

FUTURE INTERNET PPP

SMART HOME: A KEY ELEMENT OF THE SMART GRID?



Sustainability means changing our behavior towards the use of natural resources. ICT can lead the way to a more comprehensive and rational use of resources. It can help users visualize the use of energy, water and gas; guide the user on what to do in order to be more efficient, automate the needed actions in his smart ICT environments. Yet homes “per se” do not offer the functionalities needed. A future home in 2020 would embed an ICT infrastructure just as a new car does today: as soon as we receive the keys, all networking and optimization mechanisms are already in place, no additional installation costs incur. Homes will embed the networking and user interfaces by means of attractive displays. The basic parameters will be reported (temperature, energy consumption, activity, etc.), and will be configurable by the user while certain shared values can be programmed according to user needs or services contracted from utilities in a smart grid. The great challenge, however, remains with solutions that have to be adopted by existing buildings. There are several promising technologies to tackle this challenge: IOT networking, interoperability, autonomic service provisioning, home application running environment, etc.



W. M. Connelley from the Wikipedia Commons



ict for sustainable homes

October 24-25, 2011 - Nice, France

In conjunction with the CIB W078 - W102 Conference



ICT is key for the development of the Smart Grid - and the Smart Home has already gone a long way in the ICT integration process

FINSENY (<http://www.finseny.eu>) shares its views and perspectives on the Future Internet with other European Research Projects and Fora.

WORKSHOP AGENDA:

- 1 Smart Grid: State of the Art & Research Activities. Michaela Ballek, BAUM
- 2 A Gateway between Smart Home and Smart Grid. Edmund Barrett, RWE.
- 3 ENERsip: Communication Infrastructure for Large Scale Smart Home Metering. Rafael Murillo, Amplia Soluciones
- 4 The Smart Home from the Smart Grid Perspective - Status of Standardization and Mandate M/490. Johannes Stein, VDE|DKE.
- 5 ZEM2ALL (Zero Emissions to ALL). Hiromitsu Miyamoto, Mitsubishi Corporation
- 6 Electric Vehicles and Smart Homes: Intelligent Charging. Jonas Fluhr, RWTH Aachen
- 7 The Smart Home Grid as a Model for the Smart Grid at large. Gilles Privat, Orange
- 8 Cross-sectoral ICT Priorities Based on their Impact to Improve Energy Efficiency - the REViSITE Approach. Tarek Hassan, Loughborough University



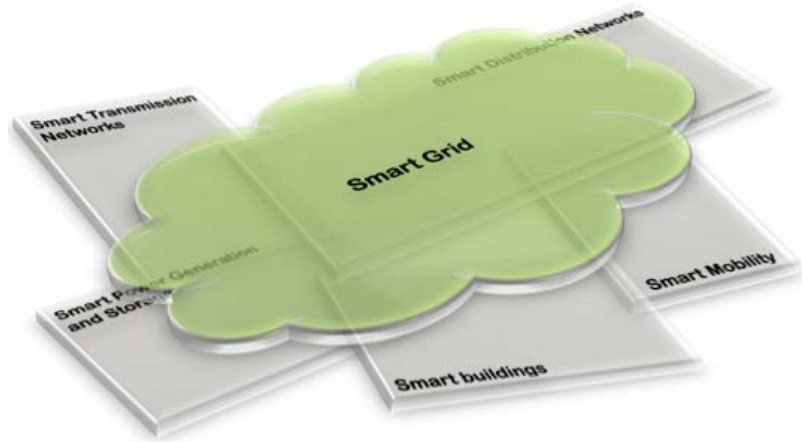
FINSENY is specifying use cases, ICT requirements and architectures in the smart energy domain in the following five areas: Distribution Networks, Microgrids, Smart Buildings, Electric Mobility and Electronic Marketplace for Energy. In this workshop, the smart buildings domain and electric mobility was emphasized.

The importance of electric mobility in this context can be explained very easily: electric vehicles in the private domain are yet another device that will have a significant influence on the energy consumption home balance (more than 70% for a typical home of 4-5 family members). Therefore, utilities will have to offer personalized services to avoid grid overload by applying services and means to the users to shift charging schedules automatically which will boost energy monitoring and management services in the home. Since EVs are being launched as commercial offers in the market already, we will see these changes soon.

FINSENY is working on the definition of use cases for buildings taking into account the relevant stakeholders and more importantly the use of the Future Internet platform (<http://www.fi-ware.eu>). The latter will allow critical services to be provided using core services running on the Internet. This approach is revolutionary because of the big challenges and restrictive requirements that have to be solved (security, latency, delays, etc.).

The contents of the FINSENY workshop in Nice is summarized on the following pages.

Smart Homes have the advantage that ICT technologies are more and more present at homes. Internet penetration in Europe is very high – with 58.3% of the population as per 2011. Thus the main link to ICT service provisioning is established, and ICT relevance will increase further.



