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BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Responsible Committee Secretary: Ms Andreea Vieru (BSI)

Direct tel: 0208 996 7432

E-mail: andreea.vieru@bsigroup.com

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Introduction

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For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 15118-21

Road vehicles — Vehicle to grid communication interface — Part 21: Common 2nd generation network layer and application layer requirements conformance test plan

*Véhicules routiers — Interface de communication entre véhicule
et réseau électrique —*

*Partie 21: Plan de test de conformité aux exigences communes de
la couche réseau et de la couche application de 2ème génération*

ICS: 43.120

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared jointly by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*, and Technical Committee IEC/TC 69, *Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks*.

A list of all parts in the ISO 15118 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

Resulting from the 2nd generation network layer and application layer requirements for the vehicle to grid communication interface specified in ISO 15118-20, a corresponding set of abstract test cases is necessary to verify the conformance of implementations. Hence, this documentspecifies a conformance test suite for the 2nd generation network layer and application layer protocols in order to derive a common basis for conformance tests. The resulting test suite is a prerequisite for downstream interoperability tests. Since interoperability furthermore involves the actual application logic of an implementation, those tests are beyond the scope of this document. Hence, this document focuses on the interface aspects and the corresponding requirements given in ISO 15118-20 only.

The layered structure of the conformance test documents with reference to ISO 15118-20 is shown in [Figure 1](#). The complete set of relevant conformance test documents per charging type is composed of all the documents within its column according to [Figure 1](#).

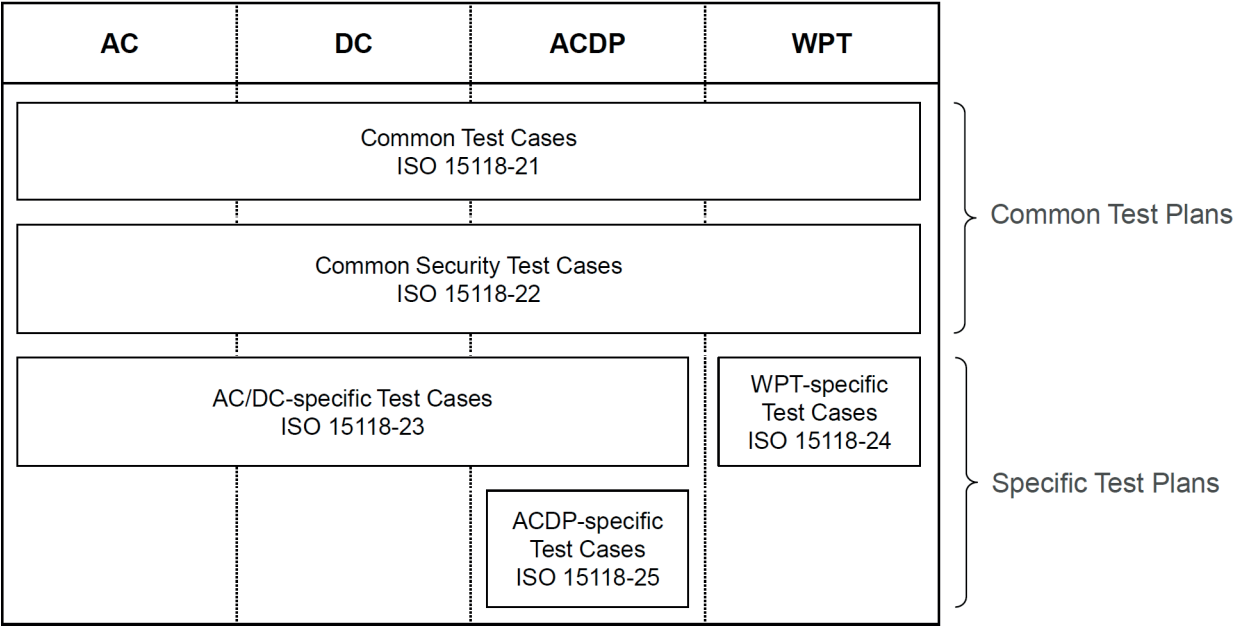


Figure 1 — Overview of mandatory set of conformance test plan documents per charging type

Example For a SUT supporting DC-charging the following conformance test plan documents apply:

- Common Test Cases specified in ISO 15118-21
- Common Security Test Cases specified in ISO 15118-22
- AC/DC specific Test Cases specified in ISO 15118-23 (only DC-specific subset applies)

Road vehicles — Vehicle to grid communication interface —

Part 21:

Common 2nd generation network layer and application layer requirements conformance test plan

1 Scope

This document specifies conformance tests in the form of an abstract test suite (ATS) for a system under test (SUT) implementing an electric-vehicle or supply-equipment communication controller (EVCC or SECC) for all common requirements that are independent of a particular charging type (AC, DC, ACD, WPT charging) according to ISO 15118-20 and against the background of ISO 15118-1. These conformance tests specify the testing of capabilities and behaviours of an SUT, as well as checking what is observed against the conformance requirements specified in ISO 15118-20 and against what the implementer states the SUT implementation's capabilities are.

The capability tests within the ATS check that the observable capabilities of the SUT are in accordance with the static conformance requirements specified in ISO 15118-20. The behaviour tests of the ATS examine an implementation as thoroughly as practical over the full range of dynamic conformance requirements specified in ISO 15118-20 and within the capabilities of the SUT (see NOTE 1).

A test architecture is described in correspondence to the ATS. The abstract test cases in this document are described leveraging this test architecture and are specified in descriptive tabular format covering the ISO/OSI layer 3 to 7 (network to application layers).

In terms of coverage, this document only covers normative sections and requirements in ISO 15118-20. This document can additionally refer to specific tests for requirements on referenced standards (e.g. IETF RFCs, W3C Recommendation, etc.) as long as they are relevant in terms of conformance for implementations according to ISO 15118-20. However, it is explicitly not intended to widen the scope of this conformance specification to such external standards, if it is not technically necessary for the purpose of conformance testing for ISO 15118-20. Furthermore, the conformance tests specified in this document do not include the assessment of performance nor robustness or reliability of an implementation. They cannot provide judgments on the physical realization of abstract service primitives, how a system is implemented, how it provides any requested service, nor the environment of the protocol implementation. Furthermore, the abstract test cases specified in this document only consider the communication protocol and the system's behaviour specified in ISO 15118-20. The power flow between the EVSE and the EV is not considered.

NOTE 1 Practical limitations make it impossible to specify an exhaustive test suite, and economic considerations can restrict testing even further. Hence, the purpose of this document is to increase the probability that different implementations are able to interwork. This is achieved by verifying them by means of a protocol test suite, thereby increasing the confidence that each implementation conforms to the protocol specification. However, the specified protocol test suite cannot guarantee conformance to the specification since it detects errors rather than their absence. Thus, conformance to a test suite alone cannot guarantee interworking. Instead, it gives confidence that a conforming implementation has the required capabilities and that its behaviour conforms consistently in representative instances of communication.

NOTE 2 This document generally refers to system under test (SUT) instead of implementation under test (IUT), due to the black box testing paradigm adopted in this document and related certification processes.

NOTE 3 This document has some interdependencies to the conformance tests specified in ISO 15118-5 and ISO 15118-9 which result from ISO/OSI cross layer dependencies in the underlying protocol specification (e.g. for sleep mode).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15118-1:2019, *Road vehicles — Vehicle to grid communication interface — Part 1: General information and use-case definition*

ISO 15118-3:2015, *Road vehicles — Vehicle to grid communication interface — Part 3: Physical and data link layer requirements*

ISO 15118-5:2018, *Road vehicles — Vehicle to grid communication interface — Part 5: Physical layer and data link layer conformance test*

ISO 15118-8:2020, *Road vehicles — Vehicle to grid communication interface — Part 8: Physical layer and data link layer requirements for wireless communication*

ISO 15118-9:2022, *Road vehicles — Vehicle to grid communication interface — Part 9: Physical and data link layer conformance test for wireless communication*

ISO/DIS 15118-10:2023, *Road vehicles — Vehicle to grid communication interface — Part 10: Physical layer and data link layer requirements for single-pair Ethernet*

ISO 15118-20:2022, *Road vehicles — Vehicle to grid communication interface — Part 20: 2nd generation network layer and application layer requirements*

IEC 61851-1:2017, *Electric vehicle conductive charging system - Part 1: General requirements*

ETSI ES 201 873-5 V4.9.1¹⁾, *Methods for Testing and Specification (MTS) — The Testing and Test Control Notation version 3 — Part 5: TTCN-3 Runtime Interface (TRI) (April 2022)*

ETSI ES 201 873-6, V4.13.1²⁾, *Methods for Testing and Specification (MTS) — The Testing and Test Control Notation version 3 — Part 6: TTCN-3 Control Interface (TCI) (April 2022)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15118-1, ISO 15118-3, ISO 15118-8, ISO 15118-10, ISO 15118-20 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

abstract test case

complete and independent specification of the actions required to achieve a specific *test purpose* (3.25)

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: This specification is defined at the level of abstraction of a particular abstract test method, starting in a stable testing state and ending in a stable testing state and can involve one or more consecutive or concurrent connections.

1) Available at https://www.etsi.org/deliver/etsi_es/201800_201899/20187305/04.09.01_60/es_20187305v040901p.pdf.

2) Available at https://www.etsi.org/deliver/etsi_es/201800_201899/20187306/04.13.01_60/es_20187306v041301p.pdf.

Note 3 to entry: The specification is be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome (i.e. sequence of test events).

Note 4 to entry: The specification is independent in the sense that it is possible to execute the derived executable test case in isolation from other such test cases (i.e. the specification always includes the possibility of starting and finishing in the “idle” state).

3.2 abstract test suite

ATS

test suite composed of *abstract test cases* ([3.1](#))

Note 1 to entry: See ITU-T X.290.

3.3 black box testing

method of testing that examines the behaviour of an *SUT* ([3.20](#)) without considering the internal implementation and structure of the SUT, thus relying on the SUT's open interface for testing

3.4 conformance requirement

requirement for implementation of a real open system which is claimed to conform to the relevant specification(s) that can be validated by *black box testing* ([3.3](#))

Note 1 to entry: The set of conformance requirements together define the behavior of the system and its communication. Conformance of a real open system will, therefore, be expressed at two levels, conformance to each individual requirement and conformance to the set. In this document, applicable conformance tests include requirements as far as they can be validated by *black box testing* ([3.3](#)).

Note 2 to entry: See also *static conformance requirements* ([3.20](#)) and *dynamic conformance requirements* ([3.6](#)).

Note 3 to entry: The requirements for this conformance specification are specified in ISO 15118-20.

3.5 conforming implementation

SUT which satisfies both *static conformance requirements* ([3.19](#)) and *dynamic conformance requirements* ([3.6](#)), consistent with the capabilities stated in the PICS(s)

Note 1 to entry: See ITU-T X.290.

3.6 dynamic conformance requirement

requirement which specifies what observable behavior is permitted by the relevant specification(s) in instances of communication

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The requirements for this conformance specification are specified in ISO 15118-2.

3.7 executable test case

realization of an *abstract test case* ([3.1](#))

Note 1 to entry: See ITU-T X.290.

3.8 expected behavior

exact response of the *SUT* ([3.20](#)) according to the underlying protocol specification to the stimulus defined in the *test behavior* ([3.21](#))

3.9 implementation conformance statement ICS

statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The given document for this conformance specification is ISO 15118-2.

3.10 implementation extra information for testing IXIT

statement made by a supplier or implementer of an *SUT* (3.20) which contains or references all information (in addition to that given in the *ICS* (3.9)) related to the SUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the SUT

Note 1 to entry: See ITU-T X.290.

3.11 implementation under test IUT

implementation of one or more OSI protocols in an adjacent user/provider relationship, being part of a real open system, which is to be studied by testing

Note 1 to entry: See ITU-T X.290.

3.12 main test component MTC

single test component in a test component configuration responsible for creating and controlling *parallel test components* and computing and assigning the test verdict

Note 1 to entry: See ITU-T X.292.

3.13 parallel test component PTC

test component created by the *MTC* (3.12)

Note 1 to entry: See ITU-T X.292.

3.14 post-condition

test steps needed to define the path from the end of the *test behavior* (3.21) up to the finishing stable state for the *abstract test case* (3.1)

3.15 pre-condition

test steps needed to define the path from the starting stable state of the *abstract test case* (3.1) up to the initial state from which the *test behavior* (3.21) will start

3.16 protocol implementation conformance statement PICS

ICS (3.9) for an implementation or system claimed to conform to a given protocol specification

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The given protocol document for this conformance specification is ISO 15118-20.

