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English version

User centric charging infrastructure for electric vehicles - Guidelines for operators to implement advanced smart charging and management strategies

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European foreword

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Introduction

This document presents results generated in the USER-CHI project, a research and innovation project funded under European Union's program Horizon 2020, aimed at unlocking the massive potential of electromobility in Europe, from a user-centric perspective.

Following an operator driven innovation approach and considering the driver preferences to charge an electric vehicle in a public/semi-public area, the project has developed a smart charging tool based on the OCPI 2.2.1 last version protocol. The new Charging Profile module included in the OCPI 2.2.1 brings a valuable functionality in the direction from the algorithm provider to the operator, however it is not sufficient to obtain the best profile for the best implementation of smart charging strategies. The document intends to give some recommendations at this regard.

The market's adoption of the latest protocol versions is recognized to be sluggish, resulting in a delay in unlocking the full potential of smart and bidirectional charging capabilities. This situation would be avoided if the market embraces new protocol versions earlier. Fruit of the group work composed of the technology providers and the electromobility operators from different countries, and the different uses cases tested in five European cities, this document proposes the smart charging architecture that the different electromobility actors should follow if wanting to offer smart charging services in their charging infrastructure through the last OCPI protocol versions.

In addition, also some keys and recommendations are given to i) implement the automated payments that will help to the operators to manage all the economic flows between the different actors and ii) implement the roaming hub mode that will result in eliminating a lot of red tape (peer-2-peer contracts) and in increasing their offer in other networks and therefore increasing the possibility to get more charges making the installation more cost-effective.

The guidelines for operators presented in this document aim to cover the following aspects, such as:

- Smart charging as a service.
- Methodology and guidelines for operators to implement smart charging through OCPI protocol.
- Open Architecture ensuring system interoperability, transparency and openness.
- Uses cases.
- Recommendations for protocols and systems.
- Software requirements and recommendations to implement smart charging through OCPI protocol.
- Other key point to take into consideration:
 - o Roaming via hub.
 - o Automated payments.
 - o Other functionalities.

Besides software solutions offered by the OCPI protocol allowing for V2G and load balancing, alternative hardware-based solutions are also in development or already available. Alternative solutions comprise, amongst others, autonomous connection devices (ACD), AVP-guided parking systems, and inductive and conductive charging solutions. With connection options to all available sides of the vehicle.

1 Scope

This document provides guidance in terms of smart charging, interoperability and payment and accounting processes among the different actors of the electromobility domain (Charging Point Operators-CPO, eMobility Service Providers-eMSP, micro-CPOs and Smart Charging Service Providers-SCSP), to set up a series of homogenous strategies and methodologies that facilitate the implementation of advanced functionalities in the electromobility operator systems.

The provided smart charging strategies will help the operators to optimize their energy-related costs, enabling a better utilization of renewable energy sources and allowing their participation as active actors in the smart grid management, both as participants of implicit strategies and explicit campaigns.

This document also includes the framework to be followed by the operators in the implementation of the smart charging as a service and for the implementation of automation of the economic compensations among all involved actors.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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 (automated) electric Vehicle Service Equipment (a)EVSE

automated (a) or manually operated Electric Vehicle Supply Equipment consisting of a single charger or combination of charger and automation connecting facility, allowing for conductive (AC & DC) or inductive charging

3.2 charging point operator CPO

subject holder of the exploitation rights of the charging point infrastructure

3.3 distribution system operator DSO

the entity responsible for distributing and managing energy from the generation sources to the final consumers.

The operating managers (and sometimes owners) of energy distribution networks, operating at low, medium and, in some member states, high voltage levels (LV, MV). Transmission grids transport large quantities of high (and extreme high) voltage (HV, EHV) electricity across vast distances, often from large power plants to the outskirts of large cities or industrial zones, where it is transformed into lower voltages distributed to all end-users through the distribution network. Over-head and underground cables leading to the homes or business are operated by DSOs.