Guidelines for deploying Plug & Charge ready charging infrastructures

Release 1

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I. Document information

This document is a preliminary version of the specifications for the installation of charging infrastructures ready to operate the Plug & Charge service. The partners of the Mobena consortium are offering this preliminary version with the aim of collecting feedback from contractors and developers for the development of a public version that can be used by the entire ecosystem.

II. Foreword

The Mobena project aims to prepare for the deployment of the new generation of electric vehicle charging systems promising to simplify the user experience and improve the quality of service. To facilitate the adoption of the offer by customers, the services must be clear, homogeneous and interoperable. Thus, the Mobena project aims to support the players in the electric vehicle charging ecosystem to define the means and the roadmap capable of ensuring a coordinated deployment with the aim of ensuring interoperability. This harmonization should enable players to offer high value-added services through the massive adoption of the ISO 15118 standard.

The scope of Mobena Project covers the deployment of Plug & Charge and Smart Charging services. This involves the description of system architectures responding to the use cases of users and ecosystem actors, based on the ISO15118 and OCPP communication protocols. As the Plug & Charge service promises a seamless user charging experience, the entire process of charging station authentication, mobility contract identification and user billing should be automated. This automation is based on the latest IT security technologies necessary to protect systems against cyberattacks and requires the integration of suitable technologies.

The Mobena consortium is participating in the dissemination of this charging experience to the electric vehicle market to promote interoperability in terms of technology, governance and market rules, and regardless of geographical areas. In this sense, the publications of the Project are common goods. As such, they are intended to be reused and to serve as a reference for ecosystem actors.

III. Executive summary

This document corresponds to task T4.2 of the project and describes the consortium's recommendations for the deployment and implementation of electric vehicle charging infrastructure ready to operate the Plug & Charge services. These recommendations are mainly intended for EV charging infrastructure developers such as charging station operators, building owners, facility managers, fleet managers, public sectors. The main objective is to assist them in tendering processes and the construction of their technical requirements. It can also help manufacturers and operators anticipate needs. Thus, this guide describes the necessary conditions, including the material and functional prerequisites, for a successful Plug & Charge implementation. It covers all the charging infrastructure installation processes, from the consultation phase to commissioning.

This guide is an implementation and deployment reference for electric vehicle charging infrastructure tailored to the specifics of the Plug & Charge service. It complements the specifications for charging infrastructure installers wishing to provide this service.

On a technical level, charging infrastructures integrate both charging stations (CS) and, when existed, local charging station management system (LCSMS). For these components, the requirements are described with regard to their respective communication protocols:

- **ISO15118 – Communication between Electric Vehicle and Charging Station**
  - ISO15118-2
  - ISO15118-2 services operated with ISO15118-20 communication protocol

  Note : The reference to ISO 15118-20 in the subsequent sections of this document specifically addresses ISO15118-2 services operated with ISO15118-20 communication protocol.

- **OCPP – Communication between Charging Station and CSMS or LCSMS**
  - OCPP 2.0.1

Note: A LCSMS is not mandatory in the electrical topology of the charging infrastructure to provide the Plug & Charge service

IV. Restrictions

In agreement with the consortium partners, the following set of items are not covered in this version of the release. These items will be integrated in a later release :

- The requirements with respect to remote charging station management systems (CSMS)
- The specificities of the OCPP 1.6 and OCPP 2.1 communication protocols
- Conformance testing requirements
- Smart Charging requirements
- Post-quantum cybersecurity requirements

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VI. Introduction

Plug & Charge is a technology used in electric vehicles that allows a seamless authentication of the vehicle by a charging station. With Plug & Charge, the charging process is simplified, making it easier for EV users to charge their car. This technology eliminates the need for drivers to use an application or an RFID card to initiate the charging process. Instead, the vehicle and charging station communicate through a high-level communication and use a secure digital certificate to authorize the charging session.

This document provide essential information to guide EV charging infrastructure developers in choosing the "Plug and Charge" services that aligns with the specific needs (Business Use Cases). These services are closely related to the four main Business Use Cases (BUCs) listed below, which are described in the document "Mobena, Plug & Charge, Business Use Cases" and from which the majority of "Plug and Charge" business use cases derive :

- **Plug & Charge service in public charging environment**

  - ✓ **BUC 1.1: The EV user subscribes to the service to a mobility operator.**
    In this context, the EV user subscribes to an e-mobility contract for its vehicle (private or company vehicle), for its own use.

