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Contents

1 Scope of Document

This document specifies requirements on the Charging Manager module.

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 Standardization Template, chapter Support for Traceability ([1]).

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

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:

- SHALL: This word 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.

- MUST: This word means that the definition is an absolute requirement of the specification due to legal issues.

- MUST NOT: This phrase means that the definition is an absolute prohibition of the specification due to legal constraints.

- SHOULD: This word, or the adjective "RECOMMENDED", mean 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" mean 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, MUST 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, MUST 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 ChrgM module that are not included in the AUTOSAR Glossary [2, AUTOSAR glossary].

Abbreviation / Acronym:	Description:
ChrgM	Charging Manager
V2GTp	Vehicle to Grid Transport Protocol
EXI	Efficient XML Interchange
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
EVCC	Electric Vehicle Communication Controller
SECC	Supply Equipment Communication Controller

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

4 Requirements Specification

This chapter describes all requirements of the Charging Manager.

4.1 Functional Overview

The Charing Manager (ChrgM) is responsible for controlling the electric charging between the electric vehicle (EV) and the electric vehicle supply equipment (EVSE).

4.2 Functional Requirements

[CP_RS_ChrgM_00001]{DRAFT} **The ChrgM module shall initiate the process of IP address assignment.** ⌈

Description:	The ChrgM shall provide an API to be used by the EthSM to inform the ChrgM about the state of the data link. Once the data link has been established the ChrgM shall initiate the process of IP address assignment using the Socket Adaptor.
Rationale:	
Dependencies:	[3, Socket Adaptor] and [4, TCPIP]
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280, RS_BRF_01784)*

[CP_RS_ChrgM_00002]{DRAFT} **The ChrgM module shall initiate the process of SECC Discovery Process (SDP).** ⌈

Description:	The ChrgM shall establish a UDP connection with the Socket Adaptor over which the SDP messages can be exchanged.
Rationale:	
Dependencies:	[3, Socket Adaptor] and [4, TCPIP]
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280, RS_BRF_01784)*

[CP_RS_ChrgM_00003]{DRAFT} **The ChrgM shall establish a TCP-TLS session.** ⌈

Description:	The ChrgM shall establish a TCP-TLS connection using the Socket Adaptor.
Rationale:	
Dependencies:	[3, Socket Adaptor] and [4, TCPIP]
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280, RS_BRF_01784)*

[CP_RS_ChrgM_00004]{DRAFT} **The ChrgM shall establish a V2G session.** ⌈

Description:	The ChrgM shall establish a V2G session during which the charging control messages shall be exchanged.
Rationale:	V2G session is required to exchange charge control information.
Dependencies:	
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280)*

[CP_RS_ChrgM_00005]{DRAFT} **The ChrgM shall implement the EXI (efficient XML interchange).** ⌈

Description:	The ChrgM shall implement EXI encoding and decoding as per the W3C recommendation.
Rationale:	EXI encoding is performed to make the processing and transmission of V2G messages faster.
Dependencies:	
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280)*

[CP_RS_ChrgM_00006]{DRAFT} **The ChrgM shall provide security and authentication for V2G messages.** ⌈

Description:	The ChrgM shall communicate with the Csm to encrypt and decrypt V2G messages, as well as generate and verify digital signatures.
Rationale:	
Dependencies:	[6, Crypto Service Manager]
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280, RS_BRF_02031)*

[CP_RS_ChrgM_00007]{DRAFT} **The ChrgM shall store, verify and update certificates.** ⌈

Description:	The ChrgM shall communicate with the KeyManager to store, update and verify certificate(s) chain, which is needed to authenticate the EVSE.
Rationale:	
Dependencies:	[7, Key Manager]
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00280, RS_BRF_02031)*

[CP_RS_ChrgM_00008]{DRAFT} **The ChrgM shall implement the V2GTp (vehicle to grid transport protocol).** ⌈

Description:	The ChrgM shall implement the V2GTp as mentioned in the ISO15118-2.
Rationale:	V2GTp is the standard communication protocol between the EVCC and SECC, the messages must be formatted as per the V2GTp standard.
Dependencies:	
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋*(RS_Main_00430)*

[CP_RS_ChrgM_00009]{DRAFT} **The ChrgM shall communicate with the RTE and CDDs.** ⌈

Description:	The ChrgM shall provide service interfaces and ports to the RTE for exchange of messages with the application software. The ChrgM shall provide APIs for exchange of messages with complex device drivers (CDDs).
Rationale:	
Dependencies:	[8, RTE]
Use Case:	
Supporting Material:	

