Connections

NEWS AND INFORMATION FROM ASCEND COMMUNICATIONS, INC. JUNE 1998

Ascend's MultiVPN: Breaking Down the Barriers to VPN Deployment

Ascend's latest solutions for Virtual Private Networks (VPNs) enable both enterprise customers and service providers to enter into territories beyond the Internet and outside the traditional areas of tunneling and firewall protection. MultiVPN™ is Ascend's unique subscriber/provider VPN strategy that breaks down the barriers to VPN adoption for enterprises and service providers. It integrates private enterprise networks via IP, Frame Relay and ATM while providing compatibility and security, manageability and assured levels of availability. Now enterprise customers can confidently choose and customize their VPN solutions and Network Service Providers (NSPs) can develop and deliver new managed VPN services while maintaining traditional services.

"Ascend is already the leader in VPN solutions," says Mory Ejabat, president and CEO of Ascend Communications. "Now Ascend is the first vendor to break down the remaining barriers to widespread VPN adoption. Our strategy is to match enterprise-wide needs with carrier-class VPN solutions that service providers can deploy profitably."

More Architectures, Many Choices

Ascend's VPN strategy offers many choices for building secure, enterprise-wide VPNs. MultiVPN supports traditional tunneling with Virtual Private Remote Networking (VPRN) for remote LAN access. But MultiVPN adds two other powerful architectures for constructing VPNs via IP, Frame Relay and ATM services: Virtual Private Trunking (VPT) and Virtual IP Routing (VIPR). VPT delivers the performance and reliability of a leased line, and VIPR employs Ascend's IP Navigator™ to extend IP routing environments into the public network. All three architectures can be used individually or in combination, providing the industry's most comprehensive and flexible foundation for configuring, operating and managing VPNs.

"The capability and flexibility afforded by all three MultiVPN architectures enables, for the first time, production level enterprise-wide deployment of VPNs that are secure, compatible and manageable," says Kurt Bauer, Ascend vice president of the Access Switching product line.

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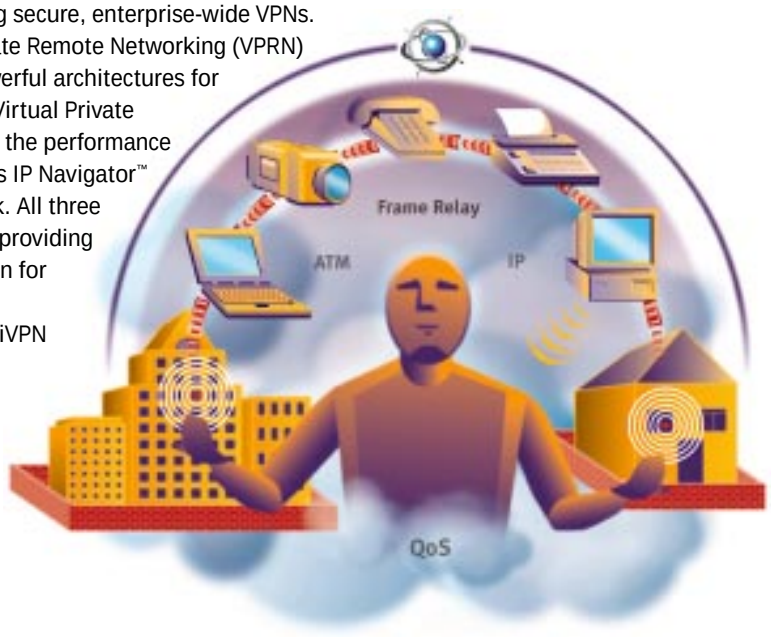


ASCEND

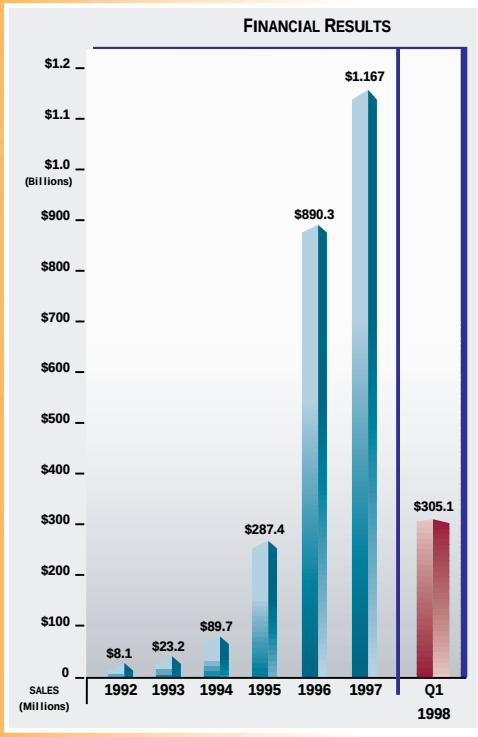
PRESIDENT'S LETTER

Welcome to the Q2 edition of *Connections.* This issue focuses on one of Ascend's most innovative solutions to date – MultiVPN™. Ascend's MultiVPN strategy offers products and technologies that break down the barriers that have prevented enterprises from deploying VPNs in the past. In addition, this issue highlights some of our recent customer successes and exciting product offerings.

