Ascend

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MultiDSL

IDSL

ISDN Digital Subscriber Line

TECHNICAL OVERVIEW

ASCEND

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INTRODUCTION

Ascend Communications develops, manufactures, markets and supports a line of digital Wide Area Network (WAN) access products. These products support a wide spectrum of end-user applications using leased lines, packet networks, public switched digital and public switched analog services offered by telecommunications carriers.

More than 800+ million telephone lines exist worldwide between the carrier Central Office (CO) and the customers premises. Many of these are provided via Digital Loop Carrier (DLC) systems to limit loop investment.

While analog and ISDN services are available today using these telephone lines, various market forces drive the need for alternate technologies to deliver high speed. These market forces include:

1. Internet and remote access connectivity that demands higher bandwidth
2. Competitive pressures from various carriers and service providers due to deregulation of the telecommunications industry
3. Voice network (Public Switched Telephone Network, or PSTN) congestion caused by data calls lasting for more than the anticipated duration

The alternate technologies that require fiber optic cable between the CO and the residences/businesses are too expensive and time consuming to build the cabling infrastructure. Digital Subscriber Line (DSL) technologies offer a promising faster solution while leveraging the existing "local loop," a twisted pair of copper wire between the CO and residences. With Ascend's MultiDSL announcement, comprehensive DSL services are made possible using the MAX™ 4002, 4004 and MAX TNT™ carrier-class WAN access switches. ISDN Digital Subscriber Line (IDSL) is a technical innovation from Ascend and part of Ascend's MultiDSL solution. It opens the door for carriers and service providers to enter the DSL market immediately while seamlessly upgrading the same platform to add additional DSL services as required.

IDSL presents an attractive alternative to subscribers since it gives them a 128 Kbps connection available 24-hours a day, 7-days a week, at an affordable rate. Above all, if those subscribers already own Customer Premises Equipment (CPE) such as ISDN BRI terminal adapters, bridges or routers, they can continue to use their equipment on the IDSL connection without an upgrade or add-on.

MARKET DRIVERS

Internet, intranet and commercial services are the key applications that are driving the need for high-speed access. Bandwidth-intensive applications such as those utilizing the World-Wide Web (WWW) are becoming increasingly popular. As a result, users are searching for faster and less expensive methods for accessing the network and their applications.

Carriers (RBOCs, Independents, IXCs, CAPs)

For the carrier, there are several key drivers. Carriers are looking for ways to reduce network costs, generate revenue and develop new service opportunities. To do so with minimal investment means reusing the existing infrastructure without modifications. This requires working through the existing loop to the customer premise, as well as operating through Subscriber Line Concentrator (SLC) and DLC technology. New platforms and services must integrate with existing methods and procedures to keep costs low. Carriers require a solution that alleviates current pressures on the narrow-band central office network while increasing speed and throughput.

Part of the problem is that the narrow band network was not designed to keep up with the demands for data connectivity. Studies and documents filed with the FCC reveal that enhanced service providers are affecting the overall design of the PSTN. Studies also show that ISPs average 26 CCS (One Centum Call Second = 100 seconds) on 1MB access and 28 CC5 or more on PRI access. With the average business customer sized

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at 7-8 CCS, these heightened usage levels require a significant investment in the network for minimal return. These loads increase the amount of Inter-Office Facilities required and reduce the number of subscribers that can be supported per line unit and switch module. The break-even point on the initial equipment investment is about eight years. In addition, trouble reports and other indirect costs have gone up dramatically in these offices, further eroding the economics.

As a result, carriers need to migrate the traffic to a packet network that offers multiplexing and reduces the resources required to handle the data traffic. IDSL is one of several tools available from Ascend that redirects data traffic to a packet-based network and provides the services that open up new revenue opportunities.

