype</code>
[TPS_MANI_03548]	Definition of <code>TimeSyncPortPrototypeToTimeBaseMapping</code>
[TPS_MANI_03549]	Usage of <code>PortPrototype</code> for the interaction with Time Synchronization
[TPS_MANI_03551]	Definition of Time Base kind
[TPS_MANI_03556]	DDS-RPC Service Binding
[TPS_MANI_03557]	DDS <code>ClientServerOperation</code> Binding
[TPS_MANI_03558]	DDS <code>Field</code> Binding
[TPS_MANI_03598]	Expected check period of E2E-Protected payload
[TPS_MANI_03599]	Expected update period of E2E-Protected payload
[TPS_MANI_03612]	Sufficient ASIL level of translation software
[TPS_MANI_03617]	Version mapping between <code>ServiceInterface</code> and <code>ServiceInterfaceDeployment</code>

Table F.34: Changed Specification Items in R20-11

F.7.3 Deleted Specification Items in R20-11

Number	Heading
[TPS_MAIN_01281]	Usage of meta-class <code>RecoveryViaApplicationAction</code>
[TPS_MANI_01015]	Semantics of meta-class <code>StartupOption</code>
[TPS_MANI_01059]	Different values of <code>optionKind</code> within a <code>StartupConfig.startupOption</code>
[TPS_MANI_01069]	Further qualification of properties of <code>PortPrototypes</code> typed by <code>PersistenceKeyValueDatabaseInterfaces</code>
[TPS_MANI_01141]	Semantics of <code>PersistenceFileProxyInterface.updateStrategy</code>
[TPS_MANI_01143]	Semantics of <code>PersistenceFileProxy.updateStrategy</code>
[TPS_MANI_01151]	Semantics of <code>PersistenceFileArray.updateStrategy</code>
[TPS_MANI_01152]	Semantics of <code>PersistenceFile.updateStrategy</code>





Number	Heading
[TPS_MANI_01154]	PersistencyFileArray.updateStrategy overrides PersistencyFileProxyInterface.updateStrategy
[TPS_MANI_01158]	PersistencyFile.updateStrategy overrides PersistencyFileArray.updateStrategy
[TPS_MANI_01163]	Impact of values of category on the semantics of SoftwareCluster
[TPS_MANI_01183]	PersistencyFile.updateStrategy overrides PersistencyFileProxy.updateStrategy
[TPS_MANI_01195]	Semantics of PersistencyFileProxyInterface.minimumSustainedSize
[TPS_MANI_01224]	Actions taken after installation of a SoftwarePackage
[TPS_MANI_01264]	Mapping of DiagnosticServiceInstance to PortPrototype(s) on the AUTOSAR adaptive platform
[TPS_MANI_01266]	Mapping of DiagnosticServiceInstance for upload/download to Port-Prototype(s) on the AUTOSAR adaptive platform
[TPS_MANI_01267]	Semantics of attribute SoftwareClusterDesign.dependsOn
[TPS_MANI_01268]	Semantics of attribute SoftwareClusterDesign.conflictsTo
[TPS_MANI_01283]	Semantics of meta-class RawDataStreamInterface
[TPS_MANI_01286]	Semantics of attribute RawDataStreamMethodDeployment.callTimeout
[TPS_MANI_03065]	Hardware resources of the machine
[TPS_MANI_03161]	Log and Trace configuration options in the Service Instance Manifest
[TPS_MANI_03518]	PhmLogicalExpression definition
[TPS_MANI_03519]	PhmRule definition
[TPS_MANI_03520]	Execution of PhmActionList with actionListExecution=triggeredOnEvaluation
[TPS_MANI_03521]	Execution of PhmActionList with actionListExecution=triggeredOnChange
[TPS_MANI_03522]	Definition of actions for application software
[TPS_MANI_03523]	Definition of actions for Platform Instance
[TPS_MANI_03524]	Definition of actions for Watchdog
[TPS_MANI_03538]	Time Synchronization interaction with a local Time Base
[TPS_MANI_03540]	Definition of PureLocalTimeBase
[TPS_MANI_03559]	Definition of DdsProvidedServiceInstance.methodQosProps
[TPS_MANI_03560]	qosProfile of DdsProvidedServiceInstance.methodQosProps is optional
[TPS_MANI_03563]	Definition of DdsProvidedServiceInstance.fieldGetSetQosProps
[TPS_MANI_03564]	qosProfile of DdsProvidedServiceInstance.fieldGetSetQosProps is optional
[TPS_MANI_03565]	Definition of DdsRequiredServiceInstance.methodQosProps
[TPS_MANI_03566]	qosProfile of DdsRequiredServiceInstance.methodQosProps is optional
[TPS_MANI_03569]	Definition of DdsRequiredServiceInstance.fieldGetSetQosProps





Number	Heading
[TPS_MANI_03570]	<code>qosProfile</code> of <code>DdsRequiredServiceInstance.fieldGet-SetQosProps</code> is optional
[TPS_MANI_03571]	transportPlugin for <code>DdsProvidedServiceInstance</code>
[TPS_MANI_03572]	transportPlugin for <code>DdsRequiredServiceInstance</code>

Table F.35: Deleted Specification Items in R20-11

F.7.4 Added Constraints in R20-11

Number	Heading
[constr_1743]	<code>CppImplementationDataType.headerFile</code> vs. <code>CppImplementationDataType.typeEmitter</code>
[constr_1744]	Definition of process state In the context of the <code>ExecutionDependency</code>
[constr_1746]	Mutual exclusive existence of <code>PersistencyInterface.redundancy</code> and <code>PersistencyInterface.redundancyHandling</code>
[constr_1747]	Completeness of the <code>SoftwareCluster.version</code>
[constr_1748]	Existence of references <code>TlvDataIdDefinition.tlvArgument</code> , <code>TlvDataIdDefinition.tlvRecordElement</code> , and <code>TlvDataIdDefinition.tlvSubElement</code>
[constr_1751]	Value of <code>PersistencyRedundancyMOutOfN.n</code> and <code>PersistencyRedundancyMOutOfN.m</code>
[constr_1764]	Counterpart of <code>PhmCheckpoint</code>
[constr_1765]	Diagnostic Services eligible for <code>DiagnosticServiceGenericMapping</code>
[constr_1769]	Existence of <code>ProcessArgument.argument</code>
[constr_1770]	Value of <code>ProvidedSomeipServiceInstance.serviceInstanceId</code>
[constr_1784]	Restriction for the reference to <code>UploadableExclusivePackageElement</code>
[constr_1785]	Restriction regarding the reference into another <code>SoftwareCluster</code>
[constr_1786]	Restriction to use <code>functionGroup</code> in terms of <code>SoftwareCluster</code>
[constr_1787]	Restricted use of function groups in the context of a <code>SoftwareCluster</code>
[constr_1788]	Restriction to <code>SoftwareCluster</code> of category <code>PLATFORM_CORE</code>
[constr_1789]	Scope of machine function group
[constr_1809]	Global supervision restricted to one function group
[constr_3563]	Mandatory topic name values
[constr_3564]	Consistency between DDS Service Interface Deployment and Provided DDS Service Instance
[constr_3565]	Consistency between DDS Service Interface Deployment and Required DDS Service Instance
[constr_3568]	No support for cross <code>PlatformHealthManagementContribution</code> references
[constr_3569]	Applicability of attribute <code>invalidValue</code> on <code>CppImplementationDataType</code> of category <code>TYPE_REFERENCE</code>





Number	Heading
[constr_3612]	Multiplicity of references <code>recoveryNotification</code> , <code>recoveryAction</code> , and <code>process</code> at <code>RecoveryNotificationToPPortPrototypeMapping</code>
[constr_3613]	Reference to a <code>PhmSupervisionRecoveryNotificationInterface</code> in the context of a <code>HealthChannelSupervision</code>
[constr_3614]	Reference to a <code>PhmHealthChannelRecoveryNotificationInterface</code> in the context of a <code>HealthChannelExternalStatus</code>
[constr_3619]	Mandatory references of <code>TimeBaseProviderToPersistencyMapping</code>
[constr_5115]	Search for a specific SOME/IP ServiceInstance and for all SOME/IP ServiceInstances over the same <code>RPortPrototype</code>
[constr_5155]	<code>SomeipServiceInstanceToMachineMapping</code> only supports a single Address Family
[constr_5156]	<code>SomeipEventDeployment.transportProtocol</code> setting to <code>udp</code> and the impact on <code>ProvidedSomeipServiceInstances</code>
[constr_5161]	<code>RequiredSomeipServiceInstance</code> that is mapped by a <code>SomeipServiceInstanceToMachineMapping</code> without a configured <code>tcpPort</code> and <code>udpPort</code>
[constr_5227]	Mandatory elements of <code>UdpNmCluster</code>
[constr_5228]	Partial Networking timing constraint
[constr_5230]	Existence of attribute <code>E2EProfileCompatibilityProps.transitToInvalidExtended</code> is mandatory for each <code>E2EProfileConfiguration</code>
[constr_5238]	<code>CryptoKeySlotAllowedModification.restrictUpdate</code> and the relationship to <code>maxNumberOfAllowedUpdates</code>
[constr_5239]	Predefined values for <code>CryptoKeySlotContentAllowedUsage.allowedKeyslotUsage</code>
[constr_5240]	Restriction applicable for <code>CryptoProviderToPortPrototypeMapping.portPrototype</code>
[constr_5241]	Restriction applicable for <code>CryptoKeySlotToPortPrototypeMapping.portPrototype</code>
[constr_5242]	Restriction applicable for <code>CryptoCertificateToPortPrototypeMapping.portPrototype</code>
[constr_5243]	Restriction of <code>LogAndTraceInstantiation.dltEcuId</code> attribute value
[constr_10002]	Only one mapping per <code>PortPrototype</code>
[constr_10003]	Restriction for the existence of <code>DiagnosticServiceDataIdentifierPortMapping.diagnosticDataIdentifier</code> vs. <code>DiagnosticServiceDataIdentifierPortMapping.diagnosticDataElement</code>
[constr_10004]	Consistency of <code>DiagnosticServiceGenericMapping</code> for <code>PortPrototype</code> typed by <code>DiagnosticDataIdentifierGenericInterface</code>
[constr_10007]	Existence of <code>ProcessExecutionError.executionError</code>
[constr_10008]	Value of <code>ProcessExecutionError.executionError</code>
[constr_10010]	Usage of attribute <code>category</code> in a <code>SoftwareClusterDependencyFormula</code>
[constr_10011]	Definition of sub-software-cluster
[constr_10021]	Existence of <code>IdsmModuleInstantiation</code>
[constr_10022]	Restriction for <code>SecurityEventMapping.process.securityEvent.id</code> w.r.t <code>SecurityEventMapping.id</code>





Number	Heading
[constr_10023]	Mandatory content of any functionGroup

Table F.36: Added Constraints in R20-11

F.7.5 Changed Constraints in R20-11

Number	Heading
[constr_1490]	Allowed value for Executable.category if ProcessToMachineMapping references a NonOsModuleInstantiation
[constr_1500]	Target SwcServiceDependency of DiagnosticEventPortMapping.swcServiceDependencyInExecutable
[constr_1507]	PortInterfaceToDataTypeMapping is only applicable to ServiceInterface or PersistencyKeyValueStorageInterface
[constr_1555]	Restriction applicable for PersistencyPortPrototypeToKeyValueStorageMapping.portPrototype
[constr_1556]	Restriction applicable for PersistencyPortPrototypeToFileStorageMapping.portPrototype
[constr_1564]	Existence of SoftwareCluster.diagnosticAddress
[constr_1566]	Usage of SoftwareCluster.containedARElement
[constr_1568]	Existence of SoftwareCluster.diagnosticExtract
[constr_1581]	Value of fileElement.fileName
[constr_1589]	Value of file.fileName
[constr_1613]	File name of matching pairs of PersistencyFileElement and PersistencyFile
[constr_1659]	Restriction for the usage of CppImplementationDataTypeElementQualifier.inplace
[constr_1666]	References from PersistencyPortPrototypeToKeyValueStorageMapping to PersistencyKeyValueStorage
[constr_1667]	References from PersistencyPortPrototypeToFileStorageMapping to PersistencyFileStorage
[constr_1668]	Allowed combinations of PersistencyRedundancyChecksum.length and algorithmFamily
[constr_1673]	Existence of attributes hasGetter , hasSetter , and hasNotifier
[constr_1710]	Consistency of values of attributes PersistencyInterface.redundancy and PersistencyRedundancyHandling.scope
[constr_1729]	Qualified combinations of PortPrototypes and PhmSupervisionRecoveryNotificationInterface / PhmHealthChannelRecoveryNotificationInterface on State Management software level
[constr_3305]	Value of attribute SomeipEventDeployment.eventId shall be unique
[constr_3306]	Value of attribute methodId shall be unique per SomeipServiceInterfaceDeployment





Number	Heading
[constr_3356]	Restriction in usage of ApSomeipTransformationProps.alignment
[constr_3414]	Allowed usage of PlatformModuleEthernetEndpointConfiguration attributes
[constr_3421]	Fibex elements applicable for a System of category MACHINE_DESIGN_EXTRACT
[constr_3426]	The logTraceFilePath is mandatory in case that logTraceLogMode is set to file
[constr_3427]	The logTraceFilePath is only relevant if logTraceLogMode is set to file
[constr_3493]	Applicable attributes for standardized E2E Profiles
[constr_3552]	Full mapping of target event
[constr_3554]	E2E protection configuration check
[constr_5052]	ProvidedSomeipServiceInstances of the same serviceInterface on one Machine

Table F.37: Changed Constraints in R20-11

F.7.6 Deleted Constraints in R20-11

Number	Heading
[constr_1481]	Usage of DataPrototypeInServiceInterfaceRef in the <i>AUTOSAR adaptive platform</i>
[constr_1497]	Attribute optionKind set to commandLineSimpleForm
[constr_1498]	Attribute optionKind set to commandLineShortForm or commandLineLongForm
[constr_1524]	Standardized values of PersistencyFileProxyInterface.category
[constr_1534]	Existence of DiagnosticSoftwareClusterProps
[constr_1542]	No nested definition of SoftwareCluster
[constr_1561]	Existence of SoftwareClusterDesign.subSoftwareCluster and SoftwareClusterDesign.dependsOn.dependentSoftwareClusterDesign
[constr_1563]	Standardized values of SoftwareClusterDesign.category and SoftwareCluster.category
[constr_1565]	Existence of SoftwareCluster.subSoftwareCluster
[constr_1567]	Existence of SoftwareCluster.subSoftwareCluster and SoftwareCluster.dependsOn/conflictsTo
[constr_1615]	Existence of attribute SomeipDataPrototypeTransformationProps.someipTransformationProps.sessionHandling
[constr_1687]	Definition of machine state
[constr_1703]	Target SwcServiceDependency of DiagnosticGenericUdsPortMapping.swcServiceDependencyInExecutable
[constr_1704]	Target SwcServiceDependency of DiagnosticUploadDownloadPortMapping.swcServiceDependencyInExecutable





Number	Heading
[constr_1705]	Target of reference <code>SoftwareActivationDependencyCompareCondition</code> . <code>softwareActivationDependency</code>
[constr_1709]	Applicability of attribute <code>PersistencyRedundancyEnum.redundantPerKey</code>
[constr_1730]	Restriction regarding the modeling of the <code>PhmRecoveryActionInterface.recovery</code>
[constr_3296]	Transport Protocol attributes defined for a <code>RequiredSomeipServiceInstance</code>
[constr_3297]	<code>SomeipServiceInstanceToMachineMapping</code> only supports a single Address Family
[constr_3307]	<code>SomeipEventDeployment.transportProtocol</code> setting to <code>udp</code> and the impact on <code>ProvidedSomeipServiceInstances</code>
[constr_3412]	<code>OsModuleInstantiation</code> shall have at least one <code>ResourceGroup</code>
[constr_3527]	<code>PhmLogicalExpression</code> referenced by one <code>PhmRule</code>
[constr_3543]	At least one <code>transportPlugin</code> definition required for each <code>DdsProvidedServiceInstance</code>
[constr_3544]	At least one <code>transportPlugin</code> definition required for each <code>DdsRequiredServiceInstance</code>
[constr_3556]	Unique transport layer mapping

Table F.38: Deleted Constraints in R20-11

F.8 Traceable item history of this document according to AUTOSAR Release R21-11

F.8.1 Added Specification Items in R21-11

Number	Heading
[TPS_MANI_01343]	Relation between Function Group states and <code>NmNetworkHandle</code>
[TPS_MANI_01344]	Actions taken after installation of a <code>SoftwarePackage</code>
[TPS_MANI_01345]	Ability to attach checksums to <code>SoftwareCluster</code>
[TPS_MANI_01346]	No formal definition of checksum algorithm
[TPS_MANI_01347]	Definition of a <code>DiagnosticDataElement</code> used in the context of a DID obtained from a <code>PPortPrototype</code> typed by a <code>DiagnosticDataElementInterface</code>
[TPS_MANI_01348]	Definition of a <code>DiagnosticDataElement</code> used in the context of a DID obtained from a <code>PPortPrototype</code> typed by a <code>DiagnosticDataIdentifierInterface</code>
[TPS_MANI_01349]	Configuration of diagnostic-related properties of a <code>SoftwareCluster</code>
[TPS_MANI_01350]	Semantics of <code>DiagnosticServiceValidationConfiguration</code>
[TPS_MANI_01351]	Reporting the status of a <code>DiagnosticEvent</code> on the <i>AUTOSAR adaptive platform</i>





Number	Heading
[TPS_MANI_01352]	Definition of DiagnosticServiceValidationMapping
[TPS_MANI_01353]	Semantics of DiagnosticExternalAuthenticationInterface
[TPS_MANI_01354]	Rationale for the existence of meta-class AbstractRawDataStreamEthernetCredentials
[TPS_MANI_01355]	Definition of local Ethernet credentials
[TPS_MANI_01356]	Definition of remote server's Ethernet credentials
[TPS_MANI_01357]	Definition of remote client's Ethernet credentials
[TPS_MANI_01358]	Restriction for the configuration of diagnostic debouncing
[TPS_MANI_01359]	Semantics of DiagnosticAuthenticationInterface
[TPS_MANI_01360]	Creation of two diagnostic mappings the fulfill different roles in the context of authenticating a diagnostic client
[TPS_MANI_01361]	Support the authentication request of a diagnostic client
[TPS_MANI_01362]	Support the responding to an authentication request of a diagnostic client
[TPS_MANI_01363]	Semantics of DiagnosticComControlInterface
[TPS_MANI_02384]	DltLogSink with category DLT_LOGSINK_REMOTE
[TPS_MANI_02385]	DltLogSink with category DLT_LOGSINK_DLT
[TPS_MANI_02386]	DltLogSink with category DLT_LOGSINK_FILE
[TPS_MANI_02387]	DltLogSink with category DLT_LOGSINK_CONSOLE
[TPS_MANI_02388]	Semantics of DltLogSinkToPortPrototypeMapping
[TPS_MANI_03277]	ServiceInterfaceElementMappings for a subset of elements of a single ServiceInterface
[TPS_MANI_03278]	Usage of ApSomeipTransformationProps.byteOrder
[TPS_MANI_03279]	Priority of Nm messages
[TPS_MANI_03280]	Semantics of ApApplicationEndpoint
[TPS_MANI_03281]	Port specific TCP configuration settings
[TPS_MANI_03282]	Assignment of a Dlt Ecu Identifier to a LogAndTraceInstantiation
[TPS_MANI_03283]	Standardized values for attribute DltLogSink.category
[TPS_MANI_03284]	Semantics of LogAndTraceInterface
[TPS_MANI_03285]	Semantics of PortPrototype.logAndTraceMessageCollectionSet
[TPS_MANI_03286]	Assignment of DltApplication to a Process
[TPS_MANI_03287]	ServiceInterface.trigger to ISignalTriggering mapping
[TPS_MANI_03288]	ApSomeipTransformationProps for triggers
[TPS_MANI_03289]	Semantics of ServiceInterfaceTriggerMapping
[TPS_MANI_03290]	Semantics of ComTriggerGrantDesign
[TPS_MANI_03291]	Semantics of ServiceInterface.trigger
[TPS_MANI_03633]	Semantics of several supervisionMode references for one supervision
[TPS_MANI_03635]	Determination of translation direction
[TPS_MANI_03636]	Definition of ServiceInterfaceElementSecureComConfig in the context of signal/service translation





Number	Heading
[TPS_MANI_03637]	Ignored attributes of <code>ServiceInterfaceElementSecureComConfig</code> in the context of <code>signal/service translation</code>
[TPS_MANI_03638]	Mapping of <code>MultiplexedIPdu</code>
[TPS_MANI_03639]	Mapping of <code>MultiplexedIPdu</code> static part
[TPS_MANI_03640]	Mapping of <code>MultiplexedIPdu</code> dynamic part
[TPS_MANI_03641]	No mapping of <code>MultiplexedIPdu</code> selector field value
[TPS_MANI_03642]	Exactly one alternative defined for mapped event / field during runtime
[TPS_MANI_03643]	Translation- <code>Executable category</code>
[TPS_MANI_03644]	Supported reception data filters
[TPS_MANI_03645]	Applicability of a filter to the <code>scoped filtered element</code>
[TPS_MANI_03646]	Definition of transmission triggers for <code>signal-service-translation</code>
[TPS_MANI_03647]	Full translation before transmission triggering
[TPS_MANI_03648]	Transmission trigger for <code>signal-service-translation</code>
[TPS_MANI_03649]	No transmission trigger for <code>signal-service-translation</code>
[TPS_MANI_03650]	Definition of <code>DdsServiceInstanceResourceIdentifierTypeEnum</code>
[TPS_MANI_03651]	Mandatory <code>SupervisionCheckpoint.process</code> reference
[TPS_MANI_03652]	<code>Signal/service translation</code> header format
[TPS_MANI_03653]	<code>Signal/service translation</code> header endianness
[TPS_MANI_03654]	Definition of <code>Partial SOME/IP Header ID</code>
[TPS_MANI_03655]	Definition of <code>No Message Header</code> - implicit SOME/IP Message Identification
[TPS_MANI_03656]	Definition of <code>No Message Header</code> - implicit Arbitrary Message Identification
[TPS_MANI_03657]	<code>Signal-service-translation</code> SOME/IP Service Discovery Find
[TPS_MANI_03658]	<code>Service-signal-translation</code> SOME/IP Service Discovery Offer
[TPS_MANI_03659]	No <code>signal-service-translation</code> SOME/IP Service Discovery Find
[TPS_MANI_03660]	No <code>signal-service-translation</code> SOME/IP Service Discovery Offer
[TPS_MANI_03661]	Configuration of Governance in DDS Security
[TPS_MANI_03662]	Configuration of Topic access rules

Table F.39: Added Specification Items in R21-11

F.8.2 Changed Specification Items in R21-11

Number	Heading
[TPS_MANI_01001]	Meaning of <code>ServiceInterface</code>
[TPS_MANI_01048]	Retrieving the status of a <code>DiagnosticEvent</code> to <code>PortPrototype(s)</code> on the <i>AUTOSAR adaptive platform</i>





