DEUTSCHE NORM **Mai 2025**

DIN EN ISO 15118-10

ICS 43.120

Straßenfahrzeuge – Kommunikationsschnittstelle zwischen Fahrzeug und Ladestation – Teil 10: Anforderungen an die physikalische Schicht und Sicherungsschicht für Zweidraht Ethernet (ISO 15118-10:2025); Englische Fassung EN ISO 15118-10:2025

Road vehicles –
Vehicle to grid communication interface –
Part 10: Physical layer and data link layer requirements for single-pair Ethernet
(ISO 15118-10:2025);
English version EN ISO 15118-10:2025

Véhicules routiers –
Interface de communication entre véhicule et réseau électrique –
Partie 10: Exigences relatives à la couche physique et à la couche liaison de données pour Ethernet à paire unique (ISO 15118 10:2025);
Version anglaise EN ISO 15118 10:2025

Gesamtumfang 26 Seiten

DIN-Normenausschuss Auto und Mobilität (NAAutomobil)

Nationales Vorwort

Das Dokument EN ISO 15118-10:2025 wurde vom Technischen Komitee ISO/TC 22 „Road vehicles“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 301 „Straßenfahrzeuge“, dessen Sekretariat von DIN (Deutschland) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 052-00-31 AA „Datenkommunikation“ im DIN-Normenausschuss Auto und Mobilität (NAAutomobil).

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die Englische Fassung von EN ISO 15118-10:2025.

Für die in diesem Dokument zitierten Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

ISO 15118-20 siehe DIN EN ISO 15118-20

Um den Energieverbrauch von Fahrzeugen zu senken, werden Fahrzeuge mit elektrischem Teil- oder Komplettantrieb entwickelt. Um die Batterien dieser Fahrzeuge aufladen zu können, wird eine spezielle Lade-Infrastruktur benötigt.

Während verschiedene Teilaspekte in der Normung von Elektrofahrzeugen und Infrastruktur bei ISO und IEC bereits behandelt wurden, beschäftigt sich diese Normenreihe mit dem Informationsaustausch zwischen Elektrofahrzeug und Lade-Infrastruktur. Kommunikation ist für das effektive Aufladen von Fahrzeugen sowie die Entwicklung effizienter und komfortabler Abrechnungssysteme unabdingbar.

Dieser Teil der Normenreihe legt Anforderungen an die Übertragung von Botschaften mittels Zweidraht Ethernet fest.

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

Nationaler Anhang NA
(informativ)

Begriffe

Reihenfolge und Inhalt der folgenden Begriffe sind identisch mit denen im Abschnitt „Begriffe“ der Englischen Fassung.

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

— IEC Electropedia: verfügbar unter https://www.electropedia.org/

— ISO Online Browsing Platform: verfügbar unter https://www.iso.org/obp

3.1
Basissignalisierung
analoge Kommunikationssignalschleife zwischen Elektrofahrzeug (EV) und Elektrofahrzeug-Ladeeinrichtung (EVSE), um einen verlässlichen hardwarebasierten Informationsaustausch während der Energieübertragung sicherzustellen

Anmerkung 1 zum Begriff: Die Basiskommunikationsschnittstelle ist in IEC 61851-23-3 festgelegt.

3.2
Ladefreigabefunktion
elektronische Funktion, die eine analoge Signalschleife zwischen EV und EVSE verwendet, um die Sicherheit während der Energieübertragung sicherzustellen und um Informationen über den Betriebsmodus von EV und EVSE in Übereinstimmung mit IEC 61851-23-3 zu übertragen

3.3
Kommunikationsmedium
physisches Medium, welches das *Kommunikations*signal *auf den unteren Schichten* (3.7) mittels Verkabelung zwischen der Ladeinfrastruktur und dem EV überträgt

3.4
Steuerung der Datenverbindung SAP
Dienstzugangspunkt, der die Schnittstelle zwischen dem Verbindungssteuerungsmodul und der Technologie für die *Kommunikation auf den unteren Schichten* (3.7) festlegt, um den Sicherungsstatus zu steuern

3.5
Daten SAP
Dienstzugangspunkt, der die Schnittstelle zwischen Schicht 2 und Schicht 3 für den Austausch von Fahrzeug-zu-Ladesäule (en: vehicle to grid, v2g) bezogene Nutzinformation festlegt

3.6
Einsatz Erkennungsfunktion
elektronische Funktion, die eine analoge Signalschleife zwischen EV und EVSE verwendet, um sicherzustellen, einen EV-Koppler, der im EV-Zugang eingefügt ist, zu erkennen (z. B., um den Stecker im Zugang zu verriegeln und die Blockierung des EVs zu ermöglichen), in Übereinstimmung mit IEC 61851-23-3

