

Outline _ = _
The Context
- Ubiquitous Wireless Access over Heterogeneous Networks
 A wide variety of competing, yet complementary, systems Towards ABC
The Networked Everything Wireless Sensor Networks
Two opposing Perspectives
- Operator Centric
- Ad Hoc, Opportunistic
The Broadband Challenge
• Wireless Challenges: Cognitive Challenges
Study Cases
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The Context: Ubiquitous Wireless Access over/across Heterogeneous Networks

> integrating Public and Private, Licensed and Unlicensed









Competing, yet Complementary Systems





The Networked Everything

- The Networked Appliance
- The Networked Vehicle
- Machine-to-Machine Communication
- Pervasive Wireless Sensor Networks



Wireless Sensor Networks Projects

- Embedded Systems
 - WiSeNts (Cooperating Embedded Systems for Exploration and Control featuring Wireless Sensor Networks)



Micro- and Nanosystems

- INOS (Intelligent Networked Optical Sensor)



12

The Chock of Two Cultures Operator Centric Operators want to offer all sorts of services by integrating a number of wireless technologies, exploiting their most valuable asset: their brand Centralised, command-and-control Ad Hoc, Opportunistic - Compelling services will be offered by a variety of providers, each with a reduced range, eventually providing ubiquitous services through loose federation Distributed, on-demand, opportunistic COST 289 WOrkshop, Aveiro, Portugal 13 © Dr. Jorge Pereira, EC





AdHocSys Ad hoc wireless network

- Best solution : reliable wireless broadband ad hoc network with fixed nodes
- Reliability is achieved by introducing redundancy, and by exploiting it through an enhanced ad hoc routing algorithm







Wireless Challenges

- Addressing real-world scenarios by seamlessly integrating, in a fully context-aware manner, the optimal set of wireless systems (in an ABC sense), whenever and wherever needed
- Ensuring Interoperability in the midst of the Standards maze
- Joint Planning, Optimisation, Management and Control of ever more complex systems
- Crucial importance of Managing and Controlling Reconfigurability







Study Cases

- 1. Analogue turn-off
- 2. Intelligent Transportation Systems
- 3. Emergency & Crisis Management



IEEE 802.22 WRAN

- Working Group on Wireless Regional Area
 Networks, is now looking at
 - developing a standard for a cognitive radiobased PHY/MAC/RAN for use by licenseexempt devices on a non-interfering basis in spectrum that is allocated to the TV Broadcast Service

White TV Space

• The broadcasting industry is in the midst of making a transition from analogue to digital television transmission - a move that the US Congress enabled by giving broadcasters two sets of spectrum for free, simultaneous use during the course of the transition, now slated to be completed by February 17, 2009.

 But because broadcasters don't need two sets of spectrum, the US Congress declared in December that unused spectrum between channels 52 and 69 should be put up for auction to commercial wireless services.

 Every one of the US 210 TV markets has between 15 and 40 unassigned and vacant channels reserved for broadcasting - all of which could be readily converted to WiFi and other wireless uses.

After broadcasters vacate the analogue spectrum (channels 2-51), Boston will have 19 vacant channels constituting 38% of the TV band spectrum. Seattle will have 26 vacant channels constituting 52% of the TV band.

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27

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DRIVE Dynamic Radio for IP-Services in Vehicular Environments

- Aims at spectrum-efficient highquality wireless IP provision in a heterogeneous multi-mode/multiband/multi-system environment to deliver multimedia services, particularly to vehicles, ensuring ubiguitous access to information
- and support of "edutainment".Will build upon the
- complementarity of various communication and interactive broadcasting systems for the delivery of IP-based multimedia services.
- Adds to the BRAIN approach a new Traffic Control (TC) layer enabling the selection of the most appropriate/efficient Radio Access Network (RAN) and eventually Dynamic Spectrum Allocation (DSA).
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www.ist-drive.org www.ist-overdrive.org

28

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3. Emergency & Crisis Management

WIDENS (2004-06)
 Wireless Deployable Network System
 www.widens.org



 Propose a system for an easily deployable IP wireless ad hoc network in the absence of infrastructure

• Design a scalable, reconfigurable, reliable and secure system introducing ad-hoc adaptations and reusing current WLAN standards

• Demonstrate enhanced services of audio/video real time communication and data exchange and replication COST 289 WOrkshop, Aveiro, Portugal 34 © Dr. Jorge Pereira, EC



