



Welcome to Your Internet Future

Mobile Broadband
Brought to You by WiMAX



Your Internet on the Go

If you had to go inside a coffee shop to make a call on your cell phone, you'd cry foul, right? So why treat it like a simple fact of life that you need to be within easy distance of a hotspot to get high speed Internet connectivity?

- WiMAX will do for broadband Internet access what the cell phone did for telephone service—give you access to the Internet while you're on the move.
- WiMAX will deliver Internet access speeds similar to DSL and cable connections, directly to your WiMAX enabled notebook computer or mobile Internet device.
- WiMAX won't replace Wi-Fi, but rather will fill in between hotspots and extend your Internet access on the go.

Intel is leading the next generation of mobility with innovative WiMAX technology for select Intel® Centrino® processor technology-based notebooks, ultra-mobile PCs, and mobile Internet devices (MIDs) that will dramatically expand your Internet experience.

Welcome aboard your mobile Internet future.

For more information, visit:
www.intel.com/go/wimax



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Disclaimers

Intel® WiMAX/WiFi Link 5050 Series modules are capable of receiving data at speeds up to 10 Mbps.

The 3 GHz frequency range is only supported by the full MiniCard form factor of the Intel® WiMAX/WiFi Link 5050 series.

Actual performance will vary depending on signal reception.

Up to 2x greater range and up to 5x better performance with optional Intel® Next-Gen Wireless-N technology enabled by 2x3 Draft N implementations with 2 spatial streams. Actual results may vary based on your specific hardware, connection rate, site conditions, and software configurations. See www.intel.com/performance/mobile/wireless/ for more information.

Requires Intel® Next-Gen Wireless-N technology and Connect with Intel® Centrino® processor technology certified Wireless N access point. Wireless N access points without the Connect with Intel Centrino technology processor identifier may require additional firmware for increased performance results. Check with your computer and access point manufacturer for details.

WiMAX connectivity requires a WiMAX enabled device and subscription to a WiMAX broadband service. WiMAX connectivity may require you to purchase additional software or hardware at extra cost. Availability of WiMAX is limited, check with your carrier for details on availability and network limitations.

Broadband performance and results may vary due to environment factors and other variables. See www.intel.com/go/wimax for more information.

Welcome Aboard Your Mobile Internet Future

You've fallen in love with Wi-Fi—being able to connect wirelessly to the Internet in your home, office, and from thousands of hotspots. Well, hold on to your Internet! Soon, a new wireless wind will be blowing over the landscape. WiMAX transmits broadband Internet connectivity for miles/kilometers, reaching into more of the places where we live, work, and play.

Imagine broadband on the go enabled by WiMAX:

- Engaging in an epic, multiplayer 3-D battle on a train
- Video conferencing from the park
- Looking up the nearest local bookstore or getting directions to a restaurant while on the move
- Downloading movies while at the soccer field
- Staying productive on the road without searching for hotspots

This is our future—and WiMAX will deliver it.

Icons Used in This Book

Throughout this little book, you'll see symbols that draw your attention to special information:



Tells you that we are zooming in on details about how WiMAX works and what it can do for you



Indicates special tips and notes that can help you adopt WiMAX more smoothly



Identifies technical information for readers who want to know the nitty-gritty behind what makes WiMAX work

Mobilizing Your Internet

A Wi-Fi hotspot is like an oasis in the desert. As you travel, your notebook connects to one Wi-Fi oasis after another to replenish your Internet thirst. In between and beyond these Wi-Fi watering holes are vast expanses of dead air where your notebook is unconnected. WiMAX will make these deserts come alive with the crackle of broadband Internet access.

What is WiMAX?

WiMAX combines the familiarity of Wi-Fi with the mobility of cellular that will deliver personal mobile broadband that moves with you. It will let you get connected to the Internet, miles from the nearest Wi-Fi hotspot. Soon, Mobile WiMAX will blanket large areas—metropolitan, suburban, or rural—delivering mobile broadband Internet access at speeds similar to existing broadband.

WiMAX is built for the future with advanced, efficient wireless technology that provides higher speeds than today's wide area wireless technologies. It will be able to completely transform your mobile Internet lifestyle, enabling you to connect in ways you've only dreamed about.