FINSENY is actively participating in the M490 Mandate of the European Commission

(http://ec.europa.eu/energy/gas_electricity/smartgrids/taskforce_en.htm)

SMART GRID – HOME – EV RELATIONSHIPS

The workshop started with a summary of how FINSENY is handling the different scenarios of a smart energy landscape in the future. One of them deals with “smart buildings” directly (see figure above). It is important to highlight that today, ICT enabled homes are on their own small smart grids and have the capability to monitor and control the various sensors and actuators that a home owner may interconnect. There are already mature solutions providing Building Energy Management together with smart metering. They are clearly separated in terms of business models but have to interact to provide a consistent approach to the consumers. The most important aspect of the FINSENY project is the definition of ICT in relation to a smart energy landscape where Internet enabled services will play a key role.

Utilities such as RWE are already offering integrated solutions combining the support of energy efficiency services with a tested catalogue of appliances, sensors and actuators. Their solution is customized to the modern requirements of a smart home, such as time-programming appliances to enable load shifting, and demand side management capabilities. Trials are showing that an energy reduction of up to 40% can be obtained integrating RES (Renewable Energy Systems) capabilities in-home.

A possible communication and integration approach of the home grid that is now getting more and more popular is the M2M (Machine to Machine) approach. This solution is advocated by the ENERSip project. It integrates communication networks (mobile or fixed) smoothly with a new ecosystem composed of devices that will be connected to the Internet. In 2020, it is projected that 50 billion devices will be interconnected which poses scalability

issues that will be supported by a well-developed M2M infrastructure. Moreover, M2M deployment supports functionalities “borrowed” from telecom infrastructures, such as context management, security, business intelligence, maintenance and operation handling, which are being adapted to link easily with application front-ends, concentrators and users.

Johannes Stein (VDE) explained the relevance of standards and the most important activities worldwide related to smart grid activities: The standardization mandates 441, 468 and 490 of the European Commission; national level initiatives in Asia, Europe and the United States (NIST, SGIP, IEEE); global standardization organisations as IEC and ISO. The M490 mandate on smart grids tackles the need for standards at the crossroads of communication and computing networks with electrical architectures, involving three organizations: CEN, CENELEC and ETSI.

Smart Homes or EVs are treated from the perspective of the needed interfaces for the smart grid and the mutual services. FINSENY is now actively involved in three working groups. Particularly relevant is the use case collection process that is currently active in the sustainable processes group. This effort will lead to the specification of interoperability needs, technical requirements and terminology that will lead to a standard gap analysis. Smart grid and smart homes will merge, but business models and the new ecosystem vulnerabilities and inconsistencies must be clarified.

Two different presentations showed how important the introduction of Electric Vehicles to the market will be, significantly impacting Smart Home-Energy services towards the grid. The ZEM2ALL project is planning a four-year trial in Malaga Spain. The Japanese corporations Mitsubishi and Hitachi are joining forces with the Spanish





FINSENY is part of the Future Internet Public Private Partnership Programme (<http://www.fi-ppp.eu/>)

big players Telefonica, Endesa and Sadiel (for integration). They will demonstrate how an ICT infrastructure will help managing the EV charging infrastructure (charging stations/parking, private chargers, etc.) that will be installed in several spots of Malaga. It will support EV customers with value added services such as car navigation to the most appropriate charging stations, the best time to charge at home etc. Aspects such as Demand Side Management consider EVs as moving storage. 200 vehicles will be used from various Japanese and European vendors.

FINSENY is specifying scenarios that deal with the need for smart charging in order to keep an acceptable grid performance. Four dimensions are being considered: user, distribution grid, generation, and batteries. All of these will have different parameters that will have to be combined to propose decisions and solutions for the grid and EV users. Distinct scenarios consider how a

charging service has to be offered for a user traveling in different types of journeys.

Gilles Privat from Orange presented the future smart homes as a good example of how to handle the control of future smart grids. Smart Homes already went through the telecom network revolution and decentralization, integrating these developments into the new age of the Internet of services. "Bottom-up control and data management will percolate from the edges to the core" presented Gilles, implying that centralized smart grid solutions with top-down hierarchical control won't suffice. Plug and play devices including both energy and communication functionalities (such as PVs, white goods) are being developed following similar approaches than the ones applied for computing devices and terminals: new devices will be automatically detected and matched to a known ontological model defining its main characteristics and

services. To achieve this, a proxy is used that will hide the complexity to higher level entities.

Finally, the roadmapping activity of the EU project REVISITE was presented, highlighting the fact that smart energy services in the sectors of lighting, smart building, smart grid and smart manufacturing are closely linked with ICT requirements and will need uniform standardization approaches. The analysis is done in all sectors following the "SMARTT" approach: analyzing the specification, materialization, automation, resource and process management and trading processes. The latter is linked to a life cycle based on three phases: Design, materialization and usage. To complete the roadmap, the project has designed and is distributing a questionnaire to relevant players in all those sectors. They are building an open community of experts - details can be found at

<http://www.revisite.eu>. Active participation in the project is explicitly encouraged!

This was the first open workshop of the FINSENY project. Stay tuned at <http://www.finseny.eu> for following events and relevant results.

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