Note 3 to entry: In the context of this document, PICS specify the configuration of the Test System (e.g. what test cases need to be executed and what configuration is required for each testcase)

3.17

protocol implementation extra information for testing

PIXIT

IXIT ([3.10](#)) related to testing for conformance to a given protocol specification

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The given protocol document for this conformance specification is ISO 15118-20.

Note 3 to entry: In the context of this document, PIXIT specify the configuration of the System under Test (SUT) (e.g. what protocol options are implemented and what configuration is required for each testcase)

3.18

runtime environment

environment that describes the operating system and corresponding platform requirements of a system

EXAMPLE Test system.

3.19

static conformance requirement

requirement that specifies the limitations on the combinations of implemented capabilities permitted in a real open system which is claimed to conform to the relevant specification(s)

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The requirements for this conformance specification are specified in ISO 15118-20.

3.20

system under test

SUT

real open system in which the *IUT* ([3.11](#)) resides

Note 1 to entry: See ITU-T X.290.

3.21

test behavior

set of test steps (test body) which are essential in order to achieve the test purpose and assign verdicts to the possible outcomes

3.22

test control interface

TCI

four interfaces that define the interaction of the TTCN-3 executable with the test management, the coding and decoding, the test component handling and the logging in a test system

Note 1 to entry: See ETSI ES 201 873-6 V4.6.1.

3.23

test execution

TE

interpretation or execution of an *abstract test suite* ([3.2](#))

Note 1 to entry: Conceptually, the TE can be decomposed into three interacting entities: an Executable Test Suite (ETS), a Test Framework (TFW) and an optional internal Encoding/Decoding System (EDS) entity.

Note 2 to entry: See also ETSI ES 201 873-5 V4.6.1.

3.24**test framework****TFW**

an entity to perform all actions of *executable test cases* (3.7) or functions

Note 1 to entry: The Test Framework interacts with the test management (TM), SUT adaptor (SA) and platform adaptor (PA) entities via test control interface (TCI) and test runtime interface (TRI) and additionally manages the executable test suite (ETS) and encoding/decoding system (EDS) entities. It initializes adaptors as well as ETS and EDS entities. This entity performs all the actions necessary to properly start the execution of a test case or function with parameters in the ETS entity. It queries the TM entity for module parameter values required by the ETS and sends logging information to it. It also collects and resolves associated verdicts returned by the ETS entity.

Note 2 to entry: See also ETSI ES 201 873-5 V4.6.1.

Note 3 to entry: In this document, the test framework TTCN-3 runtime system (T3RTS) is used to explain a test framework functionality.

3.25**test purpose**

prose description of a well-defined objective of testing, focusing on a single *static conformance requirement* (3.19) or *dynamic conformance requirement* (3.6) or a set as specified in the appropriate OSI specification

Note 1 to entry: See ITU-T X.290.

EXAMPLE Verifying the support of a specific value of a specific parameter.

3.26**test system**

real system combining the *test framework* (3.24), *abstract test suite* (3.2), *test execution* (3.23) and adapters as well as codecs

Note 1 to entry: Typically also containing a common runtime environment based on an operating system.

3.27**test runtime interface****TRI**

two interfaces that define the interaction of the TTCN-3 executable between the SUT and the platform adaptor (PA) and the system adaptor (SA) in a *test system* (3.26)

Note 1 to entry: See ETSI ES 201 873-6 V4.6.1.

3.28**test system interface****TSI**

test component that provides a mapping of the ports available in the (abstract) TTCN-3 test system to those offered by a real test system

Note 1 to entry: See ETSI ES 201 873-6 V4.6.1.

3.29**verdict****test verdict**

statement of “pass”, “fail” or “inconclusive”, as specified in an *abstract test case* (3.1), concerning conformance of an *SUT* (3.20) with respect to that test case when it is executed

Note 1 to entry: See ITU-T X.290.

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply:

AP	(wireless) access point
APUT	access point under test
ATS	abstract test suite
ETSI	european telecommunications standards institute
EV	electric vehicle
EVCC	electric vehicle communication controller
EVSE	electric vehicle supply equipment
HAL	hardware abstraction layer
ICS	implementation conformance statement
IUT	implementation under test
MTC	main test component
PICS	protocol implementation conformance statement
PIXIT	protocol implementation extra information for testing
PTC	parallel test component
SECC	supply equipment communication controller
STA	(wireless) station
STAUT	station under test
SUT	system under test
TC	test case
TCI	test control interface
TCI-CD	TCI-coding and decoding
TE	test execution
TRI	TTCN-3 runtime interface
TS	Test system
TSI	test system interface
TSS	test suite structure
TTCN-3	testing and test control notation version 3
V2G	vehicle-to-grid

5 Conventions

5.1 Requirement structure

This document uses unique number identifiers for each individual requirement. This requirement structure allows for easier requirement tracking and management. The following format is used throughout this document:

'[V2G'Y'-'XXX']' requirement text

Where:

- 'V2G' represents the ISO 15118 series;
- Y represents the document part of the ISO 15118 series, for this document Y = 21;
- XXX represents the individual requirement number; and
- 'requirement text' includes the actual text of the requirement.

5.2 Test system description

TTCN-3 is used in this document to specify the test system architecture and the conventions for the abstract test suite. TTCN-3 is, however, not mandatory for the implementation of a conformance test system according to this document.

[V2G21-001] The implementers of conformance tests shall verify that the test purposes implemented in their executable test cases are identical to the abstract test cases described in this document.

NOTE In this document, test cases are not programmatically specified in TTNC-3 core language. This will be revisited for the next edition of the document.

6 Test architecture reference model

6.1 General information

[Figure 2](#) provides an overview of the test architecture for this document. The following subclauses specify the interface requirements for platform and SUT adapters (see [6.2](#) and [6.3](#)) as well as the codecs (see [6.4](#)). The test suite is specified in detail in the remainder of this document.

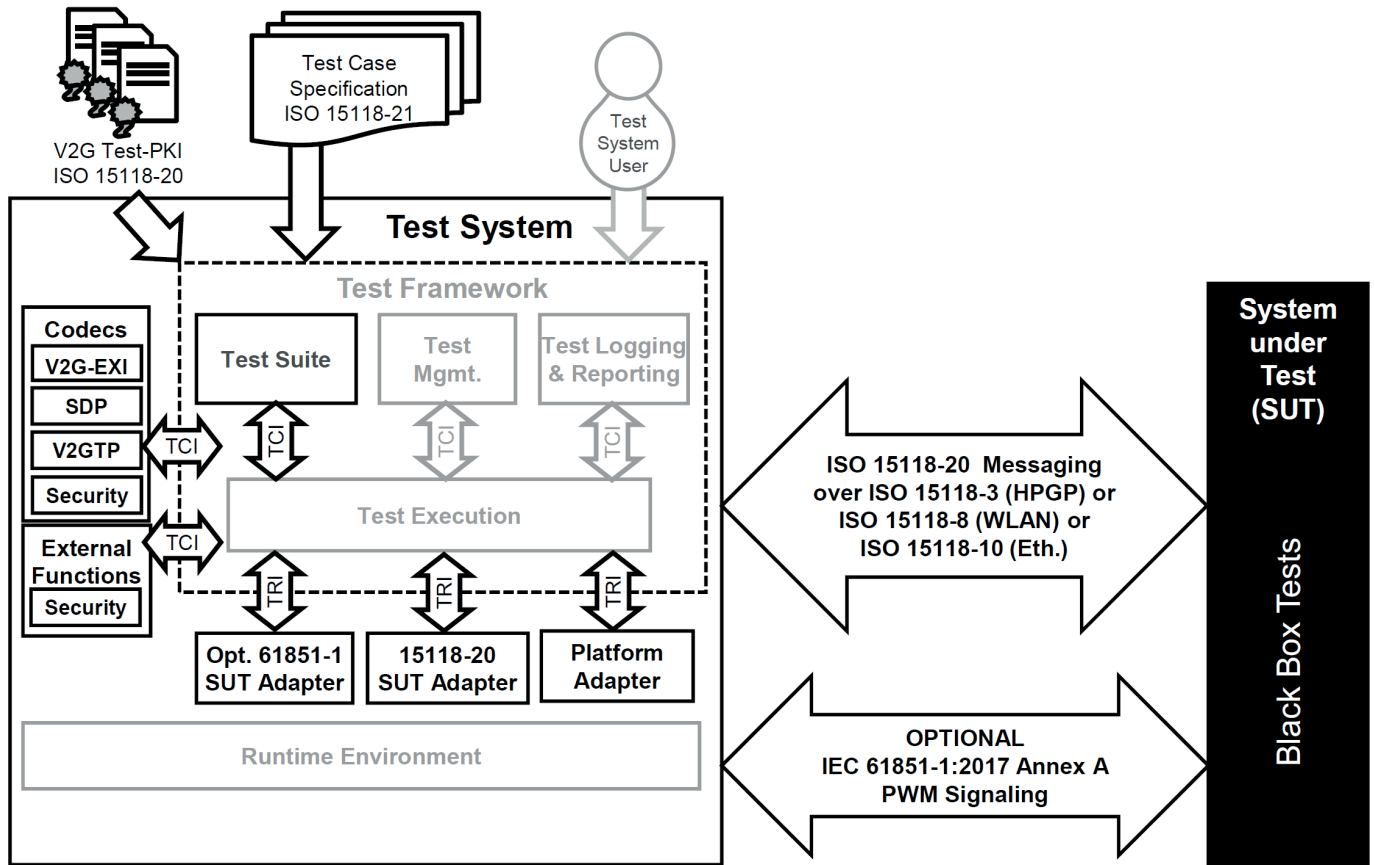


Figure 2 — Test architecture reference model

6.2 Platform adapter interface

The platform adapter within the test system is responsible for timers and external functions. Besides means for timers, which are typically provided as part of the test framework, no external functions are specified for this document.

[V2G21-002] The platform adapter of the test system shall implement the TriPlatformPA and the TriPlatformTE interfaces as specified in ETSI ES 201 873-5 V4.9.1:2022, 6.5.3.

6.3 SUT adapter interfaces

The SUT adapter within the test system adapts the TTCN-3 communication operations to the SUT based on an abstract test system interface and implements the real test system interface. It is responsible of propagating message requests and procedure-based calls from the test execution (see [Figure 2](#)) to the SUT, and of notifying the test execution of any received test events by appending them to its port queues.

[V2G21-003] Any SUT adapter of the test system shall implement the TriCommunicationSA and the TriCommunicationTE interfaces as specified in ETSI ES 201 873-5 V4.9.1:2022, 6.5.2.

NOTE 1 The actual implementation of these adapters is out of scope of this document.

[V2G21-004] The optional IEC 61851-1 SUT adapter shall adapt the HAL 61851-1 functions to a PWM Signal specified in [subclauses 6.3.1 - 6.3.5](#).

NOTE 2 The IEC 61851-1 SUT adapter involves a hardware component for adapting the message-based HAL 61851-1 communication to PWM Signaling according to IEC 61851-1 Annex A.

- [V2G21-005]** The ISO 15118-20 SUT adapter shall send/receive the encoded SDP requests/responses through UDP messages to/from the SUT as specified in ISO 15118-20:2022.
- [V2G21-006]** The ISO 15118-20 SUT adapter shall send/receive the encoded V2G messages through a TLS connection to/from the SUT as specified in ISO 15118-20:2022.
- [V2G21-007]** The ISO 15118-20 SUT adapter shall support the internal port control messages for TLS connection management.

NOTE 3 The TCP/TLS connection management includes the following functionalities:

1. control for TCP/TLS port disconnection handling;
2. control for receiving information / status on a given TCP/TLS connection;
3. notification of TCP connection status events;
4. notification of TLS Handshake status events.

- [V2G21-008]** The ISO 15118-20 SUT adapter shall provide a port map operation with additional parameters for TCP and TLS connection configuration.

NOTE 4 The TCP/TLS connection configuration includes the following functionalities:

5. configuration for IP address and port;
6. configuration for usage of security (TCP/TLS) ;
7. configuration for cipherSuite;
8. configuration for TLS protocol version;
9. configuration for TLS certificate.

NOTE 5 The ISO 15118-3 adapter is specified in ISO 15118-5.

NOTE 5 The ISO 15118-8 adapter is specified in ISO 15118-9.