Winning Combination

Strong financial results, key customer wins, as well as new product introductions have made Ascend's first quarter a success. In the access switching area of our business, we introduced our Voice-over-IP products (discussed in the March issue of *Connections*) which work on our industry-leading MAX™ access solutions. We continue to see a strong demand for our MAX TNT™ with many of our larger customers and have noted a healthy growth in the demand for our MultiDSL™ products.

In addition, our service provider customers all over the world are continuing to build the public network using a mix of Ascend's Frame Relay, IP and ATM core products. In doing so, Ascend is helping to create a robust public infrastructure that can easily handle sophisticated business applications and data transfers.



With Ascend's MultiVPN solutions, service providers and enterprise customers can build solutions together that span the access, edge and core areas of the public network. From the access to the core, Ascend's MultiVPN ties together access and switching products along with Quality of Service and extensive network management capabilities to build the most industrial strength VPN solution in the world. And Ascend's MultiVPN solutions address the needs of both the enterprise and the service provider. Enterprise managers now have a choice of three VPN architectures: VPRN, VPT and VIPR. And with MultiVPN, service providers are given the tools and technologies needed to offer high availability service management and customer network management.

There's Strength in Numbers

Ascend's first quarter financial results reinforce our strength in the market place and indicates our customers' interest in integrated solutions that span the entire network.

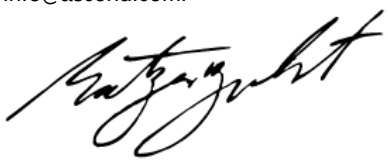
These numbers reflect a sequential growth in both net sales and net income. We experienced this increase in sales and income across our North American, European and Asian markets. First Quarter net sales were $305.1 million and net income was $52.4 million ($.026 per share on a diluted basis). Compared to the fourth quarter of 1997, these results represent sequential quarterly growth in net sales and net income of 4.3% and 10.1% respectively.

1998 Outlook

We hope to continue this strong financial trend by focusing on strategies such as MultiVoice™ and MultiVPN that offer solutions designed to help our customers do business more efficiently, more quickly and more profitably. These strategies draw on technologies in all aspects of our business to create the first comprehensive solution for handling all of today's demanding network applications. We believe that the market opportunities are significant and that Ascend is well positioned within these markets.

In addition, we will continue to focus on time to market and product quality. It is our belief that Ascend's robust solutions and technologies allow customers to more efficiently and cost effectively transfer voice, data, video and fax from one end of the world to the other.

As always, we welcome any suggestions or comments that you have for making *Connections* even more useful. Simply drop us a line at info@ascend.com.



Mory Ejabat
President and Chief Executive Officer

Next Stop: The World

Ascend Expands the Reach of Direct Broadcast Satellite Service

Headquartered in Southern California, DIRECTV launched its direct broadcast satellite (DBS) television service in 1994. Today the company is the industry leader with more than 3.6 million U.S. subscribers, and planning for worldwide expansion.

"DBS providers compete for more customers, more channels and better service, so the ability to grow geographically and to deliver more entertainment and information choices to subscribers are ongoing issues for us," says Anthony Lloyd, the company's senior manager of Network Services.

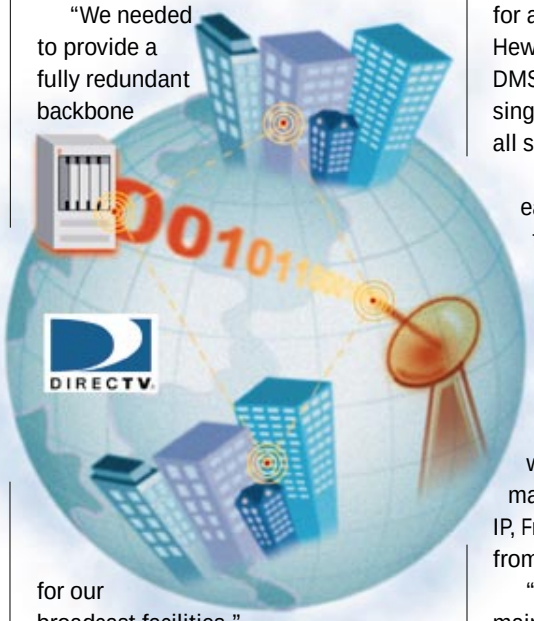
To remain competitive and position itself for worldwide expansion, DIRECTV decided to strengthen its internal WAN with technology from Ascend.

Gearing Up for Growth

By early 1997, the network management team led by Lloyd knew the existing backbone infrastructure would need to be strengthened to support more sophisticated business applications, such as e-mail and payroll, as well as its mission-critical programming applications.

One such application is the company's electronic on-screen program guide, which displays viewing options on the viewer's TV monitor. This information is generated at the company's El Segundo office, then sent across the WAN to sites in Colorado and New York to be broadcast to viewers via satellite.

"We needed to provide a fully redundant backbone for our broadcast facilities," Lloyd explains. "We also needed to increase connectivity. We were using an aging backbone that couldn't support Frame Relay or ATM."



Lloyd's staff evaluated offerings from several vendors before choosing Ascend's B-STDX 8000/9000 family of multiservice switches with NavisCore™ network management to strengthen and streamline DIRECTV's internal enterprise network.