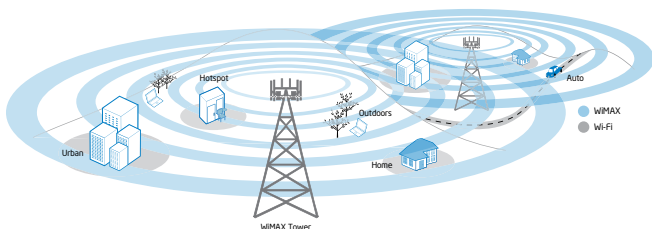


Figure 1. WiMAX blankets large areas with broadband Internet.

How Does WiMAX Work?

Think of WiMAX as taking the best part of cellular network access—the part that allows you to easily connect anywhere within your service provider's wide coverage area and taking the best part of your Wi-Fi experience—the fast speeds and a familiar broadband Internet experience. And combining them into a new wireless standard.



Expanding Your Wireless World. You'll be able to get WiMAX as a subscription or pay-as-you-go service that lets you take your broadband with you, similar to the way you receive mobile phone service.

WiMAX is a Wide Area Network (WAN) technology. Service providers will deploy a network of towers that will enable access over many miles. Internet access is instantly available anywhere within coverage areas. And like Wi-Fi, WiMAX is a standards-based technology that will unleash the benefits of open markets and global economies of scale to deliver the devices and services that consumers want.

WiMAX in Action

Dan is in a taxi when he starts having trouble with the Customer Relationship Management software on his notebook computer. He needs to assemble some information for the client meeting that starts in a few hours, and he can't get the report to work properly. Using the WiMAX network, he connects to the software provider's support site and allows a support technician to take remote control of his laptop to resolve the issue.

Imagine Broadband on the Go

Broadband that travels with you across town or across the nation makes all things Internet available on your terms. WiMAX enables the freedom and convenience that comes from having your Internet standing by where and when you need it—staying connected on the go to the people, communities, and resources that make up our lives.

Broadband on the go is your front row seat to all the rich multimedia Internet applications you already use, and exciting future possibilities enabled by Mobile WiMAX.

- **Playing in Real-Time.** Play multiplayer 3-D games, view YouTube* videos, listen to radio broadcasts—it's all there waiting to entertain you on the go.
- **Working Smarter.** WiMAX pulls productivity out of thin air. Capture lost time by doing things in areas previously unavailable. Working on the go changes the rules of competition by allowing you to be more productive.
- **Staying in Touch.** Broadband on the go is about keeping in touch with family, friends, and your communities using all the typical tools like e-mail and IM, but WiMAX adds face-to-face video conferencing and voice to your connections.
- **Locating People and Places.** WiMAX enables a spontaneous lifestyle. Location-based services creates a new paradigm in accessing real-time information where and when you need it.

- **Receiving TV and Radio on the Go.** There are just more streams of data available with WiMAX, so why not pipe broadcast television and radio into a Mobile WiMAX device? Radio stations already co-broadcast over the Internet. Mobile Internet-based TV transmissions also set the stage for content-on-demand services like movies and sporting events.

WiMAX in Action

Diane doesn't have time to stay late at the office. She packs up her notebook and heads home for dinner. While her daughter Hannah is getting ready for her soccer game, Diane turns her notebook on and checks her e-mail. Still no message from her client. Later, during the game, she gets the message using her WiMAX carrier, sends a quick response, and has one less thing to think about for the evening.

Get Ready for WiMAX

Major wireless service providers are already planning to roll out WiMAX, and Intel is enabling mass market adoption of WiMAX in notebooks and other mobile Internet devices similar to the way it enabled Wi-Fi in notebooks.

WiMAX is a global, standards-based technology that is being adopted and deployed in many countries around the world. For example, two carriers in the U.S., Sprint and Clearwire, will be deploying WiMAX services in 2008, and over 100 carriers are currently trialing Mobile WiMAX around the world.¹

¹ WiMAX Forum database of publicly announced Mobile WiMAX trials.



Wireless Providers Maintain the WiMAX Network.

The WiMAX network is supplied by a wireless provider. Once you sign up for service, you can access a WiMAX network using your notebook or any WiMAX enabled mobile Internet device.

WiMAX in Action

Elise walks by a downtown park on her way between meetings. She gets a telephone call. It's her son calling from college, and during the call, he asks for some book money. After they finish talking, she sits down on a bench with her notebook for a moment and transfers money into his account. And there's still plenty of time before her meeting.

