SPECIAL ADVERTISING SECTION

the FUTURE of BROADBAND

Inside:

Remote Site Impact

How Options Compare

Wireless, Optical Roles

It's a Glowing, Glittering Future, But...

Users must first navigate new security, location and cost issues. We've plotted the path to the brightest future.

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Fast-Food Networking:

Broadband To Go

Over the next few years, connections will go into the air, the home and the taxicab. Are you ready?

It's just a few days shy of September 9, 2004, *and Gina Jones is running late for her 5 p.m. New York-to-Los Angeles flight. Flipping open her hybrid cellphone/handheld, she watches just enough of her department head's video conference to chime in with a quick comment. She's bumped to first class and decides she'll have room to review a few inventory and sales issues on the flight. Gina pushes the synchronize button on her laptop just before she leaves the terminal, hoping to get the latest post-5 p.m. inventory database figures before she boards. She could update the figures on the airplane, but she wants to avoid the surcharge. As she boards the airplane, Gina is happy to see Gerry getting on board, too. Even though he'll be sitting 20 rows behind her, she'll use the airplane's LAN to share her slide presentation with him, and they will be able to make changes before they arrive in L.A. As a precaution, Gina will back up the encrypted presentation file to the corporate network as soon as she steps off the airplane.*

Although Gina is fictitious, those technology capabilities will be very real in just a few years. Beyond the all-but-obligatory speed increases, broadband soon will be available in as many places as workers need to be. As the futuristic Captain Kirk of the starship Enterprise would have said, "Broadband is soon going to have to go where no LAN has gone before."

Indeed, corporate executives — plotting how to fulfill their future communications needs — have a difficult time because there are so many possibilities these days. Plentiful and useful live and interactive multimedia, plus multi-Terabyte databases that will want to be refreshed constantly, will push how quickly companies will need broadband connections. But the more daunting change is that the workers who need to access the data will be moving themselves. Some will be corporate telecommuters, others will be working in small offices near major clients and still others will serve as road warriors, working from hotel rooms, client offices, airports, train stations, taxicabs and their own cars. (See sidebar, "The Remote Site Challenge," on page 8.)

The future of broadband offers great opportunities, as long as executives think about and plan for it in advance. Executives will have exciting new tools for sales, marketing, product development and other business tasks that can be enhanced or simplified by using broadband. But issues of security, robustness, pricing and coverage will continue to arise, and it's important to watch the changing landscape.

One issue is the very meaning of the word "broadband." Today, it generally means T1 speeds (1.544 megabits per second) or better. The meaning, however, is evolving into a relative measurement, as opposed to an absolute speed. In the future, the true meaning is literally to transmit at a speed faster than

BY GABRIEL ALLAN AND EVAN SCHUMAN

that at which most users are working.

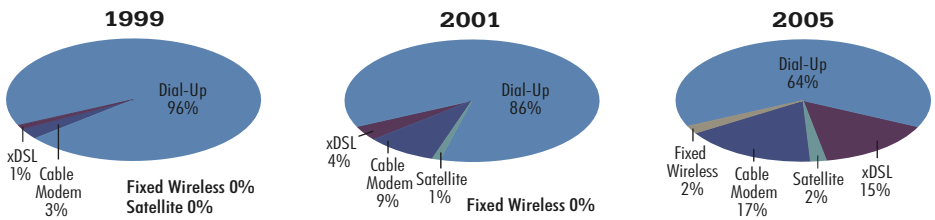
"Broadband today is basically fast narrowband," says Tom Moore, president and CEO of WildBlue Communications, a satellite broadband provider. "You're uploading and downloading the same pages and files faster. That's pretty compelling, but in three years, broadband will include a whole new suite of concepts."

Those concepts will include everything from Internet security devices to audio and video, from video collaboration and file sharing to distributed computing and data storage. And the much-ballyhooed convergence of voice, data and multimedia also will be a factor.

"The future of communication is high-speed, wideband digital with interactive data and voice," says David Robinson, president of the Motorola broadband communications sector. "A company that offers principally video or data will be able to offer competitive voice. For the business user, that will mean more control, more variety and more choice."

As employees move around, the ways of calling headquarters get more varied

How remote connections will be made.



Source: Jupiter Communications

The implications of ever-present broadband are vast. Like the hypothetical Gina Jones, corporate employees soon will be able to receive and transmit huge video and database files from inside elevators and taxicabs, and while walking from one building to another on a corporate campus.

With minor modifications to mobile hardware, these data transfers could happen transparently. When remote workers visit a corporate building, they no longer would need to scout out and borrow a network connection to upload and download information from corporate systems. Remote workers could boot up and log in, and network software would manage the rest. In theory, remote workers could set foot in a corporate location 1,000 miles from their homebase for the first time and the network would be aware of where they are sitting and direct their print requests to a local printer. The network software then could message the user with directions from the user's precise current location, not unlike the GPS-connected car-based navigational systems that always plot the vehicle's current location and give directions from that point.

With sufficient bandwidth, these kinds of always-available wireless broadband capabilities could all but eliminate many of today's data backup hassles. Data would be backed up constantly and transparently to corporate servers.

Many of the potential changes could radically rewrite the ways in which companies handle data. The client-server relationship is based on the belief that data stored on client devices can be accessed at any time, but that data stored on servers can be accessed and manipulated only when connected to the network. But when broadband connections are as easy to access as an AM radio broadcast, those client/server distinctions start to melt away — at least as far as they impact data management.

That could mean that the cost and difficulties involved in huge laptop hard disks might be reevaluated. Application and operating system upgrades as well as various licensing issues might become light years simpler, too, when IT staffers can instantly upgrade applications at any time, within reason.

Internet Protocol (IP) services, such as Voice-over-IP, rather than Baby Bell connections also might become easier, thereby offering the possibility of radical savings in various telecommunications applications.

True ubiquitous broadband likely will spur advances in CPU speeds and artificial intelligence software because the vast speed and bandwidth would open the floodgates of information. PDAs and laptops, however, would have to develop the processing power and sophistication to make sense of the avalanche of data.

For entertainment companies, the implications are equally intriguing. When a user can download a two-hour, top-quality movie in 10 seconds — chosen from a list of 200,000 titles on a pay-per-rental Web site — what impact will that have on video rental chains? Add syndicated content from around the globe, and the question could be what would be the likely impact on commercial television? On cable? Movie theaters? CD

and videotape sales? And, how will this change the way in which commercials are included? Will commercials — as we envision them today — survive?

The U.S. Postal Service and various overnight delivery services make money by transmitting documents and reports. Sure, broadband is not likely to impact the shipments of holiday fruitcakes and mechanical equipment — at least not until a Star Trek-like replicator is perfected. As more documents and reports are created on PCs and laptops, however, they could be transmitted much more cheaply and quickly by e-mailing a large PDF, for example. Today, beautiful annual reports would never be distributed in that way, but if an unchangeable PDF could be distributed, the savings in printing and distribution could be huge.

It's not a question of which connection type most users will have. Rather, it's a question of *how many?*

For corporate private lines in 2003, T1 is expected to still reign supreme

Although the number of T3 lines will almost double, and optical links will more than double, T1 lines will overwhelmingly dominate.

	T1	T3	Optical (OCx)
2000	1.2 million	58,000	14,000
2001	1.37 million	75,000	20,000
2003	1.7 million	110,000	35,000

Source: Gartner/Dataquest

Patti Reali, a senior analyst at industry analyst firm Gartner/Dataquest, spends part of her time crunching broadband user numbers, and she says it can be frustrating. "The numbers add up to more than 100 percent," Reali says. "At any given time, users will have a mobile connection, a fixed connection and often another fixed connection method at any given location."

The buildup of the wireless infrastructure over the next few years is potentially the most powerful element in how effectively and usefully broadband can extend. John Hughes, a director of business development for Texas Instruments (which makes some of the chips that enable both wireless and wired broadband), predicts wireless LAN-like environments cropping up in a wide range of business hotspots, including hotels, airports, train stations and major corporate campuses. PDAs, cellular telephones and laptops in those areas would be able to communicate with each other and through the Internet at about the same speed as most of today's wired networks within buildings.

