The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement No. 608957.

PlanGridEV

Deliverable 3.1

Joint network architecture model

Short name of the project partner	TU Dortmund
Title of the publication	D3.1 - Joint Network Architecture Model
Main author	Stefan Böcker / TU Dortmund Jens Schmutzler / TU Dortmund Eduardo Zabala, Carlos Madina / Tecnalia Cristina Silvestri / ENEL Luis Silvestre / EDP Donal Herraghty, /ESB Mario Nunes / INESC Stephan Voit, Sven Jundel / RWE
Editors	Dr. Armin Gaul, Stefan Greve

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement No. 608957.

Abstract / summary

D3.1 Joint Network Architecture Model

Deliverable D3.1 contributes to the overall design process of the PlanGridEV systems, planning tool evaluation and communication architecture and provides a state of the art analysis of communication protocols and systems related to the PlanGridEV approach, in order to provide a comprehensive communication reference architecture, which is capable of meeting the projects requirements. The main objective is to select the most promising protocols and networks to exchange information among the different systems and stakeholders, considering the present state of agreement and the potential to fulfil needs such as speed, reliability or cost. The selected architectures and protocols will constitute the ICT section to be included in the different scenarios when planning the smart grid in short, medium and long term.

It is elaborated that a huge overhead of actors and its relations in terms of business point of view could be minimized by summarizing comparable Back-End-to-Back-End communication interfaces to regular ICT solutions. For this purpose, a subset of technical units is identified and mapped to each in PlanGridEV introduced actor/stakeholder. In addition, the information flow is depicted by means of message sequence charts and therefore describes the general communication behaviour related to DSO scenario requirements without considering the transmitted information in detail. We defined a reference architecture design considering relevant PlanGridEV requirements and providing several ICT networking topologies for Front-End, as well as for Back-End communication. Therefore, different network topologies are exemplified and motivated, wherein requirements of below listed charging locations are considered:

- Public charging
- Semi-public/private charging
- Private charging

The reference architecture design provides the basis for a state-of-the-art analysis for transmission technologies and application protocols on all relevant ICT interfaces. Feasible ICT transmission technologies, as well as application protocols, are discussed in detail. Especially for Back-End communication, cellular mobile radio systems are feasible and cost efficient solutions. Wireless Technologies, like GSM, UMTS, as well as LTE, offer cost-efficient solutions for new communication infrastructures. This is due to the large reduction in installation costs for cabling, as only base stations have to be connected to an underlying IP network. Since installation costs for wired standards are higher compared to wireless technologies, the integration of existing infrastructures in PlanGridEV approaches is widely preferred. In terms of ICT application protocols, PlanGridEV solutions should depend on standardized communication protocols, in order to ensure a reliable and interoperable interaction between all entities of the system. OCPP and IEC 61850 are discussed in detail, as suitable solution for Back-End protocols. In this context, PlanGridEV DSOs view is intensively incorporated, by analysing current implementations of interfaces and/or services for relevant ICT interfaces, as well as future visions.

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement No. 608957.

This is extended to a procedure for a necessary requirement definition for desired use cases and provides the opportunity to evaluate suitable assessment and technology recommendations for a pre-defined energy grid use case. This technology and protocol collection serves as a reference related to ICT for the overall PlanGridEV consortium and will especially be incorporated within the PlanGridEV planning tool. This report also stablishes the base for a next step in D3.3 towards the proposal for an e-Mobility Model and ICT approach.