

# Entering the WiMAX era

By Alan Menezes, Aperto Networks

WiMAX is an industry forum for broadband access based on IEEE 802.16 standards for wireless metropolitan area networks (MAN). WiMAX is poised to pick up where Wi-Fi leaves off as the industry standard for broadband wireless access beyond the local area. WiMAX can be used for a variety of applications, including high-speed enterprise connectivity for businesses, hotspot/hotzone backhaul and "last mile" connections for residences. The technology is designed to cover a wide variety of link conditions including non-line-of-sight links while maintaining carrier class availability and QoS (quality of service).

One WiMAX base station can provide T1/E1-level (1.5/2.0Mb/s) broadband connectivity to dozens of subscriber sites - or DSL/cable-level links to hundreds of sites - even in areas where high-speed landline services are impractical or unavailable. WiMAX is also complimentary to a MAN SONET fibre ring or T3/E3 (45Mb/s) leased-line services. It is currently the leading technology for bridging the expensive "last mile" between the subscriber and the broadband provider's office or local node.

## Broad industry support

WiMAX profiles based on the IEEE 802.16 standard are being developed, promoted, and certified by the WiMAX Forum, an industry-led, non-profit corporation with over 160 corporate members that include service providers, equipment vendors, software developers, and systems integrators. To qualify a product as WiMAX Forum Certified, a member company must first submit their products for conformance testing to a WiMAX Forum approved certification body and then participate in a WiMAX Forum PlugFest to establish interoperability with other WiMAX member companies' products.

Although a new standard, WiMAX is an adaptation of proven technology that has already been deployed extensively worldwide.



**Aperto Networks' PacketWave system comprises a family of base stations, subscriber units and associated radios and antennas in 2.5GHz, 3.5GHz and 5GHz frequency bands and has been designed with WiMAX in mind**

## What WiMAX delivers

WiMAX delivers a number of advantages for service providers, integrators, equipment vendors, and users. Key advantages for service providers and system integrators include:

- A high-speed broadband technology for filling the "last mile" gap - 50.4Mb/s (uncoded) in a 14MHz channel, corresponding to a net throughput of 33Mb/s using 64QAM-3/4
- Carrier class availability and quality of service (QoS)
- Scalability up to several hundreds of simultaneous sessions per carrier and high bandwidth per channel
- Lower equipment costs compared to proprietary solutions due to economies of scale
- Interoperability among vendors' systems that minimise investment risk and single-vendor dependence; WiMAX Forum certification ensures compatibility
- Quick deployment and redeployment that saves on staffing
- Better multipath protection and security than Wi-Fi

- Low latency that meets requirements for voice, data, and video; IP quality of service can be provided to prioritise applications
- International standard facilitates localisation; service providers can work with forum members to influence regulatory agencies regarding spectrum allocation and specifications

Key advantages for equipment and component vendors include:

- High sales potential and volume opportunity—WiMAX products are expected to capture 60% of the overall broadband wireless access market by 2008 (source: WiMAX Forum, based on analyst estimates)
  - A clear roadmap for rapid innovation and opportunities for joint ventures
  - Simplified compatibility testing with components, systems, and subsystems from other vendors
  - Future-proof technology investment
- Key advantages to enterprise and residential users include:
- Service Level guarantees (bandwidth, latency, availability)
  - Internet access where broadband

isn't currently available, such as remote rural areas and developing countries lacking cable infrastructure

- Higher bandwidth than DSL or cable connections
- Cost benefits compared to leased data lines
- Future mobile broadband access—broadband anywhere
- More service choices

### Systems in service

Aperto Networks' PacketWave system is an example of equipment that is already available which has been designed with an eye to WiMAX integration.

Aperto Networks is a WiMAX Forum founding board member, and the PacketWave system comprises a family of base stations, subscriber units and associated radios and antennas in 2.5GHz, 3.5GHz and 5GHz frequency bands for point-to-point and point-to-multipoint deployments. Its scalable systems support new wireless builds and complement existing wireline broadband access technology.

