GLOBAL ACCESS
Fall 97
Ascend's Newsletter For Carrier Partners

Global Vision

Meeting Exploding WAN Demand: A New Public Data Network

Increasingly today, successful companies are choosing to focus on their core business and leaving the networking expertise to service providers. In the past, corporations built wide area networks by leasing circuits from a public carrier and connecting their offices directly. But building a private network can require a substantial capital investment for a business customer, both in equipment and personnel. What's even more significant is the cost of managing and maintaining the network, costs that grow with each new site.

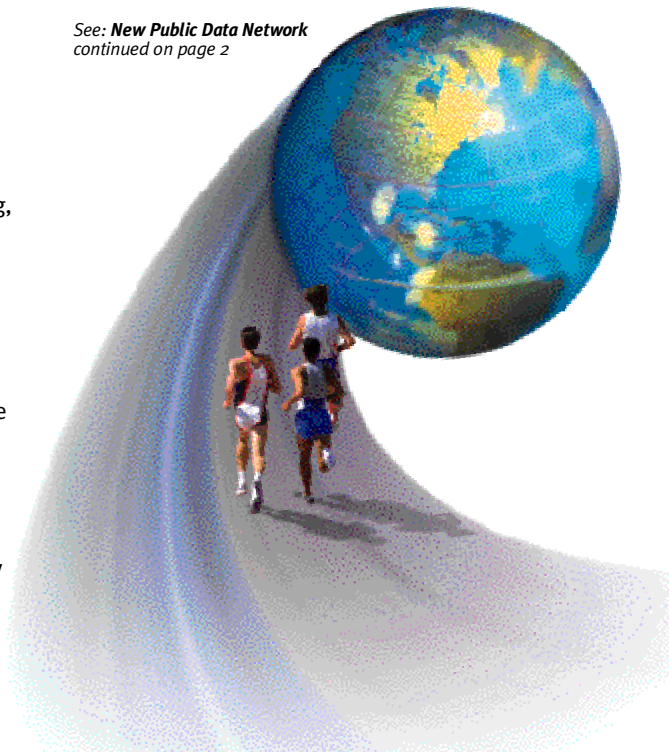
Companies feel these costs directly as they migrate their legacy infrastructures to IP-based networks. Increasing technological complexity, higher volumes of remote users, greater bandwidth requirements of new applications, and the need for global connectivity combine to make building a private network a very complex undertaking, especially for companies whose primary business is not data networking.

New Opportunities for Service Providers

As a result, service providers are fast becoming an integral part of the corporate network equation. Previously companies required dozens of different network connections to reach their employees, customers, vendors and partners. Service providers can offer that same connectivity with a single access link to public facilities. Already, many organizations are using the Internet as a worldwide data network for intranets, extranets, and Virtual Private Networks (VPNs).

Taking advantage of economies of scale, service providers today are building data networks far superior to what private companies can do for themselves. With outsourcing income from thousands of companies, service providers can implement a higher capacity, higher performing, and more reliable infrastructure than a single enterprise can afford.