6.3.1 Requirements of IEC 61851-1 SUT adapter for SECC or EVCC testing

- [V2G21-027]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the current PWM state or associated voltage level.
- [V2G21-028]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports change events of the current PWM state or associated voltage level.
- [V2G21-029]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to set the proximity on SUT side.
- [V2G21-030]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the proximity resistor value from SUT side.
- [V2G21-031]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports change events of the resistor value for the proximity from SUT side.
- [V2G21-032]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the duty cycle in [%].
- [V2G21-033]** The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports changes of the duty cycle in [%].

- [V2G21-034] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the frequency in [Hz].
- [V2G21-035] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports change events of the frequency in [Hz].

6.3.2 Requirements of IEC 61851-1 SUT adapter for SECC testing

- [V2G21-036] The IEC 61851-1 SUT adapter for SECC testing shall provide a function to set the current PWM state or associated voltage level. State B, C and D or the associated voltage level shall be supported, other voltage level are optional.

6.3.3 Requirements of IEC 61851-1 SUT adapter for EVCC testing

- [V2G21-037] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to set the current PWM state or associated voltage level. State E and F or the associated voltage level shall be supported, other voltage levels are optional.
- [V2G21-038] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to set the current duty cycle in [%]. The values 5 %, and 7 %-98 % shall be supported, other values are optional.
- [V2G21-039] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to set current frequency in [Hz]. A value of 1 000 Hz +/- 5 % shall be supported, other values are optional.
- [V2G21-040] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to switch on/off the ControlPilot Line to simulate an un-plug or plug-in for the SUT. State A or the associated voltage level shall be supported, other voltage level is optional.

6.3.4 Requirements of IEC 61851-1 PTC for SECC or EVCC testing

- [V2G21-041] The IEC 61851 PTC for SECC or EVCC testing shall provide a function which activates the validity monitoring as specified in [V2G21-036], [V2G21-037], [V2G21-038], [V2G21-039], [V2G21-040], [V2G21-041].
- [V2G21-042] The IEC 61851-1 PTC for SECC or EVCC testing shall provide a function to confirm a change from/to a given PWM state. This function shall wait for receiving a state change event from IEC 61851-1 SUT adapter. If no change event occurs within a given time [ms], the function shall return an error.
- [V2G21-043] The IEC 61851-1 PTC for SECC or EVCC testing shall provide a function to change its valid PWM state condition. This function shall change the internal monitoring condition to a given PWM state, which the IEC 61851-1 PTC will consider as the next valid PWM state.
- [V2G21-044] The IEC 61851-1 PTC for SECC or EVCC testing shall provide a function to change its valid duty cycle range. This function shall change the internal monitoring condition to a given duty cycle range from [%] – to [%], which the IEC 61851-1 PTC will consider as the next valid duty cycle range.

6.3.5 Requirements of IEC 61851-1 PTC for SECC testing

- [V2G21-045] The IEC 61851-1 PTC for SECC testing shall provide a function to confirm a given duty cycle in [%]. This function shall wait for receiving a duty cycle change event from IEC 61851-1 SUT adapter. If no change event occurs within a given time [ms], the function shall report an error.
- [V2G21-046] The IEC 61851-1 PTC for SECC testing shall provide a function to change its valid frequency range. This function shall change the internal monitoring condition to a given frequency range from [Hz] – to [Hz], which the IEC 61851-1 PTC will consider as the next frequency range.

6.4 Codecs

A codec is responsible for the external encoding and decoding of TTCN-3 values into bit strings suitable to be sent to the SUT. The test execution (TE) determines which codec shall be used and passes the TTCN-3 data to the appropriate encoder to obtain the encoded data. Received data is decoded in this entity by using the appropriate decoder, which translates the received data into TTCN-3 values cf. ETSI ES 201 873-5 that can be matched against expected values or templates.

[V2G21-009] All codecs in this document shall implement the TCI-CD interface as specified in ETSI ES 201 873-6 V4.13.1:2022, [7.3.2](#).

NOTE 1 For conformance testing in this document, the IEEE 802.11n codec (see [Figure 2](#)) is used to encode or decode messages consumable by the tester into bit strings consumable by the SUT.

NOTE 2 The exact implementation of the IEEE 802.11n codec is out of scope of this document.

[V2G21-010] The V2G-EXI codec shall encode message values of the test system into corresponding EXI streams as specified in ISO 15118-20:2022.

[V2G21-011] The V2G-EXI Security codec shall encode message values of the test system for X.509 Certificates into a corresponding Base64 representation suitable for EXI streams according to ISO 15118-20:2022.

[V2G21-012] The V2G-EXI codec shall decode EXI streams as specified in ISO 15118-20:2022, into message values of the test system.

[V2G21-047] The V2G-EXI codec shall validate decoded EXI streams for correct grammar according to the XML schema specified in ISO 15118-20:2022 and indicate a fault if a decoded EXI stream is not well-formed.

[V2G21-013] The X.509 certificate codec shall decode Base64 representation of X.509 certificates from EXI streams and decode DER representation according to ISO 15118-20:2022 into message values of the test system for X.509 certificates.

[V2G21-014] The SDP codec shall encode message values of the test system into corresponding SDP requests/responses as specified in ISO 15118-20:2022.

[V2G21-015] The SDP codec shall decode SDP requests/responses as specified in ISO 15118-20:2022 into message values of the test system.

[V2G21-048] The SDP codec shall validate decoded SDP messages for correct format according to clause 7.10.1 specified in ISO 15118-20:2022 and indicate a fault if a decoded SDP message is not well-formed.

[V2G21-016] The V2GTP codec shall encode message values of the test system into corresponding V2GTP envelopes as specified ISO 15118-20:2022.

[V2G21-017] The V2GTP codec shall decode V2GTP envelopes as specified in ISO 15118-20:2022 into message values of the test system.

[V2G21-049] The V2GTP codec shall validate decoded V2GTP messages for correct format according to clause 7.8 specified in ISO 15118-20:2022 and indicate a fault if a decoded V2GTP message is not well-formed.

6.5 Test system timer handling

6.5.1 Definition of test system timers & timeouts

For test control and verdict building on timer related test cases, the test system uses internal timers, that are specified in this subclause. [Table 1](#) lists all relevant test system specific observation and termination timers in this document.

Table 1 — ISO 15118-21 Test system timers

Time/Timeout	Description
SDP_Msg_Observation_Timer	SDP message observation timer in the EVCC
SDP_Sequence_Observation_Timer	SDP sequence observation timer in the SECC
V2G_EVCC_Msg_Observation_Timer	V2G message observation timer in the EVCC
V2G_SECC_CommunicationSetup_Observation_Timer	V2G CommunicationSetup observation timer in the SECC
V2G_SECC_Sequence_Observation_Timer	V2G sequence observation timer in the SECC
V2G_SECC_NotificationMaxDelay_Observation_Timer	V2G NotificationMaxDelay observation timer in the SECC
V2G_EVCC_Ongoing_Observation_Timer	V2G Ongoing observation timer in the EVCC
V2G_SECC_CommunicationSetup_Termination_Timer	V2G CommunicationSetup termination timer in the SECC
V2G_SECC_Sequence_Termination_Timer	V2G sequence termination timer in the SECC
V2G_EVCC_Msg_Termination_Timer	V2G message termination timer in the EVCC
TLS_Connection_Termination_Timer	Common TLS connection termination timer
T_match_leave_Termination_Timer	Common data link connection termination timer

[Table 2](#) lists all relevant test system specific timeouts in this document.

Table 2 — ISO 15118-21 Test system timings and timeouts

Time/Timeout	Value in sec	Description
V2G_SECC_NotificationMaxDelay_Time	TBD	NotificationMaxDelay according to the format specified in [V2G20-1338].
TLS_Connection_Termination_Timeout	5	Timeout for the TLS connection termination
T_match_leave_Termination_Timeout	25	Timeout for the data link termination
SDP_Msg_Timeout	0.25	Timeout for receipt of SDP response message after SDP request message
SDP_Sequence_Timeout	TBD	Timeout for receipt of SDP request message after data link detection

6.5.2 Test system timer scenarios for SUT SECC

This clause specifies relevant timer handling scenarios for test system for SUT SECC with reference to the test system timers and timeouts specified in [6.5.1](#).

[Figure 3](#) shows the TS timer handling for EVCC message timeout scenarios for SUT SECC.

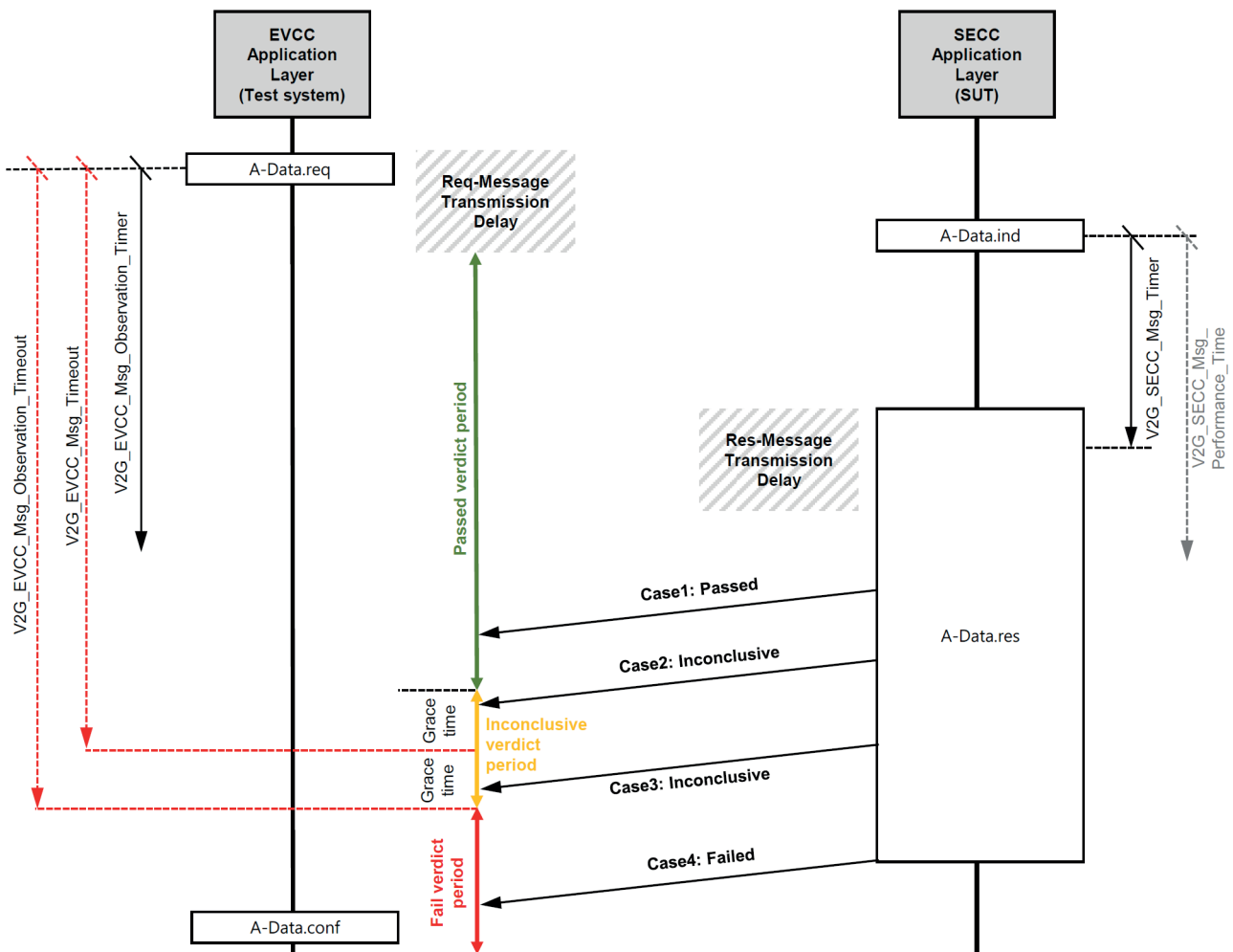


Figure 3 — Test system timer handling for EVCC message timeout scenarios for SUT SECC

Figure 4 shows the TS timer handling for SECC sequence timeout scenarios triggered by the SUT (SECC).

