


# Cutting Loose

**New wireless technologies are transforming the way we work and play, freeing us from the constraints of the cord.**





**You don't have to be old—or even in high school—to remember the days when mobile broadband was more a bad joke than a great technology. Sure, you could read e-mail on your phone—if you had an hour or two—or download a ring tone, but the feature list was small and the frustrations large. It's a good thing, then, that that's all history. Today's mobile networks are faster and more capable than ever, bringing true broadband speeds and powerful connectivity to anyone with a phone, PDA, or laptop. And this is just the beginning. New technologies promise to transform all aspects of wireless communications—and, in the process, the way we work and play.**

This next wave of mobile broadband, which is already starting to roll out, will let you surf the Internet at high speed from buses, cars, trains, and—if you're really in a crunch—the train platform, too. Forget clunky television streaming to your handset; broadcasts will be sharp and smooth, with CD-quality sound. You'll take part in videoconferences via your phone and access your office files at speeds that rival your office network, no matter where you happen to be.

For all of these nifty new features, you can thank some slick new technology, but you can thank yourself, too. With nearly two-thirds of the U.S. population already subscribing to a wireless phone service, network operators aren't expecting to see big numbers of new subscribers. Indeed, after years of double-digit growth, the pool of wireless customers is expected to grow by just 8.5% annually through 2009, according to the Telecommunications Industry Association (TIA), the leading trade association for the information and communications technology industry. To bring in new revenue, wireless operators are looking to new services.

### **Mobile and Robust**

If there's one service users want, it's broadband-to-go. Revenue generated by Wi-Fi hotspots—the wireless Internet access points users can now tap into at seemingly every airport, hotel

lobby, and Starbucks—more than doubled in 2005, to \$330 million, according to the TIA. “Consumers want the Internet to be mobile,” says Grant Seiffert, executive vice president of TIA and, starting January 1, its president. “The networks are becoming more robust to handle the content and applications consumers are demanding.” Business users want mobile broadband, too. “You'll have a salesman who needs to download a spreadsheet before getting on an airplane,” says Seiffert. “With mobile broadband, he'll be able to tap in anywhere, anytime.”

Today's 3G, or third-generation, mobile networks were designed primarily for voice traffic, not data. But recent and ongoing improvements to 3G technology have helped these networks do a better job handling data-intensive tasks, such as streaming video to users and letting them surf the web. Over the past couple of years, Verizon Wireless and Sprint Nextel have upgraded their networks to EV-DO (for Evolution-Data Optimized), a mobile broadband data standard that enables significantly faster transmission speeds that rival those of a DSL line or cable modem.

For voice users, the speed improvement may not mean much—after all, their calls made it through on the slower, older networks—but for users who want to access the Internet remotely, EV-DO means broadband without scrambling to find a nearby Wi-Fi hotspot. By plugging a



# THE WIRELESS REVOLUTION

A new generation of mobile communications is on its way to keep you seamlessly connected.

Mobile wireless networks are the ultimate work in progress. Every month, it seems, they get a little faster, a bit more reliable, and offer one or two new bells or whistles. But if keeping up with the technology today seems challenging, get ready: A revolution is coming.

The next generation of mobile communications promises not only more speed but also all manner of sophisticated applications—think videoconferences, interactive online games, and real-time trades on your mobile phone—at user-friendly prices. This technology will be embedded in all avenues of personal electronics, from handsets to digital cameras, gaming consoles, mp3 players and TVs, creating a broadband wireless fabric that blankets users in all their environments.

The brilliance of these technologies enables not just performance but unprecedented lower costs, allowing connections for voice and the Internet for the vast stretches of the globe unserved by today's wired networks. It's enabling cities to offer wireless broadband access to its residents, it's giving first responders secure, self-healing, intelligent mesh connections, and it will be here much sooner than you might think.

