# Connections

NEWS AND INFORMATION FROM ASCEND COMMUNICATIONS, INC. NOVEMBER 1996


# A Vision for Network Growth

Ascend's product families create the foundation for today's Internet-based applications


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Nowhere have end-user demands created as many headaches—and opportunities—than in the dynamic world of remote networking. Workers are searching for new ways to improve dial-up performance from the office and on the road. Corporate information officers are drowning amid a sea of requests for high-speed access to the Internet and corporate resources. At carriers and Internet POPs, network managers are rebuilding an infrastructure that strains under the weight of moving mountains of information every day.



## MAX TNT
### A Dynamite Introduction From Ascend

See page 3

The engine behind the changes is the Internet, which has forced companies to rethink the way they conduct day-to-day business. Internet-related applications present a two-headed problem for users and network managers alike: the craving for high-speed access and the bandwidth required to handle more volume.

For its part, Ascend Communications has developed a comprehensive strategy to eliminate bottlenecks at every point in the remote network. The company has developed new products and integrated others—through strategic acquisitions such as NetStar, Morningstar Technologies and Subspace (see page 2 for more details)—that address concerns over congestion and speed.

The products scale in capacity as network needs grow and change. They also lay the groundwork for transitioning to newer access services, such as frame relay or ISDN, as they become more widely available.

*CONTINUED ON PAGE 11*

# As Your Needs Change, Ascend Sets the Pace



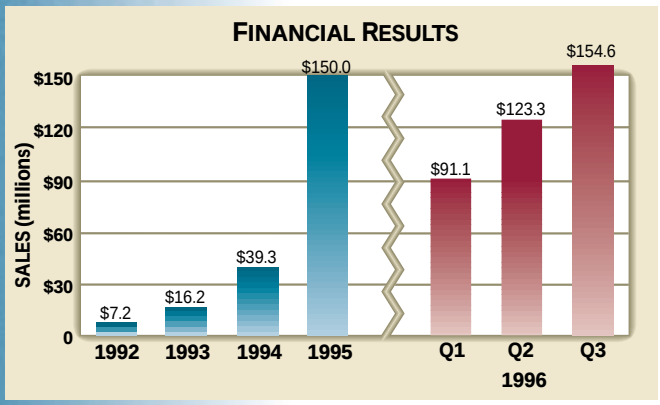
One of our objectives with *Connections* is to keep you up to date with the evolution of Ascend's product strategy. Much of our thinking is driven by discussions with many of our customers like you. The cover story describes how we have broadened our product strategy to meet more of your needs.

## Our Expanding Vision

Our vision is that IP will quickly become the dominant protocol for LAN-to-WAN networking. With our successful participation in the growth of the Internet and Intranets, we see the opportunity for Ascend to become the leading supplier of IP-based LAN-to-WAN networking solutions. We believe that by focusing on IP, we can provide the industry's best price/performance products.

Our objective with the **Pipeline** family is to continue to strive for lower prices so that single-function analog modems are no longer justifiable. Today, Ascend leads the industry with cost-effective, high-functionality digital access devices. In 1994, the first Pipeline products cost $1,600; today, they can be purchased for as little as $595. And our latest product is a high-performance terminal adapter for less than $300–the **NetWarp™ 128.**

The **Secure Access Firewall** (page 5) is a major advance for corporations accessing the Internet. Integrated into MAX® and Pipeline® products, this firewall enables corporations to protect all of their locations—even remote users and telecommuters—with state-of-the-art, dynamic firewall technology.




The new scalable **MAX TNT** (page 3) combines high-capacity routing, switching, security and WAN access into one unit. The MAX TNT offers the industry's highest port density at the lowest price per port, making it ideal for the limited space within ISP and carrier Points of Presence (POPs).

## Acquisitions Reduce Time-to-Market

The acquisition of three companies this year brought technology that complemented our product families, enabling us to meet our customers' needs quickly and stay at the forefront of the remote networking market. Morningstar Technologies provided the basis for our Secure Access™ Firewall, and NetStar's fast routing and switching technology is the basis for the GRF™ 400 product. By combining the GRF 400 with the MAX TNT™, Ascend has created the Industry's first MegaPOP™ solution, which addresses the problem of Internet bottlenecks. More recently, Subspace products gave Ascend a key element of its end user strategy by providing the basis for the NetWarp products.

