GLOBAL ACCESS
Winter 98
Ascend's Newsletter for Service Provider Partners

Global Vision

The Bandwidth Value Chain

In an era where data communication has shifted from a luxury to a necessity, users want sophisticated technology coupled with efficient customer service. This demand, along with dramatic growth in wide area networking, has triggered a new trend: large carriers who act as wholesalers of data networks and lease parts of their backbone infrastructure to smaller, and often, regional Internet Service Providers (ISPs) or Competitive Local Exchange Carriers (CLECs). These local service providers then resell the bandwidth to end users.

"From a service provider perspective, there are two sides to data internetworking. One side focuses on technology and infrastructure, while the other stresses customer service and marketing," says Sam Mathan, vice president of carrier marketing and sales at Ascend. "Both sides are vital to the success of a provider and satisfaction of the end user."

Wholesale and retail service providers in the data communications world are learning that rather than spending energy competing with each other and diluting company resources, a happy partnership can be more prudent and lucrative in the long run. Thus, each party can define its role in meeting the needs of end users, while extending the bandwidth value chain.

Carrier Wholesalers— A Lucrative Partnership

Wholesalers focus their energies and technical expertise on creating and maintaining a high-quality, high-performance, high-density, and stable network infrastructure. By taking advantage of statistical

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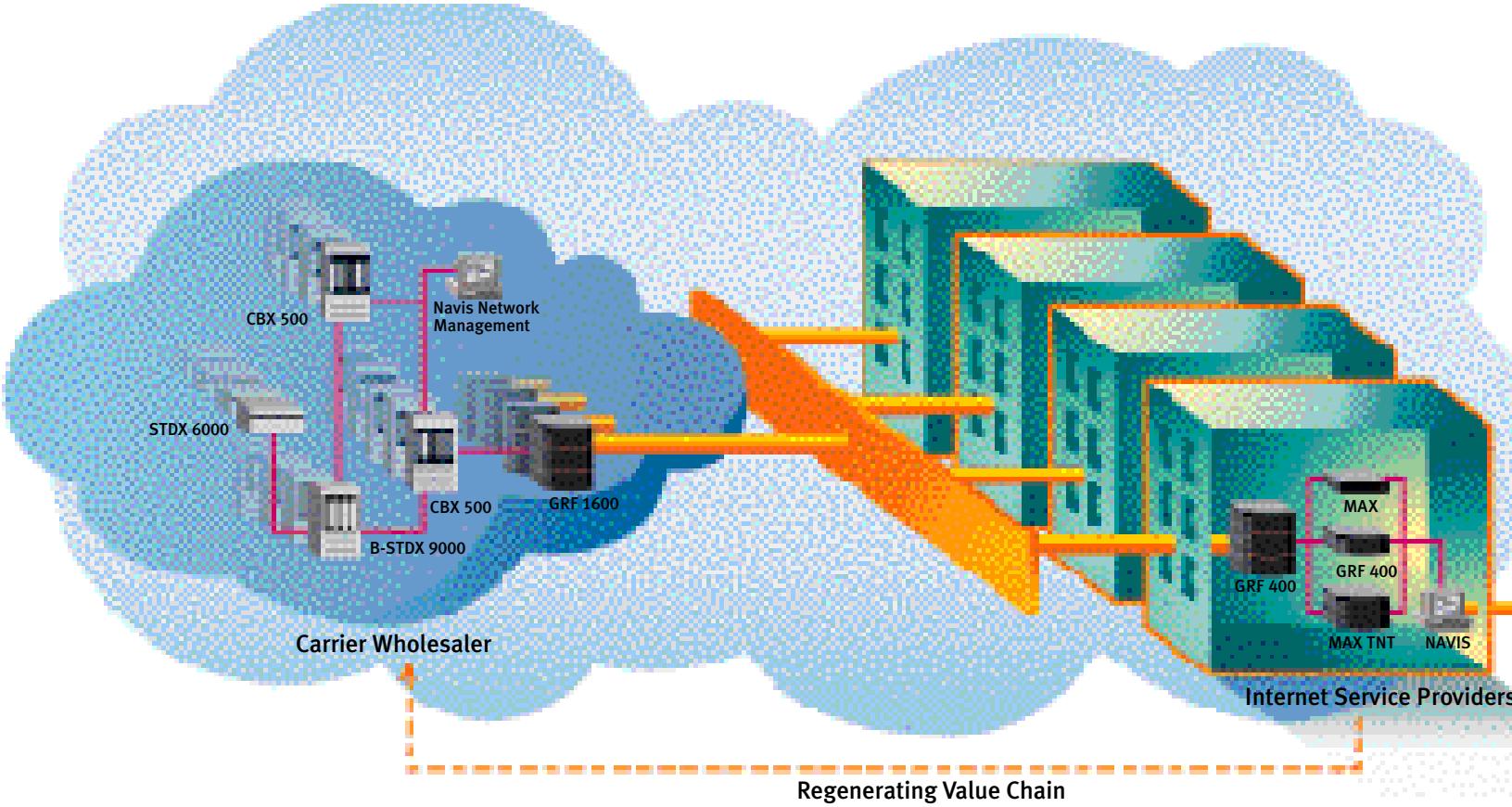
efficiencies associated with a high port count, carriers with sophisticated data networks can oversubscribe their data ports and deliver bandwidth more cost effectively to their Internet service partners. They can even offer tiered pricing, based on different Quality of Service (QoS) levels.

