



Standardisation and Interoperability in ASSURED

Standardisation & Interoperability Bus-Charger Online Workshop

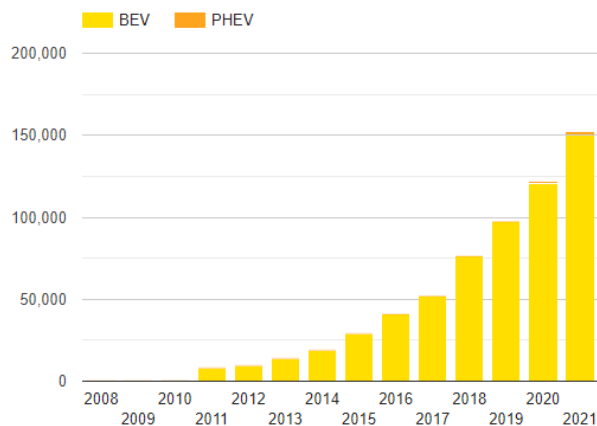
**Joan Carles Artigau Benítez
Santiago Obiols Pascual-Trenor
(IDIADA, Spain)**

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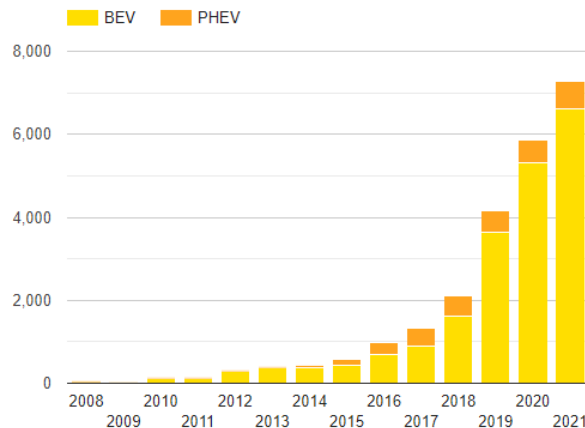


EV Charging Solutions Overview – Current Landscape

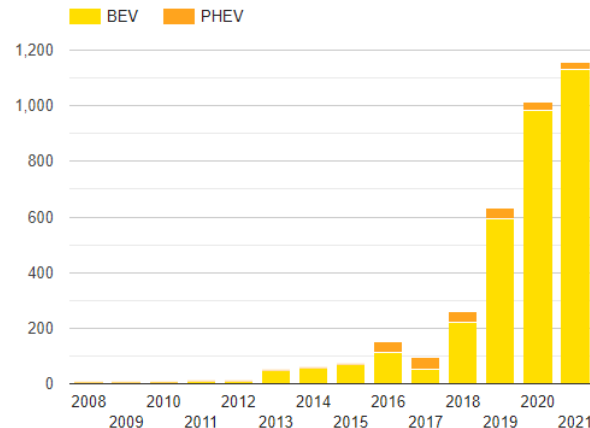
Heavy duty EVs (bus & transport) are re-shaping urban charging demands



Total EV Commercial Vehicles in Europe
(2021 YTD)



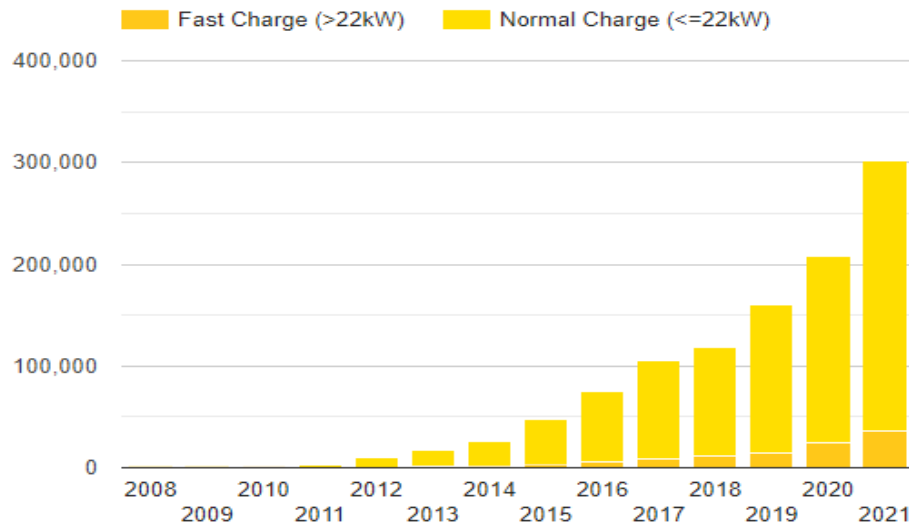
Total EV Urban Bus Fleet in Europe
(2021 YTD)



