design FAQs

WiMAX Products And Services Roll Out

FREQUENTLY ASKED QUESTIONS

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What is WiMAX?

WiMAX means Worldwide Interoperability for Microwave Access. Also known as 802.16, it is an IEEE broadband wireless standard designed for high-speed wireless broadband access as an alternative to cable TV and DSL or 3G cell-phone access.

What is the status of the standards?

Both versions of the 802.16 standard are fully ratified. The earlier standard, 802.16d (also known as 802.16-2004), is the fixed wireless version. The mobile version is called 802.16e-2005.

Are chips and equipment available?

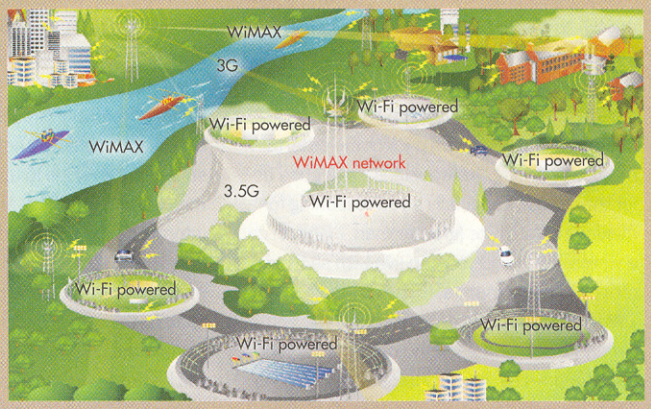
At least a dozen IC vendors supply RF and modem chips for the fixed version. New chips for the mobile version are also appearing. As for end products, several companies make fixed products, with mobile products on the way.

Is WiMAX still all hype and no service?

The hype is over, and real products and services are available. WiMAX has more users around the world than in the U.S. right now, but that is expected to change in 2008 as services from Clearwire and Sprint Nextel become available. Both companies are building out a nationwide network with roaming to offer data services from 1.5 to 5 Mbits/s.

What are its main applications?

Initially, WiMAX is being used as wireless microwave back-haul for Wi-Fi and other data services. But eventually, WiMAX will show up in adapter cards for laptops to provide longer ranges than Wi-Fi at broadband speeds up to several megabits/s depending upon the service provider's offerings. WiMAX also is expected to share the wireless space in laptops with Wi-Fi. And, WiMAX will be offered as an alternative to cable TV or DSL broadband access in areas where such services aren't available. Look for various forms of Voice over Internet Protocol (VoIP) over WiMAX as well. Some experts have even said that WiMAX could be a contender for one of the 4G cell-phone services.



1. WiMAX broadband wireless technology is a good fit with both urban and rural environments. Wi-Fi wireless local-area network (WLAN) technology is useful over shorter ranges (less than 300 feet), but WiMAX shines over longer distances of several several miles like cellular service. WiMAX is also used for Wi-Fi back-haul.

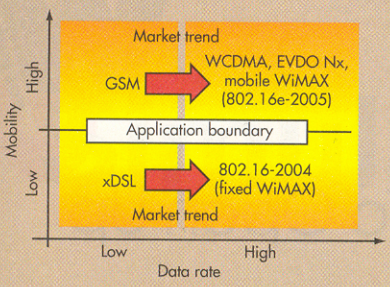
What bands does WiMAX use?

Available to some companies, the fully licensed 2.5-GHz band has been dedicated to support the fixed and mobile WiMAX standards in the U.S. WiMAX also is used in the 5.8-GHz unlicensed spectrum. The 3.5-GHz band is widely used outside the U.S.

What are the technical details?

Like most new wireless technologies, WiMAX is based on orthogonal frequency-division multiplexing (OFDM). It uses up to 2048 carriers in bandwidths that can vary from 1.25 to 28 MHz. The base modulation is binary phase-shift keying (BPSK), but its adaptive modulation scheme can switch to quadrature phase-shift keying (QPSK) or 16QAM (quadrature amplitude modulation) or 64QAM. The speed is also adaptive with data rates capable of reaching up to 75 Mbits/s. Most applications using 5 to 20 MHz of bandwidth will be in the 2- to 10-Mbit/s range.

The fixed version supports both time-division duplex (TDD) and frequency-division duplex (FDD) modes. The range from the basestation is up to several miles assuming a non-line-of-sight (NLOS) path. WiMAX also can use most advanced antenna technologies, like multiple-input multiple-output (MIMO), beam forming, and adaptive scanning to



2. The current evolution in wireless technology focuses on data rate versus mobility. Low-mobility (fixed) services like DSL have low to medium data rates, but fixed WiMAX will provide higher rates in the future. Cell phones using GSM/GPRS/EDGE provide mobility but low data rates. Higher data rates and higher mobility will come with the availability of mobile WiMAX.

improve data rate, range, and general reliability in mixed multipath conditions. The mobile version is expected to use 5- or 10-MHz channels and TDD only in a half-duplex mode.

What are some of WiMAX's implementation issues?

The biggest factor in adoption probably hasn't been the standards process itself, as it often is with other technologies. Instead, the lack of suitable spectrum has prevented companies from offering services. The unlicensed spectrum in the 5.8-GHz range is available any time, but many companies fear interference problems and have sought the sanctity of a licensed band. In the U.S., Sprint Nextel and Clearwire have had or acquired spectrum in the 2.5-GHz range that is ideal for WiMAX.

What version is expected to be the most popular?

Actual usage will eventually tell us that. In the meantime, the fixed version will serve the home and business broadband market and is even suitable for use in laptops. Most laptops aren't portable or mobile in the same sense as a cell phone. Instead, they're more accurately described as nomadic—fixed but moved around from place to place. However, the mobile version will be popular in cell phones and other mobile gear. The mobile version could end up in everything simply because of its greater flexibility and portability.

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