

# Hopling Technologies Enhances Metro Mesh in Collaboration with Fujitsu

The Dutch wireless network solutions company Hopling Technologies has been at the forefront of a challenging and exciting type of wireless access networking: the blending of WiFi and WiMAX technologies in mesh networks. Hopling Technologies uses this flat, relay-oriented architecture to deliver highly cost-effective hotspot, hotzone and metro networks for wireless carriers on three continents.



---

C A S E S T U D Y

---

Hopling Technologies' leaders sought out Fujitsu and its WiMAX SoC as the base of its the latest generation access solutions, the HopMAX™ portfolio. The company was particularly impressed by Fujitsu's powerful and innovative software upgradeability, the

### A Success Story in Wireless Mesh

Hopling Technologies was created in 2003 by seasoned executives in the telecom industry, with a vision to become the global leader in wireless mesh network solutions. Headquartered in the Netherlands,

Hopling Technologies is thriving in an environment that is a hotbed of networked and next-generation Internet applications, and which is ranked third in global broadband penetration by the ITU .

This market-driven R&D-centric company has grown rapidly by following the philosophy that its customers are looking for a solutions partner with a deep understanding of

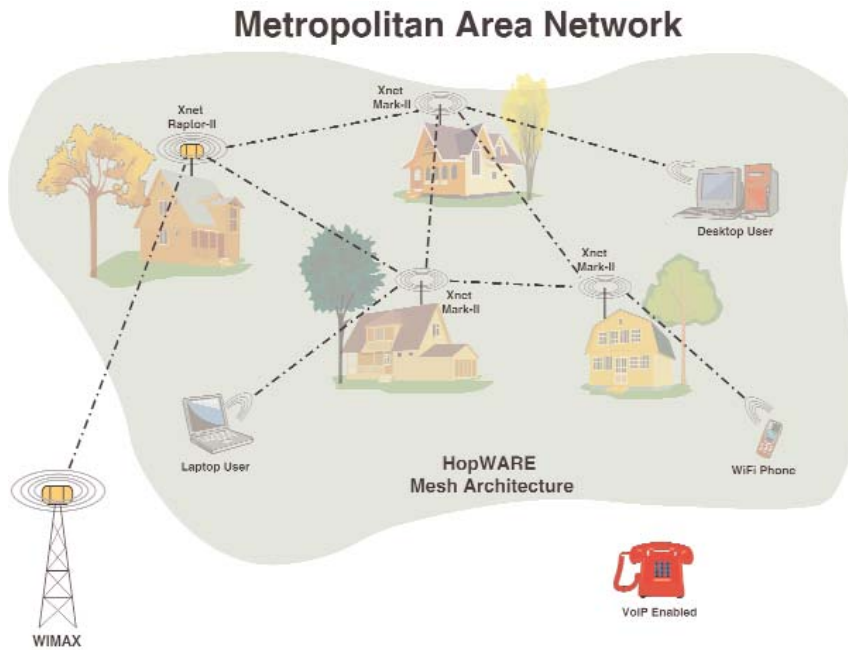


Figure 1 - Hopling Metro Topology using HopWARE Mesh Architecture

high caliber of silicon engineering within the chipset, and its ability to serve as the foundation SoC for all of Hopling's future WiMAX-generation systems.

Hopling Technologies is mastering metro mesh and harnessing the power of WiMAX for an aggressively expanding solution set.

With the help of Fujitsu, Hopling Technologies will deliver one of the most appealing, highly functional and cost-

effective product suites available in this market segment.

wireless broadband mobility solutions and the practical expertise to optimize their deployment.

Hopling Technologies specializes in wireless mesh-routing solutions, which include indoor and outdoor mesh routers, WiFi and WiMAX access

points, gateways, multi-client bridges and a suite of network management solutions, all running on Linux.

*"There is natural synergy between Fujitsu and us. Fujitsu has the hardware experience and market visibility to make the WiMAX communication protocol and our joint program highly successful."*

Hopling Technologies' metropolitan solutions are self-configuring, centrally managed and controlled.

Hopling Technologies' wireless-mesh, multi-hop

routing design is based on the HopWARE Mesh Architecture (Figures 1 and 2), which incorporates the sophisticated Hopling Mesh Protocol and the unique Hopling Discovery Protocol for the 900MHz, 2.4GHz, 2.5-2.6GHz, 3.3-3.5GHz, 4.9GHz and 5GHz bands. These protocols enable automatic coverage for seamless metropolitan and event-based networks, leveraging the advantages of WiFi such as true mobility, high throughput, and ubiquitous connectivity of client devices.

The Hopling Discovery Protocol is a means for Hopling Technologies' range of products to exchange information, thus enabling a device to configure itself for optimal communication with a neighboring Hopling product.

Another major advantage of the employed mesh wireless solution over today's traditional implementations is that the different nodes communicate with each other. Every node is capable of relaying traffic coming from any of its neighbors. The mesh network reconfigures itself when a node is installed or removed. Mesh routing and hotspot networks provide an advantage over the traditional point-to-point links, in that each node added to the mesh enhances the network as a whole.