Note that the rise of broadband anywhere is a global phenomenon. Indeed, broadband efforts are spreading faster in parts of Asia and Europe than they are in the United States. High-speed wireless capabilities, too, are gaining ground in Europe more quickly than here. Mainland China will be "the largest DSL country — by far — by 2005," says Hughes, adding that Germany and Korea also are quickly outdistancing U.S. deployment on multiple broadband fronts.

The approximately 200 broadband vendors that attended the BusinessWeek Telecom Summit 2001 in April also see the best broadband expansion possibilities overseas. In a survey conducted by TI, roughly 42 percent of the attendees identified Asia Pacific (other than Japan) as the strongest growth segment, with an additional six percent adding Japan. One-fifth of those respondents picked Europe, with only 26 percent selecting North America. (See http://webevents.broadcast.com/businessweek/webcast/home.asp.)

But as companies start to move toward the bandwidth environment of the next few years, they are going to have to be pragmatic. Although the plethora of options is quite robust, some speedbumps could slow adoption of these cutting-edge networking approaches.

One of the key obstacles to more widespread broadband access is geography. DSL, for example, has specific distance requirements for service and much more stringent distance requirements for top-level performance.

That was one of the main reasons for the popularity of DSL in Europe and parts of Asia: Most end-users there are located closer to telephone company switches. Indeed, DSL's distance-from-the-switch limitation has led to the popularity of cable modems among worldwide consumers and corporate telecommuters. Cable would be making even more of a dent in corporate applications if cable companies didn't avoid major corporate campuses. In addition, the perceived weak reliability and line stability, along with the shared nature of the technology, are crucial factors behind corporate reluctance to rely on cable modems as a key part of broadband implementation strategies.

Satellite-based broadband often is pitched as the

(continued on page 10)

The Remote Site Factor

As more employees move into the field, broadband connections become trickier.

Planning for broadband connections used to be fairly simple. The vast majority of corporate employees needing such connections were in one of a handful of nice, neat, mini-headquarters locations, often housing thousands of employees.

But things are much more complicated for the 21st Century broadband planner. A wide range of business conditions has eliminated those simple, nostalgic days. Such corporate needs as getting employees closer to customers, cutting travel costs and strengthening personnel recruitment/retention packages have pointed to the distribution of employees to many smaller sites — potentially even one-person operations.

The last few years also have brought companies technology enablers. Among them are wide use of the Internet (and its popular virtual private network capabilities) and low-cost, fast means of using it, such as DSL variants and cable modems.

The U.S. mobile and remote workforce has been growing steadily for years and is projected to include some 55 million workers by 2004, according to industry analyst firm International Data Corp.

One of the many challenges is how to treat the growing number of remote sites. Are they tiny fiefdoms that decide their own technology issues, or are they simply a part of the extended corporate WAN?

With the ever-expanding kinds of devices that people use to connect to the corporate office, these issues are becoming even more formidable. Remote sites are not just about laptops anymore — they also require fat pipes to cellular telephones, handhelds and home computers.

Denise Shiffman, a marketing vice-president with Sun Microsystems, sees the answer in dataless clients that rely on constant and robust wireless connections.

The data, she argues, will "live online," not on a hard drive in a single device. Is that a radical new concept or just a new face for dumb terminals? All of the arguments about the balance of client-server are being re-argued.

And then there are the critical people issues. How can remote workers, for instance, stay in the loop without a water cooler to congregate around? Cisco Systems, which has a large telecommuter program, assigns new engineers a "mentor-buddy," who helps them learn the ropes and introduces them to colleagues. During team meetings, detailed minutes are kept and distributed by e-mail.

Joseph Roitz, AT&T's Telework director, maintains that most managers already have direct-reports who reside in other locales. The key to a successful remote-worker program, Roitz says, comes down to "managing by objectives, challenging the status quo and embracing innovation."