"Ascend offers the best solution hands-down," he says. "It is by far the most robust and scalable. And Ascend provides all the interfaces we require for projected expansion."

Putting the Framework in Place

DIRECTV installed one B-SDTX 9000 multiservice switch at its El Segundo headquarters office and a B-STDX 8000 multiservice switch at its Los Angeles broadcast site in Culver City. The company also installed B-STDX 8000s at broadcast sites in Colorado and New York. The switches provide connectivity for a variety of servers, including Hewlett-Packard, Windows NT, UNIX DMS and Novell. The switches build a single, unified routing domain across all services deployed in the network.

"Migrating from our old setup was easy," Lloyd says. "We just had to find the right ports for each platform and plug them in. There was absolutely no downtime during installation."

All of the switches are controlled from DIRECTV's central office through Ascend's NavisCore™ network management system, which manages and configures multiservice IP, Frame Relay, ATM and SMDS switches from a single platform.

"With NavisCore, we can perform maintenance and do upgrades from the central office and we've reduced the number of connections across our WAN," says Lloyd. "We're already saving from $15,000 to $20,000 a month as a result of the Ascend solution and we haven't migrated all of our applications yet."

Ascend Delivering More Solutions

DIRECTV recently deployed a remote access solution using the Ascend MAX™ 6000 access switch that enables more than 25,000 TV retail outlets to dial into DIRECTV headquarters and verify customer application information. DIRECTV verifies the new customer information, then issues unlocked code so the retailer can allow the customer to use the DIRECTV system.

"Ascend solutions fuel our growth by enabling us to attract more subscribers and deliver more choices to them," says Lloyd.

DIRECTV

DIRECTV is the nation's leading digital television entertainment service. Since its launch in June 1994, DIRECTV has become the fastest-growing video entertainment delivery service in the world. DIRECTV, headquartered in El Segundo, California, is a unit of Hughes Electronics Corporation.

Analyst's Corner

Michael Howard Discusses VPN Trends for the Enterprise

***Connections:* What are some of the trends in terms of the adoption and use of Virtual Private Networks?**

We're at the front end of the real use of VPNs by different organizations, such as corporations, universities and governments. It is changing the way they do business. We think that VPNs will have an impact similar to that of voicemail, fax and e-mail. It's just another way that organizations will communicate internally and externally. VPNs are a stepping stone toward the day that private data networks will be operated like a utility or service provider networks.

There are a lot of early adopters that are testing and piloting VPNs today. There are actually quite a number, although it's not widespread yet, that are using the public IP network to handle their remote access. A few are using VPNs to handle site-to-site connections. Some companies that we've talked to are finding that, especially for remote access, it's the major cost savings that's drawing them to learn more about VPNs and how to implement them.

"In the year 2000, approximately a half-million offices will be connected via VPNs."

Michael Howard, CEO and co-founder of Infonetics Research

***Connections:* Do early adopters tend to be large or small organizations?**

We've found a broad acceptance or draw for VPNs, no matter what the company's size is. Many of the larger companies want to get in early, because they're the ones that have the large monthly phone bills for mobile worker remote access.

***Connections:*: What are some of the primary benefits of migrating to a VPN?**

It's interesting – in our study we found that across the board, the number one benefit of implementing VPNs was not cost savings, broader geographical reach, or being able to add users more quickly, but a more reliable network. The IT/IS folks we talked to in the study told us that they expect that VPNs based on a service provider's IP network will give them more reliable remote access and site-to-site networks than they have currently.

Reliability was the number one expected payback or benefit for companies, though the other reasons included cost savings on remote access, international dial costs, site-to-site access, and also strategic advantages such as the ability to quickly add remote access users and sites to the public data network.

We also found that for extranet VPNs that connect customers, suppliers or other types of business partners, the overwhelming payback for extranet users are just-in-time business communications. Businesses see that with extranet VPNs they can increase customer loyalty and tighten relationships with their customers. They are also finding that they don't have to confront the technology upgrades that they're faced with today – replacing their current modem banks and RAS equipment.

Another benefit for remote access VPNs is the reduction in helpdesk support by transferring many of these problems to the ISP. Our studies on the real cost of remote access indicate that IT managers are doing about 15 percent of the user configuration, installation and problem-solving in remote access, and that the end user was doing the other 85 percent! The purpose of remote access for most businesses is for mobile workers to be close to the customer which is strategic for their business.

***Connections:* What advice can you offer to organizations considering setting up a VPN?**

A key difference between VPNs and today's methods of implementing private data networking is that you have to get your service provider involved. You might want to check out what they can offer in terms of design and testing; but, I'd also recommend you investigate their managed services offerings, and what they offer in terms of taking the help desk burden away from your own staff.

***Connections:* How quickly are VPNs being adopted by enterprise users?**

In the year 2000, approximately a half-million offices will be connected via VPNs. We think that by 2001, there will be 8.3 million remote access users in the U.S. using VPNs. Although the U.S. has a faster adoption rate, there should be an additional 9.3 million remote access users in the rest of the world by 2001.

Michael Howard is the CEO and co-founder of Infonetics Research, Inc., A premiere strategic market research and consulting company focused exclusively on the computer networking industry.