⌋*(RS_Main_00060)*

[CP_RS_ChrgM_00010]{DRAFT} **The ChrgM shall provide timers for managing communication.** ⌈

Description:	The ChrgM shall provide timers for managing communication between the EV and the EVSE.
Rationale:	Timers are there to monitor the exchange of V2G messages.
Dependencies:	
Use Case:	

▽

△

Supporting Material:	[5, ISO15118-2]

⌋(RS_Main_00340)

[CP_RS_ChrgM_00011]{DRAFT} **The ChrgM shall provide an error handling mechanism for V2G messages.** ⌈

Description:	The ChrgM shall provide an error handling mechanism to manage timeouts, errors or STOP command.
Rationale:	ChrgM must be able to handle errors .
Dependencies:	
Use Case:	
Supporting Material:	[5, ISO15118-2]

⌋(RS_Main_00060)

[CP_RS_ChrgM_00012]{DRAFT} **The ChrgM shall provide callback functions.** ⌈

Description:	The ChrgM shall provide callback functions to the lower layer.
Rationale:	
Dependencies:	
Use Case:	
Supporting Material:	

⌋(RS_Main_00060)

5 Requirements Tracing

Requirement	Description	Satisfied by
[RS_BRF_01784]	AUTOSAR communication shall support the IP protocol stack	[CP_RS_ChrgM_00001] [CP_RS_ChrgM_00002] [CP_RS_ChrgM_00003]
[RS_BRF_02031]	AUTOSAR shall provide uniform access to cryptographic solutions implemented either by software or hardware	[CP_RS_ChrgM_00006] [CP_RS_ChrgM_00007]
[RS_Main_00060]	Standardized Application Communication Interface	[CP_RS_ChrgM_00009] [CP_RS_ChrgM_00011] [CP_RS_ChrgM_00012]
[RS_Main_00280]	Standardized Automotive Communication Protocols	[CP_RS_ChrgM_00001] [CP_RS_ChrgM_00002] [CP_RS_ChrgM_00003] [CP_RS_ChrgM_00004] [CP_RS_ChrgM_00005] [CP_RS_ChrgM_00006] [CP_RS_ChrgM_00007]
[RS_Main_00340]	AUTOSAR shall support the continuous timing requirement analysis	[CP_RS_ChrgM_00010]
[RS_Main_00430]	AUTOSAR shall support established automotive communication standards	[CP_RS_ChrgM_00008]

Table 5.1: RequirementsTracing

6 References

[1] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate

[2] Glossary
AUTOSAR_FO_TR_Glossary

[3] Specification of Socket Adaptor
AUTOSAR_CP_SWS_SocketAdaptor

[4] Specification of TCP/IP Stack
AUTOSAR_CP_SWS_TcpIp

[5] ISO 15118-2:Road Vehicles – Vehicle to Grid Interface – Part 2:Network and Application Protocol Requirements

[6] Specification of Crypto Service Manager
AUTOSAR_CP_SWS_CryptoServiceManager

[7] Specification of Key Manager
AUTOSAR_CP_SWS_KeyManager

[8] Specification of RTE Software
AUTOSAR_CP_SWS_RTE

A   Appendix

No content.

B History of Specification Items

B.1 Constraint and Specification Item History of this document according to AUTOSAR Release R23-11

B.1.1 Added Requirements in R23-11

Number	Heading
[CP_RS_ChrgM_-00001]	The ChrgM module shall initiate the process of IP address assignment.
[CP_RS_ChrgM_-00002]	The ChrgM module shall initiate the process of SECC Discovery Process (SDP).
[CP_RS_ChrgM_-00003]	The ChrgM shall establish a TCP-TLS session.
[CP_RS_ChrgM_-00004]	The ChrgM shall establish a V2G session.
[CP_RS_ChrgM_-00005]	The ChrgM shall implement the EXI (efficient XML interchange).
[CP_RS_ChrgM_-00006]	The ChrgM shall provide security and authentication for V2G messages.
[CP_RS_ChrgM_-00007]	The ChrgM shall store, verify and update certificates.
[CP_RS_ChrgM_-00008]	The ChrgM shall implement the V2GTp (vehicle to grid transport protocol).
[CP_RS_ChrgM_-00009]	The ChrgM shall communicate with the RTE and CDDs.
[CP_RS_ChrgM_-00010]	The ChrgM shall provide timers for managing communication.
[CP_RS_ChrgM_-00011]	The ChrgM shall provide an error handling mechanism for V2G messages.
[CP_RS_ChrgM_-00012]	The ChrgM shall provide callback functions.

Table B.1: Added Requirements in R23-11

B.1.2 Changed Requirements in R23-11

B.1.3 Deleted Requirements in R23-11