*See: **New Public Data Network** continued on page 2*



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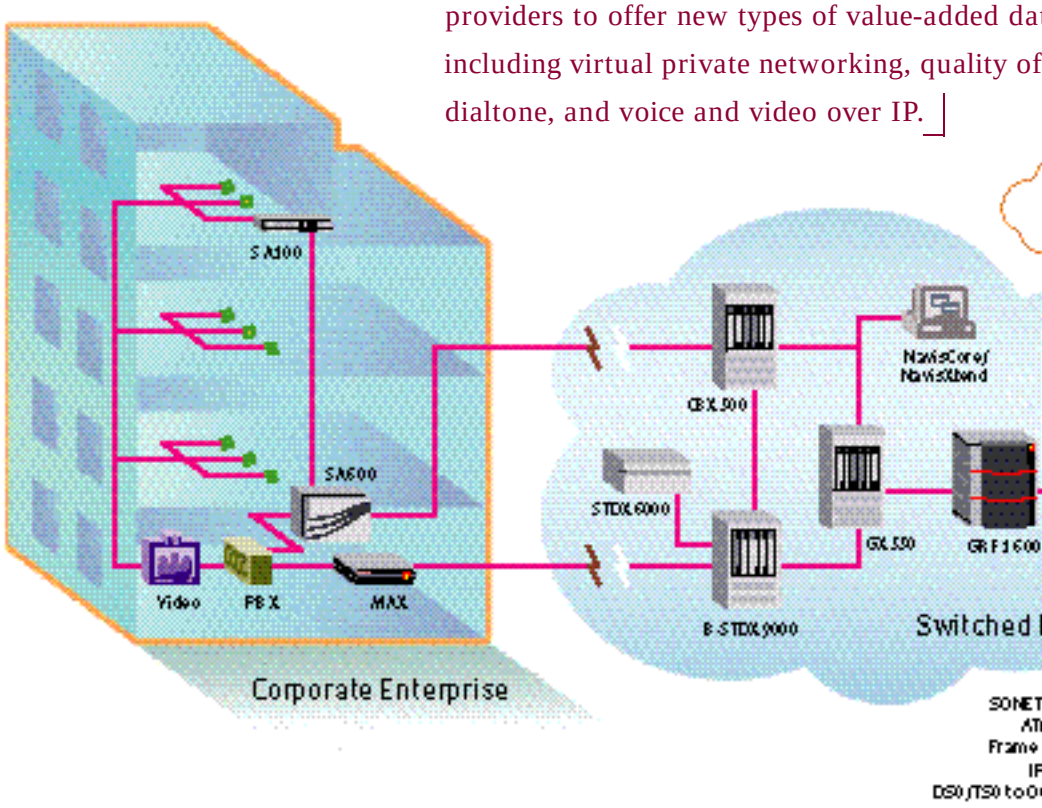

New Public Data Network
continued from page 1

The Impact on the Network

Delivering on the full promise of this shift from private to public networks requires an infrastructure with dimensions and characteristics very different from today's public facilities.

The current public network infrastructure, the Public Switched Telephone Network (PSTN), was designed to optimize voice calls; data connectivity was a very small part of the equation. The PSTN is ideally suited to two-party, three minute telephone calls. Yet the typical data session now lasts over 30 minutes—ten times as long as the average voice call—and a growing percentage of data sessions are consuming multiple circuits at 56/64 Kbps each. The result is congestion in the PSTN, with "all circuits busy" becoming a fairly common condition.

The bottlenecks now surfacing will worsen over time, compromising both voice and data communications. Data traffic is growing at up to 300% per year in some areas, while data connect times are increasing worldwide by over 10% every six months. As Internet demand exceeds supply, network failures, or "brownouts," become more frequent.

A New Foundation for Service Differentiation

To address this skyrocketing demand, a new public network infrastructure is needed, designed to handle data traffic. Built alongside the voice telephone network, this new public data network will create a vehicle for service providers to move beyond the provisioning of bandwidth and offer new types of value-added data services to their user base, including virtual private networking, quality of service, data dialtone, voice and video over IP. Optimized for data, this new network will provide the foundation for future growth and create a flexible environment for competitive service differentiation.

Progressive service providers are beginning to implement this new infrastructure, using next-generation data networking equipment from companies like Ascend.

The Challenges Ahead

Service providers face major challenges as they build and expand the new public data network:

- Coping with increased competition from deregulation on a global scale
- Building revenues for funding continual network growth and expansion
- Keeping costs of operations down while improving performance
- Meeting the demand for more services and enhancing the ability to generate revenue
- Achieving the same high level of reliability and robustness as the PSTN

With experience in growing world-class carrier and ISP networks, Ascend understands these challenges. Ascend's best-of-breed products and technologies span the breadth of WAN needs, from the end user in a remote office, throughout service provider networks, to the corporate enterprise. Ascend's strategy is to deliver products that can contribute to the success of the service provider business by enabling new revenue-generating services, maximizing yield, and lowering cost of operations. Look for more about Ascend products that support the new public data network on our Web site: www.ascend.com •