Number	Heading
[TPS_MANI_01049]	Mapping of DiagnosticOperationCycle to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01050]	Mapping of DiagnosticEnableCondition to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01111]	Diagnostic Address of a SoftwareCluster
[TPS_MANI_01176]	Standardized value for attribute CppTypeImplementationDataType.typeEmitter
[TPS_MANI_01239]	Semantics of meta-class ComEventGrant
[TPS_MANI_01244]	Semantics of DiagnosticDataElementInterface
[TPS_MANI_01259]	Mapping of DiagnosticClearCondition to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01260]	Mapping of DiagnosticIndicator to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01261]	Mapping of DiagnosticMemoryDestination to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01262]	Mapping of DiagnosticSecurityLevel to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01263]	Mapping of DiagnosticDataIdentifier or DiagnosticDataElement to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01274]	Standardized System Category Definitions for the Adaptive Platform
[TPS_MANI_01287]	Semantics of RawDataStreamMapping
[TPS_MANI_01326]	Generic Mapping to a DiagnosticServiceInstance on the AUTOSAR Adaptive Platform
[TPS_MANI_01331]	Standardized values of attribute SoftwareCluster.category
[TPS_MANI_03007]	Udp Transport Protocol Configuration for ProvidedSomeipServiceInstance
[TPS_MANI_03008]	Tcp Transport Protocol Configuration for ProvidedSomeipServiceInstance
[TPS_MANI_03010]	Udp Transport Protocol Configuration in case of IP-Multicast
[TPS_MANI_03038]	Purpose of ServiceEventDeployment
[TPS_MANI_03101]	SOME/IP serialization
[TPS_MANI_03109]	TransformationProps on the level of DataPrototypes overwrites TransformationProps settings on the level of a ServiceInterface
[TPS_MANI_03114]	Usage of AssemblySwConnectors in the System Design model
[TPS_MANI_03130]	Standardized values of the attribute E2EProfileConfiguration.profileName
[TPS_MANI_03131]	Non-Standardized values of attribute E2EProfileConfiguration.profileName
[TPS_MANI_03163]	Network configuration for Log and Trace messages
[TPS_MANI_03165]	Network Interface configuration for DoIP
[TPS_MANI_03185]	Structure of a CppTypeImplementationDataType of category ASSOCIATIVE_MAP





Number	Heading
[TPS_MANI_03225]	References to VLANs in PncMapping
[TPS_MANI_03227]	Usage of ephemeral ports
[TPS_MANI_03252]	Usage of same End2EndMethodProtectionProps.sourceId in case of Multi-Binding
[TPS_MANI_03274]	Configuration of log and trace sinks
[TPS_MANI_03276]	Semantics of PersistencyDeploymentToDltLogSinkMapping
[TPS_MANI_03512]	Applicability of global supervision without Process context
[TPS_MANI_03513]	Collection of supervisions into a GlobalSupervision
[TPS_MANI_03514]	Expiration tolerance for SupervisionMode
[TPS_MANI_03515]	Failure tolerance for AliveSupervision
[TPS_MANI_03527]	Definition of DdsProvidedServiceInstance
[TPS_MANI_03529]	Definition of DdsRequiredServiceInstance
[TPS_MANI_03577]	Definition of Arbitrary Message Header ID
[TPS_MANI_03585]	Processing order of COM-Stack features
[TPS_MANI_03589]	Reception data filter of COM-Stack
[TPS_MANI_03590]	Transfer properties and transmission modes of COM-Stack
[TPS_MANI_03592]	ISignal invalidation of COM-Stack
[TPS_MANI_03593]	handleInvalid = dontInvalidate behavior of COM-Stack
[TPS_MANI_03594]	handleInvalid = replace behavior of COM-Stack
[TPS_MANI_03597]	Support for MultiplexedIPdu
[TPS_MANI_03600]	Signal-service-translation of E2E protected payload
[TPS_MANI_03601]	Signal-service-translation of E2E protected payload - timeout handling
[TPS_MANI_03602]	Signal-service-translation of E2E protected payload - error handling
[TPS_MANI_03603]	Service-signal-translation of E2E protected payload
[TPS_MANI_03604]	Service-signal-translation of E2E protected payload - timeout handling
[TPS_MANI_03605]	Service-signal-translation of E2E protected payload - error handling
[TPS_MANI_03607]	Handling of safe signal/service translation in one Executable
[TPS_MANI_03608]	Support for safe signal/service translation
[TPS_MANI_03609]	Support for safe signal/service translation with same or different E2E profiles
[TPS_MANI_03621]	Data filtering during the signal-service-translation
[TPS_MANI_03627]	No signal/service translation for methods

Table F.40: Changed Specification Items in R21-11

F.8.3 Deleted Specification Items in R21-11

Number	Heading
[TPS_MANI_01014]	Semantics of meta-class <code>StartupConfigSet</code>
[TPS_MANI_01037]	Diagnostic data mapping on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01054]	Definition of the queue length of an <code>event</code> or <code>field</code> notifier
[TPS_MANI_01060]	Use cases for the application of <code>DiagnosticServiceDataMapping</code>
[TPS_MANI_01103]	Three-level approach to REST modeling
[TPS_MANI_01105]	Semantics of <code>RestServiceInterface</code>
[TPS_MANI_01120]	Recursive definition of <code>RestResourceDef</code>
[TPS_MANI_01121]	Semantics of <code>RestResourceDef.endpoint</code>
[TPS_MANI_01122]	Arguments to endpoints
[TPS_MANI_01123]	System Triggered Event
[TPS_MANI_01124]	Semantics of <code>RestElementDef</code>
[TPS_MANI_01125]	Properties of REST elements can either be primitive or have array semantics
[TPS_MANI_01126]	Definition of string properties
[TPS_MANI_01127]	Limited support for data semantics in <code>RestAbstractNumericalPropertyDef</code>
[TPS_MANI_01128]	Difference between <code>RestIntegerPropertyDef</code> and <code>RestNumberPropertyDef</code>
[TPS_MANI_01129]	<code>RestObjectRef</code> is only needed for specific implementations of REST-based communication
[TPS_MANI_01130]	Structure of a typical <code>URI</code> for a REST service
[TPS_MANI_01131]	Impact of nested REST resources on the structure of REST <code>URI</code>
[TPS_MANI_01178]	Semantics of <code>RestHttpPortPrototypeMapping.acceptEncoding</code>
[TPS_MANI_01256]	<code>AdaptiveApplicationSwComponentType</code> offers a <code>PPortPrototype</code> typed by <code>DiagnosticIndicatorInterface</code>
[TPS_MANI_01257]	<code>AdaptiveApplicationSwComponentType</code> offers a <code>PPortPrototype</code> typed by <code>DiagnosticConditionInterface</code>
[TPS_MANI_01258]	<code>AdaptiveApplicationSwComponentType</code> offers a <code>PPortPrototype</code> typed by <code>DiagnosticGenericUdsInterface</code>
[TPS_MANI_01272]	Duplicate entries in <code>logTrageLogMode</code>
[TPS_MANI_01288]	Impact of the <code>SoftwarePackage</code> on the value of function group states on the target platform
[TPS_MANI_01289]	Order of function group states is relevant
[TPS_MANI_01303]	Semantics of reference <code>SoftwarePackageStep.preActivate</code>
[TPS_MANI_01304]	Semantics of reference <code>SoftwarePackageStep.verify</code>
[TPS_MANI_01311]	Handling of manufacturer checks
[TPS_MANI_01312]	Handling of supplier checks
[TPS_MANI_01336]	Two use cases for using the <code>DiagnosticEventPortMapping</code>
[TPS_MANI_03075]	Byte Order of chosen <code>DataPrototype</code> in the serialized data stream





Number	Heading
[TPS_MANI_03160]	Further configuration options in <code>DltLogChannel</code>
[TPS_MANI_03275]	Configuration of log and trace message source on design level
[TPS_MANI_03552]	Supervision cycle for <code>GlobalSupervision</code>
[TPS_MANI_03584]	Definition of transmission triggers for translations with different sources
[TPS_MANI_03586]	No transmission trigger for translations with different sources
[TPS_MANI_03587]	Transmission trigger for translations with different sources
[TPS_MANI_03588]	Full translation before transmission triggering
[TPS_MANI_03596]	Update Bit support for <code>ISignalIPdu</code>

Table F.41: Deleted Specification Items in R21-11

F.8.4 Added Constraints in R21-11

Number	Heading
[constr_3623]	<code>SupervisionCheckpoints</code> in the context of a <code>GlobalSupervision</code>
[constr_3624]	At least one Supervision defined in the context of a <code>GlobalSupervision</code>
[constr_3625]	<code>DeadlineSupervision</code> referencing <code>CheckpointTransition</code> in the context of a <code>GlobalSupervision</code>
[constr_3626]	<code>LogicalSupervision</code> referencing <code>CheckpointTransition</code> in the context of a <code>GlobalSupervision</code>
[constr_3627]	Existence of <code>SupervisionModeCondition.stateReference</code>
[constr_3628]	Reference to Function Group State from a <code>SupervisionModeCondition</code>
[constr_3629]	Identical Function Group in the scope of a <code>GlobalSupervision</code>
[constr_3630]	<code>GlobalSupervision</code> and <code>Process</code> relation
[constr_3631]	Global supervision restricted to one Function Group
[constr_3632]	Supervision of a Supervised Entity Instance in the scope of a Function Group State
[constr_3633]	Mandatory attributes of <code>AliveSupervision</code>
[constr_3634]	Multiplicity of <code>CheckpointTransition.source</code> and <code>CheckpointTransition.target</code>
[constr_3635]	Mandatory attributes of <code>DeadlineSupervision</code>
[constr_3636]	Consistent <code>ISignal</code> communication direction <code>in</code> and <code>RequiredApServiceInstance</code>
[constr_3637]	Consistent <code>ISignal</code> communication direction <code>out</code> and <code>ProvidedApServiceInstance</code>
[constr_3639]	Existence of <code>SupervisionMode.expiredSupervisionTolerance</code>
[constr_3640]	Existence of <code>SupervisionMode.modeCondition</code>





Number	Heading
[constr_3641]	Allowed combinations of ServiceInterfaceDeployment , AdaptivePlatformServiceInstance , ServiceInstanceToMachineMapping
[constr_3642]	Restriction of aggregation of PortPrototypeProps to the Adaptive Platform
[constr_3643]	No filter support for service-signal-translation direction
[constr_3644]	No transmissionTrigger support for service-signal-translation direction
[constr_3645]	discoveryType mandatory for DdsProvidedServiceInstance
[constr_3646]	resourceIdentifierType mandatory for DdsProvidedServiceInstance
[constr_3647]	resourceIdentifierType value for USER_DATA QoS-based discovery
[constr_3648]	discoveryType mandatory for DdsRequiredServiceInstance
[constr_3649]	Consistent SupervisionCheckpoint.process reference
[constr_3650]	headerId required in case of Arbitrary Message Header
[constr_3674]	Existence of NoSupervision.targetPhmSupervisedEntity
[constr_3675]	Existence of NoSupervision.process
[constr_3676]	Exclusive usage of NoSupervision
[constr_3677]	ComGrants referencing DDS Service Instances
[constr_3678]	Existence of attributes for DdsSecureComProps
[constr_3679]	Existence of attributes for DdsSecureGovernance
[constr_3680]	Existence of attributes for DdsTopicAccessRule
[constr_3681]	Supported values of DdsTopicAccessRule.dataProtectionKind
[constr_3682]	Values of DdsDomainRange.min and DdsDomainRange.max
[constr_3683]	Attributes referencing DdsTopicAccessRule
[constr_3684]	Mutual exclusivity of Secure Communication Properties
[constr_5250]	Protection of AdaptivePlatformServiceInstances of the same ServiceInterfaceDeployment
[constr_5260]	UDP endpoint using DTLS CLIENT role can only serve required service instances
[constr_5261]	TCP endpoint using TLS CLIENT role can only serve required service instances
[constr_5275]	Existence of LogAndTraceInstantiation.dltEcu
[constr_5276]	Existence of LogAndTraceInstantiation.logSink
[constr_5277]	applicable DltLogSink categories
[constr_5278]	DltLogSink with category DLT_LOGSINK_REMOTE is only allowed to be referenced by DltLogSinkToPortPrototypeMapping
[constr_5279]	DltLogSink with category DLT_LOGSINK_DLT is only allowed to be referenced by LogAndTraceInstantiation
[constr_5280]	Existence of DltLogSink.defaultLogThreshold
[constr_5281]	Existence of DltLogSink.defaultTraceState
[constr_5282]	Existence of DltLogSinkToPortPrototypeMapping.process
[constr_5283]	Existence of DltLogSinkToPortPrototypeMapping.dltLogSink
[constr_5284]	Existence of DltLogSinkToPortPrototypeMapping.dltContext





Number	Heading
[constr_5285]	Existence of PortPrototype references in DltLogSinkToPortPrototypeMapping
[constr_5286]	Restriction applicable for DltLogSinkToPortPrototypeMapping . rPortPrototype
[constr_5287]	Restriction applicable for DltLogSinkToPortPrototypeMapping . pPortPrototype
[constr_5288]	Existence of process reference in DltApplicationToProcessMapping
[constr_5289]	Existence of dltApplication reference in DltApplicationToProcessMapping
[constr_5290]	PPortPrototype is not allowed to be typed by LogAndTraceInterface
[constr_5291]	Allowed usage of PortPrototype.logAndTraceMessageCollectionSet
[constr_5292]	Assigned dltSessionId shall be consistent for the same PortPrototype
[constr_5316]	Allowed ServiceEventDeployment.trigger references
[constr_5317]	ServiceEventDeployment not allowed to reference an event and a trigger at the same time
[constr_5318]	Existence of ServiceInstanceToSignalMapping for an trigger with signalBased serialization
[constr_10029]	ServiceInterfaceDeployment shall cover all elements of the corresponding ServiceInterfaceDeployment
[constr_10030]	Existence of DiagnosticDataIdentifierInterface.read
[constr_10031]	Existence of DiagnosticRoutineInterface.start
[constr_10035]	Completeness of the PersistencyDeployment.version
[constr_10037]	Existence of attribute TagWithOptionalValue.sequenceOffset in the context of attribute capabilityRecord owned by ProvidedSomeipServiceInstance , RequiredSomeipServiceInstance , SdServerConfig , SdClientConfig , or AbstractServiceInstance
[constr_10046]	Value of PersistencyRedundancyMOutOfN.n
[constr_10047]	Restriction for the applicability of DiagnosticMonitorPortMapping
[constr_10048]	Existence of reference from DiagnosticMonitorPortMapping to DiagnosticEvent
[constr_10049]	Restriction for the applicability of DiagnosticEventPortMapping
[constr_10050]	Restriction for the applicability of DiagnosticOperationCyclePortMapping
[constr_10051]	Existence of reference from DiagnosticOperationCyclePortMapping to DiagnosticOperationCycle
[constr_10052]	Restriction for the applicability of DiagnosticEnableConditionPortMapping
[constr_10053]	Existence of reference from DiagnosticEnableConditionPortMapping to DiagnosticEnableCondition
[constr_10054]	Restriction for the applicability of DiagnosticClearConditionPortMapping
[constr_10055]	Existence of reference from DiagnosticClearConditionPortMapping to DiagnosticClearCondition
[constr_10056]	Restriction for the applicability of DiagnosticIndicatorPortMapping
[constr_10057]	Restriction for the applicability of DiagnosticMemoryDestinationPortMapping





Number	Heading
[constr_10058]	Restriction for the applicability of DiagnosticSecurityLevelPortMapping
[constr_10059]	Existence of reference from DiagnosticSecurityLevelPortMapping to DiagnosticSecurityLevel
[constr_10060]	PortInterface of PPortPrototype referenced by DiagnosticDataPortMapping
[constr_10061]	Mapping to DiagnosticDataIdentifierInterface , DiagnosticDataElementInterface , or DiagnosticDataIdentifierGenericInterface
[constr_10062]	DiagnosticServiceInstances that can be mapped by a DiagnosticServiceGenericMapping
[constr_10063]	Possible values for DiagnosticServiceValidationMapping.category
[constr_10064]	Existence of DiagnosticServiceValidationMapping.pPortPrototypeInExecutable
[constr_10065]	Validity of DiagnosticServiceValidationConfiguration.manufacturerValidationOrder
[constr_10066]	Validity of DiagnosticServiceValidationConfiguration.supplierValidationOrder
[constr_10069]	Existence of SoftwareClusterDiagnosticProps.powerDownTime
[constr_10070]	Value of RequiredSomeipServiceInstance.requiredServiceInstanceId
[constr_10076]	Existence of RawDataStreamEthernetUdpCredentials.udpPort
[constr_10077]	Existence of ipV4Address and ipV6Address within AbstractRawDataStreamEthernetCredentials
[constr_10078]	Existence of RawDataStreamEthernetTcpUdpCredentials.tcpPort and udpPort
[constr_10079]	Existence of EthernetRawDataStreamMapping.localTcpPort and localUdpPort
[constr_10080]	Existence of initial values for PersistencyFileElement
[constr_10081]	Existence of initial values in the definition of PersistencyDataRequiredComSpec
[constr_10082]	Existence of initial values for PersistencyFile
[constr_10083]	Existence of initial values for PersistencyKeyValuePair
[constr_10086]	Existence of unicastUdpCredentials and multicastCredentials in the context of a EthernetRawDataStreamServerMapping
[constr_10090]	Existence of ProcessToMachineMapping.persistencyCentralStorageURI
[constr_10092]	Restriction for the applicability of DiagnosticAuthenticationPortMapping
[constr_10093]	Existence of reference from DiagnosticAuthenticationPortMapping to DiagnosticAuthentication
[constr_10094]	Restriction for the applicability of DiagnosticExternalAuthenticationPortMapping
[constr_10095]	Existence of reference from DiagnosticExternalAuthenticationPortMapping to DiagnosticAuthentication

Table F.42: Added Constraints in R21-11

F.8.5 Changed Constraints in R21-11

Number	Heading
[constr_1482]	Mapping of service interfaces vs. mapping of service interface elements
[constr_1564]	Existence of SoftwareCluster . diagnosticProps . diagnosticAddress
[constr_1598]	Scope of the uniqueness of the value of TlvDataIdDefinition . id for references to CppImplementationDataTypeElement
[constr_1601]	TlvDataIdDefinition referencing CppImplementationDataTypeElement
[constr_1604]	Completeness of the existence of a set of TlvDataIdDefinition . tlvImplementationDataTypeElements
[constr_1697]	Restriction for ClientServerOperation aggregated by a DiagnosticDataIdentifierInterface or DiagnosticDataElementInterface
[constr_1748]	Existence of references TlvDataIdDefinition . tlvArgument , TlvDataIdDefinition . tlvRecordElement , and TlvDataIdDefinition . tlvImplementationDataTypeElement
[constr_1751]	Value of PersistencyRedundancyMOutOfN.m
[constr_1764]	Counterpart of PhmCheckpoint
[constr_1770]	Value of ProvidedSomeipServiceInstance . serviceInstanceId
[constr_3288]	IP configuration restriction for unicastNetworkEndpoints
[constr_3395]	TransformationPropsToServiceInterfaceElementMapping is restricted to one single ServiceInterface
[constr_3421]	Fibex elements applicable for a System of category MACHINE_DESIGN_EXTRACT
[constr_3485]	UDP endpoint using DTLS SERVER role can only serve provided service instances
[constr_3486]	TCP endpoint using TLS SERVER role can only serve provided service instances
[constr_3493]	Applicable attributes for standardized E2E Profiles
[constr_3539]	Only one AliveSupervision per SupervisionCheckpoint
[constr_3540]	SupervisionCheckpoint in supervision graph
[constr_3541]	qosProfile mandatory for DdsProvidedServiceInstance
[constr_3542]	qosProfile mandatory for DdsRequiredServiceInstance
[constr_3555]	No support for useAsCryptographicIPdu is true
[constr_5047]	Supported values of TlsSecureComProps . category
[constr_5052]	ProvidedSomeipServiceInstances of the same serviceInterface on one Machine
[constr_5056]	Restriction of sub-class of CompositionSwComponentType . connector
[constr_5057]	PassThroughSwConnector and ServiceInterfaceMapping
[constr_5155]	SomeipServiceInstanceToMachineMapping only supports a single Address Family
[constr_10002]	Only one mapping per PortPrototype





Number	Heading
[constr_10003]	Restriction for the existence of DiagnosticDataPortMapping . diagnosticDataIdentifier vs. DiagnosticDataPortMapping . diagnosticDataElement

Table F.43: Changed Constraints in R21-11

F.8.6 Deleted Constraints in R21-11

Number	Heading
[constr_1496]	DiagnosticServiceDataMapping . mappedApDataElement shall only refer to specific sub-classes of DataPrototype
[constr_1500]	Target SwcServiceDependency of DiagnosticEventPortMapping . swcServiceDependencyInExecutable
[constr_1501]	Target SwcServiceDependency of DiagnosticOperationCyclePortMapping . swcServiceDependencyInExecutable
[constr_1502]	Target SwcServiceDependency of DiagnosticEnableConditionPortMapping . swcServiceDependencyInExecutable
[constr_1569]	Restriction for the scope of RestHttpPortPrototypeMapping . acceptEncoding
[constr_1580]	Restriction for the usage of RestHttpPortPrototypeMapping . acceptEncoding
[constr_1698]	Target SwcServiceDependency of DiagnosticClearConditionPortMapping . swcServiceDependencyInExecutable
[constr_1699]	Target SwcServiceDependency of DiagnosticIndicatorPortMapping . swcServiceDependencyInExecutable
[constr_1700]	Target SwcServiceDependency of DiagnosticMemoryDestinationPortMapping . swcServiceDependencyInExecutable
[constr_1701]	Target SwcServiceDependency of DiagnosticSecurityLevelPortMapping . swcServiceDependencyInExecutable
[constr_1702]	Target SwcServiceDependency of DiagnosticServiceDataIdentifierPortMapping . swcServiceDependencyInExecutable
[constr_1733]	Simultaneous existence of SoftwarePackageStep . preActivate and SoftwarePackageStep . verify
[constr_1738]	Multiplicity of reference GlobalSupervision . localSupervision
[constr_1739]	Multiplicity of aggregation localSupervision . transition
[constr_1744]	Definition of process state In the context of the ExecutionDependency
[constr_1765]	Diagnostic Services eligible for DiagnosticServiceGenericMapping





Number	Heading
[constr_1809]	Global supervision restricted to one function group
[constr_3366]	System category for a system design description with Adaptive Platform and Classic Platform content
[constr_3426]	The logTraceFilePath is mandatory in case that logTrageLogMode is set to file
[constr_3427]	The logTraceFilePath is only relevant if logTrageLogMode is set to file
[constr_3537]	localSupervision referenced once in the context of a GlobalSupervision
[constr_3562]	Existence of NonqueuedReceiverComSpec.filter
[constr_5243]	Restriction of LogAndTraceInstantiation.dltEcuId attribute value
[constr_10004]	Consistency of DiagnosticServiceGenericMapping for PortPrototype typed by DiagnosticDataIdentifierGenericInterface

