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References

- [1] Standardization Template
AUTOSAR_TPS_StandardizationTemplate

1 Introduction

1.1 Scope of this document

This document provides an overview of the AUTOSAR standard Classic Platform Release R22-11.

1.2 Terminology and Licenses

1.2.1 Terminology statement

AUTOSAR has identified a use of previously common terminology that can be considered oppressive or racist, such as master/slave and black/white list, or in other contexts such as gender or age as harmful connotations. AUTOSAR has started a discussion with all the working groups to replace these terms. AUTOSAR is committed to provide all specification documents without these terminology in the coming and future releases. Nevertheless, it may take several releases before the terms are completely replaced, as AUTOSAR has to continue its operations and thousands of pages of existing specifications have to be reviewed and updated in parallel.

1.2.2 Usage of W3C XML schema

The AUTOSAR XML Schema requires the XML namespace definition file `xml.xsd`.

There are several occurrences of the "xml.xsd" file within this release. For all occurrences the W3C license applies which can be found on <https://www.w3.org/Consortium/Legal/2015/copyright-software-and-document>.

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1.3 AUTOSAR Standards

1.3.1 Introduction

AUTOSAR addresses a wide range of use cases in automotive software development with its standards. These use cases have different requirements and lead to different technical solutions.

Packaging its deliverables into different "standards"

- eases the access to AUTOSAR solutions for users and
- allows AUTOSAR to scale with market needs.

1.3.2 Definition

An AUTOSAR standard is a consistent set of AUTOSAR deliverables, which are released at the same time. AUTOSAR deliverables can, but are not limited to be of the following kinds:

- textual explanations
- textual specifications
- test specifications
- source code
- other formal or semi-formal textual formats (e.g., ARXML, UML models, XML Schemata)

At the time of release, AUTOSAR ensures that dependencies are fulfilled.

1.3.3 Overview on AUTOSAR's Standards

AUTOSAR delivers the following standards:

Standard	Abbreviation
Adaptive Platform	AP
Classic Platform	CP
Foundation	FO

1.3.3.1 Adaptive Platform

The Adaptive Platform is AUTOSAR's solution for high-performance computing ECUs to build safety-related systems for use cases such as highly automated and autonomous driving.

1.3.3.2 Classic Platform

The Classic Platform is AUTOSAR's solution for embedded systems with hard real-time and safety constraints.

1.3.3.3 Foundation

The purpose of the Foundation standard is to enforce interoperability between the AUTOSAR platforms.

Foundation contains the generic artifacts that are common for AP and CP to ensure compatibility between

- Classic- and Adaptive Platform
- Non-AUTOSAR platforms to AUTOSAR platforms

1.3.4 Naming scheme for files and specification items

AUTOSAR is in the course of extending the naming scheme for files and specification items. The objective is to consistently include the AUTOSAR Standard to which the file or specification item belongs in the name. This addition also provides namespaces for the three AUTOSAR Standards and avoids conflicting names for specifications on the same topic in different AUTOSAR Standards. According to the new naming scheme, the abbreviation of the AUTOSAR Standard (AP, CP or FO) is added as first part of specification item IDs and as second part of file names. For details, please refer to [1].

From R22-11 onwards, specification items in newly introduced specifications follow the new naming scheme. In R22-11, file names are not yet changed.

From R23-11 onwards, the names of all files that are part of the release will follow the new naming scheme.

The IDs of existing specification items are not changed to avoid issues and migrations for AUTOSAR Partners that use these IDs internally.

1.3.5 Dependencies between Standards

Each release of Classic and Adaptive Platform relies on a dedicated version of Foundation. The specific dependency is documented in chapter [1.4.5](#).

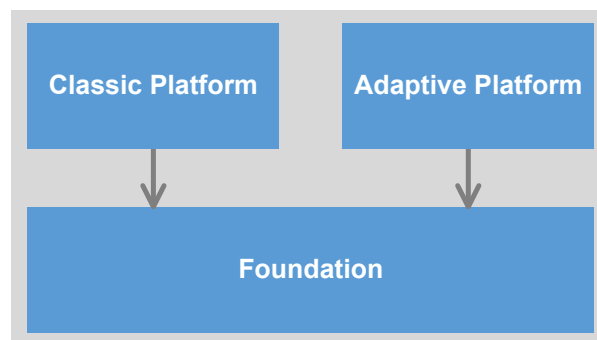


Figure 1.1: Dependencies of AUTOSAR Standards

1.3.6 Dependencies to other Standards

This release of the Classic Platform depends on the standard Foundation in release R22-11, which

- defines protocols implemented by Classic Platform
- contains the project objectives and the common requirements from which the features of the Classic Platform are derived
- contains common specification parts which apply to both, the Adaptive Platform and the Classic Platform.

These dependencies are refined in the trace information of the requirements in the respective specifications.

1.4 Release Numbering and Life Cycle

1.4.1 Release life cycle of a major release

Each major release goes through four consecutive steps within its life cycle (examples based on the internal release numbering scheme):

1. Development: Between start of life cycle and the initial release (e.g., R4.0.1)
2. Evolution: Following the initial release with zero, one or several minor releases and/or revisions (e.g., R4.0.2, R4.1.1)
3. Maintenance: No new content is added to a major release but only maintenance of the existing content with zero, one or several revisions (e.g., R3.2.2) is provided
4. Issue Notice: No more revisions but zero, one or several issue notices, i.e., updates of the list of known issues until end of life cycle.

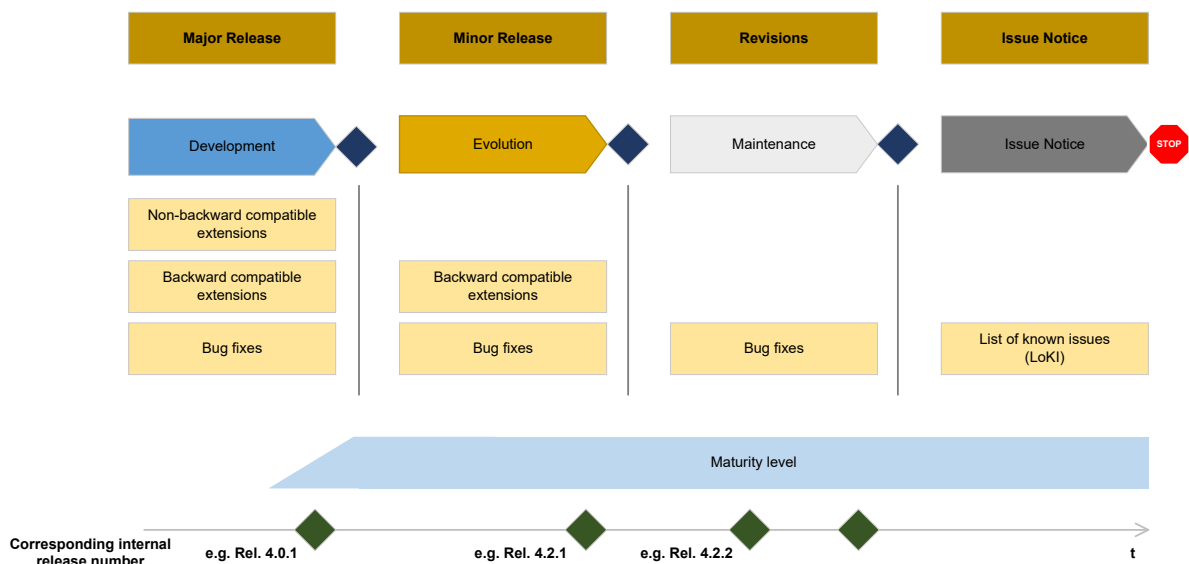


Figure 1.2: Life cycle model of AUTOSAR standards

1.4.2 Life cycle states of specification items and requirements

The life cycle state of a specification item is found after the specification item ID surrounded by curly brackets. The states are:

- {Valid}: This indicates that the related entity is a valid part of the document. This is the default and also applies if no dedicated life cycle status is annotated for the related entity.

- {Draft}: This indicates that the related entity is newly introduced but still experimental. This information is published but is subject to change without backward compatibility guarantee.
- {Obsolete}: This indicates that the related entity is subject to be removed in one of the following releases without further notice.

The life cycle state of a requirement is found in the attribute "type". The states are the same as the specification item states.

1.4.3 Platform release number

AUTOSAR applies a four-digit numbering scheme Ryy-mm to identify releases. The identifiers "yy" and "mm" depict the year and month of the release date, e.g., R20-11 for the November 2020 release.

1.4.4 Internal release number

AUTOSAR additionally maintains an internal release number for different purposes (e.g., usage in BSW modules in Classic Platform).

The internal release number is used for all platforms and follows up on the Classic Platform release number. In Adaptive Platform this is newly introduced. In Foundation this leads to a discontinuation of the former numbering pattern (e.g., R1.5.0).

A mapping list between Platform Releases and corresponding internal release numbers can be found in chapter [1.4.5](#). The internal release number uses a three-digit numbering scheme R<major>.<minor>.<revision> to identify releases. Its primary purpose is to identify a release as

- a major release: Valid and draft specification parts may be changed backward incompatibly.
- a minor release: Valid specification parts may only be changed backward compatibly. Draft specification parts may be changed backward incompatibly.
- a revision: Does not contain extensions but only backward compatible bugfixes.

1.4.5 Overview of AUTOSAR releases and corresponding AUTOSAR schema versions

Until the Releases CP R4.4.0 and AP R19-03, AUTOSAR released the platforms separately where a Foundation release went along with each platform release. Since compatibility between the platforms is essential to be able to have AP and CP ECUs within one vehicle project, an XML schema needs to be available that works with the different releases. The following table gives an overview about the different schema versions and the corresponding platform releases they can be used for.

The AUTOSAR schema does not have an impact on the Foundation. The Foundation releases are mentioned for the sake of completeness.

Schema Version	Classic Platform release	Adaptive Platform release	Foundation release
AUTOSAR_00042	R4.3.0	R17-03	R1.1.0
AUTOSAR_00043	R4.3.0	R17-10	R1.2.0
AUTOSAR_00044	R4.3.1	R17-10	R1.3.0
AUTOSAR_00045	R4.3.1	R18-03	R1.4.0
AUTOSAR_00046	R4.4.0	R18-10	R1.5.0
AUTOSAR_00047	R4.4.0	R19-03	R1.5.1

Starting with release R19-11, all platforms are released as one AUTOSAR release and therefore come along with one schema version.

Schema Version	Platform release	Internal release number
AUTOSAR_00048	R19-11	R4.5.0
AUTOSAR_00049	R20-11	R4.6.0
AUTOSAR_00050	R21-11	R4.7.0
AUTOSAR_00051	R22-11	R4.8.0

According to the release life cycle of AUTOSAR the release R22-11 is a minor release.

1.5 Content of chapters

This document is structured as follows:

- Chapter 1 introduces AUTOSAR's release strategy and its standardization approach.
- Chapter 2 provides a summary of changes since the previous release of the Classic Platform.
- Chapter 3 contains the overview of specifications comprising the AUTOSAR release R22-11. This chapter is structured according to the clusters of AUTOSAR release R22-11.
- Chapter 4 contains remarks about known technical deficiencies.
- Chapter 5 contains the detailed revision history of all released specifications.

2 Summary of changes

This chapter contains a summary of changes which have been implemented since the previous release R21-11.

2.1 Release R22-11

2.1.1 Concepts

2.1.1.1 Introduced Concepts

The following concepts in [2.1.1.1.1](#) - [2.1.1.1.7](#) have been introduced.

2.1.1.1.1 MACsec

Media Access Controller Security (MACsec) and MACsec Key Agreement (MKA) protocols:

The concept defines and includes in AUTOSAR the Modules needed for using and configuring the security protocol in Layer 2 MACsec and its related Key Agreement Protocol MKA.

Focuses on the authentication method, secret keys agreement protocol (MKA), as well as the methods, rules, and configuration related to the protected communication (extra Header (SecTAG), extra Check Value (ICV), cryptography sets (Cypher Suites), bypass rules (VLAN-ID, EthTyp)).