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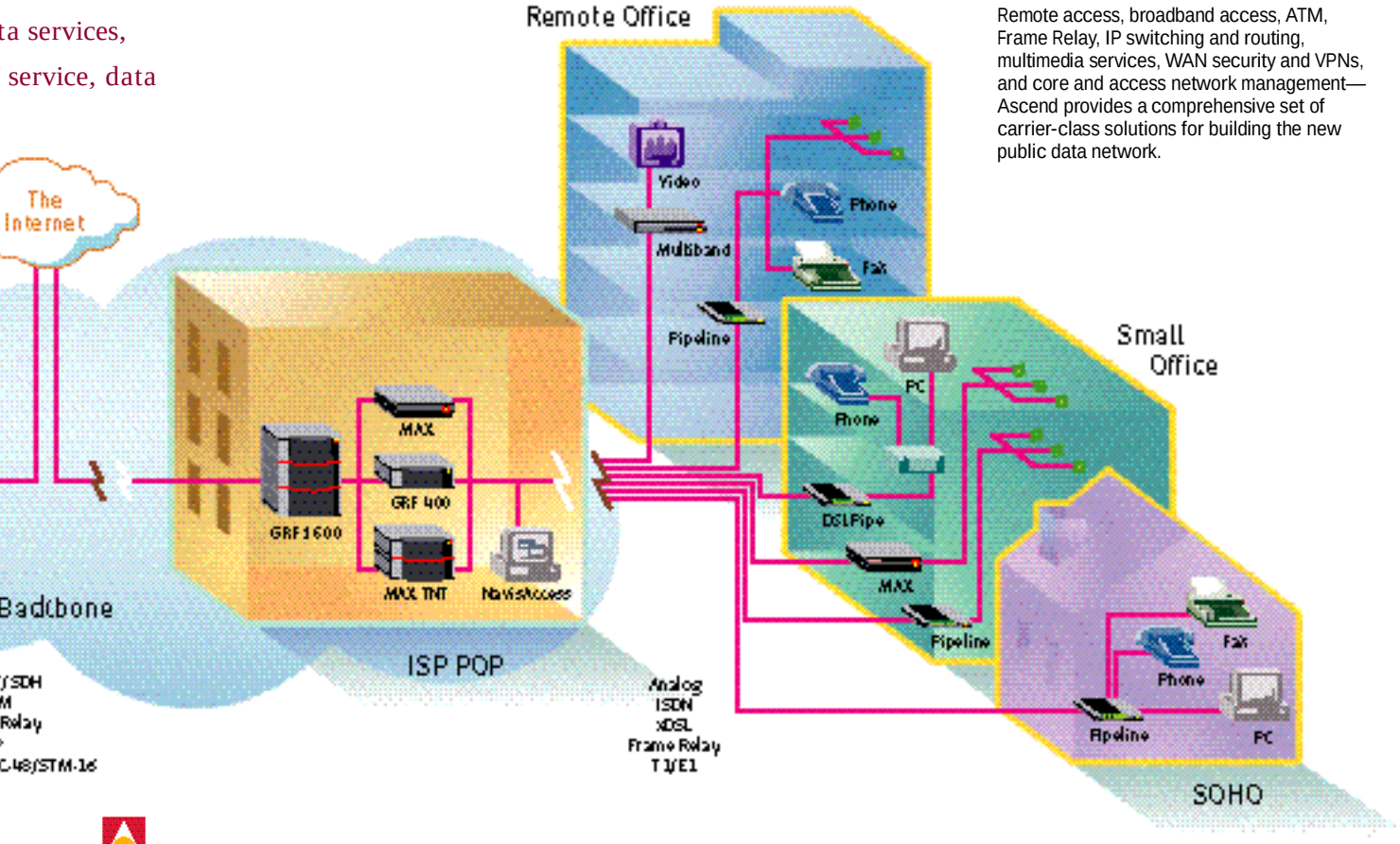


Remote access, broadband access, ATM, Frame Relay, IP switching and routing, multimedia services, WAN security and VPNs, and core and access network management—Ascend provides a comprehensive set of carrier-class solutions for building the new public data network.

