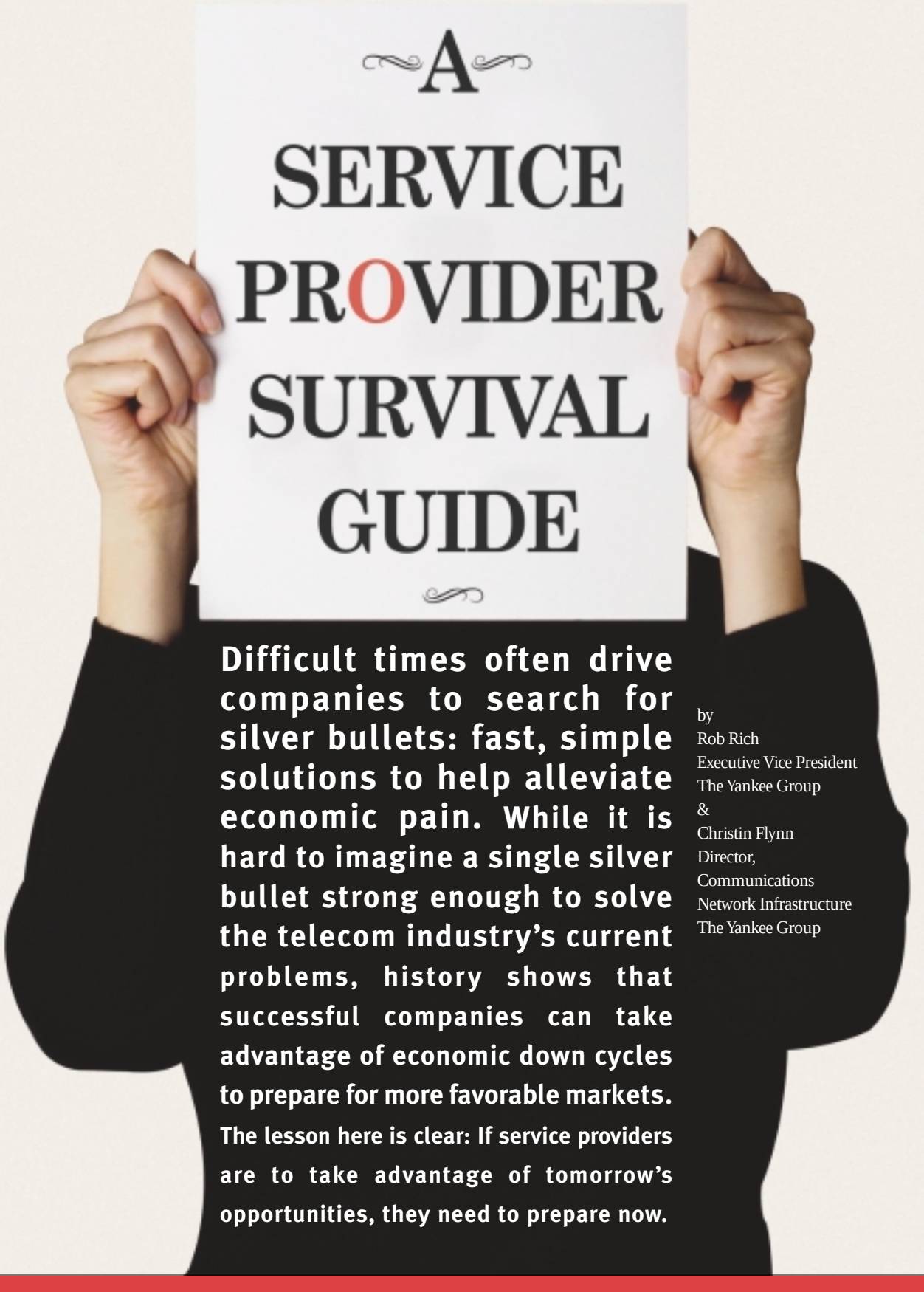

A SERVICE PROVIDER SURVIVAL GUIDE

Difficult times often drive companies to search for silver bullets: fast, simple solutions to help alleviate economic pain. While it is hard to imagine a single silver bullet strong enough to solve the telecom industry's current problems, history shows that successful companies can take advantage of economic down cycles to prepare for more favorable markets. The lesson here is clear: If service providers are to take advantage of tomorrow's opportunities, they need to prepare now.