## Q3 Financial Results

Our financial results highlight the tremendous growth in the market and the acceptance of our products. Our market share has increased to 89% of the total ISDN ports and 54% for the total access concentrator market. Third quarter net sales were $154.6 million, a 278% increase over the same period in 1995. Net income for the quarter, which includes the one-time NetStar and Subspace merger costs of $13.9 million, was $24.9 million, a 287% increase over 1995.

We are pleased to provide you with the *Connections* newsletter. If you read something that sparks an idea or a question, please feel free to send us your thoughts at info@ascend.com.



**Mory Ejabat**
*President and*
*Chief Executive Officer*

# MAX TNT for Explosive Growth

*New high-density MAX cuts costs and provides faster backbone connectivity*



Ascend has taken remote networking to a new level with the MAX TNT—a carrier-class WAN access switch that delivers unprecedented network capacity. This new addition to the MAX family packs support for more services in one system than any other WAN access switch on the market.

With a MAX TNT, service providers can support 2,016 concurrent modem users or 4,032 digital sessions (ISDN or 56/64 kbps frame relay) all in a single rack. It easily handles a dynamic mix of cellular or landline analog modem calls, ISDN BRI or PRI, as well as dedicated T1 or frame relay connections.

"The MAX TNT establishes the benchmark for the rest of the remote networking industry," said Bernie Schneider, vice president of Strategic Business Development for Ascend Communications. "No other product matches the TNT's large-scale support for multiple WAN/LAN connections —and at such a breakthrough price point."

The MAX TNT offers relief to the carriers, Internet Service Providers (ISPs) and corporate customers who are struggling to keep ahead of the growing demand for network access services. High-bandwidth applications that range from accessing multimedia Web services to telecommuting have strained already overburdened networking environments.



A single 14-inch shelf can terminate 150 T1/FT1 connections, giving corporations and network service providers a single, integrated access platform for both dial-up and dedicated traffic.

"The MAX TNT reduces the space requirements at ISP Points of Presence (POPs) and carrier central offices," said Sunil Dhar, a senior product manager at Ascend. "A single eight-foot rack supports 4,032 ports — the highest port density in the industry."

## Modular Architecture Sets the Stage for Growth

The base system can be enhanced by mixing and matching modules. Digital Modem, Hybrid Access or FrameLine modules let users grow their network into the latest technologies simply by adding a card.

With the MAX TNT, customers have an uncompromising solution for reliability and uptime. Each shelf supports 16 hot-swappable expansion slots that allow the system to be up and running even when adding or removing modules. Redundant, load-sharing power supplies ensure that the system is always available.

By using the same field-proven software that is available on the other MAX products, customers can have the same industry-standard features and functionality that have made the MAX product family an industry leader.

"Building on the software and experience of Ascend's other MAX products, the MAX TNT helps service providers roll out virtual data services and Intranets to their large corporate customers—using one scalable product family," said Dhar.

## Building High-Capacity Networks with the MAX TNT

By combining MAX TNT with Ascend's recently announced IP switch, the GRF 400, Ascend introduces a powerful solution capable of managing high-volume traffic at some of today's largest networks.

With the GRF 400 and the MAX TNT, Ascend has created the industry's first MegaPOP. At packet forwarding rates of up to 2.5 million packets per second, the GRF and the MAX TNT eliminate the network brownouts and service problems that currently plague carriers and ISPs.

"The MAX TNT and the GRF are the dynamic duo," commented Schneider. "Together, they support hundreds of thousands of users with a level of performance that is unmatched by any of our competitors."

A complete 672-port MegaPOP can be configured in one rack—with an OC-3c or an OC-12c interface to the Internet backbone. This integrated solution lets network service providers increase network capacity, reduce equipment costs and eliminate the need for multi-vendor installations.

# SHIELD Your Network

## Secure Access Firewall offers integrated security with dynamic firewall technology

Everyone with a computer wants to be part of the Internet. Unfortunately, when internal networks are connected to the Internet, they become exposed to hackers. The solution is to place a firewall between the two networks.

