

# WIRELESS BROADBAND: THE LONG AND

Truly pervasive, high-speed mobile data services won't happen overnight

BY GALEN GRUMAN

**F**IRST, THE GOOD NEWS: FOR companies planning to deploy broadband connectivity to their mobile workforces, the options have never looked better. Initial rollouts of 3G (third-generation) cellular data technology are fulfilling the technology's promise. Sales and field forces can connect to the Internet and corporate applications from virtually anywhere, network speeds are reasonable, and deploying the technology requires only minimal IT investment.

"We didn't run into a single issue," says Randy Cairns, assistant vice president for distributed technology at American Republic Insurance, which has begun a pilot program using Sprint 3G service and expects to roll out the technology to 200 salespeople in the next year. Cairns' comments echo those of other early adopters who have been happy with the ease and low cost of cellular data deployment.

Now for the bad news: Although current 3G offerings are a good start, the path toward a truly ubiquitous, high-speed wireless world is murky. Mobile WiMax, the wireless broadband technology that's touted as offering landline performance to mobile users over wide

areas, is at best several years away, and some analysts feel it may never fulfill its promoters' promises.

## Exploring 3G Options

On the positive side, U.S. cellular carriers are finally offering data services that get the job done. Enterprises can subscribe to 3G technologies from three major companies: Sprint Nextel, Verizon Wireless, and Cingular Wireless (see "3G Services Compared," page 36). A fourth carrier, T-Mobile, markets data services but only supports GPRS (general packet radio service) technology, which provides dialup speeds rather than true 3G service.

For each of the various cellular technologies deployed today, the actual throughput users can expect depends on geographic location, network load, and distance from the cell tower, among other factors. Each carrier also offers fallback to a slower network for rural locations and other areas where broadband service is unavailable.

That flexibility is critical for American Republic, Cairns says. The insurer's salespeople tend to go to customers' homes, and having online access when talking to prospective customers is a big benefit. With average connection

speeds of its Sprint EvDO (evolution, data optimized) service between 480Kbps and 960Kbps, users are happy. Even in smaller areas, where GPRS speeds drop access down to 56Kbps, salespeople appreciate having a convenient connection, Cairns says.

At tax accountancy H&R Block, lead network engineer Kevin Oellien has had a similar experience with Sprint's EvDO service. From the company's headquarters in Overland Park, Kan. — near Sprint Nextel's headquarters — Oellien has seen throughput as fast as 1.2Mbps, and he finds that in most areas, users experience speeds from 600Kbps to 800Kbps. He has now begun a broader pilot program with Sprint Nextel's 3G service, in hopes it can provide connectivity at H&R Block's many kiosks and temporary offices during the four-month tax season. By plugging a 3G card into an Air-Link Communications Raven Ethernet gateway, Oellien can add a router to almost any location, letting staff members access the Internet and corporate resources without the expense of building out dedicated network and phone lines for the temporary facilities.

The slower speeds of the competing EDGE (enhanced data GSM environ-

# WINDING ROAD

ment) service used by Cingular have caused early adopters to use it more as an adjunct connection technology rather than as a primary one. For example, users at Halton — a Pacific Northwest dealer of Caterpillar vehicles — rely on wired and Wi-Fi connections where possible, but use the roughly 100Kbps Cingular EDGE network when faster networks aren't available. Despite the slower speeds, "they use it wherever they can because it's available wherever they are," says Kip Hewahewa, the company's telecom administrator.

Deploying these technologies is largely effortless, because 3G access to corporate networks involves no special configuration. If you already have VPN clients and other remote-access authentication technologies in place for users who come in through the Internet, your network is ready for 3G users. "You use the same security for wired, 802.11b, cellular, and WiMax Internet connections," says Ed Partenope, vice president of operations at enterprise communications consultancy Innovativ.

Pleased with the service's performance and network stability, Cairns is now considering deploying 3G cards for PC users within American Republic's corporate headquarters because the building's

heavy use of steel and concrete will make installing a Wi-Fi network difficult. A key issue will be the cost of monthly 3G data-service subscriptions for each user versus the setup and maintenance costs of an internal Wi-Fi network, Cairns says. He has yet to calculate the actual full cost of each option.

## Waiting For WiMax

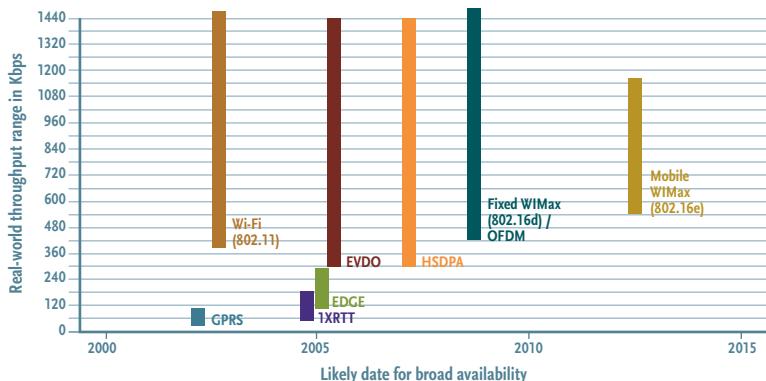
Many industry observers are hoping that WiMax, a developing wireless

broadband technology, will emerge as a third choice. Based on a technique called OFDM (orthogonal frequency division multiplexing), it's more bandwidth-efficient than 3G technology or Wi-Fi. (Two competing, proprietary technologies — UMTS-TDD and Qualcomm's Flarion Flash OFDM — also use OFDM.)