2.1.1.1.2 CAN XL

The CAN XL concept adds the improved capabilities of the next generation of CAN to AUTOSAR, e.g., a data rate up to 20MBit/s, increased frame size of up to 2048 Bytes, the introduction of a virtual separation with a Virtual CAN ID (VCID) similar to a VLAN and the possibility to transmit Ethernet frames over a physical CAN network.

2.1.1.1.3 V2X support for China

The concept "V2X Support for China" specifies common software architecture and interfaces for Chinese Day-1 V2X use cases based on the Chinese Cellular-V2X standards (LTE-V2X PC5). The concept includes 5 AUTOSAR modules: CnV2xMsg, CnV2xNet, CnV2xM, CnV2xSec, and CV2x driver. CnV2xMsg implements the functionality for reception and transmission of standardized Chinese V2X messages, building the interface for vehicle specific SW-Cs. CnV2xSec implements the functionality for

security encapsulation, decapsulation, and pseudonym management of Chinese V2X messages. CnV2xNet provides services to transmit and receive V2X messages, and exchanges data with the Ethlf module. CnV2xM manages cross-Layer functionality. CV2x driver provides Cellular V2X hardware independent interface to the upper layer (i.e., Ethlf).

2.1.1.1.4 Secure Global Time Synchronization

The concept extends Global Time Synchronization with the integrated security mechanisms that ensure the integrity and authenticity of global time on the in-vehicle communication networks (CAN, FlexRay and Ethernet). It includes error and security event detection. Secure Global Time Synchronization in the vehicle networks reduce potential security risk in the vehicle.

2.1.1.1.5 V2X in AUTOSAR

A new service module for V2x, the V2x DataManager, has been introduced to manage the receiving data of V2x messages. This module is independent from regional V2x specifications and allows to provide a harmonized view to selected data. It allows to provide a set of data through the RTE to SW-Cs or via SOME/IP to the vehicle network.

2.1.1.1.6 DDS Support on CP

The target of this Concept is to introduce a subset of capabilities of the OMG Data Distribution Services protocol (DDS) into the CP Platform. The protocol has been introduced as Bsw module located into the Communication Layer as Upper and Lower layer PduR module. Main features are full QoS handling with Sender/Receiver application interface with a full static configuration (e.g., no Dynamic Discovery is yet supported).

2.1.1.1.7 Deterministic Communication with TSN

The data model (ECUC) of the Ethernet Switch driver and Ethernet driver has been extended / re-worked to configure TSN related features (e.g., stream identification, asynchronous traffic shaping, a.s.o.) and to configure ingress and egress structure to be in line with IEEE802.1Q (e.g., scheduling algorithm, transmission selection algorithm, a.s.o.).

2.1.1.2 Impact of Concepts

The introduced concepts had impact on several specifications. The following table provides a detailed overview.

Please note that some of the specifications are marked by special text formatting:

- Specifications in **bold** font are completely new specifications originating from the particular concept.
- Specifications in *italic* font are affected indirectly as they provide artefacts for the actually impacted specifications.

Concept Name	Specification Long Name	Standard	Concept Lifecycle
MACsec	Requirements on MACsec	Foundation	draft
	Specification of Manifest	Adaptive Platform	
	Explanation of ara::com API		
	Specification of Communication Management		
	System Template	Classic Platform	
	Specification of MACsec Key Agreement		
	Specification of Ethernet Transceiver Driver		
	Specification of Ethernet Switch Driver		
	Specification of Ethernet Interface		
	Layered Software Architecture		
	List of Basic Software Modules		
CAN XL	Main Requirements	Foundation	valid
	Glossary		
	Specification of Manifest	Adaptive Platform	
	System Template	Classic Platform	
	Requirements on CAN		
	Specification of CAN Driver		
	Specification of CAN Interface		
	Specification for CANXL driver functionality to provide additional required interfaces		
	Specification for CANXL transceiver driver functionality to provide additional required interfaces		
	Specification of Ethernet Interface		
Specification of Ethernet Interface			





Concept Name	Specification Long Name	Standard	Concept Lifecycle
	Specification of ECU Configuration		
	System Template		
	Requirements on Bus Mirroring		
	Specification of Bus Mirroring		
	Requirements on Ethernet Support in AUTOSAR		
	Specification of CAN Transceiver Driver		
	Specification of TCP/IP Stack		
	Specification of Cellular Vehicle-2-X Driver		
	Specification of Ethernet Driver		
	Specification of Wireless Ethernet Driver		
	List of Basic Software Modules		
	Layered Software Architecture		
V2X support for China	Requirements on Chinese Vehicle-2-X Communication	Classic Platform	draft
	Specification of Chinese Vehicle-2-X Network		
	Specification of Chinese Vehicle-2-X Message		
	Specification of Chinese Vehicle-2-X Management		
	Specification of Ethernet Interface		
	Specification of Cellular Vehicle-2-X Driver		
	Specification of Chinese Vehicle-2-X Security		
	List of Basic Software Modules		
	Layered Software Architecture		
Secure Global Time Synchronization	Main Requirements	Foundation	draft
	Requirements on Time Synchronization		
	Glossary		
	Time Synchronization Protocol Specification	Classic Platform	
	Specification of Synchronized Time-Base Manager		
	Specification of Time Synchronization over CAN		





Concept Name	Specification Long Name	Standard	Concept Lifecycle
	Specification of Time Synchronization over Ethernet		
	Specification of Time Synchronization over FlexRay		
	System Template		
	Specification of Time Synchronization	Adaptive Platform	
V2X in AUTOSAR	Vehicle-2-X Remote Access Layer Protocol Specification	Foundation	valid
	Requirements on Vehicle-2-X Communication	Classic Platform	
	Specification on V2X Data Manager		
	Specification of Vehicle-2-X Facilities		
	Software Component Template		
	List of Basic Software Modules		
	Layered Software Architecture		
DDS Support on CP	Requirements on Data Distribution Service	Foundation	draft
	Specification of Data Distribution Service in Classic Platform	Classic Platform	
	Specification of PDU Router		
	Specification of RTE Software		
	Specification of Socket Adaptor		
	List of Basic Software Modules		
	Layered Software Architecture		
Derterministic Communication with TSN	Specification of Ethernet Driver	Classic Platform	draft
	Specification of Ethernet Switch Driver		
	Specification of Ethernet Interface		

Table 2.1: Impact of Concepts

2.1.1.3 Validated Concepts

The following concepts have been validated:

- CAN XL

- V2X in AUTOSAR
- Memory Stack Rework
- Ethernet WakeUp On DataLine - Support of OA-TC10 compliant hardware to wake-up and sleep on dataline
- Rework of PNC related ComM and NM handling

2.1.2 Specifications

2.1.2.1 New Specifications

The following new specifications have been introduced via concepts:

- Requirements on Chinese Vehicle-2-X Communication (UID 989, SRS)
- Specification of Chinese Vehicle-2-X Message (UID 990, SWS)
- Specification of Chinese Vehicle-2-X Network (UID 991, SWS)
- Specification of V2X Data Manager (UID 1023, SWS)
- Specification of Cellular Vehicle-2-X Driver (UID 1030, SWS)
- Specification of Chinese Vehicle-2-X Management (UID 1031, SWS)
- Specification of Chinese Vehicle-2-X Security (UID 1032, SWS)
- Specification of MACsec Key Agreement (UID 1066, SWS)
- Specification of Data Distribution Service in Classic Platform (UID 1069, SWS)
- Specification for CANXL driver functionality to provide additional required interfaces (UID 1014, SWS)
- Specification for CANXL transceiver driver functionality to provide additional required interfaces (UID 1015, SWS)

In addition to the above listed new specifications, the following documents have been added with R22-11:

- none

2.1.2.2 Migrated Specifications

With this release, the following specifications have been moved from AUTOSAR Classic Platform to the AUTOSAR Foundation standard:

- none

2.1.2.3 Obsolete Specifications

The following specifications have been set to status "obsolete" in this release:

- Requirements on Free Running Timer (UID 211, SRS)
- Explanation of Interrupt Handling within AUTOSAR (UID 307, EXP)

2.1.2.4 Removed Specifications

The following specifications have been set to status "removed" in this release and hence are not released anymore:

- Specification of Compiler Abstraction (UID 51, SWS)
- Requirements on Safety Extensions (UID 670, RS)
- Specification of Safety Extensions (UID 671, TPS)

2.1.2.5 Reworked Specifications

The following documents have been changed fundamentally in R22-11:

- none

2.1.2.6 Moved Specification parts

The following specification parts have been moved to other documents in R22-11.

- Explanation of Classic Platform Software Architectural Decisions (UID 1028, EXP) to Explanation of Adaptive and Classic Platform Software Architectural Decisions (UID 1078, EXP)

2.1.3 Release Documentation

There are no major changes in the Release Documentation.

2.2 History information in AUTOSAR

The following diagram shows the location of documentation of changes.

The Change Documentation is also available for Adaptive Platform since release R20-11.

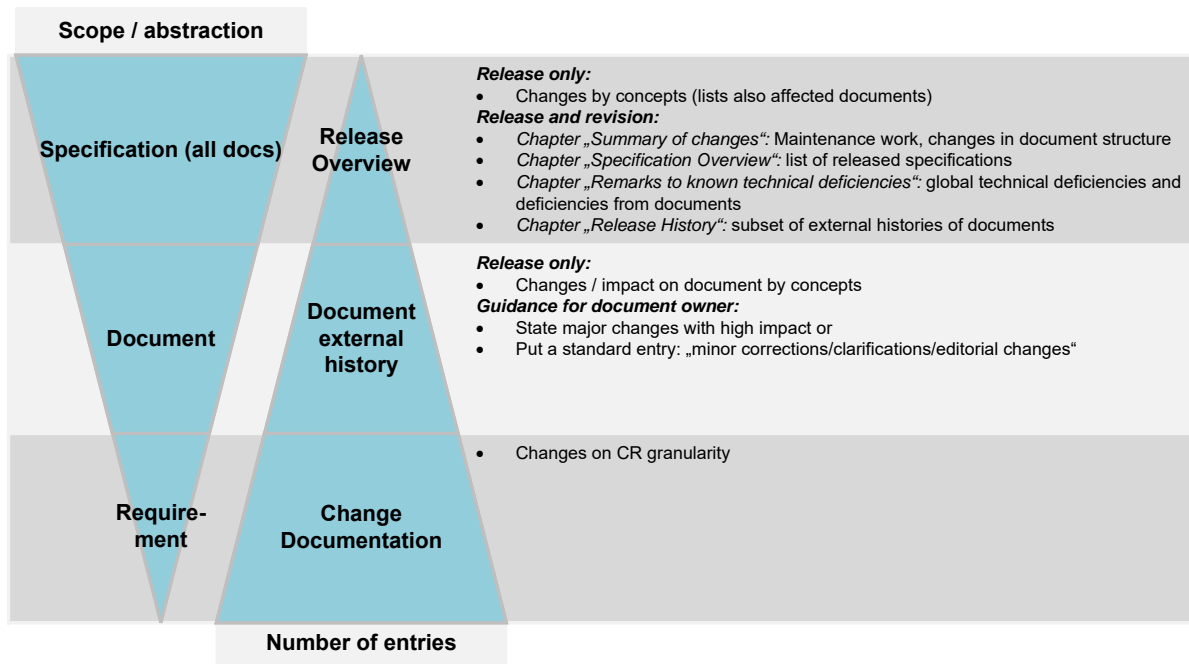


Figure 2.1: History information in AUTOSAR

3 Specification overview

The published specifications are divided into the clusters

- Release Documentation
- Communication
- Memory
- System Services
- MCAL
- IO
- Libraries
- Diagnostics
- Safety
- BSW General
- General
- Methodology and Templates
- Mode Management
- RTE
- Application Interfaces
- Crypto
- Global Time
- SWArch
- Security

The assignment of the specifications to these clusters is shown below.

