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ASCEND

Global Vision

Ascend's Voice Spans the Net

The hottest "data networking" application today is voice, which represents a multi-billion-dollar new market opportunity for service providers. Once restricted to the domain of the circuit-oriented Public Switched Telephone Network (PSTN), today's telephony applications are moving to private and public packet networks. Several factors contribute to the growth of this trend:

- Compelling economics. Service providers installing telephony gateways between the Internet and the PSTN have projected discount rates of 30-50 percent on international packet-based voice calls.
- New technology. Telephony applications can take advantage of improvements in packet transmission quality and performance.
- New players. Competitive Local Exchange Carriers (CLECs) and other Network Service Providers (NSPs) see packet-based voice as a strong differentiator.
- Customer appeal. Incumbent carriers have recognized the enormous opportunities in supplementing their existing voice business with packet-based voice.
- Healthy savings. Enterprise customers, always conscientious about their budgets, realize that packet-based voice can cut communications costs dramatically.
- International standards. ITU-T H.323 and other emerging standards allow products from different vendors to interoperate across the same network.

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■ Trusted vendors. Ascend is now offering comprehensive voice and fax solutions.

Ascend's MultiVoice Strategy

This spring, Ascend introduced its three-phase MultiVoice™ strategy, designed to integrate voice and fax services transmitted over Internet Protocol (IP), Asynchronous Transfer Mode (ATM) and Frame Relay networks with traditional PSTN service offerings. The goal of the MultiVoice strategy is to satisfy the following criteria in delivering voice and fax over data networks:

■ Comparable user experience to the PSTN. Ascend solutions must support Absolute Quality of Service (QoS), low network delay and high tolerance for delay variation.

■ Full functionality and carrier transparency. Ascend voice and fax products must support existing PSTN services and functions, including carrier network signaling (SS7).

■ End-to-end call setup, management and accounting. Ascend's solutions must be scalable to millions of calls per hour and provide end-to-end visibility and control.