But whereas 3G is now a viable option for many enterprises, WiMax is not. Although it's often portrayed as a

## Broadband Rollout

Next-gen WiMax wireless broadband is on its way, but experts warn not to expect it to supplant Wi-Fi and cellular data anytime soon.



NOTE: GPRS, EDGE, HSDPA are GSM technologies; 1XRTT, EVDO are CDMA technologies; WiMax 802.16e is an OFDM technology

## 3G Services Compared

Broadband cellular technologies are within reach of the enterprise today, but offerings differ in performance, cost, and availability.

	Cingular Wireless	Sprint Nextel	Verizon Wireless
<b>Technology</b>	GSM EDGE, with GPRS elsewhere	CDMA2000 1XEVD0, with 1XRRT elsewhere	CDMA2000 1XEVD0, with 1XRRT elsewhere
<b>Real-world throughput</b>	50Kbps — 200Kbps (EDGE), 30Kbps — 80Kbps (GPRS)	300Kbps — 1.2Mbps (EVDO), 50Kbps — 200Kbps (1XRRT)	300Kbps — 1.2Mbps (EVDO), 50Kbps — 200Kbps (1XRRT)
<b>Coverage (for EVDO or EDGE service)</b>	7,500 cities now, covering much of the nation outside the sparsely populated Great Plains and desert areas	14 metro areas plus airport/downtown coverage in 20 others now, 60 metro areas planned by January 2006	47 metro areas now
<b>Costs (enterprise plans)</b>	Five plans, from 5MB/month for \$20 to unlimited usage for \$80/month	Two plans: 40MB/month for \$40 and unlimited usage for \$80/month	One plan: unlimited usage for \$80/month

SOURCE: WIRELESS CARRIERS

“super-Wi-Fi” technology that creates citywide hot zones, most users won’t access WiMax via cards in their notebooks as they do with 802.11b. WiMax is really an infrastructure technology, like DSL or cable modem service.

When WiMax products become available in 2006, they’ll serve the same purpose as a router, providing the backbone access to a location. Individual users will connect to the WiMax modem via a wired Ethernet or Wi-Fi connection. The prospect of mobile users connecting to WiMax hot zones directly is still years away, however, and some analysts urge customers not to hold their collective breath.

“It’s a pipe dream,” says Innovativ’s Parteno. “It will take years to build out the infrastructure, but 3G will be pervasive in about two years.”

One problem is that the IEEE 802.16e standard, which enables mobile access to WiMax networks, is still about a year away from approval. Adding to the confusion — and despite vendor hype — genuine, standards-compliant hardware has yet to appear, even for fixed WiMax (the approved IEEE 802.16d standard).

When vendors first delivered hardware based on the IEEE 802.11b standard, different products often weren’t compatible — a fatal flaw for a network technology. So an industry consortium, the Wi-Fi Alliance, developed interoperability standards and certified compliance by licensing the Wi-Fi label, giving customers assurance that labeled devices would work together.

As the IEEE 802.16d standard for fixed WiMax neared completion last year, it became clear that history could repeat itself if vendors interpret the standard differently from each other. So a new industry association — the

WiMax Forum — planned to do the same as the Wi-Fi Alliance, by licensing the official WiMax label for products that passed interoperability testing. Unfortunately, it hasn’t worked.

Vendors are already selling products labeled WiMax, even though the WiMax Forum hasn’t completed interoperability testing. “All current solutions are pre-standard WiMax,” warns Mo Shakouri, the forum’s vice president of marketing. Products that pass WiMax testing will bear the label “WiMax Forum Certified,” Shakouri says, adding, “WiMax Forum Certified products currently don’t exist anywhere in the world.”

### If You’ll Come, Will They Build It?

After the standards have crystallized, WiMax networks could start appearing in select markets. First, though, the carriers will need a reason to deploy it; an unlikely decision, given that their existing 3G networks will offer similar performance, says Roger Entner, an analyst at the telecom research firm Ovum. “WiMax is just another technology doing the same thing as 3G,” Entner explains. Deploying comparable WiMax coverage could cost from \$5 billion to \$15 billion.

“A carrier that has already deployed 3G will probably not deploy WiMax,”

says Mark Whitton, vice president for WiMax and wireless mesh products at Nortel Networks, which provides both 3G and OFDM equipment to carriers.

