Ascend

BACKGROUNDER

The Ascend Signaling System 7 (SS7) Gateway and MAX TNT™

Solving the Internet Congestion Problem Today; Leading the Integration of the PSTN and Data Networks

ASCEND

Introduction

As the evolution from circuit-based services to packet- and cell-based networks continues to gain momentum, service providers are faced with difficult choices about which strategies and directions will shape their networks. Solutions using traditional network technologies – the current public switched telephone network (PSTN) – will work in the short run. To stay ahead of rapid changes in competition and technology, however, service providers require approaches designed to assure they are not left with network technologies that may quickly become obsolete.

Ascend's strategy is to deliver the technology that enables customers to take an evolutionary approach – one that is practical today and provides a way to take advantage of innovations in the next-generation public network. This multiphased approach is designed to provide specific services and functions for each stage of the evolution. As the next-generation public network continues to evolve, each phase will build upon the technology of previous stages.

Internet Call Diversion (ICD) is an important example of this multiphased approach. Ascend delivers ICD capabilities through the Ascend SS7 Gateway (ASG), which is based on technology gained through its recent acquisition of Stratus Computer, combined with the market-leading MAX TNT™ Wide Area Network (WAN) access switches.

Available now and in field trials at leading service providers, the combined ASG and MAX TNT solution offloads Internet traffic from the PSTN directly onto data networks. This gives service providers the immediate ability to handle dial-up Internet calls without costly investments in additional voice circuits. Equally significant, ICD is a building block in the Ascend MultiVoice™ strategy, a comprehensive architecture for delivering voice- and fax-over IP, ATM, and Frame Relay networks. This will enable customers to leverage their investments in the ASG and MAX TNT to deliver an array of enhanced services through the next-generation public network.

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Internet Traffic Leads to Congestion on the PSTN

Booming growth in Internet use and remote access to data services from businesses, home and school has resulted in an unprecedented increase in data traffic and a strain on the PSTN. The PSTN is engineered to be cost-effective for voice calls that average three to five minutes long, not Internet calls that average 20 minutes or more. To make matters worse, users often leave their lines open for hours, completely tying up all circuits and trunks between the user and the Internet Service Provider (ISP). These long hold time Internet calls increase the number of callers not getting a dial tone or receiving a quick busy signal, causing capacity management problems for service providers.

