



ElaadNL



Interoperability and protocols



Elaadnl

- Knowledge and innovation centre in the field of Smart Charging infrastructure in the Netherlands.
- Founded in 2009 by the Dutch grid operators.
- About 50 FTEs.
- EU largest testing site for Smart Charging.
- Promoting open innovation & open protocols.



ElaadNL

ElaadNL is the knowledge and innovation centre in the field of Smart Charging infrastructure in the Netherlands and is an initiative of the Dutch grid operators.

2009

In 2009
e-laad.nl
foundation
established

Milestone:
3.000 charging
points installed
in 2013

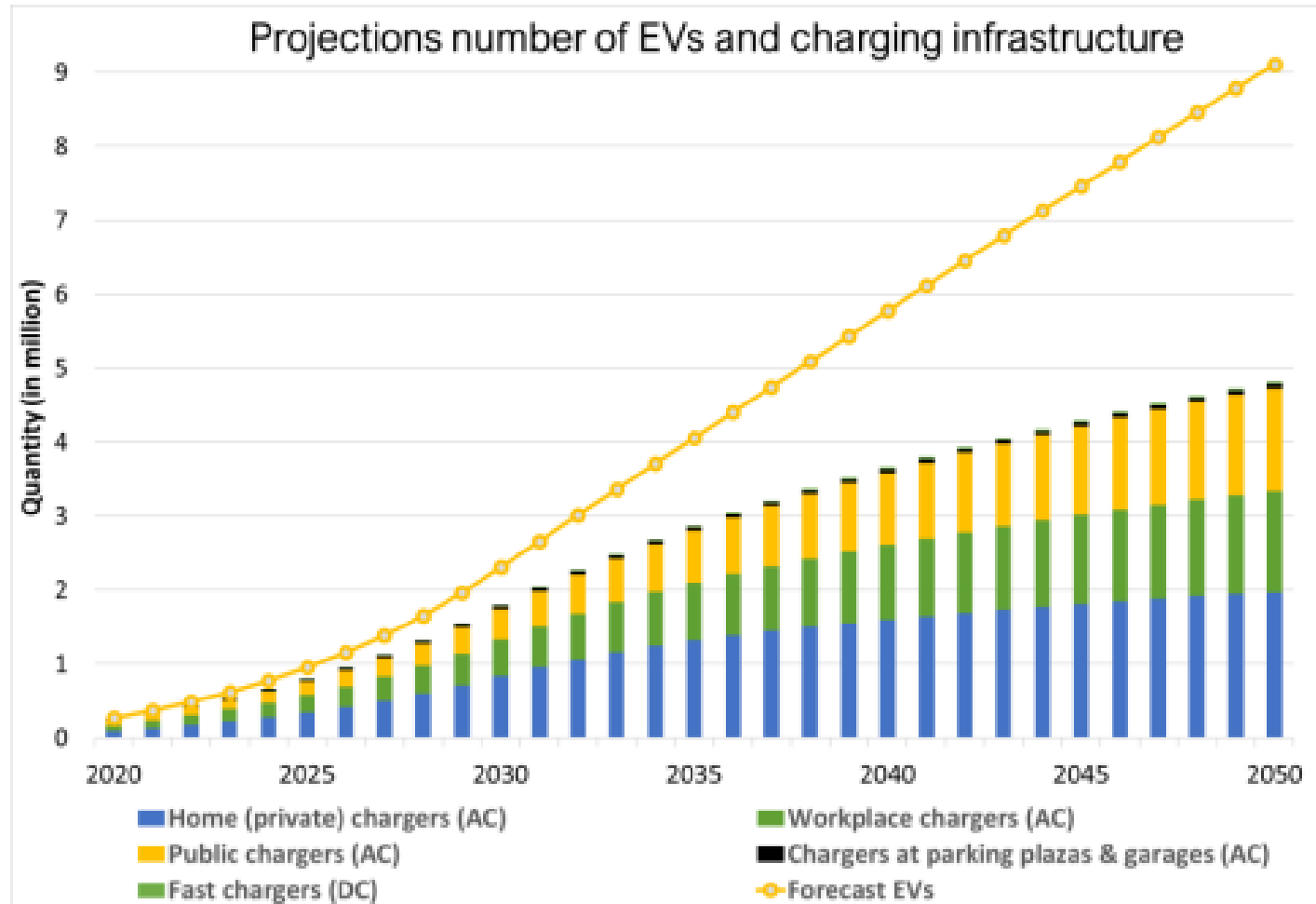
In 2014
e-laad.nl splitted
into EVnetNL
(CPO) & ElaadNL
(Knowledge &
innovation
centre on Smart
Charging)

