CONSERN

COOPERATIVE AND SELF-GROWING ENERGY-AWARE NETWORKS

# CONSERN Progress Report in Technical Items

**Makis Stamatelatos**

**Markus Mueck**

# CONSERN Structure

CONSERN
COOPERATIVE AND SELF-GROWING ENERGY-AWARE NETWORKS

- WP1: Scenarios, Impact Assessment and Valorisation
- WP2: Optimisations for Energy Efficiency
- WP3: Cooperation and Collaboration Mechanisms
- WP4: Enablers for Self-Growing Paradigms
- WP5: Validation and Proof of Concept
- WP6: Project and Technical Management

# CONSERN Technical Items in Progress

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- WP1
  - Inter-domain Business Implications: potential business opportunities and challenges related to the inter-domain aspects of CONSERN ecosystem
    - Inside and outside of the operators' business domain,
    - Inter-domain business models and value network design for CONSERN,
    - High-level impact assessment for CONSERN instantiations,
    - Operator-Centric Business Models,
    - Operator Independent Business Models,
    - Business models application to a Home-Office environment,
    - The design and development of CONSERN value network.
  - Documents
    - Completed
      - D1.1, M1.1,
    - On going – to complete
      - M1.2, D1.2.

# CONSERN Technical Items in Progress

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- WP2
- Low Energy Protocols
  - A number of protocols that take into account power consumption considerations, both from the perspective of existing standards or more speculative research,
  - A range of techniques for designing and building new power-aware protocols,
  - Tools for simulation, testing and validation of protocol designs.
- Energy Optimisations for Systems and Terminals
  - System Level Energy Optimization Techniques,
    - Energy Capabilities of Sensor Networking Devices,
    - System Idle Time Estimation,
    - The way to reduce energy consumption at the protocol level (above the physical layer) is to reduce the number of transmissions - Information Driven Architecture – IDRA,
    - Non-Intrusive Aggregation: One way to reduce the number of transmissions, and thus energy consumption, is to aggregate multiple packets into one.
  - Terminal and Architectural Level Energy Optimization Techniques
    - Power Annotations in a software defined virtual platform
    - Energy-Aware Decision Making Optimization
    - Terminal Energy Validation
      - SuperESCalar Simulator (SESC) is a cycle accurate, microprocessor architectural simulator. Fuzzy Logic Optimizations
    - Protocol Design and Modeling Tools: Petri-net Energy Extensions
- Documents
  - Completed: M2.1, M2.2
  - On going: D2.1, D2.2.

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- WP3
- Design of Energy-Aware Networking and Cooperation Mechanisms
  - Relay mechanisms in an indoor environment to mitigate interference between co-located femto base stations using the same frequency band.
    - Cooperative relay communication and network coding to increase the network performance and reliability.
  - Relay mechanisms in a Heterogeneous Network (HetNet, mix of network nodes of various types) to save energy by cooperating and thus lower the total number of needed transmissions.
  - Distributed antenna systems,
  - Radio power control mechanisms for efficient interference control in Cognitive Radio environments between primary and secondary users,
  - Detection and cooperation between various co-located network devices using unlicensed bands for their communication,
  - Error resiliency in Wireless sensor networks data.
- Documents
  - Completed: D3.1, D3.2, M3.1,
  - On going: M3.2, M3.3.

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WP4: Enablers for Self-growing Paradigms

- Current working items: Distributed Self-Growing Architecture and Interface Description
  Initial informal specifications for interfaces, primitives, functional requirements, functional entities and their relationship in order to specify a concise framework for self-growing.
- Achievements
  - Architectural model specified.
    - Comprising two classes of CONSERN functional modules: the CONSERN Cognitive Engine (CCE) and the Functional Unit (FU).
    - Stratum model for cognitive control (layered: Node – Network – Inter-Network).
    - Subset of the CONSERN system architecture.
  - Informal interface specification (partly on-going).
    - Interfaces between CONSERN entities and functional units (managed resources).
    - Draft message sequences and interface data structures.
- Next steps
  - Formal specification of interfaces and data structure.
  - Self growing mechanisms, policies and decision logic.
  - Simulation and proof-of concept.
    - Decision-making on collaborative activation/deactivation of resources for energy optimization in a self-growing way.
    - Adaptation to change of network topology.
    - Sensing and monitoring capacity (context acquisition) integration into decision-making.
    - Policy management and self-learning capacity.
    - Initial approaches for conflict detection and resolution on rules and policies.
- Documents
  - Completed: D4.1, D4.2, M4.1 (non-public), M4.2 (non-public)
  - On going: D4.3

