PRODUCT INFORMATION

Ascend MAX

WAN Access Switch Solutions

ASCEND

MAX Family of WAN Access Switches

The MAX™ family of WAN access switches accommodates the remote networking needs of service providers and enterprises alike by providing scalable, manageable and secure remote networking platforms. MAX switches offer the most robust features and best price/performance available, and are easy to install, configure and operate.

Each MAX switch is a total remote networking solution combining the functionality of a router, a terminal server, an ISDN switch and a Frame Relay concentrator. The advanced Series56™ Digital Modem Modules support a broad range of analog modems on high-speed digital lines. Because these same lines also provide ISDN, Frame Relay and other forms of digital WAN access, the MAX switch eliminates the wasteful practice of provisioning separate resources for separate services.

Based on the True Access™ Operating System (TAOS), the MAX family offers a suite of software capabilities that make advanced networking possible. Enhanced system capabilities provide a migration path from traditional analog modem access to the next-generation of public data networking, including ISDN and Digital Subscriber Lines (DSL). Integrated security allows service providers to offer reliable, secure access to the Internet, a corporate intranet or a virtual private network (VPN). Centralized management, monitoring and reporting using the Ascend NavisAccess™ management system further enhance service delivery and business offerings. The MAX family's modular and scalable approach provides the versatility to add functionality such as voice without substantial investment in additional equipment.

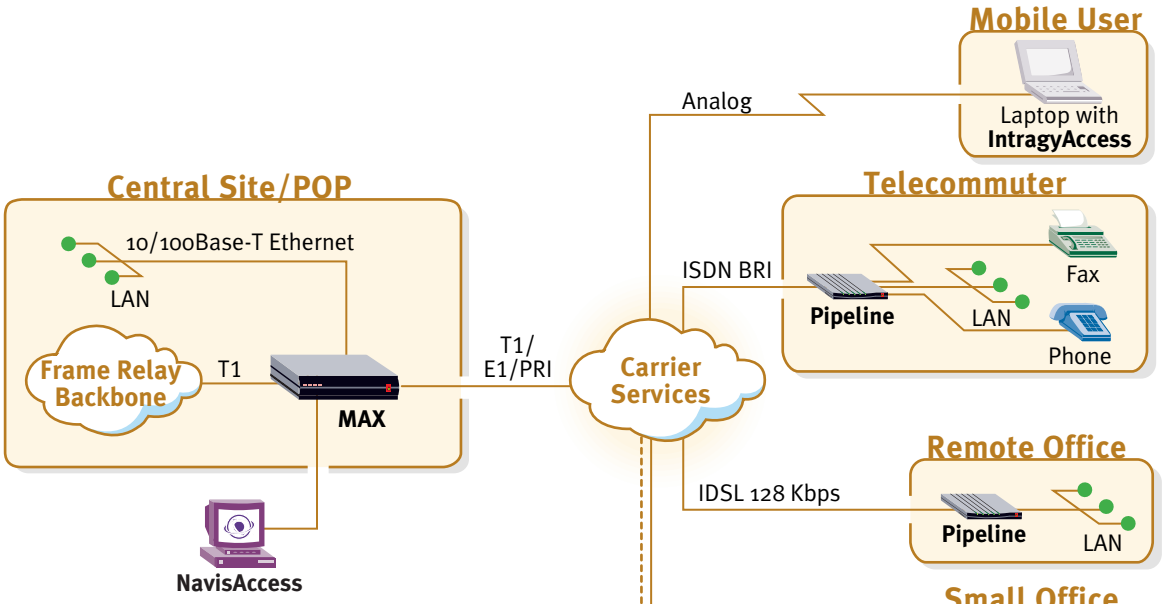
The Ascend MAX family of WAN access switches holds the number one market share position in Remote Access Concentrator (RAC) revenue and port shipments, shipping more than any other vendor worldwide. MAX switches, powered by TAOS, represent the industry's most innovative, flexible and interoperable solutions for remote networking.