Managing Today's VPNs:

Navis CNM Gateway Provides Network Insight

As more enterprises come to rely on Virtual Private Networks (VPNs) for their primary data needs, awareness into the performance of the public network becomes ever more critical. For many organizations, network status can be a frustrating black hole if their service provider lacks the proper management tools. Fortunately, Ascend's new Navis™ CNM Gateway can provide valuable insight into network performance, configuration and reliability.

The Navis CNM Gateway is a network management software application that lets end users have a secure and cost-effective way to receive network information from their service provider.

"Because it functions as a gate to network information," says Pam Dodge, Director of Product Management for NMS, "Users access only the information they are authorized to see, in a format that's most useful to them."

Information Tailored for Your Organization

The Navis CNM Gateway is ideal for Ascend's MultiVPN™ solutions as it delivers both view and control access to network configuration, performance, reporting and fault information for Ascend Frame Relay, IP, ATM, SMDS, dedicated and dial networks. Service providers can develop different CNM services targeted to their different customer bases, giving organizations access to an unprecedented wide range of network information, including configuration, fault, real-time monitoring, historical trending and reporting.

"With Web-based access to network information 24 hours per day, organizations can feel confident about their network operations..."

Pam Dodge, Director of NMS Product Management

"With Web-based access to network information 24 hours per day, organizations can feel confident about their network operations, even though their service provider is running the network," says Dodge.

This frees corporate IS managers from the expense and personnel challenges involved in running their own private WAN, while leveraging the public network for their organization's traffic. With Navis CNM Gateway, organizations can verify that they're receiving the level of service they require.

Unlike other products that require proprietary extensions or proxies, Navis CNM Gateway is a turn-key CNM service. Because it's Web-based, access is cost-effective and can be accomplished with minimal software revision control hassles. Sensitive information is protected by SSL, encryption and IPSec security measures, guarding data from unauthorized parties.

The NavisXtend™ CNM supports Ascend's B-STDX and CBX switches and both Frame Relay and ATM services. The NavisAccess™ CNM Gateway supports the dial and dedicated services on the MAX™ and MAX TNT™.

SLA Reports Provide At-a-Glance Information

NavisXtend SLA Reports allow your service providers to share Frame Relay information on a 24-hour basis via Web access. These reports give end users information about the quality and consistency of the service. The NavisXtend SLA Reports are formatted for at-a-glance understanding of the network information.

The NavisXtend SLA reports measure SLA information for Frame Relay networks. Both network throughput and network delay statistics are measured and calculated into meaningful service level information and displayed to the customer.

Learn more about Ascend's CNM products as well as Ascend's MultiVPN strategy – visit www.ascend.com

Multiband MAX 6000 and MAX DAX

A Perfect Union

The only thing better than finding the perfect solution to a problem is finding the perfect solution to multiple problems. With the introduction of the Multiband MAX™ 6000, users with extended private networks are discovering how easily the right hardware/software combination solves a diversity of challenges.

"We developed the Multiband MAX 6000 so that enterprise network users would have an economical way to handle high-bandwidth traffic," says Roger Boyce, vice president and general manager of Ascend's Enterprise Access division, "But our research revealed that companies were also grappling with problems of insufficient public network access, inefficient utilization of carriers and incompatible access lines. Realizing that the Multiband MAX 6000 was the best solution, we created the MAXDAX™ software. The result of this union is an access concentrator that exceeds the expectations of most users because it exceeds the capabilities of competing products."

Cost-Effective Concentrator

The Multiband MAX 6000 is a cost-effective remote access concentrator with inverse multiplexing and WAN network features. It offers six expansion slots, four T1 interfaces, a DB9 (RS-232) console port interface and Ethernet interfaces (UTP, autosensing 10/100 Base-T interface). The base model also comes with a two-port inverse multiplexing module installed, with all dialing and inverse multiplexing features enabled. Enhanced management features support Telnet, SNMP and Ascend's NavisAccess.™

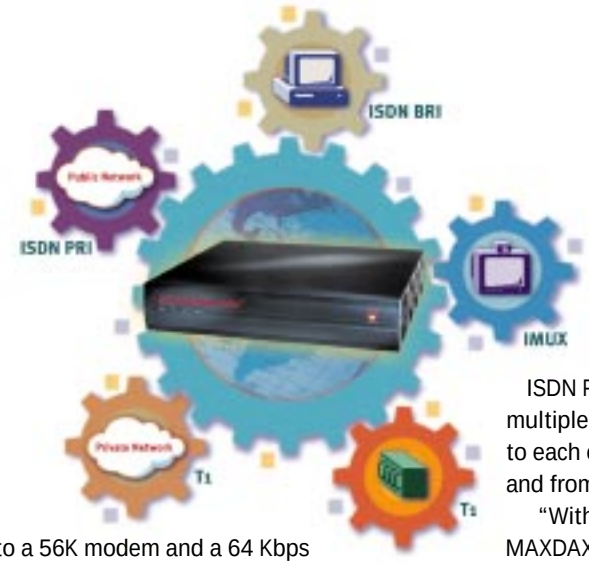
Through Ascend's patented Dynamic Bandwidth Allocation™ feature, the Multiband MAX 6000 automatically adjusts line usage as needed and reduces the cost of monthly network services. By adding the remote networking upgrade, network managers can turn their Multiband MAX 6000 into a full-featured WAN access switch capable of 96 dial-up users. The Multiband MAX is certified for use in more than 30 countries, giving companies a global connectivity solution that is also a platform for future network growth.