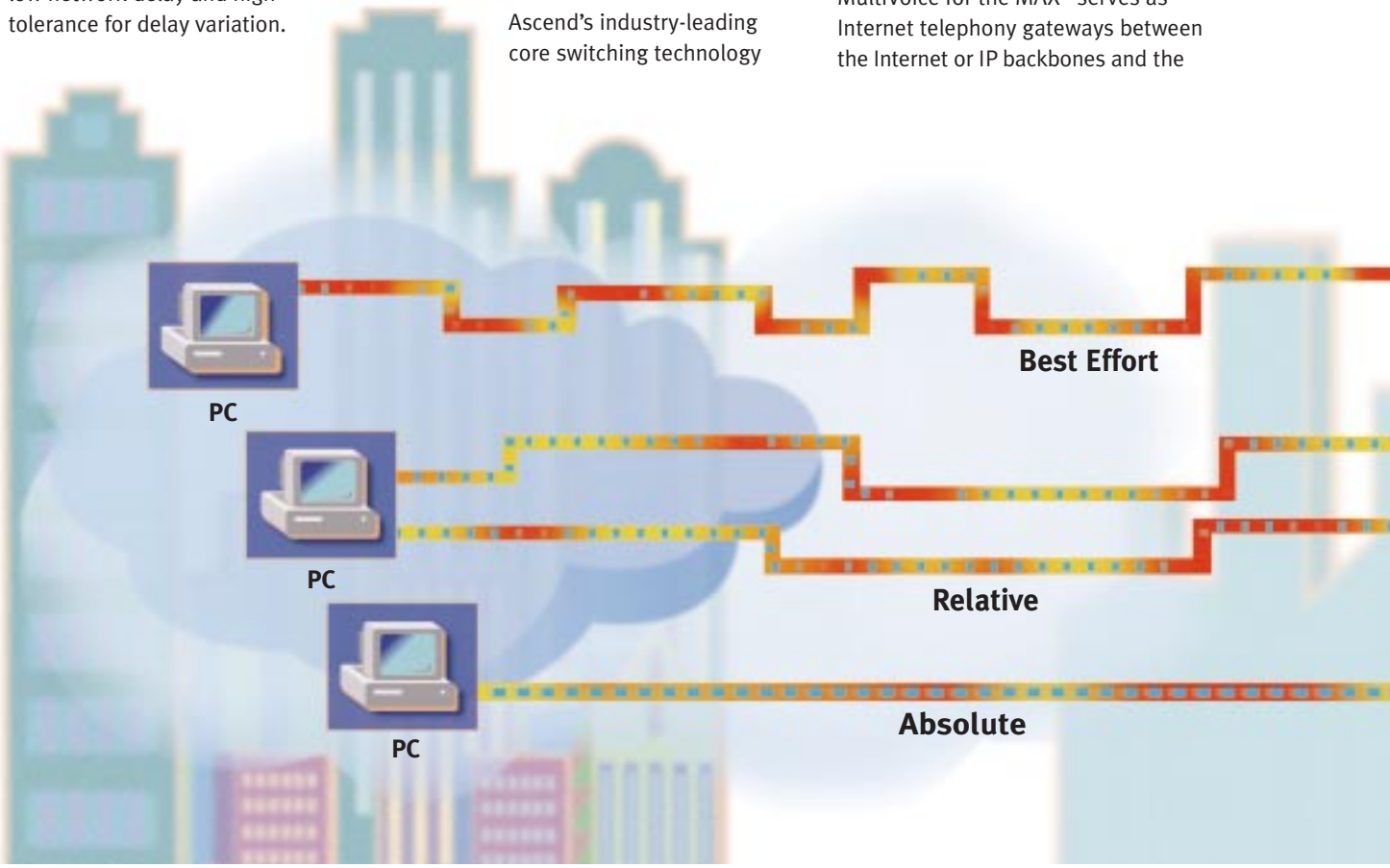
Comprehensive Voice Support

Ascend's MultiVoice strategy leverages the company's leading-edge WAN technologies, developments in voice compression, and QoS mechanisms to deliver voice and fax solutions that meet the core criteria defined above.

Ascend's industry-leading core switching technology serves as the foundation for the MultiVoice strategy, delivering unprecedented call setup rates: up to five million voice calls per busy hour for the CBX 500 Multiservice switch, and up to 8 million calls for the GX 550. (Both products were featured in the Winter 1997 issue of *Global Access*.) In contrast, a typical central-office switch today can only handle about one million calls per busy hour. In addition, Ascend's core switches can support simultaneous voice and fax over IP, Frame Relay and ATM.

Ascend's MultiVoice strat company's leading-edge V developments in voice co mechanisms to deliver vo that integrate IP, ATM an traditional PSTN service

MultiVoice for the MAX™ serves as Internet telephony gateways between the Internet or IP backbones and the



Ascend's support of Absolute Quality of Service is one of the primary advantages that Ascend's MultiVoice solution offers over competitive alternatives. With Absolute QoS, Ascend can deliver toll-quality voice and video over packet-based networks. Ascend products deliver the right performance for all applications. (*See related story on page 4*).

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PSTN, allowing carriers, service providers and enterprises to take advantage of public and private data infrastructures for transmitting voice calls. And IP QoS, an enhancement to Ascend's IP Navigator™ technology, delivers "toll-quality" voice over data networks.

Finally, Ascend's Navis™ network management system provides the most robust platform for creating, provisioning and managing new and existing data services, enabling carriers and NSPs to deploy voice services reliably and economically.