  - ✓ **BUC 1.2: The EV user benefits from the service of a mobility operator by registering his vehicle on his organization's e-mobility contract.**
    In this context, the EV user uses his organization's e-mobility contract for his private or professional vehicle.

- **Plug & Charge service in professional charging premises**

  - ✓ **BUC 2.1: The EV user benefits from the service by registering his vehicle with a facility manager.**
    In this context, the e-mobility contract is issued by the Facility Manager or the Charging Station Operator, and the EV user requests its installation to be authorized to charge in a given parking lot.
    Note: The EV user may have to switch the activated e-mobility contract from an existing one before benefiting from the Plug & Charge service.

  - ✓ **BUC 2.2: The EV user benefits from the service by registering an already existing e-mobility contract with a facility manager.**
    In this context, the user does not wish to install a new e-mobility contract in his vehicle and uses an existing one.

VII. Terms and abbreviations

BUC	Business Use Cases
CS	Charging Station
CSMS	Charging Station Management System
CSO	Charging Station Operator
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
LCSMS	Local Charging Station Management System
MO	Mobility Operator
OCA	Open Charge Alliance
OCPP	Open Charge Point Protocol
PnC	Plug & Charge
SC	Smart Charting

VIII. Definitions

Charging Infrastructure
Set of equipment constituting the charging system on its operating site, i.e. including the charging station and, when existed, the local charging station management system (LCSMS).

Charging Station Management System
Administration and supervision system to which the charging station is connected, can be local or remote.

IX. References

The guidelines complements the collection of documents provided by the members of the Mobena consortium. Among them, we find:

- ✓ Mobena, Plug & Charge, Business Use Cases
- ✓ Mobena, Plug & Charge, Hardware Requirements
- ✓ Mobena, Plug & Charge and Smart Charging, Cybersecurity and Data Protection, Analysis
- ✓ Mobena, Plug & Charge and Smart Charging, Cybersecurity and Data Protection, Analysis
- ✓ Mobena, Plug & Charge, Cybersecurity & Data Protection Requirements

Following documents apply:

- **Communication protocols**

ISO 15118-2	Road vehicles — Vehicle-to-Grid Communication Interface Part 2: Network and application protocol requirements
OCPP 2.0.1	Open Charge Point Protocol — Core Protocol Specification Open Charge Alliance, 2019

- **Ecosystem repositories**

Certificate policy	Certificate Policy for the CharIN V2G first-generation PKI (compliant to ISO 15118-2), Version 1.0 https://www.charin.global/media/pages/technology/knowledge-base/1d438c5cde-1669893263/certificate-policy-for-the-charin-v2g-first-generation-pki_v1.0.pdf
PKI Interop guide	Interoperability Guide – Public Key Infrastructure use cases, Version 1.0 https://www.charin.global/media/pages/technology/knowledge-base/f50187baf9-1683808407/charin_interoperability_guide-pki_use_cases_v1.0.pdf

X. Requirements

Requirements are described for all stages from consultation to implementation of the charging infrastructure. These steps are described according to the following process:

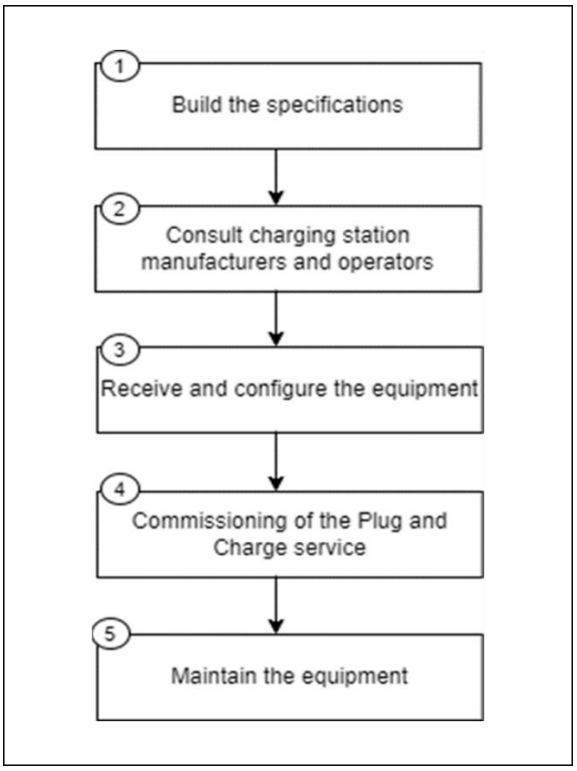

Figure 1 : Steps for deploying a charging station ready to operate Plug and Charge (PnC)

