

DIN EN ISO 15118-2:2022-11 (E)

Erscheinungsdatum: 2022-10-21

Road vehicles - Vehicle-to-Grid Communication Interface - Part 2: Network and application protocol requirements (ISO/DIS 15118-2:2022); English version prEN ISO 15118-2:2022, only on CD-ROM

| Contents | Page |
|--|-------------|
| Foreword..... | vii |
| Introduction..... | viii |
| 1 Scope..... | 1 |
| 2 Normative references..... | 1 |
| 3 Terms and definitions..... | 3 |
| 4 Symbols and abbreviated terms..... | 6 |
| 5 Conventions..... | 7 |
| 5.1 Definition of OSI based services..... | 7 |
| 5.2 Requirement structure..... | 8 |
| 5.3 Usage of RFC references..... | 8 |
| 5.4 Notation used for XML schema diagrams..... | 8 |
| 6 Document overview..... | 8 |
| 7 Basic requirements for V2G communication..... | 9 |
| 7.1 General information..... | 9 |
| 7.2 Service primitive concept of OSI layered architecture..... | 10 |
| 7.2.1 Overview..... | 10 |
| 7.2.2 Syntax of service primitives..... | 10 |
| 7.3 Security concept..... | 11 |
| 7.3.1 Call flows (flow charts)..... | 11 |
| 7.3.2 Certificate and key management..... | 15 |
| 7.3.3 Number of root certificates and root validity, certificate depth and size..... | 17 |
| 7.3.4 Support and application of TLS..... | 18 |
| 7.4 V2G communication states and data link handling..... | 20 |
| 7.5 Data link layer..... | 25 |
| 7.6 Network layer..... | 25 |
| 7.6.1 General..... | 25 |
| 7.6.2 Applicable RFCs and limitations and protocol parameter settings..... | 25 |
| 7.6.3 IP addressing..... | 26 |
| 7.7 Transport layer..... | 27 |
| 7.7.1 Transmission control protocol (TCP)..... | 27 |
| 7.7.2 User datagram protocol (UDP)..... | 28 |
| 7.7.3 Transport layer security (TLS)..... | 28 |
| 7.8 V2G transfer protocol..... | 31 |
| 7.8.1 General..... | 31 |
| 7.8.2 Supported ports..... | 31 |
| 7.8.3 Protocol data unit..... | 33 |
| 7.9 Presentation layer..... | 36 |
| 7.9.1 XML and efficient XML interchange (EXI)..... | 36 |
| 7.9.2 Message security..... | 39 |
| 7.10 Application layer..... | 46 |
| 7.10.1 SECC discovery protocol..... | 46 |
| 7.10.2 Vehicle to grid application layer messages..... | 51 |
| 7.10.3 Application layer service primitives..... | 51 |
| 8 Application layer messages..... | 55 |
| 8.1 General..... | 55 |
| 8.2 Protocol handshake definition..... | 56 |
| 8.2.1 Handshake sequence..... | 56 |

| | | |
|---|--|-----|
| 8.2.2 | Message definition supportedAppProtocolReq and supportedAppProtocolRes | 57 |
| 8.2.3 | Semantics description supportedAppProtocol messages | 57 |
| 8.2.4 | Message examples..... | 58 |
| 8.3 | V2G message definition..... | 60 |
| 8.3.1 | General..... | 60 |
| 8.3.2 | Message definition..... | 60 |
| 8.3.3 | Message header definition..... | 61 |
| 8.3.4 | Message body definition | 62 |
| 8.4 | V2G communication session and BodyElement definitions | 63 |
| 8.4.1 | General..... | 63 |
| 8.4.2 | Session handling..... | 63 |
| 8.4.3 | Common messages..... | 66 |
| 8.4.4 | AC messages | 96 |
| 8.4.5 | DC messages..... | 98 |
| 8.5 | Complex data types..... | 107 |
| 8.5.1 | Overview | 107 |
| 8.5.2 | Common..... | 107 |
| 8.5.3 | AC | 132 |
| 8.5.4 | DC..... | 136 |
| 8.6 | Identification modes and message set definitions | 142 |
| 8.6.1 | Overview | 142 |
| 8.6.2 | Supported message sets..... | 145 |
| 8.6.3 | Selection of message sets | 172 |
| 8.7 | V2G communication timing | 177 |
| 8.7.1 | Overview | 177 |
| 8.7.2 | Message sequence and communication session | 178 |
| 8.7.3 | Session setup and ready to charge..... | 183 |
| 8.7.4 | V2G message synchronization with IEC 61851-1 signalling..... | 186 |
| 8.8 | Message sequencing and error handling..... | 191 |
| 8.8.1 | Overview | 191 |
| 8.8.2 | Basic Definitions for Error Handling..... | 192 |
| 8.8.3 | ResponseCode handling..... | 192 |
| 8.8.4 | Request-response message sequence requirements..... | 196 |
| 8.9 | Request-response message sequence examples..... | 215 |
| 8.9.1 | AC | 215 |
| 8.9.2 | DC..... | 218 |
| Annex A (normative) Schema definition..... | | 223 |
| A.1 | Overview..... | 223 |
| A.2 | V2G_CI_AppProtocol.xsd | 224 |
| A.3 | V2G_CI_MsgDef.xsd..... | 224 |
| A.4 | V2G_CI_MsgHeader.xsd..... | 225 |
| A.5 | V2G_CI_MsgBody.xsd | 225 |
| A.6 | V2G_CI_MsgDataTypes.xsd | 232 |
| A.7 | xmldsig-core-schema.xsd | 242 |
| Annex B (normative) Certificate profiles..... | | 247 |
| B.1 | Overview..... | 247 |
| Annex C (normative) Specification of identifiers..... | | 253 |
| C.1 | e-Mobility account identifier (EMAID) | 253 |

