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ADAPTIVE TRANSMISSION & DYNAMIC ROUTING IN WIRELESS NETWORKS

THO LE-NGOC

ELECTRICAL & COMPUTER ENGINEERING DEPARTMENT

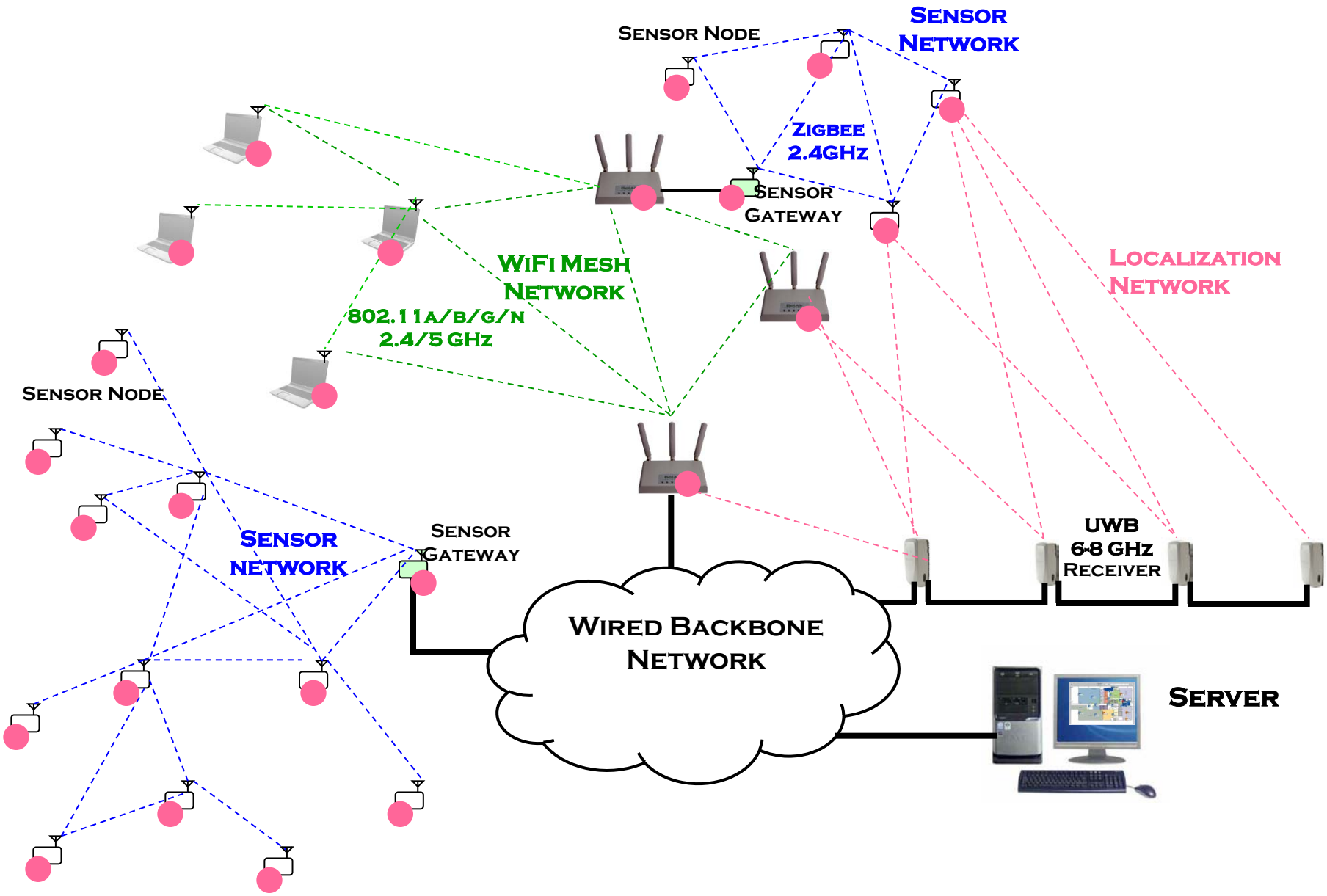
OBJECTIVES

- This research work is for
  - Task 3.1.3: *Sensors and Ad-hoc Networking*, and
  - Task 3.2.1: *Multiple-antenna Wireless Communications*

  of Theme 3: *Enabling Networks and Technologies*.
- studies and development of
  - adaptive and reconfigurable multi-dimensional transmission,
  - dynamic resource allocation, and
  - dynamic routing

  schemes for integrated, heterogeneous (wireline, wireless, sensor/ad-hoc, localization) networks suitable for hSITE.

Networks under Consideration



FOCUS

- transmission and routing for wireless and sensor/ad-hoc networks in clinical environments:
  - robust and reliable communications,
  - power/energy efficient,
  - *low electromagnetic radiation*
- exploring
  - spatial multiplexing, multi-user diversity, cooperative relaying applicable to wireless and sensor/ad-hoc networks
  - relevant side information: localization, contexts.

Research Topics:

- **Cooperative transmission and routing in wireless networks:** the problems of energy-efficient route selection at the network layer and efficient communication at the physical layer are jointly addressed in order to take advantage of spatial multiplexing, multi-user diversity, cooperative relaying.
- **Electromagnetic-interference (EMI)-aware transmission and routing:** exploits the idea of gradient-based routing to achieve the primary objective of minimizing EMI. Each node is assigned a potential value which represents its instant radiated EMI, its residue battery capacity, and its proximity to the gateway
- **Context- and location-aware routing:** data is adaptively routed through the network based on the contexts related to pre-defined relationships between network entities, network resources, required quality of services, etc.; and instant locations of network entities and devices

Work Done

- Development of an experimental *test-bed* consisting of *integrated*, heterogeneous networks: xDSL, 802.11 (mesh), 802.15, UWB localization.
- Implementation and evaluation of post-processing algorithms to improve the precision and accuracy of noisy observations from the experimental UWB-based localization system.
- EMI measurement and modeling
- Development of Optimal Symbol Power Distribution for data gathering wireless networks.
- Development of A Multi-stage Multi-user Decode-and-Forward Cooperative Communications Scheme using Linear Combination for data gathering wireless networks.