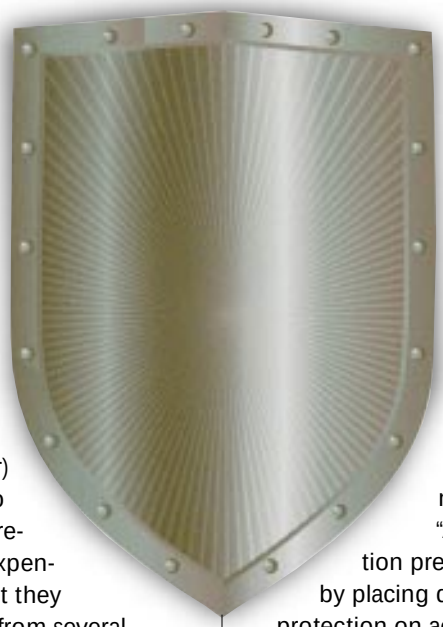
Secure Access Firewall integrates into Ascend's MAX and Pipeline products to provide bullet-proof security. "By integrating the firewall into the access devices, we also have created an effective Internet security solution that is easy to install and administer," said Richard Sekar, product manager for Ascend's network security products.

### DYNAMIC FIREWALL TECHNOLOGY

Secure Access Firewall uses the next generation of dynamic firewall technology to overcome the limitations of static packet filtering. The dynamic firewall opens specific ports for authorized users only when required, and it closes those ports at the end of the session. It also keeps all the unused ports closed at all times, preventing intruders from accessing the network.

"Secure Access Firewall restricts applications that are not explicitly permitted," Sekar said.

### STAND-ALONE FIREWALLS EXPENSIVE, NOT SECURE



Traditionally, security has been handled by installing a stand-alone firewall system between the internal network and the access device (such as a router or dial-up access concentrator) that is connected to the Internet. Such firewalls are not only expensive to purchase, but they involve equipment from several vendors, making them complex to administer.

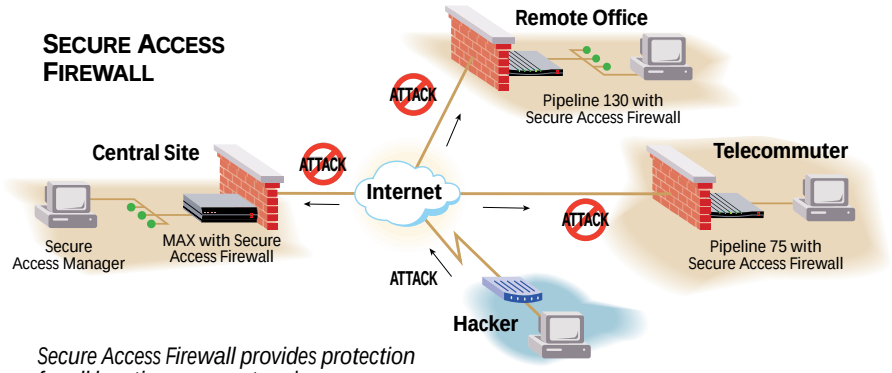
"The Internet and remote offices have been weak links in most corporate security schemes because protecting the remote network with stand-alone firewall solutions was cost-prohibitive," said Michael Howard, an industry analyst for Infonetics Research in Silicon Valley.

As a result, the corporate LAN is exposed to hackers who can enter from an unprotected remote location and piggyback on legitimate traffic to the central site. Moreover, stand-alone firewalls leave the access device itself exposed to experienced hackers, who can change routing tables and gain access to the internal network.

"An integrated solution prevents such attacks by placing dynamic firewall protection on access devices that already exist at each location," Sekar said. "This is a very practical and cost-effective way to create a security blanket for the entire network."

Integration also offers the benefits of low initial investment, reduced training and support costs, and simplified administration. Network administrators can manage Secure Access Firewall sites from a remote location using Access Control Manager, which is included at no additional cost. Secure Access Manager is a Windows-based application that simplifies setup and maintenance through a point-and-click interface.

### SECURE ACCESS FIREWALL




*Secure Access Firewall provides protection for all locations on a network*

**Test Drive Secure Access Manager software—FREE.**

**Return the enclosed card today and see how easy it is to manage Secure Access Firewall sites.**

# The European Connection



## Ascend opens new European technical assistance support centre

Ascend opened a new European Technical Assistance Support Centre (TAC) in September as part of its rapidly growing sales and operational facilities throughout Europe.

The European TAC, located in the South of France, provides first- and second-level post sales technical support to Ascend's distribution channel, VARs, corporate accounts, ISPs, carriers and OEMs.