Long Name	File Name	Life cycle changes
Release Documentation		
Classic Platform Release Overview	AUTOSAR_TR_ClassicPlatformReleaseOverview	
AUTOSAR Classic Platform Specification Hashes	AUTOSAR_TR_ClassicPlatformSpecificationHashes	
Communication		
General Specification of Transformers	AUTOSAR_ASWS_TransformerGeneral	
Requirements on BSW Modules for SAE J1939	AUTOSAR_SRS_SAEJ1939	
Requirements on Bus Mirroring	AUTOSAR_SRS_BusMirroring	
Requirements on CAN	AUTOSAR_SRS_CAN	
Requirements on Chinese Vehicle-2-X Communication	AUTOSAR_SRS_ChineseV2XCommunication	Initial release
Requirements on Communication	AUTOSAR_SRS_COM	
Requirements on Ethernet Support in AUTOSAR	AUTOSAR_SRS_Ethernet	
Requirements on FlexRay	AUTOSAR_SRS_FlexRay	
Requirements on Gateway	AUTOSAR_SRS_Gateway	
Requirements on I-PDU Multiplexer	AUTOSAR_SRS_IPDUMultiplexer	
Requirements on LIN	AUTOSAR_SRS_LIN	
Requirements on Module XCP	AUTOSAR_SRS_XCP	
Requirements on Secure Onboard Communication	AUTOSAR_SRS_SecureOnboardCommunication	
Requirements on SPI Handler/Driver	AUTOSAR_SRS_SPIHandlerDriver	
Requirements on Transformer	AUTOSAR_SRS_Transformer	
Requirements on TTCAN	AUTOSAR_SRS_TTCAN	
Requirements on Vehicle-2-X Communication	AUTOSAR_SRS_V2XCommunication	
Specification of a Request Manager for SAE J1939	AUTOSAR_SWS_SAEJ1939RequestManager	
Specification of a Transport Layer for SAE J1939	AUTOSAR_SWS_SAEJ1939TransportLayer	
Specification of Bus Mirroring	AUTOSAR_SWS_BusMirroring	
Specification of CAN Driver	AUTOSAR_SWS_CANDriver	
Specification of CAN Interface	AUTOSAR_SWS_CANInterface	
Specification of CAN Network Management	AUTOSAR_SWS_CANNetworkManagement	
Specification of CAN State Manager	AUTOSAR_SWS_CANStateManager	
Specification of CAN Transceiver Driver	AUTOSAR_SWS_CANTransceiverDriver	
Specification of CAN Transport Layer	AUTOSAR_SWS_CANTransportLayer	
Specification for CANXL driver functionality to provide additional required interfaces	AUTOSAR_SWS_CANXLDriver	Initial release
Specification for CANXL transceiver driver functionality to provide additional required interfaces	AUTOSAR_SWS_CANXLTransceiverDriver	Initial release
Specification of Cellular Vehicle-2-X Driver	AUTOSAR_SWS_CellularV2XDriver	Initial release





Long Name	File Name	Life cycle changes
Specification of Chinese Vehicle-2-X Management	AUTOSAR_SWS_ChineseV2XManagement	Initial release
Specification of Chinese Vehicle-2-X Message	AUTOSAR_SWS_ChineseV2XMessage	Initial release
Specification of Chinese Vehicle-2-X Network	AUTOSAR_SWS_ChineseV2XNetwork	Initial release
Specification of Chinese Vehicle-2-X Security	AUTOSAR_SWS_ChineseV2XSecurity	Initial release
Specification of COM Based Transformer	AUTOSAR_SWS_COMBasedTransformer	
Specification of Communication	AUTOSAR_SWS_COM	
Specification of Data Distribution Service in Classic Platform	AUTOSAR_SWS_ClassicPlatform-DataDistributionService	Initial release
Specification of Diagnostic Log and Trace	AUTOSAR_SWS_DiagnosticLogAndTrace	
Specification of Diagnostic over IP	AUTOSAR_SWS_DiagnosticOverIP	
Specification of Ethernet Driver	AUTOSAR_SWS_EthernetDriver	
Specification of Ethernet Interface	AUTOSAR_SWS_EthernetInterface	
Specification of Ethernet State Manager	AUTOSAR_SWS_EthernetStateManager	
Specification of Ethernet Switch Driver	AUTOSAR_SWS_EthernetSwitchDriver	
Specification of Ethernet Transceiver Driver	AUTOSAR_SWS_EthernetTransceiverDriver	
Specification of FlexRay AUTOSAR Transport Layer	AUTOSAR_SWS_FlexRayARTransportLayer	
Specification of FlexRay Driver	AUTOSAR_SWS_FlexRayDriver	
Specification of FlexRay Interface	AUTOSAR_SWS_FlexRayInterface	
Specification of FlexRay ISO Transport Layer	AUTOSAR_SWS_FlexRayISOTransportLayer	
Specification of FlexRay Network Management	AUTOSAR_SWS_FlexRayNetworkManagement	
Specification of FlexRay State Manager	AUTOSAR_SWS_FlexRayStateManager	
Specification of FlexRay Transceiver Driver	AUTOSAR_SWS_FlexRayTransceiverDriver	
Specification of I-PDU Multiplexer	AUTOSAR_SWS_IPDUMultiplexer	
Specification of Large Data COM	AUTOSAR_SWS_LargeDataCOM	
Specification of LIN Driver	AUTOSAR_SWS_LINDriver	
Specification of LIN Interface	AUTOSAR_SWS_LINInterface	
Specification of LIN State Manager	AUTOSAR_SWS_LINStateManager	
Specification of LIN Transceiver Driver	AUTOSAR_SWS_LINTransceiverDriver	
Specification of MACsec Key Agreement	AUTOSAR_SWS_MACsecKeyAgreement	Initial release
Specification of Module E2E Transformer	AUTOSAR_SWS_E2ETransformer	
Specification of Module XCP	AUTOSAR_SWS_XCP	
Specification of Network Management for SAE J1939	AUTOSAR_SWS_SAEJ1939NetworkManagement	





Long Name	File Name	Life cycle changes
Specification of Network Management Interface	AUTOSAR_SWS_NetworkManagementInterface	
Specification of PDU Router	AUTOSAR_SWS_PDURouter	
Specification of Secure Onboard Communication	AUTOSAR_SWS_SecureOnboardCommunication	
Specification of Service Discovery	AUTOSAR_SWS_ServiceDiscovery	
Specification of Socket Adaptor	AUTOSAR_SWS_SocketAdaptor	
Specification of SOME/IP Transformer	AUTOSAR_SWS_SOMEIPTransformer	
Specification of SPI Handler/Driver	AUTOSAR_SWS_SPIHandlerDriver	
Specification of TCP/IP Stack	AUTOSAR_SWS_Tcplp	
Specification of TTCAN Driver	AUTOSAR_SWS_TTCANDriver	
Specification of TTCAN Interface	AUTOSAR_SWS_TTCANInterface	
Specification of UDP Network Management	AUTOSAR_SWS_UDPNetworkManagement	
Specification of Vehicle-2-X Basic Transport	AUTOSAR_SWS_V2XBasicTransport	
Specification of Vehicle-2-X Data Manager	AUTOSAR_SWS_V2XDataManager	Initial release
Specification of Vehicle-2-X Facilities	AUTOSAR_SWS_V2XFacilities	
Specification of Vehicle-2-X Geo Networking	AUTOSAR_SWS_V2XGeoNetworking	
Specification of Vehicle-2-X Management	AUTOSAR_SWS_V2XManagement	
Specification of Wireless Ethernet Driver	AUTOSAR_SWS_WirelessEthernetDriver	
Specification of Wireless Ethernet Transceiver Driver	AUTOSAR_SWS_WirelessEthernetTransceiverDriver	
Specification on SOME/IP Transport Protocol	AUTOSAR_SWS_SOMEIPTransportProtocol	
Memory		
Explanation of Firmware Over-The-Air	AUTOSAR_EXP_FirmwareOverTheAir	
NV Data Handling Guideline	AUTOSAR_EXP_NVDataHandling	
Requirements on EEPROM Driver	AUTOSAR_SRS_EEPROMDriver	
Requirements on Firmware Over-The-Air	AUTOSAR_RS_FirmwareOverTheAir	
Requirements on Flash Driver	AUTOSAR_SRS_FlashDriver	
Requirements on Flash Test	AUTOSAR_SRS_FlashTest	
Requirements on Memory Hardware Abstraction Layer	AUTOSAR_SRS_MemoryHWAbstractionLayer	
Requirements on Memory Services	AUTOSAR_SRS_MemoryServices	
Requirements on RAM Test	AUTOSAR_SRS_RAMTest	
Specification of EEPROM Abstraction	AUTOSAR_SWS_EEPROMAbstraction	
Specification of EEPROM Driver	AUTOSAR_SWS_EEPROMDriver	
Specification of Flash Driver	AUTOSAR_SWS_FlashDriver	
Specification of Flash EEPROM Emulation	AUTOSAR_SWS_FlashEEPROMEmulation	
Specification of Flash Test	AUTOSAR_SWS_FlashTest	





Long Name	File Name	Life cycle changes
Specification of Memory Abstraction Interface	AUTOSAR_SWS_MemoryAbstractionInterface	
Specification of Memory Access	AUTOSAR_SWS_MemoryAccess	
Specification of Memory Driver	AUTOSAR_SWS_MemoryDriver	
Specification of Memory Mapping	AUTOSAR_SWS_MemoryMapping	
Specification of NVRAM Manager	AUTOSAR_SWS_NVRAMManager	
Specification of RAM Test	AUTOSAR_SWS_RAMTest	
System Services		
Explanation of CP Software Cluster Design And Integration Guideline	AUTOSAR_EXP_CPSwClusterDesignAndIntegrationGuideline	
Requirements on Free Running Timer	AUTOSAR_SRS_FreeRunningTimer	obsolete
Requirements on Function Inhibition Manager	AUTOSAR_SRS_FunctionInhibitionManager	
Requirements on Hardware Test Manager on start up and shutdown	AUTOSAR_SRS_HWTestManager	
Requirements on Operating System	AUTOSAR_SRS_OS	
Requirements on Software Cluster Connection module	AUTOSAR_SRS_SoftwareClusterConnection	
Requirements on Time Service	AUTOSAR_SRS_TimeService	
Specification and Integration of Hardware Test Management at start up and shutdown	AUTOSAR_TR_HWTestManagementIntegrationGuide	
Specification of Communication Manager	AUTOSAR_SWS_COMManager	
Specification of Default Error Tracer	AUTOSAR_SWS_DefaultErrorTracer	
Specification of Function Inhibition Manager	AUTOSAR_SWS_FunctionInhibitionManager	
Specification of Hardware Test Manager on start up and shutdown	AUTOSAR_SWS_HWTestManager	
Specification of Operating System	AUTOSAR_SWS_OS	
Specification of Software Cluster Connection module	AUTOSAR_SWS_SoftwareClusterConnection	
Specification of Time Service	AUTOSAR_SWS_TimeService	
MCAL		
General Requirements on SPAL	AUTOSAR_SRS_SPALGeneral	
Requirements on Core Test	AUTOSAR_SRS_CoreTest	
Requirements on GPT Driver	AUTOSAR_SRS_GPTDriver	
Requirements on MCU Driver	AUTOSAR_SRS_MCUDriver	
Specification of Core Test	AUTOSAR_SWS_CoreTest	
Specification of GPT Driver	AUTOSAR_SWS_GPTDriver	
Specification of MCU Driver	AUTOSAR_SWS_MCUDriver	
IO		
Requirements on ADC Driver	AUTOSAR_SRS_ADCDriver	
Requirements on DIO Driver	AUTOSAR_SRS_DIODriver	
Requirements on I/O Hardware Abstraction	AUTOSAR_SRS_IOHWAbstraction	
Requirements on ICU Driver	AUTOSAR_SRS_ICUDriver	
Requirements on OCU Driver	AUTOSAR_SRS_OCUDriver	
Requirements on Port Driver	AUTOSAR_SRS_PortDriver	