3.7
Kommunikation auf den unteren Schichten
Funktionen, die nach OSI-Schichten 1 und 2 des Modems gesteuert werden

3.8
Kommunikationsmodul auf den unteren Schichten
funktionale Aufbau hinter jeder Steckdose oder hinter jedem Steckverbinder (abhängig vom Typ der EV-Steckverbindung), der den Kommunikationsknoten sowie die Kommunikationskoordinierungsfunktionalität beinhaltet

3.9
physische Verbindung
physischer Verbindungsaufbau zwischen dem Elektrofahrzeug (EV) und der Elektrofahrzeug-Ladeeinrichtung (EVSE)

Anmerkung 1 zum Begriff: Diese beinhaltet die Verbindung zwischen EV und EVSE und jede *Basissignalisierung* (3.1), die möglicherweise benötigt wird, um eine hergestellte physische Verbindung zu bestätigen (z. B. Umschalten eines Schalters, um die Verbindung anzuzeigen).

3.10
Zweidraht Ethernet
Ethernet Technologie, die über eine verdrillte Zweidrahtleitung betrieben wird

Nationaler Anhang NB
(informativ)

Abkürzungen

BIN	Busschnittstellennetzwerk (en: bus interface network)
EMC	elektromagnetische Verträglichkeit (en:electromgnetic compatibility)
EV	Elektrofahrzeug (en: electric vehicle)
EVCC	Kommunikationssteuergerät Elektrofahrzeug (en: electric vehicle communication controller)
EVSE	Elektrofahrzeug-Ladeeinrichtung (en: electric vehicle supply equipment)
D-LINK	Datenverbindung (en: data link)
HLC	übergeordnete Kommunikation (en: high-level communication)
HLE	übergeordnete Entität (en: higl-level entity)
OSI	offenes System für Kommunikationsverbindungen (en: Open Systems Interconnection)
SAP	Dienstzugangspunkt (en: service access point)
SECC	Kommunikationssteuergerät Versorgungseinrichtung (en: supply equipment communication controller)
TC	Übertragungszusammenführung (en: transmission convergence)
UTP	ungeschirmtes gedrilltes Leitungspaar (en: unshielded twisted pair)
VAS	Mehrwertdienst (en: value added service)

Nationaler Anhang NC
(informativ)

Literaturhinweise

DIN EN ISO 15118-20, *Straßenfahrzeuge — Kommunikationsschnittstelle zwischen Fahrzeug und Ladestation — Teil 20: Anforderungen der 2. Generation an das Netzwerk- und Anwendungsprotokoll*

EUROPEAN STANDARD

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Road vehicles - Vehicle to grid communication interface - Part 10: Physical layer and data link layer requirements for single-pair Ethernet (ISO 15118-10:2025)

Véhicules routiers - Interface de communication entre véhicule et réseau électrique - Partie 10: Exigences relatives à la couche physique et à la couche liaison de données pour Ethernet à paire unique (ISO 15118-10:2025)

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This European Standard was approved by CEN on 5 March 2025.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN ISO 15118-10:2025 E

European foreword

This document (EN ISO 15118-10:2025) has been prepared by Technical Committee ISO/TC 22 "Road vehicles" in collaboration with Technical Committee CEN/TC 301 “Road vehicles” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2025, and conflicting national standards shall be withdrawn at the latest by September 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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Endorsement notice

The text of ISO 15118-10:2025 has been approved by CEN as EN ISO 15118-10:2025 without any modification.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO 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).

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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.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, SC 31, *Data communication*, in collaboration 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 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 atwww.iso.org/members.html.

Introduction

The looming energy crisis and necessity to reduce greenhouse gas emissions has forced vehicle manufacturers to find ways to scale down how much energy their vehicles consume. The vehicles they are currently developing are propelled either entirely or in part by electric energy. If this energy is generated from renewable sources, this will weaken dependency on oil, improve the global energy efficiency and cut CO_2 emissions. However, a dedicated charging infrastructure is needed to charge the batteries that power these vehicles.

Much of the standardization work on dimensional and electrical specifications of the charging infrastructure and the vehicle interface is already treated in the relevant ISO or IEC groups. However, the question of information transfer between the electric vehicles (EV) and electric vehicle supply equipment (EVSE) has not been treated sufficiently.

This communication is key to optimizing energy resources and energy production systems so vehicles can be charged cheaply and efficiently.

In this document, messages are exchanged between the vehicle and the infrastructure over single-pair Ethernet (which is embedded in the cable assembly).

The relevant information on use-case definitions requirements can be found in ISO 15118-1. Network and application protocol requirements can be found in ISO 15118-20, respectively.