WiMAX/Wi-Fi Synergies

WiMAX takes your wireless Internet further, but you don't have to burn any Wi-Fi bridges. WiMAX and Wi-Fi are perfectly compatible companions. Together, they give you an always-best connected experience whether you are in a Wi-Fi or WiMAX coverage area.



Figure 2. WiMAX/Wi-Fi synergies enable integration of both wireless technologies into notebooks and mobile devices.



Intel Wi-Fi/WiMAX Solution. With dual mode Wi-Fi/WiMAX technology from Intel, your notebook and other mobile devices can use both Wi-Fi and WiMAX networks.

WiMAX in Action

Lynn and Scott have spent the morning and early afternoon making presentations at an industry conference, and they're getting hungry. Lynn needs to download an updated product demo. Walking over to a nearby restaurant, her WiMAX connection is downloading what she needs.

WiMAX Built-In: From Notebooks to MIDs

WiMAX built into a wide variety of devices creates all the new capabilities our imaginations can muster.



Freedom of Choice. The real beauty of a standards-based WiMAX wireless network is your freedom of choice when it comes to the devices and services you want to use on it.

Your next notebook based on Intel® Centrino® processor technology, which can include Intel's innovative, integrated Wi-Fi/WiMAX chips, can enable you to experience a new level of mobile Internet. You wouldn't think of not having Wi-Fi in your notebook—in the future you will feel the same about WiMAX.

But WiMAX promises more than broadband on the go for notebook computers. WiMAX chips can be embedded into everything from gaming consoles, digital cameras, and home entertainment systems to utility meters and appliances.

**The Next Little Thing: Mobile Internet Devices (MIDs).**

Intel's latest ultra-mobile platform, to be introduced in the first half of 2008, powers a new type of handheld—the MID. These devices will expand your Internet experience options beyond the cropped versions available in many of today's handhelds.

WiMAX in Action

On the way home from school, John goes online with his WiMAX enabled handheld device and chats with some friends. They decide to see a movie, so John connects to a movie site and selects the theater closest to the mall. He and his buddies watch streaming movie trailers to make their choice and buy their tickets online. Before heading out from home, John prints out the tickets, and synchronizes an MP3 playlist with the media server.

Making WiMAX Fly

A huge ecosystem of companies have coalesced around WiMAX to deliver on the promise of open, standards-based, interoperable wireless broadband built for the Internet. Why do you care? Well, standards deliver the benefits of cooperation and competition to consumers in product choices and innovation.

Why WiMAX?

WiMAX success stems from a robust vision incorporating four key strengths:

- Open standards-based, interoperable technology built from the ground up for the Internet fosters innovation and competition.
- Vibrant, growing ecosystem of industry leaders such as Intel, Sprint, Clearwire, Motorola, Samsung, Nokia, Cisco, and hundreds of other companies.
- Global economies of scale and more attractive intellectual property environment that enable lower costs compared to other wireless technologies.
- Advanced wireless technology that enables a faster wireless broadband solution for doing more on the go.



Intel's Role in WiMAX. Since very early in the development stages, Intel has played a large role in creating the WiMAX standard. The company has made significant capital investments worldwide to help meet regulatory and deployment challenges, in addition to the development of the technologies themselves.

The Joy of Open Wireless

WiMAX is a robust standard designed for the Internet. It's born from the same open-standards approach that made Wi-Fi so successful.

Nurturing WiMAX deployment in the real world is the WiMAX Forum, a large industry-wide collaboration that works to ensure that WiMAX service and products work together seamlessly.



Mobile WiMAX Standard. Mobile WiMAX is based on the IEEE 802.16e-2005 standard. And like the Wi-Fi standard (IEEE 802.11), IEEE 802.16 will continue to evolve with new innovations and features.

WiMAX in Action

Mary is a college student. On the quad between classes, she uses the campus WiMAX network to check a syllabus and find out whether her exam grade has been posted yet. She has a little time, so she writes a blog entry before heading to class. Walking into the lecture hall, she connects to the Wi-Fi network and downloads today's lecture presentation. Mary's next lecture is by a remote professor overseas via video feed. It's a beautiful day, so she decides to sit outdoors and participate in the lecture using the WiMAX network. The professor is covering complex topics, so Mary records the session to watch again later.

