2003 Top Ten: Technology Trends

Could it be that the recovery starts next year? Not the same "next year" that's been bandied about for the last couple of years, but *next* year, as in, 2004?

It's possible, judging by the ground-level rustling going on. Carriers this year started seriously looking at how to use technology to make money, prodding equipment makers to mine the pragmatic potential from broadband and Ethernet. Who would have guessed? By the time the year ended, technology was actually hot again.

Bankruptcies and layoffs aren't done yet, but at least they weren't the only topics of conversation. Here are our picks for the best water-cooler topics of the past year:

No. 10 **Telco Video**

Video made last year's list, but from a cable point of view. This year was the telcos' turn. The number of digital subscriber line (DSL) customers in North America may be high enough at last to support a telco video push, and compression technology is making video easier to swallow on 1-Mbit/s links. And should the fabled RBOC request for proposals (RFP) come true, fiber-to-the-premises projects could be another vehicle for video (more about that later).

For North American carriers, it's all about pursuing the [*gag!*] Triple Play of video, voice, and data, completion of which could be vital to telcos' survival. Cable is already there, thanks to cable telephony -- which, combined with cellular phones, is nibbling away at the telcos' voice monopoly (see Cablevision Delves Into VOIP and Time Warner Delivers Phone Service... and it gets worse: See No. 1 below.)

Notable articles on the telcos' video efforts:

- News Analysis: Cisco Big Bolts for Startup and Kealia Project Raises Questions
- News Analysis: Telcos Turn On, Tune In to TV
- Boardwatch: Bell Thinks Outside the Box
- News Analysis: Video-Over-IP Charges On
- Report: Video Over IP
- Webinar: Video Over IP: Ready for Prime Time?
- Boardwatch: TV Over DSL Over Italy

No. 9 **Grid Networks**

They're not just for particle physicists any more (see Grid Goes Live at CERN). Companies such as IBM Corp. (NYSE: IBM) believe there's a business in using grids to distribute computer resources. Initial grid users have been compute-intensive types such as universities, but the possibilities for corporate use are emerging in areas such as data storage.

Grid computing is still getting its sea legs in commercial use, and new twists will likely emerge as businesses explore ways to exploit the concept.

- Column: Changing How Research Is Done
- Byte and Switch: Grid Fever Grips NetApp
- News Analysis: Nationwide Optical Research Net Planned
- Byte and Switch: ExaGrid Picks Its Nodes
- Byte and Switch: Acopia Gets $30M Cornucopia
- Report: Grid Networking
- Column: The Next xAN
- News Analysis: IBM/Morgan Deal Shares the Wealth
- Webinar: Grid Computing: Tapping the Matrix

No. 8 **Ethernet Technology**

The next wave of Ethernet is on, as chip vendors work to push the technology to its next speed-grade while also absorbing it into legacy networks.

Optics for 10-Gbit/s Ethernet are sprouting like weeds (but in a good way). The trusty 300-pin multisource agreement (MSA) remains the norm, but Xenpak, XPAK, X2, and XFP options are beginnning to ship. These developments are helping system vendors drive up the density and drive down the price of 10-Gbit/s Ethernet switches.

At the same time, new standards are emerging, aimed at making Ethernet more suitable for carrier networks. This includes the addition of operations, administration, and maintenance (OAM) functions, and several proposed standards covering the use of Ethernet in access networks, notably for Ethernet over copper and Ethernet passive optical networks (PONs).

Ethernet is also burrowing into traditional Sonet/SDH networks. The flexibility of standards such as generic framing procedure (GFP) and Resilient Packet Ring Technology aim to fill Sonet/SDH pipes with Ethernet traffic, which could be a useful tool for service providers.

Some of this year's Ethernet musings:

- News Analysis: Tunables Dig 10-Gig
- News Analysis: Future Ethernet Standards Unveiled
- Report: 10-GigE Transponders: Update
- Column: The Death & Life of Sonet/SDH
- News Analysis: XPAK Setback?
- News Analysis: JDSU Joins XFP Fray
- Report: 10-Gigabit Ethernet Switches and Routers
- Report: PHY Chips
- Report: Making Sonet Ethernet-Friendly
- News Analysis: XFP Gets the Fast Track
- Report: 10-Gigabit Ethernet

- Webinar: 10-Gig Ethernet Transponders@ Latest Developments
- Webinar: Ethernet Acess: The Road to Revenues
- Webinar: Ethernet Services: Service Provider Challenges
- Webinar: 10-Gigabit Ethernet Systems
- Webinar: Stress Testing 10-Gig Ethernet

No. 7 **Security**

The year opened with the most successful denial-of-service attack in history, a quick nudge to anyone who was slacking off on security. It's a topic that never goes away, and it gets more urgent as certain technologies become more popular. Just look at the wireless LAN arena, where tools for cracking Cisco Systems Inc.'s (Nasdaq: CSCO) Lightweight Extensible Authentication Protocol (LEAP) became available on the Web this year.