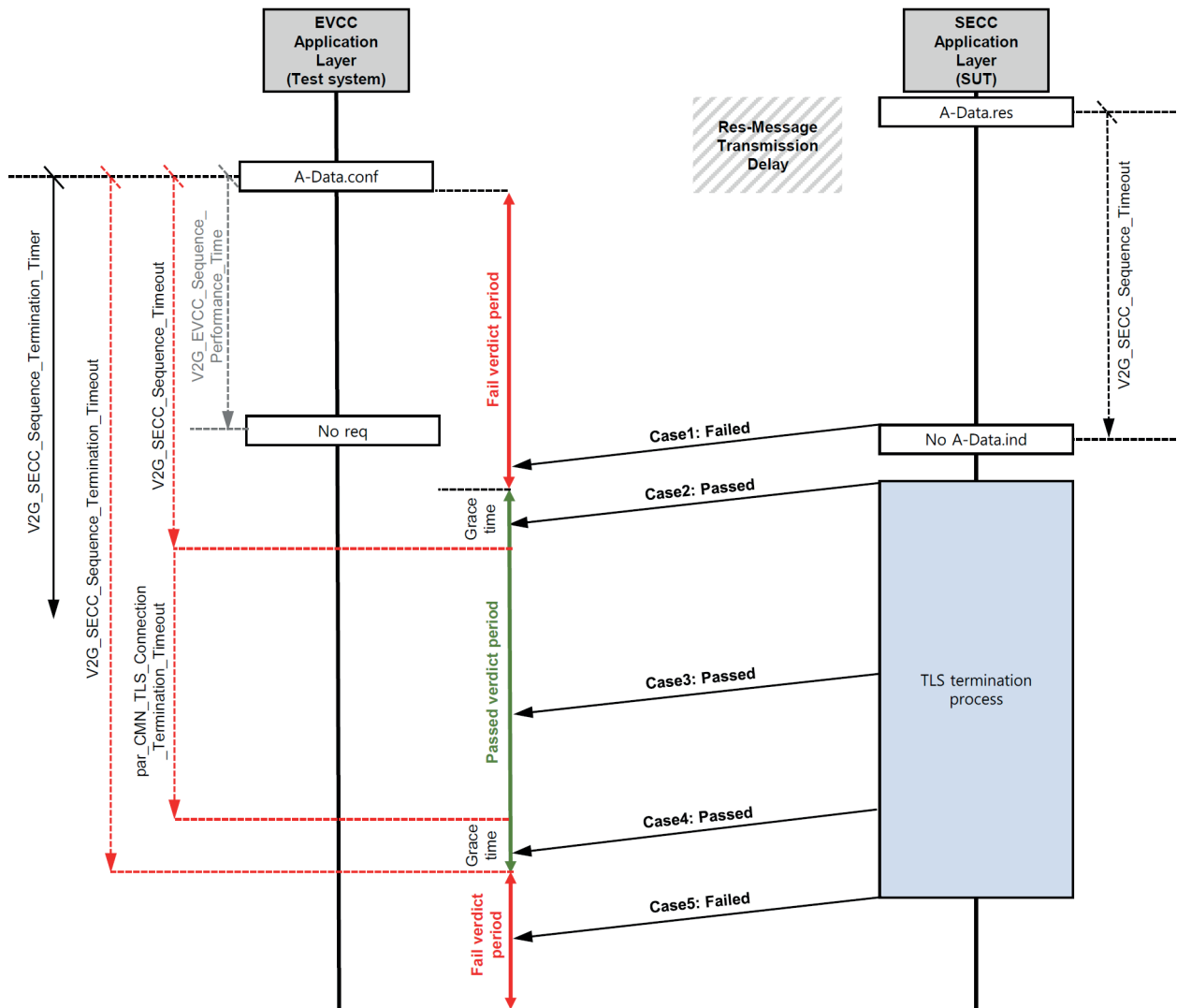


Figure 4 — Test system timer handling for SECC sequence timeout scenarios (triggered by SECC timeout)

6.5.3 Test system timer scenarios for SUT EVCC

This clause specifies relevant timer handling scenarios for test system for SUT EVCC with reference to the test system timers and timeouts specified in [6.5.1](#).

[Figure 5](#) shows the TS timer handling for SECC sequence timeout scenarios for SUT EVCC.

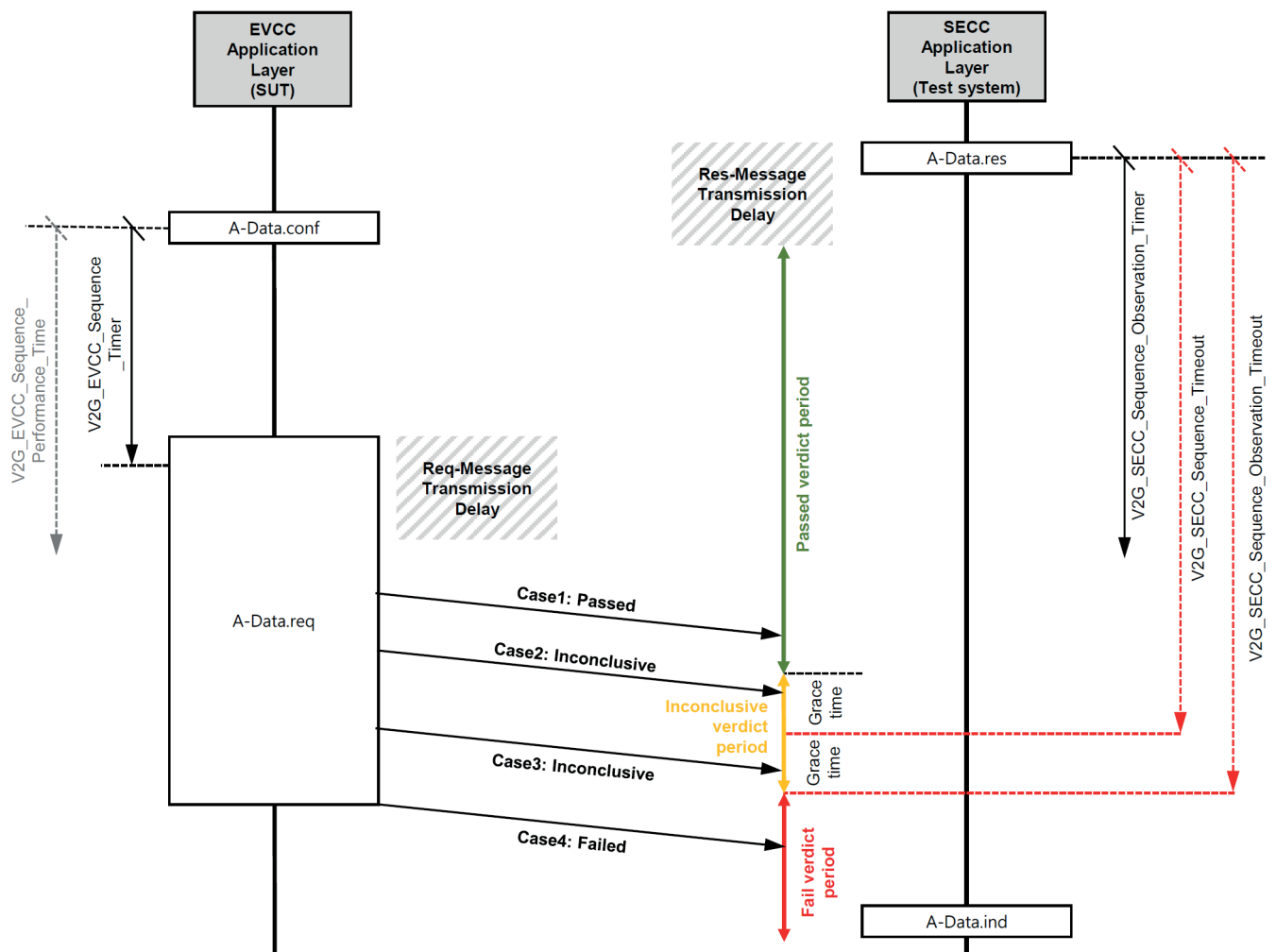


Figure 5 — Test system timer handling for SECC sequence timeout scenarios for SUT EVCC

[Figure 6](#) shows the TS timer handling for EVCC message timeout scenarios triggered by the SUT (EVCC).

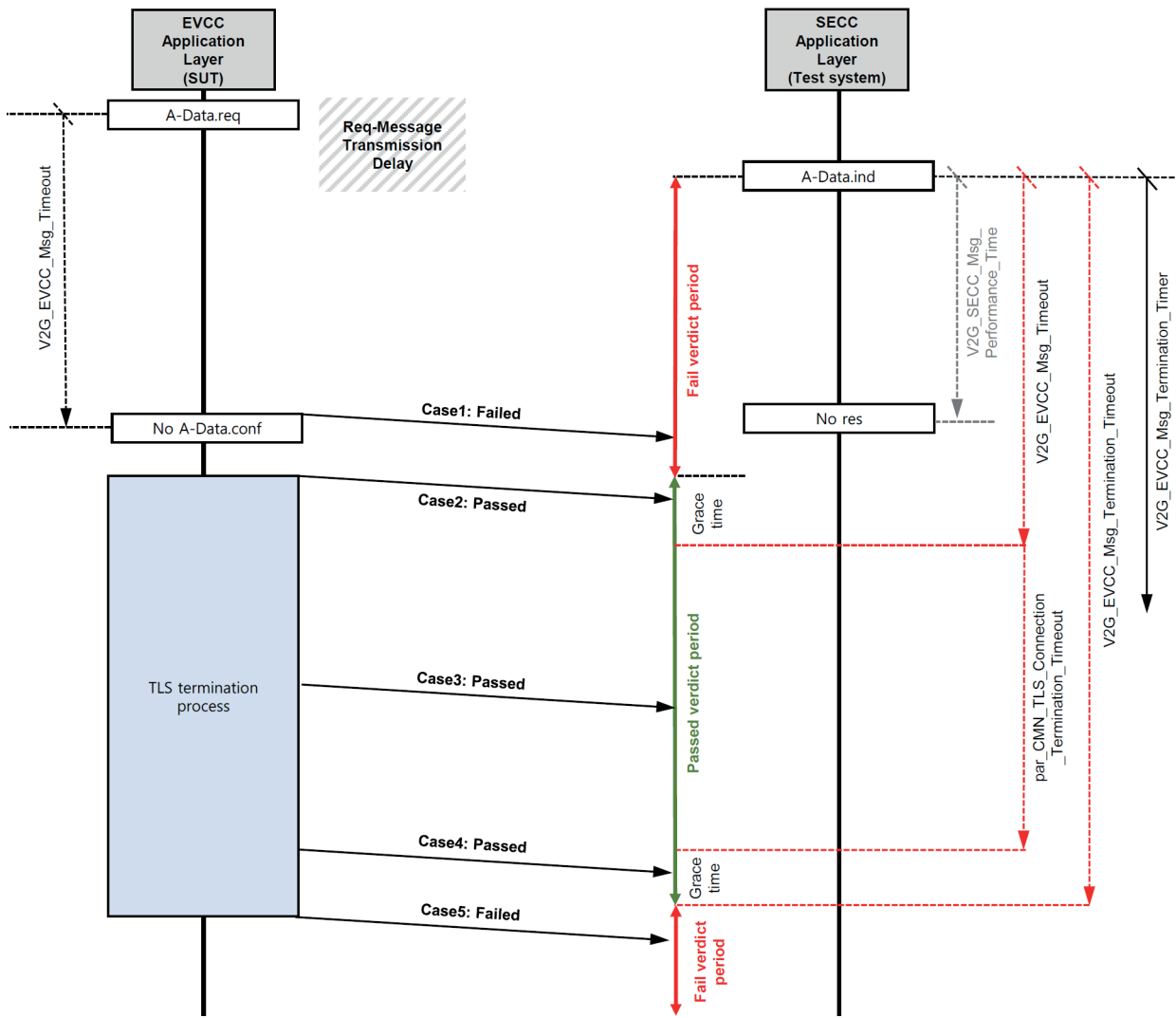


Figure 6 — Test system timer handling for EVCC message timeout scenarios (triggered by EVCC timeout)

[Figure 7](#) shows the TS timer handling for EVCC termination scenarios triggered by a test system stimulus.