Table F.44: Deleted Constraints in R21-11

F.9 Traceable item history of this document according to AUTOSAR Release R22-11

F.9.1 Added Specification Items in R22-11

Number	Heading
[TPS_MANI_01365]	Semantics of attribute NmHandleToFunctionGroupStateMapping.mappingDirection set to functionGroupStateToNmHandle
[TPS_MANI_01366]	Semantics of attribute NmHandleToFunctionGroupStateMapping.mappingDirection set to nmHandleInactiveToFunctionGroupState
[TPS_MANI_01367]	Semantics of attribute NmHandleToFunctionGroupStateMapping.mappingDirection set to nmHandleActiveToFunctionGroupState
[TPS_MANI_01369]	Semantics of reference SoftwareClusterDesign.requiredARElement
[TPS_MANI_01370]	Semantics of ExecutableImplementationProps
[TPS_MANI_01371]	PersistencyDeployment.redundancyHandling does not exist
[TPS_MANI_01372]	Properties of data obtained from the application software
[TPS_MANI_01373]	Semantics of DiagnosticRequestFileTransferInterface
[TPS_MANI_01374]	Semantics of UcmToTimeBaseResourceMapping
[TPS_MANI_01375]	Semantics of meta-class UcmRetryStrategy
[TPS_MANI_01376]	Semantics of meta-class UcmMasterModuleInstantiation
[TPS_MANI_01377]	Semantics of meta-class UcmSubordinateModuleInstantiation
[TPS_MANI_01378]	Semantics of meta-class PersistencyKeyValueDataTypeMapping
[TPS_MANI_01379]	Semantics of FunctionalClusterInteractsWithPersistencyDeploymentMapping
[TPS_MANI_01380]	Usage of PersistencyDeployment





Number	Heading
[TPS_MANI_01381]	Semantics of meta-class ArtifactLocator
[TPS_MANI_01382]	Location of artifact that contains executable code represented by Executable
[TPS_MANI_01383]	Semantics of ExecutableLoggingImplementationProps
[TPS_MANI_01384]	Semantics of StateManagementRequestRule
[TPS_MANI_01387]	Semantics of meta-class StateManagementActionList
[TPS_MANI_01388]	Semantics of the meta-class StateManagementStateMachineActionItem
[TPS_MANI_01389]	Semantics of meta-class StateManagementSyncActionItem
[TPS_MANI_01390]	Semantics of meta-class StateManagementSetFunctionGroupStateActionItem
[TPS_MANI_01391]	Semantics of StateManagementStateRequest
[TPS_MANI_01392]	Semantics of StateManagementStateNotification
[TPS_MANI_01393]	Initialization of a data object typed by a CppImplementationDataType of category VARIANT
[TPS_MANI_01394]	Support for the authorization of SOVD clients
[TPS_MANI_01395]	Support for the proximity challenge in the context of SOVD
[TPS_MANI_01396]	Semantics of meta-class DiagnosticSovdLock
[TPS_MANI_01397]	Standardized values of DiagnosticDataIdentifier.category of the usage in SOVD context
[TPS_MANI_01398]	Definition of an <i>SOVD data group</i>
[TPS_MANI_01399]	Modeling of the configuration of Service-oriented Vehicle Diagnostics
[TPS_MANI_01400]	Secure communication between SOVD Gateway and SOVD Server
[TPS_MANI_01401]	Support for TLS in vehicle-internal SOVD communication
[TPS_MANI_01402]	Identification of the SOVD Server
[TPS_MANI_01403]	External communication of the SOVD gateway
[TPS_MANI_01404]	Secure communication between SOVD gateway and SOVD Client
[TPS_MANI_01405]	Semantics of sub-classes of SoftwareClusterDiagnosticAddress
[TPS_MANI_01406]	Semantics of DeterministicSyncMaster
[TPS_MANI_01407]	Semantics of abstract base class DeterministicSyncVerificationPolicy
[TPS_MANI_01408]	Semantics of reference DeterministicClient.deterministicSyncMaster
[TPS_MANI_01409]	Semantics of meta-class DeterministicSyncMasterToTimeBaseConsumerMapping
[TPS_MANI_01410]	Semantics of attribute SoftwareCluster.installationBehavior
[TPS_MANI_01835]	Semantics of StateManagementRequestTrigger.rule
[TPS_MANI_01836]	Semantics of StateManagementRequestError.rule
[TPS_MANI_01863]	Supported value range for attribute ApApplicationErrorDomain.value
[TPS_MANI_03292]	Semantic of SomeipServiceInstanceToMachineMapping.tcpPort





Number	Heading
[TPS_MANI_03293]	Semantic of <code>SomeipServiceInstanceToMachineMapping.udpPort</code>
[TPS_MANI_03294]	Semantics of <code>DoIpNetworkConfiguration.eidRetrieval</code>
[TPS_MANI_03295]	Semantics of <code>FirewallStateSwitchInterface.firewallStateMachine</code>
[TPS_MANI_03296]	Machine-specific configuration settings for Firewall
[TPS_MANI_03297]	Semantics of <code>AdaptiveFirewallToPortPrototypeMapping</code>
[TPS_MANI_03298]	Semantics of <code>StateDependentFirewall</code>
[TPS_MANI_03299]	Semantics of <code>FirewallRuleProps</code>
[TPS_MANI_03300]	Semantics of <code>FirewallRule</code>
[TPS_MANI_03301]	Semantics of <code>FirewallRule.refillAmount</code> and <code>FirewallRule.bucketSize</code>
[TPS_MANI_03302]	Firewall rules on Data Link Layer
[TPS_MANI_03303]	Filtering of packets with a single MAC address and MAC address range
[TPS_MANI_03304]	Firewall rules on Network Layer
[TPS_MANI_03305]	Filtering of packets with a single IP address and IP address range
[TPS_MANI_03306]	Firewall rules on Transport Layer
[TPS_MANI_03307]	Byte-Pattern Firewall rule
[TPS_MANI_03308]	Deep inspection of SOME/IP SD messages
[TPS_MANI_03309]	Deep inspection of SOME/IP messages
[TPS_MANI_03310]	Deep inspection of DoIP messages
[TPS_MANI_03311]	Deep inspection of DDS messages
[TPS_MANI_03312]	Static configuration of remote peer addresses for a <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03313]	Semantics of <code>SomeipRemoteUnicastConfig.eventGroup</code> reference
[TPS_MANI_03314]	Static configuration of a remote peer address for a <code>RequiredSomeipServiceInstance</code>
[TPS_MANI_03315]	Semantics of <code>SomeipRemoteMulticastConfig</code>
[TPS_MANI_03316]	Semantics of <code>SomeipRemoteMulticastConfig.eventGroup</code>
[TPS_MANI_03317]	MACsec configuration
[TPS_MANI_03318]	MAC Security Key Agreement Entity configuration
[TPS_MANI_03319]	Standardized values for the attribute <code>cipherSuite</code> of meta-class <code>MacSecCipherSuiteConfig</code>
[TPS_MANI_03320]	Semantics of <code>MacSecCipherSuiteConfig.cipherSuitePriority</code>
[TPS_MANI_03321]	Semantics of <code>FirewallStateSwitchInterface</code>
[TPS_MANI_03663]	Ignored references of <code>ServiceInstanceToMachineMapping</code> in the context of signal/service translation
[TPS_MANI_03664]	<code>ServiceInterfaceElementSecureComConfig.securedRxVerification</code>
[TPS_MANI_03665]	<code>ServiceInterface.method</code> with <code>fireAndForget</code> equals <code>true</code> to <code>ISignalTriggerings</code> mapping
[TPS_MANI_03666]	Service Discovery for multi-event <code>ISignalIPdus</code>





Number	Heading
[TPS_MANI_03667]	Mapping from one <code>ISignalIPdu</code> to several <code>events</code> in case of <code>signal-service-translation</code>
[TPS_MANI_03668]	Supported type of Ethernet tunneling through CAN XL on Adaptive Platform
[TPS_MANI_03669]	Ethernet tunneling through CAN XL
[TPS_MANI_03670]	Definition of <code>NoCheckpointSupervision</code>
[TPS_MANI_03671]	Periodic storage of time base value
[TPS_MANI_03672]	Definition of <code>RecoveryNotification</code> for an <code>HealthChannel</code>
[TPS_MANI_03673]	<code>RecoveryNotification</code> referenced by several <code>HealthChannel</code> . <code>recoveryNotifications</code>

Table F.45: Added Specification Items in R22-11

F.9.2 Changed Specification Items in R22-11

Number	Heading
[TPS_MANI_01111]	Diagnostic Address of a <code>SoftwareCluster</code>
[TPS_MANI_01114]	Relation of <code>DiagnosticContributionSet</code> to <code>SoftwareCluster</code>
[TPS_MANI_01164]	Semantics of <code>SoftwareCluster.dependsOn</code>
[TPS_MANI_01179]	Semantics of <code>PersistencyFileElement.contentUri/</code> <code>PersistencyFile.contentUri</code> vs. <code>PersistencyDeployment.</code> <code>deploymentUri</code> and <code>PersistencyFileElement.fileName/</code> <code>PersistencyFile.fileName</code>
[TPS_MANI_01203]	Semantics of <code>DeterministicClient</code>
[TPS_MANI_01226]	Machine-specific configuration settings for the UCM module
[TPS_MANI_01255]	Semantics of DoIP <code>DiagnosticPortInterfaces</code>
[TPS_MANI_01269]	Specification of boundaries for resource consumption
[TPS_MANI_01295]	Semantics of <code>VehicleRolloutStep</code>
[TPS_MANI_01297]	Semantics of meta-class <code>UcmStep</code>
[TPS_MANI_01349]	Configuration of diagnostic-related properties of a <code>SoftwareCluster</code>
[TPS_MANI_01360]	Creation of two diagnostic mappings the fulfill different roles in the context of authenticating a diagnostic client
[TPS_MANI_01361]	Support the authentication request of a diagnostic client
[TPS_MANI_01362]	Convey the Authentication state of a diagnostic client to the diagnostic server instance
[TPS_MANI_03013]	Repetition Phase configuration for a <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03014]	Main Phase configuration for a <code>ProvidedSomeipServiceInstance</code>
[TPS_MANI_03015]	TTL for Offer Service Entries
[TPS_MANI_03027]	Repetition Phase configuration for a <code>RequiredSomeipServiceInstance</code>
[TPS_MANI_03115]	Mapping between a fire and forget <code>method</code> and elements of Classic Platform <code>PortInterfaces</code>





Number	Heading
[TPS_MANI_03178]	StdCppImplementationDataType of category STRING
[TPS_MANI_03285]	Semantics of LTMessageCollectionToPortPrototypeMapping
[TPS_MANI_03505]	Existence of SupervisionCheckpoint
[TPS_MANI_03546]	Definition of reported health status RPortPrototype
[TPS_MANI_03618]	Usage of RequiredSomeipServiceInstance.blocklistedVersion
[TPS_MANI_03654]	Definition of Partial SOME/IP Header ID
[TPS_MANI_03659]	No signal-service-translation SOME/IP Service Discovery Find
[TPS_MANI_03660]	No signal-service-translation SOME/IP Service Discovery Offer

Table F.46: Changed Specification Items in R22-11

F.9.3 Deleted Specification Items in R22-11

Number	Heading
[TPS_MANI_01100]	Semantics of Allocator
[TPS_MANI_01113]	Semantics of SoftwareClusterDesign.diagnosticAddress
[TPS_MANI_01161]	Impact of values of category on the semantics of SoftwareClusterDesign
[TPS_MANI_01271]	Semantics of Executable.loggingBehavior
[TPS_MANI_01305]	Semantics of attribute SoftwarePackageStep.activationSwitch
[TPS_MANI_01310]	Semantics of SoftwareClusterDesign.dependsOn
[TPS_MANI_01335]	Semantics of SoftwareClusterDependencyFormula.category
[TPS_MANI_03028]	TTL for Find Service Entries
[TPS_MANI_03126]	ServiceInterface.field mapping to ISignalTriggerings
[TPS_MANI_03506]	Optionality of SupervisionCheckpoint
[TPS_MANI_03623]	Usage of checkpointId in application code

Table F.47: Deleted Specification Items in R22-11

F.9.4 Added Constraints in R22-11

Number	Heading
[constr_3690]	DdsServiceInterfaceDeployment.serviceInterfaceId value shall not conflict with topic-based service discovery
[constr_3691]	Existence of ServiceInterfaceElementSecureComConfig.securedRxVerification





Number	Heading
[constr_3692]	<code>DataPrototypeInServiceInterfaceInstanceRef.targetDataPrototype</code> in the context of a <code>SignalBasedFireAndForgetMethodToISignalTriggeringMapping</code>
[constr_3693]	<code>EthernetCommunicationConnector.category</code> is set to <code>CAN_XL</code>
[constr_3694]	Existence of <code>canXlConfig</code> vs. <code>canXlConfigReqs</code>
[constr_3709]	<code>AliveSupervision.terminatingCheckpoint</code> required for self terminating <code>Processes</code>
[constr_3710]	<code>Process</code> referenced by <code>AliveSupervision.terminatingCheckpoint</code>
[constr_3711]	<code>AliveSupervision.terminatingCheckpointTimeoutUntilTermination</code>
[constr_3712]	Exclusive usage of <code>NoCheckpointSupervision</code>
[constr_3715]	Reference in the role <code>SomeipEventGroup.event</code>
[constr_3719]	<code>RecoveryNotification</code> referenced either by <code>HealthChannelExternalStatus</code> or <code>HealthChannelSupervision</code>
[constr_3720]	Upper multiplicity of reference in the role <code>ComGrantDesign.remoteSubject</code>
[constr_3721]	Upper multiplicity of reference in the role <code>EthernetCommunicationConnector.unicastNetworkEndpoint</code>
[constr_3722]	Upper multiplicity of reference in the role <code>EthernetCommunicationConnector.canXlProps</code>
[constr_3723]	Upper multiplicity of reference in the role <code>MachineDesign.tcpIpProps</code>
[constr_3724]	Upper multiplicity of reference in the role <code>MachineDesign.tcpIpIcmpProps</code>
[constr_3725]	Upper multiplicity of reference in the role <code>MachineDesign.ethIpProps</code>
[constr_3727]	Upper multiplicity of reference in the role <code>SoftwareClusterDesign.intendedTargetMachine</code>
[constr_3728]	Upper multiplicity of reference in the role <code>IdsPlatformInstantiation.networkInterface</code>
[constr_3729]	Upper multiplicity of reference in the role <code>LogAndTraceInstantiation.timeBaseResource</code>
[constr_3730]	Upper multiplicity of reference in the role <code>HealthChannel.recoveryNotification</code>
[constr_3731]	Upper multiplicity of reference in the role <code>ProcessDesign.executable</code>
[constr_3732]	Upper multiplicity of reference in the role <code>Process.executable</code>
[constr_3733]	Upper multiplicity of aggregation in the role <code>methodMapping</code>
[constr_3734]	Upper multiplicity of reference in the role <code>DoIpNetworkConfiguration.networkConfiguration</code>
[constr_5324]	<code>MachineDesign.communicationController</code> aggregation restriction
[constr_5332]	Mandatory multicast endpoint in case of <code>multicastThreshold</code> different from 0
[constr_5333]	No multicast in case of TCP
[constr_5338]	<code>ProvidedSomeipServiceInstance</code> shall offer all <code>SomeipEventGroups</code> for subscription
[constr_5339]	<code>SomeipEventGroups</code> of a <code>SomeipServiceInterfaceDeployment</code> shall be referenced at most once from a <code>RequiredSomeipServiceInstance</code> that instantiates the <code>SomeipServiceInterfaceDeployment</code>





Number	Heading
[constr_5343]	Usage of <code>DoIpNetworkConfiguration.eidRetrieval</code>
[constr_5347]	Supported value range for attribute <code>SecOcSecureComProps.authenticationVerifyAttempts</code>
[constr_5348]	Mandatory <code>initialMode</code> in <code>ModeDeclarationGroup</code> that is referenced by <code>StateDependentFirewall</code>
[constr_5349]	Mandatory <code>defaultAction</code> in <code>StateDependentFirewall</code>
[constr_5350]	Mandatory <code>action</code> in <code>FirewallRuleProps</code>
[constr_5351]	<code>FirewallRule</code> is allowed to aggregate at most one protocol subelement
[constr_5352]	<code>DdsRule.submessageType</code> value restriction
[constr_5353]	<code>DdsRule.readerEntityId</code> and <code>DdsRule.writerEntityId</code> value restriction
[constr_5355]	<code>SomeipServiceInstanceToMachineMapping</code> with configured remote peer addresses shall not mix <code>ProvidedSomeipServiceInstances</code> and <code>RequiredSomeipServiceInstances</code>
[constr_5356]	<code>RequiredSomeipServiceInstance</code> is allowed to have only a single statically configured remote peer as service provider
[constr_5357]	<code>SomeipRemoteMulticastConfig</code> shall only be used on required side
[constr_5358]	<code>AdaptiveFirewallToPortPrototypeMapping.rPortPrototype</code> restriction
[constr_6815]	Existence of <code>CppTemplateArgument.templateType</code> for <code>CppImplementationDataType</code> of category <code>STRING</code>
[constr_10098]	Relation of <code>MachineDesign.pnResetTimer</code> and <code>UdpNmCluster.nmMsgCycleTime</code>
[constr_10101]	Attribute <code>NmHandleToFunctionGroupStateMapping.mappingDirection</code> is set to <code>nmHandleActiveToFunctionGroupState</code> or <code>nmHandleInactiveToFunctionGroupState</code>
[constr_10102]	Existence of initial values for <code>PersistencyKeyValuePair</code>
[constr_10103]	Existence of initial values for <code>PersistencyFile</code>
[constr_10105]	Existence of <code>UcmRetryStrategy.maximumNumberOfRetries</code>
[constr_10106]	Existence of <code>UcmRetryStrategy.retryIntervalTime</code>
[constr_10107]	Existence of the attribute <code>UcmMasterModuleInstantiation.blockInconsistent</code>
[constr_10108]	Existence of the attribute <code>UcmMasterModuleInstantiation.serviceBusy</code>
[constr_10109]	Existence of the attribute <code>UcmMasterModuleInstantiation.updateSessionRejected</code>
[constr_10110]	Existence of <code>UcmSubordinateModuleInstantiation</code> on a <code>Machine</code>
[constr_10111]	Existence of attribute <code>DiagnosticAuthentication.authenticationTimeout</code>
[constr_10113]	Restriction for the existence of <code>ExecutableLoggingImplementationProps</code>
[constr_10114]	Existence of attributes of <code>DiagnosticEnvDataElementCondition</code> if the reference in the role <code>pPortPrototype</code> exists
[constr_10124]	Multiplicity of attribute <code>ApplicationAssocMapDataType.key</code>
[constr_10125]	Multiplicity of attribute <code>ApplicationAssocMapDataType.value</code>
[constr_10126]	Multiplicity of attribute <code>ApplicationAssocMapElementValueSpecification.key</code>





Number	Heading
[constr_10127]	Multiplicity of attribute ApplicationAssocMapElementValueSpecification.value
[constr_10128]	Multiplicity of attribute CppImplementationDataTypeElementQualifier.typeReference
[constr_10129]	Multiplicity of attribute Field.hasGetter
[constr_10130]	Multiplicity of attribute Field.hasSetter
[constr_10131]	Multiplicity of attribute Field.hasNotifier
[constr_10132]	Multiplicity of attribute ApApplicationError.errorCode
[constr_10133]	Multiplicity of attribute ApApplicationErrorDomain.value
[constr_10134]	Multiplicity of reference in the role PortInterfaceToDataTypeMapping.dataTypeMappingSet
[constr_10135]	Multiplicity of reference in the role PortInterfaceToDataTypeMapping.portInterface
[constr_10136]	Multiplicity of reference in the role ServiceInterfaceMapping.compositeServiceInterface
[constr_10137]	Multiplicity of reference in the role ServiceInterfaceMapping.sourceServiceInterface
[constr_10138]	Multiplicity of reference in the role ServiceInterfaceEventMapping.sourceEvent
[constr_10139]	Multiplicity of reference in the role ServiceInterfaceEventMapping.targetEvent
[constr_10140]	Multiplicity of reference in the role ServiceInterfaceFieldMapping.sourceField
[constr_10141]	Multiplicity of reference in the role ServiceInterfaceFieldMapping.targetField
[constr_10142]	Multiplicity of reference in the role ServiceInterfaceMethodMapping.sourceMethod
[constr_10143]	Multiplicity of reference in the role ServiceInterfaceMethodMapping.targetMethod
[constr_10144]	Multiplicity of reference in the role PersistencyRedundancyChecksum.algorithmFamily
[constr_10145]	Multiplicity of reference in the role PersistencyRedundancyChecksum.length
[constr_10146]	Multiplicity of reference in the role PersistencyRedundancyMOutOfN.m
[constr_10147]	Multiplicity of reference in the role PersistencyRedundancyMOutOfN.n
[constr_10148]	Multiplicity of reference in the role PersistencyFileElement.contentUri
[constr_10149]	Multiplicity of reference in the role PersistencyFileElement.fileName
[constr_10150]	Multiplicity of reference in the role SynchronizedTimeBaseProviderInterface.timeBaseKind
[constr_10151]	Multiplicity of reference in the role PhmCheckpoint.checkpointId
[constr_10152]	Multiplicity of reference in the role FieldSenderComSpec.initValue
[constr_10153]	Multiplicity of reference in the role PersistencyDataRequiredComSpec.dataElement





Number	Heading
[constr_10154]	Multiplicity of reference in the role ProcessDesignToMachineDesignMapping.processDesign
[constr_10155]	Multiplicity of reference in the role ComOfferServiceGrantDesign.providedServicePort
[constr_10156]	Multiplicity of reference in the role ComFindServiceGrantDesign.requiredServicePort
[constr_10157]	Multiplicity of reference in the role ComFieldGrantDesign.field
[constr_10158]	Multiplicity of reference in the role ComFieldGrantDesign.role
[constr_10159]	Multiplicity of reference in the role ComEventGrantDesign.event
[constr_10160]	Multiplicity of reference in the role ComTriggerGrantDesign.trigger
[constr_10161]	Multiplicity of reference in the role ComMethodGrantDesign.method
[constr_10162]	Multiplicity of reference in the role DiagnosticClearConditionPortMapping.clearCondition
[constr_10163]	Multiplicity of reference in the role DiagnosticIndicatorPortMapping.indicator
[constr_10164]	Multiplicity of reference in the role DiagnosticMemoryDestinationPortMapping.memoryDestination
[constr_10165]	Multiplicity of reference in the role DiagnosticDataPortMapping.process
[constr_10166]	Multiplicity of attribute DiagnosticProvidedDataMapping.dataProvider
[constr_10167]	Multiplicity of attribute SomeipServiceDiscovery.someipServiceDiscoveryPort
[constr_10169]	Multiplicity of reference in the role Machine.machineDesign
[constr_10170]	Multiplicity of attribute Machine.trustedPlatformExecutableLaunchBehavior
[constr_10171]	Multiplicity of attribute Machine.processor
[constr_10172]	Multiplicity of attribute Processor.core
[constr_10173]	Multiplicity of attribute ProcessorCore.coreId
[constr_10174]	Multiplicity of the reference in the role ProcessToMachineMapping.process
[constr_10175]	Multiplicity of attribute StateDependentStartupConfig.resourceGroup
[constr_10176]	Multiplicity of attribute StateDependentStartupConfig.startupConfig
[constr_10177]	Multiplicity of attribute PersistencyDeployment.updateStrategy
[constr_10178]	Multiplicity of the reference in the role PersistencyPortPrototypeToDeploymentMapping.process
[constr_10179]	Multiplicity of attribute PersistencyKeyValuePair.valueDataType
[constr_10180]	Multiplicity of the reference in the role PersistencyPortPrototypeToKeyValueStorageMapping.keyValueStorage
[constr_10182]	Multiplicity of the reference in the role PersistencyPortPrototypeToFileStorageMapping.fileStorage
[constr_10183]	Multiplicity of attribute PersistencyFile.fileName
[constr_10184]	Multiplicity of the reference in the role SynchronizedTimeBaseConsumer.networkTimeConsumer





Number	Heading
[constr_10185]	Multiplicity of the reference in the role SynchronizedTimeBaseProvider.networkTimeProvider
[constr_10186]	Multiplicity of attribute DoIpInstantiation.entityStatusMaxByteFieldUse
[constr_10187]	Multiplicity of attribute DoIpInstantiation.gidInvalidityPattern
[constr_10188]	Multiplicity of attribute DoIpInstantiation.logicalAddress
[constr_10189]	Multiplicity of attribute DoIpInstantiation.maxRequestBytes
[constr_10190]	Multiplicity of attribute DoIpInstantiation.vinInvalidityPattern
[constr_10191]	Multiplicity of attribute DoIpNetworkConfiguration.isActivationLineDependent
[constr_10192]	Multiplicity of attribute DoIpNetworkConfiguration.maxInitialVehicleAnnouncementTime
[constr_10193]	Multiplicity of attribute DoIpNetworkConfiguration.maxTesterConnections
[constr_10194]	Multiplicity of attribute DoIpNetworkConfiguration.networkInterfaceId
[constr_10195]	Multiplicity of attribute DoIpNetworkConfiguration.vehicleIdentificationSyncStatus
[constr_10197]	Multiplicity of attribute DoIpRequestConfiguration.endAddress
[constr_10198]	Multiplicity of attribute DoIpRequestConfiguration.requestType
[constr_10199]	Multiplicity of attribute DoIpRequestConfiguration.startAddress
[constr_10200]	Multiplicity of attribute UcmModuleInstantiation.identifier
[constr_10201]	Multiplicity of of the reference in the role ComGrant.serviceInstance
[constr_10202]	Multiplicity of attribute ComFieldGrant.role
[constr_10203]	Multiplicity of the reference in the role ComFieldGrant.serviceDeployment
[constr_10204]	Multiplicity of the reference in the role ComMethodGrant.serviceDeployment
[constr_10205]	Multiplicity of the reference in the role ComEventGrant.serviceDeployment
[constr_10206]	Multiplicity of the reference in the role ComOfferServiceGrant.serviceInstance
[constr_10207]	Multiplicity of the reference in the role CryptoProviderToPortPrototypeMapping.cryptoProvider
[constr_10208]	Multiplicity of the reference in the role CryptoProviderToPortPrototypeMapping.process
[constr_10209]	Multiplicity of the reference in the role CryptoKeySlotToPortPrototypeMapping.keySlot
[constr_10210]	Multiplicity of the reference in the role CryptoKeySlotToPortPrototypeMapping.process
[constr_10211]	Multiplicity of the reference in the role CryptoCertificateToCryptoKeySlotMapping.cryptoCertificate
[constr_10212]	Multiplicity of attribute SomeipServiceInterfaceDeployment.serviceInterfaceId
[constr_10213]	Multiplicity of attribute SomeipServiceInterfaceDeployment.serviceInterfaceVersion
[constr_10214]	Multiplicity of attribute SomeipEventGroup.eventGroupId
[constr_10215]	Multiplicity of attribute SomeipEventDeployment.eventId





Number	Heading
[constr_10216]	Multiplicity of attribute SomeipEventDeployment.transportProtocol
[constr_10217]	Multiplicity of the attribute DdsServiceInterfaceDeployment.serviceInterfaceId
[constr_10218]	Multiplicity of reference in the role ProvidedSomeipServiceInstance.sdServerConfig
[constr_10219]	Multiplicity of attribute ProvidedSomeipServiceInstance.serviceInstanceId
[constr_10220]	Multiplicity of attribute SomeipProvidedEventGroup.multicastThreshold
[constr_10221]	Multiplicity of reference in the role RequiredSomeipServiceInstance.sdClientConfig
[constr_10222]	Multiplicity of the reference in the role SomeipRequiredEventGroup.sdClientEventGroupTimingConfig
[constr_10223]	Multiplicity of attribute DdsServiceInstanceProps.domainId
[constr_10224]	Multiplicity of reference in the role DdsEventQosProps.event
[constr_10225]	Multiplicity of reference in the role DdsFieldQosProps.field
[constr_10226]	Multiplicity of attribute E2EProfileConfiguration.profileName
[constr_10227]	Multiplicity of attribute SecOcJobRequirement.secOcJobSemantic
[constr_10228]	Multiplicity of attribute SignalBasedFieldToISignalTriggeringMapping.dataPrototypeInServiceInterfaceRef
[constr_10229]	Multiplicity of reference in the role SignalBasedMethodToISignalTriggeringMapping.method
[constr_10230]	Multiplicity of attribute SignalServiceTranslationEventProps.safeTranslation
[constr_10231]	Multiplicity of attribute SignalServiceTranslationEventProps.secureTranslation
[constr_10232]	Multiplicity of reference in the role PersistenceDeploymentToCryptoKeySlotMapping.persistenceDeployment
[constr_10233]	Multiplicity of the reference in the role SoftwareCluster.vendorSignature
[constr_10234]	Multiplicity of attribute SoftwareCluster.version
[constr_10235]	Multiplicity of attribute SoftwareCluster.vendorId
[constr_10236]	Multiplicity of attribute SoftwareClusterDiagnosticAddress.addressSemantics
[constr_10237]	Multiplicity of attribute SoftwareClusterDependencyCompareCondition.compareType
[constr_10240]	Multiplicity of attribute SoftwarePackage.actionType
[constr_10241]	Multiplicity of attribute SoftwarePackage.compressedSoftwarePackageSize
[constr_10242]	Multiplicity of attribute SoftwarePackage.minimumSupportedUcmVersion
[constr_10243]	Multiplicity of attribute SoftwarePackage.packagerId
[constr_10244]	Multiplicity of reference in the role SoftwarePackage.packagerSignature
[constr_10245]	Multiplicity of reference in the role SoftwarePackage.softwareCluster
[constr_10246]	Multiplicity of attribute SoftwarePackage.uncompressedSoftwareClusterSize





Number	Heading
[constr_10247]	Multiplicity of reference in the role VehiclePackage.packagerSignature
[constr_10248]	Multiplicity of reference in the role UcmDescription.identifier
[constr_10249]	Multiplicity of reference in the role VehicleDriverNotification.approvalRequired
[constr_10250]	Multiplicity of reference in the role VehicleDriverNotification.notificationState
[constr_10251]	Multiplicity of the reference in the role ServiceFieldDeployment.field
[constr_10252]	Multiplicity of attribute SignalBasedEventElementToISignalTriggeringMapping.dataPrototypeInServiceInterfaceRef
[constr_10253]	Multiplicity of attribute SoftwareClusterDependencyCompareCondition.considerBuildNumber
[constr_10254]	Multiplicity of attribute SoftwareClusterDependencyCompareCondition.version
[constr_10255]	Multiplicity of attribute SignalServiceTranslationProps.serviceControl
[constr_10256]	Multiplicity of reference in the role SoftwarePackageStoring.storing
[constr_10365]	Existence of PersistencyDeployment.deploymentUri
[constr_10366]	Possible multiplicities of PersistencyDeployment.deploymentUri
[constr_10367]	Condition for the multiplicity of attribute PersistencyDeployment.deploymentUri
[constr_10374]	Existence of the attribute UcmSubordinateModuleInstantiation.verifyUpdate
[constr_10375]	Existence of the attribute UcmSubordinateModuleInstantiation.prepareUpdate
[constr_10376]	Existence of the attribute UcmSubordinateModuleInstantiation.prepareRollback
[constr_10377]	Completeness of the modeling of PersistencyKeyValueDataTypeMapping
[constr_10378]	PersistencyKeyValueDataTypeMapping references AbstractImplementationDataType in the role currentDataType
[constr_10379]	PersistencyKeyValueDataTypeMapping references ApplicationDataType in the role currentDataType
[constr_10380]	Target of ArtifactLocator.representedModelElement
[constr_10381]	Existence of attribute ArtifactLocator.uri
[constr_10382]	Existence of attribute ArtifactLocator.representedModelElement
[constr_10384]	PortInterface used for trigger state requests
[constr_10385]	PortInterface used for error state requests
[constr_10386]	Existence of references StateManagementStateMachineActionItem.start and stop
[constr_10387]	Consistency of StateManagementSetFunctionGroupStateActionItem.portPrototype and StateManagementSetFunctionGroupStateActionItem.setFunctionGroupState
[constr_10388]	Restriction for a PortInterface used for state switch notifications





Number	Heading
[constr_10389]	Existence of attribute <code>StateManagementFunctionGroupSwitchNotificationInterface.modeGroup</code>
[constr_10390]	Existence of attribute <code>StateManagementStateRequest.stateRequestPort</code>
[constr_10391]	Existence of attribute <code>StateManagementStateNotification.notificationPort</code>
[constr_10392]	Existence of attribute <code>StateManagementRequestRule.formula</code>
[constr_10393]	Existence of reference in the role <code>StateManagementRequestRule.nextState</code>
[constr_10394]	Existence of attribute <code>StateManagementCompareCondition.compareType</code>
[constr_10395]	Existence of attribute <code>StateManagementCompareCondition.compareValue</code>
[constr_10396]	Existence of reference in the role <code>StateManagementTriggerCompareRule.assumedCurrentState</code>
[constr_10397]	Existence of reference in the role <code>StateManagementSetFunctionGroupStateActionItem.portPrototype</code>
[constr_10398]	Existence of reference in the role <code>StateManagementSetFunctionGroupStateActionItem.setFunctionGroupState</code>
[constr_10399]	Allowed interval of the “index” field according to the initialization rule for data object typed by a <code>CppImplementationDataType</code> of category <code>VARIANT</code>
[constr_10400]	Existence of <code>SovdServerInstantiation.componentQualifier</code>
[constr_10401]	Existence of <code>SovdGatewayLocalEndpointTcpConfig.tcpPort</code>
[constr_10402]	Existence of <code>SovdGatewayEthernetCredentials.ipv4Address</code> vs. <code>SovdGatewayEthernetCredentials.ipv6Address</code>
[constr_10403]	Existence of <code>SovdGatewayEthernetCredentials.udpPort</code>
[constr_10404]	Existence of <code>SoftwareClusterSovdAddress.componentQualifier</code>
[constr_10405]	Existence of reference in the role <code>StateManagementActionList.affectedState</code>
[constr_10406]	Existence of <code>DeterministicSyncMOutOfN.numberOfConnectedClients</code>
[constr_10407]	Existence of <code>DeterministicSyncMOutOfN.minimumNumberOfRequests</code>
[constr_10408]	Existence of <code>DeterministicSyncMasterToTimeBaseConsumerMapping.deterministicSyncMaster</code>
[constr_10409]	Existence of <code>DeterministicSyncMasterToTimeBaseConsumerMapping.timeBaseConsumer</code>
[constr_10410]	Value of <code>SoftwareCluster.installationBehavior</code> for a <code>SoftwareCluster</code> of category <code>PLATFORM_CORE</code>
[constr_10411]	Existence of <code>ExecutionDependency</code> and references to <code>Function Group States</code>

Table F.48: Added Constraints in R22-11

F.9.5 Changed Constraints in R22-11

Number	Heading
[constr_1543]	Only one physical address per <code>SoftwareCluster</code> . <code>diagnosticDeploymentProps</code>
[constr_1554]	Restriction regarding attribute <code>PersistencyKeyValuePair.initValue</code>
[constr_1785]	Restriction regarding the reference into another <code>SoftwareCluster</code>
[constr_3305]	Value of attribute <code>SomeipEventDeployment.eventId</code> shall be unique
[constr_3371]	Mutually exclusive existence of <code>FireAndForgetMethodMapping.dataElement</code> reference and <code>FireAndForgetMethodMapping.trigger</code> reference
[constr_3376]	<code>FireAndForgetMethodMapping</code> shall reference only fire and forget methods
[constr_3558]	<code>RequiredSomeipServiceInstance.blocklistedVersion</code> is restricted to the usage of <code>minorVersion</code>
[constr_3632]	Supervision of a Supervised Entity Instance in the scope of a <code>Function Group State</code>
[constr_3639]	Existence of <code>SupervisionMode.expiredSupervisionTolerance</code>
[constr_3676]	Exclusive usage of <code>NoSupervision</code>
[constr_5035]	Compatibility of data types with <code>category STRING</code>
[constr_5291]	Allowed usage of <code>LTMessageCollectionToPortPrototypeMapping.rPortPrototype</code>
[constr_10002]	Only one mapping per <code>PortPrototype</code>
[constr_10062]	<code>DiagnosticServiceInstances</code> that can be mapped by a <code>DiagnosticServiceGenericMapping</code>
[constr_10069]	Existence of <code>SoftwareClusterDiagnosticDeploymentProps.powerDownTime</code>
[constr_10090]	Existence of <code>ProcessToMachineMapping.persistencyCentralStorageURI</code>

Table F.49: Changed Constraints in R22-11

F.9.6 Deleted Constraints in R22-11

Number	Heading
[constr_1535]	Existence of <code>DiagnosticSoftwareClusterProps</code> in the context of a <code>DiagnosticContributionSet</code>
[constr_1557]	Standardized values of <code>SoftwareClusterDesign.category</code> and <code>SoftwareCluster.category</code>
[constr_1558]	Existence of <code>SoftwareClusterDesign.diagnosticAddress</code>
[constr_1559]	Existence of <code>SoftwareClusterDesign.subSoftwareCluster</code>
[constr_1562]	Existence of <code>SoftwareClusterDesign.diagnosticContribution</code>
[constr_1564]	Existence of <code>SoftwareCluster.diagnosticProps.diagnosticAddress</code>
[constr_1568]	Existence of <code>SoftwareCluster.diagnosticExtract</code>
[constr_1627]	Supported value range for attribute <code>ApApplicationErrorDomain.value</code>





Number	Heading
[constr_1674]	Supported encoding of <code>StdCppImplementationDataType</code> of <code>category</code> <code>STRING</code>
[constr_1707]	Eligible subclasses of <code>HeapUsage</code> in the context of <code>StateDependentStartupConfig.resourceConsumption</code>
[constr_1732]	Existence of attribute <code>activationSwitch</code> set to <code>True</code> in the context of the enclosing <code>UcmStep</code>
[constr_1734]	Restriction for attribute <code>SoftwarePackageStep.activationSwitch</code>
[constr_5046]	Usage of <code>DoIpNetworkConfiguration.eidUseMac</code>
[constr_5280]	Existence of <code>DltLogSink.defaultLogThreshold</code>
[constr_10010]	Usage of attribute <code>category</code> in a <code>SoftwareClusterDependencyFormula</code>
[constr_10011]	Definition of sub-software-cluster

Table F.50: Deleted Constraints in R22-11

F.9.7 Added Advisories in R22-11

Number	Heading
[advisory_01000]	Existence of the reference <code>MethodMapping.clientServerOperation</code>
[advisory_01001]	Existence of reference <code>MethodMapping.method</code>
[advisory_01002]	Existence of reference <code>EventMapping.dataElement</code>
[advisory_01003]	Existence of reference <code>EventMapping.event</code>
[advisory_01004]	Existence of reference <code>FieldMapping.field</code>
[advisory_01005]	Existence of references <code>FieldMapping.getterOperation</code> , <code>setterOperation</code> , and <code>notifierDataElement</code>
[advisory_01006]	Existence of reference <code>FireAndForgetMethodMapping.method</code>
[advisory_01007]	Existence of references <code>FireAndForgetMethodMapping.dataElement</code> and <code>trigger</code>
[advisory_01008]	Multiplicity of reference in the role <code>RootSwClusterDesignComponentPrototype.applicationType</code>
[advisory_01009]	<code>PersistencyKeyValueDataTypeMapping.currentDataType</code> shall refer to a data type used in the context of the <code>PersistencyKeyValueStorageInterface</code>
[advisory_02000]	Define a <code>ServiceInstanceToSignalMapping</code> per member of an <code>AdaptivePlatformServiceInstance</code>
[advisory_02001]	No explicit <code>signal/service</code> translation for <code>ISignalGroups</code>
[advisory_02002]	<code>ServiceInterface.field</code> mapping to <code>ISignalTriggerings</code> for primitive data type <code>fields</code>
[advisory_02003]	<code>ServiceInterface.field</code> mapping to <code>ISignalTriggerings</code> for composite data type <code>fields</code>

Table F.51: Added Advisories in R22-11

F.9.8 Changed Advisories in R22-11

none

F.9.9 Deleted Advisories in R22-11

none

F.10 Traceable item history of this document according to AUTOSAR Release R23-11

F.10.1 Added Specification Items in R23-11

Number	Heading
[TPS_MANI_01411]	Initialization of a DataPrototype typed by a StdCppImplementationDataType of category VALUE that represents a Boolean
[TPS_MANI_01412]	Default value for startup timeout
[TPS_MANI_01413]	Semantics of UploadableDeploymentElement
[TPS_MANI_01414]	Semantics of UploadableDesignElement
[TPS_MANI_01415]	Semantics of attribute DiagnosticMultipleResourcePortMapping.overrideId
[TPS_MANI_01416]	Reporting the status of multiple DiagnosticEvents in the context of one PortInterface on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01417]	Retrieving the status of multiple DiagnosticEvents to PortPrototype (s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01418]	Mapping of multiple DiagnosticConditions to a PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01419]	Semantics of NetworkManagementPortInterface
[TPS_MANI_01420]	Support for the transport of bulk data in the context of SOVD
[TPS_MANI_01421]	Support for service validation in the context of SOVD
[TPS_MANI_01422]	Support for update procedures in the context of SOVD
[TPS_MANI_01423]	Support for configuration in the context of SOVD
[TPS_MANI_01424]	Semantics of DiagnosticSovdProximityChallengePortMapping
[TPS_MANI_01425]	Semantics of DiagnosticSovdAuthorizationPortMapping
[TPS_MANI_01426]	Mapping of DiagnosticSovdBulkData to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01427]	Mapping of DiagnosticSovdUpdate to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01428]	Mapping of DiagnosticSovdServiceInstance to PortPrototype on the <i>AUTOSAR adaptive platform</i>





Number	Heading
[TPS_MANI_01429]	Mapping of DiagnosticSovdConfiguration to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01430]	Mapping of DiagnosticSovdConfigurationParameter to DiagnosticDataIdentifier on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01431]	Definition of SOVD service instance
[TPS_MANI_01432]	Semantics of DiagnosticSovdMethodPrimitive
[TPS_MANI_01433]	Semantics of attribute OsModuleInstantiation.osArtiAdapterLaunchBehavior
[TPS_MANI_01434]	Diagnostic Address defined in the context of a DiagnosticCommonProps
[TPS_MANI_01435]	Semantics of meta-class DiagnosticExternalAuthenticationIdentification
[TPS_MANI_01436]	Relation of StateManagementStateMachineActionItem to internal state machine instances
[TPS_MANI_01437]	Standardized values of attribute StateManagementStateNotification.stateMachine.category
[TPS_MANI_01438]	Existence of StateManagementStateMachineActionItem.overrideInitialState
[TPS_MANI_01439]	Semantics of meta-class IdsmTimestampProviderInterface
[TPS_MANI_01440]	Using the IdsmTimestampProviderMapping for the provision of timestamps in the context of the <i>Intrusion Detection System Management</i>
[TPS_MANI_01441]	Using the IdsmContextProviderMapping for the provision of context in the context of the <i>Intrusion Detection System Management</i>
[TPS_MANI_01442]	Semantics of meta-class IdsmContextProviderInterface
[TPS_MANI_01443]	Semantics of meta-class StateManagementNmActionItem
[TPS_MANI_01444]	Semantics of attribute StateManagementSleepActionItem.sleepTime
[TPS_MANI_01445]	Semantics of meta-class StateManagementSleepActionItem
[TPS_MANI_01446]	Semantics of meta-class SmInteractsWithNmMapping
[TPS_MANI_01447]	Semantics of meta-class NmInteractsWithSmMapping
[TPS_MANI_03322]	Semantics of meta-class ComTriggerGrant
[TPS_MANI_03323]	Support for TLS in DoIP communication
[TPS_MANI_03324]	Semantics of FunctionalClusterToSecurityEventDefinitionMapping
[TPS_MANI_03325]	DltLogSink with category DLT_LOGSINK_ARTI

Table F.52: Added Specification Items in R23-11

F.10.2 Changed Specification Items in R23-11

Number	Heading
[TPS_MANI_01109]	Semantics of UploadablePackageElement
[TPS_MANI_01119]	Reference to model elements from SoftwareClusterDesign
[TPS_MANI_01137]	Possible use cases for the usage of DataPrototypeInServiceInterfaceRef
[TPS_MANI_01157]	Semantics of updateStrategy on collection level
[TPS_MANI_01159]	Semantics of updateStrategy on element level
[TPS_MANI_01191]	Modeling of possible errors
[TPS_MANI_01210]	Default encoding for all DataPrototypes typed by CppImplementationDataType of category STRING
[TPS_MANI_01239]	Semantics of meta-class ComEventGrant
[TPS_MANI_01274]	Standardized System Category Definitions for the Adaptive Platform
[TPS_MANI_01347]	Definition of a DiagnosticDataElement used in the context of a DID obtained from a PPortPrototype typed by a DiagnosticDataElementInterface
[TPS_MANI_01348]	Definition of a DiagnosticDataElement used in the context of a DID obtained from a PPortPrototype typed by a DiagnosticDataIdentifierInterface
[TPS_MANI_01362]	Convey the Authentication state of a diagnostic client to the diagnostic server instance
[TPS_MANI_01397]	Standardized values of DiagnosticDataIdentifier.category of the usage in SOVD context
[TPS_MANI_01405]	Semantics of sub-classes of SoftwareClusterDiagnosticAddress
[TPS_MANI_03101]	SOME/IP serialization
[TPS_MANI_03102]	UserDefined serialization
[TPS_MANI_03103]	Default size for all array and map length fields
[TPS_MANI_03104]	Default size for all structure length fields
[TPS_MANI_03105]	Default size for all union length fields
[TPS_MANI_03106]	Default size for all union type selector fields
[TPS_MANI_03107]	Default alignment for all dynamic DataPrototypes
[TPS_MANI_03108]	Default Byte Order for all DataPrototypes
[TPS_MANI_03117]	Default size for all string length fields
[TPS_MANI_03283]	Standardized values for attribute DltLogSink.category
[TPS_MANI_03299]	Semantics of FirewallRuleProps
[TPS_MANI_03546]	Definition of reported health status RPortPrototype
[TPS_MANI_03628]	Standardized values of ServiceInterface.category

Table F.53: Changed Specification Items in R23-11

F.10.3 Deleted Specification Items in R23-11

Number	Heading
[TPS_MANI_01111]	Diagnostic Address of a SoftwareCluster
[TPS_MANI_01199]	Semantics of DeterministicClientResourceNeeds
[TPS_MANI_01200]	Semantics of meta-class DeterministicClientResource
[TPS_MANI_01203]	Semantics of DeterministicClient
[TPS_MANI_01233]	Semantics of meta-class ComFindServiceGrantDesign
[TPS_MANI_01241]	Semantics of meta-class ComFindServiceGrant
[TPS_MANI_01330]	Definition of machine Function Group
[TPS_MANI_01406]	Semantics of DeterministicSyncMaster
[TPS_MANI_01407]	Semantics of abstract base class DeterministicSyncVerificationPolicy
[TPS_MANI_01408]	Semantics of reference DeterministicClient . deterministicSyncMaster
[TPS_MANI_01409]	Semantics of meta-class DeterministicSyncMasterToTimeBaseConsumerMapping
[TPS_MANI_03125]	ServiceInterface.method to ISignalTriggerings mapping
[TPS_MANI_03235]	Usage of ApSomeipTransformationProps.sessionHandling
[TPS_MANI_03288]	ApSomeipTransformationProps for triggers