by
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THERE IS SOME GOOD NEWS. While naysayers focus on service providers' recent financial results, Yankee Group research shows strong fundamental demand for capacity in both the corporate and consumer segments. For example:

• A 2001 Yankee Group survey of 650 global corporations showed that multinational enterprises plan to increase both bandwidth capacity and connection speed dramatically over the next two years. For example, in North America, only 6% of respondents indicated that they had OC-12 speed connections in 2000 from their main locations, while a dramatic 20% of respondents expected to have an OC-12 speed connection by 2003.

• In 2001, 60% of all U.S. households had cable modem service available to them, and 45% had DSL availability. By 2005, those figures jump to 78% and 70%, respectively.

• Growing demand for connectivity from both the enterprise and consumer markets is reflected in the growing capacity of IP traffic in the core of service provider networks. While service providers' capital expenditures in North America shrunk 4% in 2001 over 2000, the need to continue to provide capacity, availability, and a robust network to support traffic growth continues to put pressure on service providers.

While this level of growth may not appear as great as it was in the late 1990s, it is more realistic and sustainable. The issue is how that demand for increased capacity can be turned into profitable business opportunities.

Service providers must craft strategies to optimize their networks to respond to the current complex regulatory and business environment, while—and, ultimately, more importantly—positioning networks to thrive when market conditions improve. The top five priorities for network development are:

1) Optimize the network infrastructure for multiservice delivery: Over the next five years, providers must consolidate their multiple networks to optimally run over a common core architecture. This architecture will implement various forms of MPLS delivery in the core for voice, frame relay, Ethernet, ATM, wireless and IP services. Providers also must have a specific roadmap to push the ability to converge over MPLS out to the edge.

2) Develop a transition plan to move circuit-based voice traffic to a packet-based network: While packetized voice still has its challenges, the reasons to migrate away from circuit-based traffic are many and compelling, from offering operational efficiencies to new services. One compelling example targets the wireline service provider competing against wireless displacement for consumer voice revenues. The Yankee Group predicts that globally, wireless users will displace wireline access users by 2006, with much of the voice services consisting of a bundle of long distance, web access, and features such as Caller ID, Voice Mail and Call Waiting. If wireline service providers have any chance of competing on the consumer side, they must have a packetized voice infrastructure that enables them to cost effectively compete against wireless service offerings with flexible, timely new services. Additionally, for the business users, The Yankee Group projects that by 2005, 28% of all installed PBX lines in the US will be IP-enabled, many with enhanced features and functionality that service providers cannot compete against without an IP-based network.

Top Five Priorities for Network Development:

1. *Optimize* network infrastructure
2. *Develop* a transition plan
3. *Build out* metro architecture
4. *Update* network management
5. *Upgrade* service management

3) Build out the metro architecture with more intelligence: To benefit from growing service and traffic demand from both consumers and businesses as described above, service providers must build their metro architectures in such a way that they can achieve maximum throughput and efficiencies. Additionally, new metro infrastructure must be designed, engineered, and implemented to ensure operational stability and the flexibility to offer end-to-end service intelligence for new services, such as optical VPNs and wavelength services.

4) Update the network management architecture: Providers must efficiently assure reliability and availability, while incorporating the flexibility to rapidly add new elements with minimal network impact. Network management architecture must also consistently reduce the time required to activate network capacity while allowing providers to quickly incorporate new network elements.

5) Upgrade service management capabilities: Providers must offer tailored, differentiable services to a broad variety of customers, meeting their service requirements on a customer-by-customer basis. End-to-end service management is critical, even if the service provider does not own the entire network infrastructure delivering the service. Finally, security management is a critical priority for virtually all enterprises. ■

ARCHITECTING NETWORK PROSPERITY

By Annie Lindstrom

TODAY'S TELECOMMUNICATIONS SERVICE PROVIDERS need to plot a new course to future success. Their goals are to reduce their capital and operational expenditures, and retain revenue from existing services while rolling out new ones to meet customer demand and stave off competitors.