Aperto OptimaLink technology performs dynamic control of link parameters to increase capacity and coverage in multiuser cellular networks. ServiceQ technology makes it easier to provide different service classes for subscribers based on application type, which helps optimize WiMAX support for a large number of simultaneous sessions. Enterprise networking enhancements to PacketWave wireless systems include IP routing, virtual LANs, and Point-to-Point Protocol on Ethernet (PPPoE) support.

Designed with an emphasis on scalability, flexibility, and cost-efficiency, Aperto's WiMAX-class systems are already being deployed by 180 service providers in 57 countries. These providers are closely following the progress of WiMAX, and many are already WiMAX Forum members. They include:

- Iberbanda, a foremost transport carrier and Internet services company in Spain, has deployed over 100 3.5GHz PacketWave systems to drive broadband access for municipalities, businesses, government offices and residential customers throughout Spain. Iberbanda is benefiting from the flexibility and installation ease of

Aperto's PacketWave, key factors for the success of the provider's rapid deployment plan as it strives to be one of Europe's first wireless access networks to run on WiMAX.

- Enertel, one of Holland's largest data and telecom operators for the business market, and the country's largest wholesale provider to independent Dutch ISPs, has launched a national rollout of business-class broadband wireless access services using Aperto Networks' 3.5GHz PacketWave systems. This service is now available in Rotterdam, Amsterdam, the Hague, Utrecht and Eindhoven. By the end of 2005 the network will offer national coverage.
- Douglas Fast Net of Oregon in the US, a utility that has built carrier-class fiber and wireless networks throughout the mountainous terrain of Douglas County, Oregon, has standardized on PacketWave 5GHz point-to-multipoint systems for its business-grade wireless service delivery. The carrier provides wireless-based transparent LAN and Internet services to all customer locations more cost-effectively served with wireless than with fiber-based access methods.
- France Telecom used the PacketWave systems for the 91st Tour de France 2004 bicycle road race. During the 21-day Tour de France in July, Aperto base stations operated continuously along the race route and enabled access to France Telecom's backbone network. The base stations being used for the Tour de France performed under an environment that is challenging for most other wireless network technologies, moving each day as the race progresses to the next location. France Telecom has also deployed a broadband wireless access network to serve customers in Brittany.
- TransAria, one of the fastest growing network operators in the Northwestern US, has chosen Aperto as its preferred supplier of carrier-class 2.5 and 5GHz systems for last-mile wireless access. It has deployed in both frequencies for its carrier customers, enterprise and government subscribers in Montana and Alaska, and plans to roll out

Aperto-based networks in all current and proposed metro markets across six states.

- Kungsbacka, one of the rapidly growing coastal municipalities in Sweden, has deployed 3.5GHz systems for broadband wireless access serving both rural and urban areas of the municipality. Five PacketWave base stations provide complete coverage for the region. The Aperto-powered network complements the extensive fiber and radio infrastructure already in operation.
- Leap Broadband, a leading provider of business-class broadband wireless access services in Ireland, has deployed 3.5GHz licensed frequency systems to complement its extensive network of 5.8GHz PacketWave point-to-multipoint systems throughout the metropolitan area of greater Dublin. It is a primary network provider to hundreds of business-class users across Ireland's capital, serving enterprises with fractional and full E-1 symmetrical broadband wireless access as well as value-added applications.
- Bangladesh's Link3 Technologies, Ltd. has deployed Aperto's 3.5GHz PacketWave broadband wireless access systems for business-grade VPNs throughout the operator's network. The first and now largest wireless Internet Service Provider in the country, Link3 has built the premier financial services subscriber base and is well respected for its reliable and high-quality service delivery. Link3 uses the systems for its network deployment, as well as for backhaul of network traffic.

*Alan Menezes was one of the speakers at the Wireless Broadband Forum in Cambridge, UK, in November 2004, and Aperto Networks will again be participating in the 4th Wireless Broadband Forum, 14 - 17 November 2005.*

### Company Information

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