Table F.54: Deleted Specification Items in R23-11

F.10.4 Added Constraints in R23-11

Number	Heading
[constr_5366]	Allowed target of ComEventGrant.serviceDeployment reference
[constr_5367]	Allowed target of ComTriggerGrant.serviceDeployment reference
[constr_5368]	Multiplicity of the reference in the role ComTriggerGrant.serviceDeployment
[constr_5372]	SecureComProps for a PlatformModuleEthernetEndpointConfiguration that contains a UDP configuration
[constr_5373]	SecureComProps for a PlatformModuleEthernetEndpointConfiguration that contains a TCP configuration
[constr_5381]	Modeling of Security Event reports by FunctionalCluster shall not be done via ProcessToMachineMapping
[constr_5386]	Executable.traceSwitchConfiguration
[constr_5387]	Existence of Executable.traceSwitchConfiguration.traceMessage
[constr_5388]	Existence of Executable.traceSwitchConfiguration.traceSwitch
[constr_5392]	Assignment of the same event to several SomeipEventGroups is forbidden in case one of the SomeipEventGroups has the multicastThreshold set to a value greater than 1





Number	Heading
[constr_6905]	CppTypeArgument.allocators
[constr_10416]	Aggregation of optional templateArgument that defines an Allocator for a VECTOR
[constr_10417]	Existence of attributes of CppTypeImplementationDataTypes depending on the category
[constr_10420]	Restriction for the existence of initial values for PersistencyDataElement
[constr_10425]	Existence of initial values for PersistencyDataElement
[constr_10426]	Multiplicity of attribute PersistencyDeploymentElement.updateStrategy
[constr_10427]	Multiplicity of attribute PersistencyInterfaceElement.updateStrategy
[constr_10428]	Existence of attribute UcmModuleInstantiation.identifier in subclasses
[constr_10429]	Existence of attribute VehicleRolloutStep.violatedSafetyConditionBehavior
[constr_10430]	Existence of attribute Machine.defaultApplicationTimeout
[constr_10431]	Existence of attribute Machine.defaultApplicationTimeout.enterTimeoutValue
[constr_10432]	Existence of attribute Machine.defaultApplicationTimeout.exitTimeoutValue
[constr_10436]	Restriction for the applicability of DiagnosticMultipleMonitorPortMapping
[constr_10437]	Restriction for the applicability of DiagnosticMultipleEventPortMapping
[constr_10438]	Restriction for the applicability of DiagnosticMultipleConditionPortMapping
[constr_10441]	Restriction for NetworkHandlePortMapping.pPortPrototypeInExecutable
[constr_10442]	Restriction for the applicability of DiagnosticSovdProximityChallengePortMapping
[constr_10443]	Restriction for the applicability of DiagnosticSovdProximityChallengeInterface
[constr_10444]	Existence of DiagnosticSovdProximityChallengePortMapping
[constr_10445]	Existence of the reference in the role DiagnosticSovdProximityChallengePortMapping.pPortPrototypeInExecutable
[constr_10446]	Existence of the reference in the role DiagnosticSovdProximityChallengePortMapping.process
[constr_10447]	Restriction for the applicability of DiagnosticSovdAuthorizationPortMapping
[constr_10448]	Restriction for the applicability of DiagnosticSovdAuthorizationInterface
[constr_10449]	Existence of DiagnosticSovdAuthorizationPortMapping
[constr_10450]	Existence of the reference in the role DiagnosticSovdAuthorizationPortMapping.pPortPrototypeInExecutable
[constr_10451]	Existence of the reference in the role DiagnosticSovdAuthorizationPortMapping.process
[constr_10452]	Restriction for the applicability of DiagnosticSovdBulkDataPortMapping
[constr_10453]	Restriction for the applicability of DiagnosticSovdBulkDataInterface





Number	Heading
[constr_10454]	Uniqueness of reference from DiagnosticSovdBulkDataPortMapping to DiagnosticSovdBulkData
[constr_10455]	Existence of the reference in the role DiagnosticSovdBulkDataPortMapping.serviceInstance
[constr_10456]	Existence of the reference in the role DiagnosticSovdBulkDataPortMapping.pPortPrototypeInExecutable
[constr_10457]	Existence of the reference in the role DiagnosticSovdBulkDataPortMapping.process
[constr_10458]	Restriction for the applicability of DiagnosticSovdUpdatePortMapping
[constr_10459]	Restriction for the applicability of DiagnosticSovdUpdateInterface
[constr_10460]	Uniqueness of reference from DiagnosticSovdUpdatePortMapping to DiagnosticSovdUpdate
[constr_10461]	Existence of the reference in the role DiagnosticSovdUpdatePortMapping.serviceInstance
[constr_10462]	Existence of the reference in the role DiagnosticSovdUpdatePortMapping.pPortPrototypeInExecutable
[constr_10463]	Existence of the reference in the role DiagnosticSovdUpdatePortMapping.process
[constr_10464]	Restriction for the applicability of DiagnosticSovdServiceValidationPortMapping
[constr_10465]	Restriction for the applicability of DiagnosticSovdServiceValidationInterface
[constr_10466]	Existence of the reference in the role DiagnosticSovdServiceValidationPortMapping.pPortPrototypeInExecutable
[constr_10467]	Existence of the reference in the role DiagnosticSovdServiceValidationPortMapping.process
[constr_10468]	Restriction for the applicability of DiagnosticSovdConfigurationPortMapping
[constr_10469]	Restriction for the applicability of DiagnosticSovdConfigurationInterface
[constr_10470]	Uniqueness of reference from DiagnosticSovdConfigurationPortMapping to DiagnosticSovdConfiguration
[constr_10471]	Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.serviceInstance
[constr_10472]	Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.pPortPrototypeInExecutable
[constr_10473]	Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.process
[constr_10474]	Uniqueness of reference from DiagnosticSovdConfigurationDataIdentifierMapping to DiagnosticSovdConfigurationParameter
[constr_10475]	Existence of the reference in the role DiagnosticSovdConfigurationDataIdentifierMapping.serviceInstance





Number	Heading
[constr_10476]	Existence of the reference in the role <code>DiagnosticSovdConfigurationDataIdentifierMapping.dataIdentifier</code>
[constr_10477]	Existence of <code>DiagnosticSovdLog</code>
[constr_10478]	Existence of <code>DiagnosticSovdUpdate</code>
[constr_10479]	Restriction on values of attribute <code>DiagnosticSovdMethodPrimitive.category</code> aggregated in the role <code>put</code> in the context of SOVD Update
[constr_10480]	Restriction on value of attribute <code>DiagnosticSovdMethodPrimitive.category</code> aggregated in the role <code>get</code> in the context of SOVD Update
[constr_10481]	Restriction on values of attribute <code>DiagnosticSovdMethodPrimitive.category</code> aggregated in the role <code>get</code> in the context of SOVD Log
[constr_10482]	Restriction on values of attribute <code>DiagnosticSovdMethodPrimitive.category</code> aggregated in the roles <code>put</code> and <code>delete</code> in the context of SOVD Log
[constr_10483]	Applicable values of <code>baseTypeEncoding</code> in the context of the definition of a <code>DiagnosticDataElement</code>
[constr_10484]	Existence of <code>FunctionalClusterInteractsWithPersistencyDeploymentMapping.contractVersion</code>
[constr_10485]	Existence of <code>PersistencyInterface.contractVersion</code>
[constr_10486]	Existence of <code>PersistencyKeyValueDataTypeMapping.previousContractVersion</code>
[constr_10487]	Only one physical address per <code>DiagnosticCommonProps</code>
[constr_10488]	Existence of attribute <code>DiagnosticCommonProps.authenticationTimeout</code>
[constr_10489]	Existence of <code>StateManagementModuleInstantiation</code> in the context of a Machine
[constr_10490]	<code>DiagnosticDataElement</code> shall be directly or indirectly the target of a reference owned by a subclass of <code>DiagnosticMapping</code>
[constr_10491]	Type of <code>PPortPrototype</code> referenced in the role <code>IdsmTimestampProviderMapping.pPortPrototypeInExecutable</code>
[constr_10492]	<code>PPortPrototype</code> typed by a <code>IdsmTimestampProviderInterface</code>
[constr_10493]	Existence of <code>IdsmTimestampProviderMapping.idsPlatformInstantiation</code>
[constr_10494]	Existence of <code>IdsmTimestampProviderMapping.pPortPrototypeInExecutable</code>
[constr_10495]	Existence of <code>IdsmTimestampProviderMapping.process</code>
[constr_10496]	Type of <code>PPortPrototype</code> referenced in the role <code>IdsmContextProviderMapping.pPortPrototypeInExecutable</code>
[constr_10497]	<code>PPortPrototype</code> typed by a <code>IdsmContextProviderInterface</code>
[constr_10498]	Existence of <code>IdsmContextProviderMapping.idsPlatformInstantiation</code>
[constr_10499]	Existence of <code>IdsmContextProviderMapping.pPortPrototypeInExecutable</code>
[constr_10500]	Existence of <code>IdsmContextProviderMapping.process</code>
[constr_10501]	Access to time stamps for <i>Intrusion Detection System Management</i>





Number	Heading
[constr_10508]	Existence of the attribute <code>UcmSubordinateModuleInstantiation.maxAvailablePersistencyStorageSpace</code>
[constr_10509]	Existence of attribute <code>PersistencyDeployment.maximumAllowedSize</code>
[constr_10510]	Existence of attribute <code>PersistencyDeployment.minimumSustainedSize</code>
[constr_10511]	Reference <code>StateManagementStateRequest.stateRequestPort</code> shall not exist if <code>StateManagementStateRequest</code> is referenced from <code>NmInteractsWithSmMapping</code>
[constr_10512]	Restriction for the value of <code>StateManagementSleepActionItem.sleepTime</code>
[constr_10513]	Existence of the reference in the role <code>SmInteractsWithNmMapping.actionItem</code>
[constr_10514]	Existence of the reference in the role <code>SmInteractsWithNmMapping.nmNetworkHandle</code>
[constr_10515]	Existence of the reference in the role <code>NmInteractsWithSmMapping.stateRequest</code>
[constr_10516]	Existence of the reference in the role <code>NmInteractsWithSmMapping.nmNetworkHandle</code>
[constr_11000]	<code>SomeipEventDeployment.eventReceptionDefaultValue</code> shall not be specified in the physical domain

Table F.55: Added Constraints in R23-11

F.10.5 Changed Constraints in R23-11

Number	Heading
[constr_1675]	Existence of attribute <code>ApSomeipTransformationProps.stringEncoding</code>
[constr_3395]	<code>TransformationPropsToServiceInterfaceElementMapping</code> is restricted to one single <code>ServiceInterface</code>
[constr_3434]	Aggregation of <code>templateArguments</code> for a <code>VECTOR</code>
[constr_3550]	Existence of <code>ServiceInstanceToSignalMapping</code> for an event with <code>signalBased</code> serialization
[constr_3551]	Full mapping of target <code>ISignalGroup</code>
[constr_3552]	Full mapping of target <code>event</code>
[constr_3553]	Existence of <code>ServiceInstanceToSignalMapping</code> for an field with <code>signalBased</code> serialization
[constr_3555]	No support for <code>SecuredIPdu.useAsCryptographicIPdu</code> set to <code>true</code>
[constr_3636]	Consistent <code>ISignal</code> communication direction <code>in</code> and <code>RequiredApServiceInstance</code>
[constr_3637]	Consistent <code>ISignal</code> communication direction <code>out</code> and <code>ProvidedApServiceInstance</code>
[constr_5052]	<code>ProvidedSomeipServiceInstances</code> of the same <code>serviceInterface</code> on one Machine





Number	Heading
[constr_5318]	Existence of <code>ServiceInstanceToSignalMapping</code> for an <code>trigger</code> with <code>signalBased</code> serialization
[constr_5351]	<code>FirewallRule</code> is allowed to aggregate at most one protocol subelement
[constr_5352]	<code>DdsRule.submessageType</code> value restriction
[constr_5353]	<code>DdsRule.readerEntityId</code> and <code>DdsRule.writerEntityId</code> value restriction
[constr_5358]	<code>AdaptiveFirewallToPortPrototypeMapping.rPortPrototype</code> restriction
[constr_10048]	Existence of reference from <code>DiagnosticMonitorPortMapping</code> to <code>DiagnosticEvent</code>
[constr_10148]	Multiplicity of reference in the role <code>PersistencyFileElement.contentUri</code>
[constr_10386]	Existence of references <code>StateManagementStateMachineActionItem.startStateMachine</code> and <code>stopStateMachine</code>
[constr_10390]	Existence of reference <code>StateManagementStateRequest.stateRequestPort</code>

Table F.56: Changed Constraints in R23-11

F.10.6 Deleted Constraints in R23-11

Number	Heading
[constr_1543]	Only one physical address per <code>SoftwareCluster.diagnosticDeploymentProps</code>
[constr_1572]	Usage of <code>SwDataDefProps.implementationDataType</code> within a <code>CppImplementationDataType</code>
[constr_1614]	Existence of attribute <code>TransformationPropsToServiceInterfaceElementMapping.transformationProps.sessionHandling</code>
[constr_1789]	Scope of machine <code>Function Group</code>
[constr_3394]	Default value for start-up timeout on the <code>Machine</code> is not configurable
[constr_3733]	Upper multiplicity of aggregation in the role <code>ServiceInstanceToSignalMapping.methodMapping</code>
[constr_10095]	Existence of reference from <code>DiagnosticExternalAuthenticationPortMapping</code> to <code>DiagnosticAuthentication</code>
[constr_10111]	Existence of attribute <code>DiagnosticAuthentication.authenticationTimeout</code>
[constr_10156]	Multiplicity of reference in the role <code>ComFindServiceGrantDesign.requiredServicePort</code>
[constr_10229]	Multiplicity of reference in the role <code>SignalBasedMethodToISignalTriggeringMapping.method</code>
[constr_10406]	Existence of <code>DeterministicSyncMOutOfN.numberOfConnectedClients</code>
[constr_10407]	Existence of <code>DeterministicSyncMOutOfN.minimumNumberOfRequests</code>
[constr_10408]	Existence of <code>DeterministicSyncMasterToTimeBaseConsumerMapping.deterministicSyncMaster</code>





Number	Heading
[constr_10409]	Existence of <code>DeterministicSyncMasterToTimeBaseConsumerMapping.timeBaseConsumer</code>

Table F.57: Deleted Constraints in R23-11

F.10.7 Added Advisories in R23-11

none

F.10.8 Changed Advisories in R23-11

Number	Heading
[advisory_02000]	Define a <code>ServiceInstanceToSignalMapping</code> per member of an <code>AdaptivePlatformServiceInstance</code>
[advisory_02001]	No explicit <code>signal/service translation</code> for <code>ISignalGroups</code>
[advisory_02002]	<code>ServiceInterface.field</code> mapping to <code>ISignalTriggerings</code> for primitive data type <code>fields</code>
[advisory_02003]	<code>ServiceInterface.field</code> mapping to <code>ISignalTriggerings</code> for composite data type <code>fields</code>

Table F.58: Changed Advisories in R23-11

F.10.9 Deleted Advisories in R23-11

none

F.11 Traceable item history of this document according to AUTOSAR Release R24-11

F.11.1 Added Specification Items in R24-11

Number	Heading
[TPS_MANI_01448]	Semantics of <code>FunctionalClusterInteractsWithDiagnosticEventMapping</code>
[TPS_MANI_01449]	Service validation in <code>SOVD</code> context
[TPS_MANI_01450]	Definition of <code>invalidValue</code> for <code>DataPrototype</code> typed by a <code>CppImplementationDataType</code> of category <code>STRING</code>





Number	Heading
[TPS_MANI_01451]	Definition of <code>invalidValue</code> for <code>DataPrototype</code> typed by a <code>CppImplementationDataType</code> of category <code>TYPE_REFERENCE</code>
[TPS_MANI_01452]	Semantics of <code>DiagnosticTransmitCertificateInterface</code>
[TPS_MANI_01453]	<code>DiagnosticServiceInstances</code> that can be mapped by a <code>DiagnosticServiceGenericMapping</code>
[TPS_MANI_01454]	Semantics of meta-class <code>IdsmReportingModeProviderInterface</code>
[TPS_MANI_01455]	Using the <code>IdsmReportingModeProviderMapping</code> for the setting and getting the reporting mode in the context of the <i>Intrusion Detection System Management</i>
[TPS_MANI_01456]	Definition of <code>PersistencyDataRequiredComSpec.accessMode</code>
[TPS_MANI_01457]	Further qualification of properties of <code>PortPrototypes</code> typed by <code>PersistencyFileStorageInterfaces</code>
[TPS_MANI_01458]	Usage of attribute <code>ComCertificateToCryptoCertificateMapping.category</code>
[TPS_MANI_01459]	Usage of attribute <code>ComKeyToCryptoKeySlotMapping.category</code>
[TPS_MANI_01460]	Retrieve the status of the DoIP group identification to the diagnostic server instance
[TPS_MANI_01461]	Retrieve the status of the DoIP activation line to the diagnostic server instance
[TPS_MANI_01462]	Trigger the DoIP vehicle announcement at the diagnostic server instance
[TPS_MANI_01463]	Retrieving the DoIP entity identification (EID) to the diagnostic server instance
[TPS_MANI_01464]	Retrieving the status of the vehicle's power mode to the diagnostic server instance
[TPS_MANI_01465]	Semantics of reference <code>SoftwareClusterDesign.doIpLogicalAddress</code>
[TPS_MANI_01466]	Two ways to interact with crypto key slots
[TPS_MANI_01467]	Modeling of application that uses a Crypto Key
[TPS_MANI_01468]	Semantics of meta-class <code>CryptoKeySlotUserDesignMapping</code>
[TPS_MANI_01469]	Semantics of meta-class <code>CryptoKeySlotUsageDesignMapping</code>
[TPS_MANI_01470]	Standardized values of attribute <code>CryptoKeySlotDesign.cryptoAlgorithmId</code>
[TPS_MANI_01471]	Semantics of meta-class <code>CryptoKeySlotToClientPortPrototypeMapping</code>
[TPS_MANI_01472]	Semantics of reference <code>CryptoKeySlot.cryptoKeySlotDesign</code>
[TPS_MANI_01473]	Semantics of <code>StateClientInterface</code>
[TPS_MANI_01474]	Using the <code>IdsmQualifiedEventReceiverMapping</code> for the receiving of qualified security events in the context of the <i>Intrusion Detection System Management</i>
[TPS_MANI_01475]	Semantics of meta-class <code>IdsmQualifiedEventReceiverInterface</code>
[TPS_MANI_03326]	MachineDesign-specific configuration settings for DoIP
[TPS_MANI_03327]	Network Interface configuration for DoIP
[TPS_MANI_03328]	Reception Monitoring of SOME/IP segments





Number	Heading
[TPS_MANI_03329]	Reception Monitoring of SOME/IP segments of the Method Call Message
[TPS_MANI_03330]	Reception Monitoring of SOME/IP segments of the Method Response Message
[TPS_MANI_03331]	local ApApplicationEndpoint and NetworkEndpoint for transmission of security events
[TPS_MANI_03332]	Remote credentials for transmission of security events
[TPS_MANI_03333]	Semantics of DoIpNetworkConfigurationDesign.tpConnection
[TPS_MANI_03335]	Semantics of GenericDiagnosticTransportInstantiation
[TPS_MANI_03674]	Adaptive platform SOME/IP Service Instance interacting with a classic platform SOME/IP Service Instance
[TPS_MANI_03675]	Consuming an IEEE1722 stream
[TPS_MANI_03676]	Producing an IEEE1722 stream
[TPS_MANI_03677]	Producing a Non-Time-Synchronous Control Format messages
[TPS_MANI_03678]	Producing a Time-Synchronous Control Format messages
[TPS_MANI_03679]	Consuming all IEEE1722 ACF messages of an IEEE1722 ACF stream
[TPS_MANI_03680]	Consuming a set of buses from an IEEE1722 ACF stream
[TPS_MANI_03681]	Consuming a set of frames from an IEEE1722 ACF stream
[TPS_MANI_03682]	IEEE1722TpAcfConnection contributes to signal/service translation
[TPS_MANI_03683]	Identification of an ISignalIPdu inside an IEEE1722 ACF stream
[TPS_MANI_03684]	Mapping of an IEEE1722 ACF stream to an EthernetCommunicationConnector

Table F.59: Added Specification Items in R24-11

F.11.2 Changed Specification Items in R24-11

Number	Heading
[TPS_MANI_01287]	Semantics of RawDataStreamMapping
[TPS_MANI_01401]	Support for TLS in vehicle-internal SOVD communication
[TPS_MANI_01416]	Reporting the status of multiple DiagnosticEvents in the context of one PortInterface on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01417]	Retrieving the status of multiple DiagnosticEvents to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01433]	Semantics of attribute OsModuleInstantiation.osArtiAdapterLaunchBehavior
[TPS_MANI_03264]	Semantics of CryptoKeySlotToPortPrototypeMapping
[TPS_MANI_03269]	Semantics of ComCertificateToCryptoCertificateMapping
[TPS_MANI_03270]	Semantics of ComKeyToCryptoKeySlotMapping





Number	Heading
[TPS_MANI_03294]	Semantics of <code>DoIpNetworkConfiguration.eidRetrieval</code>
[TPS_MANI_03323]	Support for TLS in DoIP communication
[TPS_MANI_03527]	Definition of <code>DdsProvidedServiceInstance</code>
[TPS_MANI_03529]	Definition of <code>DdsRequiredServiceInstance</code>
[TPS_MANI_03650]	Definition of <code>DdsServiceInstanceResourceIdentifierTypeEnum</code>

Table F.60: Changed Specification Items in R24-11

F.11.3 Deleted Specification Items in R24-11

Number	Heading
[TPS_MANI_01019]	<i>Manifest</i> content may apply to different aspects of the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01073]	Semantics of <code>PortPrototype</code> typed by <code>PersistencyKeyValueStorageInterface</code>
[TPS_MANI_01081]	Semantics of <code>PortPrototype</code> typed by <code>PersistencyFileStorageInterface</code>
[TPS_MANI_03218]	Default value for the attribute <code>tcpInitialInactivityTime</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03219]	Default value for the attribute <code>tcpGeneralInactivityTime</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03220]	Default value for the attribute <code>vehicleAnnouncementCount</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03221]	Default value for the attribute <code>vehicleAnnouncementInterval</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03222]	Default value for the attribute <code>tcpAliveCheckResponseTimeout</code> of meta-class <code>DoIpNetworkConfiguration</code>
[TPS_MANI_03517]	Evaluation of <code>HealthChannelExternalStatus</code>
[TPS_MANI_03534]	Definition of Platform Health Management Health Channel
[TPS_MANI_03545]	Existence of <code>HealthChannelExternalStatus</code>
[TPS_MANI_03546]	Definition of reported health status <code>RPortPrototype</code>
[TPS_MANI_03547]	Definition of <i>offset</i> time domains
[TPS_MANI_03551]	Definition of Time Base kind
[TPS_MANI_03553]	Applicability of health channel to a specific <code>Process</code>
[TPS_MANI_03624]	Usage of <code>statusId</code> in application code
[TPS_MANI_03625]	Consistency of <code>HealthChannelExternalReportedStatus.statusId</code> and <code>PhmHealthChannelStatus.statusId</code>
[TPS_MANI_03630]	Semantics of <code>triggersRecoveryNotification</code>