In 2022 ElaadNL
opens new testlab
in Arnhem

2023

In 2018 ElaadNL
receives
commitment to
continued its
activities on
Smart Charging
till 2023

Projections



Interoperability goals



- Interoperability enables communication between different assets (from different manufacturers).
- Interoperability enables access to charging infrastructure and additional services.
- Interoperability is a precondition for the further development of the EV domain and ensures the connection with the electricity system.
- Interoperability is implemented in the Netherlands by open protocols (standards).
- Interoperability is equally important for the governments and companies making investments in charging infrastructure and services.

An open protocol is a standard that is publicly available and to which various usage rights are attached.

The World Trade Organization Commission on Technical Barriers to Trade (WTO TBT) formulated the following six conditions for international standardization processes:

1. Transparency; regarding documentation on proposal for standards and final standards,
2. Openness; open membership at every stage of the standardization process,
3. Impartiality and consensus; no privilege or representation of any particular party,
4. Effectiveness and relevance; facilitate international trade,
5. Coherence; no duplication of, or overlap with, any other labor of other standardization bodies,
6. Development dimension; no one should be de facto excluded from the trial.

General considerations regarding standards



What we add to that:

'Open' also including license and royalty free.

The OCPP and OCPI protocols are openly available free of charge, without any other terms, and their use is subject to no terms (license fees or otherwise). This contrasts with ISO and IEC standards, for which the standard itself must be paid for and which has been developed under F/RAND conditions.

The aim of open standards is to increase interoperability (including interchangeability) between different information systems or data collections and to record information in a future-proof format.

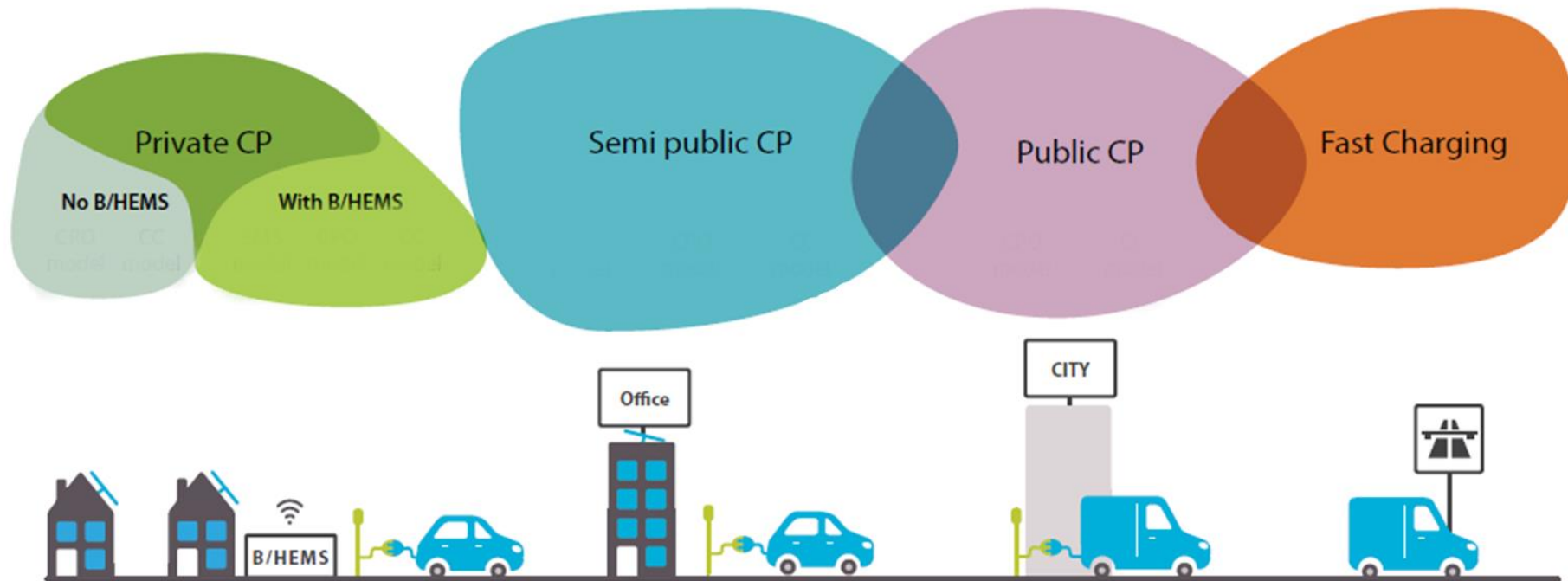
A further effect of open standards is more freedom of choice and therefore less chance of a “vendor lock-in” (dependencies on the suppliers).