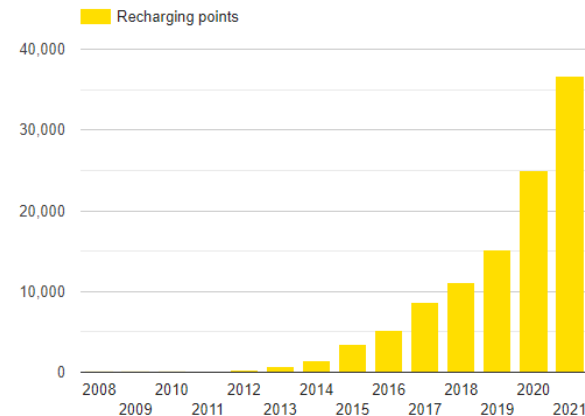
Total Heavy Duty Vehicles in Europe
(2021 YTD)

EV Charging Solutions Overview – Current Landscape

Normal and High-Power public recharging points are re-shaping urban charging demands



Total Normal and High-Power public Recharging Points Europe (2021 YTD)



Total High-Power public Recharging Points Europe (2021 YTD)

EV Charging Solutions Overview – Current Landscape

Voltage varies according to vehicle type

Charging methods, regulations and infrastructure are voltage-dependent

Light Electric Vehicle (LEV)



48V-126V



Passenger cars M1(BEV)



280V-450V

Heavy-Duty Vehicle (HDEV)






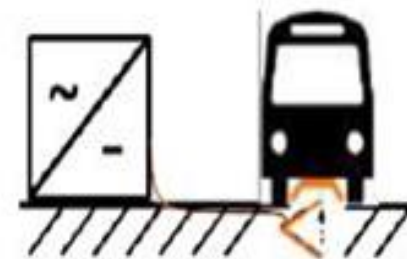
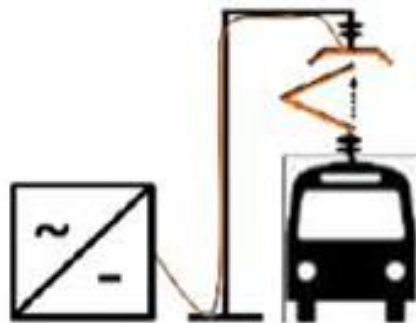
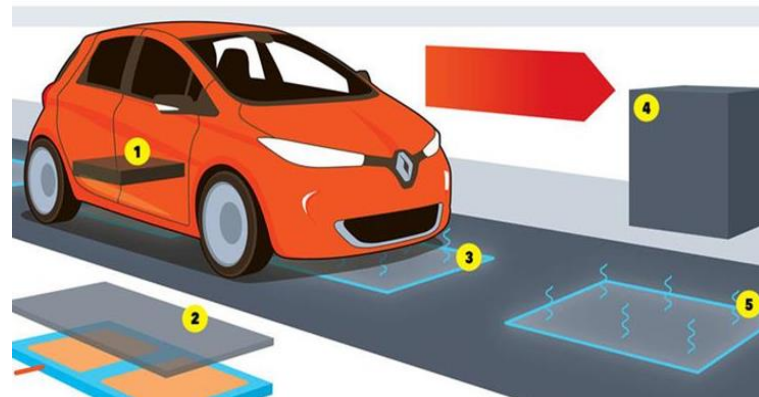
650-800V



New trends

EV Charging Solutions Overview – Charging Solutions

	N. America	Japan	EU and the rest of markets	China	All Markets except EU
AC	 J1772 (Type 1)	 J1772 (Type 1)	 Mennekes (Type 2)	 GB/T	
DC	 CCS1	 CHAdeMO	 CCS2	 GB/T	 Tesla