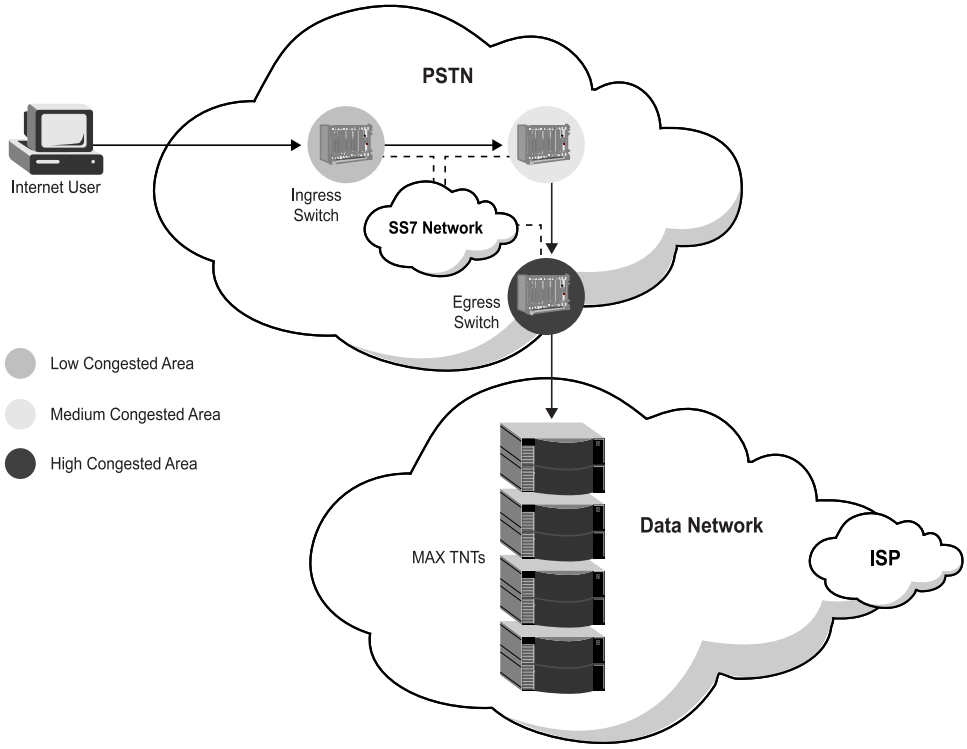


Diagram 1 – Internet Calls Lead to PSTN Congestion

Diagram 1 outlines the congestion problem. When a dial-in modem user places a call to an ISP, the entire path from the ingress central office (CO) switch, to the tandem CO switch, to the egress CO switch, and the connecting InterMachine Trunks (IMTs) is tied up for the entire call. The most severe bottlenecks occur at the egress switch nearest the ISP, where many users dial in and stay connected for lengthy periods. In the absence of another solution, carriers are forced to upgrade costly voice circuits to handle the load without recognizing increased revenue from their additional investments.

To address this growing problem, service providers are looking for ways to integrate dial-up access into the network infrastructure – to offload voice switches, launch new revenue-generating services, reduce operations costs and scale their networks effectively.

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The Ascend Solution

Ascend delivers a solution that meets these needs. It combines the strengths of the Ascend SS7 Gateway (ASG) and the MAX TNT™ WAN access switch. The ASG enables data calls to be taken from the originating central office and the MAX TNT provides the means for Internet calls to immediately be placed on a data network.

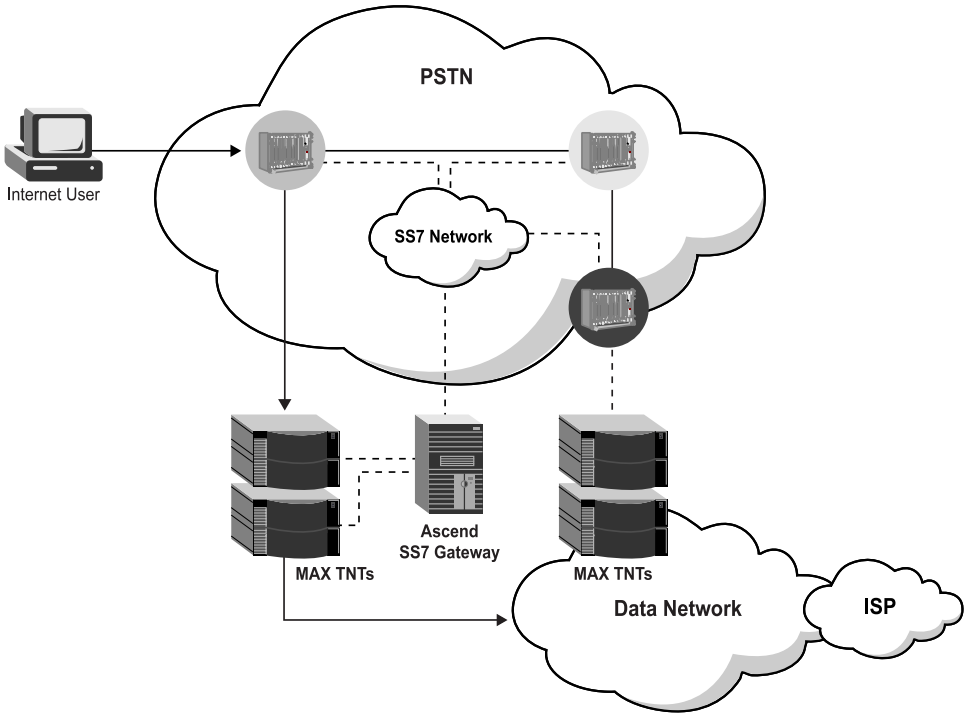


Diagram 2 – Internet Call Diversion with the ASG and MAX TNT

Diagram 2 shows how Ascend's solution works. The ASG connects to the SS7 network via multiple A-links and to the data network via multiple Ethernet connections. The MAX TNT connects directly to the originating class 5 (ingress) switch, bypassing most of the PSTN. The ASG receives SS7 signals for call set-up, circuit establishment and call release from the originating central office; converts these signals to enhanced Q.931 messages; and relays these messages to the appropriate access server (MAX TNT) that will handle the call. The MAX TNT then uses this information to establish a connection with the originating switch, thus freeing up the PSTN.