Road vehicles — Vehicle to grid communication interface —

Part 10: Physical layer and data link layer requirements for single-pair Ethernet

1 Scope

This document specifies the physical and data link layer of high-level communication (HLC) between electric vehicles (EV) and electric vehicle supply equipment (EVSE) based on single-pair Ethernet communication. Single-pair Ethernet communication uses differential twisted pair wires that are dedicated and balanced. This document applies to 10BASE-T1S only.

This document covers the overall information exchange between all actors involved in electrical energy exchange. The ISO 15118 series applies to charging between EV and EVSE.

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

IEC 61851-23-3[1)], *Electric vehicle conductive charging system — Part 23-3: DC electric vehicle supply equipment for Megawatt charging systems*

IEEE 802.3:2022, *IEEE Standard for Ethernet*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in 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
basic signalling
analogue communication signal loop between the electric vehicle (EV) and the electric vehicle supply equipment (EVSE) to ensure reliable hardware-based information exchange during energy transfer

Note 1 to entry: The basic communication interface is defined in IEC 61851-23–3.

1) Under preparation. Stage at the time of publication: IEC/CCDV 61851-23-3:2025.

3.2
charge enable function
electronic function using an analogue signal loop between the electric vehicle (EV) and the electric vehicle supply equipment (EVSE) to ensure safety during energy transfer and to transmit information about the operational modes of EV and EVSE, in conformity with IEC 61851-23-3

3.3
communication media
physical media carrying the *low-layer communication* (3.7) signal is given by the cable assembly, which connects the charging infrastructure and the electric vehicle

3.4
data link control SAP
service access point which defines the interface between the connection coordination module and the *low-layer communication* (3.7) technology for managing the link status

3.5
data SAP
service access point that defines the interface between layer 2 and layer 3 for exchange of v2g-related payload

3.6
insertion detection function
electronic function using an analogue signal loop between the electric vehicle (EV) and the electric vehicle supply equipment (EVSE) to ensure the detection of an EV coupler inserted in the EV inlet (e.g. to lock the connector in the inlet and allow for the immobilization of the EV), in conformity with IEC 61851-23-3

3.7
low-layer communication
functions managed by the OSI layer 1 and layer 2 of the modem

3.8
low-layer communication module
functional assembly behind each socket outlet or each connector (depending on the type of electric vehicle connection), which includes the communication node and the connection coordination functionality

3.9
physical connection
physical establishment of connection between the electric vehicle (EV) and the electric vehicle supply equipment (EVSE)

Note 1 to entry: This includes mating between the EV and the EVSE and any *basic signalling* (3.1) that acknowledges that a physical connection has been established (e.g. toggling of a switch to indicate connection).

3.10
single-pair Ethernet
Ethernet technology that operates over a single twisted pair cable

4 Abbreviated terms

BIN	bus interface network
EMC	electromagnetic compatibility
EV	electric vehicle
EVCC	electric vehicle communication controller
EVSE	electric vehicle supply equipment
D-LINK	data link

HLC	high-level communication
HLE	high level entity
MCS	megawatt charging system
OSI	open systems interconnection
SAP	service access point
SECC	supply equipment communication controller
TC	transmission convergence
UTP	unshielded twisted pair
VAS	value added service

5 Conventions

5.1 Definition of OSI based services

This document is based on the OSI service conventions as defined in ISO/IEC 10731.

5.2 Requirement structure

Each individual requirement included in this document has a unique code, as follows:

"**[V2G10-XXX]** requirement text"

where

— "V2G10" represents this document;

— "XXX" represents the individual requirement number;

— "requirement text" includes the actual text of the requirement.

See Table 1 for an example of the requirement structure.

Table 1 — Example

[V2G10–001]	Description of the requirement

6 System architecture

6.1 Communication layers

6.1.1 Architecture

This document defines requirements applicable to layers 1 and 2, including V2G standardized service primitive interface, according to the OSI layered architecture. Layers 3 to 7 are specified in ISO 15118-20. For a diagram, see ISO 15118-20:2022, Figure 2.

In addition to HLC to the upper layers, additional communication (basic signalling) allows for reliable hardware control.

NOTE This document only applies to DC power transfer, not AC.