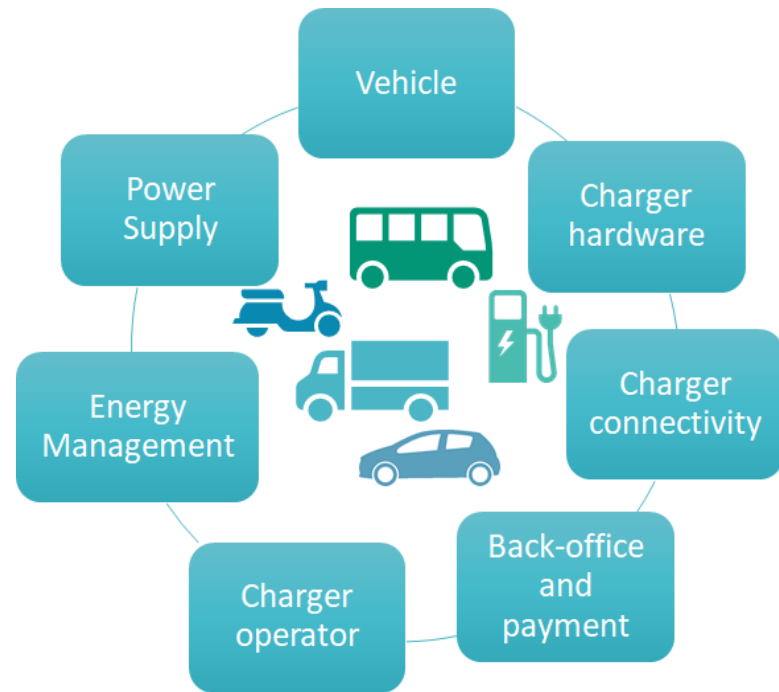


Charging Interoperability - Concept

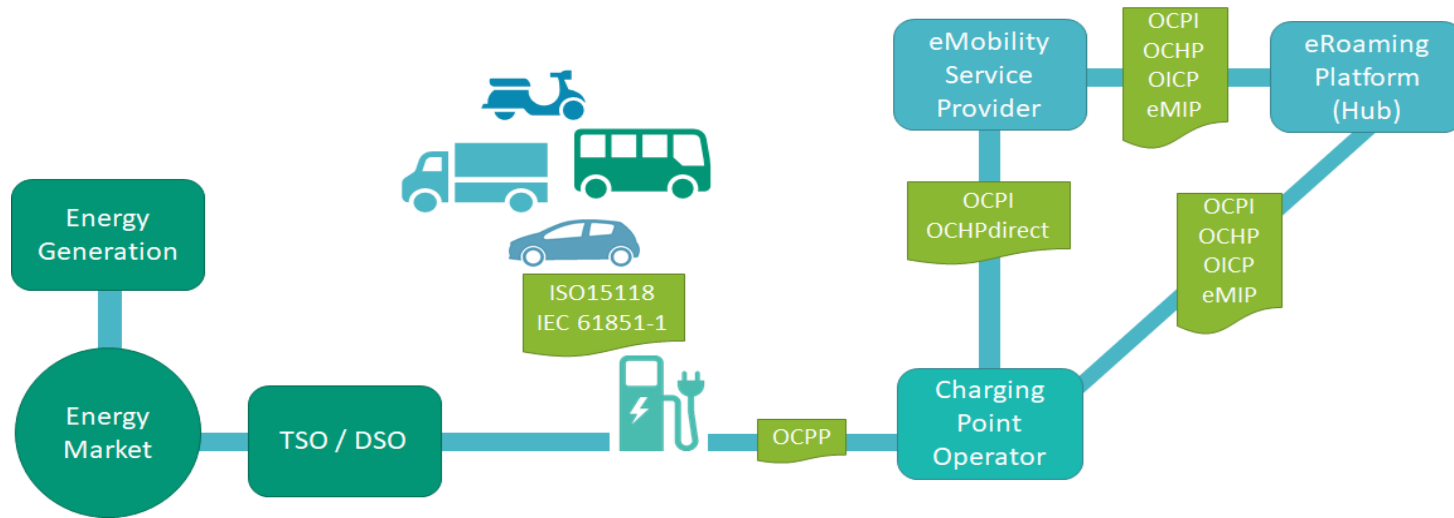
What is interoperability in the EV ecosystem?

*"Interoperability is the **ability** of vehicles, chargers, networks and management systems **to interact and manage data**, to ensure:"*

- Safety
- Compatibility of equipment and protocols
- Functionality
- System reliability
- System Availability



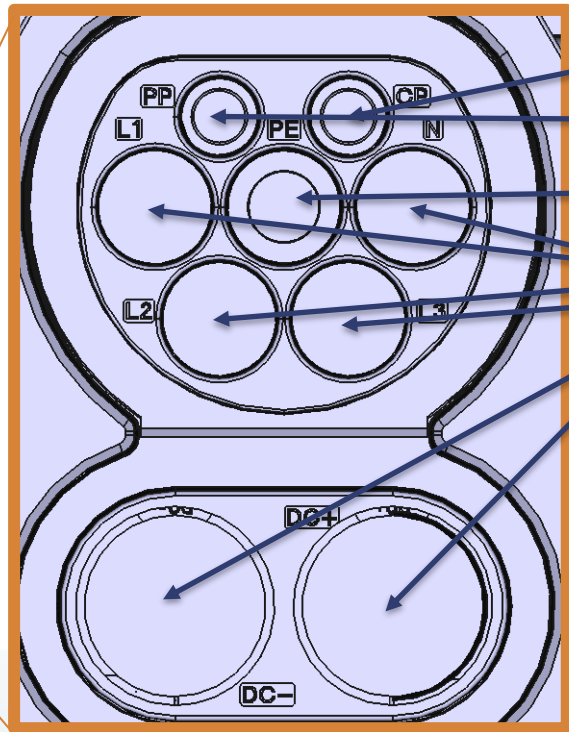
Charging Interoperability – Ecosystem



Important charging communication protocols EU/NA

- DIN 70121
- ISO 15118

Charging Interoperability - Communication



Control Pilot

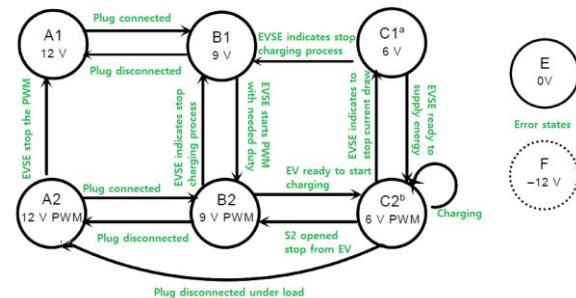
Proximity Pilot

Protective Earth

AC lines

DC lines

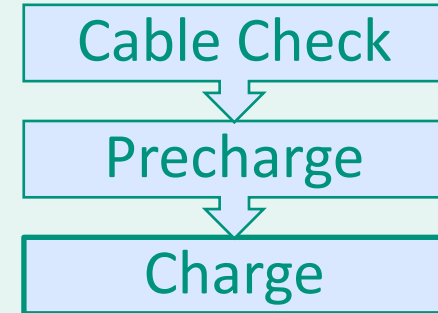
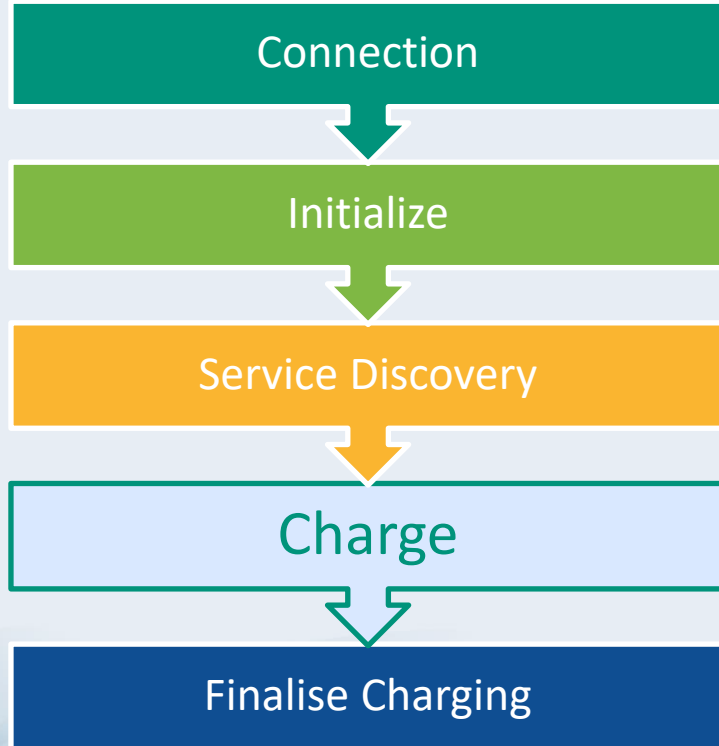
⊕ Low level communication