While technology is playing an important role in network evolution, its true value lies in its ability to help service providers immediately begin forging their networks of the future.

"Service providers are no longer in the mode of wanting technology for technology's sake–rather, they are focused on investments that reduce cost or increase revenue," says Bill O'Shea, Lucent Technologies' executive vice president of corporate strategy, chief technical officer and president of Bell Labs. "They understand that their networks have to be headed in a direction that will enable them to take advantage of new technologies that allow them to reach those two goals."

A CLEAR COURSE TO FUTURE SUCCESS

Lucent's Service Intelligent™ Architecture (SIA) provides telecom service providers with a clear vision of the future, a roadmap to get them there, and a complete portfolio of switching and transmission products that are ready for deployment, he adds.

Lucent is helping service providers implement SIA in their networks today by designing software-based intelligence into its next-generation optical and data networking switches and transmission equipment. Intelligent hardware possesses self-care, self-discovery and self-administration functionality that helps service providers immediately begin to realize significant opex savings, O'Shea says.

Lucent also is providing open applications provider interfaces (APIs) at the service control and application layers. The APIs demolish the programmability boundaries that have surrounded legacy networks. They enable all comers to create new revenue generating services, in addition to those that Lucent offers, adds O'Shea.

Service Intelligent™ Architecture consists of:

The APPLICATION layer, which hosts network-based, client server and peer-to-peer/network-based server applications.

The SERVICE control layer, which delivers services and provides for their mediation and control.

The NETWORK transport layer, where next-generation intelligent optical and data networking equipment resides.

THE BENEFITS OF SERVICE INTELLIGENCE

Today, the circuit-switched network handles voice, while IP networks support intranet and Internet applications. Frame relay and ATM networks offer up the bulk of data services, and wireless networks provide end users with mobile voice and data communications.

Service providers that begin implementing service intelligence today can change that costly and inefficient landscape dramatically. That's because it enables them to converge their now disparate networks onto a more cost-effective, simple to operate, unified, packet-based platform and manage it from a single point of control.

In addition to delivering end-to-end optical transport capability at the network layer, SIA will allow users to choose the access method, and speed and performance levels they desire on a customized basis.

Multiprotocol label switching (MPLS) and IP will enable service providers' core data networks to host existing services as well as new revenue-generating services from a unified network. Eventually, the optical core will mesh operationally with the multiservice data core, creating a truly seamless public wired or wireless multiservice network, explains O'Shea.

"Service Intelligent Architecture helps service providers understand how they can take real and concrete steps today to get where they are going and how they can benefit immediately by moving in that direction," says O'Shea. ■

Building the Service Intelligent Core

Revving the Optical Engine

Service providers are taking advantage of the current economic lull by planning their future optical network deployments. Dumb by nature, legacy optical networks not only add cost to capital expense budgets, they also increase operational expenses. In fact, it can cost three times as much to maintain and operate optical networks as it does to deploy them. Dumb, expensive optical equipment just doesn't work in today's industry.

"At the moment, the core optical network consists of dumb pipes. There has been some intelligence built into core optical equipment over the last 10 years, but the reality is that private line services, video services or wavelength services provided over these networks need to be provisioned manually," says Kathy Szelag, vice president, portfolio, optical networking for Lucent Technologies.

Today, to add another wavelength to a DWDM network, service providers may dispatch craft personnel to insert a new circuit pack into each amplifier along a route. Worse, the deployment has to be coordinated at all sites and the packs must be installed simultaneously. "That's one of the major reasons we aren't seeing a lot of wavelength services being sold," Szelag says.

Dumb, expensive optical equipment just doesn't work in today's industry.

Adding Optical Network Intelligence

In response, suppliers have been incorporating intelligence into both core and edge equipment by adding generalized multiprotocol label switching (GMPLS) software to products. This packet-based signaling standard will significantly decrease the costs of operating optical networks in much the same way that the signaling system 7 (SS7) network streamlined and cut the cost of operating the public switched network.

"The concept behind GMPLS is to make the optical network intelligent enough so that it can easily set up optical service circuits in a similar manner," Szelag says.

The addition of GMPLS to optical equipment—including OEO and all-optical switches, DWDM systems, and Sonet multiplexers—will convert slow-moving optical networking highways into smooth, fast-flowing freeways.

