IEC 63110-1

Edition 1.0 2022-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Protocol for management of electric vehicles charging and discharging infrastructures – Part 1: Basic definitions, use cases and architectures

Protocole de gestion des infrastructures de charge et de décharge des véhicules électriques – Partie 1: Définitions de base, cas d'utilisation et architectures

IEC 63110-1:2022-07(en-fr)

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Protocole de gestion des infrastructures de charge et de décharge des véhicules électriques – Partie 1: Définitions de base, cas d'utilisation et architectures

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PROTOCOL FOR MANAGEMENT OF ELECTRIC VEHICLES CHARGING AND DISCHARGING INFRASTRUCTURES –

Part 1: Basic definitions, use cases and architectures

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The text of this International Standard is based on the following documents:

Draft	Report on voting
69/837/FDIS	69/843/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 63110 series, published under the general title *Protocol for management of electric vehicles charging and discharging infrastructures*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
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INTRODUCTION

In recent years, the necessity of reducing greenhouse gas emissions has led the automotive industry to develop vehicles propelled by electric energy. Among them, the success of vehicles with electric rechargeable batteries has marked the beginning of the deployment of electric charging infrastructures.

During the first years, solutions for management of charging infrastructures were based on industry alliance specifications or proprietary protocols. They greatly contributed to education and involvement of early EV adopters. However, with the coming mass development of e-mobility required by the latest energy policies in most countries, it is necessary to standardize the communication protocol between charging infrastructures and charging stations operators in order to establish an international, safe, secure, interoperable and grid friendly e-mobility eco-system.

This standardized protocol is beneficial to all actors belonging to the e-mobility environment such as EV manufacturers, charging station manufacturers and operators, e-mobility service providers, grid network operators, distribution system operators (DSO) and transmission system operators (TSO), flexibility operators (FO), balance responsible parties and of course the EV users.

Special attention is paid to the security and traceability of the transactions with respect to identification and payment, but also to privacy regulations in force in many countries in order to avoid malicious or criminal use of the charging station.

The general requirements and definitions of this document form the basic framework for all use case descriptions and related documents in IEC 63110 (all parts). This document is the result of a large consensus among all the actors of e-mobility and should be considered as a guideline for implementers of IEC 63110 (all parts).

Technical specifications and requirements of the IEC 63110 protocol will be defined in a future part of IEC 63110.

PROTOCOL FOR MANAGEMENT OF ELECTRIC VEHICLES CHARGING AND DISCHARGING INFRASTRUCTURES –

Part 1: Basic definitions, use cases and architectures

1 Scope

This part of IEC 63110, as a basis for the other parts of IEC 63110, covers the definitions, use cases and architecture for the management of electric vehicle charging and discharging infrastructures.

It addresses the general requirements for the establishment of an e-mobility eco-system, therefore covering the communication flows between different e-mobility actors as well as data flows with the electric power system.

This document covers the following features:

– management of energy transfer (e.g., charging session), reporting, including information exchanges related to the required energy, grid usage, contractual data, and metering data;

– asset management of EVSE, including controlling, monitoring, maintaining, provisioning, firmware update and configuration (profiles) of EVSE;

– authentication/authorization/payment of charging and discharging sessions, including roaming, pricing, and metering information;

– the provision of other e-mobility services;

– cybersecurity.

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 (all parts), *Road vehicles – Vehicle to grid communication interface*

INTERNET ENGINEERING TASK FORCE (IETF). RFC 6960: *X.509 Internet Public Key Infrastructure Online Certificate Status Protocol – OCSP* [online]. S. Santesson et al. June 2013 [viewed 2022-01-26]. Available at: https://www.ietf.org/rfc/rfc6960.txt

3 Terms, definitions, and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

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

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

3.1 Terms and definitions

3.1.1
actor
entity that communicates and interacts

Note 1 to entry: These actors can include people, software applications, systems, databases and even the power system itself.

[SOURCE: IEC 62559-2:2015, 3.2]

3.1.2
balance responsible party
BRP
party that has a contract providing financial security and identifying balance responsibility with the imbalance settlement responsible of the market balance area entitling the party to operate in the market

3.1.3
business use case
description of how business roles interact to execute a business process

Note 1 to entry: These processes are derived from services, i.e., business transactions, which have previously been identified.

3.1.4
customer energy manager
CEM
internal automation function for optimizing the energy consumption and/or production within the premises according to the preferences of the customer using internal flexibilities and typically based on external information received through the Smart Grid Connection Point and possibly other data sources

Note 1 to entry: It provides the expected services while fulfilling contracted conditions with the Electricity Supplier, the DSO, the FO, or any other system operators.

3.1.5
charging service provider
CSP
role which does not operate EVSE but manages and authenticates EV user's credentials and provides charging and other value-added services for EV users

3.1.6
charging site
CSI
geographical area that encloses one or more CSs

Note 1 to entry: This is a physical concept.

3.1.7
charging site zone
CSZ
management concept representing a group of one or more charging stations at a particular charging site

Note 1 to entry: The energy management scope of a RM is defined by the CSMS in the context of a charging site zone.

Note 2 to entry: This is a logical concept.