These features make the Multiband MAX 6000 suitable for high-bandwidth applications such as videoconferencing, multimedia, telemedicine, distance learning, disaster recovery, private network backup and network overflow. But it is the MAXDAX software feature, also bundled with the unit, that gives the Multiband MAX 6000 versatility unmatched by any product in its class.

Smooth Operator

MAXDAX is a software feature that allows the Multiband MAX 6000 to make intelligent cross-connection decisions based on predefined parameters (DAX is derived from Digital Access Cross (X) connection). When a call comes in, MAXDAX can check its destination number against a profile to determine where the call should be routed. If the call must travel outside the private network, MAXDAX can determine where the call is going and consign it to the most economical carrier for the job.

MAXDAX can also make routing decisions based on the service type of a call. Thus an analog call can be routed



to a 56K modem and a 64 Kbps call can be routed directly to an Ethernet port or downstream to another channel on an ISDN line.

"The ability to intelligently manage connections and bandwidth is critical for enterprises, ISPs or any organization with an extended private network," Boyce reports. "The combination of MAXDAX software and Multiband MAX 6000 hardware makes existing enterprise networks more economical and efficient by allowing new interconnection possibilities."

For example, MAXDAX can cross-connect videoconference, voice and data traffic between T1 lines, or between T1 lines and ISDN PRIs. This gives users on multiple private networks access to each other as well as access to and from the public network.

"With the Multiband MAX and MAXDAX, there is no reason every user on an enterprise network can't have access to the public network," says Boyce.

MAXDAX also makes direct circuit mapping possible. This feature allows a number of channels to be reserved for specific kinds of data transmissions. With direct circuit mapping, "nailed" or virtual hard-wired circuits can be established between T1 lines for handling priority calls or meeting quality-of-service requirements.

"With the Multiband MAX and MAXDAX, there is no reason every user on an enterprise network can't have access to the public network."

Roger Boyce, V.P. of Enterprise Access Division

"MAXDAX is so versatile that it even enables the Multiband MAX 6000 to take over certain PBX interconnection tasks," Boyce affirms. "Users save money by not having to make expensive PBX upgrades."

Saving money is what the Multiband MAX 6000 is all about. Now enterprise users can get the most from their networks without having to invest in costly PBX enhancements and cross-connection equipment. The solution to today's and tomorrow's bandwidth, interconnection and access challenges is as close as the nearest Multiband MAX 6000.

MAXDAX is also available as an option on the MAX 4000 and 6000.

Brave View World

Getting low-and high-cost videoconference systems to communicate

As prices for desktop video systems continue to fall, monitors with small cameras perched on them are becoming as common as staplers in today's offices. And no wonder: desktop video systems allow employees in distant locations to take part in conferences without leaving their stations. The subsequent savings in travel expenses and time is considerable.

While low-cost desktop video systems are convenient, they are not necessarily compatible with the costly conference room systems most medium and large companies have an investment in. This is because videoconferencing bridges, which many large video conference systems rely on, typically communicate over T1 lines and are directly incompatible with the ISDN BRI interfaces of desktop video units.

Such incompatibilities don't matter when the network incorporates a Multiband MAX 6000 with MAXDAX crossconnection software and BRI slot cards.

Because it handles wideband video traffic and transparently interfaces BRI, PRI and T1 access lines, the Multiband MAX 6000 facilitates videoconferences between desktop and conference room systems. It thereby protects a company's investment in larger, more complex videoconferencing systems as it opens up the new world of low-cost desktop videoconferencing.

Midwest Goes Digital

CLEC Delivers xDSL Technology via RBOC Central Office

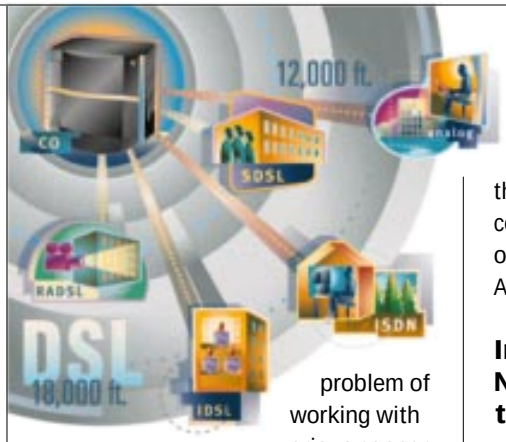
The only carrier to deploy xDSL technologies to enterprise customers in the Midwest, newcomer Dakota Services entered the market by installing Ascend DSLTNT™ access multiplexers in Ameritech central offices and providing DSLPipe™ routers to its customers. Now the fast-growing Competitive Local Exchange Carrier (CLEC) is relying on more solutions from Ascend to strengthen its network infrastructure and expand its services nationwide.

Breaking into the Business

Dakota Services was founded in April 1997 to provide businesses with affordable, reliable and secure high-bandwidth services. Founder and CEO Ted Lasser wanted to provide IDSL, SDSL and ADSL services over unbundled copper access facilities.