"To recuperate the investment spent in expanding their infrastructure, carriers sell access to Frame Relay, ATM, or dial ports to their service provider customers," explains Mathan. "These companies then provide the service to the end user."

Networking companies such as Ascend can help carriers enhance and develop their infrastructure by providing high-end core switching products designed to deliver end-to-end QoS. And using Ascend's Navis™ network management solutions, carriers can increase their operational efficiencies with incremental effort. Navis lets downstream carriers provide visibility into the configuration of their data network, allowing the local service reseller to create new customer opportunities with little, if any, "hands-on" provisioning by the carrier.

Internet Service Partners—The Next-Generation ISP

Local service providers who purchase and resell data ports from a carrier wholesaler can concentrate their efforts on customer service, marketing, and content delivery, rather than infrastructure development and management. The total direct cost to enable new ports is well defined and more economical for service providers



By purchasing ports from carrier wholesalers, Internet service partners can focus on leading-edge applications and services, such as Web hosting, electronic commerce, and information delivery. They create the applications using Ascend's core and access products, which in turn drive the demand for more bandwidth from the carrier—regenerating the bandwidth value chain.

"From a service provider perspective, there are two sides to data internetworking. One side focuses on technology and infrastructure, while the other stresses customer service and marketing. Both sides are vital to the success of a provider and satisfaction of the end user."

—Sam Mathan, vice president of carrier marketing and sales, Ascend

who partner with a wholesale carrier, because they can take advantage of the economies of scale.

"Local service providers don't need to build their own networks for ubiquitous coverage," notes Mathan. "By purchasing ports from a regional carrier, they can focus on leading-edge applications and services, such as Web hosting, electronic commerce, and information delivery. In effect, they act as the distribution arm for the carrier. They create the applications, which in turn drive the demand for more bandwidth from the carrier."