The European TAC extends Ascend's worldwide hub of product expertise with direct links to the U.S. TAC, based at the company's headquarters in Alameda, Calif., as well as direct links to the new Pacific Rim TAC, scheduled to open later this year.

The opening of this new facility is part of Ascend's effort to support the tremendous growth of remote networking throughout Europe.

"Europe's major corporations are extending their central site networks to remote and mobile workers—as well as branch and international offices—so they can compete in the fast flowing communications age of the late '90s," said Dick Baines, vice president for Ascend Communications Europe. E-mail and the World Wide Web are part of our daily working lives, and the ability to access and send information from anywhere, anyplace, anytime is fast becoming a standard business dictum.

### Developing Europe's Remote Access Networks

As a key innovator of the remote networking revolution, Ascend is helping to develop remote access solutions for Europe's leading carriers, PTTs, Internet Service Providers (ISPs) and corporations.



Customers continually demand improved access to existing carrier services. The exciting new services provided by the growing number of ISPs and major carriers require the ability to deliver transparent solutions capable of handling a wide range of incoming voice and data traffic over analog, ISDN, frame relay and leased lines. Ascend's phenomenal success across Europe is due to its ability to deliver these proven remote networking solutions.

With country offices in Belgium, France, Germany, Italy, Sweden and the UK, Ascend Communications Europe serves the growing European market as well as Africa and the Middle East.

Visit our home page on the World Wide Web at http://www.ascend.com for details about the new TAC and other international news from Ascend.

# A Connection to Every Port

## Ascend MAX and Pipeline products provide Marine Terminals with a dependable backup WAN

Communications are vital to Marine Terminals Corporation (MTC), a San Francisco-based stevedore operation that transfers cargo to and from ships at seven West Coast ports. If a ship's manifest is unavailable when it docks, the company and its customers begin losing money immediately.

To maximize network uptime, MTC installed a private Wide Area Network (WAN), using Ascend equipment, with leased lines connecting its shipping centers in San Francisco, Oakland, Long Beach, Los Angeles, Portland, Seattle and Vancouver. John Montgomery, MTC's manager of technical services, also set out to install a backup WAN based on switched Integrated Services Digital Network (ISDN) links. ISDN offered the highest throughput for dial-up access, and was available in all seven cities where MTC operated.



### Bandwidth On Demand

Montgomery contacted William Yragui, president of inføbond, for recommendations. inføbond is a systems integrator that designs, installs and maintains networks for corporations and educational institutions.

"We distinguish ourselves by establishing long-term relationships with our customers," says Yragui. "And we do it all from initial consulting to any necessary future upgrades. Our staff has worked with MTC for more than three years."

After evaluating MTC's application, Yragui recommended a network of Ascend MAX and Pipeline systems based on the need for a complete and cost-effective ISDN bandwidth on demand solution.

"We accepted inføbond's recommendation and installed the Ascend network," says Doris Mosblech, MTC's network manager. "The MAX and Pipeline systems have worked out so well that I can't imagine using any other products."

A MAX WAN access switch was installed at each of Marine's four main sites. Various models of Pipeline remote access devices were installed at each of the remaining 30-plus locations. Dial-up ISDN with bandwidth on demand now links all locations on an as-needed basis.

> "The MAX does it all. It's full-featured and easy to use."
>
> Doris Mosblech, Network Manager at Marine Terminals

### A Multi-purpose Network

When MTC's private leased network goes down, the Ascend WAN backup solution has worked every time. But MTC also felt it could get more out of its MAX and Pipeline systems, which have proven to be dependable, affordable and flexible. So the company added Internet access, then telecommuting—both using ISDN. Next, MTC added digital modem cards to the MAX products for mobile workers dialing in from the field. Today, nearly 60 employees are using the Ascend network for remote access.

"The MAX does it all," Mosblech says. "It's full-featured and easy to use. And when we need help, Ascend's technical support staff answers our questions promptly."

The future promises to bring some interesting changes at MTC. The entire MIS staff has been spun off as a separate company called Embarcadero Systems Corporation. MTC will continue to outsource its MIS needs to Embarcadero, whose systems and network expertise is now available to serve other companies in the transportation industry.