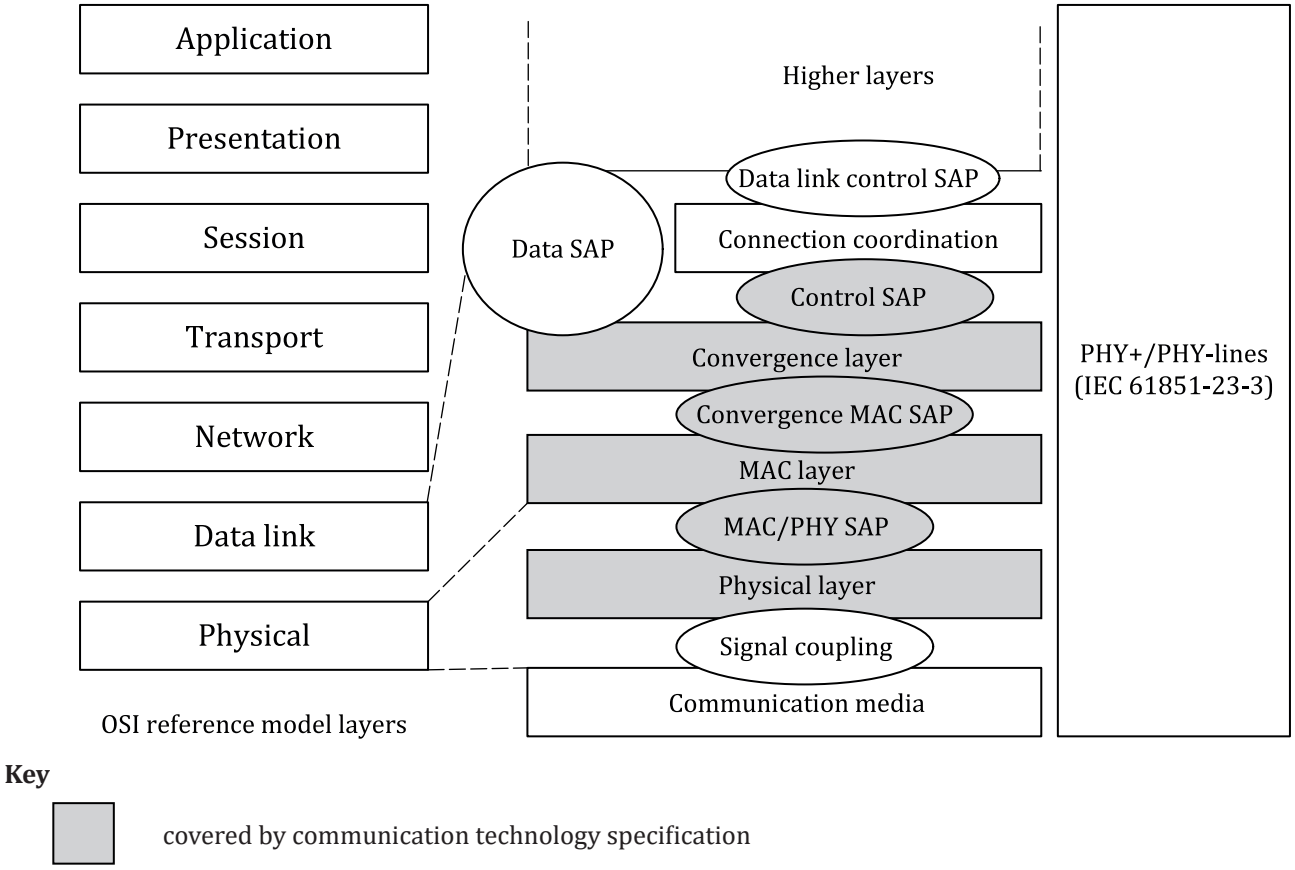

Figure 1 — Relationship to the ISO/IEC OSI reference model

6.1.2 Layer 2 interfaces

This clause describes the terminology primitives used in this document. It explains and defines a unique terminology. This terminology is implementation specific.

As shown in Figure 1, the definition of the data link layer provides two interfaces to higher layers:

— data SAP is the interface between the communication technology (layer 2) and the network layer (layer 3);

— data link control SAP provides link status information, error information and control functionality and is located between layers 2 and 3.

6.1.3 Communication media

Communication media block, as shown in Figure 1, are the PHY+ and PHY- lines (according to IEC TS 63379).

6.1.4 Data SAP

6.1.4.1 General

The network layer/logical link control sublayer data service primitives are defined in ISO/IEC 8802-2.

6.1.4.2 Syntax of service primitives

Service primitives are described using the following syntax:

— [Initial of layer]-[NAME].[primitive type](parameter list);

  — whereas [initial of layer] is one of seven possible primitive types:

    — physical, data link, network, transport, session, presentation, application;

  — whereas [NAME] is the name of the primitive;

EXAMPLE Typical examples for [Name] are CONNECT, DISCONNECT and DATA. Other names are used in this document and in ISO 15118-3.

— whereas [primitive type] is one of four possible primitive types:

  — request, indication, response, confirmation;

— whereas (parameter list) includes a list of parameters, separated by a comma, that the user of the service is supposed to provide when using the respective service primitive. Optional parameters are marked with brackets "[..]".

NOTE In this document, the primitive type ".indication" indicates an event asynchronously to the upper layer.

6.1.4.3 Data link control SAP to layer 3

These primitives are defined in ISO 15118-20. See Tables 2 to 5.

