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1 Scope of Document

This document specifies requirements of AUTOSAR Automotive API Gateway. It is meant to be independent of any particular implementation providing basic information about aspects of it to be implemented.

AUTOSAR for both Adaptive and Classic platform uses its own methodology. As Automotive API Gateway uses regular ara::com communication with its fields, methods and events semantics for in-vehicle communication it needs to combine it with data-centric approach focused around VSS data model and VISS protocol.

This documents presents requirements for:

- data type constraints,
- units,
- VSS to communication primitives mapping,
- service availability,
- minimal subset of VISS protocol features.

2 Conventions to be used

2.1 Document Conventions

The representation of requirements in AUTOSAR documents follows the table specified in [TPS_STDT_00078], see [1, Standardization Template].

The verbal forms for the expression of obligation specified in [TPS_STDT_00053] shall be used to indicate requirements, see [1, Standardization Template].

2.2 Requirements Guidelines

2.2.1 Requirements identification

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as follows.

Note that the requirement level of the document in which they are used modifies the force of these words.

- MUST: This word, or the adjective “LEGALLY REQUIRED”, means that the definition is an absolute requirement of the specification due to legal issues.
- MUST NOT: This phrase, or the phrase “MUST NOT”, means that the definition is an absolute prohibition of the specification due to legal issues.
- SHALL: This phrase, or the adjective “REQUIRED”, means that the definition is an absolute requirement of the specification.
- SHALL NOT: This phrase means that the definition is an absolute prohibition of the specification.
- SHOULD: This word, or the adjective “RECOMMENDED”, means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- SHOULD NOT: This phrase, or the phrase “NOT RECOMMENDED”, means that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
- MAY: This word, or the adjective “OPTIONAL”, means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item.

An implementation, which does not include a particular option, SHALL be prepared to interoperate with another implementation, which does include the option, though perhaps with reduced functionality. In the same vein an implementation, which does include a particular option, SHALL be prepared to interoperate with another implementation, which does not include the option (except, of course, for the feature the option provides).

3 Acronyms and abbreviations

The glossary below includes acronyms and abbreviations relevant to the Automotive API Gateway Requirements that are not included in the AUTOSAR TR Glossary.

Abbreviation / Acronym:	Description:
VSS	Vehicle Signal Specification
VISS	The Vehicle Information Service Specification
VISSv2	The Vehicle Information Service Specification version 2

Table 3.1: Acronyms and abbreviations used in the scope of this Document

4 Requirements Specification

This chapter describes all requirements driving the work to define the Automotive API Gateway.

4.1 Functional Overview

The AUTOSAR Adaptive Automotive API Gateway interacts with clients providing the VISSv2 server. This document therefore includes requirements on

- VSS adoption rules,
- mapping between VSS and ServiceInterfaces element,
- VISS supported features.

4.2 Functional Requirements

[AP_RS_AAG_00001] Enforcement of Datatype Restrictions ⌈

Description:	The Automotive API Gateway shall enforce the restrictions defined for the VSS datatypes.
Rationale:	Compliance with the external interface is required for clients to Access Data.
Dependencies:	–
Use Case:	Access Data
Supporting Material:	[2] chapter *Data Entry* defines supported datatypes - including their allowed ranges - as well as restrictions for them.

⌋

[AP_RS_AAG_00010] Datatype Mapping ⌈

Description:	The Automotive API Gateway shall support the mapping of the VSS datatype of a VSS leaf to a different, compatible datatype within the vehicle.
Rationale:	The datatypes of VSS and the ones within the AUTOSAR environment are defined separately. The Automotive API Gateway needs to be able to connect these two sides. Which concrete data types are compatible is described as part of the realization of this requirement.
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00011] Unit Mapping ⌈

Description:	The Automotive API Gateway shall support the mapping of the VSS unit of a VSS leaf to a different, compatible unit within the vehicle.
Rationale:	The units of VSS and the ones within the AUTOSAR environment are defined separately. The Automotive API Gateway needs to be able to connect these two sides. Which concrete units are compatible is described as part of the realization of this requirement.
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00020] Mapping to Field ⌈

Description:	The Automotive API Gateway shall support the mapping of a VSS leaf to a ServiceInterface field.
Rationale:	-
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00021] Mapping to Event ⌈

Description:	The Automotive API Gateway shall support the mapping of a VSS leaf to a ServiceInterface event.
Rationale:	-
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00022] Mapping to Methods ⌈