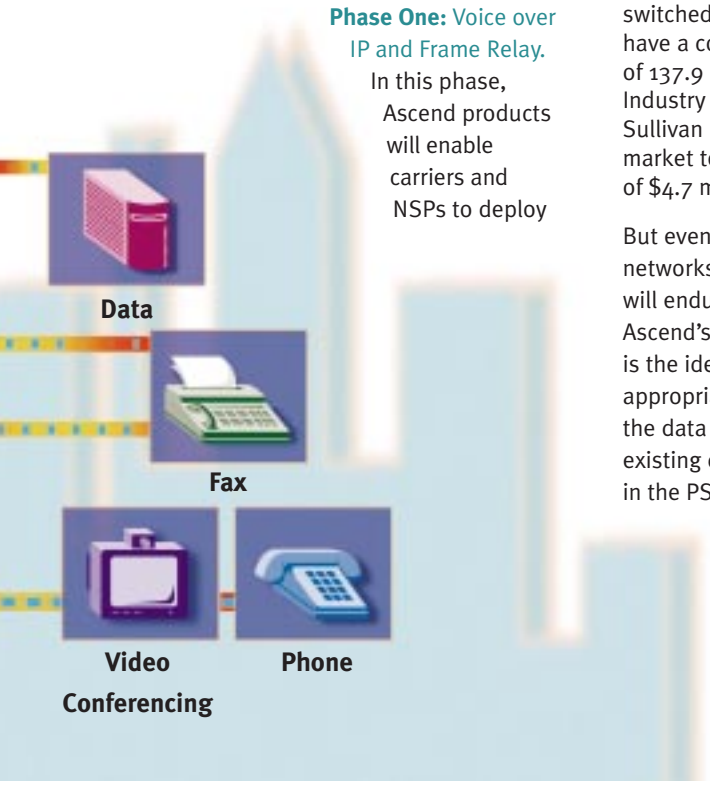
Three-Phase Implementation

Ascend intends to roll out its voice capabilities in three phases:

Phase One: Voice over IP and Frame Relay. In this phase, Ascend products will enable carriers and NSPs to deploy packetized voice using Ascend access switching, Frame Relay, and Switched IP solutions to create true 'toll-quality' voice networks.

Phase Two: Voice over ATM. Ascend will introduce products and technologies, based on Ascend's SA 100 and 600 broadband access switches, that will enhance existing circuit emulation capabilities providing Variable Bit Rate (VBR) compressed voice over ATM.

Phase Three: MultiVoice Platform Interoperability. Ascend will unveil interoperable MultiVoice over IP, Frame Relay and ATM, as well as the ability to integrate MultiVoice into SS7 carrier signaling networks.



Preserving PSTN Investment

According to IDC/LINK Research, Internet telephony over packet-switched networks is expected to have a compound annual growth rate of 137.9 percent through 2001. Industry analyst group Frost & Sullivan projects the "voice over" market to grow from its 1996 revenue of $4.7 million to $1.81 billion by 2001.

But even as voice traffic shifts to data networks, the PSTN infrastructure will endure for many years to come. Ascend's MultiVoice architecture is the ideal solution for migrating appropriate voice applications over the data network, while preserving existing carrier and NSP investment in the PSTN. •

Events Calendar

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

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

April 28 - 30
Gartner Group Remote Access
Lake Buena Vista, Florida USA

May 5 - 7
Networld & Interop
Las Vegas, Nevada USA

June 2 - 5
CommunicAsia '98
Singapore

June 3 - 4
ATM Forum
San Jose, California USA

June 3 - 5
Networld & Interop
Tokyo, Japan

June 9 - 11
Supercomm
Atlanta, Georgia USA

June 16 - 18
Building the Future Multi-Service Network Internet & Broadband IIR Conference
Hong Kong, China

September 8 - 11
Networking China Expo
98 China Computerworld Expo
Beijing, China

Making Quality Absolute

One of the key distinguishing components of Ascend's MultiVoice™ strategy is its support of toll-quality voice over packet-based networks. Through newly announced enhancements to its IP Navigator™ software, Ascend now supports the industry's first Absolute Quality of Service (QoS), making real-time voice and video applications a commercial reality for the first time.