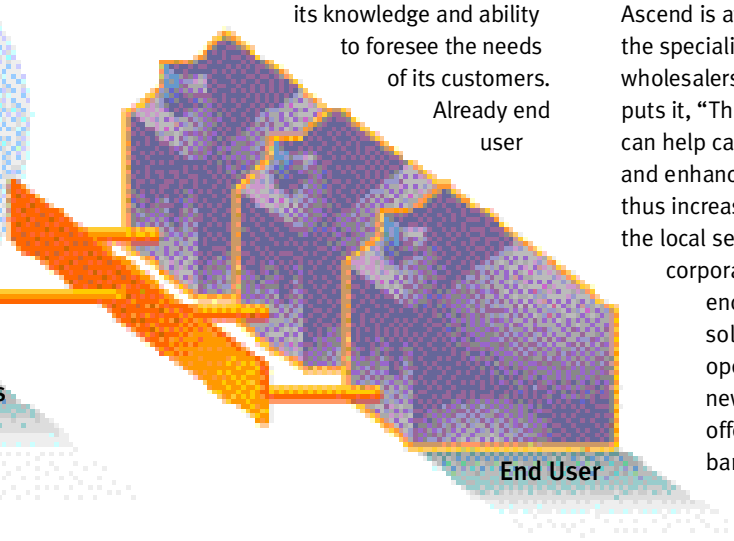
What ultimately differentiates one service provider from another is its knowledge and ability to foresee the needs of its customers. Already end user customers are looking beyond Internet access to turnkey intranet, extranet and VPN solutions. According to Mathan, "A service provider's best bet is to tailor its infrastructure to customer connectivity patterns and develop the right set of managed network services and other value-added applications to address the needs of their local constituencies."

Once again, networking companies like Ascend can assist in this endeavor. Ascend's core and access products support differentiated services throughout the bandwidth value chain. And Navis network management solutions allow service providers to create, manage, track and bill for new services as they are deployed.

The Value Chain

While currently more prevalent in the United States, this trend is catching on with service providers worldwide. In the meantime, both wholesalers and their Internet service partners can maximize their position on the value chain by streamlining their services for the ultimate benefit of the end user.

Ascend is at the forefront of meeting the specialized needs of both wholesalers and resellers. As Mathan puts it, "Through our product line, we can help carrier wholesalers expand and enhance bandwidth delivery, thus increasing data availability in the local service provider and corporate markets. And with end-to-end management solutions, we can lower operational costs and create new opportunities for service offerings all along the bandwidth value chain."•



Events Calendar

To learn more about new service provider solutions from Ascend, visit us at these upcoming trade shows (partial list):

February 4 - 6
NET&COM '98
Tokyo, Japan

February 16 - 21
APRICOT '98
Manila, Philippines

February 23 - 25
AP Tariffing, Pricing & Bundling of Telecom Services
Hong Kong, China

March 10 - 12
DSLCon
San Jose, California, USA

March 11 - 13
Internet World
Los Angeles, California, USA

March 16 - 19
ISPCON
Baltimore, Maryland, USA

March 19 - 25
CeBIT'98
Hannover, Germany

March 24 - 26
Internet World
Kuala Lumpur, Malaysia

March 31- April 2
ComputerWorld Expo
Auckland, New Zealand

April 26 - 29
China Intl. Conf. & Exhibition on Information Infrastructure
Beijing, China

CBX 500

First Backbone Switch to Support ATM, Frame Relay, and IP Switching

Last fall Ascend introduced multiservice capabilities for the CBX 500, an ATM backbone switch optimized for DS1 and DS3 access with high speed trunking at OC-3/STM-1 or OC-12/STM-4. With this new functionality, based on Ascend's IP Navigator™ and Priority Frame™ technologies, the CBX 500 becomes the first multiservice switch to include IP switching support, the first to offer end-to-end Quality of Service (QoS) for Frame Relay and IP as well as ATM.

"The addition of high speed Frame Relay and IP support on the CBX 500 switches is an example of Ascend's ability to deliver products that enable providers such as GTE to aggressively compete in the data services market."

— Joe Lardieri, ATM product manager, GTE Network Services

The announcement introduced two new modules for the CBX 500: a high-density six-port DS3/E3 Frame Module, and a four-port 10/100 Mbps Ethernet module. The new modules can support up to 250,000 IP routes using IP Navigator, more than enough capacity to support future Internet/intranet growth and provide long-term investment protection for the service provider. The DS3/E3 Frame Module also allows the delivery of high speed Frame Relay services.

The CBX 500's ability to deliver end-to-end QoS for ATM, Frame Relay and IP gives carriers greater flexibility in delivering new services to both consumers and business customers. The results are lower operational costs and higher revenues. In addition, the CBX 500 is fully integrated with Ascend's Navis network management system.•

The CBX 500 and GX 550 are currently available in North America; international release to follow. For more information, go to our web site at http://www.ascend.com, and then to "Products."