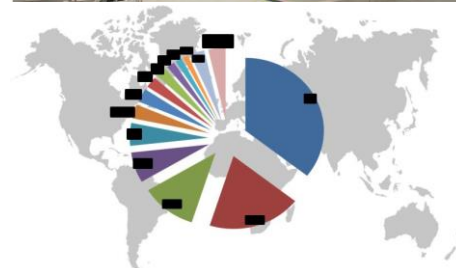
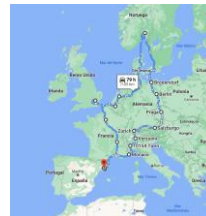
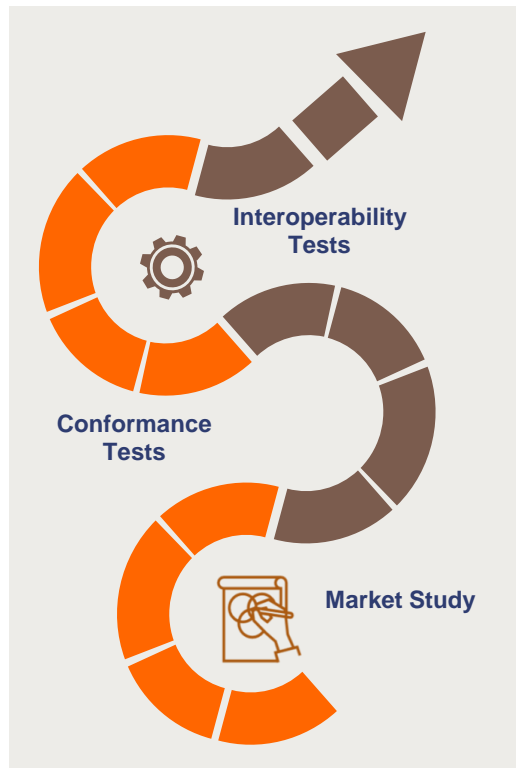
⊕ High level communication – EV charging roles



Charging sequence concept, analysis and error detection



Charging Interoperability - Validation





Electric Bus Charging Laboratory



Standardisation and Interoperability in ASSURED

ASSURED 1.1 Specification

3. Infrastructure-mounted ACD (Type A)

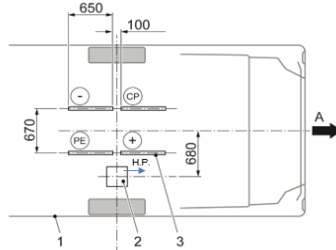


Figure 1. Dimensioning and positioning of the contacts and Wi-Fi antenna on the vehicle roof.
(1) Vehicle (2) Wi-Fi antenna (3) Connector pole

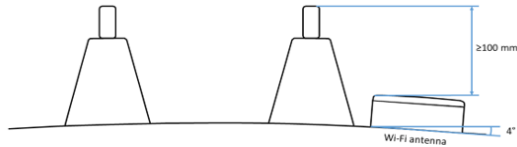


Figure 2. Recommended Wi-Fi antenna mounting

4. Roof-mounted ACD (Type B)

4.1 INTRODUCTION

The roof-mounted ACD solution is primarily based on the CCS Mode 4 charging, with minor updates to the related standards taking into account higher charging power and utilization of a roof-mounted pantograph as a charging connector. Therefore, the standards related to the roof-mounted ACD are the most mature. There are still a few gaps, for which definitions are presented in this document.

4.2 MECHANICAL INTERFACE

The mechanical interface is to be implemented according to EN 50696:2021, specifically annex B.

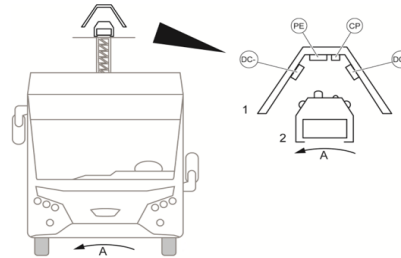


Figure 7. Contact pin positions with Type B ACD

- PLC Attenuation
- CP noise injection
- PreCharge Voltage offset
- Stop procedures
- Charge parameter Discovery misalignments
- Isolation resistance levels
- ...



Thank you

assured-project.eu

joancarles.artigau@idiada.com

santiago.obols@idiada.com

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