

InduStry-acadeMia pARtnership for the design and implementation

of an efficient, Reliable and secure smart eNERgy network

SMART-NRG aims at bringing together experts, from industry and academia, from cross-sectorial research areas and complementary background, with the long-term goal of designing and developing a more efficient smart metering system for the future Smart Grid (SG). Special attention is devoted to the development of innovative Smart Energy Networks (SENs), with integrated communications, energy management, and security capabilities.

Smart-NRG at a glance

Project Manager

Prof. Lazaros Merakos

Technical Manager

Dr. Nikos Passas

Project website

<http://gain.di.uoa.gr/smart-nrg>

Partners

- University of Athens (GR)
- WEST Aquila S.r.l. (IT)
- LINK Technologies S.A. (GR)

Duration

Jan. 2014 - Dec. 2017

Contract number

FP7-PEOPLE-2013-IAPP-612294

Contacts

Email: iapp.smartnrg@gmail.com

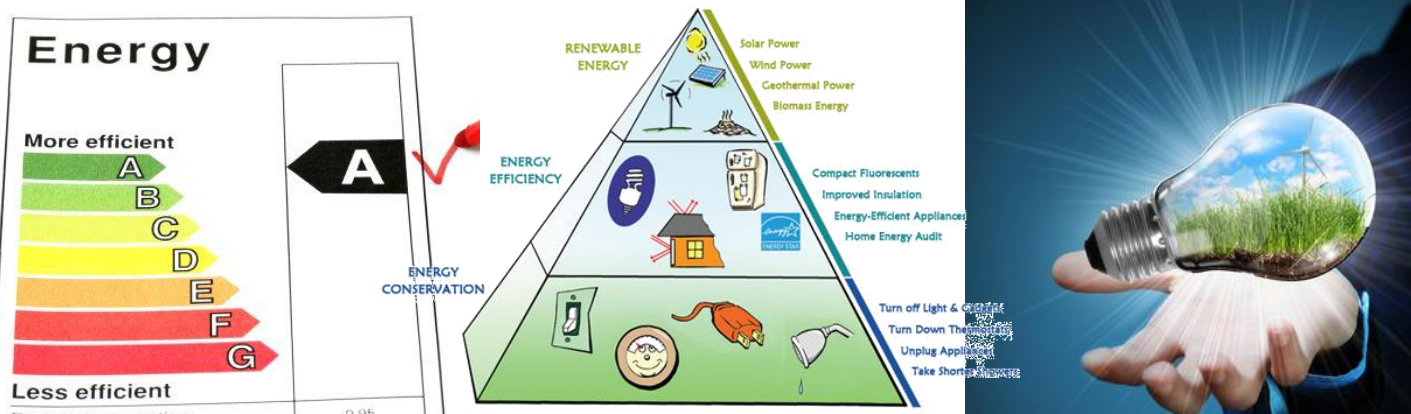
Twitter: twitter.com/smart_nrg

Motivation

Smart energy networks (SENs) are electric systems that use two-way networking technologies, cyber-secure communications technologies, and computational intelligence and control in an integrated fashion to efficiently manage energy consumption with the aim of providing a new electricity grid that is clean, safe, secure, reliable, resilient, efficient, and environmentally sustainable. SENs can be well regarded as a system of many systems, whose design challenges, requirements, and expectations can only be achieved through a holistic analysis, design, and optimization of all its components.

In SMART-NRG, we will go beyond state-of-the-art approaches for SENs by introducing an innovative and integrated protocol stack, which will be made of three interlinked and optimized sub-systems: (i) reliable communications and networking; (ii) smart energy management; and (iii) security and protection, which are one-to-one connected to the three key functionalities of SENs. The sub-systems will be studied, optimized, and integrated in a very efficient protocol stack, which will be tested via system level simulations and hardware testbeds, and, eventually, will be integrated into commercial devices.

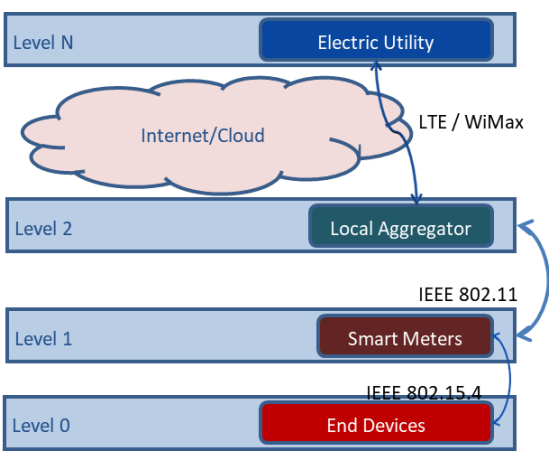
The Smart Energy Living® Pyramid



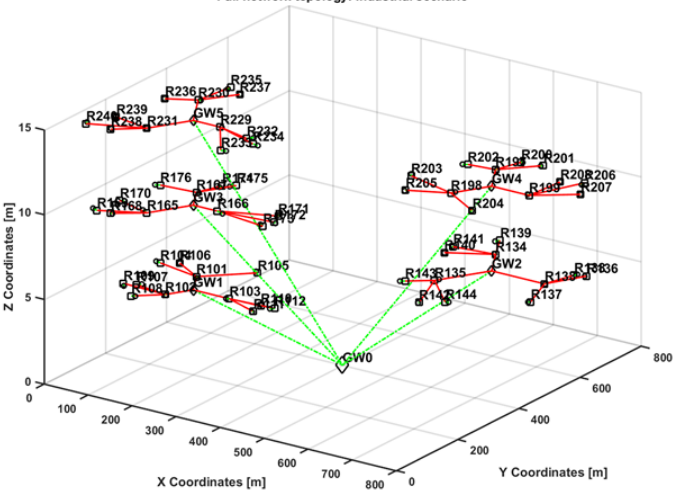
3rd Year Technical Achievements

The key technical achievements of the third year of the SMART-NRG project can be summarized as follows:

- **Conclusion of WP5** where the outputs of WP3 and WP4 have led to the implementation of basic building blocks in the protocol stack architecture referred early in WP2.
- These modules have been implemented as modules for the **System Level Simulator**, in the defined multi-tiers network architecture.
- Performance assessment of the full system have been conducted in the simulation environment for the four project's scenarios.



Full network topology: Industrial scenario



Smart Metering Scenarios

The project addresses 4 use case scenarios for smart grids:

- **Dense Urban.** Household users, all appliances connect to smart meters. **Low and Moderate interference.**
- **Rural.** Mix of medium buildings/houses, areas found on small towns. **Comm. Reliability in Low and Moderate Interference.**
- **Large Scale.** Composition of a number of microgrids. **Low and Moderate Interference.**
- **Industrial. Big buildings. Energy-efficiency in communications in High Interference.**
- **Performance indices include the gains of assuming the energy management policy at the application layer as well as packet loss, goodput and e2e delays at the network layer.**

