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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

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Foreword

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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*, and with the European Committee for Standardization (CEN) Technical Committee CEN/TC 301, *Road vehicles*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 15118 series series can be found on the ISO and IEC websites.

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 document specifies a conformance test suite for the 2nd generation network layer and application layer protocols to derive a common basis for conformance tests. The resulting test suite is a prerequisite for downstream interoperability tests. Since interoperability tests also involve the actual application logic of an implementation, such tests are beyond the scope of this document (see NOTE 1). Therefore, this document focuses on the communication 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.

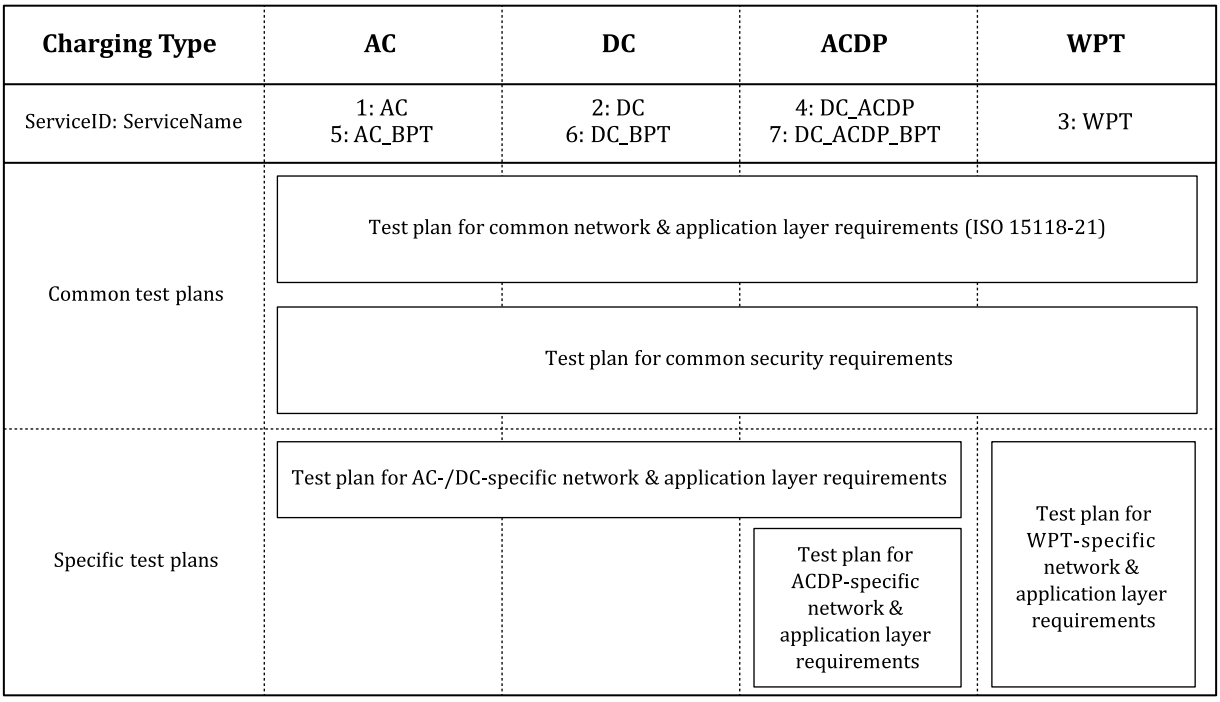

Figure 1 — Overview of relevant conformance test plans for ISO 15118-20 per charging type

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

— test plan for common network and application layer requirements (this document);

— test plan for common security requirements;

— test plan for AC-/DC-specific network and application layer requirements (only DC-specific subset applies).

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 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).

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) that implements an electric-vehicle communication controller (EVCC) or a supply-equipment communication controller (SECC) for all common requirements specified in ISO 15118-20 that are independent of a particular charging type (AC, DC, ACD, WPT charging). 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.

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 additionally refers to specific tests for requirements on referenced standards (e.g. IETF RFCs, W3C Recommendation, etc.) if 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, or 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. Power flow between the EVSE and the EV is no prerequisite for the test cases specified in this document.

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

ISO 15118-3, *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, *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 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*

IEC 61851-23, *Electric vehicle conductive charging system — Part 23: DC electric vehicle charging station*

ETSI ES 201 873-5 V4.9.1[1)], *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 V4.13.1[2)], *Methods for Testing and Specification (MTS) — The Testing and Test Control Notation version 3 — Part 6: TTCN-3 Control Interface (TCI) (April 2022)*

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.

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[2] ITU-T X.292:2002[4], *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications — The Tree and Tabular Combined Notation (TTCN)*

[3] Whitepaper of Charging Interface Initiative e.V., CharIN Conformance Test Systems (CCTS) Specification *(V1.0), 07.07.2023*

3) Available at https://www.itu.int/rec/T-REC-X.290-199504-I/en.

4) Available at https://www.itu.int/rec/T-REC-X.292-200205-I/en.