GX 550

"Smart Core"Switch Delivers Industry's First OC-48/STM-16 Support

In another fall announcement, Ascend introduced the industry's first "smart core" ATM switch, the GX 550, which uniquely combines the scalability and capacity of a core switch with the intelligence, service capability and cost-effectiveness of an edge switch. The GX 550's Universal Line Card design supports any mix of OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 interfaces, allowing service providers to respond quickly to changing user demands. The system performance of the GX 550 is designed for high scalability by adding over one million cell buffers and more than a quarter of a million connections on each Universal Line Card module.

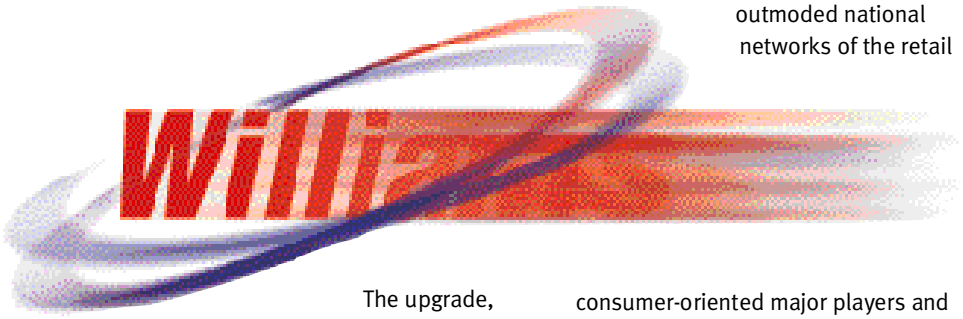
"By combining scalable capacity with advanced networking features, Ascend's GX 550 is delivering the most advanced core switch in the industry."

—Volker Gebhardt, director of INFNET, Swiss Telecom

The GX 550 incorporates end-to-end QoS and advanced networking features enabling service providers to offer sophisticated ATM services directly from the core network, something not achievable with traditional core switches. Integral SONET/SDH capabilities offer a new solution for high-speed trunking, allowing service providers to maximize bandwidth while reducing network and operational costs. Along with all Ascend products, the GX 550 is managed under the unified Navis family of network management products.•

Williams Communications: Building a Carrier's Carrier

In January of this year, Williams Communications (Tulsa, Okla., USA) announced a multi-million dollar upgrade to its carrier-class network to support an initial $1 billion worth of long-term wholesale agreements with major service providers in the US.



The upgrade, valued at $150 million, includes Ascend's recently announced GX 550 ATM core switches and CBX 500 Multiservice ATM switches; B-STDX 9000 Multiservice Frame Relay switches; as well as Navis network and service management products. (See related articles on the GX 550 and CBX 500 in this issue's Product Spotlight section on page 4.)

"With this network upgrade, Williams is underscoring its commitment to providing our customers a scalable broadband infrastructure," said Joe Turcotte, vice president of engineering and operations for Williams network — a business unit of Williams' communications group. "The addition of the Ascend switches and management systems to our existing carrier-class network gives our wholesale customers greater variety of speeds to accommodate their bandwidth needs, as well as faster access onto the network."

Scalable in Multiple Directions

The enhanced Williams network will provide industry-best scalability in multiple dimensions, including ports, circuits, nodes, trunks and speeds. "This high-capacity network will be more efficient than the outmoded national networks of the retail consumer-oriented major players and will be more economical than the networks currently under construction by new market entrants," said Howard Janzen, president and chief executive officer of Williams'communications group. Williams will use Navis network and service management products for end-to-end visibility and control of the new network, and will take advantage of many NavisXtend™ applications to enhance its new service offerings and streamline business operations.

Williams selected the GX 550 ATM core switches because they combine the scalability and capacity of a core switch with the intelligence, service capability, and cost-effectiveness of an edge switch. The GX 550 enables a multiservice, multi-class network that handles different protocols with different degrees of reliability.