3.1.8
charging station management system
CSMS
system responsible for managing charging infrastructures

Note 1 to entry: CSMS can have local CSMS and/or cloud CSMS instances to implement the system. See system description in 4.4.

Note 2 to entry: This is a logical concept.

3.1.9
charging station operator
CSO
party responsible for the provisioning and operation of a charging infrastructure (including charging sites), and managing electricity to provide requested energy transfer services

3.1.10
charging station
CS
physical equipment consisting of one or more CSCs and one or more EVSEs managing the energy transfer to and from EVs

3.1.11
charging station controller
CSC
sub-system of CS responsible for managing one or more EVSEs

Note 1 to entry: The protocol between the CSC and the EVSE is out of scope of IEC 63110 (all parts).

3.1.12
charging station manufacturer
CSM
party responsible for manufacturing charging station providing software updates, upgrades of the hardware and diagnostics support to the CSO

3.1.13
cloud CSMS
CSMS instance physically deployed at a distant place from the charging site

Note 1 to entry: The cloud CSMS does not have to guarantee the same level of reliability and communication latency that is expected from a local CSMS.

Note 2 to entry: This is a physical concept.

3.1.14 Constraints

3.1.14.1
power constraints
range for upper and lower limits for extreme power values within a period of time

3.1.14.2
energy constraints
range for upper and lower limits for average power within a period of time

3.1.15
distribution system operator
DSO
entity responsible for the planning, operation, maintenance, and the development in given areas of the electricity distribution network

Note 1 to entry: The given areas of the electricity distribution network can be low voltage, medium voltage, and potentially high voltage.

Note 2 to entry: The DSO provides the quality of electricity supply (power delivery, voltage, etc.) and customer access to electricity provider market through its system under regulated conditions.

Note 3 to entry: This definition has been adapted from the one in IEC SRD 62913-2-4:2019, Table 3.

3.1.16
e-mobility clearing house
EMOCH
entity mediating between two clearing partners to provide validation services for roaming regarding contracts of different EMSPs

3.1.17
e-mobility needs
mobility needs expressed by the EV user in terms of departure time, minimum and maximum energy request and target energy request or minimum and maximum target state of charge

[SOURCE: ISO 15118-1:2019, 3.1.25, modified – The words "or minimum and maximum target state of charge" have been added to the definition.]

3.1.18
e-mobility service provider
EMSP
party responsible for providing high-value service related to the use of an EV

Note 1 to entry: Examples of service are renting an EV, reservation of parking service, navigation services, energy services which include charging station provider in relation with CSO.

Note 2 to entry: This definition has been adapted from the one in IEC SRD 62913-2-4:2019, Table 3.

3.1.19
electric vehicle communication controller
EVCC
embedded system, within the vehicle, that implements the communication between the vehicle and the SECC in order to support specific functions

[SOURCE: ISO 15118-1:2019, 3.1.31, modified – Note 1 to entry has been removed.]

3.1.20
electric vehicle supply equipment
EVSE
equipment or a combination of equipment, providing dedicated functions to supply electric energy from a fixed electrical installation or supply network to an EV for the purpose of charging and discharging

[SOURCE: IEC 61851-1:2017, 3.1.1, modified – The words "and discharging" have been added to the definition, and the examples have been removed.]

3.1.21
electric vehicle user
EVU
person or legal entity using the vehicle and providing information about its needs

Note 1 to entry: This definition has been adapted from the one in IEC SRD 62913-2-4:2019, Table 3.

3.1.22
electricity provider
EP
entity whose activity is the wholesale purchase of electricity and the subsequent direct resale to client through a contract

Note 1 to entry: The electricity provider may also deliver energy related-services.

Note 2 to entry: The electricity provider can generate flexibilities through modulation of electricity prices (time-of-use, critical peak prices, etc.) which can have value on energy markets and/or for network operations.

3.1.23
e-mobility authentication identifier
EMAID
identifier used for identification of the contract holder

3.1.24
energy transfer plan
ETP
forecast of future energy transfer activities with associated uncertainties, flexibility options and limits over time

Note 1 to entry: The energy transfer plan is able to support all different charging techniques (ISO 15118 schedule and dynamic modes, CHAdeMO, etc.).

3.1.25
flexibility
elasticity of resource use (demand, storage, generation), modification of consumption and/or generation of energy/power, on an individual or aggregated level, in reaction to an external signal (price signal or request) in order to provide a service within the energy system

Note 1 to entry: This definition is based on EURELECTRIC, Active Distribution System Management [see Bibliography].

3.1.26
flexibility operator
FO
party that is responsible for at least one of services like aggregating load flexibility from different users of low voltage and/or medium voltage grids, and trading it with other parties like the TSO and/or the DSO in order to provide ancillary services (adjustment mechanism), or any other (future) flexibility markets, e.g., optimization of balancing grid billing

Note 1 to entry: It may address EV charging through CSOs and may trade its service to other parties.

3.1.27
functional block
FB
logical representation of a component which contains information about the inputs, outputs, processes, requirements, functions, and functional sequences of a given functionality

3.1.28
hard power limit
HPL
maximum permissible power of a charging station due to physical design