Technically GMPLS does not go on IP routers, MPLS does. There is an extension of the GMPLS concept of signalling, called UNI, that could go on an IP router.

"GMPLS makes operational pieces of the network easy to manage and provision, so service providers don't have to spend a lot of money changing, upgrading and provisioning them," says Tim Sullivan, president, optical networking for Lucent.

Once equipped with GMPLS software, next-gen Lucent optical equipment will end such profit-sapping procedures. GMPLS has a signaling mechanism that provides each element with self-care, self - discovery and self-administration capabilities.

Intelligent Automation Means Significant Savings

This intelligence will automate end-to-end provisioning, management and maintenance processes that previously had to be completed manually. For example, GMPLS specifies the service being requested, whether or not the chosen network element can accommodate the traffic, and whether a circuit is available.

Each network element has a name and knows the other elements in the network. Unlike SS7-based elements, they don't need to dip into a database to determine network configuration for routing purposes.

For instance, if a normal path is blocked, an element can send out a message to the others in the network to determine precisely where it can send traffic productively.

"GMPLS promises to provide a unified control plane separated from the data plane. It will provide the intelligence to respond efficiently and rapidly to signaled requests for network resources, and simplify management across the service and transport layers of the network through integrated network management sys-

Continued on page 8

By Annie Lindstrom

Building the Service Intelligent Core

Driving Toward Data

A data dilemma confronts carriers: Demand for legacy frame relay and ATM-based data services is up, but future profitability demands adopting multiprotocol label switching (MPLS) and packet-based technology in the core of data networks.

Networks must be scaled to unify, rather than further stratify, existing disparate data networks. The data network of the future must provide a core-to-edge network architecture that will accommodate popular legacy services, which generate the bulk of data revenues today, and simultaneously meet the growing demand for advanced IP services.

MIGRATE & DRIVE EXISTING REVENUES

"All service providers realize the need to migrate to MPLS core networks, but the services that continue to drive their existing revenue streams are frame relay and ATM," says Sarbpreet Singh, vice president of product management, multiservice switching for Lucent.

Deploying larger IP routers in IP networks and larger ATM switches in cell-based networks is neither a cost effective nor efficient scenario. Evolving the core to accommodate a true multiservice environment in which cell and packet-based services can be provisioned and managed from a single point of control is a far better alternative.

To help address the dilemma, Lucent has introduced the TMX 880™ MPLS Core Switch. The ATM/MPLS internetworking platform has two key evolutionary attributes:

- **It integrates MPLS and ATM control planes on the same switch.**
- **It is managed by the Navis™ iOperations network management system, which carriers now use to manage existing ATM/frame relay switches.**

In a major advance, the TMX 880 joins MPLS and cell switching on the same platform. The Martini draft MPLS standard, which encapsulates ATM cells so they can be carried on MPLS networks, is a step in that direction.

"The problem with Martini is that it just takes care of the data plane," says Singh. "It's also important to integrate the control plane so that carriers don't have to absorb the costs of managing separate networks. Otherwise, it's a painful, manual process to get them to work with each other."

"The TMX 880 solves that problem with fluid signaling," Singh notes. "This guarantees them that ATM traffic will be carried through the core with all QoS preserved."

Intelligence built into the TMX 880 translates ATM control information into MPLS and vice versa. This enables the switch to automatically perform all mapping between the two domains for service set up and recovery between ATM virtual circuits and MPLS label switched paths.

The TMX 880 is a future-proof way to scale the core data network. In addition to its ability to support frame relay, ATM and IP services on the same control plane, the switch supports 10 Gbps trunks and provides 160 Gbps of capacity. That's an order of magnitude more bandwidth than Lucent's GX 550™ Multiservice WAN switch's 25 Gbps and its CBX 500® Multiservice WAN switch's 5 Gbps.

The previous lack of meaningful integration between the IP and ATM control planes has slowed deployment of MPLS. Integration is the key to providing quality of service inside MPLS-based core data networks. The control planes also must interoperate seamlessly and provide complete visibility into the network.