"We believe xDSL fills an end user's high-bandwidth requirements better than any other remote access technology," he explains.

The US Telecom Act of 1996 allows CLECs to co-locate telecommunications equipment in the central offices of Regional Bell Operating Companies (RBOCs) such as Ameritech. However, Ameritech prohibits CLECs from co-locating routing or switching equipment. Dakota Services was faced with the problem of working with various copper loop distances from the central office. The company explored several possible solutions before deciding on the Ascend DSLTNT access concentrator with its inverse multiplexing platform to eliminate the problem.



Solutions on Every Level

Ascend's DSLTNT supports IDSL, SDSL and ADSL service connectivity options and is the only integrated multiservice xDSL concentrator for the central office. It solved Dakota Service's problem because it is certified NEBS Level 3 compliant and has the ability to function as a Layer-2 multiplexer, which makes it legally and technically suitable for co-location. Layer-2 muxing enables carriers to offer end-to-end, transparent xDSL transport.

For enterprise customers, DSLTNT enables Dakota Services to deliver multiple DSL services at speeds ranging from 128 Kbps to 7.0 Mbps over Ameritech's unbundled copper access loops. The high-density access multiplexer can support up to 1,344 IDSL ports, 1,440 SDSL ports, or 540 ADSL ports in a single seven-foot telco rack.

"It solved our problems on several levels," explains Lasser. "First, its high port density makes it an economical choice for utilizing space within the central office. Next, it gives our enterprise customers all flavors and speeds of xDSL for their varying application needs. This also solves the problem of working with various copper loop distances from the central office. Finally, it offers two standards of ADSL technology, CAP and DMT."

Industrial Strength Networking – More Services to More Customers

Dakota Services' plans to strengthen its network infrastructure include upgrading to a nationwide ATM network using central office equipment from Ascend. The DSLTNT will provide data connectivity to the nationwide transport network. This will enable Dakota Services to connect all its customers and offer them premium data services, including broadband ATM-based services and WAN connectivity, to the edge of their enterprise networks.

The company is also relying on Ascend solutions to support its expansion to more service areas. The DSLTNT provides a flexible platform that is easy to add customers to. If Dakota Services customers are within DSL range, copper loops are connected directly from the Ameritech Main Distribution Frame to the DSLTNT, and DSLPipe routers are provided at the customer locations. Customers that are beyond DSL distance limits get digital service over an unbundled T1 circuit that is connected to the same DSLTNT.

"The DSLTNT access multiplexer provides options that enable us to reach all of our customers," says Lasser. "And Ascend offers the end-to-end solution we need to continue to strengthen our network and expand our services to our enterprise customers into the future."

Learn more about Ascend's other MultiDSL products at www.ascend.com/products

Dakota Services

Headquartered in Waukesha, WI, Dakota Services is the first network service provider to deploy xDSL technology in the Midwest. The company serves businesses in more than 23 metropolitan areas throughout Wisconsin and Illinois. It was recognized by PC Computing magazine in January 1998 as one of the top 10 xDSL network service providers in the US.

New Multiband MAX 6000 Powers WAN Networking

Organizations seeking to implement powerful, flexible videoconferencing and remote applications will find an ideal solution in the new Multiband MAX™ 6000, the newest member of the Multiband family of bandwidth-on-demand controllers. The Multiband MAX™ family offers inverse multiplexing and WAN network features optimized for

videoconferencing and backup/overflow. The Multiband MAX 6000 is bundled at no additional cost with MAXDAX™, a software feature that delivers sophisticated cross-connection capabilities, allowing access to and from the public network from all points on a private network.

Ascend Delivers Multiprotocol DSL to the Enterprise

For corporate users who need the speed and flexibility of DSL transport, Ascend has announced support for Layer-2 multiplexing using Frame Relay over xDSL on the DSLTNT™ central office concentrator. Layer-2 muxing enables carriers to offer end-to-end, versatile, transparent multiprotocol DSL transport. Using the new service, remote users and corporate LANs can communicate with each other using any mix of protocols, from IP to IPX, over their IDSL, SDSL and RADSL links.

eFusion and Ascend Offer Advanced IP Telephony

Ascend continues its IP telephony leadership, teaming with eFusion, Inc. to support Ascend's MultiVoice™ for the MAX™ product architecture with eFusion's IP telephony/data network applications. eFusion will port its value-added IP telephony applications to support MultiVoice for the MAX, Ascend's complete Voice over IP (VoIP) solution. With the support of eFusion applications for MultiVoice for the MAX, enterprise customers can implement innovative VoIP solutions – such as phone-to-PC, Web-to-phone or Web-to-agent – delivered through a reliable, scalable architecture.

Ascend Sweeps N+I Awards

At Networld+Interop, Ascend announced that it has won a Network Computing "1998 Well-Connected Award" for its Pipeline® 75 with Secure Access™ Firewall. Editors lauded its tight security, ease of management and configuration, and excellent reporting features: "In less than an hour we configured the Pipeline 75 – firewall and all – and were making connections. Security, router and device events reports were some of the best we've seen," stated Network Computing. Based on product testing editors conducted in 1997, Ascend's Pipeline 75 also won Network Magazine and Network Solutions' "Product of the Year."