The Ascend solution builds on proven technology that is already widely deployed in carrier-class networks. The ASG features a trusted SS7 protocol stack and fault-tolerant, central-office compliant hardware platform that service providers worldwide already use to deliver an array of Intelligent Network (IN) services.

In addition to providing a platform for ICD, the MAX TNT delivers innovative access solutions such as MultiVPN™ and MultiVoice™, and Last Mile technologies such as MultiDSL™ and Network Wholesaling. Furthermore, Ascend has been recognized as the market leader for the first half of 1998 in the following markets: total worldwide remote access server (RAS) concentrator revenue and ports shipped (International Data Corp.); RAS concentrator end user revenue, manufacturer revenue and port shipments (Cahner's In-Stat); total remote access concentration, service provider remote access concentration and asynchronous port shipments (The Dell'Oro Group); and access concentrator factory revenue (Dataquest). In addition to these first-half figures, Ascend has recently been recognized as the market leader for all of 1998 in remote access concentrator revenue (Frost & Sullivan).

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Because the ASG and MAX TNT provide the industry's only end-to-end solution for bridging SS7 and data networks, they offer benefits beyond the immediate cost savings and improved service quality that result from Internet Call Diversion. They provide a foundation for service providers to supply value-added services transparently over voice and data networks. The Ascend solution positions customers to build profitability and market share by delivering future advanced services using cost-efficient packet- and cell-based networks.

How Service Providers Benefit from Internet Call Diversion

Ascend's approach to Internet Call Diversion brings new benefits to carriers as well as ISPs:

- **Incumbent Local Exchange Carriers (ILECs)** want to take advantage of new data technologies while protecting the sizeable investments they have already made in the existing PSTN**.** The Ascend solution enables a packet-switched data network to handle Internet calls, using only the originating ingress switch and bypassing most of the PSTN. This eliminates the cost of adding additional voice circuits that would otherwise be required for long hold time Internet calls. This more cost-effective alternative is also an investment in the next-generation network that will support enhanced Voice-over-IP (VoIP) services.
- **Competitive Local Exchange Carriers (CLECs)** are new market entrants driving to achieve competitive differentiation with minimal capital expenditures. They need to develop market penetration and establish credibility with customers as quickly as possible. The ASG allows CLECs to use a switchless network for handling dial-up calls with the same quality and reliability of the PSTN — without investing in voice circuits.
- **Internet Service Providers** also benefit indirectly from this solution. Because carriers can now provide data services that satisfy both ISP and consumer needs, ISPs can choose to leave the access server business to carriers and focus on Web hosting and email.

The Ascend SS7 Gateway

The ASG consists of an Internet Call Diversion application running on a fault-tolerant platform with full SS7 capabilities, and is designed for installation at telecommunications company central offices. Diagram 3 outlines the components of the ASG, which consists primarily of hardware and software developed by Stratus Computer for deployment in carrier networks worldwide. This robust, carrier-class product also features remote and 24 x 7 service designed to keep services running without interruption.

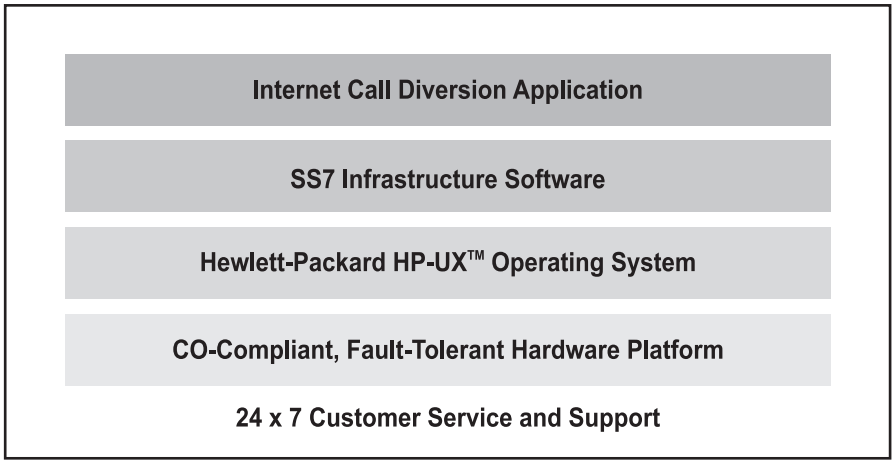


Diagram 3 – Components of the Ascend SS7 Gateway

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The ASG delivers benefits and features that include:

- **Integrated end-to-end solution builds on market-leading technology.** Because the ASG integrates with the carrier-class MAX TNT WAN access switch, service providers benefit from a proven solution that is a long-standing marketshare leader.
- **Standards compliance enables interoperability with remote access equipment**. Support for emerging and established Bellcore generic requirements, and ANSI and ITU standards assures an open interface between the PSTN and data networks. Future compliance with specifications recommended by the Technical Advisory Council (TAC) industry group and the Bellcore Internet Traffic Engineering Solutions Forum (ITESF) will allow ASG to interface with remote access concentrators provided by other vendors.
- **Built-in reliability and serviceability assure uninterrupted service.** All major components of the fault-tolerant hardware platform, including processors, disks and power supplies, are fully duplicated to assure uninterrupted operation even in the event of a component failure. Replacement components can be plugged in without affecting service in any way. Furthermore, the ASG monitors and diagnoses its own operation, automatically alerting the Ascend Technical Assistance Center (ATAC) at the first sign of a potential problem.
- **Versatile SS7 capabilities simplify voice and data network integration.** The ASG employs industry-standard SS7 signaling to set up and tear down calls, a prerequisite for transparently routing calls between voice and data networks. It features a widely deployed protocol stack that supports multiple variations of SS7 used in carrier networks internationally.
- **Carrier-class solution enables smooth deployment.** The ASG platform meets Network Equipment Building System (NEBS), European Telecommunications Standards Institute (ETSI) and other standard specifications for computer equipment in central office and switching environments worldwide. It is an open hardware and software system using industry standard PCI I/O and the HP-UX™ operating system. This open system, multipurpose architecture supports deployment of additional applications and services on the same platform.
- **Complements the Ascend MultiVoice architecture.** Future applications of the ASG will enable it to use standards-based SS7 carrier signaling to direct voice traffic to a MultiVoice network. As a result, customers will be able to leverage their investment in the ASG to provide voice across data networks transparently.

A 50,000 port configuration includes a Model 418 fault-tolerant ASG platform with 512MB memory, SS7 links and an Internet Call Diversion software license. Cost for this configuration works out to an economical $24/port (U.S.). A 100,000 port configuration includes a Model 428 fault-tolerant ASG platform with 1GB memory, SS7 links and an Internet Call Diversion software license; the cost is equivalent to $18/port (U.S.). These configurations are based upon industry-wide averages for data call traffic patterns; they may not be the same for every service provider. Installed configurations will be based on traffic studies in individual service provider networks.

Adding PCI-based I/O controllers can provide additional connectivity. Customers outside the U.S. should contact their local Ascend representative or reseller for pricing and availability information.

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About Ascend Communications

Ascend Communications, Inc. (NASDAQ: ASND) develops, manufactures, sells and services wide area networking (WAN) solutions for telecommunications carriers, Internet service providers and enterprise customers worldwide. On October 20, 1998, Ascend completed its acquisition of Stratus Computer and established the Carrier Signaling and Management Business Unit.

For more information about Ascend and its products, please visit the Ascend Web site at www.ascend.com, or send email to info@ascend.com. For Investor Relations, please call our communications hotline at 800-648-3059 or 760-704-4423 (outside the U.S. & Canada). Additional investor information can also be accessed on our Web site at: http://www.ascend.com/662.html. Ascend is headquartered at One Ascend Plaza, 1701 Harbor Bay Parkway, Alameda, Calif. 94502; phone is 800/ASCEND4 and fax is 510-814-2300.

The foregoing statements may contain forward-looking statements that are based on current expectations and involve risks and uncertainties. Actual results could differ materially from these expectations as a result of factors including, but not limited to, the Company's success in developing, introducing or shipping new products, competition, the mix of distribution channels employed, the Company's dependence on single or limited source suppliers for certain components used in its products, risks inherent in international sales, seasonality and general economic conditions. These and other factors are discussed in Ascend's 10-K, 10-Q and other filings made periodically with the Securities and Exchange Commission



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