Networking Solutions for Service Providers and Enterprises

Service Provider Points of Presence

The MAX access switch is the preferred solution for Internet service providers (ISPs) around the globe. In the fast-growing, fiercely competitive access business, carriers, ISPs and other network service providers have come to appreciate the importance of a scalable, versatile and reliable point of presence (POP) solution found in MAX switches. Each MAX switch is a complete solution in one box that is easy to deploy and affordable to operate. The Global Digital Access™ capability for ISDN and Frame Relay environments includes support for ISDN clients, Frame Relay concentration and internationally homologated ISDN signaling for optimum efficiency. Bandwidth on demand, Quality of Service (QoS) and Voice-over-IP (VoIP) features empower MAX switches to meet the most demanding of applications. NavisAccess network management software provides the ability to monitor the largest MAX networks from a single point of view. And, by utilizing MAX Stack™, a feature which maximizes bandwidth availability by enabling multiple MAX switches to function together as one logical switch for Multilink PPP (MP), Multilink Protocol Plus (MP+) and Bandwidth Allocation Control Protocol (BACP) calls, users can reduce the complexity and increase the simplicity of provisioning access to multiple central site WAN access switches. Configuration change control and task automation simplify management, while extensive reporting capabilities aid in capacity planning and verifying service level agreements (SLAs).

Central Site/POP access with analog and Global Digital Access



The MAX provides multiservice support for analog, ISDN, IDSL and Frame Relay and supports four T1/E1 lines for up to 96/120 (E1) concurrent sessions.

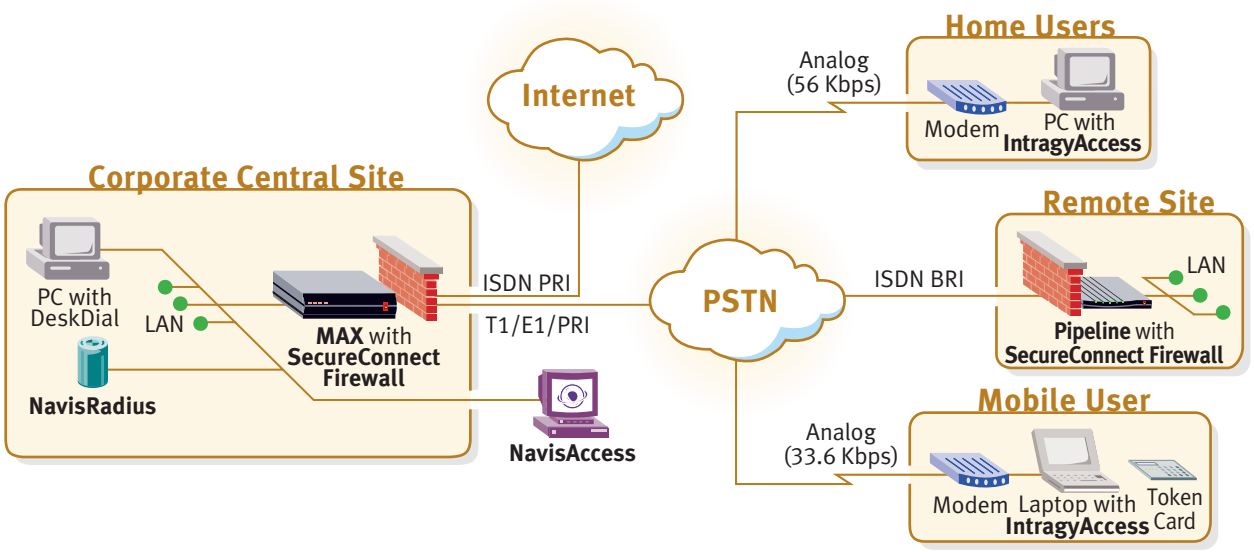
Applications

Enterprise WAN solutions

The advantages of the MAX WAN access switch appeal equally to organizations with extensive enterprise networking needs. MAX switches can provide remote LAN access for telecommuters and mobile workers, or WAN backbone and Internet access for multi-user sites. In either case, Ascend Intragy™ software provides multiprotocol dial-in and dial-out capabilities to all local and remote users. Real-time and historical user traffic data is gathered and consolidated by the NavisAccess management system. For major facilities, MAX switches offer the capacity, along with both primary and backup/overflow bandwidth, for efficient utilization of WAN services.

A single MAX switch can even integrate voice, fax, video and data traffic for additional economies of scale in the WAN. For smaller sites, the scalability and remote manageability are especially valuable. For small office/home office (SOHO) settings and telecommuters, Ascend offers the Pipeline® family of remote access routers. MAX switches and Pipeline routers work together to provide the capability, simplicity and affordably needed in today's enterprise networking environments.