Sprint Nextel expects to deploy WiMax or other OFDM technology in the future, according to Peter Cannistra, director of strategy and planning at the company’s broadband group, but he says that’s because it agreed to do so to satisfy regulators’ concerns about Sprint’s recent acquisition of Nextel. It’s not clear how Sprint Nextel would use such a network or what services it would provide over it, Cannistra says.

SBC Laboratories vice president David Deas says local phone and cable providers are already exploring WiMax as a low-cost way to extend their residential broadband service to rural areas. Deas, however, questions the vision of a national WiMax network through which mobile users move. “802.16e will be third to market,” he notes.

One possibility, says Innovativ’s Ed Parteno, is that municipalities will deploy WiMax as an Internet utility service for residents in much the same way that cities once provided gas and electric service a century ago. He believes that cities, such as Philadelphia and San Francisco, now looking to

# “Mobile WiMax is a pipe dream. It will take years to build out the infrastructure.”

— Ed Partenope, Innovativ

build citywide Wi-Fi networks will eventually switch to WiMax.

Already, the District of Columbia has deployed an OFDM public-safety network to link mobile police, firefighters, hazardous-materials teams, and others. It successfully tested the network during the presidential network in January, says the District's CTO, Suzanne Peck.

However the first WiMax networks are deployed, enterprises should not expect to manage their own WiMax zones. Although the standard does permit deployment over public spectrum, that spectrum is shared by Wi-Fi and many other devices, so interference and other issues will likely scuttle its use, says Ovum's Entner. Companies with large campuses may be able to manage spectrum use or buy the licensed spectrum they need. Otherwise, says Nortel's Whitton, “I don't see it as an enterprise technology.”

## 4G and Beyond

Sprint Nextel's Cannistra sees OFDM technologies succeeding 3G in a decade or so, because their more efficient spectrum usage means the cost per megabyte is lower. But for now, 3G makes more sense for the carriers because it uses existing hardware and its performance matches that of current OFDM technologies. As the 3G deployment costs are worked off and OFDM performance continues to improve, economics will justify a switch, Cannistra says.

SBC's Deas agrees, but with even more reservation. Whatever happens with WiMax, he says, carriers expect their 3G services to be around for at least a decade. They also expect to improve the throughput of those networks as demand increases, by adding additional radios and upgrading the backbone infrastructure. As 3G networks reach their peak throughput,

Deas and Ovum's Entner both expect carriers to use some form of OFDM — no doubt labeled “4G” — as the replacement. That OFDM-based 4G network might be based on WiMax,

UMTS-TDD, Flarion, or some variation not yet developed. Regardless, IT should expect their mobile users to depend on 3G-based networks for quite some time. ☛

## Switching Networks on the Fly

MOBILE USERS TYPICALLY MOVE AMONG MULTIPLE NETWORKS: A WIRED DSL connection at home, a Wi-Fi hot spot at the airport, a landline connection at a hotel, and 3G service in between. Today, users must use a connection manager to log off one service and log on to another manually. Future smart clients, however, will be able to detect available networks and switch among them based on which networks are fastest, which are cheapest, and which are most secure for business use.

Although such switching is theoretically possible at the transport layer — switching from Wi-Fi transport to 3G transport, for example, is much like switching between a wired network and a wireless one — making the handoff seamless requires additional engineering, according to David Deas, vice president at SBC Labs. The biggest challenge lies in maintaining VPN connections as the network shifts.

One approach is to use Mobile IP tunneling protocol, which provides the device and VPN with fixed IP addresses but maps those addresses to intermediate ones as the device moves across networks ([infoworld.com/3204](http://infoworld.com/3204)). The VPN doesn't see a change, so it maintains its tunnel, says Shahid Ahmed, an Accenture partner who specializes in network services. This approach, however, requires that the enterprise and carrier networks coordinate the handoff — either through a direct connection or via a third-party aggregator — using a device called an access gateway or home gateway.

Fortunately, VeriSign is working on a project to manage these handoffs across existing networks ([infoworld.com/3211](http://infoworld.com/3211)). Because VeriSign handles much of the voice roaming among mobile carrier networks, it's in a good position to manage the handoff from, say, Sprint's 3G network to a T-Mobile Wi-Fi hot spot. One downside to VeriSign's approach, however, is that it requires all the networks to use the same VPN client, which is unlikely for enterprises, says Tom Kershaw, the company's vice president of next-generation markets.

That's certainly the case at H&R Block, notes the tax preparer's lead network engineer, Kevin Oellien. He says H&R Block investigated using Sprint Nextel's VPN client for both 3G and internal use but found that other providers, such as credit card processors, did not support the Sprint VPN.

Future client software could invisibly log off one VPN and log onto the other, allowing the use of multiple VPNs. That approach will work for data transmissions, which tend to be sent in clusters, but it could be problematic for voice and other streaming media where the dataflow is constant, Kershaw says. In the meantime, IT will need to train mobile users to log off one network before accessing another. — G.G.

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