Title	InovGrid Project – Distribution network evolution as a decisive answer to new electrical sector challenges

SUMMARY

This paper describes the technical architecture that is being developed for the implementation of a fully active distribution network. This project was launched as a response to the new challenges that EDP Distribution (EDPD) faces regarding the liberalization of the European and Iberian electricity markets and regarding the need to introduce more intelligence to manage and control distribution networks with large scale integration of micro-generation and responsive loads.

At the same time, EDPD, while promoting this project that will apply to more than 6 million customers, should bring benefits for all stakeholders and also contribute to changes in energy consumption behaviors in order to successfully address the energy efficiency European requirements, as stated in the European Service Directive and subsequent local countries initiatives.

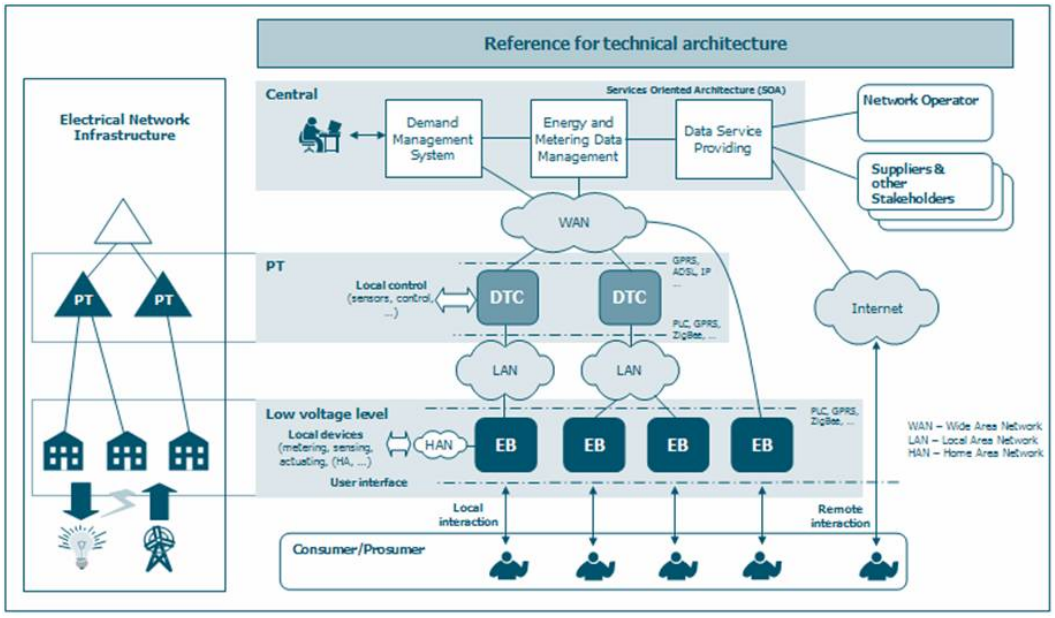
The InovGrid Project, besides being a large technical challenge, is an excellent opportunity to progress towards the smart grid paradigm, giving support to all new smart metering and commercial processes recently defined by Iberian energy regulators and allowing, at the same time, increases in operation flexibility and efficiency, grid reinforcement cost reduction, improvement of quality of service, and others, while keeping costs down.

In order to develop this project a consortium was created, headed by EDPD and incorporating companies from metering (Janz), communications, distribution equipments and IED (EFACEC), systems (Edinfor/LogicaCMG) and scientific research institutions (INESC Porto), with support from noLimits Consulting for project office activities and technological advising.

This paper describes the main goals, developed and planned work, and also the main expected deliverables for the InovGrid Project that includes a first pilot phase starting this year, to be followed by two other ones.

Presently, functional and technical specifications are already concluded and the development of the hardware for the components of the first versions is about to start.

The technical architecture of the solution is based on a multi-level hierarchical architecture, capable of dealing both separately and in an integrated way with commercial and technical information, where the components defined for phase 1 are the ones represented in the next picture:



Picture 1 – Reference for phase 1 InovGrid technical architecture

- Energy Boxes (EB), as the nearest devices to consumers and producers, will support all metering and contractual life-cycle related services, also delivering, through local communications, detailed information and support messages exchange, and, where applicable, support micro-generation management and control;
- Distribution Transformer Controllers (DTC) to be housed at MV/LV substation level, that besides managing services and communication with EB, will operate as intelligent devices for transformer station control and automation, for fault detection and also for public light management. They will be the main intelligent devices at this network level;
- Central management, energy data and SCADA systems will guarantee the dispatching orders and data collection activities – measurements, notifications and alarms from devices, network monitoring and potential fraud detection, etc. Subsequently, integration with existing and new MDM and EDM applications will provide services improvement for market activities, outage management and energy balance for network losses characterization, among others.
- Communications will be present in the form of WAN, TAN, LAN and HAN, integrating systems and DTC, DTC and IED local devices, DTC and EB, and new services for consumers and producers, respectively. The main project choices have, as primary references, open solutions, modularity and degree of standardization, even knowing that there is a path to go through until the final communications architecture that will support all expected services.

The following phases before the massive rollout starts, will introduce significant developments in the areas of active distribution networks, self-healing, micro-generation control strategies to deal with islanded operation and to help in power system restoration after exploitation problems and blackout situations, network assets monitoring, automation and control, and demand response and side management techniques. Phase 2 functional design and conception will take place right now.