"Service providers are more motivated than ever to make sure that the equipment they deploy in their growing networks has longevity," Singh says. "They have no need for something that scales only to meet the needs of ATM, frame relay or IP. The TMX 880 is an excellent hedge that offers them the ability to provide all three services immediately."

"If you have an ATM network today, you either have to upgrade your core using ATM, which has no real value past 2005, or use something that can support both ATM and MPLS. A 'pure' MPLS core that didn't support ATM would demand service conversion at the edge to continue to offer ATM/frame relay services to users," says Tom Nolle, principal of CIMI Corp. "So far, vendors aren't really pushing that, so a dualistic ATM/MPLS switch seems the best approach."

Continued on page 8

tems," says David Dunphy, principal analyst, optical infrastructure for Current Analysis Inc. "This generates a lot of interest among carriers, as the prospect of being able to leverage signaling to automate operation of the network creates anticipation of significant opex savings, improved time-to-revenues and substantial new service opportunities."

The addition of GMPLS to next-gen network gear will not cost a big premium. The opex savings with GMPLS are only one of the cost-savings features in Lucent's new systems—all products have also been designed for significantly lower capex cost per bit.

"Service providers find GMPLS appealing conceptually, but its evolution will be a complex undertaking that will require time, can be expected to occur in phases and will require proof points and additional standards progress along the way," says Dunphy. "Vendors like Lucent seek to be on the forefront of GMPLS development, initially to drive sales by bringing cost efficiencies such as automated provisioning and flexible meshed restoration capabilities to the table with an integrated services control plane – but with the long-term goal of driving revolutionary changes in carrier networks." ■

Building Next-Generation Optical Networks

In 2002, Lucent announced eight optical customer deployments and contracts for intelligent core and metro products, including:

- Verizon will deploy a 32-channel DWDM system in its regional interoffice network ring deployments.
- Deutsche Telekom is field-trialing 40G transport and deploying broadband services in its network.
- Sichuan Telecom is building an optical network to support the growing voice and data traffic of the more than 90 million people of the Sichuan province using Lucent's LambdaUnite™ MultiService Switch.
- Slovenske Telekomunikacie plans to offer new data services and further network capacity to existing customers using Metropolis® EON.
- The Korean National Railroad and the Seoul Metropolitan Government are using high-capacity metro optical networking systems for their enhanced communications networks.

That is the approach of Lucent's TMX 880™. At the edge of the network, the TMX 880 links to advanced IP edge solutions such as Lucent's SpringTide® 5000/7000 platform. It also links with the GX 550™ and CBX 500® ATM/frame relay switches, which already are ubiquitously deployed.

The TMX 880 also provides ties to the optical core. It accommodates the Optical Internetworking Forum's User to Network Interface 1.0 (UNI 1.0). Lucent is adding intelligence to its family of optical switches and transmission equipment via generalized MPLS (GMPLS) software. GMPLS, MPLS and the OIF UNI 1.0 ultimately will enable the Navis network management system to dynamically provision services and bandwidth between both networks.

Deploying the TMX 880 does not require service providers to abandon their investments in GX 550 and CBX 500 switches. They can be moved closer to the edge of the network and, by simply adding new low-speed interface cards, maximize their value.

Earlier this year, Lucent introduced a three-port channelized DS3 ATM circuit card for the CBX 500 that provides a tenfold increase in the switch's ATM T-1 ports. A 32-port channelized E-1 card provides an eight-fold increase in available frame relay and IP ports. And new multilink frame relay software enables carriers to deploy scalable, bundled bandwidth solutions for enterprise customers.

Lucent has experience with MPLS. A pre-standard version has been implemented in the GX 550 and CBX 500 for years. It is now used to provide site-to-site virtual private networks and to carry voice over IP traffic with QoS. TMX 880 has been built from the ground up to support true QoS for all types of traffic.

History is one reason carriers can confidently entrust revenue generating services to an MPLS core.

"Although service providers' capital budgets have been shrinking over the past few years, they are still spending money on new equipment. If service providers need to deploy larger data switches to meet the growing demand for revenue generating services, they are going to find the money to do it," says Singh. "We are seeing interest in our MPLS core data switch across the board because the value proposition it offers service providers is very, very compelling." ■

How Carriers Compete with Cable

By Donny Jackson

TELECOM CARRIERS have seen the future, and it involves their customers seeing video.