It is not the manufacturer that determines whether a protocol is also a standard. The authorities that can do this are the generally recognized standardization institutes and the market:

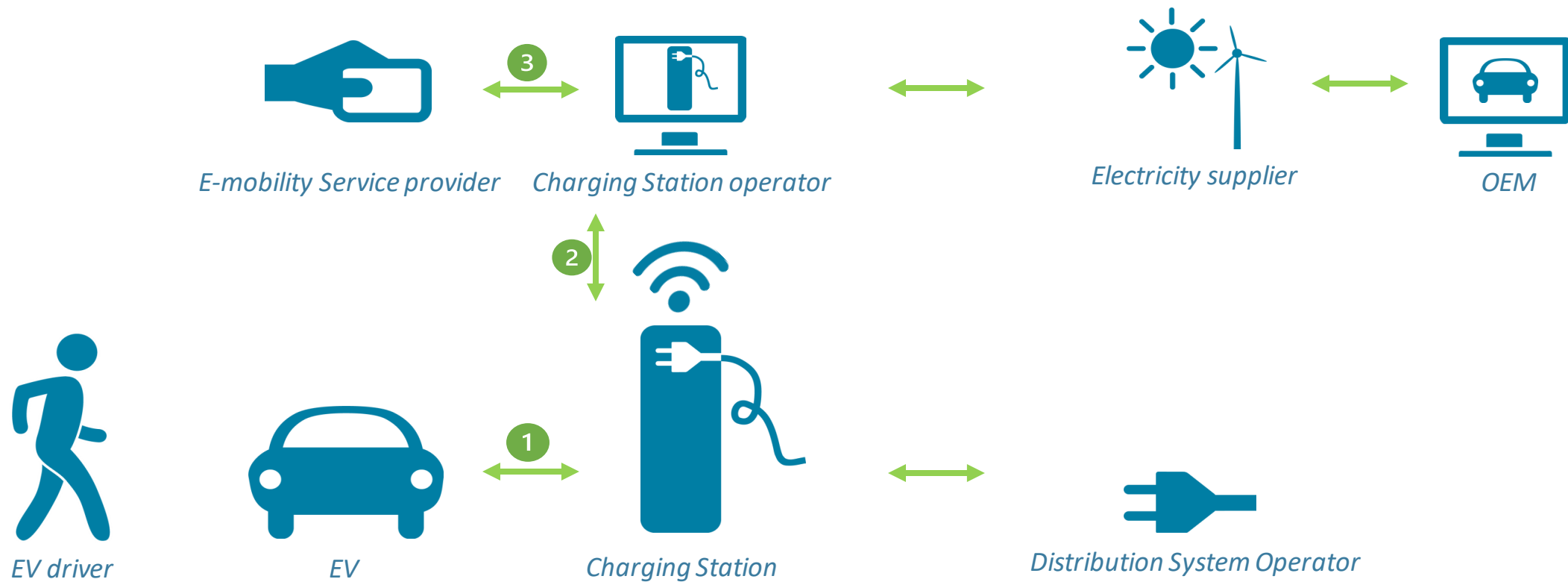
- “de jure” standards (“by law”),
- “de facto” standards (“more or less” standard due to mass use). Most “de facto” standards are later fixed as “de jure”.

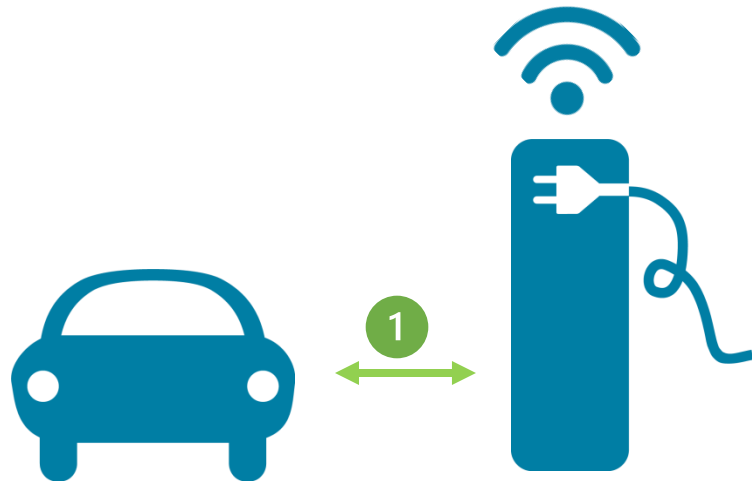
The EV market in the Netherlands has a mature, interoperable system. The market and infrastructure for EV charging points is open, transparent, interoperable and future-proof. To scale this up still some actions are needed.