Number	Heading
[TPS_MANI_03631]	Semantics of meta-class PhmHealthChannelRecoveryNotificationInterface

Table F.61: Deleted Specification Items in R24-11

F.11.4 Added Constraints in R24-11

Number	Heading
[constr_10517]	Upper multiplicity of reference in the role <code>IdsPlatformInstantiation.idsTimeBase</code>
[constr_10518]	Mutually exclusive existence of <code>FunctionalClusterInteractsWithDiagnosticEventMapping.persistencyDeployment</code> vs. <code>functionalCluster</code>
[constr_10519]	Existence of reference <code>FunctionalClusterInteractsWithDiagnosticEventMapping.diagnosticEvent</code>
[constr_10526]	<code>DiagnosticAuthenticationPortMapping</code> refers to a <code>PPortPrototype</code> that is typed by a <code>DiagnosticTransmitCertificateInterface</code>
[constr_10528]	Existence of <code>FirewallStateSwitchInterface.firewallStateMachine</code>
[constr_10530]	Each Ucm shall process at least one software package
[constr_10535]	Restriction for attribute <code>SenderComSpec.transmissionProps.onChangeDataPrototype</code>
[constr_10536]	Existence of <code>TransmissionComSpecProps.onChangeDataPrototype.dataPrototypeInServiceInterface.rootDataPrototype</code>
[constr_10537]	Existence of <code>TransmissionComSpecProps.onChangeDataPrototype.rootDataPrototype</code>
[constr_10540]	Arguments of a <code>ClientServerOperation</code> shall be fully covered by <code>SignalBasedFireAndForgetMethodToISignalTriggeringMappings</code>
[constr_10541]	Consistent assignment of <code>ISignalTriggerings</code> to an <code>ISignalGroup</code> for <code>SignalBasedFireAndForgetMethodToISignalTriggeringMapping</code>
[constr_10546]	<code>PortPrototype</code> typed by <code>DiagnosticGenericUdsInterface</code> shall only be referenced by <code>DiagnosticServiceGenericMapping</code>
[constr_10547]	Reference in the role <code>UcmStep.ucm</code> in the context of the enclosing <code>VehicleRolloutStep</code>
[constr_10566]	Allowed values of attribute <code>CppImplementationDataType.swDataDefProps.compuMethod.category</code>
[constr_10567]	Existence of <code>DiagnosticSovdMethod.get</code> resp. <code>delete</code> in the context of <code>DiagnosticSovdFaultMemoryAccess</code>
[constr_10568]	Type of <code>RPortPrototype</code> referenced in the role <code>IdsmReportingModeProviderMapping.rPortPrototypeInExecutable</code>
[constr_10569]	<code>RPortPrototype</code> typed by an <code>IdsmReportingModeProviderInterface</code>
[constr_10570]	Existence of <code>IdsmReportingModeProviderMapping.idsPlatformInstantiation</code>





Number	Heading
[constr_10571]	Existence of IdsmReportingModeProviderMapping. rPortPrototypeInExecutable
[constr_10572]	Existence of IdsmReportingModeProviderMapping.process
[constr_10574]	Value of ApApplicationErrorDomain.value shall be unique in the context of a ClientServerOperation
[constr_10576]	Existence of attribute PersistencyDataRequiredComSpec.accessMode
[constr_10578]	Existence of the attribute UcmMasterModuleInstantiation. ucmNotAvailableOnTheNetwork
[constr_10586]	Restriction for the applicability of DiagnosticDoIpGroupIdentificationPortMapping
[constr_10587]	Restriction for the applicability of DiagnosticDoIPGroupIdentificationInterface
[constr_10588]	Existence of DiagnosticDoIpGroupIdentificationPortMapping. pPortPrototypeInExecutable
[constr_10589]	Existence of DiagnosticDoIpGroupIdentificationPortMapping.process
[constr_10590]	Restriction for the applicability of DiagnosticDoIpActivationLinePortMapping
[constr_10591]	Restriction for the applicability of DiagnosticDoIPActivationLineInterface
[constr_10592]	Existence of DiagnosticDoIpActivationLinePortMapping. pPortPrototypeInExecutable
[constr_10593]	Existence of DiagnosticDoIpActivationLinePortMapping.process
[constr_10594]	Restriction for the applicability of DiagnosticDoIpTriggerVehicleAnnouncementPortMapping
[constr_10595]	Restriction for the applicability of DiagnosticDoIPTriggerVehicleAnnouncementInterface
[constr_10596]	Existence of DiagnosticDoIpTriggerVehicleAnnouncementPortMapping. rPortPrototypeInExecutable
[constr_10597]	Existence of DiagnosticDoIpTriggerVehicleAnnouncementPortMapping. process
[constr_10598]	Restriction for the applicability of DiagnosticDoIpEntityIdentificationPortMapping
[constr_10599]	Restriction for the applicability of DiagnosticDoIPEntityIdentificationInterface
[constr_10600]	Existence of DiagnosticDoIpEntityIdentificationPortMapping. pPortPrototypeInExecutable
[constr_10601]	Existence of DiagnosticDoIpEntityIdentificationPortMapping. process
[constr_10602]	Restriction for the applicability of DiagnosticDoIpPowerModePortMapping
[constr_10603]	Restriction for the applicability of DiagnosticDoIPPowerModeInterface
[constr_10604]	Existence of DiagnosticDoIpPowerModePortMapping. pPortPrototypeInExecutable
[constr_10605]	Existence of DiagnosticDoIpPowerModePortMapping.process





Number	Heading
[constr_10609]	Existence of references in the role <code>AbstractDoIpPortMapping.rPortPrototypeInExecutable</code> and <code>AbstractDoIpPortMapping.pPortPrototypeInExecutable</code>
[constr_10611]	Existence of attribute <code>DoIpLogicalAddress.logicalAddress</code>
[constr_10612]	Standardized values for attribute <code>CryptoKeySlotDesign.cryptoObjectType</code>
[constr_10613]	<code>CryptoKeySlotDesign</code> where attribute <code>shared</code> is set to <code>false</code>
[constr_10614]	Existence of attribute <code>CryptoKeySlotDesign.shared</code>
[constr_10616]	Existence of the reference in the role <code>StateClientInterface.functionGroupType</code>
[constr_10617]	Existence of the reference in the role <code>FunctionGroupPortMapping.functionGroup</code>
[constr_10618]	Existence of the reference in the role <code>FunctionGroupPortMapping.process</code>
[constr_10619]	Existence of the reference in the role <code>FunctionGroupPortMapping.rPortPrototypeInExecutable</code>
[constr_10620]	Reference to function group from <code>FunctionGroupPortMapping</code>
[constr_10621]	Same <code>ModeDeclarationGroup</code> for <code>StateClientInterface</code> and <code>FunctionGroupPortMapping.functionGroup</code>
[constr_10622]	Existence of <code>FunctionGroupPortMapping</code> depending on the role <code>rPortPrototypeInExecutable</code> and <code>process</code>
[constr_10623]	Type of <code>RPortPrototype</code> referenced in the role <code>IdsmQualifiedEventReceiverMapping.rPortPrototypeInExecutable</code>
[constr_10624]	<code>RPortPrototype</code> typed by an <code>IdsmQualifiedEventReceiverInterface</code>
[constr_10625]	Existence of <code>IdsmQualifiedEventReceiverMapping.idsPlatformInstantiation</code>
[constr_10626]	Existence of <code>IdsmQualifiedEventReceiverMapping.rPortPrototypeInExecutable</code>
[constr_10627]	Existence of <code>IdsmQualifiedEventReceiverMapping.process</code>
[constr_10628]	Allowed range of attribute <code>TimeSyncCorrection.providerRateDeviationMax</code>
[constr_3772]	Range of <code>ApApplicationError.errorCode</code> for interoperability with the AUTOSAR classic platform
[constr_3773]	Uniqueness of <code>ApApplicationError.errorCode</code> for interoperability with the AUTOSAR classic platform
[constr_3774]	Existence of <code>EthernetMacRawDataStreamMapping.localCommConnector</code>
[constr_3775]	Existence of <code>IEEE1722RawDataStreamConsumerMapping.ieee1722Stream</code>
[constr_3776]	Existence of <code>IEEE1722RawDataStreamProducerMapping.ieee1722Stream</code>
[constr_3777]	Existence of <code>IEEE1722AcfBusRawDataStreamConsumerMapping.acfBus</code>
[constr_3778]	Existence of <code>IEEE1722AcfBusPartRawDataStreamConsumerMapping.acfBusPart</code>
[constr_9323]	Restriction of <code>DoIpFunctionalClusterDesign</code> on a <code>MachineDesign</code>
[constr_9324]	Allowed <code>PlatformModuleEthernetEndpointConfiguration.communicationConnector</code> references





Number	Heading
[constr_9325]	<code>DoIpFunctionalClusterDesign.doIpLogicalAddress.logicalAddress</code> shall be within the physical address boundaries defined by <code>DoIpRequestConfiguration</code>
[constr_9327]	SOME/IP segment reception monitoring allowed for udp <code>SomeIpEventDeployments</code>
[constr_9328]	Reception Monitoring of SOME/IP segments is allowed for udp <code>SomeIpMethodDeployments</code>
[constr_9329]	Allowed <code>PlatformModuleEthernetEndpointConfiguration.tcpPort</code> and <code>PlatformModuleEthernetEndpointConfiguration.udpPort</code> references
[constr_9334]	Supported value range for attribute <code>GenericTpConnection.sourceAddressRangeStart</code>
[constr_9335]	Supported value range for attribute <code>GenericTpConnection.sourceAddressRangeEnd</code>
[constr_9336]	<code>DoIpNetworkConfigurationDesign</code> shall reference a <code>GenericTpConnection</code>
[constr_9337]	Same <code>priority</code> for overlapping address ranges in the context of the same <code>MachineDesign</code>
[constr_9338]	<code>GenericTpConnection.sourceAddressRangeStart</code> shall be less or equal of <code>GenericTpConnection.sourceAddressRangeEnd</code>
[constr_9344]	Supported value range for attribute <code>DoIpFunctionalClusterDesign.doIpProtocolVersion</code>

Table F.62: Added Constraints in R24-11

F.11.5 Changed Constraints in R24-11

Number	Heading
[constr_10186]	Multiplicity of attribute <code>DoIpFunctionalClusterDesign.entityStatusMaxByteFieldUse</code>
[constr_10189]	Multiplicity of attribute <code>DoIpFunctionalClusterDesign.maxRequestBytes</code>
[constr_10209]	Existence of the reference in the role <code>AbstractCryptoKeySlotToPortPrototypeMapping.keySlot</code>
[constr_10210]	Existence of the reference in the role <code>AbstractCryptoKeySlotToPortPrototypeMapping.process</code>
[constr_10438]	Restriction for the applicability of <code>DiagnosticMultipleConditionPortMapping</code>
[constr_10483]	Applicable values of <code>baseTypeEncoding</code> in the context of the definition of a <code>DiagnosticDataElement</code>
[constr_10487]	Only one physical address per <code>DiagnosticCommonProps</code>
[constr_10488]	Existence of attribute <code>DiagnosticCommonProps.authenticationTimeout</code>
[constr_10511]	Reference <code>StateManagementStateRequest.stateRequestPort</code> shall not exist if <code>StateManagementStateRequest</code> is referenced from <code>NmInteractsWithSmMapping</code>





Number	Heading
[constr_1478]	SwDataDefProps applicable to ApplicationDataTypes exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1579]	SwDataDefProps applicable to CppImplementationDataTypes exclusive to the <i>AUTOSAR adaptive platform</i>
[constr_1695]	Semantics of a Grant depends on the existence of CmModuleInstantiation
[constr_1729]	Qualified combinations of PortPrototypes and PhmSupervisionRecoveryNotificationInterface on State Management software level
[constr_3414]	Allowed usage of PlatformModuleEthernetEndpointConfiguration attributes that are allowed to be used to configure the network communication in the different platform modules
[constr_3495]	Supported value range for attribute DoIpFunctionalClusterDesign.eid
[constr_3497]	Supported value range for attribute DoIpFunctionalClusterDesign.maxRequestBytes
[constr_3645]	discoveryType mandatory for DdsProvidedServiceInstance
[constr_3646]	resourceIdentifierType mandatory for DdsProvidedServiceInstance
[constr_3647]	resourceIdentifierType value for USER_DATA QoS-based discovery
[constr_3648]	discoveryType mandatory for DdsRequiredServiceInstance
[constr_3677]	ComGrants referencing DDS Service Instances
[constr_5241]	Restriction applicable for AbstractCryptoKeySlotToPortPrototypeMapping.portPrototype
[constr_5343]	Usage of DoIpNetworkConfiguration.eidRetrieval
[constr_5372]	SecureComProps for a PlatformModuleEthernetEndpointConfiguration that contains a UDP configuration
[constr_5373]	SecureComProps for a PlatformModuleEthernetEndpointConfiguration that contains a TCP configuration
[constr_5381]	Modeling of Security Event reports by FunctionalCluster shall not be done via ProcessToMachineMapping
[constr_5386]	Existence of Executable.traceSwitchConfiguration
[constr_5387]	Existence of reference Executable.traceSwitchConfiguration.traceMessage
[constr_5388]	Existence of attribute Executable.traceSwitchConfiguration.traceSwitch
[constr_5392]	Assignment of the same event to several SomeipEventGroups is forbidden in case one of the SomeipEventGroups has the multicastThreshold set to a value greater than 0

Table F.63: Changed Constraints in R24-11

F.11.6 Deleted Constraints in R24-11

Number	Heading
[constr_10022]	Restriction for SecurityEventMapping.process.securityEvent.id w.r.t SecurityEventMapping.id
[constr_10062]	DiagnosticServiceInstances that can be mapped by a DiagnosticServiceGenericMapping
[constr_10150]	Multiplicity of reference in the role SynchronizedTimeBaseProviderInterface.timeBaseKind
[constr_10153]	Multiplicity of reference in the role PersistencyDataRequiredComSpec.dataElement
[constr_10187]	Multiplicity of attribute DoIpInstantiation.gidInvalidityPattern
[constr_10190]	Multiplicity of attribute DoIpInstantiation.vinInvalidityPattern
[constr_10241]	Multiplicity of attribute SoftwarePackage.compressedSoftwarePackageSize
[constr_1690]	SoftwareCluster shall only be referenced by a single SoftwarePackage .
[constr_1728]	Qualified combinations of PortPrototypes and PhmHealthChannelInterface on application software level
[constr_3532]	Mandatory definition of statusId
[constr_3614]	Reference to a PhmHealthChannelRecoveryNotificationInterface in the context of a HealthChannelExternalStatus
[constr_3719]	RecoveryNotification referenced either by HealthChannelExternalStatus or HealthChannelSupervision

Table F.64: Deleted Constraints in R24-11

F.11.7 Added Advisories in R24-11

Number	Heading
[advisory_01011]	Existence of the reference in the role CryptoKeySlotUserDesignMapping.processDesign
[advisory_01012]	Existence of the reference in the role CryptoKeySlotUserDesignMapping.cryptoKeySlotUserDesign
[advisory_01013]	Existence of the reference in the role CryptoKeySlotUserDesignMapping.processDesign
[advisory_01014]	Existence of the reference in the role CryptoKeySlotUsageDesignMapping.portPrototype
[advisory_01015]	Existence of the reference in the role CryptoKeySlotUsageDesignMapping.cryptoKeySlotUsageDesign
[advisory_01016]	Existence of the aggregation in the role CryptoKeySlotUserDesign.keySlotUsage
[advisory_03003]	Secure communication should not be lost by switching to multicast

Table F.65: Added Advisories in R24-11

F.11.8 Changed Advisories in R24-11

Number	Heading
[advisory_02001]	No explicit signal/service translation for ISignalGroups

Table F.66: Changed Advisories in R24-11

F.11.9 Deleted Advisories in R24-11

none

F.12 Traceable item history of this document according to AUTOSAR Release R25-11

F.12.1 Added Specification Items in R25-11

Number	Heading
[TPS_MANI_01476]	Semantics of meta-class FunctionalClusterToDltLogSinkMapping
[TPS_MANI_01477]	Description of Core affinity
[TPS_MANI_01478]	Supported error handling scenarios in the context of state management
[TPS_MANI_01479]	Semantics of meta-class SoftwareClusterDependencyFormula
[TPS_MANI_01480]	Semantics of SoftwareClusterDesign.dependsOn
[TPS_MANI_01481]	Semantics of meta-class SoftwareClusterDependencyCompareCondition
[TPS_MANI_01482]	Semantics of SoftwareClusterDesign.conflictsTo
[TPS_MANI_01484]	Mapping of DiagnosticExtendedDataRecordElement to PortPrototype(s) on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01485]	Support of CryptoCertificateGroups
[TPS_MANI_01486]	Modeling of application that accesses a Crypto Certificate Group
[TPS_MANI_01487]	Support for the execution of operations in the context of SOVD
[TPS_MANI_01488]	Modeling of the DiagnosticSovdOperationInterface
[TPS_MANI_01489]	Support for data access in the context of SOVD
[TPS_MANI_01490]	Mapping of DiagnosticAbstractSovdContent to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01491]	Mapping of DiagnosticSovdOperation to a PPortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01492]	Standardized values for attribute DiagnosticSovdDataCategory.category
[TPS_MANI_01493]	Semantics of meta-class DiagnosticSovdContent
[TPS_MANI_01494]	Semantics of meta-class DiagnosticSovdContentElement





Number	Heading
[TPS_MANI_01495]	Modeling of hierarchical data structures using <code>DiagnosticSovdContentElement</code>
[TPS_MANI_01496]	<code>DiagnosticSovdArrayContentElement</code> can have fixed or variable size
[TPS_MANI_01497]	<code>DiagnosticSovdContentElement</code> can be declared optional
[TPS_MANI_01498]	Semantics of attribute <code>DiagnosticSovdPrimitiveContentElement.dataConstr.dataConstrRule.physConstrs</code>
[TPS_MANI_01499]	<code>InternalConstrs</code> is not supported in the context of a <code>DiagnosticSovdPrimitiveContentElement</code>
[TPS_MANI_01500]	Semantics of attribute <code>DiagnosticSovdPrimitiveContentElement.swDataDefProps.unit</code>
[TPS_MANI_01501]	Semantics of <code>DiagnosticSovdPrimitiveContentElement.type</code>
[TPS_MANI_01502]	Definition of <code>DiagnosticAccessPermission</code> for <code>DiagnosticSovdOperation</code>
[TPS_MANI_01503]	Semantics of <code>DiagnosticSovdOperationPrimitive</code>
[TPS_MANI_01504]	Semantics of <code>DiagnosticEnvSovdDataCondition</code>
[TPS_MANI_01505]	Semantics of <code>DiagnosticTroubleCodeProps.sovdSnapshotContent</code>
[TPS_MANI_01506]	Semantics of <code>DiagnosticTroubleCodeProps.legislatedSovdFreezeFrameContent</code>
[TPS_MANI_01507]	Semantics of <code>AbstractSuspendToRamInterface</code>
[TPS_MANI_01508]	Semantics of meta-class <code>StateManagementSuspendToRamActionItem</code>
[TPS_MANI_01509]	Semantics of <code>SuspendToRamSatelliteInterface</code>
[TPS_MANI_01510]	Mapping of <code>SuspendToRamModuleInstantiation</code> to a <code>PortPrototype</code> in the <code>suspend-to-RAM</code> satellite role
[TPS_MANI_01511]	Semantics of <code>SuspendToRamHubInterface</code>
[TPS_MANI_01512]	Mapping of <code>SuspendToRamModuleInstantiation</code> to a <code>PortPrototype</code> in the <code>suspend-to-RAM</code> hub role
[TPS_MANI_01513]	Semantics of <code>Executable.suspendToRamAwareness</code>
[TPS_MANI_01514]	Semantics of <code>DiagnosticSovdProps.singleElementSerialization</code>
[TPS_MANI_01515]	Mapping of <code>DiagnosticSovdConfigurationParameter</code> to <code>DiagnosticSovdContent</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_03336]	Semantics of <code>TraceSwitchConfig</code>
[TPS_MANI_03337]	The definition of the <code>namespace</code> of a <code>TraceSwitchConfig</code> may follow a hierarchical pattern
[TPS_MANI_03338]	Ordered definition of <code>TraceSwitchConfig.namespace</code>

Table F.67: Added Specification Items in R25-11

F.12.2 Changed Specification Items in R25-11

Number	Heading
[TPS_MANI_01112]	Semantics of SoftwareClusterDesign
[TPS_MANI_01116]	Reference to model elements included in an uploadable software package
[TPS_MANI_01119]	Reference to model elements from SoftwareClusterDesign
[TPS_MANI_01229]	Pre-allocation of a given ProcessDesign on a specific MachineDesign
[TPS_MANI_01230]	Semantics of DiagnosticProvidedDataMapping
[TPS_MANI_01329]	Reference to model elements in different SoftwareClusters
[TPS_MANI_01331]	Standardized values of attribute SoftwareClusterDesign.category and SoftwareCluster.category
[TPS_MANI_01347]	Definition of a DiagnosticDataElement used in the context of a DID obtained from a PPortPrototype typed by a DiagnosticDataElementInterface
[TPS_MANI_01348]	Definition of a DiagnosticDataElement used in the context of a DID obtained from a PPortPrototype typed by a DiagnosticDataIdentifierInterface
[TPS_MANI_01387]	Semantics of meta-class StateManagementActionList
[TPS_MANI_01396]	Semantics of meta-class DiagnosticSovdLock
[TPS_MANI_01399]	Modeling of the configuration of Service-oriented Vehicle Diagnostics
[TPS_MANI_01400]	Secure communication between SOVD Gateway and SOVD Server
[TPS_MANI_01401]	Support for TLS in vehicle-internal SOVD communication
[TPS_MANI_01402]	Identification of the SOVD Server
[TPS_MANI_01403]	External communication of the SOVD gateway
[TPS_MANI_01404]	Secure communication between SOVD gateway and SOVD Client
[TPS_MANI_01405]	Semantics of sub-classes of SoftwareClusterDiagnosticAddress
[TPS_MANI_01410]	Semantics of attribute SoftwareClusterDesign.installationBehavior
[TPS_MANI_01418]	Mapping of multiple DiagnosticConditions to a PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01424]	Semantics of DiagnosticSovdProximityChallengePortMapping
[TPS_MANI_01425]	Semantics of DiagnosticSovdAuthorizationPortMapping
[TPS_MANI_01426]	Mapping of DiagnosticSovdBulkData to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01427]	Mapping of DiagnosticSovdUpdate to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01428]	Mapping of DiagnosticSovdServiceInstance to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01429]	Mapping of DiagnosticSovdConfiguration to PortPrototype on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_01431]	Definition of SOVD service instance
[TPS_MANI_01432]	Semantics of DiagnosticSovdMethodPrimitive





Number	Heading
[TPS_MANI_01438]	Existence of <code>StateManagementStateMachineActionItem.overrideInitialState</code>
[TPS_MANI_01449]	Service validation in <code>SOVD</code> context
[TPS_MANI_01461]	Retrieve the status of the DoIP activation line to the diagnostic server instance
[TPS_MANI_01462]	Trigger the DoIP vehicle announcement at the diagnostic server instance
[TPS_MANI_03015]	TTL for Offer Service Entries
[TPS_MANI_03207]	IPsec Internet Key Exchange protocol configuration
[TPS_MANI_03514]	Expiration tolerance for <code>GlobalSupervision</code>
[TPS_MANI_03543]	Definition of time sync correction attributes
[TPS_MANI_03577]	Definition of <code>Arbitrary Message Header</code> ID