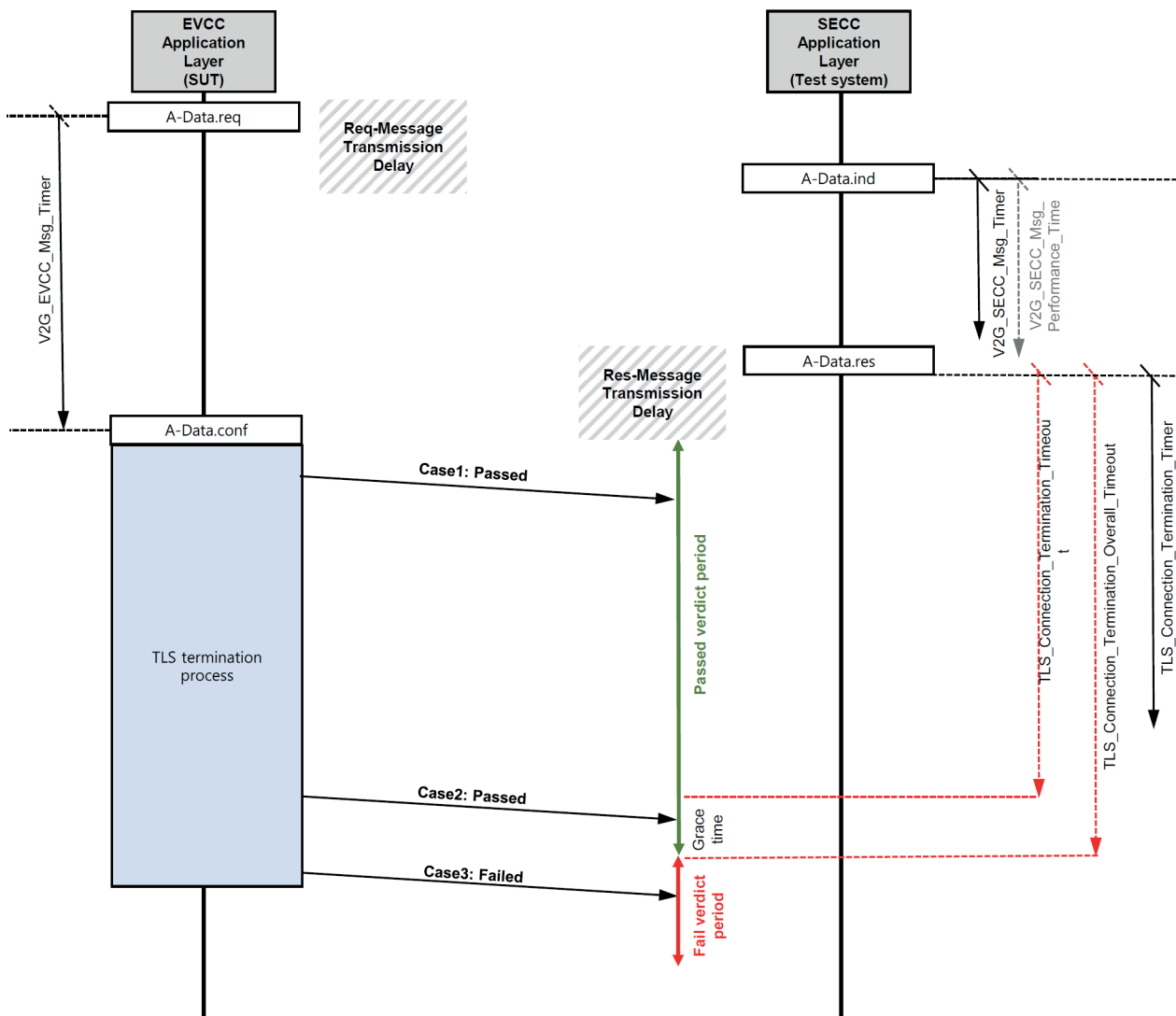


Figure 7 — Test system timer handling for EVCC termination scenarios (triggered by test system stimulus)

7 Test suite conventions

7.1 General information

This clause specifies all conventions that are relevant for conformance tests of SUTs implementing ISO 15118-20.

7.2 Test suite structure (TSS)

An abstract test suite is a complete set of abstract test cases, possibly combined into groups or modules, that are necessary to perform conformance testing for a given SUT.

Each abstract test case specifies how the SUT is stimulated with specific inputs and furthermore specifies expected reaction(s) for verdict assignment. Depending on the test purpose different pre-conditions and post-conditions are considered for the formulation of the test behaviour. The pre-conditions, post-conditions as well as test behaviours are encapsulated into individual functions and stored within separate modules. Thus, an abstract test case is composed by the actual test behaviour enveloped by pre- and post-conditions.

The corresponding grouping of functions can therefore be assigned to the lowest abstract hierarchical level (see [Figure 8](#)). The abstract test cases are assigned to the second level.

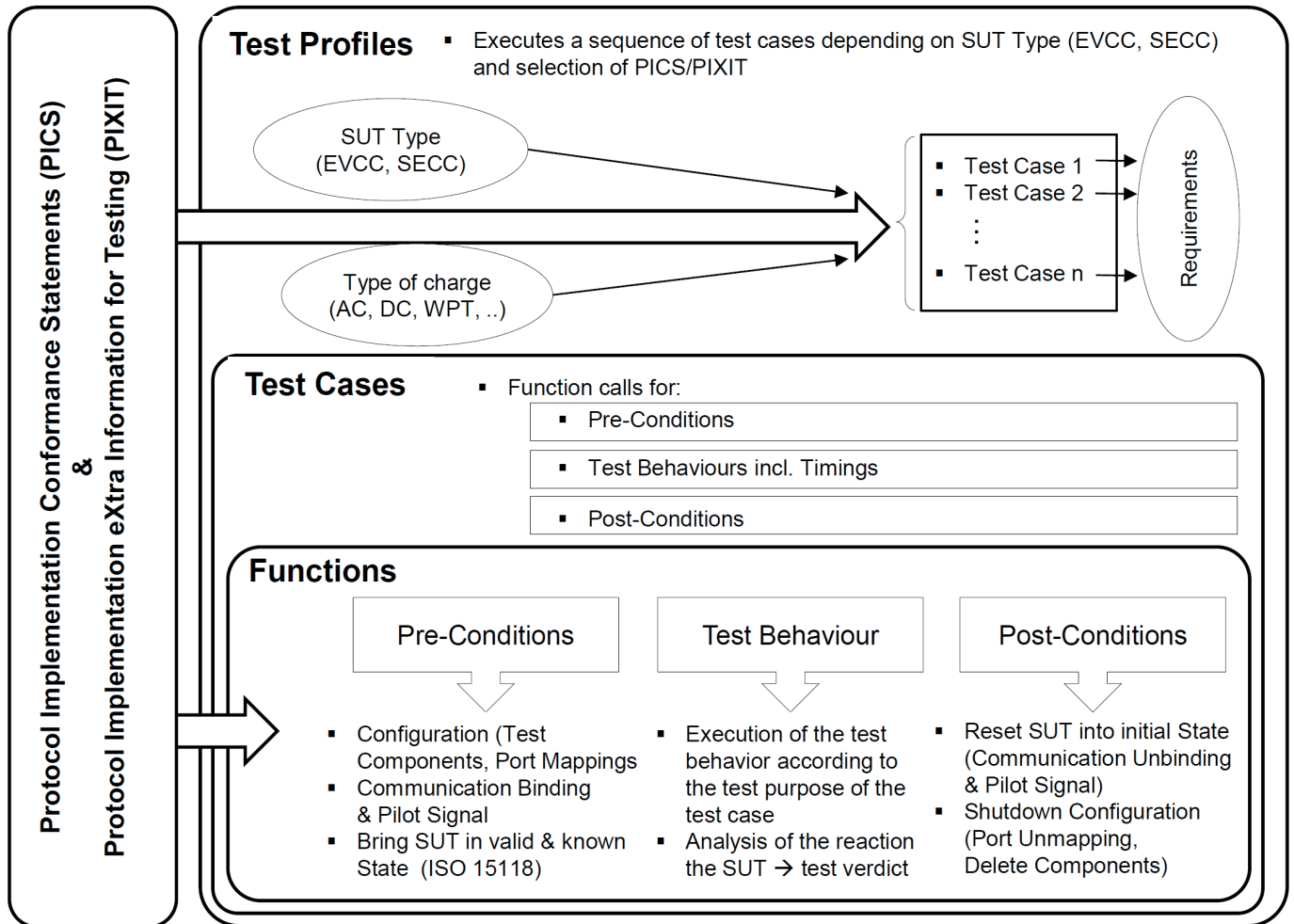


Figure 8 — General overview of the test suite structure (TSS)

The test profile is a collection of self-contained test cases as well as PICS (see [7.3.3](#)) and PIXIT (see [7.3.4](#)) in order to represent a given use case. The selection is based on the use cases of the ISO 15118 series and its corresponding requirements.

Hence, the abstract test suite structure (TSS) is segmented into subgroups for conformance testing according to the use cases specified in ISO 15118-1. [Table 3](#) shows these subgroups, which are used for the organization of the abstract test case specifications as well as for the test suite identifiers (see [7.3](#) for details).

Table 3 — Identifiers within the test suite structure (TSS)

Identifiers	Values	Description
<sut>		System under test
	EVCC	Electric vehicle communication controller
	SECC	Supply equipment communication controller
<ctx>	{fullname}	Context (e.g. name of message pattern signal name according to standard)

7.3 Test profiles

7.3.1 General information

This sub clause specifies test profiles for conformance with ISO 15118-20. A test profile consists of a test configuration as well as a selection and assignment of PICS/PIXIT. Depending on the test configuration a set of test components and ports are specified. The test profile furthermore includes a test group defining the set of relevant test cases and the sequence in which they are executed in order to perform a conformance test for a given use case.

7.3.2 Test configurations

The test configuration reflects various ISO 15118 scenarios. The main entities for the system under test (SUT) are:

- electric vehicle communication controller (EVCC),
- supply equipment communication controller (SECC).

The combination of entities and additionally used test components are grouped by test configuration IDs (CF_Part_ID). [Table 4](#) shows the test configurations for this document.

Table 4 — Test configurations

CF_Part_ID	SUT	Tester	PTCs
CF_21_001	SECC including HPGP PLC interface	EVCC with ISO 15118-20 SUT adapter	61851-1 CP PWM PTC
CF_21_002	EVCC including HPGP PLC interface	SECC with ISO 15118-20 SUT adapter	61851-1 CP PWM PTC
CF_21_003	SECC including wireless LAN interface	EVCC with ISO 15118-20 SUT adapter	61851-1 CP PWM PTC
CF_21_004	EVCC including wireless LAN interface	SECC with ISO 15118-20 SUT adapter	61851-1 CP PWM PTC
CF_21_005	SECC including wireless LAN interface (AP / APUT)	EVCC with ISO 15118-20 SUT adapter	None
CF_21_006	EVCC including wireless LAN interface (STA / STAUT)	SECC with ISO 15118-20 SUT adapter	None

7.3.3 Components and ports

In correspondence to the identified set of relevant test configurations this sub clause specifies test components which reflect the main entities needed for stimulation of the SUT with respect to ISO 15118-20 and IEC 61851-1. Ports are used to connect these components with each other and the SUT. The components are specified in the configuration module and are summarized in [Table 5](#). Port types specify which kind of messages can be sent or received by this port. The corresponding port type definitions are summarized in [Table 6](#).

The parallel test component (PTC) for IEC 61851-1 signaling continuously observes the protocol specific parameters positive voltage (state), frequency, duty cycle and the proximity resistor value in accordance with the specified valid range of values (as specified in IEC 61851-1:2017, Annex A), during the entire test case execution.

Table 5 — Component definitions

Components	Description
SECC_Tester (MTC)	This component type is the main type for the tests of an SECC. A V2G_TCP_TLS_ALM_SECC_Port, V2G_UDP_SDP_Port, HAL_61851_Port and a HAL_61851_Internal_Port (see Table 6) are assigned to this component type.
EVCC_Tester (MTC)	This component type is the main type for the tests of an EVCC. A V2G_TCP_TLS_ALM_EVCC_Port, V2G_UDP_SDP_Port, HAL_61851_Port and a HAL_61851_Internal_Port (see Table 6) are assigned to this component type.
HAL_61851_Listener (PTC)	The HAL_61851_Listener is responsible for watching the correct IEC 61851 behaviour and is used in the form of a parallel test component (PTC). This component uses the HAL_61851_Port (see Table 6) to communicate with an IEC 61851-1 SUT Adapter and the HAL_61851_Internal_Port (see Table 6) to communicate with the MTC.