"There's a lot of excitement about wireless broadband," says Greg Brown, president of Motorola Inc.'s Networks and Enterprise. "Networks are going to be as fast and capable outside as they are inside. We're going to see an unprecedented level of interactivity."

This next wave of mobile broadband is built entirely on IP, fostering an open development environment that encourages rapid, competitive innovation. Adopting the foremost advances from the world's expert community of engineers and scientists, new technologies such as WiMAX promise mobility with speeds over ten times that of the T1 lines businesses commonly use to connect with the Internet.

WiMAX has some big boosters for many good reasons. WiMAX complements current wireline and wireless systems, cost-

effectively extending the reach of existing networks. Simple, self-install WiMAX devices offer alternatives to wired DSL or cable modems—reducing operator expense.

WiMAX will provide users with seamless mobility, plus the ability to work (and maybe catch a football highlight or two) without worrying about where they are. "You'll be able to go about your life, whether you're in your office, at home, or in transit, and take all of your services, content, and applications with you," says Raghu Rau, senior vice president for strategy and business development at Motorola's Networks and Enterprise.

Motorola—which has earned its mark as a leader in bringing WiMAX to market—is uniquely positioned to spur the WiMAX revolution. Its MOTOwi4™ portfolio, that also includes fixed, mesh, and broadband over powerline networks, enables operators to build WiMAX networks, and will let people experience a host of cool applications.

And make no mistake: The applications will be compelling, with WiMAX chips expected to be embedded in countless consumer-electronics devices—just as Wi-Fi chips are today.

Just as compelling, says Motorola's Brown, will be WiMAX's economics. Up until now, the delivery of high-level mobile content has been hindered as

much by cost as by technology. WiMAX's open standards and interoperability among products are expected to make the solutions appealing to operators of all shapes and sizes—cable, telcos, cellular, municipalities, enterprise, and new entrants. "With WiMAX, mobile broadband data will become accessible and affordable to the average consumer," says Brown.

The message is getting out. Already, Sprint Nextel and Clearwire Corp. (a service provider created by wireless pioneer Craig McCaw) have announced that they will be using Motorola WiMAX equipment. It's a shot in the arm for a new technology—and a step closer to a new world of communications. ■



special EV-DO wireless card into their laptop, users subscribing to Verizon's BroadbandAccess service (\$59.99 per month with a two-year commitment and a qualifying voice plan) can surf the web, check their e-mail, and work as efficiently on the road as they do in the office. It literally works on the go, too: Users can access the Internet while riding in a moving vehicle. (A competing, somewhat slower mobile broadband standard, called EDGE—for Enhanced Data rates for GSM Evolution—is used by Cingular Wireless and T-Mobile.)

Mobile networks aren't going to replace the wired or Wi-Fi systems now in use in homes and offices, but complement them. Not surprisingly, then, device manufacturers are coming up with innovative new ways to integrate all the networks in your life, creating products that can work in different communication modes: Wi-Fi one moment, cellular the next. And the software that runs these devices is smart enough to know which network it should connect you to at any given moment.

### Double-duty Phones

Motorola Inc. has already announced the A910, a dual-mode phone that leverages both Wi-Fi and cellular networks. Essentially, this is a mobile handset that contains two radios: one that works with Wi-Fi networks and one that works with cellular networks. Multi-mode phones like this are a real draw because they can help users stay productive while realizing significant cost savings.

Here's how they work: When your phone detects that you are within range of a Wi-Fi network, it operates in Wi-Fi mode, allowing you to make Voice Over IP, or VoIP calls, which travel over the Internet (or private data networks) and generally cost far less than traditional cellular calls. When the phone fails to detect a Wi-Fi network, it automatically logs on to your cellular provider's network. The idea is that you'll be making the more expensive cellular calls only when you have to, keeping costs down. Analysts have big expectations for



dual-mode phones: Shipments are expected to top 300 million units in 2011, according to ABI Research, a market research firm based in Oyster Bay, N.Y.