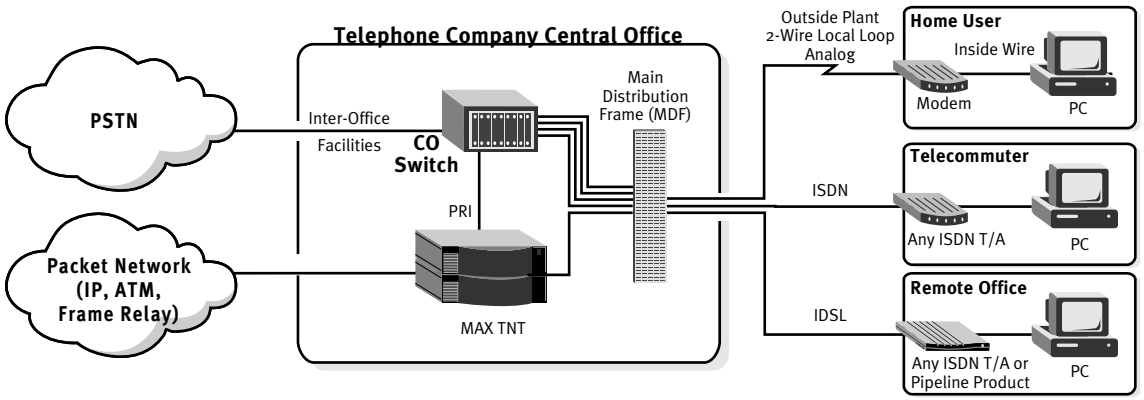
End Customers

Customers require faster access to utilize all the information and services available on-line today. Access solutions must be compatible with a wide array of CPE. Moreover, the CPE must be attractively priced and compatible with services from a variety of access providers. On the carrier side, services and CPE must be easy to order and configure.

ASCEND IDSL

Ascend Communications has developed ISDN Digital Subscriber Line (IDSL), part of the MultiDSL offering, for its MAX family of access switches (MAX 4002, MAX 4004 and MAX TNT). It provides dedicated high-speed access at 128 Kbps over a pair of 24 gauge wire for up to 18,000 feet. IDSL is the first of several DSL technologies from Ascend that utilize existing telephone wires (twisted pair) between the CO and the customer premises for high-speed data access. IDSL permits carriers and service providers to immediately enter the fast growing DSL market using the multiprotocol, multi-service MAX TNT WAN access switch, with an easy upgrade path to offer other DSL services.

Integrated IDSL Access



IDSL leverages the existing ISDN capabilities of the service provider both in provisioning and testing of the services, while avoiding the cost of going through the CO. IDSL can co-exist with current analog and ISDN services on the MAX 4002, 4004 and MAX TNT platforms.

Central Office Equipment (COE)

IDSL is a line card that fits into the existing MAX 4002, 4004 and MAX TNT product line. It terminates a dry U loop that is ISDN qualified and provides all of the access security, firewall, routing and VPN services available on the MAX today.

IDSL lines provide dedicated access to a packet switched network. Customers subscribing to IDSL services can simultaneously connect to the Internet access and corporate headquarters. Ascend's solution ensures

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that end users can continue to use their existing ISDN terminal adapters, Pipeline® products and application software while connecting to IDSL circuits from the carriers.

Customer Premise Equipment (CPE)

IDSL utilizes the same 2B1Q standard line coding scheme that is used with ISDN BRI. As a result, any ISDN terminal adapter, bridge and router may be used as the CPE (including Ascend's Netwarp™ terminal adapters and award-winning Pipeline family of routers and bridges).

Protocols

IDSL supports the most commonly used protocols such as Point-to-Point, Multilink PPP and Multilink Protocol Plus™. These IDSL circuits can be switched using a nailed up circuit or AT&T Point-to-Point, which eliminates the SPID requirement and allows use of pseudo dialing number for a TA. In either case, all the benefits of the PPP protocol such as authentication and accounting are available to carriers, and the setup requires little if any change to the existing infrastructure.

IDSL BENEFITS

IDSL is the first service that works on the existing loop and through a DLC. It delivers a digital service that is at least four times the speed of existing analog technology for a similar cost. Since it is a dedicated service, IDSL is easy to configure and provides the following benefits:

- Supports 2B1Q line coding, which is same as regular ISDN BRI circuits
- Provides transport protocols: PPP, MP, MP+ or Frame Relay
- Functions with existing (third party) ISDN BRI terminal adapters, routers and bridges such as Pipeline products, and application software
- Offers extensive loopback tests such as Line Loopback, Corrupt CRC test, Request Corrupt CRC test that verify the quality of the local loop between COE and CPE
- Monitors line conditions including line errors, block errors such as Near End Block Errors (NEBE) and Far End Block Errors (FEBE)
- Supports management of products through SNMP-based management systems, AView and also via the console port with a VT-100 terminal
- Supports multiple lines with MP+ for speeds greater than 128 Kbps
- Supports eight-port IDSL line cards for the MAX 4002 and 4004; up to 40 IDSL ports per MAX 4002 and 4004
- Supports 12-port IDSL line cards for the MAX TNT; up to 168 IDSL ports per MAX TNT shelf

SUMMARY

Ascend's IDSL allows carriers to be the first to market with a dedicated digital subscriber loop product that meets the key market drivers and requirements:

- Moves data traffic to a packet-oriented network, significantly improving the economics of serving Enhanced Service Providers (ESPs) by providing huge capital savings on line unit, switch module and interoffice facility upgrades
- Allows carriers to deploy IDSL technology as easily as they deploy ISDN
- Works with existing ISDN CPE
- Provides a product that can easily be ordered and deployed
- Competes cost-effectively with analog service

All of these features are available on a platform that allows the carrier to add other members of Ascend's MultiDSL technology family to the common MAX TNT service platform as they mature and the market develops.

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