Table 6 — Port type definitions

Port Type	Description
V2G_TCP_TLS_ALM_SECC_Port	This port is used to send and receive V2G- Application Layer Messages (ALM) or supportedAppProtocol messages via TCP/TLS specified in ISO 15118-20 to/from an SECC. This port is also used to send and receive internal TCP/TLS port control messages.
V2G_TCP_TLS_ALM_EVCC_Port	This port is used to send and receive V2G- Application Layer Messages (ALM) or supportedAppProtocol messages via TCP/TLS specified in ISO 15118-20 to/from an EVCC. This port is also used to send and receive internal TCP/TLS port control messages.
V2G_UDP_SDP_Port	This port is used to send and receive SDP messages via UDP specified in ISO 15118-20 to/from an EVCC or SECC.
HAL_61851_Port	This port is used to send or receive messages to an IEC 61851 communication unit. The communication unit will interpret these messages and will set the corresponding signaling to the SUT (SECC/EVCC). The specification of the IEC 61851 communication unit is out of scope of this standard.
HAL_61851_Internal_Port	This port is used to synchronize the status of the IEC 61851-1 PWM signal between the MTC (SECC_Tester or EVCC_Tester) and PTC (HAL_61851_Listener_Port). It enables the MTC and PTC to send and receive HAL 61851-1 messages.

These components and ports comprise relevant test configurations for this document. Whether the type EVCC_Tester or SECC_Tester is to be used as MTC depends on the type of the SUT.

[V2G21-018] If the SUT is an EVCC, the MTC shall use the type EVCC_Tester.

[V2G21-019] If the SUT is an SECC, the MTC shall use the type SECC_Tester.

The MTC always contains a TTCN-3 test configuration and delimits the lifeline during test execution. Next to using ports for communication purposes, local timers, variables or constants may be assigned to components to store dynamic information during test case execution.

A test configuration also consists of respective test system interfaces (TSI). An abstract TSI is specified as a collection of ports. A TSI has no local timers, constants or variables; only ports are assigned to it. During the test case execution, test components ports can be mapped dynamically to the TSI ports to establish communication channel to the real test system interface.

In the test configuration the TSI uses the type System_EVCC or System_SECC depending on the type of the SUT.

- If the SUT is an EVCC, the TSI uses the type System_EVCC.
- If the SUT is an SECC, the TSI uses the type System_SECC.

The test configuration is illustrated in [Figure 9](#). The type of the V2G components and ports (EVCC or SECC) depends on the SUT type.

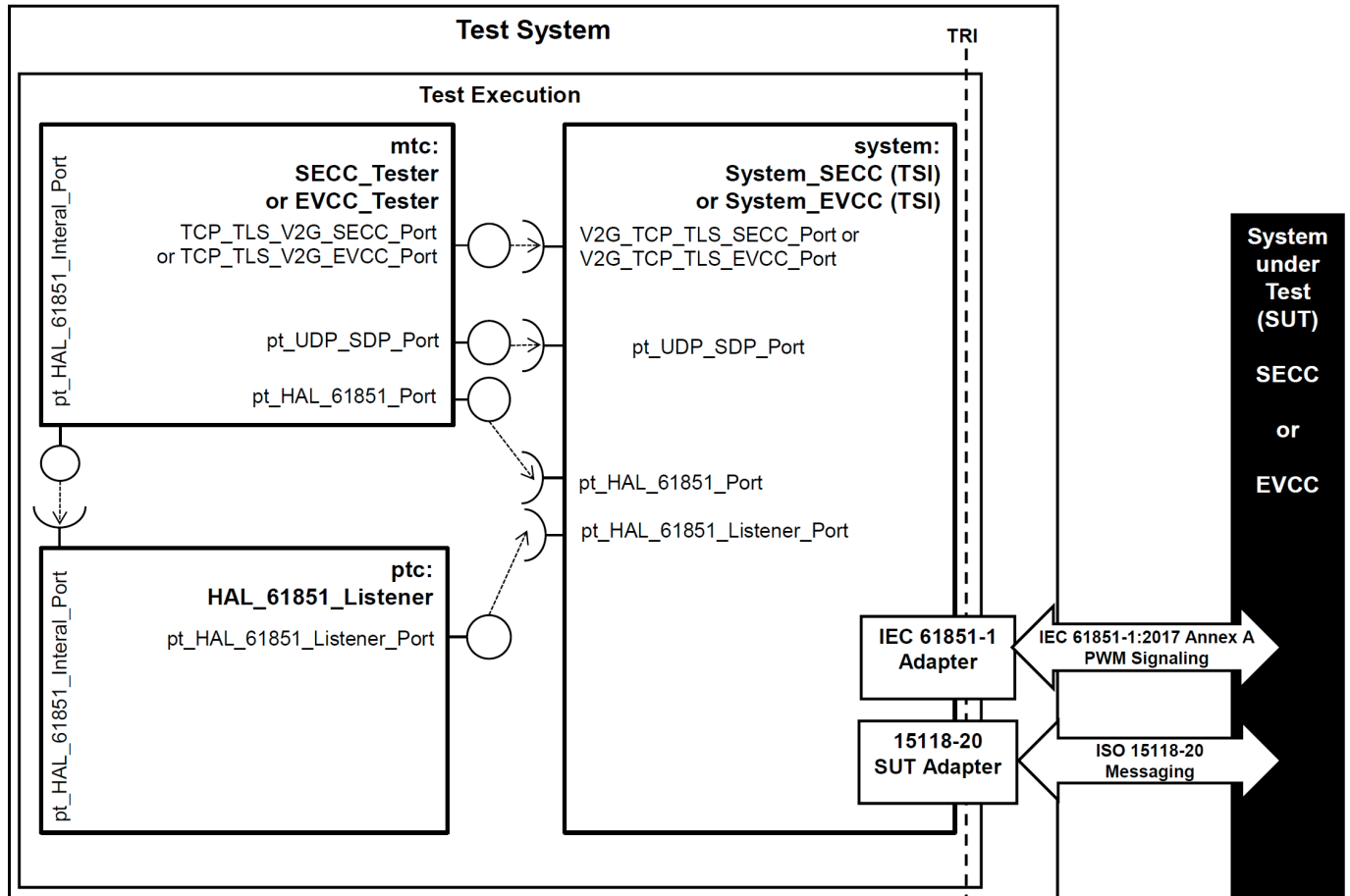


Figure 9 — Overview of test system components and ports in this document

As shown in [Figure 9](#) the port mappings are specified statically as follows:

- The port `pt_V2G_TCP_TLS_ALM_EVCC_Port` of the TSI is always mapped to port `pt_V2G_TCP_TLS_ALM_EVCC_Port` of the MTC.
- The port `pt_V2G_TCP_TLS_ALM_SECC_Port` of the TSI is always mapped to port `pt_V2G_TCP_TLS_ALM_SECC_Port` of the MTC.
- The port `pt_V2G_UDP_SDP_Port` of the TSI is always mapped to port `pt_V2G_UDP_SDP_Port` of the MTC.
- The port `pt_HAL_61851_Port` of the TSI is always mapped to port `pt_HAL_61851_Port` of the MTC.
- The port `pt_HAL_61851_Listener_Port` of the TSI is always mapped to port `pt_HAL_61851_Listener_Port` of the `v_HAL_61851_Listener`. The `pt_HAL_61851_Listener_Port` is from the same type `HAL_61851_Port` as the `pt_HAL_61851_Port`.
- The internal port `pt_HAL_61851_Internal_Port` is not mapped to the TSI. This port is connected between the MTC and PTC.

7.3.4 Protocol implementation conformance statement (PICS) definition

To evaluate the conformance of a particular SUT, it is necessary to have implementation conformance statements (ICS) of the capabilities and options which have been implemented, and any features which have been omitted, so that the implementation can be tested for conformance against relevant requirements,

and against those requirements only. Such a statement is called a protocol implementation conformance statement (PICS), compare to ITU-T X.290.

All PICS specified in the ATS are summarized in [Table 7](#) to [Table 9](#).

Table 7 — PICS for test system configurations CF_21_001 and CF_21_002 (SUT either SECC or EVCC)

PICS	Capability description	Test parameter
PICS_CMN_ETT	Specifies the list of all supported energy transfer types (ETT) by the SUT. Possible values contained in that list are: — AC — DC — WPT — ACDP Any combination of these values is allowed.	Test parameter PICS_CMN_ETT_value indicates which energy transfer type is being tested. One of the following values can be assigned to ett_value: — AC — DC — WPT — ACDP
PICS_CMN_ControlMode	Specifies the list of all supported Control Modes by the SUT. Possible values contained in that list are: — Dynamic — Scheduled Any combination of these values is allowed.	Parameter controlMode_value indicates which control mode is being tested. One of the following values can be assigned to controlmode_value: — Dynamic — Scheduled
PICS_CMN_AuthorizationServices	Specifies the list of all supported Authorization Services supported by the SUT. Possible values contained in that list are: — EIM — PNC Any combination of these values is allowed.	Parameter authorizationServices_value indicates which authorization service is being tested. One of the following values can be assigned to authorizationServices_value: — EIM — PNC
PICS_CMN_CertificateInstallationService	Specifies whether Certification Installation Service is supported by the SUT. Possible values to choose from are: — True — False	Parameter certificationInstallationService_value indicates if the certificate installation service is being tested. One of the following values can be assigned to certificationInstallationService_value: — True — False
PICS_CMN_Pause	Specifies whether Charging Pause is supported by the SUT. Possible values to choose from are: — True — False	Parameter pause_value indicates if a paused session is being tested. One of the following values can be assigned to pause_value: — True — False
PICS_CMN_ACPlugType	Specifies the list of all supported AC Plug Types supported by the SUT. Possible values contained in that list are: — SinglePhase — ThreePhase Any combination of these values is allowed.	Parameter acPlugtype_value indicates which AC Plug Type is being tested. One of the following values can be assigned to acPlugtype_value: — SinglePhase — ThreePhase
PICS_CMN_BPT	Specifies whether BPT is supported by the SUT. Possible values to choose from are: — True or False — True — False	Parameter bpt_value indicates if a BPT is being tested. One of the following values can be assigned to bpt_value: — True — False
PICS_CMN_MeteringConfirmationRequested	Specifies whether a MeteringConfirmation is triggered by the SUT using EVSENotification set to 'MeteringConfirmation'. Possible values to choose from are: — True — False	Parameter meteringConfirmationRequested_value indicates if a MeteringConfirmation message sequence is being tested. One of the following values can be assigned to meteringConfirmationRequested_value: — True — False

Table 7 (continued)

PICS	Capability description	Test parameter
PICS_CMN_Internet	Specifies whether the value-added service 'Internet' is supported by the SUT. Possible values to choose from are: — True or False — True — False	Parameter <code>internet_value</code> indicates if the 'Internet' service is selected in <code>ServiceSelectionReq</code> message. One of the following values can be assigned to <code>internet_value</code> : — True — False
PICS_CMN_ParkingStatus	Specifies whether the value-added service 'ParkingStatus' is supported by the SUT. Possible values to choose from are: — True or False — True — False	Parameter <code>parkingStatus_value</code> indicates if the 'ParkingStatus' service is selected in <code>ServiceSelectionReq</code> message for testing. One of the following values can be assigned to <code>parkingStatus_value</code> : — True — False
PICS_CMN_MobilityNeedsMode	Specifies who provides mobility needs information. Possible values to choose from are: — 1: Mobility needs provided by EVCC — 2: Mobility needs provided by SECC allowed	Parameter <code>mobilityNeedsMode_value</code> indicates which <code>MobilityNeedsMode</code> is selected for testing. One of the following values can be assigned to <code>mobilityNeedsMode_value</code> : — 1: Mobility needs provided by EVCC — 2: Mobility needs provided by SECC allowed

Table 8 — PICS for test system configuration CF_21_001 (SUT equals SECC)

PICS	Capability description	Test parameter
PICS_SECC_VAS	Specifies whether any VAS is provided by the SUT. Possible values to choose from are: — True — False	Parameter <code>vas_value</code> indicates if any VAS is included in <code>ServiceDiscoveryRes</code> message. One of the following values can be assigned to <code>vas_value</code> : — True — False

Table 9 — PICS for test system configuration CF_21_002 (SUT equals EVCC)

PICS	Capability description	Test parameter
PICS_EVCC_PrioritizedEmaids	Specifies whether prioritized EMAIDs are supported by the SUT. Possible values to choose from are: — True or False — True — False	Parameter <code>prioritizedEmaids_value</code> indicates if the <code>PrioritizedEMAIDs</code> is included in <code>CertificateInstallationReq</code> message. One of the following values can be assigned to <code>prioritizedEmaids_value</code> : — True — False

7.3.5 Protocol implementation extra information for testing (PIXIT) definition

In addition to the ICS, further statements (IXIT) made by a supplier or implementer may be required related to the SUT and its testing environment to enable the test laboratory to run the test suite against the SUT. With reference to ISO 15118-20 protocol conformance, the following set of PIXIT is specified in addition to the PICS in this document.

NOTE Due to the black box test paradigm in this document, it is not specified how to ensure that a corresponding PIXIT is set on the SUT side for a given test case execution.

All PIXIT specified in the ATS are summarized in [Table 10](#) to [Table 12](#).

Table 10 — PIXIT for test system configurations CF_21_001 and CF_21_002

PIXIT	Description
PIXIT_CMN_MinPowerRating	Max(Test System MinPosPowerRating, SUT MinPosPowerRating)
PIXIT_CMN_MaxPowerRating	Min(Test System MaxPowerPosRating, SUT MaxPosPowerRating)
PIXIT_CMN_MultipleContracts	Specifies whether multiple contract certificates are available or requested. Possible values to choose from are: — True — False

Table 11 — PIXIT for test system configuration CF_21_001 (SUT SECC)

PIXIT	Description
PIXIT_SECC_UnknownEMAID	Specifies whether the provided EMAID is registered at SA. Possible values to choose from are: — True — False
PIXIT_SECC_UnknownPCID	Specifies whether a contract is registered at SA for the provided PCID. Possible values to choose from are: — True — False
PIXIT_SECC_CommunicationToSA	Specifies whether the connection to the SA is established. Possible values to choose from are: — True — False
PIXIT_SECC_AuthorizationInitiated	Specifies whether the EIM authorization is executed. Possible values to choose from are: — True — False
PIXIT_SECC_ChargingParameterAvailable	Specifies whether the charging parameter are available. Possible values to choose from are: — True — False

Table 12 — PIXIT for test system configuration CF_21_002 (SUT EVCC)

PIXIT	Description
PIXIT_EVCC_EVCCID	Electric vehicle communication controller ID according to the format specified in [V2G20-2597].

7.3.6 Test control

For test control the following requirements or recommendations apply for this document:

- [V2G21-020]** Test control shall execute all applicable test cases listed in 4.2 for SUT SECC and 8.4 for SUT EVCC.
- [V2G21-021]** Test control should execute test cases in the order as they appear in [Table 17](#) for each SUT.
- [V2G21-022]** Test control shall implement the PICS and PIXIT parameters as specified in [3.6](#) and [3.7](#) and assign them as specified in each test case definition for SUT SECC (4.2) and for SUT EVCC (4.3).

7.3.7 Test system template messages

Test system template messages are specified in order to provide common parameterization values for all message elements used by the TS in send operations during test case execution.

- [V2G21-023]** A TS for SUT type EVCC shall use the template messages as specified in [Annex B](#) for default parametrization of the send operation during test case execution.
- [V2G21-024]** A TS for SUT type SECC shall use the template messages as specified in [Annex C](#) for default parametrization of the send operation during for test case execution.
- [V2G21-025]** The test case specification may override the parametrization values from the template messages. In such a case, the TS shall use the parameterization from the test case specification.
- [V2G21-026]** With reference to the template messages specified in [Annex B](#) and [Annex C](#), the TS for SUT type EVCC and SUT type SECC shall implement all functions listed in [Annex D](#) to determine any dynamic data elements during test case execution.

7.4 Test suite identifiers

The selection of common naming conventions is one simple and often used mechanism to implement test suites which are consistent, maintainable and understandable for multiple users. Therefore, based on common ETSI naming conventions more specific naming conventions for the ISO 15118 conformance test suite are specified.

7.4.1 Test case identifiers

The test case identifier for test cases specified in this document is specified as follows:

TC21_<sut>_<ctx>_<nnn>

The segments of this identifier are described in [Table 13](#).

Table 13 — ISO 15118 test suite naming convention for test case identifiers

Identifier	Values	Description
<prefix>	TC21	Prefix for test cases in this document
<sut>		System under test
	EVCC	Electric vehicle communication controller
	SECC	Supply equipment communication controller
<ctx>	{fullname}	Context (e.g. name of message pattern signal name according to standard)
<nnn>	{xxx}	Sequential number from 001 to 999

An example for test case identifier is:

TC21_SECC_SupportedAppProtocolRes_001

7.4.2 PICS/PIXIT identifiers

The ISO 15118 test suite naming convention for PICS/PIXIT is specified as:

<pic>_<sut>_<ctx>

The segments of this identifier are described in [Table 14](#). An example for PICS/PIXIT identifier is:

PICS_CMN_ETT

Table 14 — ISO 15118 test suite naming convention for PICS/PIXIT identifiers

Identifier	Values	Description
<pic>		Protocol implementation capability
	PICS	Protocol implementation conformance statement
	PIXIT	Protocol implementation extra information for testing
<sut>		System under test
	EVCC	Electric vehicle communication controller
	SECC	Supply equipment communication controller
	CMN	Common
<ctx>	{fullname}	Context (e.g. name of message pattern signal name according to standard)

7.4.3 Verdict types

In this subclause the conventions for test verdicts are specified. The test verdicts specified in this document are listed in [Table 15](#).

Table 15 — ISO 15118 test suite conventions on verdict handling

Verdict type	TTCN-3 definition	ISO 15118 Test suite
NONE	Is implicitly assigned in the beginning of every test case by default and is reported as a final verdict in the absence of any other verdict assignment during the test case execution.	No TSS specific definition (see TTCN-3 definition).
PASS	Means that everything is OK. A verdict given when the observed outcome satisfies the test purpose and is valid with respect to the relevant requirements and with respect to the PICS. See ITU-T X.290.	If in review of a requirement the SUT has a correct behaviour, then this verdict type shall be used.
INCONC	A verdict given when the observed outcome is valid with respect to the relevant requirements but prevents the test purpose from being accomplished. See ITU-T X.290.	Means that neither pass nor fail can be reliably assigned.
FAIL	A verdict given when the observed outcome is syntactically invalid or inopportune with respect to the relevant requirements or the PICS/PIXIT. See ITU-T X.290.	If in review of a requirement the SUT has a wrong behaviour, then this verdict type shall be used.

7.5 Test case specification

The abstract test case specification in this document is described according to the template shown in [Table 16](#).

Table 16 — Abstract test case specification template

TC Id	The TC Id is a unique identifier for a test case. It is specified according to the TC Id naming convention specified in 3.3.1.
Test purpose	Short description of test purpose according to the requirements from the base standard (ISO 15118-20).
Pre-condition	Description of steps needed to bring the SUT and TS into the state before the actual test behaviour of the test cases is entered.
Test behaviour	Description of the steps needed execute the test behaviour and to derive a test verdict. The steps in the test behaviour typically involve to send one or more stimuli from the TS to the SUT and to match the SUT's expected behaviour with its actual response to the stimuli.
Document reference	The document reference indicates the subclauses of the reference standard specifications in which the conformance requirement(s) is/are expressed. The references are provided according to the following format: Document: ISO 15118-X:20XX:(IS FDIS) Section(s): x.x.x.x.x, y.y.y.y, ...
Referenced requirement(s)	The referenced requirement(s) refers to the subclauses of the referenced standard specification requirement(s). The requirements are referenced according to the format specified in ISO 15118-20: [V2G20-YXX-ZZZ], ...
Config Id	The Config Id references the ISO 15118-20 configuration selected for this test case according to 3.4. EXAMPLE 2 CF_21_001, ...
PICS selection	The PICS selection references the PICS statement(s) for this test case in accordance with 3.6. EXAMPLE 3 PICS_CMN_ETT
PIXIT selection	The PIXIT selection references the PIXIT statement(s) for this test case in accordance with 3.7. EXAMPLE 4 PIXIT_CMN_MultipleContracts

8 Test case specification for common ISO 15118-20 requirements

8.1 General information

Subclause 4.2 covers all test cases for SECC according to ISO 15118-20 while subclause 4.3 covers all test cases for EVCC according to ISO 15118-20, respectively.

8.2 Test cases for SUT SECC

8.2.1 SECC SDP test case specifications

TC Id	TC21_SECC_SDP_001
Test purpose	This TC observes whether the SUT sends an SDP response message in time after receiving an SDP request message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link is successfully established.
Test behaviour	The test system starts the SDP_Msg_Observation_Timer when sending an SDP request message with all elements and values from default parameter set according to Annex C. For verdict 'pass' the test system then checks whether an SDP response message is received within SDP_Msg_Timeout according to the test system timer handling as specified in clause 6.5 with the following format: <pre>SDP response := { SECC IP address := ? SECC port := ? Security := '00'H Transport protocol := '00'H }</pre> If no SDP response message is received within SDP_Msg_Timeout, the test system restarts the SDP_Msg_Observation_Timer and sends another SDP request message. This message sequence is repeated until receipt of SDP response message or the maximum number of 50 SDP request messages is reached.
Document reference	ISO 15118-20:2022, 7.4, ISO 15118-20:2022, 7.10.1.3, ISO 15118-20:2022, 7.10.1.6
Referenced requirement(s)	[V2G20-027], [V2G20-123], [V2G20-624], [V2G20-144], [V2G20-150], [V2G20-154]
Config Id	CF_21_001
PICS	PICS_CMN_ETT contains (ett_value = AC DC)
PIXIT	-

8.2.2 SECC V2GTP test case specifications

TC Id	TC21_SECC_V2GTPSDP_001
Test purpose	This TC observes whether the SUT sends an SDP response message with V2GTP header information ProtocolVersion equals to '01'H, InvProtocolVersion equals to 'FE'H and PayloadType equals to '9001'H after receiving an SDP request message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link is successfully established.
Test behaviour	The test system starts the SDP_Msg_Observation_Timer when sending an SDP request message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C. For verdict 'pass' the test system then checks whether an SDP response message with V2GTP header information is received within SDP_Msg_Timeout according to the test system timer handling as specified in clause 6.5 with the following format: <pre> V2GTP := { Header := { ProtocolVersion := '01'H InvProtocolVersion := 'FE'H PayloadType := '9001'H PayloadLength := ? } Payload := SDP response := ? } </pre> If no SDP response message is received within SDP_Msg_Timeout, the test system restarts the SDP_Msg_Observation_Timer and sends another SDP request message. This message sequence is repeated until receipt of SDP response message or the maximum number of 50 SDP request messages is reached.
Document reference	ISO 15118-20:2022, 7.8.3.1, ISO 15118-20:2022, 7.10.1.6
Referenced requirement(s)	[V2G20-2307], [V2G20-1255]
Config Id	CF_21_001
PICS	PICS_CMN_ETT contains (ett_value = AC DC)
PIXIT	-

TC Id	TC21_SECC_V2GTPSDP_002
Test purpose	This TC observes whether the SUT ignores an SDP request message with invalid V2GTP header information ProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link is successfully established.
Test behaviour	The test system starts the SDP_Msg_Observation_Timer when sending an SDP request message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: ProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to an SDP request message with invalid V2GTP header within SDP_Msg_Timeout according to the test system timer handling as specified in clause 6.5. This process is repeated for the maximum number of 50 invalid SDP request messages.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001
PICS	PICS_CMN_ETT contains (ett_value = AC DC)
PIXIT	-

TC Id	TC21_SECC_V2GTPSDP_003
Test purpose	This TC observes whether the SUT ignores an SDP request message with invalid V2GTP header information InvProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link is successfully established.
Test behaviour	The test system starts the SDP_Msg_Observation_Timer when sending an SDP request message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: InvProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to an SDP request message with invalid V2GTP header within SDP_Msg_Timeout according to the test system timer handling as specified in clause 6.5. This process is repeated for the maximum number of 50 invalid SDP request messages.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001
PICS	PICS_CMN_ETT contains (ett_value = AC DC)
PIXIT	-

TC Id	TC21_SECC_V2GTPSDP_004
Test purpose	This TC observes whether the SUT ignores an SDP request message with invalid V2GTP header information PayloadType equals to '7001'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link is successfully established.
Test behaviour	The test system starts the SDP_Msg_Observation_Timer when sending an SDP request message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: PayloadType := '7001'H For verdict 'pass' the test system then checks whether the SUT does not respond to an SDP request message with invalid V2GTP header within SDP_Msg_Timeout according to the test system timer handling as specified in clause 6.5. This process is repeated for the maximum number of 50 invalid SDP request messages.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001
PICS	PICS_CMN_ETT contains (ett_value = AC DC)
PIXIT	-

TC Id	TC21_SECC_V2GTPSDP_005
Test purpose	This TC observes whether the SUT ignores an SDP request message with invalid V2GTP header information PayloadLength equals to '00000000'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link is successfully established.
Test behaviour	The test system starts the SDP_Msg_Observation_Timer when sending an SDP request message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: PayloadLength := '00000000'H For verdict 'pass' the test system then checks whether the SUT does not respond to an SDP request message with invalid V2GTP header within SDP_Msg_Timeout according to the test system timer handling as specified in clause 6.5. This process is repeated for the maximum number of 50 invalid SDP request messages.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001
PICS	PICS_CMN_ETT contains (ett_value = AC DC)
PIXIT	-

TC Id	TC21_SECC_V2GTPSupportedAppProtocol_001
Test purpose	This TC observes whether the SUT sends a SupportedAppProtocolRes message with V2GTP header information ProtocolVersion equals to '01'H, InvProtocolVersion equals to 'FE'H and PayloadType equals to '8001'H after receiving a SupportedAppProtocolReq message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SupportedAppProtocolReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C. For verdict 'pass' the test system then checks whether a SupportedAppProtocolRes message with V2GTP header information is received within V2G_EVCC_Msg_Time-out according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5 with the following format: <pre> V2GTP := { Header := { ProtocolVersion := '01'H InvProtocolVersion := 'FE'H PayloadType := '8001'H PayloadLength := ? } Payload := SupportedAppProtocolRes := ? } </pre>
Document reference	ISO 15118-20:2022, 7.8.3.1
Referenced requirement(s)	[V2G20-2307]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP)
PIXIT	-

TC Id	TC21_SECC_V2GTPSupportedAppProtocol_002
Test purpose	This TC observes whether the SUT sends a SupportedAppProtocolRes message whose TCP destination port number is in range of V2G_DST_TCP_DATA after receiving a SupportedAppProtocolReq message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SupportedAppProtocolReq message with all elements and values from default parameter set according to Annex C. For verdict 'pass' the test system then checks whether the used TCP destination port number of SupportedAppProtocolRes message is in the range of Dynamic Ports (49152-65535).
Document reference	ISO 15118-20:2022, 7.8.2
Referenced requirement(s)	[V2G20-078], [V2G20-080]

Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP)
PIXIT	-

TC Id	TC21_SECC_V2GTPSupportedAppProtocol_003
Test purpose	This TC observes whether the SUT ignores a SupportedAppProtocolReq message with invalid V2GTP header information ProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SupportedAppProtocolReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: ProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SupportedAppProtocolReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP)
PIXIT	-

TC Id	TC21_SECC_V2GTPSupportedAppProtocol_004
Test purpose	This TC observes whether the SUT ignores a SupportedAppProtocolReq message with invalid V2GTP header information InvProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SupportedAppProtocolReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: InvProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SupportedAppProtocolReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP)
PIXIT	-

TC Id	TC21_SECC_V2GTPSupportedAppProtocol_005
Test purpose	This TC observes whether the SUT ignores a SupportedAppProtocolReq message with invalid V2GTP header information PayloadType equals to '7001'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SupportedAppProtocolReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: PayloadType := '7001'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SupportedAppProtocolReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP)
PIXIT	-

TC Id	TC21_SECC_V2GTPSupportedAppProtocol_006
Test purpose	This TC observes whether the SUT ignores a SupportedAppProtocolReq message with invalid V2GTP header information PayloadLength equals to '00000000'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SupportedAppProtocolReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: PayloadLength := '00000000'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SupportedAppProtocolReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP)
PIXIT	-

TC Id	TC21_SECC_V2GTPCommonMessages_001
Test purpose	This TC observes whether the SUT sends a SessionSetupRes message with V2GTP header information ProtocolVersion equals to '01'H, InvProtocolVersion equals to 'FE'H and PayloadType equals to '8002'H after receiving a SessionSetupReq message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until SupportedAppProtocolRes message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SessionSetupReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C. For verdict 'pass' the test system then checks whether a SessionSetupRes message with V2GTP header is received within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5 with the following format: <pre> V2GTP := { Header := { ProtocolVersion := '01'H InvProtocolVersion := 'FE'H PayloadType := '8002'H PayloadLength := ? } Payload := SessionSetupRes := ? } </pre>
Document reference	ISO 15118-20:2022, 7.8.3.1
Referenced requirement(s)	[V2G20-2307]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	-
PIXIT	-

TC Id	TC21_SECC_V2GTPCommonMessages_002
Test purpose	This TC observes whether the SUT sends a SessionSetupRes message whose TCP destination port number is in range of V2G_DST_TCP_DATA after receiving a SessionSetupReq message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until SupportedAppProtocolRes message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SessionSetupReq message with all elements and values from default parameter set according to Annex C. For verdict 'pass' the test system then checks whether the used TCP destination port number of SessionSetupRes message is in the range of Dynamic Ports (49152-65535).
Document reference	ISO 15118-20:2022, 7.8.2

Referenced requirement(s)	[V2G20-078], [V2G20-080]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	-
PIXIT	-

TC Id	TC21_SECC_V2GTPCommonMessages_003
Test purpose	This TC observes whether the SUT ignores a SessionSetupReq message with invalid V2GTP header information ProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until SupportedAppProtocolRes message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SessionSetupReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: ProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SessionSetupReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	-
PIXIT	-

TC Id	TC21_SECC_V2GTPCommonMessages_004
Test purpose	This TC observes whether the SUT ignores a SessionSetupReq message with invalid V2GTP header information InvProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until SupportedAppProtocolRes message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SessionSetupReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: InvProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SessionSetupReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]

Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	-
PIXIT	-

TC Id	TC21_SECC_V2GTPCommonMessages_005
Test purpose	This TC observes whether the SUT ignores a SessionSetupReq message with invalid V2GTP header information PayloadType equals to '7001'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until SupportedAppProtocolRes message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SessionSetupReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: PayloadType := '7001'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SessionSetupReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	-
PIXIT	-

TC Id	TC21_SECC_V2GTPCommonMessages_006
Test purpose	This TC observes whether the SUT ignores a SessionSetupReq message with invalid V2GTP header information PayloadLength equals to '00000000'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until SupportedAppProtocolRes message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a SessionSetupReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment: PayloadLength := '00000000'H For verdict 'pass' the test system then checks whether the SUT does not respond to a SessionSetupReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]

Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	-
PIXIT	-

TC Id	TC21_SECC_V2GTPMeteringConfirmation_001
Test purpose	In case the SUT supports PnC (PICS_CMN_AuthorizationServices) and triggers a MeteringConfirmation (PICS_CMN_MeteringConfirmationRequested), this TC observes whether the SUT sends a MeteringConfirmationRes message with V2GTP header information ProtocolVersion equals to '01'H, InvProtocolVersion equals to 'FE'H and PayloadType equals to '8102'H after receiving a MeteringConfirmationReq message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until second AC_ChargeLoopRes (ett_value := AC) or DC_ChargeLoopRes (ett_value := DC/ACDP) or WPT_ChargeLoopRes (ett_value := WPT) message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a MeteringConfirmationReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C using the multiplexed communication. For verdict 'pass' the test system then checks whether a MeteringConfirmationRes message with V2GTP header is received within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5 with the following format: <pre> V2GTP := { Header := { ProtocolVersion := '01'H InvProtocolVersion := 'FE'H PayloadType := '8102'H PayloadLength := ? } Payload := MeteringConfirmationRes := ? } </pre>
Document reference	ISO 15118-20:2022, 7.8.3.1, ISO 15118-20:2022, 8.3.4.3.11.1
Referenced requirement(s)	[V2G20-2307], [V2G20-1085]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_AuthorizationServices contains (authorizationServices_value = PnC), PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP), PICS_CMN_MeteringConfirmationRequested contains (meteringConfirmationRequested_value = True)
PIXIT	-

TC Id	TC21_SECC_V2GTPMeteringConfirmation_002
Test purpose	This TC observes whether the SUT sends a MeteringConfirmationRes message whose TCP destination port number is in range of V2G_DST_TCP_DATA after receiving a MeteringConfirmationReq message from the test system.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until second AC_ChargeLoopRes (ett_value := AC) or DC_ChargeLoopRes (ett_value := DC/ACDP) or WPT_ChargeLoopRes (ett_value := WPT) message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a MeteringConfirmationReq message with all elements and values from default parameter set according to Annex C using the multiplexed communication. For verdict 'pass' the test system then checks whether the used TCP destination port number of MeteringConfirmationRes message is in the range of Dynamic Ports (49152-65535).
Document reference	ISO 15118-20:2022, 7.8.2
Referenced requirement(s)	[V2G20-078], [V2G20-080]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_AuthorizationServices contains (authorizationServices_value = PnC), PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP), PICS_CMN_MeteringConfirmationRequested contains (meteringConfirmationRequested_value = True)
PIXIT	-

TC Id	TC21_SECC_V2GTPMeteringConfirmation_003
Test purpose	This TC observes whether the SUT ignores a MeteringConfirmationReq message with invalid V2GTP header information ProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until second AC_ChargeLoopRes (ett_value := AC) or DC_ChargeLoopRes (ett_value := DC/ACDP) or WPT_ChargeLoopRes (ett_value := WPT) message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a MeteringConfirmationReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment using the multiplexed communication: ProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to a MeteringConfirmationReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5 .
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]

Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_AuthorizationServices contains (authorizationServices_value = PnC), PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP), PICS_CMN_MeteringConfirmationRequested contains (meteringConfirmationRequested_value = True)
PIXIT	-

TC Id	TC21_SECC_V2GTPMeteringConfirmation_004
Test purpose	This TC observes whether the SUT ignores a MeteringConfirmationReq message with invalid V2GTP header information InvProtocolVersion equals to 'FF'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until second AC_ChargeLoopRes (ett_value := AC) or DC_ChargeLoopRes (ett_value := DC/ACDP) or WPT_ChargeLoopRes (ett_value := WPT) message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a MeteringConfirmationReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment using the multiplexed communication: InvProtocolVersion := 'FF'H For verdict 'pass' the test system then checks whether the SUT does not respond to a MeteringConfirmationReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5 .
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_AuthorizationServices contains (authorizationServices_value = PnC), PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP), PICS_CMN_MeteringConfirmationRequested contains (meteringConfirmationRequested_value = True)
PIXIT	-

TC Id	TC21_SECC_V2GTPMeteringConfirmation_005
Test purpose	This TC observes whether the SUT ignores a MeteringConfirmationReq message with invalid V2GTP header information PayloadType equals to '7001'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until second AC_ChargeLoopRes (ett_value := AC) or DC_ChargeLoopRes (ett_value := DC/ACDP) or WPT_ChargeLoopRes (ett_value := WPT) message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a MeteringConfirmationReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment using the multiplexed communication: PayloadType := '7001'H For verdict 'pass' the test system then checks whether the SUT does not respond to a MeteringConfirmationReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]
Config Id	CF_21_001, CF_21_003, CF_21_005
PICS	PICS_CMN_AuthorizationServices contains (authorizationServices_value = PnC), PICS_CMN_ETT contains (ett_value = AC DC WPT ACDP), PICS_CMN_MeteringConfirmationRequested contains (meteringConfirmationRequested_value = True)
PIXIT	-

TC Id	TC21_SECC_V2GTPMeteringConfirmation_006
Test purpose	This TC observes whether the SUT ignores a MeteringConfirmationReq message with invalid V2GTP header information PayloadLength equals to '00000000'H.
Pre-condition	The SUT and TS are initialized to a state, where the data link and TLS connection are successfully established and V2G message sequence is succeeded until second AC_ChargeLoopRes (ett_value := AC) or DC_ChargeLoopRes (ett_value := DC/ACDP) or WPT_ChargeLoopRes (ett_value := WPT) message.
Test behaviour	The test system starts the V2G_EVCC_Msg_Observation_Timer when sending a MeteringConfirmationReq message and the corresponding V2GTP header with all elements and values from default parameter set according to Annex C with consideration of the following parameter adjustment using the multiplexed communication: PayloadLength := '00000000'H For verdict 'pass' the test system then checks whether the SUT does not respond to a MeteringConfirmationReq message with invalid V2GTP header within V2G_EVCC_Msg_Timeout according to Table 215 in ISO 15118-20:2022 and the test system timer handling as specified in clause 6.5.
Document reference	ISO 15118-20:2022, 8.6.4.6.3.1
Referenced requirement(s)	[V2G20-800]