Certified WiMAX

WiMAX Forum Certified means anyone can buy a product or service based on the IEEE 802.16 standard from different companies and be confident that everything will work together. This method follows the successful approach that 802.11-based Wi-Fi networks used. The IEEE 802.11 standard set the requirements, and the Wi-Fi Alliance ensured product compliance for interoperability.



Figure 3. Look for the WiMAX Forum Certified logo on WiMAX products.



Collaborative Effort. The WiMAX Forum (www.wimaxforum.org) is an industry-led, non-profit organization with more than 500 members, among them equipment manufacturers, component suppliers, and service providers. Intel is a founding member of the WiMAX Forum and provides executive leadership.

Built for the Internet

WiMAX is built from the ground up for Internet applications, services, and security, with architecture specifically designed to seamlessly extend the Internet to mobile users. Because WiMAX is built on Internet protocol (IP) networking, it supports all the latest IP security and quality of service (QoS) standards. WiMAX support of QoS standards enables real-time media like Voice over IP (VoIP) and streaming video.



Advanced Wireless Security. WiMAX supports advanced security features to protect information as it travels across the airwaves. For example, it supports AES (Advanced Encryption Standard), a state-of-the-art security technology that encrypts data as it passes between the client and the base station.

How WiMAX Works

So how does WiMAX transmit the Internet over the landscape? The WiMAX network uses an approach that is similar to that of cell phones. Coverage for a geographical area is divided into a series of overlapping areas called cells. Each cell provides coverage for users within that immediate vicinity. When you travel from one cell to another, the wireless connection is handed off from one cell to another.



A Wireless for All Reasons. The WiMAX standard supports mobile, portable, and fixed service options. This enables wireless providers to offer broadband Internet access to areas underserved by telephone and cable companies. For fixed WiMAX deployments, service providers supply Customer Premises Equipment (CPE) that acts as a wireless “modem” to provide the interface to the WiMAX network for a specific location, such as a home, cafe, or office. WiMAX is also well suited for emerging markets as a cost-effective way to deliver high-speed Internet.

The WiMAX network includes two key components: a base station and a subscriber device. The WiMAX base station is mounted on a tower or tall building to broadcast the wireless signal. The subscriber receives the signals on a WiMAX enabled notebook, mobile Internet device (MID), or even a WiMAX modem.



Intel Enables Adoption. Intel is enabling mass market adoption of WiMAX in notebooks similar to the way it enabled Wi-Fi in notebooks. Intel has taken advantage of synergies between Wi-Fi and WiMAX with an integrated Wi-Fi/WiMAX solution that minimizes space used within portable devices.

WiMAX in Action

Tom starts his day in a coffee shop, checking his e-mail while participating in a conference call using Wi-Fi. He has to be at a client site by 10:00 a.m., so he checks the traffic report and estimated drive time. It's time to leave before he has handled all of his e-mails, so Tom switches over to the WiMAX network and voice mode. He uses the text-to-speech feature in his e-mail software to listen to his messages in the car while he downloads an updated customer presentation and project data. He arrives at the client location, and he's ready for action.

What's Behind those Bars?

Those bars on your cell phone or wireless notebook tell you the strength of your wireless signal. Behind those graphic indicators is the world of wireless communications.

Wireless networks travel through the air using radio signals that operate on given frequencies, called spectrum. Over distance, signals weaken because of weather, buildings, and even foliage. This is why wireless networks rely on multiple towers with broadcasting areas that overlap to blanket a large region.



Licensed to Thrill. Spectrum is either licensed or unlicensed. Unlicensed spectrum is open to any users, which raises the possibility of interference from other devices. Wi-Fi networks use unlicensed spectrum. WiMAX service providers use licensed spectrum, which allows exclusive rights to its use for more predictability and stability.

WiMAX is built on advanced wireless technologies that counteract the effects of interference to deliver more data at greater ranges.



Souped-Up Wireless. Two key advanced wireless breakthroughs incorporated into the Mobile WiMAX standard are Orthogonal Frequency Division Multiple Access (OFDMA) and Multiple Input/Multiple Output (MIMO) smart antenna technology.

