Application Note

Multimegabit Internet Access Multilink Point-to-Point Protocol



The Internet has experienced tremendous growth over the last twelve months. More and more businesses are making better use of the Internet as a marketing tool for promoting their services and products to a global audience. As a result of the increased fascination with the Internet and the many uses it affords businesses, continued explosion in Internet Access and Intranets will create an increasing demand for greater access bandwidth.

Multilink Point-to-Point Protocol (MLPPP) gives Internet service providers and service providers the ability to provision cost-effective multimegabit Internet access services.

Technology Overview

To keep up with this growth, Internet service providers (ISPs) and service providers must implement technologies that will keep them ahead of the bandwidth demand curve. Today, dedicated private line, Frame Relay, and ISDN WAN services make up the list of popular Internet access services for business users.

One technology that can address the demand for increased bandwidth is Multilink Point-to-Point Protocol (MLPPP). MLPPP, known in the IETF community as RFC 1717, was originally designed to facilitate on-demand aggregation of multiple bearer channels in ISDN and async dial-up links. MLPPP can be deployed where multiple PPP links connect two systems. Cascade has extended MLPPP functionality to its B-STDX family of switches to allow service providers to offer cost-effective high speed Internet access.

Cascade MLPPP combines multiple PPP links from routers and other access equipment into one logical data pipe by introducing the concept of a bundle. A bundle is simply a group of one or more individual PPP links, logically grouped together for the purpose of bandwidth aggregation. The actual implementation of the bundle as a group of separate PPP links is hidden within MLPPP. Each PPP link comprising an MLPPP bundle is said to be a member of that bundle. To higher layers, the bundle appears as a single, larger-bandwidth, logical link. Both user data and control data can pass through the MLPPP virtual link, just as it would pass through a single PPP link.

MLPPP is a mature and proven technology, used initially for aggregating bandwidth of slower speed access links, primarily ISDN and 56/64 Kbps DS0 circuits. Due to increased bandwidth demands, particularly with central site routers, MLPPP is being extended to support multiples of T1/E1 WAN circuits.

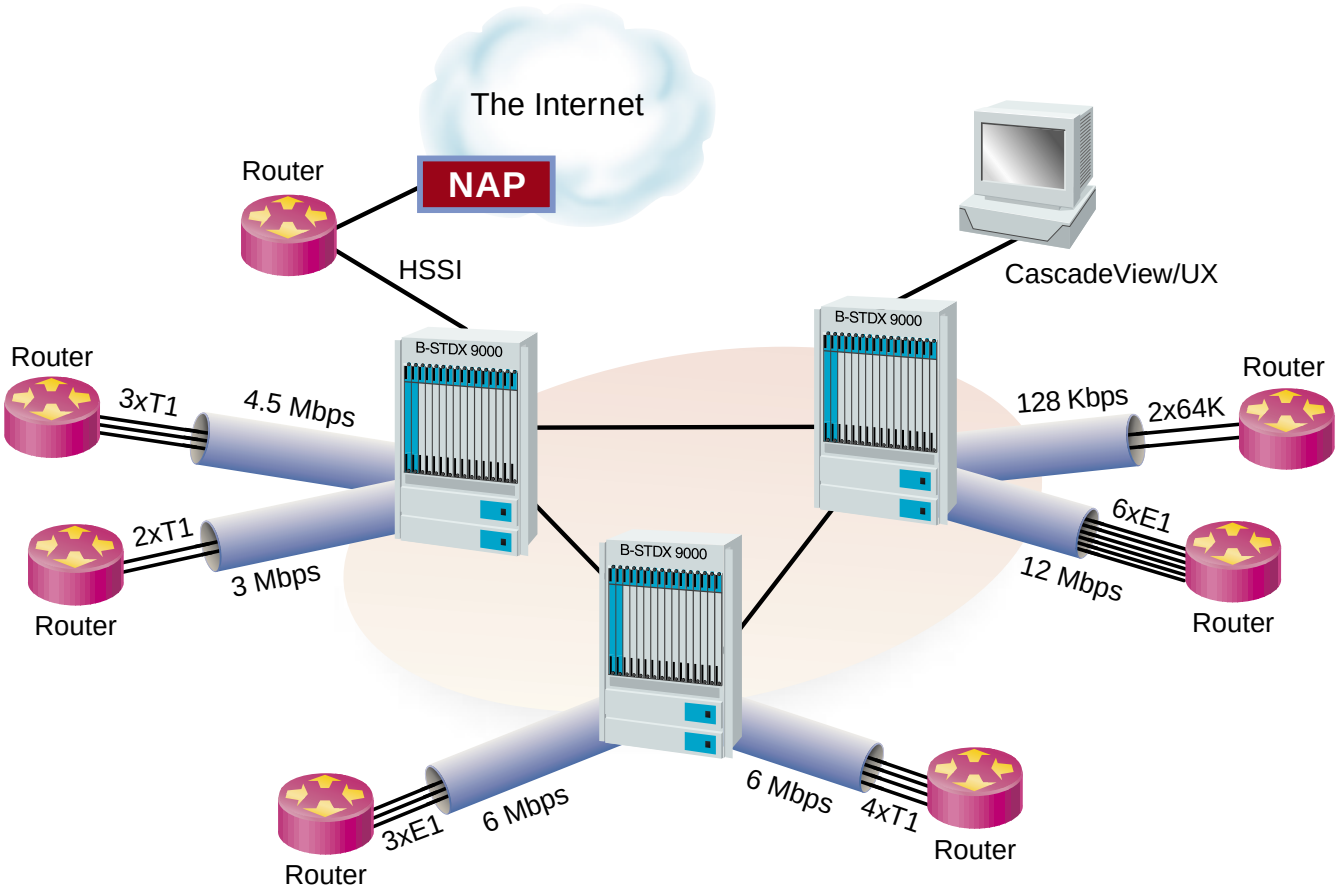
MLPPP's ability to combine separate T1/E1 links into one "big" logical pipe creates new opportunities for ISPs and service providers to introduce new high speed Internet services. Multimegabit service in speeds of 3 Mbps, 4 Mbps, 6 Mbps, and more can be created by combining NxT1/E1 circuits. New cost-effective access services can be introduced, providing interim rates for customers and promoting a smoother migration to full DS3 frame access services.