Description:	The Automotive API Gateway shall support the mapping of a VSS leaf to ServiceInterface methods that have getter or setter semantics.
Rationale:	Mapping to methods that do not have getter or setter semantics is considered too implementation specific. That would have to be solved in an application.
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00023] Mapping to Structured Datatype ⌈

Description:	The Automotive API Gateway shall support the mapping of a VSS leaf to a part of a structured data type.
Rationale:	-
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00024] Mapping of Structured Datatype ⌈

Description:	For VSS leaves with a struct type the Automotive API Gateway shall use atomic reading and writing of that leafs' data in its in-vehicle interface.
Rationale:	VSS intends to only use structs when it is important that the data is read or written in an atomic operation.
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00030] Tolerate Missing Mappings ⌈

Description:	The Automotive API Gateway shall tolerate VSS leaves that do not have a mapping.
Rationale:	Requiring all VSS leaves to be mapped would hinder incremental mapping and extension of the interface. Allowing missing mappings makes making data accessible a simpler and more convenient process.
Dependencies:	–
Use Case:	Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00031] Possible Mapping Targets ⌈

Description:	The Automotive API Gateway shall map each VSS leaf to either Service Interface fields, events, or methods or not have a mapping for it at all.
Rationale:	-
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00032] Association to Concrete Instance of a Service Interface ⌈

Description:	The Automotive API Gateway shall map each `VSS` leaf to instances of service interfaces.
Rationale:	-
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00033] Mapping of Functionality ⌈

Description:	The Automotive API Gateway shall map a `VISS` request to corresponding activity on its AUTOSAR-facing interfaces.
Rationale:	-
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[3]

⌋

[AP_RS_AAG_00034] Mapping of Errors ⌈

Description:	The Automotive API Gateway shall map all errors that can occur on requests to its required Service Interfaces to a `VISS` error.
Rationale:	Accessing data without feedback on errors is unnecessarily complex and cumbersome.
Dependencies:	–
Use Case:	Access Data
Supporting Material:	[3]

⌋

[AP_RS_AAG_00040] `VISS` interface ⌈

Description:	The Automotive API Gateway shall offer a `VISSv2` service according to [3].
Rationale:	`VISS` was chosen as the protocol through which the Automotive API is offered.
Dependencies:	–
Use Case:	Access Data; Make Data Accessible
Supporting Material:	[3]

⌋

[AP_RS_AAG_00050] VISS Read of Multiple Leaves ⌈

Description:	The Automotive API Gateway shall support VISS read requests that address multiple VSS leaves.
Rationale:	This capability is mandated by the VISS specification.
Dependencies:	[AP_RS_AAG_00040]
Use Case:	Access Data
Supporting Material:	[3]

⌋

[AP_RS_AAG_00051] VISS Subscriptions ⌈

Description:	The Automotive API Gateway shall support VISS subscriptions.
Rationale:	Subscriptions allow more efficient communication in some scenarios comparted to a polling style.
Dependencies:	–
Use Case:	Access Data
Supporting Material:	[3]

⌋

[AP_RS_AAG_00052] Ignore VSS Aggregates ⌈

Description:	The Automotive API Gateway shall ignore VSS aggregates.
Rationale:	VSS Aggregates are a relatively complex possibility in VSS that would be difficult to take into account in the Automotive API Gateway. The semantics can in the meanwhile also be expressed with structured datatypes. This is why it was considered acceptable to not support them in the Automotive API Gateway.
Dependencies:	–
Use Case:	Make Data Accessible
Supporting Material:	[2]

⌋

[AP_RS_AAG_00060] VISS Change Filter ⌈

Description:	The Automotive API Gateway shall support the change filter as defined in [3].
Rationale:	This filter is mandated by the VISS specification.
Dependencies:	[AP_RS_AAG_00040]
Use Case:	Access Data
Supporting Material:	[3]

⌋

[AP_RS_AAG_00061] VISS Timebased filter ⌈

Description:	The Automotive API Gateway shall support the timebased filter as defined in [3].
Rationale:	This filter is mandated by the VISS specification.
Dependencies:	[AP_RS_AAG_00040]
Use Case:	Access Data
Supporting Material:	[3]

⌋

[AP_RS_AAG_00062] VISS Server Capabilities ⌈

Description:	The Automotive API Gateway shall support the dynamic-metadata filter with the parameter "server_capabilities" as defined in [3].
Rationale:	Information about the server capabilities is essential to allow clients to use the full spectrum of what the server offers. Without this capability the clients would be restricted to the common ground which would disincentivize process and innovation.
Dependencies:	–
Use Case:	Access Data
Supporting Material:	[3]