Interoperability goals



Overview of communication standards

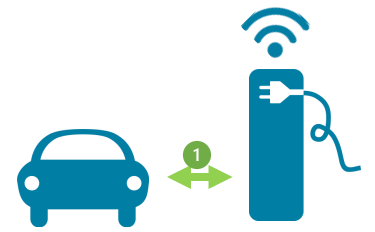




Why an International standard between EV s and Charging Stations?

- To allow all EV s to use all available charging stations
 - To prevent EV s from having to equip the vehicle with multiple charging ports
 - To prevent Charging Stations having to include different types of charging connectors
 - To avoid customers having to use adapters
- ✓ To decrease costs and improve customer friendliness

Overview of communication standards



IEC 61851 (ed.2 - 2010)

- Mode 1: basic AC charging to a maximum of 16A / 1x250V / 3x480V.
- Mode 2: basic AC charging to a maximum of 32A / 1x250V / 3x480V including some additional features, such as standardized socket-outlets, power and protective earth conductors together with a control pilot function and system of personnel protection against electric shock.
- Mode 3: AC charging with basic signaling (Pilot control function) with the ability to activate / deactivate the power flow and set charging rate limits.
- Mode 4: DC – charging, using an off-board charger and high-level communication (Powerline or CAN).

IEC/ISO 15118 (ed.1 - 2014; next version est. 2021)

- Both AC and DC charging
- More advanced form of communication: ‘High Level Communication’. Includes digital certificates for secure communication, plug&charge functionality, Time of departure, price tables etc.
- Future version (planned for 2021) includes a.o. Bi-directional power flow, wireless charging.

DIN70121

- DC only
- A German specification based on an early unpublished version of ISO 15118 from 2012

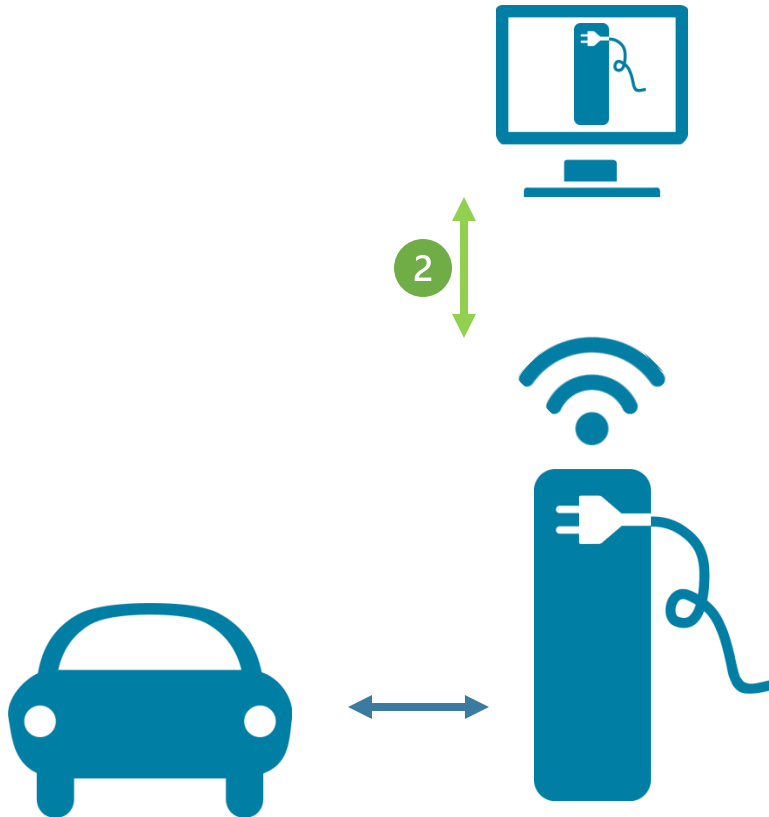
Chademo

- DC charging standard since 2010
- 1.1 (2015) includes V2H; 1.2 (2017) up to 200kW; 2.0 (2018) up to 400kW; 3.0 (est. 2021) >500kW