In the applications world, Secure Sockets Layer (SSL) became a happy hunting ground for acquisitions big and small, as equipment makers gravitated towards using the technology to secure virtual private networks (VPNs). IPSec is an option there, too, but SSL is ubiquitous thanks to its use in Web browsers, making SSL VPNs easy to implement. And let's face it -- no matter how many Slammer worms come around, "easy" will always trump "safe."

Your safe, easy summary of the year's security stories:

- Webinar: SSL-Based VPNs: Access Unlimited
- News Analysis: Shocking Results in *LR*'s SSL VPN Test
- News Analysis: Security No Problem for 802.11
- Webinar: Managing and Securing Enterprise 802.11 Wireless LANs
- Webinar: Security Processors: Driving the Secure Network
- News Analysis: Security Players Catch M&A Bug
- Webinar: Securing Your Wireless LAN
- Unstrung: LEAPing Attack Tools, Batman!
- Unstrung: Look Before You LEAP
- Unstrung: WLAN Security Blues
- News Analysis: Service Providers See Green in SSL
- News Analysis: Analyst: Big Shift in Security Spending
- News Analysis: Security God in the Making?
- Reports: Security Processors
- Unstrung: Public Access *Black*Spots?
- News Analysis: Slammer Worm Contained for Now

No. 6 **DSL**

It's still losing to cable in North America, but DSL went on the offensive this year. The DSL Forum's TR-59 architecture, released in October, infuses quality of service (QOS) into DSL and could increase the technology's appeal.

Elsewhere, where cable networks are less pervasive, DSL rollouts are roaring ahead. More than 55 million DSL lines have been installed, and in Korea DSL is close to catching up with fixed telephony in terms of how much it contributes to carrier revenues.

Meanwhile, the broadband backhaul is beefing up with broadband remote access servers (B-RAS), which terminate and authenticate huge volumes of subscriber traffic. Metro B-RAS densities approached 1 million session terminations per rack this year.

As well, the DSL architecture began shedding its Asynchronous Transfer Mode (ATM) skin with a new generation that will plug into IP DSLAMs (really Ethernet DSLAMs). Already the idea's catching on with multitenant installations in Asia. After that, the *next* next step will be DSLAMs with built-in B-RAS.

Notable DSL stories this year:

- Report: DSL Chipsets
- News Analysis: Can Broadband Save the Day?
- Report: New DSL Network Architectures
- News Analysis: DSL Heads for 60M Users
- News Analysis: *Unknown Document 40098*
- News Analysis: *Unknown Document 39355*
- News Analysis: DMT Chips Win 'VDSL Olympics'
- News Analysis: ADSL, Take 2+
- News Analysis: Getting a Bead on B-RAS
- Report: Upstream of the DSLAM
- Webinar: Semiconductor Vendor Effects on DSL Operator Networks
- Webinar:Next-Gen DSLAMs
- Webinar: WT-81: The B-RAS Blueprint
- Webinar: Next-Gen B-RAS: The Money Makers
- Webinar: Upstream of the DSLAM: Technologies for the Future of Residential Broadband

No. 5 **Ethernet Services**

Metro Ethernet got real this year, paving the way for an anticipated boom in services such as virtual private LANs. Juniper Networks Inc. (Nasdaq: JNPR) and Laurel Networks Inc. picked up business from KT Corp. in South Korea, while Atrica Inc. tallied several European contracts from its service-provider investors. In the U.S., carriers including AT&T Corp. (NYSE: T) and BellSouth Corp. (NYSE: BLS) saw the light, at least inside big cities and metropolitan regions.

On a more formal note, the Metro Ethernet Forum (MEF) began defining standard Ethernet services, a move intended to further grease the wheels when it comes to carriers adopting Ethernet.

- News Analysis: Can Broadband Save the Day?
- News Analysis: Future Ethernet Standards Unveiled
- Top 10 Movers and Shakers: Bobby Johnson, Foundry Networks

- News Analysis: *Unknown Document 41979*
- Boardwatch: FastWeb Piles On the Users
- Interview: Bobby Johnson, Foundry Networks
- Market Stats: Report Sees Metro Ethernet Growth
- Webinar: Ethernet Services: Service Provider Challenges
- News Analysis: Gearmakers Chase Ethernet in Europe
- News Analysis: Carriers Converge on Ethernet
- Webinar: Ethernet Services: What's in it for the Enterprise?
- News Analysis: Metro Ethernet Stirs Debate
- Report: Virtual Private LAN Service
- Webinar: Ethernet Services: The Economics Behind the Myth
- News Analysis: IDC Predicts Metro Ethernet Boom

No. 4 **WLAN Networking**

Wireless LANs were a hot property this year, but the interesting technology story lies in networking all those cheapo client devices into some sort of mesh. The big breakthrough could come if WLAN roaming develops, making 802.11 a credible competitor against 3G cellular for data services.