Ascend Key Technologies

GX 550	CBX 500	B-STDX and STDX Family	SA Family	GRF™ Family	MAX TNT™
Carrier-class ATM core switch • Capacity of core switch with the intelligence of an edge • High capacity OC-48/STM-16 trunking • Industry leading density for OC-3/STM-1 and OC-12/STM-4	Carrier-class ATM, Frame Relay and IP switching • High performance, high density • Quality of service for thousands of virtual circuits • T1/E1 through OC-12/STM-4	Carrier-class Frame Relay, IP switching and Frame Relay-to-ATM interworking • High-capacity multiservice support • Scalable broadband packet switching • High system and network reliability	Broadband access • High-performance ATM concentration • T1/E1 through OC-3/STM-1 • Circuit emulation and native LAN support	Hardware-accelerated IP switching • Up to 10 million pps throughput • Route table of up to 150,000 routes • Scalable, media independent	High-density, multiservice WAN access • Highest port density in its class • Carrier class reliability and redundancy • Scales to HSSI, FDDI, T3/E3
MAX™ Family	**Pipeline® Family**	**Multiband™ Family**	**SecureConnect™ Family**	**Navis™ Family**	
High-performance WAN access • Multiprotocol, multi-service WAN access • Scalable platform supports multiple access services: analog, ISDN, T1/E1, MultiDSL and Frame Relay • Most widely used in ISP networks	End-user remote access • Multiprotocol router/bridge/hub • Dynamic bandwidth allocation • Wide range of applications	Cost-effective multimedia • Integrated audio, video, and data • Dynamic bandwidth allocation and management • Affordable, flexible, easy to use	Network security and VPNs • Integrated, standards-based encryption • Dynamic firewall technology • Extended RADIUS capabilities	Unified network and service management • Access core network management • Distributed, Web-based management architecture • Centralized network management for VPNs	

Product Spotlight

NavisXtend™: Distributed Management and New Network Services

Introduced this September, NavisXtend is a comprehensive set of distributed network management applications designed to align with service provider business operations. With NavisXtend, network management becomes a strategic business tool for providing new services and increasing bottom-line revenues. In addition, NavisXtend applications lower operating costs by automating and streamlining operations.

Ascend is the only vendor with best-of-breed management for both the core and access portions of service provider networks. Other products within the Navis unified network management umbrella include NavisCore (formerly CascadeView/UX) and NavisAccess (formerly NetClarity, described in the summer issue of *Global Access*).

Each NavisXtend application focuses on a specific business function within an Ascend Frame Relay, ATM, IP, and SMDS switch network:

- **NavisXtend Accounting Server** enables usage-and-time-based Switched Virtual Circuit (SVC) and Permanent Virtual Circuit (PVC) call billing. Accounting Server supports a variety of new ATM billing plans, including plans based on customer bandwidth consumption or call duration.
- **NavisXtend Customer Network Management Server** allows service providers to package a new service for end users to monitor their subscribed portion of the network. CNM Server enhances the appeal of network outsourcing by enabling users to access actual network data, so that they can monitor quality of service directly.
- **NavisXtend Fault Server** helps improve network performance and reduce downtime expense by focusing on critical alarms and monitoring for trend information proactively. Using special intelligence, Fault Server correlates and consolidates network event and alarm information across multivendor environments, enabling service providers to address critical traps immediately.
- **NavisXtend Provisioning Server** reduces the number of resources required to manage the network by allowing service providers to provision the network in a single step, using existing order entry systems. By automating end-to-end provisioning across mixed Frame Relay and ATM networks, Provisioning Server can lower network operating costs dramatically.
- **NavisXtend Standby Server** delivers full redundancy for NavisXtend network management data, protecting valuable data assets and ensuring continuous network operations. Service providers can use Standby Server to implement internal disaster recovery plans that support backup and tight synchronization of data over the WAN.
- **NavisXtend Statistics Server and Report Generator** gather detailed ATM, Frame Relay, and SMDS network performance and utilization statistics to aid in proper planning for network growth and design. Using a third-party webcasting system, Report Generator provides easy-to-understand access to network data for internal and external customers, allowing service providers to add performance reporting as a new service. •

Available in North America; international release to follow.

Ascend will demonstrate the NavisXtend applications at the NetWorld+Interop trade show in Atlanta, October 8-10. For more information, browse www.ascend.com, and look for pages describing Core Switching Division products.

Events Calendar

To learn more about Ascend products, visit us at these trade shows (partial list).