Corporate Remote Access



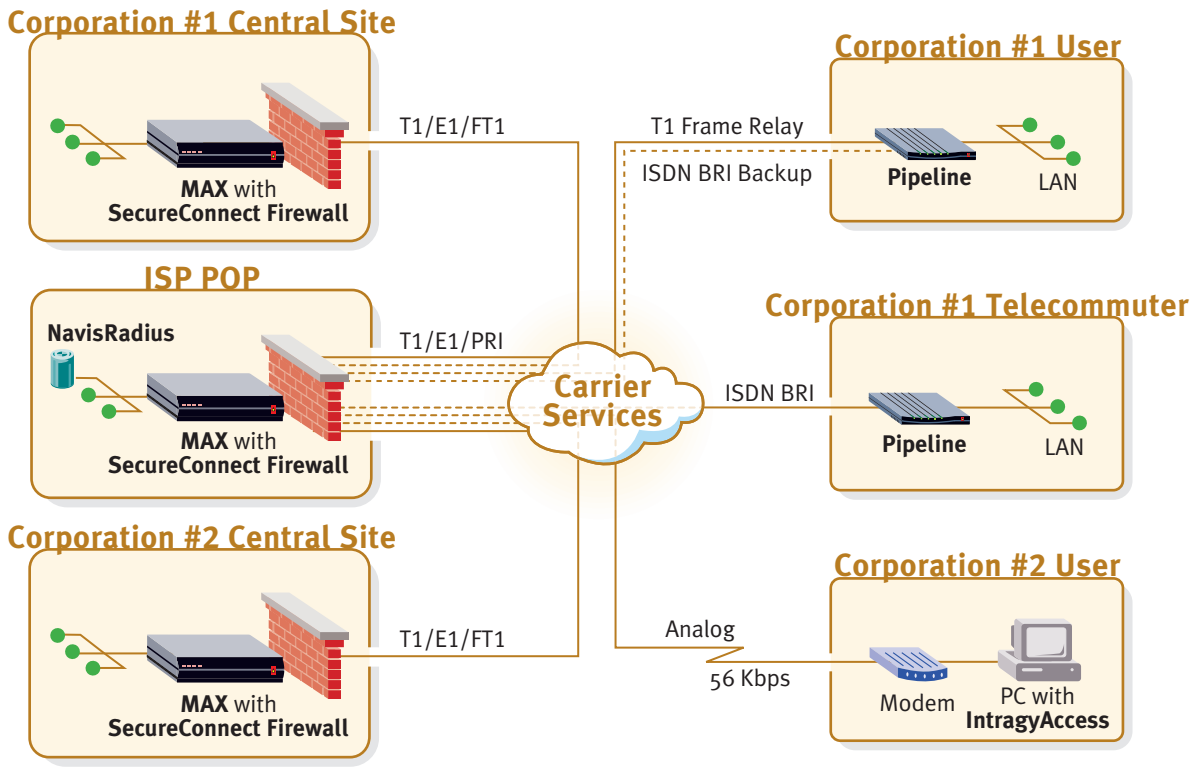
Corporations can offer remote offices and remote users secure connections to the corporate headquarters using the MAX with SecureConnect Firewall.

Applications

Virtual Private Networks

Already the leader in virtual private network (VPN) solutions, Ascend is the first vendor to break down the remaining barriers to widespread VPN adoption in a strategy to match enterprise-wide needs with carrier-class VPN solutions that service providers can deploy profitably. The Ascend enabling MultiVPN™ strategy supports tunneling, or Virtual Private Remote Networking (VPRN) and two other much-needed ways of constructing VPNs using IP, Frame Relay and ATM services: Virtual Private Trunking (VPT) and Virtual IP Routing (VIPR). MAX switches work in tandem with other Ascend product lines to create the most comprehensive VPN solutions available on the market today. When constructing or outsourcing a VPT or VIPR, users may elect to deploy a MAX switch on the access side. The MAX access switch supports all popular tunneling protocols, including the Ascend Tunnel Management Protocol (ATMP), the Point-to-Point Tunneling Protocol (PPTP) and the Layer 2 Tunneling Protocol (L2TP). For large enterprise sites in a hybrid private network or virtual private network, Ascend MAX WAN access switches offer a total solution. MAX switches offer the capability, scalability and flexibility enterprises need in the migration from private to virtual private networks.

Virtual Private Networking



The MAX can be used for establishing a secure virtual private network over the public network.

