

Smart Buildings Cluster: From Construction to Usage



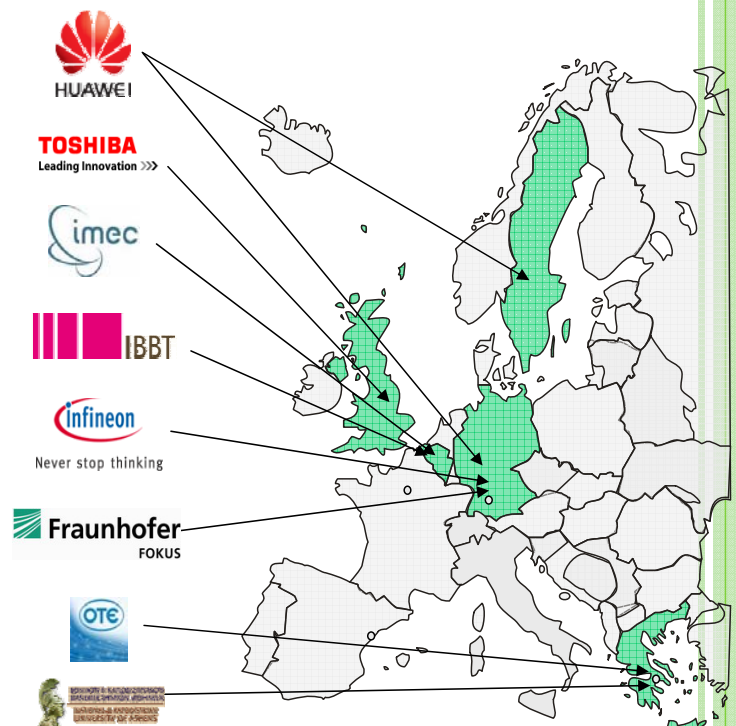
ΕΘΝΙΚΟΝ & ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ
NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS



Never stop thinking

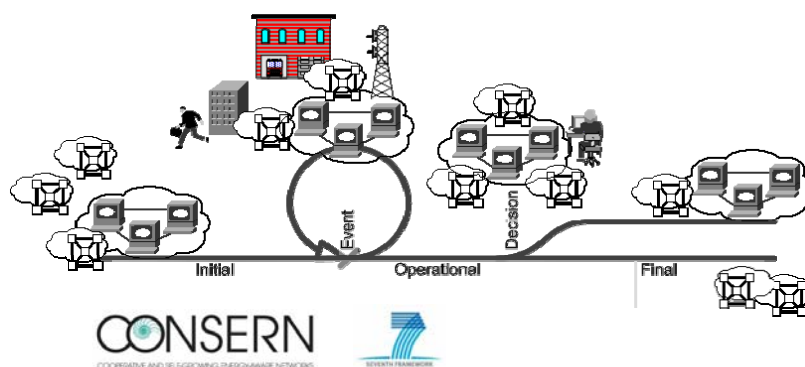
CONSERN Overview

- ❑ The consortium combines academic and industrial research, with the common goal of improving actual research activities towards ICT spectrum and energy efficiency using multi-band cognitive radio techniques,
- ❑ The CONSERN consortium is composed of nine (9) partners from five (5) EU countries.
 - Large semiconductor and telecommunication manufacturers (HWSE/HWDU, IFX, TREL,),
 - Network Operators (OTE),
 - Academic partners (NKUA), and ,
 - World-leading research institutes (IMEC, Fraunhofer, IBBT)
- ❑ The consortium intends to achieve significant and concrete results, including a proof-of-concept, with associated exploitation plans.



Project main idea and concepts

- ❑ CONSERN will work on
 - Communication optimisation,
 - Dynamic and gradual evolvement of the CONSERN network features deployment in larger infrastructures.
- ❑ The Self-growing network paradigm considers mechanisms for
 - Energy efficient interaction of the wireless network elements, and,
 - The reliable and efficient evolvement towards later lifecycle phases.
- ❑ Self-Growing network lifecycle phases
 - A **Self-Growing network** is set up on-demand, dedicated to a single purpose,
 - During its lifecycle, it can evolve to serve **several different objectives as needed**, such as integrating sensor networks in the vicinity or supporting safety of life applications under exceptional situations,
 - Towards the end of its lifecycle, it may serve as a **dedicated purpose (embedded) network** or as a failover for applications associated with other networks sharing the same area.



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CONSERN and Smart Buildings – Use Cases

- ❑ CONSERN's scope includes the usage area of smart buildings targeting potential applicability of the Self-Growing paradigms,
- ❑ CONSERN's Use Cases incorporate related concepts and present the network and system evolution from small to larger scale contexts,
- ❑ During the system and networks' life-cycle its usage may need to be adapted several times, in order to satisfy the increasing user needs.
- ❑ In the last phase, the network can also work supplementary to the system that will replace it, performing special functions or increasing availability and providing error resiliency.
- ❑ The following slides will present
 - The related Use Cases,
 - The identified usage aspects, together with,
 - The self-growing stages and the outlined mechanisms.

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Reference Use Cases - Construction Sites

- Use Case: Network Evolution in Construction Sites
 - **Where:** Wide-area and in-facility construction sites and moving work zones,
 - **How:** Network/System evolution is achieved by deploying heterogeneous equipment, by continuously updating operational policies and by cooperating, collaborating and integrating with neighbouring networks/systems.
 - **Usage:** Voice and data communications, WSNs, control aspects, safety scenarios under normal and urgent situations.

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Reference Use Cases - Construction Sites

- Self-Growing Initial stage
 - Network equipment is deployed whenever needed for a given purpose and provides sensor network and surveillance services as well as a first step towards a large scale, distributed sensor network,
 - Equipment is mostly dedicated to linking sensor (and actuator) functions and providing simple point-to-point and broadcast communications.
- Self-Growing intermediate stages
 - The network is augmented by voice and data communication, positioning, machinery monitoring and control services and supports safety of life applications, e.g., for construction site workers or emergency teams.
- Self-Growing Final stage
 - The network equipment might be left embedded in buildings and may provide wireless repeater functions (e.g., through elevator shafts), or may provide sensor network functionality to support facility management and monitoring.

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Reference Use Cases - Home and Office Environment

□ Use Case: Self-Growing Home and Office Environment

- **Where:** The deployment of a heterogeneous wireless network in a limited geographical area, such as a home and office environment. Such a network also acts as a large scale, distributed and cooperating system for monitoring and control, possibly incorporating Wireless Sensor Networks.
- **How:** Self-growing network deployment approach incorporates self-reconfiguration and self-adaptation of the currently deployed network environment,
- **Usage:** Variable utilisation challenges energy efficient parameterisation due to both the variation in usage and the high percentage of households that are expected to apply the corresponding concepts in the future.

CONSERN and Smart Buildings

Reference Use Cases - Home and Office Environment

□ Self-growing Initial stage

- Households and/or offices will deploy a network designed for an initial estimate of capacity and QoS requirements.

□ Self-growing intermediate stage

- Interconnection of a constantly increasing number of devices, partially building of novel radio components
- Evolution towards a distributed and cooperating system being able to support monitoring and control, incorporating wireless sensor networks,
- The system can orchestrate the efficient operation of different sub-systems (e.g. power nets, water nets, home appliances, sensor nets) providing increased functionality and flexibility to the end user.

□ Self-growing final stage

- Stable level of a high-density heterogeneous network deployment ensuring a low level of overall energy consumption and an optimum exploitation of the available system capacity.
- The network evolves further, and the network thereby enters the “intermediate stage” again.