# Discover Remote Networking

## New training courses provide opportunity to master remote networking skills

Attend one of Ascend's five new training courses—and learn the specific technical skills you need to use Ascend products effectively. Our courses combine lectures, small-group activities, hands-on labs and interaction in a real-world setting with live networks. The courses provide an excellent opportunity for mastering the skills necessary to install and integrate our products into your LAN/WAN environments. Courses include:

**MAX/Pipeline:** Provides an introduction to the basics of MAX and Pipeline products, including applications, general features and menu options, security and card options.

**Multiband/MAX Videoconferencing:** Discusses the basics of Ascend Multiband products, including configuration and operation of Multiband hardware, and examines their relationship to video teleconferencing products.

**Network Design Fundamentals:** Familiarizes students with the principles of network design, with particular emphasis on remote connectivity and the use of Ascend products. *Prerequisites:* Knowledge of data communication technologies, network architectures and the OSI seven-layer networking model; exposure to routers, bridges, switches, hubs and access servers; understanding of networking protocols such as TCP/IP and IPX; familiarity with Ascend's MAX/Pipeline products.

**Advanced Troubleshooting:** Reviews system diagnostic utilities and troubleshooting strategies for advanced Ascend product users. *Prerequisites:* Courses on MAX/Pipeline or Multiband/MAX.

**RADIUS Training:** Provides an overview of RADIUS protocol, including accounting, authentication and network security, and prepares students for setting up remote access network security. *Prerequisites:* MAX/Pipeline course.

To enroll in a course, call 510-747-2125, or visit our Web site at http://www.ascend.com.

### SCHEDULE OF COURSES

| Course | Length | Cost | Nov | Dec |
|---|---|---|---|---|
| MAX/Pipeline | 3 days | $1,200 | 4-6*<br>6-8<br>13-15<br>18-20*<br>20-22 | 2-4*<br>4-6<br>11-13<br>16-18*<br>18-20 |
| Multiband/MAX Videoconferencing | 2 days | $ 800 | 4-5<br>18-19 | 2-3<br>16-17 |
| Network Design Fundamentals | 2 days | $ 800 | 11-12 | 9-10 |
| Advanced Troubleshooting | 2 days | $ 800 | 11-12<br>25-26 | 9-10 |
| RADIUS Training | 2 days | $ 800 | 18-19 | 16-17 |

*Courses held in Reston, VA

All courses held in Alameda, Calif. except as noted.

# Frequently Asked Questions

**Q How many Pipeline 130 models are available?**

**A** Three models are now available:
Model 1: One T1/FT1 WAN interface and one ISDN BRI WAN interface
Model 2: One DDS 56 kbps interface and one ISDN BRI interface
Model 3: One DDS 56 kbps interface and one Switched 56 kbps interface

**Q What is a T1/PRI line?**

**A** A T1/PRI line uses 23 B channels for user data and one 64 kbps D channel for ISDN D-channel signaling. This type of Primary Rate Interface (PRI) line is standard in North America, Japan and Korea.

**Q What is a digital modem?**

**A** A digital modem is an internal device in the MAX (except the MAX 200Plus). It allows the MAX to communicate over a digital line (such as T1/PRI) with a remote station that is using a modem connected to an analog line. An integrated digital modem allows incoming analog modem and incoming digital calls to use the same digital line; it is not necessary to maintain a separate analog line. A MAX unit with T1/PRI access, can dynamically allocate all channels of the T1/PRI line for either incoming analog modem calls or incoming digital calls; the access line is used to its optimal capacity.

**Q What is the Ascend Multiband VSX?**

**A** The VSX is a cost-effective single application dialup inverse multiplexer with scalability. It is for media access applications such as videoconferencing. With its V.25bis dialing and DTR dialing ability, you can also use the VSX as a data dial backup device.

# The Sky's the Limit

## EchoStar Satellite Corporation automates pay-per-view subscriber accounting with a scalable system based on MAX 4000s

Competition is fierce for EchoStar Satellite Corporation, which offers high-quality digital satellite television programming to subscribers across the U.S. through its DISH Network.

To strengthen its market position against cable and other satellite providers, EchoStar keeps tight control over costs and service quality. The company manufactures its own dishes and receivers, and plans to double its channel capacity by launching a second satellite in September 1996.

To help minimize administrative costs, EchoStar decided to set up an automated system for pay-per-view accounting at its uplink facility in Wyoming. The system needed to accept monthly calls from all of EchoStar's installed receivers, which track subscribers' pay-per-view usage. EchoStar tried a configuration using channel banks and analog modems connected to a terminal server—but the resulting system was too expensive, did not operate reliably, and certain requirements, such as customer identification using Automatic Number Identification (ANI), failed to work correctly.