⌋

[AP_RS_AAG_00063] Signal Freshness ⌈

Description:	The Automotive API Gateway shall enable clients to measure the freshness of a received signal.
Rationale:	Without information about the freshness of the signal, a client cannot judge what to do with a received value for a signal. The data would be technically still accessible, but its usefulness cannot be decided without freshness information.
Dependencies:	–
Use Case:	Access Data
Supporting Material:	–

⌋

[AP_RS_AAG_00070] Protection from Overloads ⌈

Description:	The Automotive API Gateway should implement protections against getting overloaded.
Rationale:	-
Dependencies:	–
Use Case:	Access Data
Supporting Material:	–

⌋

[AP_RS_AAG_00080] Limited Request Rate on AUTOSAR-facing Interfaces ⌈

Description:	The Automotive API Gateway shall support configurable limitation of the request rate on its AUTOSAR-facing interfaces.
Rationale:	Providers of the interfaces have an interest to make their data accessible, but not to be overloaded. To ensure that, the request rate of the Gateway needs to be restricted.
Dependencies:	–
Use Case:	Make Data Accessible
Supporting Material:	

⌋

[AP_RS_AAG_00081] Signal to Service Capability ⌈

Description:	The Automotive API Gateway shall support a signal to service conversion.
Rationale:	This capability is required so that the Gateway is able to directly interact with AUTOSAR Classic signals. Without it, a separate conversion application would be required, which would be more complex to model, require more resources, and would be slower.
Dependencies:	–
Use Case:	Access Data inside Classic; Make Data Accessible
Supporting Material:	

⌋

4.3 Non-Functional Requirements

There is no non-functional requirements.

5 References

[1] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate

[2] Vehicle Signal Specification
https://covesa.github.io/vehicle_signal_specification/

[3] Vehicle Information Service Specification - Core
https://github.com/COVESA/vehicle-information-service-specification/releases/download/v2.0/VISSv2_Core.pdf

A Change history of AUTOSAR traceable items

A.1 Traceable item history of this document according to AUTOSAR Release R26-11

A.1.1 Added Requirements in R26-11

none

A.1.2 Changed Requirements in R26-11

none

A.1.3 Deleted Requirements in R26-11

none

A.2 Traceable item history of this document according to AUTOSAR Release R25-11

A.2.1 Added Requirements in R25-11

none

A.2.2 Changed Requirements in R25-11

none

A.2.3 Deleted Requirements in R25-11

none

A.3 Traceable item history of this document according to AUTOSAR Release R24-11

A.3.1 Added Requirements in R24-11

Number	Heading
[AP_RS_AAG_00001]	Enforcement of Datatype Restrictions
[AP_RS_AAG_00010]	Datatype Mapping
[AP_RS_AAG_00011]	Unit Mapping
[AP_RS_AAG_00020]	Mapping to Field
[AP_RS_AAG_00021]	Mapping to Event
[AP_RS_AAG_00022]	Mapping to Methods
[AP_RS_AAG_00023]	Mapping to Structured Datatype
[AP_RS_AAG_00024]	Mapping of Structured Datatype
[AP_RS_AAG_00030]	Tolerate Missing Mappings
[AP_RS_AAG_00031]	Possible Mapping Targets
[AP_RS_AAG_00032]	Association to Concrete Instance of a Service Interface
[AP_RS_AAG_00033]	Mapping of Functionality
[AP_RS_AAG_00034]	Mapping of Errors
[AP_RS_AAG_00040]	`VISS` interface
[AP_RS_AAG_00050]	`VISS` Read of Multiple Leaves
[AP_RS_AAG_00051]	`VISS` Subscriptions
[AP_RS_AAG_00052]	Ignore `VSS` Aggregates
[AP_RS_AAG_00060]	`VISS` Change Filter
[AP_RS_AAG_00061]	`VISS` Timebased filter
[AP_RS_AAG_00062]	`VISS` Server Capabilities
[AP_RS_AAG_00063]	Signal Freshness
[AP_RS_AAG_00070]	Protection from Overloads
[AP_RS_AAG_00080]	Limited Request Rate on AUTOSAR-facing Interfaces
[AP_RS_AAG_00081]	Signal to Service Capability

Table A.1: Added Requirements in R24-11

A.3.2 Changed Requirements in R24-11

none

A.3.3 Deleted Requirements in R24-11

none