NetworkMagazine PRODUCT OF THE YEAR 1998

Ascend and Digital Broadcast Network Team for High-Speed Network

Ascend and Digital Broadcast Network Corporation have signed an agreement for Ascend to provide more than $20 million in equipment for DBN's rollout of an Internet Protocol (IP) based Asynchronous Transfer Mode (ATM) network linking 28 U.S. and Canadian cities. This high-speed voice, video and data network will leverage Ascend's full

suite of remote access, switching, and routing products for speeds up to OC-48 (2.4 Gb/s).

"We are pleased and excited to work with Ascend in the development of what promises to be one of the most robust, fully-featured data networks in the country," said Timothy M. Roberts, DBN's President and CTO.

Ascend Helps BT Employees Get Connected

Ascend's multiprotocol WAN access switches have enabled British Telecom Remote Access to extend the reach of its IS systems to more than 10,000 mobile, roving and teleworker employees. The initiative, one of the biggest remote access projects ever undertaken in the UK, enables remote access users across the entire company to connect to BT's internal Intranet and central site applications via analog, ISDN and GSM services, with security and convenience.

Enterprise managers – Find out more about Ascend's VPN teleseminars at www.ascend.com/identifyvpn

Graduates Laud Ascend Education

Training Brings Organizations Ahead of Evolving Technology

As networking technology evolves at a faster pace than ever, staying current with the latest advances can be dizzying. Fortunately, Ascend Education offers a variety of cost-effective educational programs that teach users to design, operate and manage Ascend products in networking environments. Ascend courses and workshops encompass a wide range of topics on network planning, design, configuration, optimization, management and operation, enabling administrators to keep abreast of current developments. To keep pace with expanding technology, Ascend continually enhances courseware and develops new offerings so that customers benefit to the fullest.

Satisfied, Knowledgeable Students

A blend of presentation, discussion, and hands-on exercises help Ascend's class attendees realize full benefit from their studies. Students acquire and experience new skills and knowledge through practice with Ascend products in a controlled, instructor-facilitated setting. Recent class attendees lauded the presentation and content of the courses:

"Outstanding class. Instructor was great, and all documentation and materials were very clear and concise. I could recommend this course to anyone working on this equipment. One of the best classes I have ever attended."

"Great learning experience – I recommend it to all networking professionals."

"Well presented and delivered on an understandable level of a highly technical subject. Very informative."

Classes That Fit Your Needs

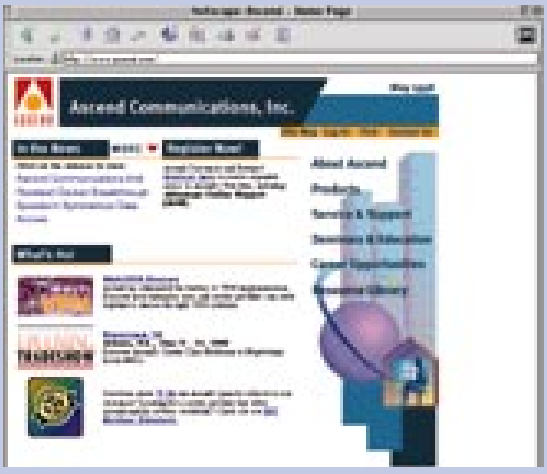
A variety of course topics are regularly available from Ascend Education, including remote access, core switching, and computer-based training.

Remote access courses, designed for students who have MAX TNT™, MAX™ Pipeline®, Multiband™ and NavisAccess™ are offered in the following areas:

- MAX/Pipeline Installation & Configuration
- RADIUS Installation & Configuration
- MAX Troubleshooting
- MAX TNT Installation & Configuration
- Multiband Configuration & Operations
- NavisAccess Fundamentals

Ascend Education offerings are designed to be flexible and to help organizations make the most of their training investment. Students can choose from classes at Ascend's facilities around the world. Many classes can also be brought directly to an organization's site – a cost-effective alternative for a group of professionals who wish to attend the same program. Additionally, our training consultants can work with customers to customize any course to meet their specific needs – a practical option for unique technical circumstances.

Call Ascend at 1-800-380-1026 to discuss your education needs, or e-mail training@ascend.com. International callers may dial (510) 747-2125. Curriculum maps, course descriptions and class schedules are available on the Web site at www.ascend.com/education/. More information on courses in Japan can be found on Ascend's Japanese Web site.



New On the Web

- Navigate through our expanding product line. We've improved our product categorizations for easier access
- Check out our expanded Seminars and Education section for our world-wide technical product courses
- Visit our new Investor Relations section for up-to-date financial information, including Ascend's 1997 Annual Report

(continued from front cover)

The three architectures are linked by Ascend's Navis™ network management system with Customer Network Management (CNM) capabilities. Navis provides the ability to create and control data services, enabling fast and cost-effective deployment and on-going management. CNM enables NSPs to share VPN-specific network information with their enterprise subscribers 24 hours a day.