Laptop manufacturers are also starting to embrace dual-mode connectivity. One of the first companies to take the leap is Panasonic, which has spent the past 13 years focusing on mobile, connected laptops. Known primarily for its ruggedness,

Panasonic's Toughbook line features magnesium alloy cases, shock-mounted removable hard disks, and extremely long battery life (in some models, over ten hours per charge). With models ranging from fully rugged to ultra-lightweights (just over three pounds), Panasonic is pumping up its wireless capabilities, as well.

Its three newest Toughbook models—the ultra-portable (3.1-pound) CF-W5, the tablet-format CF-T5, and

**Mobile networks aren't going to replace the wired or Wi-Fi systems now in use, but will complement them. That's why manufacturers are coming up with products that work in various communication modes.**

the big-screen (14.1-inch), lightweight (3.7-pound) CF-Y5-feature integrated Wi-Fi radios. But they also offer optional compatibility with high-speed data networks from Cingular, Sprint Nextel, and Verizon. There are no PC cards to install; both wireless radios, Wi-Fi and cellular, are embedded on a chip built into the computer. Onboard software detects what networks are available and switches the user from Wi-Fi to mobile broadband as needed, all without requiring any input from the user.

### Reliability Plus Speed

"These laptops let us make wireless access seamless," says Victoria Obenshain, director of wireless strategy at Panasonic Computer Solutions Co. "People who use laptops, whether for business, personal use, or both, don't just

want reliable laptops, but access from anywhere, especially as the wireless carriers move to higher-speed networks that can support all sorts of new applications."

Panasonic's strategy is to combine all-terrain reliability with all-mode connectivity to create, in effect, the ideal laptop. The company is so confident it has hit on a winning combination that, while it has historically marketed its Toughbook line to specific niches—military, government agencies, and first responders, among them—it is taking its laptops to a far wider audience, particularly the large multinational companies with growing and often-unmet mobile connectivity needs.

Within six months, Panasonic will have nine products, virtually its entire product line, featuring embedded dual-mode wireless—everything from ultraportables and laptops, to

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tablet displays that let remote workers capture and send data in real time to a central database, a particularly handy capability, for example, for health-care workers collecting patient data. "It's going to be the broadest line of embedded wireless products in the world," says Obenshain. "Users will be able to turn on a device and get the kind of productivity they need throughout the entire day, regardless of location. It will radically improve how work gets done."

### Citywide Coverage

It is not just the wireless providers and laptop manufacturers who are fueling the mobile broadband boom. Several metropolitan areas, including Philadelphia and the Silicon Valley region, have initiated projects to build Wi-Fi networks encompassing their entire jurisdiction. In theory, it will be low-cost Wi-Fi for everyone, anywhere, even though just how "low-cost" remains to be determined.

Philadelphia's project, one of the furthest along, uses Wi-Fi mesh technology—where a series of Wi-Fi hotspots are connected to each other—to create what will be a 135-square-mile network when it is completed later this year. Community groups will be able to add local content and training programs, and low-income residents will be able to access the network at a reduced monthly fee. Free access will be available in certain parks and other common areas. The city itself hopes to benefit, too: According to Wireless Philadelphia, the nonprofit organization overseeing the project, the citywide hotspot could lead to the creation of over 6,000 jobs.

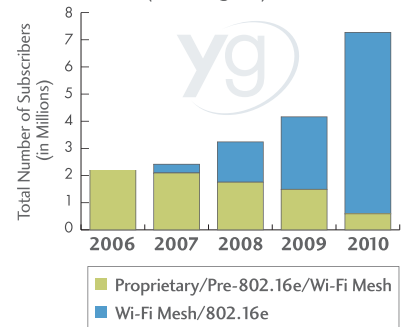
Further down the road—maybe not too far—are new technologies that promise to greatly expand the capabilities of mobile broadband. But before providers can launch their next-generation broadband services, they need to find room on the electromagnetic spectrum, the frequencies over which radio signals transmit. In September, the Federal Communications Commission,



the global connectivity experts™

## By 2010, there will be 7.3 million broadband wireless subscribers in the United States.

US Emerging Broadband Wireless Forecast (Excluding 3G)