[V2G10-001]	The D-LINK_READY.indication shall be sent with any change in the link status and the charge enable status.

Table 2 — D-LINK_READY.indication primitive

Primitive	D-LINK_READY.indication
Entity to support	EVCC, SECC
Parameter name	Description
LINKSTATUS	Status of communication link: — no link (either no connection or Charge Enable not ready) — link established (Ethernet is operational and state B or B_AUX)
Note	D-LINK_Ready.indication needs to be translated to D_LINK.indication: — OK (link established) — FAIL (no link) D-LINK_Ready.indication only applies to the higher layers of ISO 15118-20. It is allowed for the Ethernet to connect and transmit data prior to or after charging.

The D-LINK_TERMINATE.request requests lower layers to terminate the data link.

Table 3 — D-LINK_TERMINATE.request primitive

Primitive	D-LINK_TERMINATE.request
Entity to support	EVCC, SECC
Note	This function does not do anything other than fulfil the HLC requirements.

The D-LINK_ERROR.request requests information about the error status of the communication link.

Table 4 — D-LINK_ERROR.request primitive

Primitive	D-LINK_ERROR.request
Entity to support	SECC
Note	The higher layer will use this to determine if there is an error in the communication link.

The D-LINK_PAUSE.request requests lower layers to enter a power saving mode.

Table 5 — D-LINK_PAUSE.request primitive

Primitive	D-LINK_PAUSE.request
Entity to support	EVCC, SECC
Note	This function does not do anything other than fulfil the HLC requirements.

6.1.4.4 Communication and signalling

6.1.4.4.1 General

This document describes the general requirements to the two communication channels necessary to establish a charging session: basic signalling, and the HLC.

6.1.4.4.2 Basic signalling

Any charging process, regardless of the presence of HLC, uses the basic communication as defined in IEC 61851-23-3, indicating EV and EVSE-related information on the control of the flow of the energy transfer.

[V2G10-002]	The basic signalling from IEC 61851-23-3 shall be applied.
[V2G10-003]	All timings shall conform to IEC 61851-23-3.

6.1.4.4.3 High-level communication (HLC)

The sequence of the data exchange within the HLC-based charging session shall be done in accordance with the ISO 15118-20 high level communication protocol.

6.1.5 Service primitive concept of OSI layered architecture

See ISO 15118-20 for details on the OSI layered architecture.

6.2 Physical channel

6.2.1 General

This clause specifies the requirements for connecting single-pair ethernet signals to the PHY1 and PHY2 lines using the contact definition from IEC TS 63379.

The physical channel starts at the SECC (node-id 0), moves through the cable to the connector, to the inlet, and then to the EVCC (node-id 1). It is also possible there will be an adaptor between the connector and the inlet, but this is for future development.

There is a maximum of eight nodes for this network. Not all nodes will be present, but this allows for future-proofing.

[V2G10-004]	All nodes shall set aPLCANodeCount to 8.

6.2.2 Nodes

The characteristics of the physical channel are shown in Table 6.

Table 6 — Characteristics of the physical channel

Node ID	Name	Configuration	Mandatory
0	SECC	End node, Coordinator	Yes
1	EVCC	End node	Yes
2	Connector	Drop node	No (optional)
3	Inlet	Drop node	No (optional)
4	Adaptor	Drop node	No (optional)
5	Optional	Drop node	(No)
6	Optional	Drop node	(No)
7	Optional	Drop node	(No)

6.2.3 Requirements for the physical channel

6.2.3.1 General

The physical requirements of the channel are defined in IEC 61851-23-3.

6.2.3.2 EVSE

[V2G10-005]	Each EVSE outlet shall have its own dedicated charge enable function controller.
[V2G10-006]	Each optional node shall not disturb the mandatory nodes in the physical channel.
[V2G10-007]	Each EVSE outlet shall have its own dedicated low-layer communication module.
[V2G10-008]	Each EVSE shall possess its dedicated SECC containing the low-layer communication module.
[V2G10-009]	The EVSE’s low-layer communication module shall have a Node-ID of 0.
[V2G10-010]	The EVSE shall have a Node-ID of 2 for the connector.

6.2.3.3 EV

[V2G10-011]	Each EV shall possess its dedicated EVCC containing the low-layer communication module.
[V2G10-012]	Each EVCC shall have its own dedicated charge enable function controller.
[V2G10-013]	Each EVCC shall have its own dedicated low-layer communication module to the SECC.
[V2G10-014]	The EVCC's low-layer communication module shall have a Node-ID of 1.
[V2G10-015]	The EVCC shall have a Node-ID of 3 for the inlet.

6.2.3.4 Adaptor

[V2G10-016]	The adaptor (between EVSE and EV) shall have a Node-ID of 4.