CCS

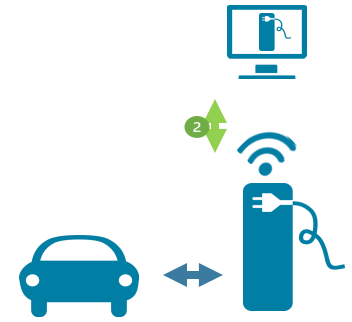




Why an International standard between Charging Stations and Charging Station Management Systems?

- Charging Network Operators can choose many different (International) Charging Station Vendors
 - This vendor competition is good for price, quality, innovation and scaling up
 - Charging Station Vendors can offer their stations to many different (International) Charging Network Operators, increasing their market share
- ✓ To enable competition, innovation, decrease costs and enable market growth

Overview of communication standards



OCPP

- Started in 2009
- Developed following the need of the growing industry and incorporating field experience
- OCPP1.6 (2015), OCPP2.0 (2018), OCPP2.0.1 (2020 – bugfix release)
- Open, patent and royalty free with no cost or licensing barriers
- Governed by the Open Charge Alliance (OCA), a nonprofit foundation
- OCA is only standardizing OCPP and is not a broader Standards Development Organization (SDO) such as ISO, IEC and IEEE.
- OCPP is the 'de facto' global standard, in some countries also the 'de jure' standard.

IEC has started developing a standard in 2017

- IEC 63110 (est. 2022)
- Asynchronous Transport Mechanism (XMPP)
- Harmonised with CIM

IEEE 2030.5 (SEP 2.0 - Smart Energy Profile 2.0)

- IEEE standard since 2013
- Also covers EV to Charging Station communication and Utility to Charging Station Operator communication

Overview of communication standards



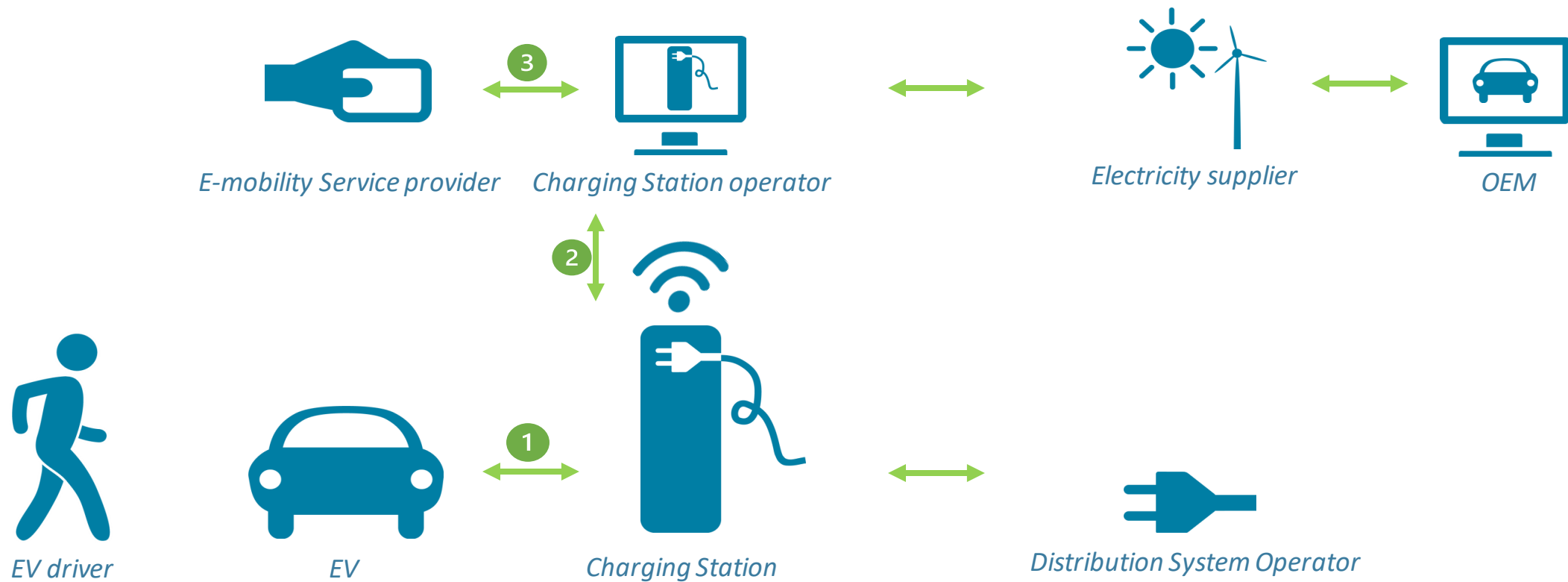
If you would like to learn more about these protocols:

- Download OCPP from www.openchargealliance.org for free
- For the IEEE, IEC and ISO standards:
 - purchase the IEEE standards at www.techstreet.com/ieee/
 - the IEC standards at <https://webstore.iec.ch/>
 - and the ISO standards at www.iso.org/store.html
 - rule of thumb is around 1 euro per page
- For Chademo: join the Chademo association for an annual fee www.chademo.com

If you would like to get involved in drafting new versions of these standards:

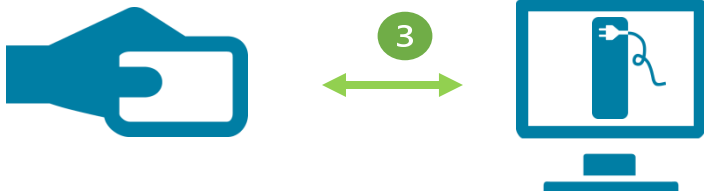
- For OCPP join the Open Charge Alliance www.openchargealliance.org
- For IEC and ISO standards:
 - Join your National Standardization Committee
 - Get your country to nominate you to join the IEC and ISO working groups
- For Chademo: join the Chademo association
- For IEEE, join IEEE
- For ISO 15118, Charin www.charinev.org is more and more acting like a standards organization so it is worth to join

Overview of communication standards

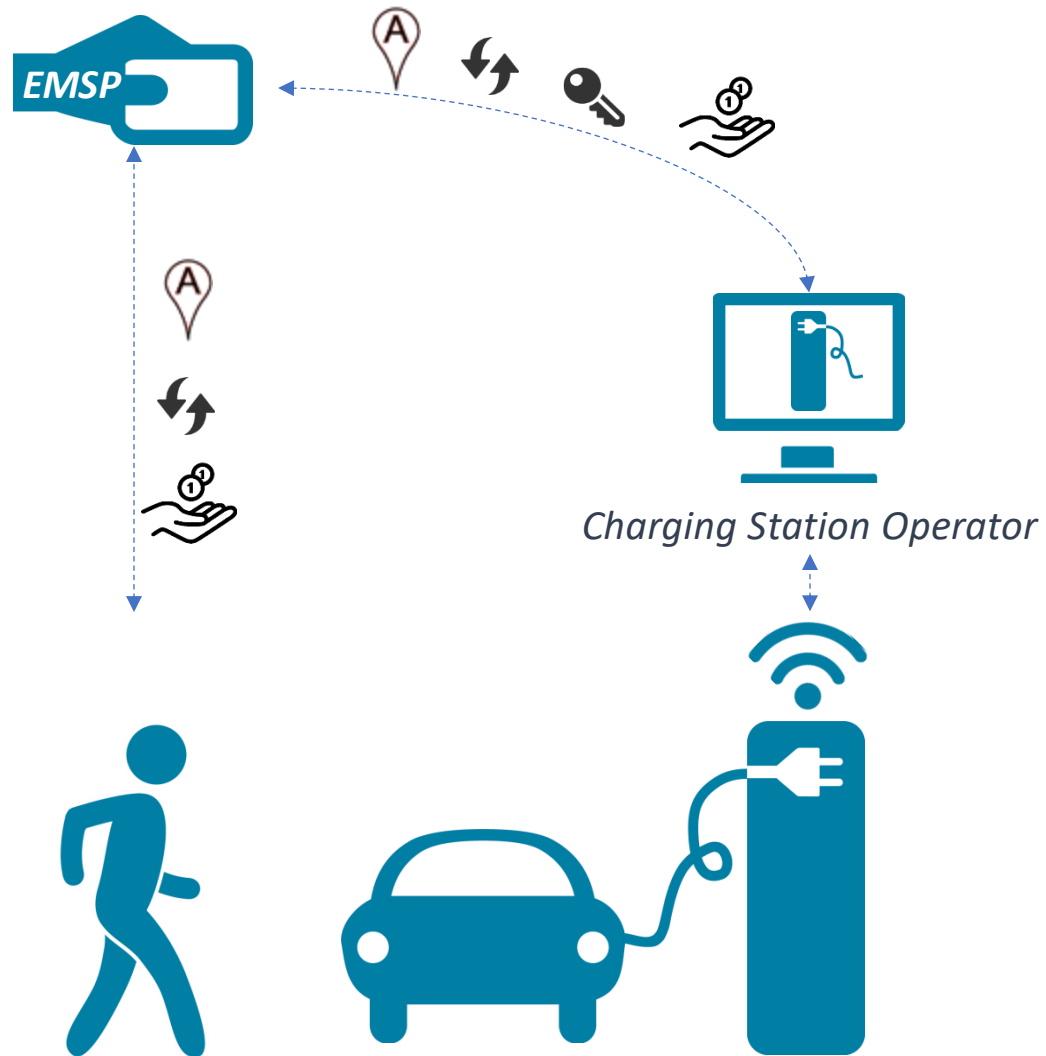
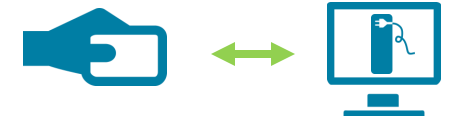