## Traditional business models will fall to the wayside.

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- ▶ **First Annual Mobile & Personal Broadband TechZone at CES**  
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Beijing, April 18-20, 2007
- ▶ **WiMAX World Europe Conference & Exposition 2007**  
Vienna, May 29-31, 2007

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which governs the allocation of these frequencies, completed the auction of 1,087 licenses in spectra designated for advanced wireless services (netting the federal government close to \$14 billion in the process). The 104 winning bidders—both established wireless providers and smaller upstarts—can now use their new space to expand and improve existing mobile services or launch sophisticated new ones.

“It was the largest amount of spectrum suitable for wireless

broadband ever auctioned, and it will enable faster, better-quality services and more applications,” says the TIA’s Seiffert. “This is going to be wireless service on steroids.”

As networks become more powerful, so, too, will the devices that work with them. The new networks will be able to handle video, data, and voice. Even more significantly, they’ll be able to handle them simultaneously. Mobile handsets and other wireless devices are going to have to keep up. “We’re going to see more of the

current drive to create that one device capable of doing everything,” says Seiffert. “You’ll be able to surf the web, view video, and hold a teleconference with 20 colleagues. And you’ll be able to do it all with one device that fits in your hip pocket.”

### Multiple Standards

Within the mobile broadband community the big and unsettled question is not what we’ll be doing on our high-speed networks five years down the road, but which technology is going to make it all possible. It could well be that more than one technology will prove successful; the wireless industry—unlike, say, the video recording industry—has a track record of embracing multiple standards, which is why your cell phone may work fine in the U.S. but be useless in Europe.

One thing, however, is certain: The current third-generation networks, as enhanced as they may be, aren’t going to be able to handle all the data-intensive applications now on the drawing boards. “The challenge for mobile broadband is to get ten, even 20 times the speed we get today,” says Eliot Weinman, president and CEO of Trendsmedia, Inc., an integrated media firm serving emerging technology markets. “A

## MOBILE VIDEO BROADCASTING

**D**on’t be surprised if the future of television looks a lot like its past. Over the last few years, wireless carriers have been rolling out video programming for mobile handsets, everything from music videos to sports highlights. But transmitting video—which involves sending enormous amounts of data—can be hugely taxing on mobile networks. The problem is that video is commonly sent via a technique known as unicasting: a transmission from the network to a single user. Send a bunch of unicasts at once and you’ve got a big drain on the network.

The solution is something traditional broadcasters have been doing all along: sending one signal to multiple users. Called multicasting, it’s a far more efficient way to beam video, simply because you only have to beam it once. But what’s come easy to old-school broadcasters has proved difficult for wireless providers, and only now is the technology to multicast starting to emerge. The

good news: When it does go into commercial operation—within the next year—multicasting technology will transform the quality, and popularity, of mobile television. Viewers will see fluid video (forget the midstream pauses due to network delays) with clear sound. And expect a lot of viewers: 511 million video subscribers worldwide in 2011, according to ABI Research, a market research firm in Oyster Bay, N.Y.

One of the first multicasting systems will be launched by Verizon Wireless, which announced last December that it would be partnering with a company named MediaFLO USA Inc. to power its next-generation video programming. MediaFLO and a competing technology called DVB-H (for digital video broadcasting—handheld) are expected to be the main drivers of multicasting, capable of broadcasting not only shows but advertising as well. Seems the new wave of television really will resemble the old. ■

# SEAMLESS AND SIMPLE

Thanks to low-cost, low-grief technology, Wimatex is bringing anywhere/anytime broadband closer to reality.