6.2.4 Schematic of the coupling network

The physical channel can be represented as shown in Figure 2. The node on the left is the SECC node (node-id 0) and the node on the right is the EVCC node (node-id 1). The nodes that hang down (i.e. drop nodes) are optional.

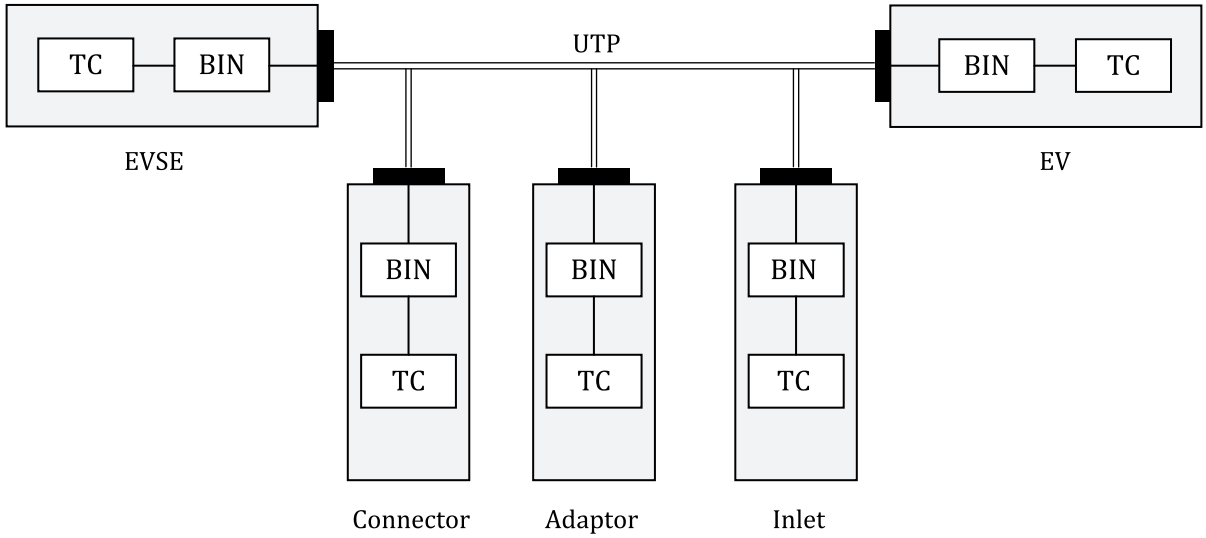

Figure 2 — Single-pair ethernet

6.3 System requirements

6.3.1 Overview of basic signalling

This clause defines general system requirements for basic signalling and HLC for EVs and EVSE. See Table 7.

State transitions are defined in IEC 61851-23-3.

The states defined in IEC 61851-23-3 are used in the following clauses:

Table 7 — Overview of basic signalling states from IEC 61851-23–3 for MCS

Basic signalling state description	State name	Comment
Not mated	A	
Mated/EV and EVSE not ready	B0	If there is no auxiliary power via insertion detection function requested by EV
Mated/EV and EVSE not ready/EV AUX requested	B0_AUX	If there is auxiliary power via insertion detection function requested by EV
Mated/EVSE ready/EV not ready	B	Data link setup occurs and D-LINK_READY.indication primitive is set to ready
Mated/EV not ready / EVSE ready/EV AUX requested	B_AUX	Data link setup occurs and D-LINK_READY.indication primitive is set to ready
Mated/EV and EVSE ready	C	Ready for power transfer (HV and aux. power) This ensures safety-relevant preconditions on both sides, e.g. connector locking or immobilization.
Mated/EV and EVSE ready/EV AUX requested	C_AUX	

Table 7 *(continued)*

Basic signalling state description	State name	Comment
Mated/no LV power	E	No signal (0 V) Shall not be used for signalling purposes.
Mated/emergency shutdown EVSE	Transition from state C to state EC, or state C_AUX to state EC_AUX	Transition from state C or C_AUX to EC or EC_AUX triggered by the EVSE
Mated/emergency shutdown EV	Transition from state C to state B, or state C_AUX to state B_AUX	Transition from state C to B or C_AUX to B_AUX triggered by the EV

6.3.2 Electric vehicle supply equipment (EVSE)

6.3.2.1 Low-layer communication requirements

This clause describes the requirements for the low-layer communication module for the EVSE.