Long Name	File Name	Life cycle changes
Requirements on PWM Driver	AUTOSAR_SRS_PWMDriver	
Specification of ADC Driver	AUTOSAR_SWS_ADCDriver	
Specification of DIO Driver	AUTOSAR_SWS_DIODriver	
Specification of I/O Hardware Abstraction	AUTOSAR_SWS_IOHardwareAbstraction	
Specification of ICU Driver	AUTOSAR_SWS_ICUDriver	
Specification of OCU Driver	AUTOSAR_SWS_OCUDriver	
Specification of Port Driver	AUTOSAR_SWS_PortDriver	
Specification of PWM Driver	AUTOSAR_SWS_PWMDriver	
Libraries		
Macro Encapsulation of Interpolation Calls	AUTOSAR_EXP_MacroEncapsulationofInterpolationCalls	
Requirements on Libraries	AUTOSAR_SRS_Libraries	
Specification of Basic Software Multicore Library	AUTOSAR_SWS_BSWMulticoreLibrary	
Specification of Bit Handling Routines	AUTOSAR_SWS_BFXLibrary	
Specification of CRC Routines	AUTOSAR_SWS_CRCLibrary	
Specification of Extended Fixed Point Routines	AUTOSAR_SWS_EFXLibrary	
Specification of Fixed Point Interpolation Routines	AUTOSAR_SWS_IFXLibrary	
Specification of Fixed Point Math Routines	AUTOSAR_SWS_MFXLibrary	
Specification of Floating Point Interpolation Routines	AUTOSAR_SWS_IFLLibrary	
Specification of Floating Point Math Routines	AUTOSAR_SWS_MFLLibrary	
Specification of SW-C End-to-End Communication Protection Library	AUTOSAR_SWS_E2ELibrary	
Diagnostics		
Specification of a Diagnostic Communication Manager for SAE J1939	AUTOSAR_SWS_SAEJ1939DiagnosticCommunicationManager	
Specification of Diagnostic Communication Manager	AUTOSAR_SWS_DiagnosticCommunicationManager	
Specification of Diagnostic Event Manager	AUTOSAR_SWS_DiagnosticEventManager	
Safety		
Overview of Functional Safety Measures in AUTOSAR	AUTOSAR_EXP_FunctionalSafetyMeasures	
Requirements on Watchdog Driver	AUTOSAR_SRS_WatchdogDriver	
Safety Use Case Example	AUTOSAR_EXP_SafetyUseCase	
Specification of Watchdog Driver	AUTOSAR_SWS_WatchdogDriver	
Specification of Watchdog Interface	AUTOSAR_SWS_WatchdogInterface	
Specification of Watchdog Manager	AUTOSAR_SWS_WatchdogManager	
BSW General		
Basic Software UML Model	AUTOSAR_MOD_BSWUMLModel	
Complex Driver design and integration guideline	AUTOSAR_EXP_CDDDesignAndIntegrationGuideline	





Long Name	File Name	Life cycle changes
Description of the AUTOSAR standard errors	AUTOSAR_EXP_ErrorDescription	
Explanation of Error Handling on Application Level	AUTOSAR_EXP_ApplicationLevelErrorHandling	
Explanation of Interrupt Handling within AUTOSAR	AUTOSAR_EXP_InterruptHandlingExplanation	obsolete
General Requirements on Basic Software Modules	AUTOSAR_SRS_BSWGeneral	
General Specification of Basic Software Modules	AUTOSAR_SWS_BSWGeneral	
Guide to BSW Distribution	AUTOSAR_EXP_BSWDistributionGuide	
List of Basic Software Modules	AUTOSAR_TR_BSWModuleList	
Modeling Guidelines of Basic Software EA UML Model	AUTOSAR_TR_BSWUMLModelModelingGuide	
Specification of Communication Stack Types	AUTOSAR_SWS_CommunicationStackTypes	
Specification of Platform Types	AUTOSAR_SWS_PlatformTypes	
Specification of Standard Types	AUTOSAR_SWS_StandardTypes	
General		
Layered Software Architecture	AUTOSAR_EXP_LayeredSoftwareArchitecture	
Requirements on AUTOSAR Features	AUTOSAR_RS_Features	obsolete
Specification of Bulk NvData Manager	AUTOSAR_SWS_BulkNvDataManager	
Virtual Functional Bus	AUTOSAR_EXP_VFB	
Methodology and Templates		
Basic Software Module Description Template	AUTOSAR_TPS_BSWModuleDescriptionTemplate	
Diagnostic Extract Template	AUTOSAR_TPS_DiagnosticExtractTemplate	
Integration of Franca IDL Software Component Descriptions	AUTOSAR_TR_FrancaIntegration	
Methodology for Classic Platform	AUTOSAR_TR_Methodology	
Modeling Show Cases Examples	AUTOSAR_EXP_ModelingShowCases	
Modeling Show Cases Report	AUTOSAR_TR_ModelingShowCases	
Requirements on Basic Software Module Description Template	AUTOSAR_RS_BSWModuleDescriptionTemplate	
Requirements on Diagnostic Extract Template	AUTOSAR_RS_DiagnosticExtractTemplate	
Requirements on ECU Configuration	AUTOSAR_RS_ECUConfiguration	
Requirements on ECU Resource Template	AUTOSAR_RS_ECUResourceTemplate	
Requirements on Software Component Template	AUTOSAR_RS_SoftwareComponentTemplate	
Requirements on System Template	AUTOSAR_RS_SystemTemplate	
Software Component Template	AUTOSAR_TPS_SoftwareComponentTemplate	
Specification of ECU Configuration	AUTOSAR_TPS_ECUConfiguration	
Specification of ECU Configuration Parameters (XML)	AUTOSAR_MOD_ECUConfigurationParameters	





Long Name	File Name	Life cycle changes
Specification of ECU Resource Template	AUTOSAR_TPS_ECUResourceTemplate	
Specification of Timing Extensions	AUTOSAR_TPS_TimingExtensions	
Supplementary material of general blueprints for AUTOSAR	AUTOSAR_TR_GeneralBlueprintsSupplement	
System Template	AUTOSAR_TPS_SystemTemplate	
Mode Management		
Guide to Mode Management	AUTOSAR_EXP_ModeManagementGuide	
Requirements on Mode Management	AUTOSAR_SRS_ModeManagement	
Specification of Basic Software Mode Manager	AUTOSAR_SWS_BSWModeManager	
Specification of ECU State Manager	AUTOSAR_SWS_ECUSTateManager	
RTE		
Requirements on Runtime Environment	AUTOSAR_SRS_RTE	
Specification of RTE Software	AUTOSAR_SWS_RTE	
Application Interfaces		
Application Design Patterns Catalogue	AUTOSAR_TR_AIDesignPatternsCatalogue	
Application Interface Examples	AUTOSAR_MOD_AISpecificationExamples	
Application Interfaces User Guide	AUTOSAR_EXP_AIUserGuide	
Explanation of Application Interface of AD/ADAS vehicle motion control	AUTOSAR_EXP_AIADASAndVMC	
Explanation of Application Interfaces of Occupant and Pedestrian Safety Systems Domain	AUTOSAR_EXP_AIOccupantAndPedestrianSafety	
Explanation of Application Interfaces of the Body and Comfort Domain	AUTOSAR_EXP_AIBodyAndComfort	
Explanation of Application Interfaces of the Chassis Domain	AUTOSAR_EXP_AIChassis	
Explanation of Application Interfaces of the HMI, Multimedia and Telematics Domain	AUTOSAR_EXP_AIHMIMultimediaAndTelematics	
Explanation of Application Interfaces of the Powertrain Engine Domain	AUTOSAR_EXP_AIPowertrain	
Requirements on SW-C and System Modeling	AUTOSAR_RS_SWCModeling	
SW-C and System Modeling Guide	AUTOSAR_TR_SWCModelingGuide	
Unique Names for Documentation, Measurement and Calibration: Modeling and Naming Aspects including Automatic Generation	AUTOSAR_TR_AIMeasurementCalibrationDiagnostics	
XML Specification of Application Interfaces	AUTOSAR_MOD_AISpecification	
Crypto		
Requirements on Crypto Stack	AUTOSAR_SRS_CryptoStack	
Specification of Crypto Driver	AUTOSAR_SWS_CryptoDriver	
Specification of Crypto Interface	AUTOSAR_SWS_CryptoInterface	
Specification of Crypto Service Manager	AUTOSAR_SWS_CryptoServiceManager	





Long Name	File Name	Life cycle changes
Specification of Key Manager	AUTOSAR_SWS_KeyManager	
Utilization of Crypto Services	AUTOSAR_EXP_UtilizationOfCryptoServices	
Global Time		
Specification of Synchronized Time-Base Manager	AUTOSAR_SWS_SynchronizedTimeBaseManager	
Specification of Time Synchronization over CAN	AUTOSAR_SWS_TimeSyncOverCAN	
Specification of Time Synchronization over Ethernet	AUTOSAR_SWS_TimeSyncOverEthernet	
Specification of Time Synchronization over FlexRay	AUTOSAR_SWS_TimeSyncOverFlexRay	
SWArch		
Explanatory Document for usage of AUTOSAR RunTimeInterface	AUTOSAR_EXP_ClassicPlatformARTI	
Requirements on Debugging, Tracing and Profiling support of AUTOSAR Components	AUTOSAR_RS_ClassicPlatformDebugTraceProfile	
Specification of AUTOSAR Run-Time Interface	AUTOSAR_SWS_ClassicPlatformARTI	
Security		
Specification of Intrusion Detection System Manager	AUTOSAR_SWS_IntrusionDetectionSystemManager	

Table 3.1: Specification Overview

4 Remarks to known technical deficiencies

The technical deficiencies per specification are - if applicable - mentioned inside the respective specification in a chapter "Known Limitations" located after the table of contents.

The following technical deficiencies are to be mentioned, where clicking on the section reference will bring you to the respective document:

Document UID	Long Name	Document Type	Section Reference
18	Specification of Diagnostic Communication Manager	SWS	4.1
33	Specification of NVRAM Manager	SWS	4.2
72	Specification of LIN Driver	SWS	4.3
78	Specification of ECU State Manager	SWS	4.4
253	Specification of CAN State Manager	SWS	4.5
313	Specification of Basic Software Mode Manager	SWS	4.6
412	Specification of Module XCP	SWS	4.7
414	Specification of UDP Network Management	SWS	4.8
421	Specification of Synchronized Time-Base Manager	SWS	4.9
430	Specification of Ethernet Driver	SWS	4.10
431	Specification of Ethernet Transceiver Driver	SWS	4.11
631	Guide to BSW Distribution	EXP	4.12
674	Specification of Time Synchronization over CAN	SWS	4.13
675	Specification of Time Synchronization over FlexRay	SWS	4.14
676	Specification of Time Synchronization over Ethernet	SWS	4.15
907	Specification of Key Manager	SWS	4.16
988	Explanation of Application Interface of AD/ADAS vehicle motion control	EXP	4.17

4.1 Specification of Diagnostic Communication Manager (UID 18, SWS)

The Dcm module does not provide any diagnostic multi-channel capabilities. This means that parallel requests of a tester addressed to different independent functionalities cannot be processed by a single Dcm module. Furthermore, the concept currently implemented does not take more than one instance of a Dcm module residing in one ECU into account. As the legislator requires that emission-related service requests according to ISO 15031-5 [2] shall be processed prior to any enhanced diagnostic requests, the Dcm module provides a protocol switching mechanism based on protocol prioritization.

- UDS Service AccessTimingParameter (0x83) is not supported by the ISO standards in CAN and LIN. Also, it is not planned to support this service with FlexRay. Therefore no support for this service is planned.