Table F.68: Changed Specification Items in R25-11

F.12.3 Deleted Specification Items in R25-11

Number	Heading
[TPS_MANI_01164]	Semantics of <code>SoftwareCluster.dependsOn</code>
[TPS_MANI_01214]	Semantics of <code>SoftwareCluster.conflictsTo</code>
[TPS_MANI_01215]	Semantics of meta-class <code>SoftwareClusterDependencyFormula</code>
[TPS_MANI_01217]	Semantics of meta-class <code>SoftwareClusterDependencyCompareCondition</code>
[TPS_MANI_01284]	Granularity of meta-class <code>RawDataStreamGrantDesign</code>
[TPS_MANI_01307]	Semantics of meta-class <code>EthernetRawDataStreamGrant</code>
[TPS_MANI_01397]	Standardized values of <code>DiagnosticDataIdentifier.category</code> of the usage in <code>SOVD</code> context
[TPS_MANI_01398]	Definition of an <i>SOVD data group</i>
[TPS_MANI_01430]	Mapping of <code>DiagnosticSovdConfigurationParameter</code> to <code>DiagnosticDataIdentifier</code> on the <i>AUTOSAR adaptive platform</i>
[TPS_MANI_03258]	Modeling of application designed as trust-master
[TPS_MANI_03266]	Semantics of <code>CryptoCertificateToCryptoKeySlotMapping</code>
[TPS_MANI_03628]	Standardized values of <code>ServiceInterface.category</code>

Table F.69: Deleted Specification Items in R25-11

F.12.4 Added Constraints in R25-11

Number	Heading
[constr_10629]	<code>DdsServiceInterfaceDeployment</code> shall cover all applicable elements of the corresponding <code>ServiceInterface</code>
[constr_10630]	<code>PPortPrototype</code> that is typed by a <code>DiagnosticDataIdentifierInterface</code> shall be mapped to a <code>DiagnosticDataIdentifier</code>
[constr_10631]	<code>PPortPrototype</code> that is typed by a <code>DiagnosticDataElementInterface</code> shall be mapped to a <code>DiagnosticDataElement</code>
[constr_10633]	Existence of references <code>StateManagementStateMachineActionItem.overrideInitialState</code> and <code>stopAgent</code>
[constr_10634]	<code>ClientServerOperation</code> aggregated by meta-class <code>DiagnosticDataIdentifierInterface</code> or meta-class <code>DiagnosticDataElementInterface</code>
[constr_10641]	Existence of reference in the role <code>StateManagementModuleInstantiation.maxActionListDuration</code>
[constr_10648]	Target of the reference in the role <code>DiagnosticDoIpActivationLinePortMapping.networkConfigurationDesign</code>
[constr_10649]	Existence of reference in the role <code>DiagnosticDoIpActivationLinePortMapping.networkConfigurationDesign</code>
[constr_10650]	Target of the reference in the role <code>DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.networkConfigurationDesign</code>
[constr_10651]	Existence of reference in the role <code>DiagnosticDoIpTriggerVehicleAnnouncementPortMapping.networkConfigurationDesign</code>
[constr_10652]	<code>SystemMappings</code> applicable for a <code>System</code> of category <code>MACHINE_DESIGN_EXTRACT</code>
[constr_10653]	Existence of attribute <code>UriDescription.uri</code>
[constr_10654]	Existence of <code>PersistencyFileRequiredComSpec</code>
[constr_10655]	Allowed range of values for attribute <code>ServiceInterfaceDeploymentElement.minimumSendInterval</code>
[constr_10657]	Multiplicity of reference in the role <code>ProcessDesignToMachineDesignMapping.machineDesign</code>
[constr_10658]	Multiplicity of the reference in the role <code>ProcessToMachineMapping.machine</code>
[constr_10659]	Consistency of references in the roles <code>ProcessDesignToMachineDesignMapping.machineDesign</code> and <code>shallRunOn</code> resp. <code>shallNotRunOn</code>
[constr_10660]	Usage of <code>shallRunOn</code> and <code>shallNotRunOn</code> references
[constr_10661]	Consistency of references <code>shallRunOn</code> and <code>shallNotRunOn</code>
[constr_10662]	Mutual exclusive existence of references <code>shallRunOn</code> and <code>shallNotRunOn</code>
[constr_10663]	Existence of attribute <code>DiagnosticCommonProps.authenticationTimeout</code>
[constr_10666]	Restriction for <code>StateManagementStateMachineActionItem</code>





Number	Heading
[constr_10682]	Restriction of the multiplicity of <code>DiagnosticExtendedDataRecordInterface.provide.argument</code>
[constr_10683]	Restriction for the data type of <code>DiagnosticExtendedDataRecordInterface.provide.argument</code>
[constr_10684]	Restriction for the applicability of <code>DiagnosticExtendedDataRecordClientPortMapping</code>
[constr_10685]	Restriction for the reference to an <code>RPortPrototype</code> typed by a <code>DiagnosticExtendedDataRecordInterface</code>
[constr_10686]	Multiplicity of reference in the role <code>DiagnosticExtendedDataRecordClientPortMapping.recordElement</code>
[constr_10690]	Existence of <code>CryptoAlgorithmDescription.cryptoAlgorithmId</code>
[constr_10691]	Existence of <code>CryptoAlgorithmDescription.cryptoKeyType</code>
[constr_10692]	Existence of aggregation in the role <code>DiagnosticSovdOperationInterface.start</code>
[constr_10693]	Existence of reference in the role <code>DiagnosticSovdAccessArgument.contentObject</code>
[constr_10694]	Restriction for <code>DiagnosticSovdAccessOperation</code> aggregated by a <code>DiagnosticSovdContentInterface</code>
[constr_10695]	Existence of <code>DiagnosticSovdAccessOperation.argument</code> if <code>DiagnosticSovdAccessOperation</code> that is aggregated in the role <code>DiagnosticSovdContentElementInterface.read</code>
[constr_10696]	Target of the reference <code>DiagnosticSovdContentPortMapping.pPortPrototypeInExecutable</code>
[constr_10697]	<code>DiagnosticSovdContentPortMapping</code> maps on the level of <code>SOVD Data</code>
[constr_10698]	<code>DiagnosticSovdContentPortMapping</code> maps on the level of <code>SOVD Data Element</code>
[constr_10699]	Existence of the Reference in the role <code>DiagnosticSovdContentPortMapping.pPortPrototypeInExecutable</code>
[constr_10700]	Existence of the Reference in the role <code>DiagnosticSovdContentPortMapping.content</code>
[constr_10701]	Existence of the Reference in the role <code>DiagnosticSovdContentPortMapping.process</code>
[constr_10702]	Existence of the Reference in the role <code>DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable</code>
[constr_10703]	Existence of the Reference in the role <code>DiagnosticSovdOperationPortMapping.sovdOperation</code>
[constr_10704]	Existence of the Reference in the role <code>DiagnosticSovdOperationPortMapping.process</code>
[constr_10705]	Restriction regarding references in the roles <code>DiagnosticSovdDataCategory.group</code> and <code>DiagnosticSovdData.sovdGroup</code>
[constr_10706]	Existence of reference in the role <code>DiagnosticSovdData.sovdDataCategory</code>
[constr_10707]	Relation of the values of attributes <code>minNumberOfElements</code> and <code>maxNumberOfElements</code>





Number	Heading
[constr_10708]	<code>DiagnosticSovdContentElement</code> aggregated in the role <code>DiagnosticSovdArrayContentElement.element</code> shall not be declared <i>optional</i>
[constr_10711]	Existence of attribute <code>DiagnosticSovdArrayContentElement.maxNumberOfElements</code>
[constr_10712]	Allowed roles within <code>SwDataDefProps</code> in the context of <code>DiagnosticSovdPrimitiveContentElement</code>
[constr_10713]	Target of the reference <code>DiagnosticSovdOperationPortMapping.pPortPrototypeInExecutable</code>
[constr_10714]	<code>PPortPrototype</code> that is typed by a <code>DiagnosticSovdOperationInterface</code> as a mapping target
[constr_10715]	<code>DiagnosticSovdOperation</code> shall not refer to <code>DiagnosticSovdMethod</code>
[constr_10716]	Existence of <code>DiagnosticSovdOperation.start</code>
[constr_10717]	Existence of <code>DiagnosticSovdOperation.proximityProofRequired</code>
[constr_10718]	Existence of <code>DiagnosticEnvSovdDataCondition.compareValue</code>
[constr_10719]	Existence of <code>DiagnosticEnvSovdDataCondition.contentElement</code>
[constr_10720]	Restriction for the value of <code>StateManagementSuspendToRamActionItem.maxActionItemDuration</code>
[constr_10721]	Target of <code>AbstractSuspendToRamMapping.pPortPrototypeInExecutable</code>
[constr_10722]	Restriction for <code>PPortPrototype</code> that is typed by a <code>SuspendToRamSatelliteInterface</code>
[constr_10723]	Existence of <code>SuspendToRamSatelliteMapping.moduleInstantiation</code>
[constr_10724]	Existence of <code>SuspendToRamSatelliteMapping.pPortPrototypeInExecutable</code>
[constr_10725]	Existence of <code>SuspendToRamSatelliteMapping.process</code>
[constr_10726]	Target of <code>AbstractSuspendToRamMapping.pPortPrototypeInExecutable</code>
[constr_10727]	Restriction for <code>PPortPrototype</code> that is typed by a <code>SuspendToRamHubInterface</code>
[constr_10728]	Restriction for <code>SuspendToRamHubMapping.moduleInstantiation</code>
[constr_10729]	Existence of <code>SuspendToRamHubMapping.moduleInstantiation</code>
[constr_10730]	Existence of <code>SuspendToRamHubMapping.pPortPrototypeInExecutable</code>
[constr_10731]	Existence of <code>SuspendToRamHubMapping.process</code>
[constr_10732]	Existence of attributes <code>DiagnosticExtendedDataRecord.trigger</code> and <code>update</code> on the <i>AUTOSAR adaptive platform</i>
[constr_10733]	Uniqueness of reference from <code>DiagnosticSovdConfigContentMapping</code> to <code>DiagnosticSovdConfigurationParameter</code>
[constr_10734]	Existence of the reference in the role <code>DiagnosticSovdConfigContentMapping.serviceInstance</code>
[constr_10735]	Existence of the reference in the role <code>DiagnosticSovdConfigContentMapping.content</code>
[constr_3795]	No Platform Health Management supervision for non-reporting <i>Executables</i>
[constr_3798]	Applicable attributes for an Ethernet node on the adaptive platform





Number	Heading
[constr_3823]	Existence of <code>GlobalSupervision.expiredSupervisionTolerance</code>
[constr_9350]	All Provided Service Instances using the same UDP endpoint shall use the same DTLS SERVER configuration settings
[constr_9351]	All Provided Service Instances using the same TCP endpoint shall use the same TLS SERVER configuration settings
[constr_9352]	Mutual exclusive existence of <code>RemoteEndpointConfiguration.tcpPort</code> and <code>RemoteEndpointConfiguration.udpPort</code>
[constr_9353]	Mutual exclusive existence of <code>RemoteEndpointConfiguration.ipv4Address</code> and <code>RemoteEndpointConfiguration.ipv6Address</code>
[constr_9356]	Upper multiplicity of reference in the role <code>DoIpNetworkConfigurationDesign.networkConfiguration</code>
[constr_9370]	<code>ApSomeipTransformationProps</code> shall be defined at most once for a <code>ServiceInterface</code> element
[constr_9392]	Existence of reference <code>TraceSwitchConfig.traceMessage</code>
[constr_9393]	Existence of attribute <code>TraceSwitchConfig.traceSwitch</code>
[constr_9394]	Existence of reference <code>TraceSwitchConfig.executable</code>

Table F.70: Added Constraints in R25-11

F.12.5 Changed Constraints in R25-11

Number	Heading
[constr_10029]	<code>ServiceInterfaceDeployment</code> (except <code>DdsServiceInterfaceDeployment</code>) shall cover all elements of the corresponding <code>ServiceInterface</code>
[constr_10037]	Existence of attribute <code>TagWithOptionalValue.sequenceOffset</code> in the context of attribute <code>capabilityRecord</code> owned by <code>ProvidedSomeipServiceInstance</code> , <code>RequiredSomeipServiceInstance</code> , or <code>AbstractServiceInstance</code>
[constr_10154]	Multiplicity of reference in the role <code>ProcessDesignToMachineDesignMapping.processDesign</code>
[constr_10172]	Multiplicity of attribute <code>Processor.core</code>
[constr_10173]	Multiplicity of attribute <code>ProcessorCore.coreId</code>
[constr_10386]	Existence of references <code>StateManagementStateMachineActionItem.startAgent</code> and <code>stopAgent</code>
[constr_10400]	Existence of <code>SovdServerInstantiation.componentQualifier</code>
[constr_10401]	Existence of <code>SovdGatewayLocalEndpointTcpConfig.tcpPort</code>
[constr_10402]	Existence of <code>SovdGatewayEthernetCredentials.ipv4Address</code> vs. <code>SovdGatewayEthernetCredentials.ipv6Address</code>
[constr_10403]	Existence of <code>SovdGatewayEthernetCredentials.udpPort</code>
[constr_10404]	Existence of <code>SoftwareClusterSovdAddress.componentQualifier</code>





Number	Heading
[constr_10410]	Value of <code>SoftwareClusterDesign.installationBehavior</code> for a <code>SoftwareClusterDesign</code> of category <code>PLATFORM_CORE</code>
[constr_10442]	Restriction for the applicability of <code>DiagnosticSovdProximityChallengePortMapping</code>
[constr_10443]	Restriction for the applicability of <code>DiagnosticSovdProximityChallengeInterface</code>
[constr_10444]	Existence of <code>DiagnosticSovdProximityChallengePortMapping</code>
[constr_10445]	Existence of the reference in the role <code>DiagnosticSovdProximityChallengePortMapping.pPortPrototypeInExecutable</code>
[constr_10446]	Existence of the reference in the role <code>DiagnosticSovdProximityChallengePortMapping.process</code>
[constr_10447]	Restriction for the applicability of <code>DiagnosticSovdAuthorizationPortMapping</code>
[constr_10448]	Restriction for the applicability of <code>DiagnosticSovdAuthorizationInterface</code>
[constr_10449]	Existence of <code>DiagnosticSovdAuthorizationPortMapping</code>
[constr_10450]	Existence of the reference in the role <code>DiagnosticSovdAuthorizationPortMapping.pPortPrototypeInExecutable</code>
[constr_10451]	Existence of the reference in the role <code>DiagnosticSovdAuthorizationPortMapping.process</code>
[constr_10452]	Restriction for the applicability of <code>DiagnosticSovdBulkDataPortMapping</code>
[constr_10453]	Restriction for the applicability of <code>DiagnosticSovdBulkDataInterface</code>
[constr_10454]	Uniqueness of reference from <code>DiagnosticSovdBulkDataPortMapping</code> to <code>DiagnosticSovdBulkData</code>
[constr_10455]	Existence of the reference in the role <code>DiagnosticSovdBulkDataPortMapping.serviceInstance</code>
[constr_10456]	Existence of the reference in the role <code>DiagnosticSovdBulkDataPortMapping.pPortPrototypeInExecutable</code>
[constr_10457]	Existence of the reference in the role <code>DiagnosticSovdBulkDataPortMapping.process</code>
[constr_10458]	Restriction for the applicability of <code>DiagnosticSovdUpdatePortMapping</code>
[constr_10459]	Restriction for the applicability of <code>DiagnosticSovdUpdateInterface</code>
[constr_10460]	Uniqueness of reference from <code>DiagnosticSovdUpdatePortMapping</code> to <code>DiagnosticSovdUpdate</code>
[constr_10461]	Existence of the reference in the role <code>DiagnosticSovdUpdatePortMapping.serviceInstance</code>
[constr_10462]	Existence of the reference in the role <code>DiagnosticSovdUpdatePortMapping.pPortPrototypeInExecutable</code>
[constr_10463]	Existence of the reference in the role <code>DiagnosticSovdUpdatePortMapping.process</code>
[constr_10464]	Restriction for the applicability of <code>DiagnosticSovdServiceValidationPortMapping</code>





Number	Heading
[constr_10465]	Restriction for the applicability of DiagnosticSovdServiceValidationInterface
[constr_10466]	Existence of the reference in the role DiagnosticSovdServiceValidationPortMapping.pPortPrototypeInExecutable
[constr_10467]	Existence of the reference in the role DiagnosticSovdServiceValidationPortMapping.process
[constr_10468]	Restriction for the applicability of DiagnosticSovdConfigurationPortMapping
[constr_10469]	Restriction for the applicability of DiagnosticSovdConfigurationInterface
[constr_10470]	Uniqueness of reference from DiagnosticSovdConfigurationPortMapping to DiagnosticSovdConfiguration
[constr_10471]	Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.serviceInstance
[constr_10472]	Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.pPortPrototypeInExecutable
[constr_10473]	Existence of the reference in the role DiagnosticSovdConfigurationPortMapping.process
[constr_10477]	Existence of DiagnosticSovdLog
[constr_10478]	Existence of DiagnosticSovdUpdate
[constr_10479]	Restriction on values of attribute DiagnosticSovdMethodPrimitive.category aggregated in the role put in the context of SOVD Update
[constr_10480]	Restriction on value of attribute DiagnosticSovdMethodPrimitive.category aggregated in the role get in the context of SOVD Update
[constr_10481]	Restriction on values of attribute DiagnosticSovdMethodPrimitive.category aggregated in the role get in the context of SOVD Log
[constr_10482]	Restriction on values of attribute DiagnosticSovdMethodPrimitive.category aggregated in the roles put and delete in the context of SOVD Log
[constr_10483]	Applicable values of baseTypeEncoding in the context of the definition of a DiagnosticDataElement
[constr_10490]	DiagnosticDataElement shall be directly or indirectly the target of a reference owned by a subclass of DiagnosticMapping
[constr_10567]	Existence of DiagnosticSovdMethod.get resp. delete in the context of DiagnosticSovdFaultMemoryAccess
[constr_10612]	Standardized values for attribute CryptoKeySlotDesignDescription.cryptoObjectType
[constr_1507]	PortInterfaceToDataTypeMapping is only applicable to PortInterfaces that contain modeled data types
[constr_1549]	Value of ProcessorCore.coreId
[constr_1693]	Relation of Executable , ProcessDesign , and Process
[constr_1697]	Restriction for ClientServerOperation aggregated by a DiagnosticDataIdentifierInterface
[constr_1785]	Restriction regarding the reference into another SoftwareCluster





Number	Heading
[constr_3421]	Fibex elements applicable for a System of category MACHINE_DESIGN_EXTRACT
[constr_3650]	headerId required in case of Arbitrary Message Header
[constr_5239]	Predefined values for CryptoKeySlotContentAllowedUsage.allowedKeyslotUsage
[constr_5291]	Allowed usage of LTMessageCollectionToPortPrototypeMapping.rPort

Table F.71: Changed Constraints in R25-11

F.12.6 Deleted Constraints in R25-11

Number	Heading
[constr_10007]	Existence of ProcessExecutionError.executionError
[constr_10008]	Value of ProcessExecutionError.executionError
[constr_10195]	Multiplicity of attribute DoIpNetworkConfiguration.vehicleIdentificationSyncStatus
[constr_10211]	Multiplicity of the reference in the role CryptoCertificateToCryptoKeySlotMapping.cryptoCertificate
[constr_10474]	Uniqueness of reference from DiagnosticSovdConfigurationDataIdentifierMapping to DiagnosticSovdConfigurationParameter
[constr_10475]	Existence of the reference in the role DiagnosticSovdConfigurationDataIdentifierMapping.serviceInstance
[constr_10476]	Existence of the reference in the role DiagnosticSovdConfigurationDataIdentifierMapping.dataIdentifier
[constr_10488]	Existence of attribute DiagnosticCommonProps.authenticationTimeout
[constr_11000]	SomeipEventDeployment.eventReceptionDefaultValue or UserDefinedEventDeployment.eventReceptionDefaultValue shall not be specified in the physical domain
[constr_3639]	Existence of SupervisionMode.SupervisionMode
[constr_5386]	Existence of Executable.traceSwitchConfiguration
[constr_5387]	Existence of reference Executable.traceSwitchConfiguration.traceMessage
[constr_5388]	Existence of attribute Executable.traceSwitchConfiguration.traceSwitch

Table F.72: Deleted Constraints in R25-11

F.12.7 Added Advisories in R25-11

Number	Heading
[advisory_01017]	Existence of <code>IdsPlatformInstantiation.networkInterface</code> if <code>IdsmModuleInstantiation.reportableSecurityEvent</code> exists
[advisory_01019]	Existence of attribute <code>DiagnosticSovdArrayContentElement.element</code>
[advisory_01020]	Existence of attribute <code>DiagnosticSovdArrayContentElement.minNumberOfElements</code>
[advisory_01021]	Existence of attribute <code>DiagnosticSovdRecordContentElement.element</code>
[advisory_03004]	Definition of SOME/IP serialization properties via <code>ApSomeipTransformationProps</code>

Table F.73: Added Advisories in R25-11

F.12.8 Changed Advisories in R25-11

none

F.12.9 Deleted Advisories in R25-11

none

G Splitable Elements in the Scope of this Document

This chapter contains a table of all model elements stereotyped «atpSplitable» in the scope of this document.

Each entry in the table consists of the identification of the specific model element itself and the applicable value of the tagged value `atp.Splitkey`.

For more information about the concept of splitable model elements and how these shall be treated please refer to [8, TPS Generic Structure Template].