Features and Benefits

Full integration simplifies installation, operation and management

Each MAX switch combines everything needed for remote access in a single, compact chassis including the remote access server, routing, data compression, security, bandwidth management, line interfaces and more. All elements employ industry standards to provide seamless integration with the rest of the network infrastructure. And sophisticated management features make it easy to install, configure and operate MAX access switches. The point-and-click NavisConnect™ software simplifies initial installation, allowing network administrators to get the MAX access switch up and running in as little as 15 minutes. In addition, network administrators can manage many other functions of the MAX switch, either locally or remotely, using these same intuitive configuration menus.

- LAN and WAN interfaces
- PPP, SLIP and C-SLIP terminal service
- TCP/IP routing using RIP2 and OSPF
- Support for Novell's IPX and Apple's AppleTalk
- Bridging all protocols (BCP standard bridging)
- Integral RFC 1144 header and Stac data compression
- ATMP, PPTP and L2TP tunneling for VPNs
- Inverse multiplexing on most models for videoconferencing and backup/overflow bandwidth applications

Multiservice consolidation maximizes versatility and drives down the cost of ownership

By eliminating the need for separate modem banks, terminal servers and routers, the MAX switch lowers the cost of network equipment, WAN services, management and facilities. And because MAX switches consolidate a dynamic mix of analog and digital access technologies over high-speed digital lines, available capacity is truly available to any session at any time—dynamically and automatically. With MAX switches, gone are the days of provisioning separate services with separate lines and separate systems. The MAX access switch supports the industry's broadest array of WAN services, all concurrently and all in a single chassis:

- Modem access using digital modem technology
- ISDN BRI and PRI
- Frame Relay
- Switched 56
- T1/E1 Leased Lines
- Fractional T1
- ISDN and Digital Subscriber Lines (IDSL)

Comprehensive, iron-clad security adds privacy, integrity and confidentiality to all applications

The security provisions of the MAX access switch integrate seamlessly into existing network security architectures. These built-in features also make it easy to manage large-scale remote access applications from a central site.

- PAP, CHAP and MS-CHAP industry standard authentication
- User authentication, authorization and accounting (AAA) is compatible with RADIUS, TACACS and TACACS+
- Encrypted token-card security, callback (for digital connections), Calling Line ID (CLID) and transmit/receive packet filtering
- Integral SecureConnect™ ICSA-certified dynamic stateful firewall (optional)

Features and Benefits

Global Digital Access makes the MAX even more versatile and affordable

Global Digital Access™, which optimizes utilization of WAN services, consists of several related features: Digital Access, ISDN signaling, Frame Relay support, E1/R2 and E1/R1, PHS, V.110.

Digital Access

With Digital Access, MAX users are able to support both analog modems and digital services on the same high-speed lines. The digital modem traffic integrates with ISDN, Switched 56 and Frame Relay traffic automatically on a call-by-call basis, without the need to provision these services separately. And because Digital Access is software-based, users can select what they need today and upgrade later to the next generation of digital technologies, while preserving the investment in their MAX access switch platform.

ISDN Signaling

Optional ISDN signaling software supports incoming ISDN signaling from Ascend Pipeline routers and MAX access switches as well as other ISDN access devices. The ISDN signaling supports ISDN connections for both analog modem and digital services dial-in traffic.

- ITU-T R2 signaling on E1
- PRI to T1 signaling conversion
- D4 to ESF conversion
- D-channel multiplexing and X.25 packet services
- Frame Relay or X.25 over ISDN B-channels
- Calling Line Identification (CLID)
- International homologation in over 40 countries worldwide
- BRI with integrated NT1
- PRI with integrated CSU

Frame Relay Support

Each MAX access switch can support numerous 56K or 64K Frame Relay connections, depending on its capacity. The Frame Relay software integrates incoming Frame Relay traffic from Ascend Pipeline routers and other Frame Relay access devices (FRADs) with analog and digital dial-in traffic. A high-speed, synchronous V.35 port on most models connects directly to a Frame Relay switch at speeds up to 8 Mbps.

- Route to multiple Frame Relay PVCs over single or multiple interfaces
- Supports up to 4096 PVCs with Ascend NavisRadius™ (extended RADIUS database software)
- Dial-in PPP gateway function with PVCs selected and switched on a per-user basis
- RFC 1490 encapsulation
- ANSI Annex D and ITU Annex A management
- Frame Relay Forum UNI and NNI
- Dial Access Signaling Interface (DASI)

Features and Benefits

Extensive features make the MAX the leading digital WAN access solution

Digital modems eliminate the expense and hassle of analog modem banks

Ascend Series56 Digital Modems afford high densities in a compact space, and are compatible with a full spectrum of analog modems, including cellular versions. And because digital modems are software upgradeable, users can take advantage of advances in modem technology.