The promise of mobile broadband—anytime, anywhere, high-speed Internet access—is set to become a reality early next year in the Netherlands when a Swiss company named Wimatex rolls out the world's first border-to-border, fully mobile wireless broadband network. Users will be able to surf the Internet, watch videos, and play graphics-intensive games—in other words, do all the things they now do on traditional broadband networks, whether they are sitting in a café in Amsterdam or stuck in traffic.

Thing is, they won't have to work hard to do it. The Wimatex technology makes mobile access seamless and simple. Users will be able to move around the country without losing their Internet connection, even when driving at speeds of up to 95 miles per hour. They'll be able to make low-cost, high-quality Voice over IP (VoIP) telephone calls. And they'll do it all without the need for expensive new hardware.

The Wimatex technology is based on a high-speed wireless standard known as HC-SDMA (for High Capacity-Spatial Division Multiple Access). An array of base stations is used to provide coverage throughout a country. One of the key advantages is that HC-SDMA doesn't require a huge number of stations to cover great swathes of territory; the Netherlands, for example, will require just 320 base stations for the entire nation. This means that Wimatex networks can be launched quickly and at minimal expense, especially when compared to traditional wired networks. The technology will enable developing countries to bring broadband access to their citizens without laying expensive cables.

Another big plus is that the Wimatex technology is designed from the ground up to handle data. As an Internet Protocol (IP) network—just like the Internet itself—Wimatex integrates easily with other IP networks, such as those operated by local Internet service providers (ISPs). This enables Wimatex to

partner with ISPs to provide users with mobile broadband as a low-cost add-on to their existing Internet service. At home or in the office, users will access the Internet through their ISP; on the road, they will access it through the Wimatex mobile network, using their same user name and password.

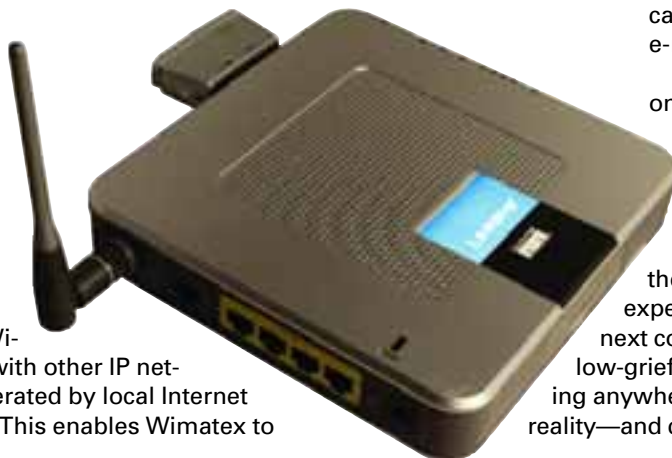
Perhaps the real key to Wimatex, however, is just how easy it will be to access the mobile network no matter where you are or what device you are carrying. Laptop users can install a special PC card to access the Wimatex network from any location in the Netherlands; visitors to the country will be able to rent the PC card when they land at the airport, or they can log on from any Wi-Fi hotspot. Wimatex is even developing a tiny battery-powered Wi-Fi access point that users will be able to carry around with them for anytime/anywhere access to the network.

Users who don't need all the bells and whistles of mobile Internet access and simply want to make VoIP calls have a Wimatex solution, too. Instead of lugging around a laptop, they can use special dual-mode, Wi-Fi—and cellular-compatible phones from Nokia and other manufacturers, and purchase pre-paid Wimatex minutes (two cents per minute to 54 countries) at telephone shops throughout the Netherlands. Wimatex VoIP users each get two phone numbers (so they can separate business and personal calls); since the network is IP-based, voicemail messages can be sent as audio files to any e-mail inbox.

Wimatex users won't be the only ones hitting the road. The company itself has travel plans.