<i>Name of splitable element</i>	<i>Splitkey</i>
AbstractDolpPortMapping.process	process
AdaptiveApplicationSwComponentType.internalBehavior	internalBehavior.shortName, internalBehavior.variationPoint.shortLabel
ApmcChoiceContainerDef.choice	choice.shortName
ApmcContainerValue.container	container.shortName
ApmcContainerValue.element	element.shortName
ApmcEnumerationParamDef.literal	literal.shortName
ApmcFunctionalClusterDef.container	container.shortName
ApmcFunctionalClusterValue.container	container.shortName
ApmcParamConfContainerDef.container	container.shortName
ApmcParamConfContainerDef.element	element.shortName
CmModuleInstantiation.grant	grant
CpplImplementationDataTypeElement.swDataDefProps	swDataDefProps
CryptoKeySlotUserDesign.keySlotUsage	keySlotUsage.shortName
CryptoModuleInstantiation.cryptoCertificate	cryptoCertificate.shortName
CryptoModuleInstantiation.cryptoCertificateGroup	cryptoCertificateGroup.shortName
CryptoModuleInstantiation.cryptoProvider	cryptoProvider.shortName
CryptoProvider.keySlot	keySlot.shortName
DiagnosticAuthenticationPortMapping.process	process
DiagnosticClearConditionGroup.clearCondition	clearCondition
DiagnosticClearConditionPortMapping.process	process
DiagnosticDataPortMapping.process	process
DiagnosticExternalAuthenticationPortMapping.process	process
DiagnosticIndicatorPortMapping.process	process
DiagnosticMemoryDestinationPortMapping.process	process
DiagnosticMonitorPortMapping.process	process
DiagnosticMultipleConditionPortMapping.process	process
DiagnosticMultipleEventPortMapping.process	process
DiagnosticMultipleMonitorPortMapping.process	process
DiagnosticSecurityLevelPortMapping.process	process
DiagnosticServiceGenericMapping.process	process
DiagnosticServiceValidationMapping.process	process
DiagnosticSovdAuthorizationPortMapping.process	process
DiagnosticSovdBulkDataPortMapping.process	process





Name of splittable element	Splitkey
DiagnosticSovdConfigurationPortMapping.process	process
DiagnosticSovdContent.element	element.shortName
DiagnosticSovdPrimitiveContentElement.swDataDefProps	swDataDefProps
DiagnosticSovdProximityChallengePortMapping.process	process
DiagnosticSovdUpdatePortMapping.process	process
GlobalSupervision.supervisionMode	supervisionMode.shortName
IdsmModuleInstantiation.reportableSecurityEvent	reportableSecurityEvent
IdsPlatformInstantiation.idsTimeBase	idsTimeBase
Machine.environmentVariable	environmentVariable
Machine.moduleInstantiation	moduleInstantiation.shortName
Machine.secureCommunicationDeployment	secureCommunicationDeployment.shortName
MachineDesign.communicationConnector	communicationConnector.shortName
MachineDesign.communicationController	communicationController.shortName
MachineDesign.cryptoKeySlot	cryptoKeySlot.shortName
MachineDesign.serviceDiscoveryConfig	serviceDiscoveryConfig
NmNetworkHandle.partialNetwork	partialNetwork
PersistencyDeployment.redundancyHandling	redundancyHandling
PersistencyInterface.redundancyHandling	redundancyHandling
PlatformHealthManagementContribution.checkpoint	checkpoint.shortName
PlatformHealthManagementContribution.globalSupervision	globalSupervision.shortName
PlatformHealthManagementContribution.healthChannel	healthChannel.shortName
PlatformHealthManagementContribution.supervisionModeCondition	supervisionModeCondition.shortName
ServiceInstanceToPortPrototypeMapping.process	process
ServiceInterface.event	event.shortName, event.variationPoint.shortLabel
ServiceInterface.field	field.shortName, field.variationPoint.shortLabel
ServiceInterface.method	method.shortName, method.variationPoint.shortLabel
ServiceInterface.trigger	trigger.shortName, trigger.variationPoint.shortLabel
ServiceInterfaceDeployment.eventDeployment	eventDeployment.shortName, eventDeployment.variationPoint.shortLabel
ServiceInterfaceDeployment.fieldDeployment	fieldDeployment.shortName, fieldDeployment.variationPoint.shortLabel
ServiceInterfaceDeployment.methodDeployment	methodDeployment.shortName, methodDeployment.variationPoint.shortLabel
SoftwareCluster.artifactChecksum	artifactChecksum.shortName
SoftwareCluster.containedARElement	containedARElement
SoftwareCluster.containedPackageElement	containedPackageElement
SoftwareCluster.moduleInstantiation	moduleInstantiation
SoftwareClusterDesign.conflictsTo	conflictsTo
SoftwareClusterDesign.containedProcess	containedProcess
SoftwareClusterDesign.dependsOn	dependsOn
SoftwareClusterDesign.diagnosticContribution	diagnosticContribution
SoftwareClusterDesign.dolpLogicalAddress	dolpLogicalAddress
SoftwareClusterDesign.requiredARElement	requiredARElement
SoftwareClusterDesign.requiredDesignElement	requiredDesignElement





<i>Name of splitable element</i>	<i>Splitkey</i>
SoftwarePackage.primaryDownloadUri	primaryDownloadUri.shortName
SoftwarePackage.secondaryDownloadUri	secondaryDownloadUri.shortName
SomeipDataPrototypeTransformationProps.networkRepresentation	networkRepresentation
StateManagementModuleInstantiation.actionItemList	actionItemList.shortName
StateManagementModuleInstantiation.notification	notification.shortName
StateManagementModuleInstantiation.request	request.shortName

Table G.1: Usage of splitable elements

H Variation Points in the Scope of this Document

This chapter contains a table of all model elements stereotyped `<<atpVariation>>` in the scope of this document.

Each entry in the table consists of the identification of the model element itself and the applicable value of the tagged value `vh.latestBindingTime`.

For more information about the concept of variation points and how model elements that contain variation points shall be treated please refer to [8, TPS Generic Structure Template].

<i>Variation Point</i>	<i>Latest Binding Time</i>
AdaptiveApplicationSwComponentType.internalBehavior	preCompileTime
CppImplementationDataType.arraySize	preCompileTime
ServiceInterface.event	blueprintDerivationTime
ServiceInterface.field	blueprintDerivationTime
ServiceInterface.method	blueprintDerivationTime
ServiceInterface.trigger	blueprintDerivationTime
ServiceInterfaceDeployment.eventDeployment	blueprintDerivationTime
ServiceInterfaceDeployment.fieldDeployment	blueprintDerivationTime
ServiceInterfaceDeployment.methodDeployment	blueprintDerivationTime

Table H.1: Usage of variation points

I Upstream Mapping

The content of this appendix chapter is *informative* in nature and shall **not** be considered as *normative* content.

I.1 Introduction

This chapter describes the mapping of the APMC Configuration parameters (M1 model) onto the meta-classes and attributes of the AUTOSAR upstream templates (in this case: Manifest).

The relationships between upstream templates and APMC Configuration are described in order to answer typical questions like:

- How shall a supplier use the information in a Design Description in order to fulfill the needs defined by the systems engineer?
- How is a tool vendor supposed to generate an APMC Configuration Description out of a Design Description?

Please note that the upstream mapping tables contain the following columns:

Column Name	Column Meaning
Functional Cluster	Name of Functional Cluster
Functional Cluster Context	Reference to parameter container
APMC Parameter	Name of the APMC parameter
Kind of APMC Parameter	M2 Class used to type the parameter
APMC Description	Description from the configuration document
Template Description	Class note or attribute note of the M2 model element
M2 Parameter	Name of the upstream template model element
Mapping Rule	Textual description on how to transform between Design and Target Configuration domains
Mapping Type	One of: local no mapping needed since parameter local to Target Configuration partial some data can be automatically mapped but not all full all data can be automatically mapped
Mapping Status	Indication of life-cycle status of the mapping
APMC Parameter ID	ID of the parameter in the respective SWS document (may be empty if the mapping is owned by an enumeration literal)

Table I.1: Upstream mapping table content

I.2 Persistency

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyChecksum		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container provides the ability to describe redundancy via a checksum approach.		
Template Description		
Abstract class that defines the common attributes for implementations of redundancy.		
M2 Parameter		
PersistencyRedundancyChecksum		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00030]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum/PersistencyRedundancyChecksumChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyCrc		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container is used to configure a CRC-based cchecksum.		
Template Description		
This meta-class formally describes the usage of a CRC for the implementation of redundancy.		
M2 Parameter		
PersistencyRedundancyCrc		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00032]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum/PersistencyRedundancyChecksumChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyHash		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container is used to configure a hash-based cchecksum.		
Template Description		
This meta-class formally describes the usage of a Hash for the implementation of redundancy.		





M2 Parameter	
PersistencyRedundancyHash	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00033]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum/PersistencyRedundancyChecksumChoice/PersistencyRedundancyHash
APMC Parameter	Kind of APMC Parameter
InitializationVectorLength	APMC-INTEGER-PARAM-DEF
APMC Description	
Length of the initialization vector in bits.	
Template Description	
Length of the initialization vector.	
M2 Parameter	
PersistencyRedundancyHash.initializationVectorLength	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00034]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum
APMC Parameter	Kind of APMC Parameter
RedundancyChecksumAlgorithmFamily	APMC-STRING-PARAM-DEF
APMC Description	
This attribute identifies the algorithm family that is used to execute the CRC/Hash.	
Template Description	
This attribute identifies the algorithm family that is used to execute the CRC/Hash.	
M2 Parameter	
PersistencyRedundancyChecksum.algorithmFamily	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00038]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum





APMC Parameter	Kind of APMC Parameter
RedundancyChecksumLength	APMC-INTEGER-PARAM-DEF
APMC Description	
This parameter describes the length of the CRC/Hash in the unit bits.	
Template Description	
This attribute describes the length of the CRC/Hash in the unit bits.	
M2 Parameter	
PersistencyRedundancyChecksum.length	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00037]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/ PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/Persistency RedundancyHandlingChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyMOutOfN		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container provides the ability to describe redundancy via an "M out of N" approach. In this case N is the number of copies created and M is the minimum number of identical copies required for a reliable read access to the data.		
Template Description		
This meta-class provides the ability to describe redundancy via an "M out of N" approach. In this case N is the number of copies created and M is the minimum number of identical copies to justify a reliable read access to the data.		
M2 Parameter		
PersistencyRedundancyMOutOfN		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00027]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/ PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/Persistency RedundancyHandlingChoice/PersistencyRedundancyMOutOfN	
APMC Parameter		Kind of APMC Parameter
RedundancyM		APMC-INTEGER-PARAM-DEF
APMC Description		
This configuration parameter represents the "M" coordinate in the "M out of N" scheme.		
Template Description		
This attribute represents the "M" coordinate in the "M out of N" scheme.		
M2 Parameter		
PersistencyRedundancyMOutOfN.m		
Mapping Rule		Mapping Type
1:1 mapping		full





Mapping Status	APMC Parameter ID
valid	[APMC_PER_00028]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyMOutOfN	
APMC Parameter		Kind of APMC Parameter
RedundancyN		APMC-INTEGER-PARAM-DEF
APMC Description		
This configuration parameter represents the "N" coordinate in the "M out of N" scheme.		
Template Description		
This attribute represents the "N" coordinate in the "M out of N" scheme.		
M2 Parameter		
PersistencyRedundancyMOutOfN.n		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00029]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyHandlingScope		APMC-ENUMERATION-PARAM-DEF
APMC Description		
This parameter controls the scope on which the redundancy handling is applied.		
Template Description		
This attribute controls the scope in which the redundancy handling is applied.		
M2 Parameter		
PersistencyRedundancyHandling.scope		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00025]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingScope	
APMC Parameter		Kind of APMC Parameter
SCOPE_ELEMENT		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The redundancy handling shall be applied on element level (for all key-value pairs and files).		
Template Description		





The redundancy handling shall be applied on element level (key-value pair and file).	
M2 Parameter	
PersistencyRedundancyHandlingScopeEnum.persistencyRedundancyHandlingScopeElement	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingScope	
APMC Parameter		Kind of APMC Parameter
SCOPE_STORAGE		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The redundancy handling shall be applied on storage level (for the whole key-value storage and file storage).		
Template Description		
The redundancy handling shall be applied on storage (key-value storage and file storage) level.		
M2 Parameter		
PersistencyRedundancyHandlingScopeEnum.persistencyRedundancyHandlingScopeStorage		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/UpdateStrategy	
APMC Parameter		Kind of APMC Parameter
DELETE		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to delete the value of the respective data item.		
Template Description		
PersistencyElementLevelUpdateStrategyEnum.delete: The update strategy is to delete the value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.delete: The update strategy is to delete all values on the level of the respective collection.		
M2 Parameter		
PersistencyElementLevelUpdateStrategyEnum.delete, PersistencyCollectionLevelUpdateStrategyEnum.delete		
Mapping Rule		Mapping Type
If DELETE is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If DELETE is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyCommon/UpdateStrategy	
APMC Parameter		Kind of APMC Parameter
KEEP_EXISTING		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to keep the existing value of the respective data item.		
Template Description		
PersistencyElementLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing values on the level of the respective collection.		
M2 Parameter		
PersistencyElementLevelUpdateStrategyEnum.keepExisting , PersistencyCollectionLevelUpdateStrategyEnum.keepExisting		
Mapping Rule		Mapping Type
If KEEP_EXISTING is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If KEEP_EXISTING is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection	
APMC Parameter		Kind of APMC Parameter
PersistencyFile		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container represents a file in the context of the enclosing file collection.		
Template Description		
This meta-class has the ability to represent a file at design time such that it is possible to configure the behavior for accessing the represented file at run-time.		
M2 Parameter		
PersistencyFileElement		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00016]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection/PersistencyFile	
APMC Parameter		Kind of APMC Parameter
ContentUri		APMC-STRING-PARAM-DEF
APMC Description		
This attribute represents the URI that identifies the initial content of the PersistencyFile.		
Template Description		
This attribute represents the URI that identifies the initial content of the PersistencyFile.		





M2 Parameter	
<code>PersistencyFileElement.contentUri</code>	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00017]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection/PersistencyFile
APMC Parameter	Kind of APMC Parameter
ElementUpdateStrategy	APMC-ENUMERATION-PARAM-DEF
APMC Description	
This attribute can be used to specify the update strategy on element level, i.e. for a single key-value pair or file.	
Template Description	
This attribute can be used to specify the update strategy of the respective PersistencyInterfaceElement.	
M2 Parameter	
<code>PersistencyInterfaceElement.updateStrategy</code>	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00036]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection/PersistencyFile/ElementUpdateStrategy
APMC Parameter	Kind of APMC Parameter
DELETE	APMC-ENUMERATION-LITERAL-DEF
APMC Description	
The update strategy is to delete the value of the respective data item.	
Template Description	
PersistencyElementLevelUpdateStrategyEnum.delete: The update strategy is to delete the value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.delete: The update strategy is to delete all values on the level of the respective collection.	
M2 Parameter	
<code>PersistencyElementLevelUpdateStrategyEnum.delete</code> , <code>PersistencyCollectionLevelUpdateStrategyEnum.delete</code>	
Mapping Rule	Mapping Type
If DELETE is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If DELETE is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.	full
Mapping Status	APMC Parameter ID
valid	

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection/PersistencyFile/ElementUpdateStrategy	
APMC Parameter		Kind of APMC Parameter
KEEP_EXISTING		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to keep the existing value of the respective data item.		
Template Description		
PersistencyElementLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing values on the level of the respective collection.		
M2 Parameter		
PersistencyElementLevelUpdateStrategyEnum.keepExisting , PersistencyCollectionLevelUpdateStrategyEnum.keepExisting		
Mapping Rule		Mapping Type
If KEEP_EXISTING is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If KEEP_EXISTING is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection/PersistencyFile/ElementUpdateStrategy	
APMC Parameter		Kind of APMC Parameter
OVERWRITE		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to overwrite the value of this element.		
Template Description		
The update strategy is to overwrite the respective data item.		
M2 Parameter		
PersistencyElementLevelUpdateStrategyEnum.overwrite		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyFileStorageCollection/PersistencyFileStorage/PersistencyFileCollection/PersistencyFile	
APMC Parameter		Kind of APMC Parameter
FileName		APMC-STRING-PARAM-DEF
APMC Description		
This attribute holds filename part of the storage location for the PersistencyFile, e.g. file on the file system.		
Template Description		
This attribute holds the filename part of the storage location, e.g. file on the file system.		





M2 Parameter	
PersistencyFileElement.fileName	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00018]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyChecksum		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container provides the ability to describe redundancy via a checksum approach.		
Template Description		
Abstract class that defines the common attributes for implementations of redundancy.		
M2 Parameter		
PersistencyRedundancyChecksum		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00030]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksumChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyCrc		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container is used to configure a CRC-based checksum.		
Template Description		
This meta-class formally describes the usage of a CRC for the implementation of redundancy.		
M2 Parameter		
PersistencyRedundancyCrc		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00032]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum/PersistencyRedundancyChecksumChoice	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyHash		APMC-PARAM-CONF-CONTAINER-DEF
APMC Description		
This container is used to configure a hash-based cchecksum.		
Template Description		
This meta-class formally describes the usage of a Hash for the implementation of redundancy.		
M2 Parameter		
PersistencyRedundancyHash		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00033]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum/PersistencyRedundancyChecksumChoice/PersistencyRedundancyHash	
APMC Parameter		Kind of APMC Parameter
InitializationVectorLength		APMC-INTEGER-PARAM-DEF
APMC Description		
Length of the initialization vector in bits.		
Template Description		
Length of the initialization vector.		
M2 Parameter		
PersistencyRedundancyHash.initializationVectorLength		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00034]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum	
APMC Parameter		Kind of APMC Parameter
RedundancyChecksumAlgorithmFamily		APMC-STRING-PARAM-DEF
APMC Description		
This attribute identifies the algorithm family that is used to execute the CRC/Hash.		
Template Description		
This attribute identifies the algorithm family that is used to execute the CRC/Hash.		
M2 Parameter		





PersistencyRedundancyChecksum.algorithmFamily	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00038]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyChecksum
APMC Parameter	Kind of APMC Parameter
RedundancyChecksumLength	APMC-INTEGER-PARAM-DEF
APMC Description	
This parameter describes the length of the CRC/Hash in the unit bits.	
Template Description	
This attribute describes the length of the CRC/Hash in the unit bits.	
M2 Parameter	
PersistencyRedundancyChecksum.length	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00037]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice
APMC Parameter	Kind of APMC Parameter
PersistencyRedundancyMOutOfN	APMC-PARAM-CONF-CONTAINER-DEF
APMC Description	
This container provides the ability to describe redundancy via an "M out of N" approach. In this case N is the number of copies created and M is the minimum number of identical copies required for a reliable read access to the data.	
Template Description	
This meta-class provides the ability to describe redundancy via an "M out of N" approach. In this case N is the number of copies created and M is the minimum number of identical copies to justify a reliable read access to the data.	
M2 Parameter	
PersistencyRedundancyMOutOfN	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00027]

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyMOutOfN





APMC Parameter		Kind of APMC Parameter
RedundancyM		APMC-INTEGER-PARAM-DEF
APMC Description		
This configuration parameter represents the "M" coordinate in the "M out of N" scheme.		
Template Description		
This attribute represents the "M" coordinate in the "M out of N" scheme.		
M2 Parameter		
PersistencyRedundancyMOutOfN.m		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00028]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingChoice/PersistencyRedundancyMOutOfN	
APMC Parameter		Kind of APMC Parameter
RedundancyN		APMC-INTEGER-PARAM-DEF
APMC Description		
This configuration parameter represents the "N" coordinate in the "M out of N" scheme.		
Template Description		
This attribute represents the "N" coordinate in the "M out of N" scheme.		
M2 Parameter		
PersistencyRedundancyMOutOfN.n		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00029]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling	
APMC Parameter		Kind of APMC Parameter
PersistencyRedundancyHandlingScope		APMC-ENUMERATION-PARAM-DEF
APMC Description		
This parameter controls the scope on which the redundancy handling is applied.		
Template Description		
This attribute controls the scope in which the redundancy handling is applied.		
M2 Parameter		
PersistencyRedundancyHandling.scope		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		[APMC_PER_00025]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingScope	
APMC Parameter		Kind of APMC Parameter
SCOPE_ELEMENT		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The redundancy handling shall be applied on element level (for all key-value pairs and files).		
Template Description		
The redundancy handling shall be applied on element level (key-value pair and file).		
M2 Parameter		
PersistencyRedundancyHandlingScopeEnum.persistencyRedundancyHandlingScopeElement		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/PersistencyRedundancyHandlingCollection/PersistencyRedundancyHandling/PersistencyRedundancyHandlingScope	
APMC Parameter		Kind of APMC Parameter
SCOPE_STORAGE		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The redundancy handling shall be applied on storage level (for the whole key-value storage and file storage).		
Template Description		
The redundancy handling shall be applied on storage (key-value storage and file storage) level.		
M2 Parameter		
PersistencyRedundancyHandlingScopeEnum.persistencyRedundancyHandlingScopeStorage		
Mapping Rule		Mapping Type
1:1 mapping		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/UpdateStrategy	
APMC Parameter		Kind of APMC Parameter
DELETE		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to delete the value of the respective data item.		
Template Description		
PersistencyElementLevelUpdateStrategyEnum.delete: The update strategy is to delete the value of the respective data item.		
PersistencyCollectionLevelUpdateStrategyEnum.delete: The update strategy is to delete all values on the level of the respective collection.		
M2 Parameter		





PersistencyElementLevelUpdateStrategyEnum.delete , PersistencyCollectionLevelUpdateStrategyEnum.delete	
Mapping Rule	Mapping Type
If DELETE is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If DELETE is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.	full
Mapping Status	APMC Parameter ID
valid	

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyCommon/UpdateStrategy
APMC Parameter	Kind of APMC Parameter
KEEP_EXISTING	APMC-ENUMERATION-LITERAL-DEF
APMC Description	
The update strategy is to keep the existing value of the respective data item.	
Template Description	
PersistencyElementLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing values on the level of the respective collection.	
M2 Parameter	
PersistencyElementLevelUpdateStrategyEnum.keepExisting , PersistencyCollectionLevelUpdateStrategyEnum.keepExisting	
Mapping Rule	Mapping Type
If KEEP_EXISTING is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If KEEP_EXISTING is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.	full
Mapping Status	APMC Parameter ID
valid	

Functional Cluster	ShortName Path of Parameter Definition
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyKeyValuePairCollection/PersistencyKeyValuePair
APMC Parameter	Kind of APMC Parameter
ElementUpdateStrategy	APMC-ENUMERATION-PARAM-DEF
APMC Description	
This attribute can be used to specify the update strategy on element level, i.e. for a single key-value pair or file.	
Template Description	
This attribute can be used to specify the update strategy of the respective PersistencyInterfaceElement.	
M2 Parameter	
PersistencyInterfaceElement.updateStrategy	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	[APMC_PER_00036]

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyKeyValuePairCollection/PersistencyKeyValuePair/ElementUpdateStrategy	
APMC Parameter		Kind of APMC Parameter
DELETE		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to delete the value of the respective data item.		
Template Description		
PersistencyElementLevelUpdateStrategyEnum.delete: The update strategy is to delete the value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.delete: The update strategy is to delete all values on the level of the respective collection.		
M2 Parameter		
PersistencyElementLevelUpdateStrategyEnum.delete , PersistencyCollectionLevelUpdateStrategyEnum.delete		
Mapping Rule		Mapping Type
If DELETE is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If DELETE is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyKeyValuePairCollection/PersistencyKeyValuePair/ElementUpdateStrategy	
APMC Parameter		Kind of APMC Parameter
KEEP_EXISTING		APMC-ENUMERATION-LITERAL-DEF
APMC Description		
The update strategy is to keep the existing value of the respective data item.		
Template Description		
PersistencyElementLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing value of the respective data item. PersistencyCollectionLevelUpdateStrategyEnum.keepExisting: The update strategy is to keep the existing values on the level of the respective collection.		
M2 Parameter		
PersistencyElementLevelUpdateStrategyEnum.keepExisting , PersistencyCollectionLevelUpdateStrategyEnum.keepExisting		
Mapping Rule		Mapping Type
If KEEP_EXISTING is aggregated on element level, then the upstream mapping to PersistencyElementLevelStrategyEnum applies. If KEEP_EXISTING is aggregated on collection level, then the upstream mapping to PersistencyCollectionLevelStrategyEnum applies.		full
Mapping Status		APMC Parameter ID
valid		

Functional Cluster	ShortName Path of Parameter Definition	
Persistency	Persistency/PersistencyKeyValueStorageCollection/PersistencyKeyValueStorage/PersistencyKeyValuePairCollection/PersistencyKeyValuePair/ElementUpdateStrategy	
APMC Parameter		Kind of APMC Parameter
OVERWRITE		APMC-ENUMERATION-LITERAL-DEF





APMC Description	
The update strategy is to overwrite the value of this element.	
Template Description	
The update strategy is to overwrite the respective data item.	
M2 Parameter	
<code>PersistencyElementLevelUpdateStrategyEnum.overwrite</code>	
Mapping Rule	Mapping Type
1:1 mapping	full
Mapping Status	APMC Parameter ID
valid	