For now, the attention is on WLAN switches -- or "smart media hubs," if you're sensitive (see Vivato's Switch Bitch). Startups ruled this land early in the year, but it wasn't hard to see the giants such as Extreme Networks Inc. (Nasdaq: EXTR) and Nortel Networks Corp. (NYSE/Toronto: NT) marching over the hill and Cisco supposedly on the way, too. So, watch this space for some slap-downs in 2004. As Trapeze Networks Inc. VP of marketing George Prodan said in April, "The winners will be anointed and the losers will be shot."

A slice of this year's WLAN switch life:

- Unstrung: It's Alive: 802.11 Switches On
- Unstrung: Cisco's SWAN Song
- Unstrung: Aruba's Mini-Switch
- Unstrung: Airespace Talks Up VOIP
- Unstrung: 2005: A Switch Odyssey?
- Unstrung: Penny-Pinching Switch Hitters
- Unstrung: Cisco's Path to Switchdom
- Unstrung: WLAN Switches Cause a Stir
- Unstrung: Moto Expands in Jordan
- Unstrung: Trapeze's High Wire*less* Act
- Unstrung: Nortel 'Reveals' WLAN Offerings
- Unstrung: WLAN Switch Shakeout Looms?

No. 3 **FTTx**

Fiber to the premises, fiber to the curb, fiber to anything that stands still too long. The request for proposals (RFP) from BellSouth Corp. (NYSE: BLS), SBC Communications Inc. (NYSE: SBC), and

Verizon Communications Inc. (NYSE: VZ) was the Pavlovian bell that set the optical industry drooling. Suddenly passive optical networking (PON) was cool again, and the promise of new fiber buildouts was budding (see RBOCs Hungry for Fiber).

How much money? How many homes? Tough to say. The project is no slam dunk, as some still speculate that the RBOCs would prefer to succeed with DSL (see DSL Fuels Second Thoughts on FTTP and FTTP Booty Tough to Peg). But at minimum, the RBOCs have stimulated talk of fiber possibilities in the United States.

Of course, don't forget that other countries are further along in FTTP (see NTT Calls for Ethernet PON, Salira Scores in China; Flexlight Funded, Salira Gets Another China Deal, and Utilities Key to Euro FTTH).

More about the RBOC RFP:

- News Analysis: SBC Picks Alcatel for FTTP
- News Analysis: IDC Sees Modest FTTP Growth
- News Analysis: How Big Is FTTP for AFC?
- News Analysis: RBOCs See Three Ways to FTTP
- Webinar: Access Technologies: Fiber to the Future
- News Analysis: FTTP Bidders Slashing Prices?
- News Analysis: Carriers Give FTTP Update
- News Analysis: SBC Ratchets Up PON Politics
- News Analysis: Fiber Surprise in FCC Rules?
- News Analysis: Vendors Await FTTP Shortlist
- News Analysis: A Closer Look at PON Econ
- News Analysis: Fiber Access Plans Proliferate
- News Analysis: RBOCs Hungry for Fiber

No. 2 **Wireline Convergence**

Major vendors of wireline equipment have converged about convergence, according to an October *Heavy Reading* report, "Setting a Course to Convergence." They've got different spins but are all approaching a network model that uses one packet-based infrastructure for carrying all services. At the heart of the model is an IP core that uses Multiprotocol Label Switching (MPLS) to sprinkle ATM-like features such as classes of service.

Carriers are on board with the plan, too; it's all part of AT&T Corp.'s (NYSE: T) "Concept of One." Take time now to become One with this year's coverage:

- Report: Flow-Based Networking
- Webinar: Flow-Based Networking: A Better Business Model for IP?
- Top 10 Movers and Shakers: Hossein Eslambolchi, CTO, AT&T
- News Analysis: Survey: Carrier Dough Flows to IP/MPLS
- News Analysis: MPLS Is Growing Up

- Webinar: Interworking: Making the Transition to MPLS
- News Analysis: Incumbents Converge on Convergence
- News Analysis: MPLS Migration Gets a Voice
- Webinar: MPLS: Five Key Convergence Questions
- News Analysis: AT&T Closer to 'One' With Itself
- Webinar: The Challenges and Rewards of Building Profitable MPLS VPN Services

No. 1 **VOIP**

Pity about the name. This isn't just voice. This is really the rollout of new, packet-based multimedia services -- what carriers are hoping will generate new revenues and save their collective bacon.

But voice is the simplest, flashiest example. After years of possibilities, voice over IP is finally ensconced in the tech industry's consciousness. Longtime believers such as Cisco saw their vision validated as carriers started bracing for the inevitability of VOIP and softswitches to replace the rickety Class 5 infrastructure.

And then there's Skype. As one might expect from Niklas Zennstrom, founder of music file-sharing service KaZaA, Skype is built on peer-to-peer (P2P) technology, using third-party computers to route calls. Like KaZaA, Skype is free for users. Good news for them; less so for the companies that want VOIP to make money.

The best of this year's voluminous VOIP verbalizing: