Multi-radio MESH Node

Heraklion MESH is an experimental metropolitan multi-radio mesh network that covers an area of approximately 60Km^2 in the city of Heraklion, Crete. The network consists of 14 nodes, of which six are core nodes with up to four 802.11a wireless interfaces each, and one wireless interface for management and monitoring. The distance between core nodes varies from 1 to 5Km. Finally, the wireless mesh network contains two gateways that connect it to a fixed network. Figures depict the Multi-radio MESH node, a prototype develop by the Telecommunications & Networks Laboratory of FORTH-ICS.

Each multi-radio mesh node consists of a mini-ITX board (EPIA SP 13000, 1.3GHz C3 CPU, 512 MB DDR400 memory) and a 40GB 2.5" HDD. A four slot mini PCI to PCI adapter (MikroTik RouterBOARD 14) holds four 802.11a/b/g mini PCI adapters (NL-5354 MP PLUS Aries 2, Atheros-based High Power Super A/G dual Band 802.11/a/b/g). The mini-ITX runs Gentoo 2006 i686 Linux (2.6.18 kernel) with the MadWiFi driver version 0.9.2.1. Finally, the nodes run OLSR daemon version 0.4.10 (by olsr.org), which implements the Optimized Link State Routing (OLSR) protocol.

One of our design requirements was to allow remote management, monitoring, and recovery of the mesh nodes, even in situations when a mesh node's mini-ITX board crashes or its wireless interfaces are down. To address this requirement we added to each mesh node an additional 802.11a client, which connects to a management and monitoring network that operates in parallel to the experimental mesh network. Additionally, to enable remote recovery of the mesh node's mini-ITX board we added an intelligent remote power switch (Dataprobe iBoot); this allows the power to be switched off and on through a web interface, but also supports timed power switch pinging other devices (the mini-ITX board or some remote device).

More info: http://www.ics.forth.gr/netlab/hermesh.html

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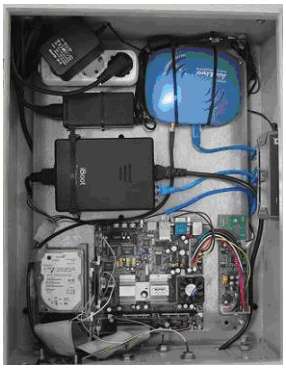
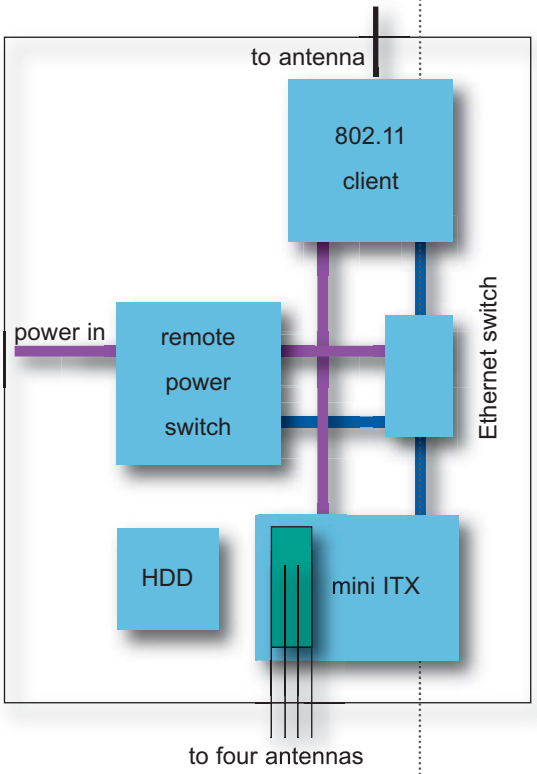


(a) Actual Node



(b) Component Layout

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TELECOMMUNICATIONS AND NETWORKS LABORATORY (TNL)

The Telecommunications and Networks Laboratory (TNL) of FORTH-ICS is actively involved in the areas of high-performance, wireless networking and mobile communications. In particular, research and development activities involve resource control and traffic engineering in wired and wireless networks, performance evaluation of networks with guaranteed Quality of Service (QoS), traffic measurement and analysis, voice processing, synthesis and compression, mobile positioning, and contactless smartcards. The Laboratory maintains a number of collaborative signal processing, sensor networks, fixed and wireless (based on IEEE 802.11) test beds for experimenting with new network technologies and protocols, and for performing measurement and analysis experiments of real network traffic. TNL collaborates closely with both national and international industries, including network manufacturers and telecommunication service providers, as well as with other research groups having interests in the above areas. Funding of this research has been provided by the European Commission, through ACTS (CASHMAN, MISA, REFORM, MONTAGE, ITHACI) and IST (M3I, SCAMPI) projects, by national programme funds (General Secretariat for Research and Technology - GSRT), and by industrial funded projects.

The work outlined above can be divided into four activities: (i) Telecommunications Activity, (ii) Mobile Computing Activity, (iii) Broadband and Wireless Networking Activity, (iv) Digital Signal Processing Activity.

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