Why an International (roaming) standard between EMSPs and Charging Station Operators?

- To allow customers to charge at any charging station network using their own E-Mobility Service Provider
 - To avoid customers having to use multiple charging cards
 - To avoid customers not being allowed to charge at charging stations
 - For Charging Station Operators to attract as many customers as possible
 - For E-Mobility Operators to offer their customers access to the largest possible number of charging stations
- ✓ To improve customer friendliness, ease of use and business!

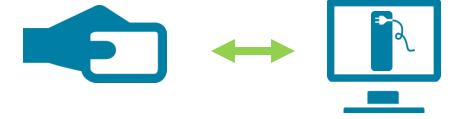


Overview of communication standards



- Charging location
- Live Status Data
- Authorization Data
- Billing information

Overview of communication standards



OCPI

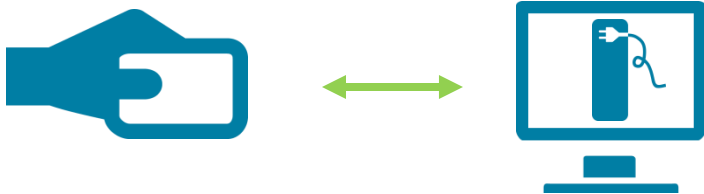
- Started in 2014
- Governed by the EVRoaming Foundation
<https://evroaming.org/>

IEC has started developing a standard in 2017

- IEC 63119 (est. 2021)

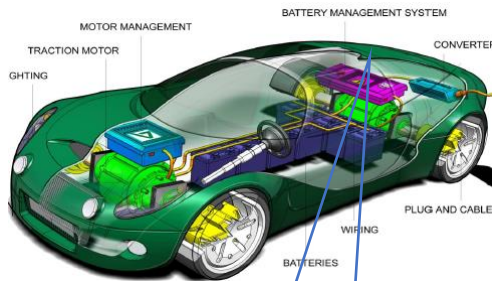
Roaming Platform specific standards

- OICP by Hubject (International)
- OCHP by E-Clearing.net (Europe)
- eMIP by Gireve (Europe)



Standards covering aspects of charging infrastructure

Vehicle side



Cables
IEC 62893-1
IEC 62893-2

Connectors / inlet
IEC 62196-1
IEC 62196-2
IEC 62196-3
Pr IEC 62196-3-1
(HPC)



On board
IEC 61851-21-1
(EMC)
ISO 17409

Socket and Socket outlets
IEC 62196-1
IEC 62196-2
IEC 62196-3
Pr IEC 62196-3-1
(HPC)

Communication EV- EVSE
ISO 15118
Chademo
DIN 70121/70122

EVSE
IEC 61851-1
IEC 61851-23 (DC)
IEC 61851-24(Com)
IEC 61851-21-2
(EMC)
IEC 62955 (RDC-DD)

Infrastructure side

Communication
OCPP 1.6 / 2.0.1
IEC 63110 (draft)



Central Management System

Grid

IEC 60364-7-717
IEC 61439-7

Overview of communication standards

Thank You!