Threatened by cable operators dominating the residential broadband market and making telephony inroads, telcos have longed for a solution that lets them generate revenue from MSOs' traditional "turf": video service. Lucent's enhancements to its Stinger® broadband-access platform do just that, letting carriers provide IP video services over their copper infrastructure.

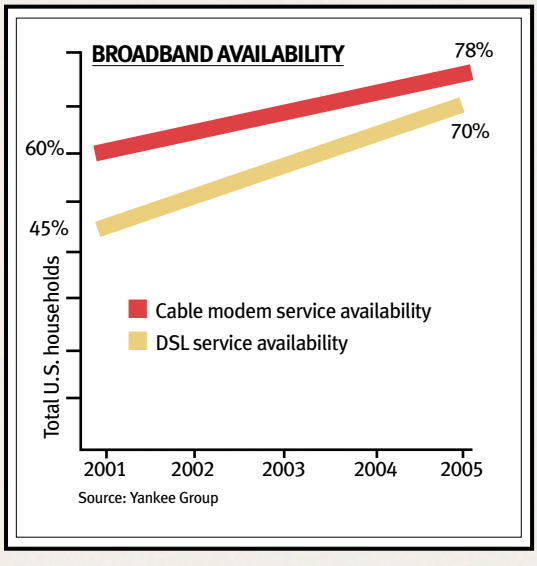
Service providers have longed for a solution that generates revenue from MSOs' traditional turf.

While video over copper is not new, previous solutions have been proprietary and too expensive for incumbents to deploy. But the Stinger solution, which is being deployed commercially by Canadian carrier Sasktel, gives telcos the ability to make a standards-based "triple play" offering of voice, data and video services to compete with cable operators.

DELIVERING THE TRIPLE PLAY-VOICE, DATA, AND VIDEO

"We're the only vendor who can do all of these things on a full-scale deployment level," said Bruce Miller, senior product manager of the broadband access group at Lucent. "Most DSLAMs don't even have IP multicast capability at this time."

With MPEG-2 compression technology, Stinger's enhancements support two channels of video per household over ADSL and video-on-demand functionality. In addition, a 24-port line card can be added that will carry very high bit rate DSL (VDSL) signals—providing six times the bandwidth of ADSL, so more channels and high-definition TV can be supported—in the future.



And it's flexible. While the Stinger solution can be deployed from a central office with as many as 1008 ports for high-density areas, it can be offered from a remote terminal with as few as 36 ports.

Stinger's IP2000 controller module provides gigabit Ethernet connectivity and means there is no need for additional routing or switching equipment, improving the economics for new customers as well.

The capital environment is challenging, but economics ultimately require carriers to enter the video market to generate new revenue streams and compete with aggressive MSOs. While technologies such as passive optical networking and proprietary Ethernet-over-copper solutions remain options, video offerings via ADSL or VDSL provide the quickest entry opportunity, according to Matt Davis, director of broadband access technologies at The Yankee Group.

Stinger is ideal for serving overlay areas where there is a known broadband demand, but Lucent's AnyMedia platform may be the choice of carriers entering a new development. Lucent's flexible portfolio lets a carrier offer any service needed to a greenfield area through a single product. In addition, on the CPE side, Lucent's CellPipe integrated access device enables as many as 24 voice-over-DSL lines for small businesses.

"We truly have a full, end-to-end [broadband] solution," Miller said. ■

CIRCUIT-TO-PACKET PROFITABILITY

By Annie Lindstrom

MOVING FROM CIRCUIT TO PACKET switched infrastructures is complicated but profitable. Carriers can reap immediate revenue and cost benefits, and use current economic conditions to their strategic advantage.

"The race to C-to-P is no longer the frenzy we all thought it would be," says Linda Manchester, vice president and general manager for Lucent's Universal Gateway business. "Because they have such a large embedded base of circuit-switched equipment and more time to implement their strategies, service providers are taking a more focused, deliberate and phased approach to reaching their ultimate goal of a pure packet infrastructure."