| | | |
|-----------------------|--|-----|
| C.1.1 | EMAID syntax | 253 |
| C.1.2 | EMAID Semantics | 253 |
| C.1.3 | Calculation of the check digit | 254 |
| C.2 | Electric vehicle supply equipment ID (EVSEID)..... | 254 |
| C.2.1 | EVSEID syntax | 254 |
| C.2.2 | EVSEID semantics | 254 |
| Annex D (informative) | Mapping of ISO 15118-1 use case elements | 256 |
| D.1 | Relation of identification modes and use case elements..... | 256 |
| Annex E (informative) | Mapping of ISO 15118 message element names to SAE J2847/2 terms | 309 |
| E.1 | SAE J2847/2 status codes..... | 309 |
| E.2 | SAE J2847/2 energy transfer types | 310 |
| E.3 | SAE J2847/2 signals | 311 |
| Annex F (informative) | Message examples | 313 |
| F.1 | Value added service selection | 313 |
| F.2 | EXI encoded message examples..... | 315 |
| F.2.1 | SessionSetupRes message | 315 |
| F.2.2 | ChargeParameterDiscoveryReq message (AC-based)..... | 315 |
| F.2.3 | CurrentDemandReq message..... | 316 |
| F.3 | Schedules and tariff information | 317 |
| F.3.1 | Overview..... | 317 |
| F.3.2 | Dynamic GridSchedule w/o SalesTariff over ISO 15118 V2G CI..... | 317 |
| F.3.3 | “Time Of Use”-based SalesTariff with constant value for GridSchedule..... | 319 |
| F.3.4 | “Time Of Use”-based SalesTariff with dynamic GridSchedule..... | 320 |
| F.3.5 | “Consumption”-based SalesTariff with constant value for GridSchedule | 322 |
| F.3.6 | Multiple SalesTariffs with different demand Limits in GridSchedule | 323 |
| F.3.7 | Time of Use-based SalesTariffs including relativePricePercentage | 325 |
| Annex G (informative) | Application of certificates | 333 |
| G.1 | General information | 333 |
| G.1.1 | Overview..... | 333 |
| G.1.2 | Demands of the OEM..... | 334 |
| G.1.3 | Demands of the secondary actors..... | 334 |
| G.1.4 | Rationale for decisions in this document | 335 |
| G.1.5 | Overview of the resulting certificate structure | 337 |
| G.2 | Simplified certificate management in private environment..... | 338 |
| G.2.1 | Overview (motivation) | 338 |
| G.2.2 | Solution for private environments..... | 338 |

| | |
|---|------------|
| G.2.2.1 General | 338 |
| G.2.2.2 Installation of a private root certificate into a vehicle | 339 |
| G.2.2.3 Charging in a private environment | 339 |
| G.2.2.4 Compromised certificate of a wall box | 339 |
| G.3 Use of OEM provisioning certificates | 340 |
| G.3.1 Introduction | 340 |
| G.3.2 Processes | 341 |
| G.3.2.1 Vehicle production | 341 |
| G.3.2.2 Vehicle Hand-Over | 341 |
| G.3.2.3 Contract Conclusion | 342 |
| G.3.2.4 Certificate installation | 342 |
| G.3.2.5 Certificate update | 342 |
| G.3.2.6 Component replacement | 342 |
| G.4 Security appliances and their associated certificates | 343 |
| Annex H (informative) Encryption for the distribution of secret keys | 346 |
| H.1 Overview | 346 |
| H.2 Ephemeral-static Diffie-Hellman key agreement | 346 |
| H.3 Key pairs | 347 |
| Annex I (informative) Message sequencing for renegotiation | 348 |
| I.1 Overview | 348 |
| I.2 Renegotiation after resuming a V2G communication session | 351 |
| Annex J (informative) Overview on XML signatures | 352 |
| J.1 Overview | 352 |
| J.2 Signature generation | 352 |
| J.3 Signature generation for secondary actors | 355 |
| J.4 Signature validation | 355 |
| Annex K (informative) Summary of requirements | 356 |
| Bibliography | 362 |