- Subfunction onComparisionOfValues of Service ResponseOnEvent is not supported in the current release.
- Subfunction onTimerInterrupt of Service ResponseOnEvent is not supported in the current release.
- UDS Service SecuredDataTransmission (0x84) is not supported in the current release.
- The Dcm SWS does not cover any SAE J1939 related diagnostic requirements.
- Due to DEM limitation, the diagnostic service \$19 05 is limited to the OBD legislative freeze frame.
- Management of IOControl service without InputOutputControlParameter in request and response is not supported
- The length of controlState parameter in IOControl request and response has to be of same size (due to the one configuration parameter DcmDspDataByteSize)
- Same layout of a DID which is used in RDBI, WDBI or IOCBI services
- The user optional parameter DTCSSettingControlOptionRecord in the ControlDTCSSetting request is only supported if it corresponds to a groupOfAllDTCs(0xFFFFFFFF) value. In other cases, it has to be managed in a vendor specific implementation.
- Only the ControlDTCSSetting sub-functions 0x01 and 0x02 are supported.
- The handling of infrastructure errors reported by the RTE during DCM/DEM <-> SW-C interactions is missing from the SWS and might have to be taken into account by implementers if they need it.
- The Dcm does not support DLT for ROE
- The ROE ServiceToRespondTo does not support PageBuffering
- ROE only supports sub-function listed in Table 2
- DID range feature cannot be applied for services DynamicallyDefineDataIdentifier, ReadDataByPeriodicIdentifier and InputOutputControlById
- AUTOSAR Dcm is not intended to be used in the bootloader
- PeriodicTransmission is not possible on FlexRay, as ISO 14229-4 demands header information (address information (source and target address) and FPL (Frame Payload length)). This information cannot be filled with the specified concept of IF interface.
- The specification of the transformer for intra ecu communication between the Dcm module and the NvBlockSoftwareComponentType is not standardized in the current AUTOSAR release. For this scenario custom transformers implemented by a complex driver can be used. To elaborate on this the responsible stakeholder (usually the OEM) needs to specify the custom transformer from a

behavioral point of view in a separate document (this might include definition of byte-ordering or alignment). If there is the necessity to define transformer specific attributes in the model this can be done using special data groups in `UserDefinedTransformationDescription` and `UserDefinedTransformationSignalProps`. For the configuration of this scenario, a `DataPrototypeMapping` shall exist for the affected `SenderReceiverInterfaces` of the `Dcm` module and the `NvBlockSoftwareComponentType` which refers to a `DataTransformation` in the role `firstToSecondDataTransformation`. This `DataTransformation` shall reference exactly one `TransformationTechnology` in the role `transformerChain` with the `transformerClass` attribute set to "serializer" and may compose a `UserDefinedTransformationDescription` in the role `transformationDescription`.

- In certain situations, the `Dcm` module is capable to process diagnostic requests in parallel. This possibility is explicitly limited of OBD in parallel to UDS protocol processing. No other protocol combination can be processed in parallel. Particularly the use case of parallel processing of two or more UDS protocol requests or WWH-OBD and UDS protocols is not supported.
- For UDS service 0x29, the `Dcm` supports only the sub-functions for PKI. Authentication via challenge response is not supported.
- For UDS service 0x29, secure diagnostic communication with Diffie-Hellmann key exchange is not supported.
- For UDS service 0x29, the `Dcm` does not support NRC 'Certificate verification failed'
 - Invalid Content'.
 - * The `Dcm` supports only selected subset of functionality according to ISO 14229-1:2020 [8]. Unless explicitly stated the `Dcm` follows the ISO 14229-1:2013 [1].
- AUTOSAR PduR architecture allows the use of streaming protocols. As diagnostic protocols do not use streaming protocols, the `Dcm` does not support it either and therefore the `Dcm StartOfReception` with `TpSduLength` equal to zero is not supported.
- The `Dcm` has a different order of NRCs for UDS service 0x36. The ISO14229-1 [1] defined NRC order for that service would require further APIs that would make the overall service processing more complicated. Details can be found in chapter 7.6.2.21

4.2 Specification of NVRAM Manager (UID 33, SWS)

Limitations are given mainly by the finite number of "Block Management Types" and their individual treatment of NV data. These limits can be reduced by an enhanced user defined management information, which can be stored as a structured part of

the real NV data. In this case the user defined management information has to be interpreted and handled by the application at least.

4.3 Specification of LIN Driver (UID 72, SWS)

Only one LIN channel of an ECU is allowed to connect to a particular LIN cluster. Unless there are unused (not connected) channels in the ECU, the number of LIN channels is equal to the number of LIN clusters.

Driver scope

[SWS_Lin_00045] [One LIN driver provides access to one LIN hardware unit type (simple UART or dedicated LIN hardware) that may consist of several LIN channels.](SRS_BSW_00347)

[SWS_Lin_00201] [For different LIN hardware units a separate LIN driver needs to be implemented. It is up to the implementer to adapt the driver to the different instances of similar LIN channels.]()

[SWS_Lin_00177] [In case several LIN driver instances (of same or different vendor) are implemented in one ECU the file names, API names, and published parameters must be modified such that no two definitions with the same name are generated. The name shall be extended according to SRS_BSW_00347 with a Vendor Id (needed to distinguish LIN drivers from different vendors) and a Vendor specific name (needed to distinguish different hardware units implemented by one Vendor): <Module abbreviation><Vendor Id><Vendor specific name>.]()

The LIN Interface is responsible for calling the correct function. The necessary information shall be given in an XML file during configuration. See [8] for description how the LIN Interface handles several LIN drivers.

4.4 Specification of ECU State Manager (UID 78, SWS)

ECUs cannot always be switched off (i.e., zero power consumption).

Rationale: The shutdown target OFF can only be reached using ECU special hardware (e.g., a power hold circuit). If this hardware is not available, this specification proposes to issue a reset instead. Other default behaviors are permissible, however.

4.5 Specification of CAN State Manager (UID 253, SWS)

The CanSM module can be used for CAN communication only. Its task is to operate with the CanIf module to control one or multiple underlying CAN Controllers and CAN Transceiver Drivers. Other protocols than CAN (i.e., LIN or FlexRay) are not supported.

4.6 Specification of Basic Software Mode Manager (UID 313, SWS)

Maximum one instance of the BSW Mode Manager may be used within a partition.

4.7 Specification of Module XCP (UID 412, SWS)

The following XCP features are currently out of scope:

- The SET_DAQ_ID command according to the XCP CAN Transport Layer Specification is not part of the AUTOSAE XCP module
- Currently, the AUTOSAR RTE does not offer APIs for direct communication with XCP
- For further details concerning the supported feature set, please refer to [13]
- NAX is only configurable through the ASAM configuration file A2L.

Please note:

For the communications bus LIN, no ASAM XCP is specified.

4.8 Specification of UDP Network Management (UID 414, SWS)

- One instance of UdpNm is associated with only one NM-Cluster in one network. One NM-Cluster can have only one instance of UdpNm in one node.
- One instance of UdpNm is associated with only one network within the same ECU.
- UdpNm is only applicable for TCP/IP based systems.

[SWS_UdpNm_00131] [The AUTOSAR UdpNm algorithm shall support up to 250 nodes per NM-Cluster by default.]()

Note: The AUTOSAR UdpNm algorithm can support an arbitrary number of nodes per NM-cluster (even more than default 250 nodes per cluster, if necessary) - it is only a matter of configuration, since the upper limit is not fixed and depends on the trade-off between response time, fault-tolerance and resulted bus load configured for the AUTOSAR UdpNm coordination algorithm. This might depend on the physical layer used.

4.9 Specification of Synchronized Time-Base Manager (UID 421, SWS)

OS ScheduleTable

The Synchronized Time-Base Manager shall perform the functionality of synchronizing OS ScheduleTables with a respective Synchronized Time Base. However, the StbM considers only the case when the targeted OS ScheduleTable is explicitly synchronized. The implicit synchronization does not affect the StbM, because the synchronization mechanism bypasses the module (for more information about the difference between explicit and implicit synchronization, please refer to the Specification of Operating System (SWS OS). Thus, when talking in the following about synchronization of OS ScheduleTables, always the explicit one is meant.

Synchronized Time Base Identifier

The StbMSynchronizedTimeBaseIdentifier range (128 .. 65535) is currently reserved and might still be used by legacy applications (implementing Triggered Customers). The ID range will however be reassigned to new features in the next release. Legacy applications will then no longer be supported.

Mode switches

The Synchronized Time-Base Manager does not deal with mode switches during runtime.

Configuration

Post-build configuration of the StbM is limited to enabling or disabling the functionality of a system wide Global Time Master for a Time Base (refer to StbMIsSystemWideGlobalTimeMaster).

Out of scope

- Errors, which occurred during Global Time establishment, and which are not caused by the module itself (e.g., loss of FlexRay global time is a FlexRay issue and is not an issue of the Synchronized Time-Base Manager).
- Errors, which occurred during interaction with customers.

Example: Calling the explicit OS ScheduleTable synchronization may cause an exception, because the delta between the submitted parameter counterValue and the OS internal counter is higher than the tolerance range of affected expiry points. Dealing with this exception is an OS issue, not an issue of the Synchronized Time-Base Manager.

4.10 Specification of Ethernet Driver (UID 430, SWS)

It is not possible to transmit data which exceeds the available buffer size of the used controller. Longer data has to be transmitted using the Internet Protocol (IP) or Transmission Control Protocol (TCP).

Depending on the Ethernet hardware, it may become necessary that implementations deviate from API specifications in respect to the asynchronous/synchronous behavior.

4.11 Specification of Ethernet Transceiver Driver (UID 431, SWS)

The Ethernet Transceiver Driver module is only able to handle a single thread of execution. The execution must not be pre-empted by itself.

4.12 Guide to BSW Distribution (UID 631, EXP)

The support for Basic Software Allocation in AUTOSAR is currently limited to backward compatible changes (with respect to AUTOSAR 4.0.3). This currently results in the following restrictions, which may not apply to future releases of AUTOSAR:

- Communication between master and satellites is not standardized.
- BSW functional clusters and their AUTOSAR BSW Cluster Interface are not standardized.

Since CONC 691 is still draft, this also applies to the properties of the Mem driver mentioned in subsection 2.5.8.

4.13 Specification of Time Synchronization over CAN (UID 674, SWS)

- The Time Base in the SYNC and OFS messages is limited to 32 bit, wherefore the maximum supported time value is 4294967295 seconds ($2^{32}-1$).
- Time Masters, Time Gateways and Time Slaves shall work with a Time Base reference clock with a worst-case accuracy of $2\mu\text{s}$.
- "CRC secured" in the context of this document refers to CRC integrity protection mechanism and does not imply that CRC is used as a cybersecurity solution.
- The authentication protection mechanism of the time is not supported on classic CAN busses, due to below reasons.
- The authentication protection mechanism is complex to achieve on classic CAN busses due to payload limitation and any solution incorporated will leave the security vulnerabilities (e.g., cryptographic attacks, DoS).

- Today's ECUs in vehicle E/E architecture supports both classic CAN and CanFD channels.

4.14 Specification of Time Synchronization over FlexRay (UID 675, SWS)

- Time Masters, Time Gateways and Time Slaves shall work with a Time Base reference clock with a worst-case accuracy of $2\mu\text{s}$.
- The Time Base in the OFS messages is limited to 32 bit, wherefore the maximum supported time value is 4294967295 seconds ($2^{32}-1$).
- "CRC secured" in the context of this document refers to CRC integrity protection mechanism and does not imply that CRC is used as a cybersecurity solution.
- No support of securing the messages of PDelay protocol.

4.15 Specification of Time Synchronization over Ethernet (UID 676, SWS)

- No support of BMCA protocol, like specified in [4, IEEE 802.1 AS].
- No support of Announce and Signaling messages, like specified in [4, IEEE 802.1 AS].
- The reception of a Pdelay_Req is not taken as a pre-condition to start with the transmission of Sync messages.
- The Rate Correction will be performed by the StbM, (refer to [2]) based on Sync messages, which does not require the Pdelay mechanism, though the IEEE Standard mandates to calculate the rate correction based on Pdelay messages. This is considered to be a deviation from the IEEE-Standard, but it is considered to be interoperable. For some applications, for example, for Audio/Video, it might be necessary to use Pdelay based Rate Correction performed by EthTSyn itself, which is optional and not considered by this specification.
- The Time Validation use case (Time Validation enabled) requires that the Pdelay measurement appears for a higher layer Validation application as if it was performed with timestamps from that Global Time Base that needs to be validated. The relevant timestamps are therefore mapped to the local instance of that Global Time. This is not considered to be a deviation from the IEEE-Standard, as no restrictions on the on-wire timestamps arise, i.e., one can still put Virtual Local Time into the PTP messages for each and every Pdelay measurement; only the corresponding instances of Global Time must be made available.

- EthTSyn will not maintain the Ethernet HW clock but may use it as a source for the Virtual Local Time.
- While [4, IEEE 802.1 AS] states, that IEEE 802.1AS messages shall not have a VLAN tag nor a priority tag, EthTSyn would allow Time Synchronization on VLANs under the condition, that the switch HW supports forwarding of reserved multicast address using the range of 01:80:C2:00:00:00 .. 0F.
- "CRC secured" in the context of this document refers to CRC integrity protection mechanism and does not imply that CRC is used as a cybersecurity solution.
- While multidrop topology is used, pDelay measurement are not supported and shall be set to static value.
- No support of securing the messages of PDelay protocol.

4.16 Specification of Key Manager (UID 907, SWS)

The Key Management module shall be used with a Crypto Service Manager and its underlying modules.

Only a single KeyElement (with ID = 1) per CsmKey is currently supported.

4.17 Explanation of Application Interface of AD/ADAS vehicle motion control (UID 988, EXP)

The logical architectures proposed do not restrict the development or products of companies or organizations participating in AUTOSAR.

5 Release history

5.1 Release R22-11

Name	Specification history entry
Application Design Patterns Catalogue	<ul style="list-style-type: none"> • Table for interface definitions introduced • Usage options for SensorActuator-Pattern • Editorial changes
Application Interfaces User Guide	<ul style="list-style-type: none"> • No content changes
Basic Software Module Description Template	<ul style="list-style-type: none"> • Added constraints for Lower Multiplicity • Modified compatibility for client server entries • Minor corrections • Editorial changes
Classic Platform Release Overview	<ul style="list-style-type: none"> • Release Life Cycle Status: R22-11 is in Evolution, R22-11 supersedes R21-11
Complex Driver design and integration guideline	<ul style="list-style-type: none"> • Update of the figure which describes the header files hierarchy of a CDD module
Description of the AUTOSAR standard errors	<ul style="list-style-type: none"> • Removed the description of PDU replication error and PDU counter error handling
Diagnostic Extract Template	<ul style="list-style-type: none"> • Support for nested data structures • Rework of ROE • Improvement of environmental condition • minor corrections / clarifications / editorial changes
Explanation of Application Interface of AD/ADAS vehicle motion control	<ul style="list-style-type: none"> • Add definition of PLN2 and VMC1 • Revision of Functional description of ADAS Application • Revision of ADAS Manager functions and function description • Add Appendix A and revision of Appendix B
Explanation of Application Interfaces of Occupant and Pedestrian Safety Systems Domain	<ul style="list-style-type: none"> • No content changes
Explanation of Application Interfaces of the Body and Comfort Domain	<ul style="list-style-type: none"> • No content changes
Explanation of Application Interfaces of the Chassis Domain	<ul style="list-style-type: none"> • No content changes
Explanation of Application Interfaces of the HMI, Multimedia and Telematics Domain	<ul style="list-style-type: none"> • No content changes
Explanation of Application Interfaces of the Powertrain Engine Domain	<ul style="list-style-type: none"> • No content changes
Explanation of CP Software Cluster Design And Integration Guideline	<ul style="list-style-type: none"> • Minor corrections / clarifications / editorial changes
Explanation of Error Handling on Application Level	<ul style="list-style-type: none"> • No content changes. • Editorial changes: • Document converted from Word to LaTeX. • Document structure adjusted to the standard.
Explanation of Firmware Over-The-Air	<ul style="list-style-type: none"> • No content changes
Explanation of Interrupt Handling within AUTOSAR	<ul style="list-style-type: none"> • No content changes • Document Status changed to obsolete





Name	Specification history entry
Explanatory Document for usage of AUTOSAR RunTimeInterface	<ul style="list-style-type: none"> • Deprecated compiler abstraction • Minor corrections and updates
General Requirements on Basic Software Modules	<ul style="list-style-type: none"> • Clarifications related to security events and development error table (SRS_BSW_00385, SRS_BSW_00386, SRS_BSW_00490) • Older requirements set to valid (were draft before) • New (ARTI related) requirement (SRS_BSW_00495)
General Requirements on SPAL	<ul style="list-style-type: none"> • No content changes
General Specification of Basic Software Modules	<ul style="list-style-type: none"> • Removed compiler abstraction • Add Security events chapter • Minor corrections / clarifications / editorial changes; For details please refer to the ChangeDocumentation • Changed Document Status from Final to published
General Specification of Transformers	<ul style="list-style-type: none"> • Removed section 8.2.1 Std_TransformerForward • Editorial Changes
Guide to BSW Distribution	<ul style="list-style-type: none"> • Updated multicore type for CanXL and Wdg
Guide to Mode Management	<ul style="list-style-type: none"> • Added explanatory content for rework of PNC related ComM and NM handling • Editorial Changes
Integration of Franca IDL Software Component Descriptions	<ul style="list-style-type: none"> • No content changes
Layered Software Architecture	<ul style="list-style-type: none"> • Incorporated new concepts for Vehicle-2-X Data Manager, MACsec, CAN XL, DDS, • Secured Time Synchronization, Vehicle-2-X Support for China • Editorial changes
List of Basic Software Modules	<ul style="list-style-type: none"> • Removed Compiler Abstraction • Added Vehicle-2-X Data Manager • Added MACsec Key Agreement • Added CAN XL • Added Data Distribution Service • Added Chinese Vehicle-2-X
Macro Encapsulation of Interpolation Calls	<ul style="list-style-type: none"> • No content changes
Methodology for Classic Platform	<ul style="list-style-type: none"> • Deprecate compiler abstraction
Modeling Guidelines of Basic Software EA UML Model	<ul style="list-style-type: none"> • described adapted package structure in BSWUMLModel • added appendix with all supported stereotypes and tagged values • clarified and simplified modeling of bitrange in bitfields
Modeling Show Cases Report	<ul style="list-style-type: none"> • No content changes
NV Data Handling Guideline	<ul style="list-style-type: none"> • No content changes
Overview of Functional Safety Measures in AUTOSAR	<ul style="list-style-type: none"> • No content changes
Requirements on ADC Driver	<ul style="list-style-type: none"> • No content changes
Requirements on AUTOSAR Features	<ul style="list-style-type: none"> • Updated to C9
Requirements on Basic Software Module Description Template	<ul style="list-style-type: none"> • Updated "supporting material" for RS_BSWMD_00016





Name	Specification history entry
Requirements on BSW Modules for SAE J1939	<ul style="list-style-type: none"> No content changes
Requirements on Bus Mirroring	<ul style="list-style-type: none"> Support for CAN XL
Requirements on CAN	<ul style="list-style-type: none"> CanXL requirements were added Minor corrections / clarifications / editorial changes
Requirements on Chinese Vehicle-2-X Communication	<ul style="list-style-type: none"> Initial release
Requirements on Communication	<ul style="list-style-type: none"> Editorial changes
Requirements on Core Test	<ul style="list-style-type: none"> No content changes
Requirements on Crypto Stack	<ul style="list-style-type: none"> Add support of certificate formats CVC and X.509
Requirements on Debugging, Tracing and Profiling support of AUTOSAR Components	<ul style="list-style-type: none"> Added requirements for tracing runnables, schedulables, VFB tracing hooks and BSW module entries/exits.
Requirements on Diagnostic Extract Template	<ul style="list-style-type: none"> Support for nested data structures Remove superfluous requirement
Requirements on DIO Driver	<ul style="list-style-type: none"> No content changes
Requirements on ECU Configuration	<ul style="list-style-type: none"> No content changes
Requirements on ECU Resource Template	<ul style="list-style-type: none"> Editorial changes
Requirements on EEPROM Driver	<ul style="list-style-type: none"> No content changes
Requirements on Ethernet Support in AUTOSAR	<ul style="list-style-type: none"> Introduction of CAN XL
Requirements on Firmware Over-The-Air	<ul style="list-style-type: none"> No content changes
Requirements on Flash Driver	<ul style="list-style-type: none"> No content changes
Requirements on Flash Test	<ul style="list-style-type: none"> No content changes
Requirements on FlexRay	<ul style="list-style-type: none"> No content changes
Requirements on Free Running Timer	<ul style="list-style-type: none"> Document set to obsolete
Requirements on Function Inhibition Manager	<ul style="list-style-type: none"> No content changes Editorial changes
Requirements on Gateway	<ul style="list-style-type: none"> Added support for Data Distribution Service (DDS)
Requirements on GPT Driver	<ul style="list-style-type: none"> No content changes
Requirements on Hardware Test Manager on start up and shutdown	<ul style="list-style-type: none"> Made FS_HTMSS_00001 as dependency instead of uptrace
Requirements on I/O Hardware Abstraction	<ul style="list-style-type: none"> No content changes
Requirements on ICU Driver	<ul style="list-style-type: none"> No content changes
Requirements on I-PDU Multiplexer	<ul style="list-style-type: none"> Fixed number of possible multiplexed PDUs
Requirements on Libraries	<ul style="list-style-type: none"> No content changes
Requirements on LIN	<ul style="list-style-type: none"> No content changes
Requirements on MCU Driver	<ul style="list-style-type: none"> No content changes





Name	Specification history entry
Requirements on Memory Hardware Abstraction Layer	<ul style="list-style-type: none"> ● Set items from draft to valid: <ul style="list-style-type: none"> – SRS_MemHwAb_14034 – SRS_MemHwAb_14035 – SRS_MemHwAb_14036 – SRS_MemHwAb_14037 – SRS_MemHwAb_14038 – SRS_MemHwAb_14039 – SRS_MemHwAb_14040 – SRS_MemHwAb_14041 – SRS_MemHwAb_14042 – SRS_MemHwAb_14043 – SRS_MemHwAb_14044 – SRS_MemHwAb_14045 – SRS_MemHwAb_14046 – SRS_MemHwAb_14047 – SRS_MemHwAb_14048 – SRS_MemHwAb_14049 – SRS_MemHwAb_14050 – SRS_MemHwAb_14051 – SRS_MemHwAb_14052 – SRS_MemHwAb_14053 – SRS_MemHwAb_14054 – SRS_MemHwAb_14055 – SRS_MemHwAb_14056 – SRS_MemHwAb_14057
Requirements on Memory Services	<ul style="list-style-type: none"> ● No content changes
Requirements on Mode Management	<ul style="list-style-type: none"> ● Rework of PNC related ComM and NM handling ● Removed "DRAFT"-tag from SRS_ModeMgm_09249 ● Editorial Changes
Requirements on Module XCP	<ul style="list-style-type: none"> ● No content changes
Requirements on OCU Driver	<ul style="list-style-type: none"> ● No content changes
Requirements on Operating System	<ul style="list-style-type: none"> ● Narrowed scope to cores running AUTOSAR OS
Requirements on Port Driver	<ul style="list-style-type: none"> ● Editorial Changes
Requirements on PWM Driver	<ul style="list-style-type: none"> ● No content changes
Requirements on RAM Test	<ul style="list-style-type: none"> ● No content changes
Requirements on Runtime Environment	<ul style="list-style-type: none"> ● Removed Support for Compiler Abstraction
Requirements on Secure Onboard Communication	<ul style="list-style-type: none"> ● No content changes
Requirements on Software Cluster Connection module	<ul style="list-style-type: none"> ● fixed the terminology by rephrasing Applicative Software Cluster to Application Software Cluster
Requirements on Software Component Template	<ul style="list-style-type: none"> ● No content changes.
Requirements on SPI Handler/Driver	<ul style="list-style-type: none"> ● No content changes
Requirements on SW-C and System Modeling	<ul style="list-style-type: none"> ● No content changes
Requirements on System Template	<ul style="list-style-type: none"> ● Updated RS_SYST_00042





Name	Specification history entry
Requirements on Time Service	<ul style="list-style-type: none"> No content changes
Requirements on Transformer	<ul style="list-style-type: none"> No content changes
Requirements on TTCAN	<ul style="list-style-type: none"> Editorial changes
Requirements on Vehicle-2-X Communication	<ul style="list-style-type: none"> Added concept for V2X Data Manager, V2X Remote Access Layer
Requirements on Watchdog Driver	<ul style="list-style-type: none"> No content changes
Safety Use Case Example	<ul style="list-style-type: none"> No content changes
Software Component Template	<ul style="list-style-type: none"> Support for service discovery Clarification of the role of SwBaseType minor corrections / clarifications / editorial changes
Specification and Integration of Hardware Test Management at start up and shutdown	<ul style="list-style-type: none"> No content changes
Specification for CANXL driver functionality to provide additional required interfaces	<ul style="list-style-type: none"> Initial release
Specification for CANXL transceiver driver functionality to provide additional required interfaces	<ul style="list-style-type: none"> Initial release
Specification of a Diagnostic Communication Manager for SAE J1939	<ul style="list-style-type: none"> Clarification of LampStatus in DM1 Fixed ACK code for DM19 Limited retransmission of messages
Specification of a Request Manager for SAE J1939	<ul style="list-style-type: none"> No content changes
Specification of a Transport Layer for SAE J1939	<ul style="list-style-type: none"> Fixed not applicable SWS items
Specification of ADC Driver	<ul style="list-style-type: none"> SWS_ADC_00460 editorially adapted according to TPS_STDT_00042
Specification of AUTOSAR Run-Time Interface	<ul style="list-style-type: none"> Corrected Error Classification Introduced ARTI macro with several event parameters Introduced ARTI class for tracing RTE API and BSW API Splitted "arti.h" in module depending header files
Specification of Basic Software Mode Manager	<ul style="list-style-type: none"> Removal of obsolete event request BswMwDgMRequestPartitionReset Editorial Changes
Specification of Basic Software Multicore Library	<ul style="list-style-type: none"> Introduced BMC Atomic Datatypes Reworked APIs to make use of Atomic Datatypes Cleaned up library
Specification of Bit Handling Routines	<ul style="list-style-type: none"> New Functions added: SWS_Bfx_91002, SWS_Bfx_00134, SWS_Bfx_00135, SWS_Bfx_91003, SWS_Bfx_00137, SWS_Bfx_91004, SWS_Bfx_00139, SWS_Bfx_91005 and SWS_Bfx_00141
Specification of Bulk NvData Manager	<ul style="list-style-type: none"> editorial changes
Specification of Bus Mirroring	<ul style="list-style-type: none"> Support for CAN XL
Specification of CAN Driver	<ul style="list-style-type: none"> CanXL requirements were added Minor corrections / clarifications / editorial changes
Specification of CAN Interface	<ul style="list-style-type: none"> CAN XL Support Editorial changes





Name	Specification history entry
Specification of CAN Network Management	<ul style="list-style-type: none"> Fixes for Partial Networking and PNC Shutdown Improved traceability
Specification of CAN State Manager	<ul style="list-style-type: none"> ComTxModeTimePeriodFactor replaced with ComTxModeTimePeriod
Specification of CAN Transceiver Driver	<ul style="list-style-type: none"> Added support for CanXL
Specification of CAN Transport Layer	<ul style="list-style-type: none"> Clarification of PduR result value in case of transmit error
Specification of Cellular Vehicle-2-X Driver	<ul style="list-style-type: none"> Initial release
Specification of Chinese Vehicle-2-X Management	<ul style="list-style-type: none"> Initial release
Specification of Chinese Vehicle-2-X Message	<ul style="list-style-type: none"> Initial release
Specification of Chinese Vehicle-2-X Network	<ul style="list-style-type: none"> Initial release
Specification of Chinese Vehicle-2-X Security	<ul style="list-style-type: none"> Initial release
Specification of COM Based Transformer	<ul style="list-style-type: none"> No content changes
Specification of Communication	<ul style="list-style-type: none"> Removed obsolete elements Minor corrections / clarifications / editorial changes
Specification of Communication Manager	<ul style="list-style-type: none"> Introduced validation findings of concept "ReworkOfPNCrelatedComMandNM handling (part2)" Introduced validation findings of concept "VNSM (part1)" Removed obsolete marked requirements of concept "ReworkOfPNCrelatedComMandNM handling (part1/part2)" and "EthernetWakeOnDataLine (part1)"
Specification of Communication Stack Types	<ul style="list-style-type: none"> Removed reference to CompilerAbstraction
Specification of Core Test	<ul style="list-style-type: none"> Changed SWS_CorTst_00999 to SWS_CorTst_NA_00999
Specification of CRC Routines	<ul style="list-style-type: none"> Minor corrections / clarifications / editorial changes
Specification of Crypto Driver	<ul style="list-style-type: none"> Clarification on handling the Key state during Crypto_KeyElementSet API Add support for custom service and related API
Specification of Crypto Interface	<ul style="list-style-type: none"> Added CRYPTO_CUSTOM service Updated CRYPTO_E_PARAM_HANDLE to CRYIF_E_PARAM_HANDLE Removed return values after reporting Det errors
Specification of Crypto Service Manager	<ul style="list-style-type: none"> New Feature: Addition of the CsmCustom service for vendor customized security services. Removal of certificate functionality (moved to KeyM and replaced by CsmCustom services) Editorial changes
Specification of Data Distribution Service in Classic Platform	<ul style="list-style-type: none"> Initial release
Specification of Default Error Tracer	<ul style="list-style-type: none"> Added not applicable requirement SWS_Det_NA_00999 Editorial Changes





Name	Specification history entry
Specification of Diagnostic Communication Manager	<ul style="list-style-type: none"> • Diagnostic Extract shall be completed to describe multi-dimensional arrays and arrays with complex data types • Update RoE to match latest ISO 14229-1 • Handling of Dem_GetNumberOfFreezeFrameRecords • minor corrections / clarifications / editorial changes; For details please refer to the ChangeDocumentation
Specification of Diagnostic Event Manager	<ul style="list-style-type: none"> • Add Interface Intrusion Detection System Manager • Support J1979-02 use case • Rename DemDebounceTimeBaseClass to DemDebounceTimeBasedClass • Rename DemDebounceTimeBaseRef to DemDebounceTimeBasedClassRef • Add API Dem_ResetMonitorStatus
Specification of Diagnostic Log and Trace	<ul style="list-style-type: none"> • Added DltProtocolVersion Parameter • Added Privacy flags and message tags • Editorial changes
Specification of Diagnostic over IP	<ul style="list-style-type: none"> • No content changes
Specification of DIO Driver	<ul style="list-style-type: none"> • Minor corrections / clarifications / editorial changes
Specification of ECU Configuration	<ul style="list-style-type: none"> • Clarified usage of apiServicePrefix for Xfrm module definitions • Added origin flag to EcucContainerDef • Improved description how optionality of containers, parameters and references in the Ecuc Parameter Definition UML model is expressed • Clarified semantic of multiple aggregated container trees that include references
Specification of ECU Resource Template	<ul style="list-style-type: none"> • No content changes
Specification of ECU State Manager	<ul style="list-style-type: none"> • Added uptraces to SRS document • Minor content changes, clarifications
Specification of EEPROM Abstraction	<ul style="list-style-type: none"> • Removal of obsolete items from R21-11 • Editorial changes
Specification of EEPROM Driver	<ul style="list-style-type: none"> • Proper implementation of TPS_STDT_00042
Specification of Ethernet Driver	<ul style="list-style-type: none"> • Entrency limitation • Editorial changes
Specification of Ethernet Interface	<ul style="list-style-type: none"> • Migration from word document to LaTeX • Changed SWS_EthIf_00498 and SWS_EthIf_00504 to Valid • New chapters for: <ul style="list-style-type: none"> • CellularV2x (V2X for China) • CAN-XL • MACSec • Editorial changes





Name	Specification history entry
Specification of Ethernet State Manager	<ul style="list-style-type: none"> • Update state machine behaviour • Removal of obsolete items • Set items to valid: <ul style="list-style-type: none"> – SWS_EthSM_00216 – SWS_EthSM_00217 – SWS_EthSM_00220 – ECUC_EthSM_00110
Specification of Ethernet Switch Driver	<ul style="list-style-type: none"> • Remodel EthSwTPort MAC address and VLAN definition • Implemented MACSec • Implemented Derterministic Communication with TSN
Specification of Ethernet Transceiver Driver	<ul style="list-style-type: none"> • MACSec support • Editorial changes
Specification of Extended Fixed Point Routines	<ul style="list-style-type: none"> • Functions added: SWS_Efx_91002, SWS_Efx_00435, SWS_Efx_00412, SWS_Efx_10001, SWS_Efx_10002, SWS_Efx_10003, SWS_Efx_10004, SWS_Efx_10005, SWS_Efx_00423, SWS_Efx_10006, SWS_Efx_10007, SWS_Efx_10008, SWS_Efx_10009, SWS_Efx_10010, SWS_Efx_00426, SWS_Efx_00434, SWS_Efx_10015, SWS_Efx_10011, SWS_Efx_10012, SWS_Efx_10013 and SWS_Efx_10014. • Functions updated: SWS_Efx_00005, SWS_Efx_00178, SWS_Efx_00181, SWS_Efx_00175, SWS_Efx_00178, SWS_Efx_00181, SWS_Efx_00210, SWS_Efx_00213 and SWS_Efx_00216
Specification of Fixed Point Interpolation Routines	<ul style="list-style-type: none"> • Functions updated: <ul style="list-style-type: none"> • SWS_lfx_00014, SWS_lfx_00017, SWS_lfx_00022, SWS_lfx_00027, SWS_lfx_00032, SWS_lfx_00209, SWS_lfx_00041, SWS_lfx_00051, SWS_lfx_00062, SWS_lfx_00077, SWS_lfx_00087, SWS_lfx_00097, SWS_lfx_00110, SWS_lfx_00122, SWS_lfx_00222, • SWS_lfx_00136, SWS_lfx_00151, SWS_lfx_00236, SWS_lfx_00166, SWS_lfx_00181, SWS_lfx_00247, SWS_lfx_00185, SWS_lfx_00186, SWS_lfx_00006 and SWS_lfx_00821. • • Functions added: SWS_lfx_91002, SWS_lfx_91003, SWS_lfx_91004 and SWS_lfx_91005.
Specification of Fixed Point Math Routines	<ul style="list-style-type: none"> • Update SWS_Mfx_00064 for the Function IDs 0x152 to 0x156 with the new "Associated maximum shift" value • Corrected the datatype of Mfx_Add_u32s32_u8 function (SWS_Mfx_00008) • Correct parameter description for (SWS_Mfx_00053) • New Signum function Mfx_Sgn_s32_s8 is added
Specification of Flash Driver	<ul style="list-style-type: none"> • Migrated FLS_E_BUSY to runtime error • Proper implementation of TPS_STDT_00042





Name	Specification history entry
Specification of Flash EEPROM Emulation	<ul style="list-style-type: none"> • Removed obsolete items • Changed SWS_Fee_00999 to SWS_Fee_NA_00999 • Set items to valid: <ul style="list-style-type: none"> – SWS_Fee_00194 – SWS_Fee_00195 – SWS_Fee_00196
Specification of Flash Test	<ul style="list-style-type: none"> • Changed SWS_FlsTst_00166 to SWS_FlsTst_NA_00166
Specification of FlexRay AUTOSAR Transport Layer	<ul style="list-style-type: none"> • No content changes
Specification of FlexRay Driver	<ul style="list-style-type: none"> • Changed "Kind" and "Derived from" of Fr_ConfigType • Changed SWS_Fr_00602 to SWS_Fr_NA_00602
Specification of FlexRay Interface	<ul style="list-style-type: none"> • No content changes
Specification of FlexRay ISO Transport Layer	<ul style="list-style-type: none"> • No content changes
Specification of FlexRay Network Management	<ul style="list-style-type: none"> • Changes to Partial Networking • Traceability changes
Specification of FlexRay State Manager	<ul style="list-style-type: none"> • Improved traceability
Specification of FlexRay Transceiver Driver	<ul style="list-style-type: none"> • No content changes
Specification of Floating Point Interpolation Routines	<ul style="list-style-type: none"> • Requirements added SWS_lfl_91000 to SWS_lfl_91003 • Requirements added SWS_lfl_00226, SWS_lfl_00228, SWS_lfl_00229, SWS_lfl_00231, WS_lfl_00232, SWS_lfl_00234, SWS_lfl_00235 • Modified SWS_lfl_00170 , SWS_lfl_00011 and SWS_lfl_00221
Specification of Floating Point Math Routines	<ul style="list-style-type: none"> • Updated SWS_Mfl_00285 and SWS_Mfl_00289. • New function added SWS_Mfl_00820 and updated the following: <ul style="list-style-type: none"> • SWS_Mfl_00142, SWS_Mfl_00152, • SWS_Mfl_00157, SWS_Mfl_00163, • SWS_Mfl_91000, SWS_Mfl_91001, • SWS_Mfl_00854, SWS_Mfl_91003 • and SWS_Mfl_91004
Specification of Function Inhibition Manager	<ul style="list-style-type: none"> • No content changes • Editorial changes
Specification of GPT Driver	<ul style="list-style-type: none"> • Rename SWS_Gpt_00381 into SWS_Gpt_NA_00381
Specification of Hardware Test Manager	<ul style="list-style-type: none"> • No content changes
Specification of I/O Hardware Abstraction	<ul style="list-style-type: none"> • Changed SWS_loHwAb_00145 to SWS_loHwAb_NA_00145
Specification of ICU Driver	<ul style="list-style-type: none"> • Changed SWS_lcu_00380 to SWS_lcu_NA_00380
Specification of Intrusion Detection System Manager	<ul style="list-style-type: none"> • Security Events - Added additional context data • Added SWS_IdsM_01034
Specification of I-PDU Multiplexer	<ul style="list-style-type: none"> • Improved retransmission of PDUs • Clarified priority handling for contained PDUs • Fixed error tables