The Service Quality Spectrum

New services for the next generation of the Internet will require a full spectrum of service quality, supporting different service levels and costs *(see diagram on opposing pages)*. Today's Internet is based on a straightforward "Best Efforts" model, where every application receives the same level of service. There is no distinctive treatment for time-sensitive applications, such as voice. As the Internet matures, the "Best Efforts" approach will remain suitable only for basic, low cost Internet access and time-insensitive applications, such as email transfer.

With Absolute QoS, Ascend WAN switches can ensure that the most critical traffic receives guaranteed and reserved bandwidth as it travels end-to-end throughout the network.

Relative or "Priority-based" QoS, which has sparked recent industry interest, offers business-class services that can be applied to higher priority applications. Relative QoS assigns a priority to data traffic flowing through a router by taking advantage of a special byte in the IP header. For this mechanism to work, equipment such as voice gateways need to request low delay and low likelihood of being dropped by specifying a certain priority in the header. Relative QoS is a substantial improvement over "Best Efforts," and can yield acceptable Voice over IP quality in a well-managed IP network. But it requires network operations and engineering staff to monitor the usage of voice traffic on each trunk.

While Ascend products support "Best Efforts" and Relative performance, a new level of service quality is needed to handle more sophisticated services that require minimal delay and guaranteed bandwidth. Ascend calls this new level of performance Absolute QoS and delivers it through its IP Navigator technology.

Guaranteed Paths Mean Carrier-Class Service

IP Navigator is Ascend's carrier-class implementation of the Multi Protocol Label Switching (MPLS) standard, which is now pending approval from the Internet Engineering Task Force (IETF). IP Navigator software adds IP Layer-3 routing to Ascend's connection-oriented (Layer-2) B-STDX 8000/9000, CBX 500, and GX 550 multiservice WAN switches. As a result, Ascend WAN switches can ensure that the most critical traffic receives guaranteed and reserved bandwidth as it travels end-to-end throughout the network. Ascend calls this type of performance Absolute Qos.

IP Navigator maps critical IP traffic onto reserved bandwidth paths through the service provider's ATM or Frame Relay network, providing optimum QoS. This level of performance is required for delivery of real-time services normally associated with telco-quality circuit-switched networks.

The impact of Absolute QoS resides squarely on the bottom line. Service providers can now leverage their investment in existing switched infrastructure, deliver new applications at performance levels differentiated by price, and thereby increase their profitability. •

For more information about IP Navigator or other Ascend products and technologies, visit Ascend's Web site at www.ascend.com.

The Absolute QoS features will be available in the next release of IP Navigator scheduled for mid-1998; international release to follow. Check with your local Ascend sales representative for more detailed information.

JPSnet: Growing With Ascend

JPSnet is a prototypical Internet service provider; it started small in Marysville, California, three years ago and now provides dial-up access to more than 50,000 customers throughout the entire state of California and the metropolitan areas of Seattle, Portland, New York City, Boston, Miami and Salt Lake City. JPSnet also hosts more than 7,000 Web sites. During fiscal 1998, the company will expand to Chicago, Houston and other major metropolitan areas across the U.S.

"Our motto is 'Internet Everything'," said Brad Jenkins, president and CEO of JPSnet. "Some ISPs specialize in just a few services, but at JPSnet we have fueled our growth and profitability by offering innovative Internet-related services such as Web hosting, Internet on-line training, email paging, Web faxing, broadcast faxing, and other applications."

Growing with Ascend

Ascend has helped JPSnet grow every step of the way. "Ascend provides us with the products we need to build a solid network," Jenkins explained. "Ascend's price-per-port is terrific, and Ascend Credit has helped finance our equipment purchases." The company now has more than 125 MAX™ 4000 WAN access switches, representing about 6,000 ports, to handle the bulk of its dial-up and ISDN customer needs. In addition, JPSnet employs GRF® 400 MultiGigabit routers with DS3 connectivity at its Los Angeles, San Francisco, and Sacramento locations.

