



Update

The Next Big Thing in Wireless

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Even as we're in the midst of the rapid growth of Wi-Fi and 2.5G and 3G wireless data networking, we're already hearing about "the next big thing" in broadband and wireless networking: WiMAX and IEEE 802.20.

WiMAX and IEEE 802.20 are two of the latest options for mobile and remote users and systems, part of an ongoing evolution from intermittent, dial-up Internet connectivity to pervasive high-speed networking and "always-on" computing. While these new technologies are not likely to have significant short-term impact on business infrastructure and applications, IT leaders should monitor their development and consider their potential for business applications and network architectures if, as forecast, they reach the market in the next several years.

WiMAX and 802.20 products and services hold the promise of greatly increasing access to networking through increased bandwidth, reducing connectivity costs, and enabling new mobile, always-on, and bandwidth-intensive business applications.

WiMAX

WiMAX is the WiMAX Forum's marketing name for a new standard for wireless metropolitan area networking (MAN).

The WiMAX Forum brings together representatives of more than 100 companies to create a standard for broadband wireless MAN technologies and services. The forum hopes that creating a widely accepted standard and certifying products as compliant with that standard will generate rapid growth of WiMAX-based wireless products and services, similar to the growth of Wi-Fi and 802.11 over the past several years. Targeting the global market, WiMAX-certified products will conform to both the IEEE's 802.16 and HiperMAN wireless MAN standards from the European Telecommunications Standards Institute (ETSI).

In the second half of 2004, the WiMAX Forum is expected to begin branding products as "WiMAX-Certified™": that is, products that have been tested and shown to adhere to the WiMAX standard.

WiMAX networks will provide wireless broadband network connections to clients up to 31 miles from the base station, with data rates of up to 71 Mbps. Initially focused on fixed clients (e.g., as wired DSL, T1, T3, or DS3 replacements), future products based on WiMAX's 802.16e extension will enable broadband wireless networking with mobile clients (see Table 1 for a comparison of MANs, PANs, and LANs).

Table 1 — PANs, LANs, and MANs

	Cell Radius	Data rate (Rate reduces as signal strength weakens)	Example Technology	Available Today?
Wireless Personal Area Network (PAN)	1-10 meters	Up to 723 kbps	Bluetooth	Yes
Wireless Local Area Network (LAN)	802.11a: up to 30 meters	802.11a: up to 54 Mbps	802.11a	Yes
	802.11b/g: up to 100 meters	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps	802.11b/g	Yes
Wireless Metropolitan Area Network (MAN)	WiMAX: up to 50 km	Up to 71 Mbps	WiMAX	No (prestandard implementation only)
	802.20: up to 15 km	Up to 1 Mbps	802.20	

WiMAX Details

While there are several extensions to the base 802.16 standard, two are likely to be significant for IT leaders: 802.16-2004 (also known as 802.16 REVd) and 802.16e.

The 802.16-2004 extension supports fixed point-to-point and point-to-multipoint connections across licensed and unlicensed frequency bands. Products using WiMAX in licensed frequency bands will require government licenses, adding expense but also potentially providing more control and less interference than that provided by unlicensed bands. In the US, 802.11b/g technology uses the unlicensed 2.4 GHz frequency band, and 802.11a the unlicensed 5 GHz frequency band, while 3G cell phones use licensed frequency bands, with telco service providers holding the licenses, enabling their customers to use the devices.

The 802.16-2004 extension supports data rates of up to 71 Mbps, over distances of up to 31 miles, and supports clear line-of-sight as well

as non-line-of-sight (NLOS) configurations. NLOS capability enables connections from outdoor and indoor antennas, including those obscured by trees, walls, structures, and so on, but at a lower data rate than that provided by a direct, unencumbered line-of-sight connection.

The other new extension to 802.16, 802.16e, opens up low-latency wireless broadband to mobile clients, enabling new broadband wireless mobile services for businesses and consumers as well as potentially new classes of always-on, always-networked mobile applications.

IEEE 802.20

Meanwhile, another, separate IEEE standard in development seems to have significant overlap with WiMAX and IEEE 802.16e: the IEEE 802.20 standard.

WiMAX and 802.16e are targeted for mobile users moving at speeds of up to 60 mph inside a WiMAX region (laptop users moving across

a corporate campus, for example). But 802.20 is focused more on high-speed mobile users traveling across an extended metropolitan area at speeds of up to 150 mph (a salesman traveling across a city or an executive traveling between nearby cities on a high-speed train, for example). WiMAX/802.16e also differs from 802.20 in that it supports substantially higher data rates (up to 71 Mbps) than 802.20 (up to 1 Mbps).