- **OFDMA** breaks a signal into many independent pieces before transmitting it across the airwaves in order to increase spectral efficiency. By diversifying the signal in this way, even if some of the pieces don't make it through, the signal can still be reconstructed on the other end.
- **MIMO** uses multiple antennas at both ends of the wireless connection (base station and subscriber device) to enable data to travel along multiple independent paths. For example, a 1x2 configuration refers to a device with 1 Tx (transmit) and 2 Rx (receive) antennas; similarly, 3x3 refers to 3 Tx and 3 Rx antennas.

Both of these technologies effectively place more data into the available airwaves to increase throughput and/or coverage. MIMO is particularly beneficial in high interference environments, like urban centers.

WiMAX in Action

Dana is sitting on a commuter train on her way home. She looks ahead to a typically busy evening, with a rushed dinner followed by her daughter's dance recital. Reflecting on the challenges of fitting everything in, she uses her WiMAX provider to download software updates for her operating system and security software, backs up her notebook using an online service, and then indulges in a game of Web backgammon.

Moving Your Mobility Forward

Broadband that travels with you enables new freedom and convenience that comes from having your Internet standing by where and when you need it to stay connected to the people, communities, and resources that make up our lives.

Designed from the ground up for the Internet and born from the same open-standards approach that made Wi-Fi so successful, WiMAX will provide the benefits of cooperation and competition to consumers in product choices, innovation, and competitive prices.

Get ready to move your mobility forward with WiMAX.

Major wireless service providers are planning WiMAX service roll-outs, and Intel is leading the next generation of mobility with innovative WiMAX technology for Intel® Centrino® processor technology-based notebooks and mobile Internet devices.

WiMAX FAQs

- **What does WiMAX offer me?**

WiMAX is a new way of subscribing to mobile Internet access through a wireless connection, direct to your service provider. It gives you reliable, convenient broadband access on the go, for real-time information and entertainment.

- **Does WiMAX replace Wi-Fi?**

No. WiMAX and Wi-Fi are complementary technologies. WiMAX can fill in gaps between Wi-Fi hotspots, extending your wireless reach.

- **Do I need special equipment to connect to WiMAX networks?**

Yes. A single Intel wireless solution can deliver both WiMAX and Wi-Fi access to your notebook. Look for Intel® Centrino® processor technology-based notebooks with Intel® WiMAX/WiFi Link 5150 or Intel® WiMAX/WiFi Link 5350 coming soon.

- **Do I need to set up the WiMAX access point like I did for Wi-Fi?**

No. All you need is your WiMAX enabled device and either a subscription or pay-as-you-go plan, and you can connect to a network maintained by a service provider offering WiMAX service in your area.

- **If I switch service providers, can I take my equipment with me?**

Yes. WiMAX equipment is based on open standards, just like Wi-Fi.

WiMAX Glossary

Access Point. A device that distributes Wi-Fi signals to and from a wireless local area network.

Base station. The central radio transmitter/receiver from which a service provider broadcasts WiMAX signals. Typically mounted on towers or tall buildings.

Broadband. A general term for subscription access from an Internet Service Provider at speeds of 1 Mbps (million bits per second) or higher.

Customer Premises Equipment (CPE). Equipment installed at a customer's location for fixed WiMAX deployments.

Intel® Next-Gen Wireless-N. Advanced Intel Wi-Fi technology based on the IEEE 802.11n specification that provides up to 2x greater range and up to 5x better performance than previous 802.11 standards.

Local Area Network (LAN). A data network that covers a relatively small geographic area, such as a building or cluster of buildings, typically measured in feet/meters. Wi-Fi is a LAN technology.

Wide Area Network (WAN). A data network that covers a relatively large geographic area, such as a whole town, typically measured in miles/kilometers. WiMAX is a WAN technology.

Wi-Fi. The set of local-area mobile wireless technologies based on the 802.11 standard, with range up to a few hundred feet/meters from an access point.

WiMAX. The wide-area mobile wireless technology based on the IEEE 802.16 standard, with range up to a few miles/kilometers from a base station.

Get Ready for Your Mobile Internet Future

Hold on to your Internet! WiMAX will soon be blowing broadband Internet over the landscape, reaching into more of the places where we live, work, and play.

- WiMAX will do for broadband Internet access what the cell phone did for telephone service—give you access to the Internet while you're on the move.
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