[V2G10-017]	The EVSE shall enable the communication module using D-LINK.request(ENABLE).
[V2G10-018]	The EVSE shall disable the communication module using D-LINK.request(DISABLE).
[V2G10-019]	The EVSE's low-layer communication module shall not use auto negotiation.
[V2G10-020]	The EVSE shall initiate the data link after detection of plug-in.
[V2G10-021]	The EVSE's low-layer communication module shall use half-duplex.
[V2G10-022]	After the data link layer connection is established, the SECC shall initiate the IP address assignment mechanism defined in ISO 15118-20. NOTE This is to allow use of the communication link for VAS and other communications.
[V2G10-023]	Upon detection of state B or B_AUX, and successful data link setup, the EVSE shall send (D-LINK_READY.indication(DLINKSTATUS = Link established)) to the HLE.

6.3.3 Electric vehicle (EV)

6.3.3.1 Low-layer communication requirements

[V2G10-024]	The EVCC shall enable the communication module using D-LINK.request(ENABLE).
[V2G10-025]	The EVCC shall disable the communication module using D-LINK.request(DISABLE).
[V2G10-026]	The EVCC's low-layer communication module shall not support auto negotiation.
[V2G10-027]	The EVCC's low-layer communication module shall use half-duplex.
[V2G10-028]	The EVCC shall initiate the data link after detection of plug-in.
[V2G10-029]	After the data link layer connection is established, the EVCC shall initiate the IP address assignment mechanism defined in ISO 15118-20. NOTE This is to allow use of the communication link for VAS and other communications.
[V2G10-030]	Upon detection of state B or B_AUX, and successful data link setup, the EV shall send (D-LINK_READY.indication(DLINKSTATUS = Link established)) to the HLE.
[V2G10-031]	If the EVCC sends a pause request to the SECC, it shall pause the Data Link (D-LINK_PAUSE.request()) and follow the sleep and wake-up requirements defined in 7.6. NOTE If the EVCC's node goes to sleep, it has no impact on the SECC's node.
[V2G10-032]	If the EVCC wants to stop communication, it shall terminate the Data Link (D-LINK_TERMINATE.request()). NOTE If the EVCC's node is turned off, it has no impact on the SECC's node.

7 Connection coordination

7.1 General

This clause describes the process of establishing a physical connection between the EV and the EVSE. This physical connection combines the mating of the plug and inlet as well as the necessary signalling to begin energy transfer.

7.2 Overview

This clause provides information about the connection setup for EVs and EVSE – for exact details, refer to IEC 61851-23-3.

NOTE 1 A “plug-in” corresponds to a state transition from A to B0 or B0_AUX. A “re-init” corresponds to a state transition from B0 to B or B_AUX of the charge enable function.

NOTE 2 On the transition to state B or B_Aux, the EV will initiate the low-level communication setup with the EVSE.

Once the single-pair ethernet communication is established (see IEC 61851-23-3), the HLC takes place.

7.3 Plug-in phase

7.3.1 General

Upon plug-in, the communication between the single-pair ethernet nodes will be set up. Ideally, the network layer would also be set up (see ISO 15118-20) to allow for VAS and other communication. HLC will not start until detection of state B or B_AUX.

7.3.2 EVSE side

[V2G10-033]	After detection of state B or B_AUX, the SECC shall finish communication setup in less than T_conn_resume.
[V2G10-034]	The SECC shall only apply charge enable function state B if the low-layer communication module is ready for communication.

NOTE There is no requirement for how long the SECC is allowed to stay in state B0 before moving to state B.

7.3.3 EV side

[V2G10-035]	After detection of state B or B_AUX, the EVCC shall finish communication setup in less than T_conn_resume.

7.4 Initialization phase

After the physical link has been established (V2G data link setup finished), the initialization phase is governed by ISO 15118-20.

7.5 Loss of communication

7.5.1 General

This subclause covers when the communication link is lost.

[V2G10-036]	If a data link was established and a D-LINK_READY.indication(link established) was already indicated to higher layers, any detected loss of the data link shall cause a D-LINK_READY. indication(no link) indication to higher layers.

7.5.2 EVSE side

[V2G10-037]	When D-LINK_ERROR.request is detected, the SECC shall attempt to reconnect a maximum of C_conn_retry times.
[V2G10-038]	If the retries in V2G10-037 fail, the EVSE shall move to state B0.

7.5.3 EV side

If the EV detects a loss of communication, it will stop charging. If the loss of communication happens during state C, the EV will switch to state B immediately. Since the EVSE can relaunch the HLC by moving to state B after moving to state EC, the EV can retry communication initialization after indication from the EVSE.

[V2G10-039]	After receiving a D-LINK_ERROR.request from HLE, the EV's communication node shall change to the B state within TP_sync_leave and wait for a new incoming communication trigger (charge enable function state B).

7.6 Sleep mode and wake-up

7.6.1 General

Sleep mode is used for energy saving. The EVCC and SECC can enter sleep mode after negotiating a pause through the HLC.

For the EVSE, sleep mode means that charge enable is in state B0 or B0_Aux, and the low-layer communication module may switch to low power mode.