Name	Specification history entry
Specification of Key Manager	<ul style="list-style-type: none"> • Add the certificate handling to keyM. • Add new configuration parameter to KeyMCertificate container. • Add new format for representing certificate. • Editorial changes.
Specification of Large Data COM	<ul style="list-style-type: none"> • Migrate from Word to LaTeX • Minor corrections
Specification of LIN Driver	<ul style="list-style-type: none"> • Clarification of Lin_CheckWakeup return values • Editorial changes
Specification of LIN Interface	<ul style="list-style-type: none"> • Changed upper limit of LinTpP2Timing and LinTpP2Max • Renamed the arguments "Schedule" (SWS_LinIf_00202 LinIf_ScheduleRequest) and "schedule" (SWS_LinIf_00520 <User>_ScheduleRequestConfirmation)
Specification of LIN State Manager	<ul style="list-style-type: none"> • Changed ID from SWS_LinSM_00211 to SWS_LinSM_NA_00211 • Renamed the arguments "Schedule" (SWS_LinSM_00113 LinSM_ScheduleRequest) and "schedule" (SWS_LinSM_00129 LinSM_ScheduleRequestConfirmation)
Specification of LIN Transceiver Driver	<ul style="list-style-type: none"> • Updated LinTrcv_CheckWakeup return values
Specification of MACsec Key Agreement	<ul style="list-style-type: none"> • Initial release
Specification of MCU Driver	<ul style="list-style-type: none"> • Cleaned up unresolved references in traceability.
Specification of Memory Abstraction Interface	<ul style="list-style-type: none"> • Changed SWS_MemIf_00999 to SWS_MemIf_NA_00999
Specification of Memory Access	<ul style="list-style-type: none"> • Renamed MemAcc_MemApiType in MemAcc_MemBinaryHeaderType • Additional DET checks added • Updated Configurable Interface chapter • Corrected Service IDs • Minor corrections and bugfixes • Editorial changes
Specification of Memory Driver	<ul style="list-style-type: none"> • Renamed MEM_JOB_PENDING into MEM_E_JOB_PENDING for DET errors • Additional DET checks added • Minor corrections and bugfixes • Editorial changes
Specification of Memory Mapping	<ul style="list-style-type: none"> • Correction of inconsistent MAKW patterns and examples • Resolve incompatibility to constr_4103 • Add 64bit alignment support • Deprecate compiler abstraction





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Specification of Module E2E Transformer	<ul style="list-style-type: none"> • Remove duplicated requirement SWS_E2EXf_00195 • Correction of transformer call in SWS_E2EXf_00203, SWS_E2EXf_00196 • Use consistent function names (e.g. E2EXf_handling_PXXm_server, E2EXf_handling_PXXm_client) • Counter handling for client/server communication (methods) updated • Correction of transformer status forwarding • Correction of MaxDataLength and Offset in profile P07m
Specification of Module XCP	<ul style="list-style-type: none"> • Editorial changes
Specification of Network Management for SAE J1939	<ul style="list-style-type: none"> • Fixed generic component names
Specification of Network Management Interface	<ul style="list-style-type: none"> • Refined Partial Network Cluster handling • Editorial changes
Specification of NVRAM Manager	<ul style="list-style-type: none"> • Obsolete requirements related to Mode Switch are removed • Immediate block with CRC condition was transitioned to recommendation
Specification of OCU Driver	<ul style="list-style-type: none"> • Editorial changes
Specification of Operating System	<ul style="list-style-type: none"> • Several minor issues and clarifications (IOC error codes, applicability of multi-core, ARTI updates) • Additional memory allocation keywords • Added further uptraces to SRS requirements • Removal of StartNonAutosarCore API
Specification of PDU Router	<ul style="list-style-type: none"> • Introduced production error for buffer overflow handling • Added support for Data Distribution Service (DDS) • Clarification for fan-in support • Editorial changes
Specification of Platform Types	<ul style="list-style-type: none"> • The standard AUTOSAR type boolean shall now be implemented using the C99 build-in type _Bool. • Introduced limit macros for integer and float types.
Specification of Port Driver	<ul style="list-style-type: none"> • Proper implementation of TPS_STDT_00042
Specification of PWM Driver	<ul style="list-style-type: none"> • Changed ID from SWS_Pwm_00153 to SWS_Pwm_NA_00153
Specification of RAM Test	<ul style="list-style-type: none"> • Changed SWS_RamTst_00999 to SWS_RamTst_NA_00999
Specification of RTE Software	<ul style="list-style-type: none"> • Extended support for Software Clusters • Compiler abstraction removed • Minor corrections / clarifications / editorial changes
Specification of Secure Onboard Communication	<ul style="list-style-type: none"> • Minor corrections / clarifications / editorial changes
Specification of Service Discovery	<ul style="list-style-type: none"> • Editorials clean up;





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Specification of Socket Adaptor	<ul style="list-style-type: none"> ● Improved SoAd_TcplpEvent() requirement SWS_SoAd_00688 ● Improved nPdu requirements SWS_SoAd_00691 and SWS_SoAd_00735 ● Added NA infix to "not applicable" requirement SWS_SoAd_NA_00296
Specification of Software Cluster Connection module	<ul style="list-style-type: none"> ● Corrections and editorial changes of existing features
Specification of SOME/IP Transformer	<ul style="list-style-type: none"> ● implementsSOMEIPStringHandling (SWS_SomelpXf_00239 set to OSOLETE) ● Reworked SWS_SomelpXf_00054 with regards to UTF-8 ● Clarified byte order of length fields within SOME/IP payload ● Extended SWS_SomelpXf_00300 to support uint64 ● Distinguished in SWS_SomelpXf_00200 use of error messages with Messade ID ERROR ● not clearly distinguished from use of autonomous error responses ● Bugs resolved within SWS_SomelpXf_00244 and SWS_SomelpXf_00303 ● Resolved mismatch in the size of Method-ID on SWS_SOMEIPTransformer and ● PRS_SOMEIPProtocol. Removed chapters 7.2.3.1 "Message ID 32 bit", 7.2.3.2 "Length 32 bit, 7.1 "Definition of Identifiers" and 7.4 "Reserved and special identifiers for SOME/IP and SOME/IP-SD" ● Editorial Changes
Specification of SPI Handler/Driver	<ul style="list-style-type: none"> ● Reworked or rephrased requirements: ● SWS_Spi_NA_00999, SWS_Spi_00126, SWS_Spi_00151, ECUC_Spi_00220, SWS_Spi_00377, SWS_Spi_00389, SWS_Spi_00150, ECUC_Spi_00214 ● Editorial changes
Specification of Standard Types	<ul style="list-style-type: none"> ● Added Std_TransformerForwardCode and removed SWS_Std_00027 ● Introduced Not applicable requirement SWS_Std_NA_00999 ● Removed use of deprecate "compiler abstraction" from SWS_Std_00031 ● Editorial Changes
Specification of SW-C End-to-End Communication Protection Library	<ul style="list-style-type: none"> ● Corrections of MinDataLength in P04m and P07m ● Correction of syntax errors in profiles P11 and P22 ● Chapters 8 and Annex B: Make Service IDs of functions unique
Specification of Synchronized Time-Base Manager	<ul style="list-style-type: none"> ● Support for "Secured Time Synchronization" added ● API StbM_GetCurrentTime modified to query the Time Tuple ● Restorage of Global Time from persistent memory enhanced





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Specification of TCP/IP Stack	<ul style="list-style-type: none"> • ARP defensive processing • Transition OFFLINE to ONLINE
Specification of Time Service	<ul style="list-style-type: none"> • Changed SWS_Tm_00059 to SWS_Tm_NA_00059 • Editorial changes
Specification of Time Synchronization over CAN	<ul style="list-style-type: none"> • Support for "Secured Time Synchronization" added • Support for rate corrected Sync reception delay • Minor content changes, clarifications
Specification of Time Synchronization over Ethernet	<ul style="list-style-type: none"> • Support for "Secured Time Synchronization" added • AUTOSAR TLV processing enhanced • Several minor clarifications and corrections
Specification of Time Synchronization over FlexRay	<ul style="list-style-type: none"> • Support for "Secured Time Synchronization" added • Minor content changes, clarifications
Specification of Timing Extensions	<ul style="list-style-type: none"> • Added SL-LET feature • Rework document structure
Specification of TTCAN Driver	<ul style="list-style-type: none"> • Editorial changes
Specification of TTCAN Interface	<ul style="list-style-type: none"> • Rework of Chapter <User_TriggerTransmit> • Editorial changes
Specification of UDP Network Management	<ul style="list-style-type: none"> • Fixes for Partial Networking and PNC Shutdown • Removal of obsolete requirements • Bug fixes and editorial changes
Specification of Vehicle-2-X Basic Transport	<ul style="list-style-type: none"> • Editorial changes to reflect the introduction of V2xDM
Specification of Vehicle-2-X Data Manager	<ul style="list-style-type: none"> • Initial release
Specification of Vehicle-2-X Facilities	<ul style="list-style-type: none"> • New architecture with V2x DM
Specification of Vehicle-2-X Geo Networking	<ul style="list-style-type: none"> • Editorial changes to reflect the introduction of V2XDM
Specification of Vehicle-2-X Management	<ul style="list-style-type: none"> • Modification of ECUC configuration related to security configuration • Added V2xM module id and missing ECUC id • Editorial changes to reflect the introduction of V2xDM
Specification of Watchdog Driver	<ul style="list-style-type: none"> • Changed ID from SWS_Wdg_00175 to SWS_Wdg_NA_00175
Specification of Watchdog Interface	<ul style="list-style-type: none"> • Editorial changes
Specification of Watchdog Manager	<ul style="list-style-type: none"> • Editorial changes
Specification of Wireless Ethernet Driver	<ul style="list-style-type: none"> • Figures are now at the begin of a chapter. • Fixed text alignment of some artifacts. • Fixed some incorrect trace references.
Specification of Wireless Ethernet Transceiver Driver	<ul style="list-style-type: none"> • Figures are now at the begin of a chapter. • Fixed text alignment of some artifacts. • Fixed some incorrect trace references
Specification on SOME/IP Transport Protocol	<ul style="list-style-type: none"> • Updated Sequence for Transmission of SOME/IP segments • Editorial changes
Supplementary material of general blueprints for AUTOSAR	<ul style="list-style-type: none"> • No content changes
SW-C and System Modeling Guide	<ul style="list-style-type: none"> • No content changes





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System Template	<ul style="list-style-type: none"> • Added support for MACsec • Added support for Can XL • Clarification of usage of transfer property for signal groups and group signals • Minor corrections / clarifications / editorial changes; For details please refer to the ChangeDocumentation
Unique Names for Documentation, Measurement and Calibration: Modeling and Naming Aspects including Automatic Generation	<ul style="list-style-type: none"> • No content changes
Utilization of Crypto Services	<ul style="list-style-type: none"> • Bugfix done to ensure secure counter removal
Virtual Functional Bus	<ul style="list-style-type: none"> • Replaced "Figure 2.1" in the document with the "Figure 2.9" from TR_Methodology • Changed the caption of "Figure 2.2" to "Concept of the virtual functional bus" • Rephrased references to the obsolete step called "Configure System"