Its Netherlands network is just the first in a planned series of mobile broadband systems, with other countries—including the United States and Canada—expected to come online within the next couple of years. With its low-cost, low-grief technology, Wimatex is bringing anywhere/anytime broadband closer to reality—and closer to home. ■

**Wimatex mobile  
Wi-Fi can access  
points anywhere,  
and reduce the  
expense of  
today's traditional  
networks.**



3G network is based on voice, and once you push into video and data it becomes all too apparent that the network just isn't designed for that."

A growing number of industry players, including Intel Corp. and Motorola, are looking to an all-new technology known as WiMAX, or Worldwide Interoperability for Microwave Access, to provide the backbone for future mobile broadband services. Unlike current 3G networks, WiMAX networks are designed specifically for data while supporting voice even more efficiently than today's 3G networks.

Ironically, WiMAX wasn't originally intended for mobile communications, but for use in fixed, stationary zones, much like Wi-Fi. The difference was that WiMAX can support ranges far in excess of Wi-Fi, covering miles instead of feet. (Just how many miles is another unsettled question, with estimates ranging from five to 30 miles, depending on where the network is installed and what obstructions might hinder the signal.) Fixed WiMAX can bring broadband access to remote communities where the high cost of laying cables had hampered efforts to install high-speed wired networks.

But the newer, mobile version of WiMAX is where experts expect to see the most action. ABI Research projects that mobile WiMAX sales will surpass those for fixed WiMAX in 2008—no small feat considering that the first commercial mobile WiMAX networks aren't expected to launch until 2007 or 2008. Like cellular systems, the mobile version of WiMAX will use towers stationed across a large geographic area. As you move, even at vehicular speeds, the system hands you off from tower to tower so that your calls (or Internet sessions) aren't dropped. Mobile WiMAX won't have quite the speed of its fixed counterpart, topping out at about 15 megabits per second compared to some 40 Mbps, but that will still be many times the speed of any wireless network in place today. [www.fortune.com/sections](http://www.fortune.com/sections)

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### Pick and Choose

As an open standard, WiMAX will enable interoperability between products made by different manufacturers, just as Wi-Fi does today. Users won't be saddled with proprietary systems but will be able to pick and choose among a wide range of products. That's expected to keep costs down. First, however, products need to be certified as being WiMAX compliant, a process that has suffered delays but is starting to gain momentum, with some 30 products now certified and many more expected soon.

One of the biggest boosts for WiMAX is expected to come from Intel, which plans to incorporate WiMAX technology—along with Wi-Fi—in its laptop chips by 2008. Other consumer-electronics products, including digital cameras, portable videogame players, and PDAs, may build in mobile WiMAX, too, just as many of them incorporate Wi-Fi today. "You won't even have to know whether you're on a Wi-Fi or WiMAX network. You'll just know you're connected," says Tara Howard, an analyst with Yankee Group's Broadband Access Technologies Decision Service. "Putting chips in consumer devices is going to help foster the adoption of WiMAX."

Don't be surprised, then, if dual-mode devices eventually become multi-mode devices, able to connect to Wi-Fi, WiMAX, and cellular networks. At Motorola, multi-mode phones are already in development and the first WiMAX devices are anticipated in 2008, according to Raghu Rau, senior vice president for strategy and business development at Motorola's Networks and Enterprise unit.

Of course, as mobile broadband

becomes more intertwined with consumer electronics, the business models will need some adjustment. Users aren't going to want to pay multiple subscription fees so their phones, laptops, and cameras can all access mobile networks. "What you're going to see is an extension of the Wi-Fi business model, where you can turn on a laptop at an airport and buy 24 hours of access," says Phil Marshall, a vice president at Yankee Group. "You're going to be able to use the network when you need it, for as long as you need it."

All of which is good news, indeed. Along with faster speeds, advanced new services, and unprecedented productivity, the next wave of mobile broadband also promises to deliver instant gratification, the key ingredient today's fast-moving consumers crave. ■

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