"As service providers evolve to IP technology they will be able to achieve higher speeds and run protocols that allow end users to play into the rest of the Internet community," says Jack Kozik, director of enhanced services architecture for Lucent's mobility solutions group. In the wireless world, for example, end users could link their mobile phones or PC clients to Internet instant messaging (IM) buddy lists and use those devices to send IMs.

Cost reductions offered by packet-based trunking of inter-office facilities are a major driver. Using a large packet facility to link COs significantly reduces the number of circuits that have to be provisioned between COs and greatly simplifies network management.

Cost reductions offered by packet-based trunking of inter-office facilities are a major driver and greatly simplify network management.

THE THREE PATHS TO PACKET

C-to-P migration occurs three ways:

- Augmentation
- Bypass
- Replacement

"We believe that the best strategy is to leverage the existing infrastructure while gracefully migrating to a next-generation network based on softswitches and media gateways," says Manchester. Incumbent providers are augmenting Class 5 switches with external gateways that "expose packet-based end points to Class 5 features."

Services that the gateways connect to the circuit switch include IP Centrex, voice over DSL and voice over cable. Lucent's *iMerge*™ product line connects Class 5 switches to enterprise customers' IP PBXs and enables those customers to begin replacing traditional desksets with IP phones and soft-phones. The new phones have access to the same Centrex features as traditional phones, allowing each business to migrate at its own pace.

iMerge also takes in packet voice traffic from DOCSIS-based cable modems. The gateway converts packet traffic to circuit and hands it off to the Class 5 switch via a TR-303 interface. Because DSL conversion differs slightly, Lucent's PacketStar® (PSAX) 4500 Multiservice Media Gateway, which can be used as a line side or trunk side device, is used to convert DSL-based voice traffic from packet to circuit.

On the trunk side, service providers can augment their 5ESS® Class 5 switches with Lucent's new APX 8100 IP-based trunk Universal Gateway to take advantage of interoffice packet connectivity's cost savings offers.

Some providers are bypassing their Class 5 switch using the Lucent Softswitch, which provides call control, and appropriate media gateways.

Applications include:

- Offloading IP traffic from the switch
- Transport of voice over IP and voice over broadband on a second line
- Support for IP VPNs.

Wireline providers can use the Lucent APX 1000™, 8000 or 8100 Universal Gateways. The APX 8100 supports new end point services provided by Session Initiation Protocol (SIP)-enabled devices.

Wireless providers can use the ATM-based PSAX gateway to collect TDM traffic from radio base stations and convert it to packet for transport to mobile switching centers. So carriers can cut backhaul transport costs by as much as 50% and add up to 7% in revenues.

Ultimately—perhaps in a few years—service providers may begin to replace their legacy installed base of Class 5, tandem, toll switches and mobile switching centers with next-generation networks based on softswitches and media gateways. ■

SOFTWARE FOR CONVERGENCE

By Donny Jackson

THE BEAUTY OF NETWORK CONVERGENCE is its simplicity—all traffic will flow over a single network, regardless of protocol, destination or purpose. The headache of network convergence is that the execution of this simple concept is fraught with complications, especially for established carriers with legacy networks.

For instance, IP is a great protocol that gives carriers tremendous flexibility in their service offerings. But ensuring these new network elements work seamlessly with the legacy TDM network that features decades-old equipment and the more recently developed packet technologies is a daunting task. Integrating a carrier's data, optical and wireless networks only magnifies the challenge.

Theoretically, one solution is simply to build a new parallel network, but that is inefficient and impractical, especially in the current capital-restrictive environment. More than ever, carriers need to leverage their existing investments, according to Deepak Kanwar, executive director of product management and marketing for the network operations software (NOS) group at Lucent Technologies.

"Service providers are saying, 'I have a tremendous amount of investment in my existing infrastructure, so I really can't do a flash cut,'" says Kanwar. "They want to be able to offer new technologies and services on an incremental basis over their existing infrastructure."

Service providers want to be able to offer new technologies and services on an incremental basis over their existing infrastructure.

ENGINEERING THE MULTI-VENDOR NETWORK

It's easier said than done. Fortunately, Lucent is intimately aware of carriers' existing networks and the latest optical and packet technologies. After all, the vendor supplied much of the equipment used to build them–and not just for a limited period of time in a niche area of the network, but generations of gear that is used throughout today's optical, data and wireless networks.