MultiVPN Addresses Enterprise Concerns

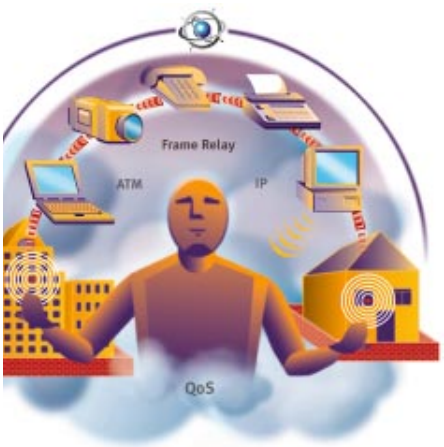
"It takes more than a firewall or some encryption capabilities to build a VPN," explains Bauer. "The MultiVPN solution delivers iron-clad security and addresses three other enterprise concerns: compatibility with existing applications, availability and manageability."

Compatibility and Security

Compatibility and security are closely linked because making enterprise applications compatible with the public network also makes them vulnerable. With Ascend in the infrastructure, enterprise users get compatibility through a choice of VPRN, VPT and VIPR architectures delivered in MultiVPN products, services, or a combination of both. They no longer have to worry about the possibility that security may be compromised when running on the public network.

Manageability

MultiVPN enables enterprise users to manage the network end-to-end, including their private portion of the public network. Ascend's Navis network management architecture gives network-wide support to the MultiVPN environment.



And because NSPs have integrated CNM into their networks, the enterprise customer can view monitor, reconfigure, troubleshoot and otherwise manage the entire VPN, if they choose.

Availability

A successful VPN must deliver the same dependability and performance as a private network. Ascend's MultiVPN access, routing and switching products have features that produce carrier-class performance. Ascend's VPN strategy extends Quality of Service (QoS) capabilities from ATM to both Frame Relay and IP.

"This is the first major vendor to acknowledge the dependence of VPNs on QoS," says Tom Nolle, president of CIMI Corp., a technology assessment firm in Voorhees, N.J.

The Only Solution that Meets NSP Needs

"Strategic partnerships with the world's leading NSPs have given us a privileged perspective on providers' three most crucial VPN needs: high availability, service management and customer network management," says Bauer.

MultiVPN integrates these three capabilities into Ascend's carrier-class switching, routing and access systems. The high performance and inherent redundancy of Ascend's multiservice platforms allow NSPs to offer QoS and Service level Agreements to enterprise customers.

"Because MultiVPN products and services can be completely managed by Ascend's Navis network management, service providers can comfortably offer a secure network infrastructure that enterprise customers can easily depend on," adds Bauer.

Ascend's unique MultiVPN subscriber/provider solutions makes virtual private networking a reality today for handling a full range of enterprise-wide networking applications.

"It's more than a strategy," concludes Bauer. "It's a whole new way of doing business."

VPN Glossary

CNM – Customer Network Management gives enterprise network managers, carrier partners, internal employees and service provider customers access and control over their portion of the public infrastructure.

IPSec – IPSec is a security protocol from the IETF that provides authentication and encryption for secure conversations between systems and networks on the Internet.

MultiVPN – Ascend's MultiVPN strategy breaks down the barriers to VPN deployment by making VPNs suitable for all networking applications – from simple, remote LAN access to sophisticated enterprise-wide networking. Ascend is the first vendor to adopt a subscriber/provider approach to VPNs and to offer a comprehensive choice of VPN architectures.

QoS – Quality of Service is the ability to define a level of performance in a network. Ascend lets service providers offer enterprise customers a "best effort" cost effective service for non-critical applications, relative or priority based service and an "absolute" service.

SLA – A Service Level Agreement enables service providers to give enterprise customers a contract that guarantees a level of wide area network traffic delivery.

VIPR – Virtual IP Routing extends private route tables and address spaces from the enterprise into the service provider's infrastructure using Ascend's IP Navigator.

VPN – Virtual Private Networks integrate private enterprise, semi-private extranet and public Internet access all over a single connection with less cost, greater capability and flexibility, and as much, if not more control than a private network.

VPRN – Virtual Private Remote Networking provides multiprotocol tunneling for transporting private traffic over public IP networks such as the Internet. Ascend's VPRN adds SLA assurances, QoS and multiprotocol capabilities to IP.

VPT – Virtual Private Trunking goes beyond traditional permanent and switched virtual circuits to provision trunk lines and/or bandwidth for optimal resource utilization performance.

EVENTS CALENDAR

Be sure to visit us at the following exhibitions and trade shows — learn about our latest product releases, see our products in action and watch live demonstrations.

DATE	EXHIBITION	LOCATION
August 17-20	Broadband Networks	Chicago, IL
August 30-September 2	ACTA	Chicago, IL
September 8-10	Comdex Enterprise	San Francisco, CA
September 13-14	NFOEC	Orlando, FL
September 29-October 1	ISPCON	San Jose, CA

Extending the Internet to Meet Your Needs

The Internet is changing. Learn where it is going and how each new direction can benefit you or your organization by attending *Extending the Internet to Meet Your Needs*. This free three-hour educational seminar explores current and future uses of the Internet. Basic Internet and remote networking topics are discussed as well as all new material covering public network offerings, virtual private networks, voice on the Internet and security.

Reserve your space now. Seating is limited.

Visit the Web site at www.ascend.com for seminar schedules.

For more information, call 1-800-366-4058.

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