executive guides

connectivity

overview

Information technology executives hunting for wide-area communication services 20 years ago had two options: packet routing (as in Ethernet) and connection switching (as in leased lines). These were stark choices, quite distinct in their vendors, equipment, maintenance, features and service levels. For instance, packet routing delivered resource efficiencies, while connection switching was strong on speed and quality control. Buyers had to choose one or the other; anyone looking for a bit of each went away disappointed.

During the '80s several proposals began surfacing that promised the best of both. The leading candidates were frame relay, widely thought to be a short-term to midterm solution, and asynchronous transfer mode (ATM), an exotic and powerful technology that promised to do everything for everyone, though it was still a few years away at the time.

Both frame relay and ATM proposed to reintegrate a market that was then split between packets and connections. The technologies were packet-like in that they bundled data from different nodes and sessions into the same wire, making it unnecessary to provision each pair of nodes with its own leased line. They also sent setup signals through the network in advance of any given session, instructing the system to treat all the data associated with that session in the same way. (The difference from leased lines is that fast-packet "pipes" were defined in software instead of physical wires, connecting port to port instead of phone number to phone number.)

Setup signals provided packets with a much friendlier environment than raw Ethernet. With Ethernet, packets received the equivalent of a map and a backpack, were kicked out into the world, and told to find their own way home. Under a fast-packet regime, packets got the equivalent of a VIP pass that guaranteed expeditious handling at each routing point. Since fast-packet systems were usually running in a low-noise physical environment (optical fiber, for example), the error detection and correction tools necessary for Ethernet became extraneous. Discarding this processing weight accelerated throughput marvelously, allowing the technologies to deliver the same speed and quality as a switched connection.

Most observers have seen frame relay as an interim solution, compromised in that it permitted substantial variations in packet length. That kept the technology relatively simple and cheap, but the interactions resulting from this jumble of sizes imposed limitations on both bandwidth and content. ATM chopped all its packets into the same size. That uniformity promised a universal solution for all content types plus smooth progression to higher speeds—possibly even into the multigigabit realm. Granted, all that control came at a price in dollars. But the belief held that the costs would come down in time; it always had before.

By the early '90s the level of excitement surrounding these technologies was, as we observed "attracting more hype than a new TV series." On Nov. 1, 1991, we published our own evaluation of the so-called fast-packet technologies. Our article was prudently tentative about the possibilities, reviewing the theoretical potential of fast packets but consistently refusing to make predictions about market trends and penetration rates. This turned out to be wise. According to Vertical Systems Group, a broadband

networking consultancy in Dedham, Mass., even after 10 years, frame relay has not managed to dislodge leased lines as the dominant broadband solution. (In 2000, leased-line services pulled in about $25 billion in services revenue to frame relay's $10.5 billion, though frame is growing more quickly.) ATM services rolled out in force in the mid- to late '90s, but have been loafing along at a measly $1 billion a year.

Even more striking, pure old-fashioned packet routing—riding the spectacular increase in router processing speeds and the development of such new services as DSL, cable and fixed wireless—has crept up out of the basement. According to Erin Dunne, director of research at Vertical Systems Group, businesses buying broadband for the first time are overwhelmingly choosing IP as the protocol of choice. (They need to buy IP anyway for their website, and for many there is no obvious reason not to standardize on the format companywide.) A further sign of the trend is AT&T's recent announcement of an "IP-enabled frame relay service"—a product that suggests that the company's frame relay customers were feeling increasingly attracted to the IP world. From the fast-packet point of view, this is a little like black-and-white TV or coal heating making a comeback.

The moral of this story is that communications technology is sensitive to changes (or the lack of them) in the environment. Banks have not dropped their leased lines, not because they are cost-effective, but because other banks haven't. New businesses are buying IP because other businesses (and consumers) have. Any CIO, analyst or journalist focusing exclusively on slick new feature sets is likely to be getting at least half the story wrong.

caseSTUDY

As the United Kingdom continues to struggle to roll out asymmetric digital subscriber line (ADSL) and other broadband Internet services, companies and politicians are beginning to complain about the delays.