"Often, service providers look at point solutions that specifically manage a technology, but they soon realize that—unless it is tied back in some fashion to their legacy network—they will end up with two operational silos," says Madan Kumar, vice president of Lucent's network operations software group. "We can offer a solution that can overlay their legacy and next-generation services and make it a single process to manage across a single environment."

Many believe Lucent's knowledge base for writing operations software for telecommunications networks is unmatched.

"They probably know the inner workings of the network better than anyone else," says Karl Whitelock, program director for Stratecast Partners' OSS competitive strategies and analysis service.

"There is no question in our mind that all networks out there are going to be multi-vendor," Kumar says. "[What] surprises a lot of people is we have a big focus on providing multi-vendor capability, to a point where we proactively work with some of our competitors in the hardware space and integrate their products into our environment."

THE MULTI-VENDOR NETWORK TOOLBOX

Lucent's multi-vendor focus is reflected in the makeup of flagship Navis™ iOperations solution. While the Navis iEngineer offering provides element-management support only for Lucent gear, the two larger parts of the portfolio—Navis iProvision and Navis iAssure—are multivendor in nature and feature published APIs to encourage interoperability with other vendors.

Through Navis iProvision, carriers get network elements functioning quickly and correctly, so they can realize revenue from their capital expenditures with as little "dead" time as possible. In addition, the solution has led some customers to transition the

traditionally labor-intensive DSL provisioning process to "one that's not touched by human hands," allowing end users to self-install the service—a boon to carriers trying to increase revenue margins, Kanwar says.

Another way to maintain network efficiency is by addressing problems quickly. Lucent's Navis™ iAssure family monitors the network and flags trouble spots. Just as importantly, the product automatically checks the network inventory and updates the database—not an insignificant matter.

"Carriers need to know what's in the field for more cost-effective provisioning and repair," says Ted Finlan, Lucent's director of global product marketing for the network operations software group. "Service providers want technicians to focus on their customers, not database updates."

Lucent's NOS package also includes a feature called MyVital, which provides secure, updated information to a designated person about a portion of the network as dictated by the primary carrier. While this function primarily will be used by employees of the primary carrier, the tool also can be configured so that a representative for another carrier using the network—a CLEC or, in the case of wireless, an MVNO—can monitor their equipment.

And having network operations software with the intelligence of Lucent's solution will be more important in the future. While converging disparate networks within a carrier is difficult, integrating the network elements added to their systems after economic realities result in consolidation promises to be even more challenging.

"Most service providers have combined multiple networks, technologically and geographically, dramatically increasing the complexity of providing service," Kanwar says. "But their customers don't care. They expect their service to be provided seamlessly, as if it's all one network. We're helping them do that." ■

Wireless data end game

Global wireless data services won't follow a common trajectory worldwide. The affordable, ubiquitous North American wireline infrastructure—lacking in many places—may temper the acceptance of wireless data services by consumers here. But they are extremely attractive to corporations with highly mobile employees.

"Based on our primary market research, we see pent-up demand on the enterprise side," says John Marinho, vice president of offer management for Lucent's Mobility Solutions Group.

Wireless data success stories tend to come from carriers that deploy spread-spectrum technologies, Lucent's development focus. In 50% of its markets, for example, Verizon Wireless has deployed a Lucent CDMA2000 1X network that provides downloads of 80 kbps to 100 kbps with network security.

By contrast, GPRS data speeds are slowed when security payloads—a business requirement—are applied. Lucent is encouraging these carriers to migrate quickly to UMTS, the spread-spectrum technology that offers increased data rates and other efficiencies.

"We want to help the GSM carriers get to UMTS as quickly as possible," Marinho says. "We are encouraging them to get data services up first and generate revenues until handsets are available to derive voice revenues as well."

While focusing on CDMA2000 and UMTS 3G solutions, Lucent also is supporting existing GSM and TDMA customers, and is working to help them evolve quickly to 3G. For instance, Lucent is seeking approval for a modified standard—UMTS Compact—that would provide a 3G alternative for GSM operators constrained by spectrum shortages.

—Donny Jackson

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