Towards a Future Internet Public Private Partnership

SECOND USAGE AREA WORKSHOP

Position Paper

Union Fenosa Distribucion

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(1) What use case and scenario in your area would you consider the most appropriate and representative one for large-scale experimentation with the Future Internet platform to be built starting from 2013?

The use of the Internet in conjunction with Web-based technologies provides potentials for improving the performance of current electricity systems. Today's electricity management systems can profit to a large extent by services based on open and standardized Internet protocols that have revolutionized the ICT and provide us with new business opportunities. With wide area network coverage over various interoperable infrastructures and an increasing support for communication in power grid components (e.g. smart meters, home appliances, power generators), current state-of-the-art technologies provide us with the foundation for wide area provisioning of electricity related value added services. This offer benefits to both the electricity providers and customers: Providers benefit from the distributed and self organizing communication algorithms, thereby enabling intelligent load distribution and thus reducing peak loads and grid failure risks. Customers, on the other hand, benefit from up-to-date knowledge about the household's electricity consumption and value added services for home appliances, which ultimately help to reduce overall electricity consumption/costs and pollutant emission. Moreover entire electricity market can be revolutionized with open, timelier electricity trading and a new *"prosumer"* concept, also taking into account electricity providing means of customers like photo-voltaic facilities. By that and with the help of future Internet infrastructures, customers become active participants of the market as minute-users as well as minute-providers.

(2) What innovative Internet functionality and technologies would you consider important for your suggested use case and scenario (e.g. context awareness, sensor networks, advanced real time processing capabilities handling huge volume of data, ad hoc service composition and mash-up, managed broadband connectivity and services, embedded media support for interfaces easing the interpretation of processed contextual data, etc.) ?

Service Oriented Architectures (SOA) is an approach to automate business processes by shifting them to pure M2M communication. SOA is not a concrete technology but a recommendation for software design in a succession of object oriented and component based programming. Web Services are the most popular implementation of SOA principles and are currently penetrating not only the field of control systems for internal business processes but also the field of Business-to-Business (B2B) processes. Home appliance manufacturers could use Web Service interfaces to open their products for e-market interaction based on electricity-consumption. This also leads to one of the main advantages of Web Services, which is interoperability in terms of software and hardware heterogeneity. It is primarily achieved by adopting open and standard technologies like XML as a common denominator. Hence the description of service

interfaces or message interactions are interpretable by various endpoints and also human-readable.

(3) Which of the identified functionalities would you expect the Future Internet core technology platform to deliver to support your and other usage area scenarios?

The communication infrastructure for the future electricity system architecture can be divided in three fundamental layers:

- The Electricity Supply Layer being upgraded by IP-capable ICT-components, which are exclusively used for power applications (e.g. communication among Transmission System Operators and Distribution Systems Operators).
- The Outdoor Layer Infrastructure provides Internet access through various network technologies. Both the clients as well as the service providers are linked by this infrastructure in order to offer and utilize different services. One interesting perspective of using the available public infrastructure is the capability of controlling and managing the prosumers' home applications for electricity saving and decentralized electricity generation.
- The in-house layer enables indoor connection of electricity users and producers. Well-proven technologies from the Smart Home and Building Automation can be used in various wired and wireless networking solutions, e.g. KNX, ZigBee or WLAN. In addition, PLC is a valid option as well.

(4) What kind of experimentation environment would you consider necessary for broad large scale testing of the platform to be developed in your use area? What would be needed to experiment new services and applications cutting across use areas (services and application mash-up) and building a new services and application ecosystem around the prototype implementations of the platform?

The technologies described here can be applied to a wide range of application scenarios in the field of future electricity grid applications, such as the use of Web Services in the context of load management for e-cars, where utilization of a Web Service-based approach can be used on different interfaces. On the user interface, (between e-car/customer and the electriicty supplier's control center), the authentication of the customer and the configuration of the load process can be carried out by public networks using Web Services. On the dedicated interface, (between charging point and electricity supplier's control center), the initialization of the charging process, the monitoring of the charging process as well as billing can also be realized through Web Services.

With respect to future electricity grid, where an important part of electricity will be generated by renewable, but intermittent resources, the necessity appears of maintaining a decentralized electricity grid with the possibility of load management and control functions. For instance, a centralized controller can be able to send switching requests via Web Services to the prosumer's household appliances in order to guarantee continuous quality of the electricity grid. In combination with this control function, an optional load management can be implemented by offering different pricing models, which can be transmitted to the prosumer's infrastructure using Web Services. Based on

this tariff information, the prosumer's appliances can then be configured to use the cheapest available tariff for electricity consumption.

(5) How do you see the potential role of your organisation in the FI-PPP, in the context of Usage areas taking a prominent role in the Initiative, to ensure an appropriate application driven approach?

UFD is a electricity distribution company more than 100 years old and owned by Grupo Gas Natural since 2009. UFD mission is to develop, maintain and operate HV/MV/LV facilities in order to deliver electricity to its market, whilst ensuring quality, safety, efficiency and demonstrating concern for the environment.

UFD invested 361,3 million euros in 2008, with an increase of 16,2 % with regard to the previous year. 1.572 km of MV and LV lines, and 36 km of HV lines were put in service in 2008. UFD distribution network reached 113.882 km at the end of 2008,. Electricity delivered by UFD distribution network reached 38.488 million kWh, with an increase of 2,1 % with regard to the previous year, and across a market with a surface of approximately 81.000 km2. In 2008 the number of service applications filed in the regulated market grew a 1,7 % with regard to the previous year, reaching 3.615.015 customers scattered across Madrid, Castilla y Léon, Galicia, and Castilla-La Mancha.

Former utility UFD, increased resources devoted to R&D&I by 14% last year and in the course of year 2009, UFD was awarded with the following R&D National Projects: REDES 2025 (research the optimal integration of distributed energy resources into the distribution grid) and ENERGOS (New technologies for automated and intelligent management of Smart Grids), but UFD has been also participating on the following R&D International Projects: IMPROGRES (Improvement of the Social Optimal Outcome of Market Integration of DG/RES in European Electricity Markets), HiperDNO (High Performance Computing Technologies for Smart Distribution Network Operation) and OPERA (European research effort in PLC communications).

UFD based on its past experience will give a great contribute to the SEGE Project developing Smart MV infrastructures and software tools for active MV network operation and control, in order to allow Distributed Generation (DG) integration in medium voltage (MV) networks without compromising quality and security of supply.