October 8-10
NetWorld+Interop
Atlanta, Georgia

October 20-23
NetWorld+Interop
Paris, France

October 20-24
Expocomm
Buenos Aires, Argentina

October 26-27
USTA
Chicago, Illinois

November 5-7
Telecon
Anaheim, California

November 26-28
NetWorld+Interop
Sydney, Australia

Complimentary Ascend Strategy White Paper

Get an in-depth look at Ascend's New Public Network strategy. Learn about the needs of users, requirements of service providers, and Ascend's role with products and technologies. E-mail us at global_access@ascend.com. Simply say, "Send me the Strategy White Paper," and we'll e-mail a short survey to you. Complete it and your white paper will quickly follow.

Resource Guides

Go to www.ascend.com
Select "Resource Library".

Virtual Private Networks

MultiDSL Profit Opportunities for Network Service Providers

The Next-Generation Public Data Network at SAVVIS

Congestion. Instability. Brownouts. Blackouts. These symptoms of Internet overload are becoming more common. And with traffic doubling every few months and bandwidth-intensive multimedia applications on the way, these problems could become even more serious.

SAVVIS Communications Corporation, a St. Louis-based provider of full-service global Internet broadband networking solutions for businesses, is taking steps to solve these congestion problems. SAVVIS is deploying its next-generation network architecture without using a single conventional router, once the fundamental building block of the Internet. Instead, the SAVVIS design employs state-of-the-art ATM switches and IP switches from Ascend that handle traffic easily and economically in the multiple gigabit-per-second range. The move away from routers to next-generation IP and ATM switching products enables SAVVIS to provide Service Level Agreements (SLAs) and, eventually, full Quality of Service (QoS) guarantees to its business customers.

> SAVVIS is deploying its next-generation network architecture without using a single conventional router, once the fundamental building block of the Internet.

"Conventional routers were not designed to handle the vast quantities of data and the large number of routes that we see on the Internet," said Gary Zimmerman, vice president, network engineering at SAVVIS. "And they have no native mechanisms for setting service priorities. In contrast, the Ascend equipment represents a new generation of hardware that was built with the Internet in mind."

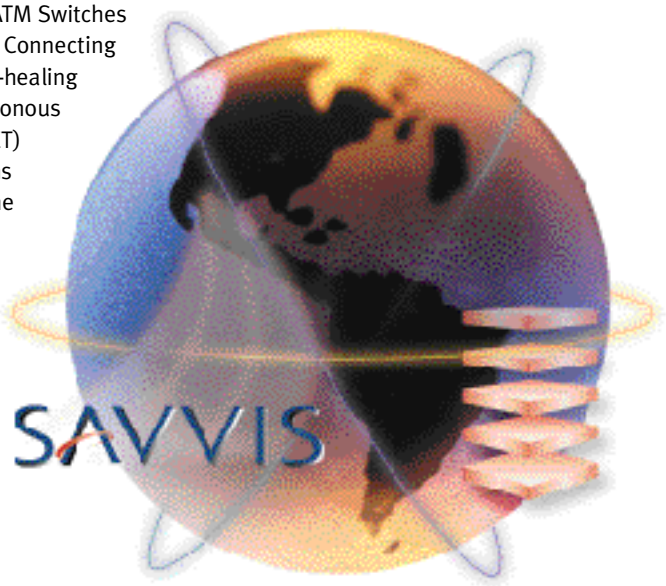
SAVVIS differentiates itself from other high-capacity backbone operators by bypassing the public Metropolitan Area Exchanges (MAEs) and Network Access Points (NAPs) that cause massive bottlenecks on the public Internet. Instead, SAVVIS has implemented a nationwide network of Private Network Access Points (PNAPs) and offers high-speed Internet services over a privately managed, high-performance network. While used exclusively for the Internet now, the new backbone will someday provide directly accessible public data network links for corporate customers.

SAVVIS chose carrier-class WAN switches from Ascend Communications for its new National Internet Service. SAVVIS is using a total of 32 Ascend switches at its 17 U.S. POPs. The total includes 16 B-STDX 9000 Frame Relay Switches, 16 CBX 500 ATM Switches and 7 GRF IP Switches. Connecting the PNAP sites is a self-healing DS-3 (45 Mbps) Synchronous Optical Network (SONET) backbone. SAVVIS plans to migrate the backbone to OC-3 (155 Mbps) and OC-12 (622 Mbps) as traffic conditions warrant.