When it became clear that the piecemeal configuration was not working, EchoStar contacted Lantech, a well-known network integrator in Denver. "Such a sophisticated application required a state-of-the-art solution," says Mark Schnabel from Lantech. "EchoStar needed an integrated system, like the MAX WAN access switch from Ascend."

### Executive Summary

**Problem:**
High administrative costs for pay-per-view accounting system caused by an unreliable system

**Solution:**
Redundant MAX 4000 WAN access switches to handle incoming calls over high-speed channelized T1 links

**Benefit:**
The system minimizes administrative expenses by fully automating pay-per-view accounting for all subscribers

### A Cost-Effective, Automated Solution

The solution for EchoStar's pay-per-view accounting system involves two MAX 4000s: one to handle the incoming calls, the other for standby redundancy. Each MAX is configured with a full complement of digital modems, which have proven to be totally compatible with the dial-out capabilities of the satellite receiver. They use three channelized T1 links to connect the MAX to the local carrier's central office, giving the system a capacity of 72 concurrent incoming calls.

Each transaction works as follows. Every subscriber's satellite receiver dials a toll-free number at a specified time each month. After the MAX answers the call, the receiver downloads its log of pay-per-view usage.



The MAX forwards this information over an Ethernet LAN to a DEC Alpha server, which enters the subscriber's monthly usage into the billing database. The Alpha server then sends instructions to the subscriber's receiver, via the MAX, to clear its log and terminate the call.

This unique application uses several advanced features built into every MAX system. The digital modems handle calls from ordinary residential service over the Plain Old Telephone System (POTS). The channelized T1 links both simplify and lower the cost of the interface with the local exchange carrier, and permit use of a single toll-free number. The Calling Line ID (CLID) ANI capability allows the subscriber's phone number to be used for account identification without special programming of each satellite receiver.

"The MAX 4000s work great," comments Jeff McSchooler, EchoStar's communication systems manager. "Lantech did an excellent job prototyping the application and getting all of the required functions to work. We contacted Ascend for a few minor enhancements to the call processing software that were needed to implement all of the desired features. Ascend's technical support staff was eager to help and responsive."

> "Such a sophisticated application required a state-of-the-art solution...like the MAX WAN access switch from Ascend."
>
> Mark Schnabel, Lantech

### More than Just Accounting

The pay-per-view accounting system is not the only application for Ascend products at EchoStar. The company's Englewood headquarters uses Ascend's remote access servers for connecting to the Internet and supporting EchoStar's telecommuting program. That the MAX can handle such seemingly diverse applications demonstrates the advantages of its basic design. By combining all remote access functionality into a single unit, the MAX achieves a fundamental level of integration and interoperability. Atop this foundation, Ascend is able to add advanced features in software, which are also made available to all existing MAX customers through a simple upgrade.

The future looks bright for EchoStar. As EchoStar increases its number of subscribers, the company will replicate the existing configuration of MAX 4000s to handle its growing needs.



## Did You Know...?

- Ascend's revenue is growing at a rate of almost 400 percent per year.
- Ascend ranked #1 in the *Inter@ctive Week Fast 50*, which measures companies in the interactive industry on their financial results and Wall Street performance in the past year.
- Ascend has 54 percent market share of access concentration ports.
- The MAX TNT is the industry's most powerful WAN access switch, supporting up to 2,016 modem sessions, up to 4,032 ISDN or 56/64 kbps frame relay connections, and up to 150 T1/frame relay connections.
- Ascend holds the highly regarded, difficult-to-obtain Quality System Certificate ISO 9001 from the ISO 9000 series for design, manufacture, sale and service of bandwidth on demand products.

### ASCEND INTRODUCES NORTH AMERICAN SERVICE PROGRAM

On Oct. 7, Ascend introduced the most comprehensive service initiative in the company's history aimed at supporting its entire North American corporate customer base. The announcement, which is available to any of Ascend's customers in the carrier and ISP arenas, has three components: Ascend Advantage Services for end users; the Ascend Channel Service Programs for resellers; and the signing of a multi-year contract with IBM to provide field support.