- Supports V.90, K56flex, V.34, V.FC, V.32bis, V.32, V.22, V.22bis, V.21 and below for broad compatibility with user equipment
- MNP 2-4 and MNP10-EC error correction for cellular connections
- V.42bis data compression throughput up to 115.2 Kbps
- Group 3 fax-out support with optional DeskDial™ software

Modular architecture provides versatility and investment protection

Each MAX model is fully customizable with plug-in cards, a software-based configuration and optional feature sets. Most models utilize a compatible and interchangeable set of plug-in modules available from Ascend. Some models utilize industry standard PCMCIA cards available from Ascend and other vendors. In either case, the MAX access switch can be reconfigured as needed to keep pace with changing needs and technologies.

Although the MAX switch employs a modular design, a special Scalability Agent allows multiple MAXes to operate as a single, more powerful "MAX Stack." The logical integration lets users fully exploit existing resources to manage bandwidth in an optimal fashion. MAX Stack is also ideal in situations where a network service provider has assigned a single hunt group to all the T1/E1/PRI lines on the MAX Stack. The agent even supports bandwidth management across multiple lines and MAX access systems.

Bandwidth on demand delivers maximum performance at minimal cost

Ascend is also a recognized leader in bandwidth on demand technology. Ascend Dynamic Bandwidth Allocation™ gives users the bandwidth they need when they need it automatically, while utilizing available system resources effectively and efficiently. And the MAX switch is fully compatible with SOHO routers that integrate voice, fax and data communications on ISDN BRI lines, including the Ascend award-winning Pipeline family of products. The MAX access switch gives carriers, service providers and enterprises the ability to adjust bandwidth dynamically on a call-by-call basis. Best of all, intelligent bandwidth management delivers maximum performance at minimal cost by eliminating the need to over-build the network topology.

- Dynamic per-call bandwidth from 56 Kbps to 4 Mbps
- Bandwidth management via Multilink PPP (MP), Multilink Protocol Plus™ (MP+) and the Bandwidth Allocation Control Protocol (BACP)
- Inverse multiplexing support with Ascend Inverse Multiplexing (AIM) and BONDING
- Bandwidth control automatically, manually or by time-of-day profile

Product Highlight: Network Management

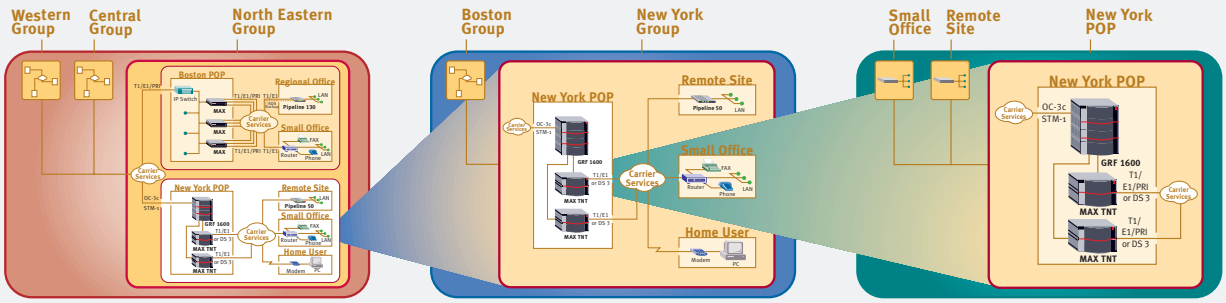
Navis™ advanced management system enhances service delivery

Managed by Navis™

NavisAccess is the first tool designed for managing both service provider and enterprise access networks. Its unique ability to combine multiple devices into logical groups enables real-time monitoring of the entire access network as if it were a single entity. Simple point-and-click functionality lets users drill down from the group level through the individual device level, all the way to viewing a single modem or channel. Extensive reporting tools provide historical data to help verify service level agreements (SLAs) for dial access, Frame Relay CIR and IP network bandwidth utilization.

- Full network discovery and multi-layer topology mapping
- Performance management features to monitor the utilization of network resources both in real-time and as historical trends
- Automatic fault detection with user-defined thresholds to provide immediate notification of and help isolate network problems
- Comprehensive configuration capabilities to permit remote management from a central location, including change control and upgrade validation
- Integrated reporting features to gather detailed information about user activity
- Ascend NavisRadius database with 120 extended attributes and capabilities (optional)
- Multi-vendor support for all MIB II-compliant routing devices
- Integration with NavisConnect—a GUI configuration tool for all True Access Operating System (TAOS) devices

Viewing the Network with NavisAccess



Ascend NavisAccess lets network professionals view the entire network at a glance and implement actions based on group definitions and requirements. The NavisAccess family of applications delivers superior management for dial and dedicated portions of the access network.