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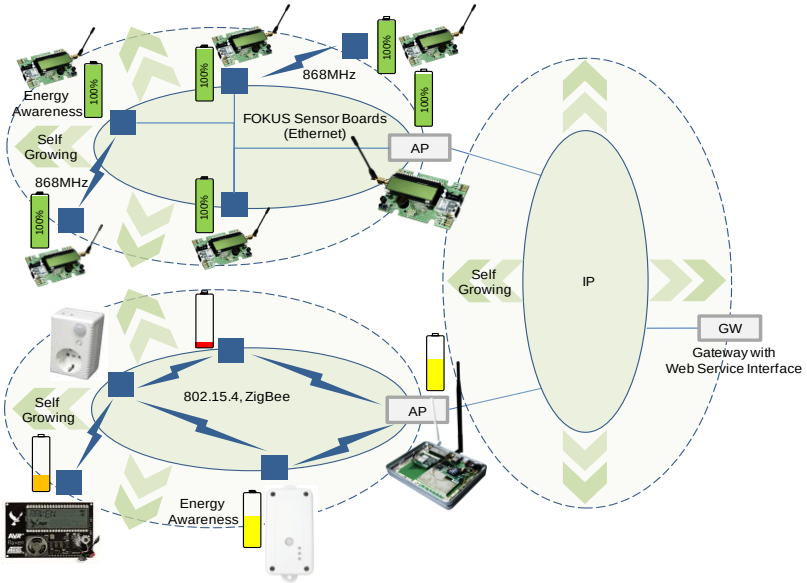
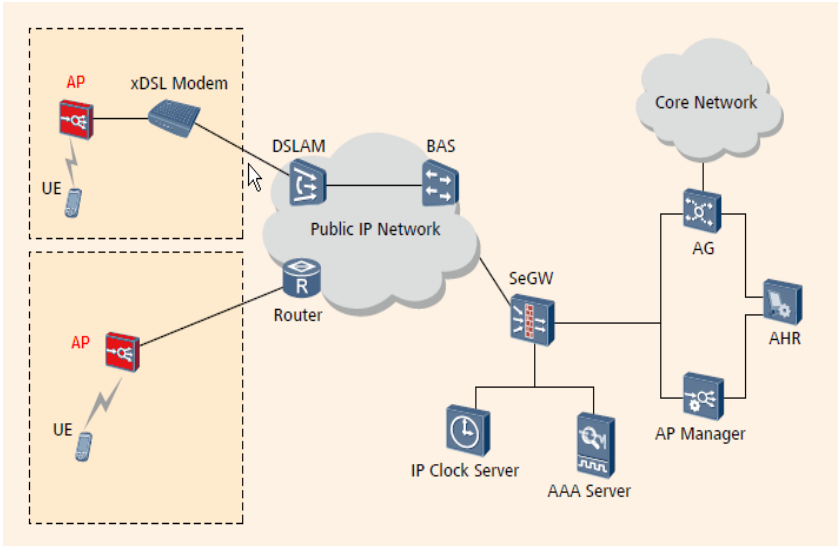
- WP5
- HW equipment available to the project has been identified
  - Examples: Sensor Network Test-Bed, Femto Platform, etc.



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- Overall Use Cases as defined by the „System Working Package“ have been analyzed and the following short-list has been finally identified:
  - Use Case “Energy Optimisation in an Office environment under coverage constraints”,
  - Use Case “Energy Optimisation for Self-Growing Office environment under coverage and capacity constraints”,
  - Use Case “Network reconfiguration following the introduction of new nodes”,
  - Use Case “Switch on-off of nodes for Energy Efficiency in Heterogeneous Networks”,
  - Use Case “Cooperative relay for energy efficiency”,
  - Use Case “Purpose-driven network configuration during an emergency situation”,
  - Use Case “Energy optimisation of co-located wireless networks in a home/office environment”,
  - Use Case “Self-adaptation of a reconfigurable wireless terminal”,
  - Use Case “Home Monitoring Energy Optimization”,
  - Use Case “Cooperation Enablers in Home Gateway Environments”,
  - Use Case “Dynamic Meeting Setup in Flexible Office/Building Environments”.