The government agency that regulates the United Kingdom's telecommunications industry, the Office of Telecommunications (Oftel), put out a statement in November 1999 that British Telecommunications (BT) has a monopoly on the local network lines. To encourage competition, Oftel directed BT to lease access to the local loop and to upgrade it. BT was given a deadline of July 2001. "The U.K. needs to look at issues such as continuing monopolies and the speed with which BT is moving to offer broadband. We've been looking at the issues of local-loop unbundling for far too long," said Michael Portillo, a leading Conservative member of Parliament, while speaking at the opening of GlobalCenter's new 42,500-square-foot data center in London's Docklands area on Oct. 5.

The lack of broadband will hit small and midsize enterprises hardest, says Susan Thomson, an analyst in the London office of Dataquest, a market research company. That's keeping the United Kingdom as a whole restricted to ISDN speeds, she says. ISDN runs about one-tenth the speed of ADSL.

FUTURE TRENDS

Darwin reporter Scott Kirsner examines the ways in which ubiquitous connectivity will change the way workers work and consumers consume

Here's my conundrum of the month. I don't know that it's of the same caliber as nature versus nurture, how many angels can dance on the head of a pin, or why do fools fall in love, but I've been puzzling over it nonetheless.

Will ubiquitous connectivity—access to the Net from your mobile phone, your handheld computer, your car—really change the way you behave as a consumer, or the way you perform as an employee?

The big trend of the next few years will be the extension of Internet-based computing beyond the desk. By 2005, 111 million Americans will use mobile data services of some sort, says Forrester Research. Worldwide, by that same target date, there actually will be more users of Net-connected mobile devices than PCs, according to Greg Wolfond, the chairman of 724 Solutions, a developer of wireless applications in Toronto.

Mobile computing will most likely be even more important to corporate worker-bees than it is to consumers. "The fundamental problem is that organizations have invested trillions of dollars in information technology," says Larry Roshfeld, senior vice president of software at Aether Systems, a wireless services developer in Owings Mills, Md. "But when an employee gets up from his desk, the company completely loses the benefit of that investment. Wireless solves that."

OK, so ubiquitous computing is gonna be big. But what does it really change about consumer and employee behavior?

Primarily, though, consumers use wireless phones to have voice conversations, and they use devices like the RIM Blackberry to retrieve and respond to e-mail. Such communications applications will remain dominant. Certain types of e-mail marketing will prove valuable to consumers—imagine getting a last-minute notice about deeply discounted tickets to a play or sporting event an hour before show time, courtesy of American Express—but for the most part, users will reject commercial come-ons.

Eventually, the smartest marketers will offer applications, not advertisements, for handheld devices, and they'll encourage consumers to trade them like baseball cards. Already, Starbucks has developed a locator program that will guide you to the nearest Starbucks in an unfamiliar city. Marketing doesn't get more viral than when one Starbucks junkie beams that application to another.

Once the security issues are ironed out, U.S. consumers will also use their phones and PDAs to pay for purchases—mostly in person, not via a website. The phone will serve as a smart card, beaming a few bucks to take care of your taxi ride. And instant messaging will replace e-mail as the dominant form of communication. People will expect a response in seconds, not minutes.

Those are some pretty significant changes but it won't happen overnight. "For the U.S. market, we're at least three to four years away from any appreciable consumer wireless data market," says David Grannan, the CEO of GeoWorks, a software and services company in Alameda, Calif., that helps businesses develop mobile applications.

The next five years will see a new explosion in connectivity—people will be online in airplanes, in hotel rooms and lobbies, in cars, at conventions and everywhere in between. Their expectations will continue to rise. What good is it if your PDA tells you the flight has been cancelled, but you still have to go to the airport or wait interminably on hold to rebook on a later flight? I'm expecting mobile computing to spark some interesting shifts in consumer behavior, and to help employees work smarter and more efficiently, though probably not in new ways.

buzzwords

Asynchronous transfer mode (ATM)

A network technology that organizes digital data into units and transmits them over a physical medium using digital signal technology. ATM is a key component of broadband ISDN.

Broadband

A telecommunications network that can process a large amount of data.

Ethernet

The most widely installed LAN (local area network) technology.

Internet service provider

A company that provides paid users with access to the Internet. Customers use software to connect to the ISP over phone or cable lines. ISPs connect to each other through NAPs (network access points).

Virtual private network (VPN)

A remote-access system in which users connect to an ISP or a private IP-based network and from there establish a secure connection with network servers via an encrypted tunnel.

HOTQUESTIONS

The answer to this connectivity question was provided by Sandra England, president of PGP Security based in Santa Clara, California.