For the EV, sleep mode means state B and the low-layer communication module may switch off. The wake-up mechanisms may also be used after the charge session was already terminated to allow the counterpart station to re-establish HLC.

Definitions of sleep indications are given in IEC 61851-23-3.

7.6.2 Entering sleep mode

[V2G10-040]	After receiving a D-LINK_PAUSE.request, the EV shall change to state B and may switch the low-layer communication module to low-power mode or power-off mode.
[V2G10-041]	After receiving a D-LINK_PAUSE.request, the EVSE shall switch to state B0 and may switch the low-layer communication module to low-power mode.

7.6.3 Wake-up

7.6.3.1 General

[V2G10-042]	As soon as the lower layers detect a data link after a wake-up and detection of state B or B_AUX, the lower layer shall send a D-LINK_READY.indication (link established) to a higher layer entity.
[V2G10-043]	In case of a wake up trigger (as defined in IEC 61851-23-3) from the counterpart, the communication setup shall be finished in maximum T_conn_resume after the trigger.

7.6.3.2 EVSE side

[V2G10-044]	To wake-up the EV, the EVSE shall change the charge enable state from state B0 to state B or B_AUX.
[V2G10-045]	The EVSE shall be ready to set up HLC before transitioning to state B or B_AUX.
[V2G10-046]	The EVSE shall always respond to a wake up from the EV in case the EV would like to start or resume a charge session. NOTE See IEC 61851-23-3.
[V2G10-047]	As soon as the EVSE is ready to communicate after a wake-up from EV, it shall switch the charge enable function to state B or B_AUX.

7.6.3.3 EV side

NOTE If the EV resumed from sleep state and the charge enable state remains in state B0 or B0_AUX, the EV can perform a wakeup. See IEC 61851-23-3.

[V2G10-048]	If the EV is asleep or in charge pause, it shall wake up by detecting a charge enable function state transition from B0 to B or B_AUX.

7.7 During a charge pause

[V2G10-049]	While the EV or the EVSE is asleep, the EVSE shall keep the charge enable state B0.
[V2G10-050]	The lower layer communication module of the EVSE shall be in sleep or power conservation state only in states A and B0 or B0_AUX.

NOTE The EVSE can enter the charge enable state B0_AUX while the EV and EVSE are asleep to further ensure auxiliary power supply.

8 Timing and constants

This clause summarizes all timings used in this document.

[V2G10-051]	All low-layer communication devices shall conform with Table 8.

Table 8 — Timing and constant values

Parameter	Description	Min.	Max.	Unit
C_conn_retry	Number of communication setup retries by wakeup trigger by basic signalling	1	3	nbr
T_conn_resume	Time after the wake-up trigger until the communication setup is finished	0	4	s
TP_sync_leave	Maximum time for communication link teardown	0	400	ms
TT_EV_link_detect_timer	Maximum time for detection of valid communication link	0	4	s
TT_sync_repetition	Maximum time for communication setup	0	4	s
TO_Timer	PLCA transmit opportunity timer (TO_Timer) for all nodes on the network	32	32	Bit times

[V2G10-052]	A successful communication setup shall reset all the timeout timers and reset the retry_counters.

9 EV-EVSE communication initialization

9.1 Overview

Upon plug-in, the single-pair ethernet modules will need to set up communication (e.g. set up IPV6).

When state B or B_AUX is detected, D-Link_READY.Indication(link established) is communicated to higher layers.

If communication is not established, D-Link_READY.Indication(no link) is communicated to higher layers.

Communication shall be established in accordance with IEEE 802.3.

[V2G10-053]	The HLC communication setup shall take place after state B or B_AUX is detected.

9.2 Errors

[V2G10-054]	Upon expiration of TT_EV_link_detect timer, if no Link_Detected indication has arrived (link was not established), the EV and EVSE shall consider the communication initialization as FAILED.
[V2G10-055]	A timer TT_sync_repetition shall be started with the trigger of the communication initialization.
[V2G10-056]	If the communication initialization is considered as FAILED, the communication initialization shall be restarted as long as the timer TT_sync_repetition is not expired and EVSE and EV are in state B or B_AUX.
[V2G10-057]	If the communication initialization is considered as FAILED, the EV and EVSE shall wait for a time of TT_ sync_repetition before restarting the process.
[V2G10-058]	If the communication initialization fails for all retries started within TT_sync_repetition, the communication initialization shall be stopped.
[V2G10-059]	If a plug out is detected during the communication initialization, the communication initialization shall be stopped.

10 EMC requirements

See IEC 61851-23-3 for all EMC requirements.

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[1] ISO/IEC 8802-2:1998, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 2: Logical link control*

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2) Under preparation. Stage at the time of publication: IEC/CDTS TS 63379:2025.