Combined with the CBX 500 ATM and B-STDX frame relay switches, the platforms will provide more than two million connections, over 10 million cell buffers, and data rates from less than DS0 up to OC-48/STM16 (2.5 Gbps). With this capacity, the Williams network can support customers' future network growth while increasing overall performance.

The Investment Pays Off

US West (Denver, Colo., USA) and Intermedia Communications Inc. (Tampa, Fla., USA) are among the carriers that have already signed bandwidth-leasing agreements to take advantage of Williams' new infrastructure.

Intermedia's long-term agreement for committed capacity sets the stage for Williams to directly provide multimedia capacity on its wholesale network as well as taking over comprehensive management of Intermedia's network. Intermedia will have access to a broad range of carrier-level products, including high-capacity private-line services and collocate space for its equipment in Williams'facilities.

> "The addition of the Ascend switches and management systems to our existing carrier-class network gives our wholesale customers greater variety of speeds to accommodate their bandwidth needs, as well as faster access onto the network."
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> – Joe Turcotte, vice president of engineering and operations, Williams network.

US West signed a five-year agreement with Williams for "virtual acquisition of a dedicated nationwide backbone network." Company officials said the deal is an important step toward US West's "data-centric" communications strategy and its impending entry into long-distance telecommunications. •

AGIS: The Ultimate Internet Solution

To provide the highest level of performance on the Internet—that's the goal of AGIS, the fourth largest carrier of US Internet traffic, headquartered in Dearborn, Michigan, USA. However, in 1996 AGIS realized that the exponential growth of Internet users and the increasing load of data traffic could hamper their ability to prevail as the most robust Internet backbone in the world. Through extensive in-house research, AGIS found that its current network-routing hardware had the potential to become overburdened from the ever-increasing number of Internet users who were operating multitudes of applications and downloading complex, media-rich Web sites. Always the innovator, AGIS immediately began to search for the ultimate solution.

> "Internally, we now move 40 percent more traffic than before, and that's not including the extra traffic we carry due to increases in bandwidth."
>
> —Phil Lawlor, CEO, AGIS

At first, AGIS collaborated with various hardware distributors to upgrade its infrastructure. "Our current vendor did not offer a satisfactory solution. AGIS needed a partner that could meet the increasing demand of customers while providing the scalability to satisfy our future needs," said AGIS CEO, Phil Lawlor.

A Powerful Combination

In 1997, AGIS found the solution in Ascend's CBX 500 ATM switches and GRF™ 400 multigigabit routers. The CBX 500 supports high-speed ATM switching from DS1/E1 through OC-12/STM-4 and integrates Ascend's IP Navigator and Priority Frame technologies to deliver IP and Frame Relay Quality of Service (QoS) respectively. The GRF combines switching, route management, and high-speed distributed IP forwarding at speeds up to 2.8 million packets per second. (See the related story on the CBX 500 in this issue's Product Spotlight section on page 4.)

To date, AGIS has replaced conventional routers with GRF units at local and regional Points-Of-Presence (POPs). IP traffic routes through Ascend's B-STDX 9000 WAN access switches to the high-speed GRFs. The traffic is then forwarded to the CBX 500 switched backbone network.

"We needed more router capacity and more backbone horsepower. The GRF and CBX 500 exceed those requirements and expectations on both counts," Lawlor continued. "Ascend also demonstrated a willingness to make custom enhancements to the products for optimizing large-scale deployment."

Significantly Higher Throughput, Fewer Failures

Overall, AGIS has installed 32 GRF multigigabit routers and 30 CBX 500 switches across its network. The result is a dramatic improvement in network performance. The new equipment, coupled with an expanding customer base, is producing more than a hundred-fold increase in data throughput.

"Internally, we now move 40 percent more traffic than before, and that's not including the extra traffic we carry due to increases in bandwidth," Lawlor said. Implementing the Ascend products also has eliminated more than 90 percent of the failures caused by overtaxed equipment. Together, AGIS and Ascend have created the ultimate Internet solution.•

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