

# The ECONET Project:

## Energy Efficiency in Next-Generation Wireline Networks

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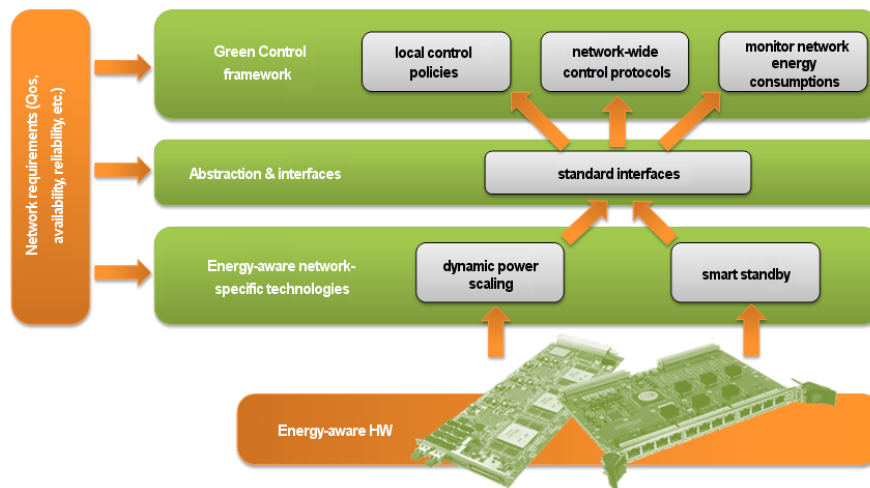
Nowadays, it is widely recognised that the sole introduction of low consumption silicon elements may not be sufficient to effectively curb tomorrow's network energy requirements.

Based on this assumption, the ECONET (low Energy Consumption NETworks) project is investigating, developing and testing new capabilities for the Future Internet devices that can enable the efficient management of power consumption, so to strongly reduce the current network energy waste. The ECONET project is a 3-year large-scale Integrating Project (IP) running from October 2010 to September 2013, co-funded by the European Commission under the 7<sup>th</sup> Framework Programme (FP7), addressing the Strategic Objective ICT-2009.1.1 "The Network of the Future".

The ECONET project will therefore be devoted at re-thinking and re-designing wired network equipment and infrastructures towards more energy-sustainable and eco-friendly technologies and perspectives. The overall idea is to introduce novel green network-specific paradigms and concepts enabling the reduction of energy requirements of wired network equipment by 50% in the short to mid-term (and by 80% in the long run) with respect to the business-as-usual scenario. To this end, the main challenge will be to design, develop and test novel technologies, integrated control criteria and mechanisms for network equipment enabling energy saving by dynamically adapting network capacities and resources to current traffic loads and user requirements, while ensuring end-to-end Quality of Service.

The ECONET project will address such challenge, by focusing its research and development efforts along three main research axes, namely (Fig. 1):

1. Green Technologies for Network Device Data Plane
2. Green Strategies at the Control Plane, and
3. Green Abstraction Layer.



**Fig. 1: The ECONET vision and its main research threads.**

In the first axis, novel network-specific capabilities are being investigated and developed to optimise the power management features (e.g. standby and power scaling primitives). Research activities cover several HW/FW (and related) technologies and network device typologies (e.g. home-gateway, DSLAM, switches, routers) in order to explore specific energy-saving solutions and techniques with respect to legacy and future HW and network requirements.

The second research axis investigates the design and development of local and distributed frameworks for energy-efficient flexible and cognitive network Operation, Administration and Management (OAM), with the aim to enable dynamic, scalable, ad-hoc optimized resource allocation in terms of trade-off between energy consumption and network performance, as well as differentiated performance, fault-tolerance and robustness levels.

The third axis, the Green Abstraction Layer, is focusing on the development of a standard and general purpose interface for exposing and controlling the novel green capabilities and functionalities, realized with different typologies of network equipment and of HW technologies, towards “general purpose” OAM frameworks. This research axis will be the key for the integration and the development of energy-aware device prototype platforms, including both data-plane green capabilities and control strategies, for project dissemination, demonstration and proof-of-concept activities. Moreover, it will lead to the definition of novel device internal standards for managing and monitoring energy and performance profiles.

The ECONET project will ultimately deliver a significant number of novel energy-aware device prototypes (representing all the different aggregation and logical levels of a real large-scale network), on which large-scale experimental evaluations and tests will be conducted. With a significant dissemination effort, the project will aim at maximising the impact of its results on industrial and network operator communities, as well as on standardisation bodies, thus bridging the gap between long term research and industrial deployment.