What are the security risks in implementing a VPN for dial-up network access, and what are the solutions?

All remote nodes connected to the Internet may pose a threat to a company's network. These threats can be eliminated by deploying a VPN solution with Personal Firewall and IDS. Personal Firewall and IDS will protect the remote node from potential hackers and Trojans when connected to the Internet and communicating to other devices. A VPN solution that is configured to disable "Split Tunneling" will prevent the remote nodes from communicating to any other device other than the VPN gateway when the VPN tunnel is active. Disabling "split tunneling" allows remote users to have a secure connection and removes the transparency issue.

METRICS

Cable and DSL providers add 1.37 million high-speed subscribers in the second quarter of 2002.

U.S. cable providers currently dominate the broadband market with 65% of its total share. The leading cable and DSL providers together added 1.37 million high-speed subscribers in the second quarter of 2002. That total consisted of more than 900,000 new broadband subscribers and 460,000 new DSL subscribers. DSL subscriptions have increased by 1.9 million in the past year, while U.S. cable companies have garnered 3.5 million new subscribers to their broadband services. August 22, 2002 - *Leichtman Research*

Business broadband subscribers to total 8 million by end of 2002. Remote workers accounted for 30%-40% percent of mid-market and enterprise IT spending in 2001. Working from home and remote locations was the norm for more than 60% of the U.S. workforce last year. In 2001, business subscribers comprised 40% of all broadband subscribers. In 2002, business subscribers are expected to number 8 million by year's end. Most of those subscribers (60%) will be in residential areas.

June 6, 2002 - *Cahners In-Stat Group*

TECHtalk

Do you know what IP means? It is one of those terms that is thrown around as if everyone understood what it stands for, but while many Internet users know that IP has something to do with the Net, they don't understand what it means.

IP stands for Internet protocol, which is the standard that describes how data is sent across networks and one of the Internet's most important elements.

IP describes how to break information up into efficient pieces commonly referred to as packets. The packets of data are then sent over the network until they reach their intended destination. IP is technically considered a simple protocol, but there a several different versions of IP.

What is an IP address and why do I need one?

An IP address doesn't have anything to do with the post office, but it's just as important as a mailing address if you consider that many people receive more electronic mail than paper mail. An IP address works in the same way as a postal address—it makes your computer different than all other computers so that the information (e-mail) meant for you gets to you.

One of the most important elements of IP is the actual assigning of IP addresses. An IP address is a series of number put in a specific order that describes where your computer is located. (an example IP address would be: 193.145.232.151).

I usually see IP in the context of TCP/IP, what does that mean?

TCP stands for Transport Control Protocol and without TCP or another transportation protocol, IP would be useless. TCP is the part of the standard that keeps track of how the packets are broken up before transmission so that they can

be put back into the correct order for the recipient. TCP also makes an effort to ensure that all the pieces get from one place to the other (it isn't guaranteed).

How do all these pieces work together?

So, you write and e-mail to your sister in Arizona from your house in New York. After the e-mail is sent, your computer uses IP to break it up into pieces and then pushes it out onto the network. The network routes it through a series of towns until it finally arrives in her in box. Different packets can get to their destinations using different routes, but TCP makes a best effort to get all the pieces to their final destination and are put back in the right order.

CIO.com's Infrastructure Research Center: Connectivity/Bandwidth

http://www.cio.com/research/infrastructure/articles.html#237
In-depth articles covering IP technology, broadband, and VPN.

Computerworld

http://www.computerworld.com/
Meet and discuss the latest technology topics with your IT peers in the Computerworld forums. Computerworld also provides the top IT headlines, several in-depth knowledge centers, and expert columns.

IDG.net

http://www.idg.net/
IDG.net offers an updated technology newswire and one-stop access to top stories from all IDG publications, like Computerworld and Network World Fusion.

InternetNews.com

http://www.internetnews.com/
Internet News combines real-time Internet industry news with global coverage of finance, enterprise applications, infrastructure and online commerce news.

TechWeb

http://www.techweb.com/
TechWeb's focus is on providing extensive coverage of business technology. Their site features webcasts, newsletters, a tech glossary and research papers.

The Technical Translator

http://www.mouli-net.com/translator/
If you are searching for a technical definition within a user's manual and need some help finding it, try the Technical Translator. Terms in English, French, Spanish and German are available and the site even encourages vocabulary contributions.

* Taken from Darwin Publications