Every indoor and outdoor node is capable of relaying traffic coming from any of its neighbor's nodes. By simply adding another node, the range of the wireless mesh network is extended, creating a highly reliable, seamless and ever-increasing broadband network footprint. These networks offer bandwidth control, roaming, automatic configuration, automatic channel selection, push content functionality, universal access methods, radius services and

additional access security. With the self-healing mesh routing algorithms, the network has no single point of failure, ensuring a reliable wireless roaming- and VoIP-enabled connection for customers.

Using the Hopling Discovery Protocol enables Hopling Technologies devices to configure themselves for optimal communication with a neighboring "Hopling" product.



**Figure 2 - Hopling Xnet Mark-II Mesh Node**

The company's flexible and reliable solutions are deployed for video surveillance, municipal private networks, VoIP, mobile Wi-Fi broadband solutions, wireless LANs, last-mile wireless access connectivity, mesh backhaul/metropolitan area networks and ad hoc/event-based solutions.

Hopling Technologies' latest solution set is the recently launched HopMAX™ product portfolio, which puts the company on the road to fulfilling the potential of new-generation WiMAX end-to-end solutions.

To achieve rapid time-to-market and the engineering flexibility it requires, Hopling chose to work with Fujitsu Microelectronics and its WiMAX SoC as the silicon foundation for its HopMAX™ base stations, micro base stations and high-end subscriber units. The Fujitsu SoC is also used for Hopling Technologies' mesh hybrid node system, the Xnet Raptor-II.

“There is natural synergy between Fujitsu and us. Fujitsu has the hardware experience and market visibility to make the WiMAX communication protocol and our joint program highly successful,” stated Frank Koopman, Chief Executive Officer of Hopling Technologies.

The first Hopling WiMAX products based on the IEEE 802.16-2004 standard are the HopMAX™ 1600 and the HopMAX 2600 Plug-and-Play Linux-based subscriber stations. The Xnet Raptor-II hybrid node, a mesh-based WiMAX-backbone solution, will become commercially available later this year. The Hopling Mesh Protocol will be added as a layer on top of the IEEE 802.16 standard used by the HopMAX™ products. Hopling plans to produce a micro base station (HopMAX™ 4600) and base station (HopMAX™ 6600) based on the upcoming Fujitsu mobile WiMAX SoC. These base station systems, micro base stations and high-end subscriber stations based on the IEEE 802.16e-2005 standard will become commercially available in 2008. WiMAX Forum lab certification and limited production

shipments for these systems will start in the second quarter of 2008 (Figure 3).

The HopWARE Mesh Architecture will be added later as a layer on top of the IEEE 802.16 standard used

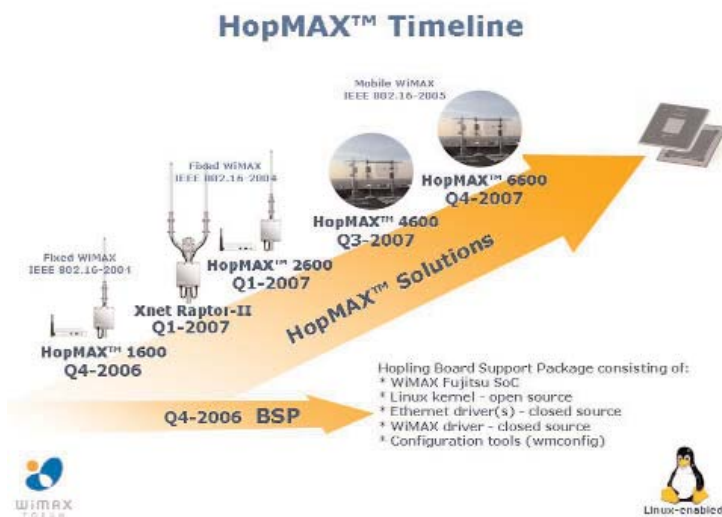


Figure 3 - Development Roadmap for HopMAX™ Solutions

by the HopMAX™ products. Hopling Technologies is an active member of the WiMAX Forum, envisioning the next wave of wireless access, e.g., personal broadband, based on the IEEE 802.16 standards.

Hopling Technologies has deployed systems for more than 30 service providers in seven countries. Among its prominent customers are KPN, the national incumbent operator in the Netherlands; the National Dutch Rail Authority, which operates 5GHz wireless mesh at 20 rail stations and hotspot coverage at 50 more rail stations; the Cloud in Amsterdam (formerly known as Hotspot Amsterdam); and WebNet CWN which operates wireless broadband networks in Canada and the United States.

FUJITSU MICROELECTRONICS AMERICA, INC.

Corporate Headquarters  
 1250 E. Arques Avenue, M/S 333, Sunnyvale, CA 94085-5401  
 Tel: (800) 866-8608 Fax: (408) 737-5999  
 E-mail: inquiry@fma.fujitsu.com Web Site: http://us.fujitsu.com/micro