The programs are a direct result of Ascend's acceleration into the corporate marketplace. Advantage Services represents a complete portfolio of services designed to provide everything from installation to telephone assistance to on-going maintenance for end users. The Channel Service Programs enable resellers to deliver a complete solution to their customers, including products and services. Corporate customers will be able to purchase Advantage Services through resellers participating in Channel Service Programs.

Ascend will utilize IBM's Availability Services organization, part of IBM Global Services, which provides customers with wireless and multi-vendor services to keep systems running 24 hours a day, seven days a week.

### INTERNET ACCESS DEVICE INTRODUCED FOR HOME MARKET

On Oct. 7, Ascend expanded into another segment of the remote access marketplace: single-user ISDN dial-up. The NetWarp family of high-performance Terminal Adapters (TAs) addresses the burgeoning market of home PC users who want high-speed ISDN access to the Internet. The new ISA-bus cards are designed to address the three primary end-user requirements for ISDN dial-up: performance, low cost and easy installation.

With the addition of the NetWarp family, Ascend offers a complete remote access solution, from PC cards to SOHO routers and bridges to POP remote access concentrators and backbone IP switches.

### MAX 180 WINS "WORLD CLASS AWARD"

On Sept. 17, the MAX 1800 won *Network World*'s "World Class Award" for ISDN Remote Access Servers. The award was the result of an extensive comparison and evaluation of seven manufacturers' ISDN remote access servers, conducted by Jeffrey N. Fritz, chairman emeritus of the North American ISDN Users' Forum Enterprise Network Data Interconnectivity Family.

"The clear-cut winner based on interoperability, documentation and ease of configuration is the Ascend Communications, Inc., MAX 1800," Fritz wrote. "The best that can be said of any RAS (remote access server) device is that it works properly and transparently. This was definitely the case with the Ascend MAX 1800."

### ASCEND INTRODUCES HIGH-SPEED IP SWITCH

On Sept. 16, Ascend announced the GRF series of high-performance IP switches designed to solve congestion problems on carrier and Internet backbones. The series' initial product, GRF 400, is the only true IP switch on the market to offer customers a choice of high-speed media, including ATM and SONET.

The GRF can forward IP packets at unprecedented speeds—up to 2.8 million packets per second even in complex networks—a capability not available in backbones built with conventional routers or other switches. It is a robust IP switch designed to replace conventional routers and edge switches. It is built from a unique combination of scalable switching, route management and high-speed distributed IP forwarding. This unique architecture offers true Layer-3 switching that reduces the number of wide area switches currently required and facilitates moving edge switches into the backbone.

The MAX™ TNT from Ascend is here!
Remote Networking Solutions That Work.™
ASCEND

What's New on Our Web Site
Visit us at http://www.ascend.com

We update our Web site daily, so drop in for a visit.
Some of our latest additions include:
- The latest quarterly results
- Upcoming corporate training schedules, including new courses, with online registration available
- Incremental software releases and notes (in Service and Support)



CONTINUED FROM COVER

# A Vision for Network Growth

"Ascend is the only company to provide an end-to-end remote networking solution from the telecommuter to the ISP POP to the corporate headquarters," said Mory Ejabat, CEO of Ascend." That means you can support the existing network architecture and provide a migration path to higher-speed digital networks."

Ascend's product families—GRF, MAX, Pipeline, NetWarp and Secure Access—are the foundation of a comprehensive remote networking solution. They meet the needs for additional bandwidth and higher speeds at each point in the remote network: corporate headquarters, remote office and telecommuter, as well as carrier central site and ISP POP.

For instance, the GRF 400 and the MAX TNT provide a one-two punch that overcomes problems associated with Internet backbone congestion. The GRF is an IP switch that delivers an order of magnitude above the throughput of the conventional backbone routers that it replaces. The MAX TNT is the first carrier-class WAN access switch capable of handling thousands of Internet dial-up callers concurrently (see page 3 for related story). Together, they create a high-powered "MegaPOP" for ISPs and carriers.

"The MegaPOP offers the scalability needed to serve an escalating number of Internet users," said Bernie Schneider, vice president of Strategic Business Development at Ascend. "At the same time, it offers a quantum leap in performance, eliminating the brownouts that are becoming more and more common on the Internet."

On the corporate side of the equation, Ascend gives businesses a cost-effective way to accommodate more users who need access to the central site or Internet from remote locations. Network managers who have installed MAX WAN access switches can meet increasing demand for dial-up bandwidth by simply adding digital modem, ISDN or frame relay cards. A single MAX product can support as few as eight or as many as 672 calls simultaneously. They provide a single platform for dial-up and dedicated access.