NavisConnect

NavisAccess works with NavisConnect to facilitate the monitoring, configuration and control of MAX systems, making them easy to manage—locally or remotely—from a central site.

- Industry standard SNMP MIBs for in-band (LAN/WAN) network management software integration
- Password-protected Telnet remote management and VT-100 terminal local management
- PPP Link Quality Monitor (LQM)
- Frame Relay Annex A and Annex D link monitoring
- ISDN event log and Syslog support

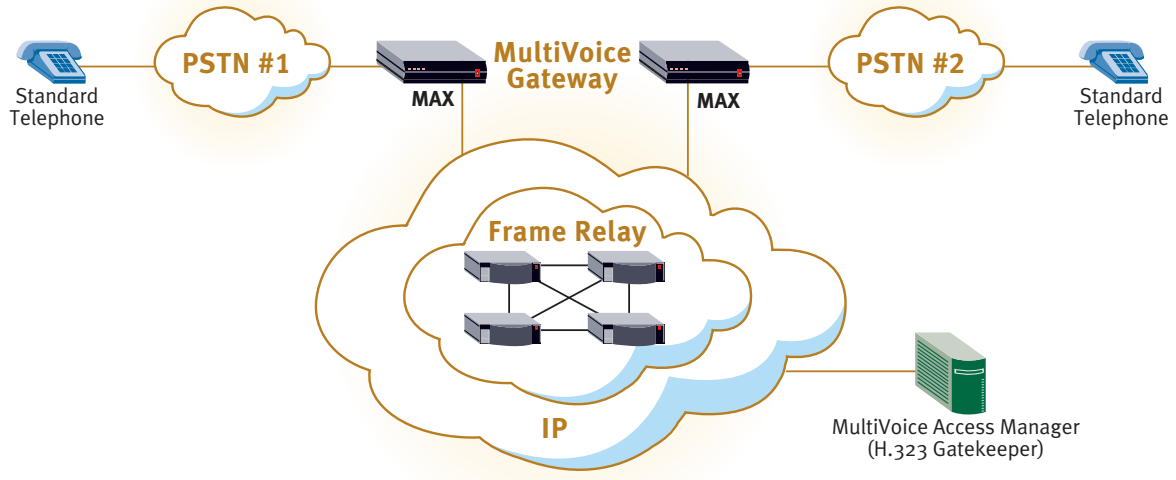
MultiVoice for the MAX

In today's communications networks, real time voice information is transmitted via the public switched telephone network (PSTN). Voice is transmitted on the PSTN using circuit switched technology where each call is provided with dedicated bandwidth, usually 64 Kbps. In most public and private enterprises, computer generated information is transmitted over a separately maintained packet data network. In data networks bandwidth is usually shared between different computing endpoints.

Recently new technology and international standards have been introduced which allow enterprise customers and network service providers to introduce real time communications (voice) to traditional packet networks that utilize the Internet Protocol (IP). For example, Voice-over-IP (VoIP) technology and the ITU-T H.323 standards define a framework for the transmission of real time voice over IP-based packet networks such as the public Internet, private intranets and extranets. The implementations of these standards allow for products from different vendors to interoperate on the same network.

Ascend MultiVoice™ for the MAX solutions allow ordinary telephones to connect to other telephones using a public or private packet network. This is accomplished using a standard Voice-over-IP (VoIP) gateway that allows ordinary telephone calls to be transmitted across a packet network. The MultiVoice for the MAX solutions consist of a set of hardware and software components that allow service providers or enterprise customers to add real-time voice transport services to their existing IP backbone network.

Long-haul VoIP Network



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Ascend Communications, Inc. develops, manufactures and sells wide area networking solutions for telecommunications carriers, Internet service providers, and corporate customers worldwide. For more information about Ascend and its products, please visit the Ascend Web site at http://www.ascend.com, or e-mail info@ascend.com.

Ascend markets the B-STDX, CBX, GRF, GX, IP, MAX, Multiband, MultiDSL, Navis, Pipeline, SA, SecureConnect and STDX families of products. Ascend products are available in more than 40 countries worldwide.

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