— Joe Mullich

TIPS

Pay Twice, Sleep Through the Night

Buy redundant DSL lines from competing DSL providers. This way, when there is a glitch, you can switch to the alternative unless the problem is with the regional Baby Bell. It also will allow for stronger fee negotiations, as you'll have precise, comparable data about an alternate provider.

BROADBAND RESOURCES

AT&T
http://www.attbroadband.com/services/

El Paso
http://www.elpaso.com/network/default.htm

Siemens
http://www.siemens.com/

Williams Communications
http://www.williamscommunication.com/index.html

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court of last appeal for locations where no other technology can reach; but it only works where there's a clear southern exposure. That means it may not work in either mountainous areas where DSL doesn't reach or downtown areas with tall buildings where cable has yet to be laid. That's why satellite-based broadband will be the solution for only a tiny percent of the population. (See chart, on page 6.)

Broadband will require careful resource allocation, too. Suppliers speak enthusiastically of the convergence of voice, data and video in the same pipeline. They promise more variety, flexibility and better pricing thanks to increased competition. But users have a habit of devouring all available bandwidth. Without proper planning, such practices can end up turning broadband back into narrowband. Not to mention that one pipeline means putting all corporate communications eggs in one potentially fragile basket.

TIPS

Location, Location, Location

When scouting for new buildings, identify the switch distance for DSL options, ask the cable provider about cable modem support and remember that satellites need a southern exposure and a direct line of sight.

In the next few years, pure fiber networks reportedly will deliver some 50 gigabits per second, which is about five times faster than today's fiber networks. "That's the dream for the next several years: fiber to the curb," says TI's Hughes. To have the ability to deliver "better than Ethernet-class connectivity to the terminal points of the network." Most corporate PCs are linked via a standard Ethernet connection that runs at roughly 10 megabits per second.

Bruce Miller, a senior product manager at Lucent Technologies, points to efforts at Bell Labs running several hundred gigabits per second. "Terabits per second are possible over pure fiber. These speeds are available and dormant until they are turned on," he says.

Not everybody agrees that fiber-optic speeds will extend to corporate PCs and other devices at the end of the network. "You'll see optical grow in backbones and at some of the edges," says Dave Zatloukal, vice-president of network services for Hughes Network Systems. "But the last mile? That's just a pipe dream."

As corporations need to extend their current broadband networks to much more cost effective but less sturdy options such as cable modems, DSL and wireless, reliability will be an issue. And this is reliability as measured by conservative business standards, where an outage of a few hours can cost a company millions of dollars.

DSL and cable providers boast about their systems being "always on." Perhaps a better description would be "always on unless something has gone wrong somewhere." The reliability of these technologies has been weak, even by consumer standards.

Not that the lack of reliability has slowed acceptance of these technologies. Given that the only alternative has been 56k analog modems, broadband interest by consumers has been soaring. A report released in late May from Statistical Research showed the percentage of U.S. households with broadband access — via cable modem, DSL or DirectPC satellite — had nearly doubled in the prior six months.

Broadband service suppliers are getting better about installing gear, too. Abhi Ingle, vice-president of product development and marketing for broadband provider Covad Communications, a subsidiary of Covad Communications Group, says: "Just a year ago, when we installed a line, we had to run two trucks — the first for the line; the second for our equipment. It was both expensive and painful. Now that we share the customer line, we are able to eliminate both trucks."

"It's that last mile that's the challenge," says WildBlue's Moore. "Whether it's cable, DSL or satellite." Satellite providers work hard at reliability because half of each company's equipment is up in space. "You can't roll a truck up to a satellite," he says. Satellites have other problems, too: Disruptions are truly an act of God, because weather conditions such as heavy rain can wreck havoc with satellite communications.

But executives who are not prepared for the imminent tidal wave of broadband changes may face no less of a disaster. Just like Gina's fellow fictitious character, *The West Wing's* President Jed Bartlett, discovered, blaming God won't help. ■

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