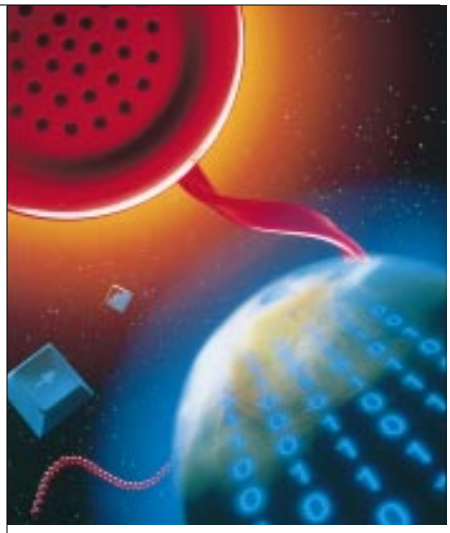
Network managers also can leverage built-in features within MAX and Pipeline products whenever they set up Ascend equipment on both sides of the network equation. As an example, Ascend products incorporate its patented Multilink Protocol Plus (MP+) for dynamic channel allocation, allowing users to increase and decrease bandwidth automatically. If a user with a Pipeline router at a remote office dials up an Ascend-based ISP with a MAX WAN access switch, the two devices handle the process transparently.

"Ascend's dominance in the ISP market lays the groundwork for solving many of the challenges faced in remote networking applications," Schneider said. "Since 28 of the world's 30 largest ISPs have standardized on MAX products, businesses can make MP+ and other Ascend technology part of their global network strategies."

**Ascend's products scale in capacity as network needs grow and change.**

Businesses can improve access to the Internet or central site by installing high-speed ISDN routers, which transfer and receive files four times faster than a 28.8 kbps modem. For instance, users on an Ethernet LAN can share a single ISDN line connected to a Pipeline product. For regional sites with an expanding user base, the Pipeline 130 allows businesses to start with an ISDN connection and migrate to even higher-speed frame relay.

Telecommuters and home users also can benefit from the additional bandwidth offered by ISDN connections. High-performance ISDN cards



such as the Ascend NetWarp 128 plug directly into the ISA bus of a standard personal computer. The NetWarp 128 uses a unique passive design approach that leverages the processing power of the PC itself, thereby providing the full 128 kbps throughput possible with an ISDN line.

According to Schneider, businesses must also consider security as part of any solution to expand the reaches and functionality of a remote network. Security breaches often come by way of the Internet, where hackers can piggyback on legitimate network traffic. Or experienced hackers can attack the remote access devices to redirect traffic or reconfigure access codes.

Ascend's Secure Access Firewall helps prevent such attacks by integrating dynamic firewall protection into MAX and Pipeline products. The firewall is located at the front of the router, protecting the equipment while preventing unauthorized access to the LAN. Administrative chores are simplified because Secure Access Firewall does not require additional equipment and can be managed from a remote location.

"For the first time businesses can create a secure and seamless connection to information resources wherever they exist," Schneider said. "Businesses can meet their immediate need for high-speed access and scalable bandwidth while transitioning into the next generation of remote networking technology."

# Special 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 |
|---|---|---|
| **11/11-12** | ALTS | Lake Buena Vista, Fla. |
| **11/11-13** | Computer Security Institute (CSI) | Chicago, Ill. |
| **12/4-5** | ISDN World | Santa Clara, Calif. |
| **12/11-13** | Fall Internet World | New York, N.Y. |




Return the enclosed card for FREE Product Guide.

# Telecommuting and Internet Access Seminars

Learn the basics of effective telecommuting. In only three hours, you can learn about analog, ISDN, and frame relay connections; the types of digital access lines available; equipment necessary at your remote and central sites; how to provide your telecommuters with digital Internet access; how to secure your network; how to manage your telecommuting environment; and how to create a telecommuting solution that fully supports both your modem and digital telecommuters.



Reserve your space now. Seating is limited!

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

| *DATE* | *LOCATION* |
|---|---|
| *November 5* | *Sacramento* |
| *November 7* | *San Francisco* |
| *November 12* | *Denver* |
| *November 14* | *Minneapolis* |
| *December 3* | *Houston* |
| *December 5* | *Dallas* |

# Connections


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