SAVVIS selected the Ascend equipment on the basis of the following criteria:

- Complies with existing and emerging standards for high-performance networking
- Delivers high throughput to eliminate significant cell, frame or packet loss
- Provides virtually unlimited scalability with full, systems-level compatibility
- Monitors, gathers and reports SLA- and QoS-related information
- Permits an end-to-end network design with no single point of failure
- Utilizes a hot-swappable modular design and redundancy to minimize downtime

"Because the Internet is now an integral part of business communications, there is a growing need for quality of service guarantees," observed Zimmerman. "Ascend's performance and management capabilities allow us to deliver quality of service for our business customers today, with the potential to scale our network globally tomorrow." •



ELI: Fulfilling the Promise of a Full-Service Network

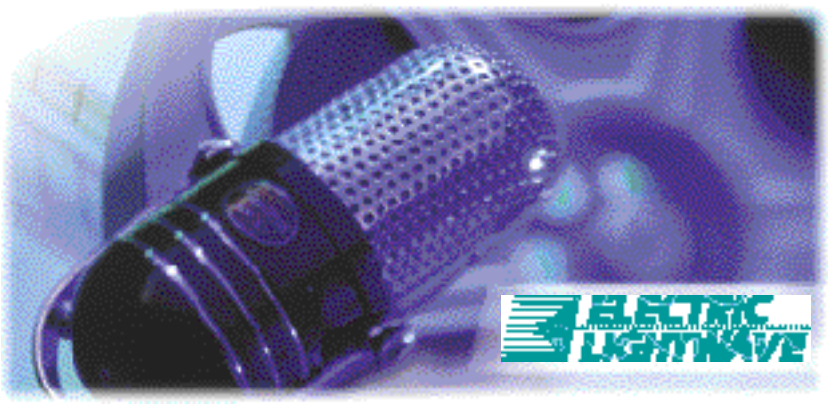
In a major upgrade to its broadband network infrastructure, Electric Lightwave, Inc. (ELI), a leading full-service competitive communications company headquartered in Vancouver, Washington, selected Ascend's CBX 500 switches as the foundation of future broadband services integrating voice, video and data. ELI's business-oriented services include local and long-distance telephony, videoconferencing, enterprise networking and Internet access. Rather than build separate infrastructures for each type of service, ELI plunged head-first into ATM with a high-speed switching solution.

"We conducted a comprehensive evaluation of all wide-area ATM offerings available on the market," remarked Richard Shimizu, ELI's product line manager of data and video services. "We chose Ascend switches because they provide the scalability and breadth of features we require to achieve our goal of becoming the pre-eminent communications provider in the Western U.S."

ELI will deploy the switches in Seattle, Portland, Salt Lake City, Sacramento and Phoenix.

ATM is the only wide-area network backbone technology designed specifically to provide integrated support for voice, video and data services. While many industry analysts have focused on ATM's secondary role in private premises networking, it has been quietly replacing other technologies in the public WAN because of its inherent scalability, support for quality of service, and multiservice integration.

An important factor in ELI's selection of Ascend switches was the migration path they offered from Frame Relay to high-speed ATM access for data services. The CBX 500 ATM Switches will power ELI's high-speed backbone, while an installed base of Ascend B-STDX 9000 Frame Relay Switches provide support at the network's edge. Initially the CBX 500 systems will constitute ELI's broadband infrastructure for Internet and Frame Relay public data network services. As time passes, the expanding ATM backbone will handle an increasing percentage of voice/video traffic, and direct ATM access capabilities will be made available to business customers. Ascend's NavisCore™ management system lets ELI manage its entire network, end-to-end, from a single console.



ELI's business customers can look forward to several important benefits from the ATM-enhanced infrastructure: bundled voice, video and data services; simplified network administration; and a substantial savings over piecemeal configurations. And ATM will deliver even more advantages in the not-too-distant future as ELI's network scales to utilize the maximum capacity of the backbone's fiber optic cabling.

"With ATM and Frame Relay solutions from Ascend, business owners can select exactly what they need to meet their data requirements—Frame Relay, native ATM or transparent LAN services for higher than T1 speeds," said Shimizu. "Since ATM supports voice and video, customers will have the right service for every location. And we can guarantee the appropriate quality of service to meet their business objectives." •

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