Application Overview – Provisioning Multimegabit Internet Access Services

MLPPP allows multiple T1/E1 circuits to be bundled together as one logical pipe, supporting multimegabit access connections between a customers central site router and the ISP's or service provider's POP. (See Figure 1.)

A single MLPPP logical link can contain multiple T1/E1 connections. In the application shown in Figure 1, the subscriber routers are configured with multiple PPP WAN ports bundled together, using Multilink PPP. The Cascade B-STDX 9000 switch terminates the MLPPP links and converts PPP to Frame Relay using RFC 1490 for delivery into the Frame Relay network.

Figure 1: Multimegabit Internet Access using MLPPP



The Cascade Solution

To allow service providers to respond to the demand for cost-effective, high speed access services between T1/E1 and T3/E3, Cascade has extended MLPPP functionality to its B-STDX family of switches. With a simple software upgrade, ISPs and service providers can provision multimegabit NxT1/E1 Access Services on Cascade switches today.

Support for MLPPP is available on the following I/O Processor Cards:

- 4 Port Channelized T1/E1
- 4 Port Unchannelized T1/E1
- 4 Port ISDN PRI T1/E1
- 10 Port T1 DSX
- 4 Port Unchannelized E1
- 8 Port V.35

Features and Benefits of the Cascade MLPPP Implementation

Feature	Benefit
Aggregates individual T1/E1 links into one logical pipe.	Allows service providers to satisfy demand for cost-effective, multimegabit Internet Access. Increases demand for T1/E1 links and provides migration path to T3/E3.
Simple software implementation.	Quick deployment, allowing immediate service provisioning and revenue. Lowers costs by reducing hardware to purchase, manage and maintain.
MLPPP bundle can consist of different types of links of various speeds.	Gives ISPs and service providers the flexibility to provision various bandwidth increments to meet their customer requirements. (E.g., Nx56/64 Kbps and NxT1/E1.)
Fault tolerant links allow individual member links to be taken out of service during failures or excessive bit errors, automatically redistributing production traffic traversing on the link to other member links.	Allows service providers to build redundancy into the network at a low cost. Allows ISPs to provide service guarantees, differentiating their service from competitors.
MLPPP allows additional WAN bandwidth to be added without disrupting the existing WAN infrastructure.	Allows service providers to react quickly to customers' growing bandwidth needs. Service providers can provision new circuits without disrupting other customers.
MLPPP is a standards-based solution.	Most CPE equipment currently supports MLPPP, providing a large, easily addressable market for new customers.

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MLPPP – Available Today!

MLPPP is a technology that can allow service providers to deliver high bandwidth to customers quickly at a reasonable cost. MLPPP is supported today by a broad range of Customer Premises Equipment (CPE) equipment. Cascade is expanding MLPPP support to its industry-leading Frame Relay switch – the B-STDX 9000 - to allow service providers to quickly and easily deliver new services in response to subscriber demand. Service providers and ISPs are beginning to realize the potential of MLPPP as way to bridge the gap between T1/E1 and T3/E3 services. MLPPP has gone beyond just another ISDN enhancement. It's ready to provide real solutions by offering high speed Internet access, *today*!

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