10.1. Build the specifications

The specifications must first define the desired business use case, referring to the "Mobena, Plug & Charge, Business Use Cases " document. Once this use case has been selected, it is essential to specify in the specifications that the components, i.e. the charging station and, when existed, the LCSMS or CSMS, shall meet the requirements of the selected business use case.

The specifications shall also describe the hardware needs, functional requirements, Cybersecurity and data protection requirement of the Plug & Charge service, with reference to the Mobena reference documents.

The Mobena reference documents are as follows:

- ✓ Mobena, Plug & Charge, Business Use Cases : This document describes the operational use cases "Business Use Cases", retained for the Plug & Charge service within the framework of the Mobena project, identified by the abbreviations BUC.
- ✓ Mobena, Plug & Charge, Hardware Requirements : This document is intended primarily for charging station manufacturers, and provides details of the minimum hardware requirements for Plug and Charge, covering both AC and DC charging.
- ✓ Mobena, Plug & Charge, Functional Requirements : **This document will be provided in a forthcoming release** and will provide a detailed description of the specific functional requirements for each component of the functional architecture.

- ✓ Mobena, Plug & Charge, Cybersecurity & Data Protection Requirements : This document define the minimum security requirements and recommendations applicable to the Plug & Charge ecosystem and to define the current and future best practices to be implemented to ensure optimal security of the system. Both charging infrastructure manufacturers and operators must comply with the cybersecurity and data protection guidelines.

To ensure that all specifications are up to date and that the latest versions of deliverables are taken into account, it is essential to refer to the Mobena project roadmap website. This will provide information on updates to reference documents.

Projects Engineering offices and design offices could get additional support from these detailed specifications by joining Mobena consortium.

10.2. Consult charging station manufacturers and operators

The sourcing of a charging infrastructure for plug and Charge must relate to the consultation of the equipment, typically provided by manufacturers of charging stations or energy management systems, and to the consultation of the operator intended to supervise the charging sessions. Each of the awarded service providers must meet the above requirements.

To ensure the best level of conformity of integration of the requirements and recommendations in the systems, it is recommended to consult the manufacturers and operators that:

- ✓ Complies with the requirements defined in Mobena reference documents (which include conformity with ISO 15118-2 communication between the vehicle and the charging station, OCPP 2.0.1 communication protocol between the charging station and the LCSMS and cybersecurity measures).
  Note: The compliance requirements for ISO15118-20 are not yet available.

It is not essential to know the operator (so called CSO below) of the charging infrastructure when sourcing the hardware components. Nevertheless, the prior assignment of the operator can allow pre-configuration of the equipment before delivery to the developer, favorable to a better level of security.

10.3. Receive and configure the equipment

Upon receipt, the equipment may not be configured with the network profiles allowing them to connect to the charging station operator's supervision system.

Mobena recommends that configuration operations be carried out by a qualified and certified CSO and/or installer in accordance with local requirements, and with the procedures set out in "Mobena, Plug & Charge, Business Use Cases" document, which include the installation of the certificates needed to secure CS-CSMS communication,

The process of configuring the charging station and, when existed, the LCSMS must be described in the response to the call for tender.

10.4. Commissioning of the Plug and Charge service

The Plug & Charge service do not have any requirement for the installation of the charging station and the LCSMS on their operating site.

When installed, both systems must be configured in order to enable ISO15118 plug and charge functionality for this customer site. The commissioning process must be carried out in accordance with

the guidelines set out in the commissioning section of the "Mobena, Plug & Charge, Business Use Cases" document.

10.5. Maintain the equipment

The response to the call for tender must include detailed specifications regarding the maintenance of digital certificates within the equipments. These specifications must adhere to the requirements defined in “Mobena, Plug & Charge, Cybersecurity & Data Protection Requirements” document.