"We're adding ports somewhere in our network on an almost daily basis," he continued. "We had a presence in 12 cities by the end of the first quarter of 1998, and we doubled that number in a month. Ascend products are so easy to install that expanding our network is virtually effortless. We joke that we can get a MAX 4000 out of the package and up and running in about four minutes flat."

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> – Brad Jenkins, president and CEO, JPSnet

And Ascend has helped JPSnet stay at the leading edge as technology changes. "At a time when a lot of ISPs were still analog, Ascend upgraded us from 33.6K modems to 56K modems, free of charge," Jenkins added.

JPSnet is even able to help its corporate customers connect remote offices and telecommuters to headquarters and the Internet by selling them Ascend Pipeline remote access routers. An example is *Real World*, an MTV show that follows a group of six young people as they live together for six months. For the Seattle home that is the current show setting, JPSnet provided a Pipeline 75, used by both residents and the MTV crew, in a WAN of five computers.

Great Communications

Ascend's contribution to JPSnet's growth extends beyond products and technology. "In the fast moving Internet world, communication with vendors is consistently a problem, but not with Ascend," noted Jenkins. "Ascend has people who specialize in our account in the sales, marketing, and technical support departments. Our contacts are very responsive and a pleasure to deal with. They have visited us many times and very much understand our business. A few months ago, Ascend even flew a technical engineer to Sacramento and kept him here for two days until our problem was solved. That is real customer service." •

ISPtel: Making Internet Telephony Global

ISPtel is a new company in a new line of business. Launched in April, ISPtel has a comprehensive new alternative for Internet telephony service providers who offer voice and fax communications over the Internet. Based on Ascend's MultiVoice™ technology, this solution allows service providers to lower the cost of voice and fax transmission dramatically, as much as 50 percent in some international markets. Service providers can increase their competitive differentiation by passing these savings on to their multinational enterprise customers, and generate a healthy return in the process. "It's a win-win solution for everyone involved," said Paul McGovern, ISPtel's director of marketing.

"By helping ISPtel to build a VoIP network, Ascend is making it easier for its many service provider customers to step up to Internet telephony. This foresight sets Ascend apart from its competitors."

– Paul McGovern, director of marketing, ISPtel

Technical and Business Solutions from Ascend

Finding a way to bring this new service to providers was not easy, however. "We spent six months in the spring and summer of 1997 trying to build a voice over IP (VoIP) network without success, and gateway vendors were of little help," continued McGovern. "Then we discovered that Ascend was working on its comprehensive MultiVoice architecture for delivering voice and fax over IP, Asynchronous Transfer Mode (ATM), and Frame Relay networks. Ascend has technical and business solutions that make Internet telephony a reality today. Its technology provides clearly superior voice quality, and its price per port is very aggressive."

McGovern notes that because Ascend's IP gateway solution was developed for the MAX™ platform, which carries about 70 percent of the WAN access switch traffic worldwide, existing Ascend customers can easily implement these new services. ISPtel is a partner of Ascend customer JPSnet, which is a major ISPtel customer. ISPtel is building its network on JPSnet's existing Ascend infrastructure and is now rolling out nodes in 25 cities throughout the U.S. Working with Ascend customers in Europe and the Pacific Rim, as well as with Ascend's international marketing department, ISPtel will bring up 25 international nodes by the end of July.

Increased Network Utilization

ISPtel's main customers are ISPs and enterprise customers with corporate intranets. "Our customers can increase their network utilization by using their excess bandwidth to originate and terminate voice calls. And for ISPs there is a low incremental cost because, in most cases, their networks are paid for by their dial-up access business," noted McGovern.

"Ascend is looking for partners who can provide a total business solution, and we are working closely with Ascend's International Marketing department to do just that," added McGovern. "By helping us build a VoIP network, Ascend is also making it easier for its many service provider customers to step up to Internet telephony. This foresight sets Ascend apart from its competitors." •

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