

This is a preview of "ISO 15118-20:2022". [Click here to purchase the full version from the ANSI store.](#)

First edition
2022-04

Road vehicles — Vehicle to grid communication interface —

Part 20: 2nd generation network layer and application layer requirements

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

*Partie 20: Exigences des couches réseau et application de 2ème
génération*



Reference number
ISO 15118-20:2022(E)

© ISO 2022



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of "ISO 15118-20:2022". Click here to purchase the full version from the ANSI store.

| Contents | Page |
|---|-------------|
| Foreword | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 4 |
| 4 Abbreviated terms | 12 |
| 5 Conventions | 15 |
| 5.1 Definition of OSI based services | 15 |
| 5.2 Requirement structure | 15 |
| 5.3 Usage of references | 16 |
| 5.4 Notation used for XML schema diagrams | 16 |
| 6 Document overview | 16 |
| 7 Basic requirements for V2G communication | 17 |
| 7.1 General information | 17 |
| 7.2 Service primitive concept of OSI layered architecture | 18 |
| 7.2.1 Overview | 18 |
| 7.2.2 Syntax of service primitives | 18 |
| 7.3 Security concept | 19 |
| 7.3.1 General | 19 |
| 7.3.2 Certificate and key management | 21 |
| 7.3.3 Number of root certificates and root validity | 35 |
| 7.3.4 Support and application of TLS | 37 |
| 7.3.5 Firewall | 38 |
| 7.3.6 Protection of the cryptographic keys | 38 |
| 7.3.7 Random number generation | 40 |
| 7.4 V2G communication states and data link handling | 42 |
| 7.5 Data link layer | 46 |
| 7.5.1 Data link layer security for WLAN | 46 |
| 7.6 Network link layer | 51 |
| 7.6.1 General | 51 |
| 7.6.2 Applicable RFCs, limitations and protocol parameter settings | 51 |
| 7.6.3 IP addressing | 53 |
| 7.7 Transport layer | 54 |
| 7.7.1 Transmission control protocol (TCP) | 54 |
| 7.7.2 User datagram protocol (UDP) | 55 |
| 7.7.3 Transport layer security (TLS) | 56 |
| 7.8 V2G transfer protocol | 82 |
| 7.8.1 General information | 82 |
| 7.8.2 Supported ports | 83 |
| 7.8.3 Protocol data unit | 84 |
| 7.9 Presentation layer | 87 |
| 7.9.1 XML and efficient XML interchange (EXI) | 87 |
| 7.9.2 Message security | 90 |
| 7.10 Application layer | 115 |
| 7.10.1 SECC discovery protocol | 115 |
| 8 Application layer messages | 128 |
| 8.1 General information and definitions | 128 |
| 8.2 Protocol handshake definition | 129 |

This is a preview of "ISO 15118-20:2022". [Click here to purchase the full version from the ANSI store.](#)

| | | |
|-------|--|-----|
| 8.2.1 | Handshake sequence | 129 |
| 8.2.2 | Message definition supportedAppProtocolReq and supportedAppProtocolRes | 131 |
| 8.2.3 | Semantics description supportedAppProtocol messages | 132 |
| 8.2.4 | Message examples..... | 133 |
| 8.3 | V2G message definition..... | 134 |
| 8.3.1 | Overview | 134 |
| 8.3.2 | General..... | 135 |
| 8.3.3 | Header definition | 135 |
| 8.3.4 | Request and response definitions..... | 138 |
| 8.3.5 | Complex data types..... | 240 |
| 8.4 | Service selection..... | 361 |
| 8.4.1 | General..... | 361 |
| 8.4.2 | General description of configuration parameters | 362 |
| 8.4.3 | Selection of service and service parameters..... | 363 |
| 8.5 | V2G communication timing..... | 373 |
| 8.5.1 | Overview | 373 |
| 8.5.2 | Common..... | 373 |
| 8.5.3 | DC service..... | 374 |
| 8.5.4 | Message sequence and communication session | 374 |
| 8.5.5 | Session setup and ready to charge..... | 381 |
| 8.5.6 | V2G message synchronization for AC and DC with IEC 61851-1 signalling | 387 |
| 8.5.7 | V2G message synchronization with IEC 61980-2 signalling for WPT | 394 |
| 8.6 | Message sequencing and error handling..... | 394 |
| 8.6.1 | Overview | 394 |
| 8.6.2 | Basic definitions for error handling..... | 395 |
| 8.6.3 | ResponseCode handling..... | 395 |
| 8.6.4 | Request-response message sequence requirements..... | 406 |
| 8.6.5 | Multiplexed communication | 434 |
| 8.6.6 | Message sequence diagrams | 437 |
| | Annex A (normative) Schema definition..... | 442 |
| | Annex B (normative) Certificate profiles..... | 444 |
| | Annex C (normative) Specification of identifiers..... | 498 |
| | Annex D (informative) ACDP | 504 |
| | Annex E (informative) Basic PPD for interoperability | 506 |
| | Annex F (informative) Message sequencing for renegotiation..... | 509 |
| | Annex G (informative) Association of VAS client to V2G session | 511 |
| | Annex H (informative) Application of certificates | 512 |
| | Annex I (informative) Precision of measurements and tolerances | 547 |
| | Annex J (informative) Absolute pricing examples | 549 |

This is a preview of "ISO 15118-20:2022". Click here to purchase the full version from the ANSI store.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <https://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared jointly by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*, Technical Committee IEC/TC 69, *Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 301, *Electrically propelled 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 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

The pending energy crisis and necessity to reduce greenhouse gas emissions started in the former century has led the vehicle manufacturers to a very significant effort to reduce the energy consumption of their vehicles up to the present. As countermeasures to this continuous problem, they developed vehicles partly or completely propelled by electric power and launched them into the market. Those vehicles will reduce the dependency on oil, improve the global energy efficiency and reduce the total CO₂ emissions for road transportation if the electricity is produced from renewable sources. To charge electricity to the batteries of such vehicles, a specific charging infrastructure is required.

Much of the standardization work on dimensional and electrical specifications of the charging infrastructure for electric vehicles and the vehicle interface were treated in the relevant ISO or IEC groups. However, the standardization work about direct information transfer between the electric vehicle and the charging infrastructure was not enough, and it was assigned to the ISO 15118 series to treat the subject sufficiently.

Such communication is necessary for the optimization of energy resources and energy production systems. With it electric vehicles can be connected to the supply network and communicate the most economic or most energy efficient way for charging/discharging. It is also required to develop efficient and convenient billing systems in order to cover the resulting payments. The necessary communication channel can serve in the future to contribute to the stabilization of the supply network as well as to support additional information services required to operate electric vehicles efficiently and economically.

After the standardization work of the first basic smart charging was completed, more standardization work for further evolved functions and high energy efficiency was continuously requested again.

It includes:

- improved charge methods that reduces efforts and agonies of the charging operation;
- extended functions for the electric vehicles to be utilized as distributed energy resources, which enable smoothing of the electricity load of the supply network for higher energy efficiency and also provide power back to the grid;
- information services for the user with higher added value and new convenience.

As for the communication system, the next evolution will be expected to realize these new applications.