Both WiMAX/802.16e and 802.20 provide for mobility while enabling broadband connections across a much larger area than Wi-Fi and at higher data rates than what is commonly available to mobile clients today. Barring unexpected problems with the technology (unexpected, but certainly not unheard of), it's likely we'll see both 802.16e and 802.20 products and services entering the market over the next few years, and we'll have to wait to see which standard gains traction for various user groups and applications.

TIME FRAME

If you currently have a need for a point-to-point wireless broadband connection (e.g., you need to connect a new remote site where wired networking is not an option), you may find prestandard wireless broadband products and services available that will meet your needs. For example, TowerStream, a member of the WiMAX Forum, provides broadband wireless services at T1, T3, and DS3 speeds to businesses in the New York, Boston, Providence, and Chicago metropolitan areas (with Los Angeles coming soon). TowerStream has provided this service since 2000, using proven pre-WiMAX technology, demonstrating high reliability, lower costs, and more responsive customer service than many wired broadband services can provide. Enterprises can also create their own private point-to-point wireless broadband connections using licensed or unlicensed frequencies to directly connect two sites (such as a remote building and a corporate network).

The first WiMAX-enabled products and services should enter the market in late 2004 and into 2005. Initial products and services are likely to be targeted at point-to-point and point-to-multipoint broadband connections for businesses (e.g., as a wired T1 substitute for connecting offices). The WiMAX Forum also hopes that initial WiMAX-based services will increase the number of Wi-Fi hot-spot services by providing quick, convenient, and cost-effective solutions to connect distributed Wi-Fi access points to the Internet (sometimes referred to as “backhaul” connections), greatly increasing the availability and usage of Wi-Fi-based WLAN services.

In 2006, 802.16e products are expected to reach the market, creating a new option for connecting mobile users. In that year and in 2007, enterprises could consider

setting up their own 802.16e-based networks (across a corporate campus, for example). These networks would potentially be easier to set up and manage, would provide a more seamless network, and — potentially — would provide more consistent security, than a network of Wi-Fi access points. Mobile WiMAX 802.16e could also be used to create a broadband network in which no suitable wired networks exist, for example, in rural areas or large industrial complexes. And of course, 802.16e and 802.20 are expected to create new mobile broadband services from existing wireless carriers. T-Mobile, for example, is testing a pre-802.20 network today in the Netherlands.

SUMMARY

WiMAX and 802.20 will not have a significant near-term impact on most IT organizations. Wi-Fi or 2.5G and 3G cellular data networking will likely meet mobile and wireless networking needs over the next six to 24 months.

Over the next two to four years, WiMAX products and services are likely to begin creating competitive pressure on fixed and mobile wireless networking services, reducing prices while increasing availability of broadband access choices. It is also hoped that WiMAX, through its use as a cost-effective backhaul solution, will boost the availability of 802.11b/g Wi-Fi services.

Mobile WiMAX 802.16e and 802.20-enabled technology should find its way into laptops, mobile computers, and potentially PDAs, mobile data terminals, and even multi-function mobile phone handsets starting in late 2006. It's likely that in 2007 and 2008, we'll see new services offering broadband-enabled mobile Internet connections, initially covering high-density metropolitan areas and growing to cover mixed-density areas, transportation corridors, and selected rural areas.

All the while, expect growth in other wired and wireless networking technologies and services to continue, with more bandwidth, more ways to get connected, greater mobility and persistence, always-on connections, and more bits per dollar coming each year for the foreseeable future. For example, expect the following developments:

- More Wi-Fi hot spots and greater roaming capability between Wi-Fi service providers
- 2.5G, 3G, and even 4G cellular data services expanding and serving more areas, with more aggressive pricing
- Higher-speed wired xDSL options
- Cable-system wired broadband services expanding from consumer markets to business markets
- High-bandwidth symmetric broadband networking via electric power lines
- Prestandard and initial rollout of WiMAX and 802.20 wireless products and services

ACTIONS FOR IT LEADERS

- Ensure that your company is positioned to take advantage of productivity, efficiency, and cost benefits created by new networking products and services.
- Consider prestandard wireless broadband products and services if you have a current need to connect fixed points; the technology is proven and working in many venues today:
 - In some geographies, services from existing companies (e.g., TowerStream and NextWeb) can quickly create dedicated T1-like connections to connect remote locations today.

- You can create your own dedicated point-to-point broadband connections, spanning short-to-medium distances using licensed and unlicensed frequencies.
- Consider enabling mobile applications with existing prestandard wireless solutions such as 2.5G and 3G cellular data networks, but ensure that the application architecture can adopt new networks and networking technologies as they arrive.
- In your long-range plans, anticipate new options for distributed, mobile, and always-on networked business applications that are impractical or impossible to create using today's private and public wired and wireless data networks.

ABOUT THE AUTHOR

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