



AT&T Managed IP Network Service (MIPNS) MPLS Private Network Transport Technical Configuration Guide Version 1.0

Introduction.....	2
Overview.....	2
1. Technology Background.....	2
2. MPLS PNT Offer Models.....	3
Customer Benefits.....	4
Technical Configuration Guidelines.....	4
1. Service Interfaces and Protocols.....	4
2. Customer Edge (CE) Router Configuration Guidelines.....	4
3. IP Transport Option:.....	5
A. Using Static Routing:.....	5
B. Using BGP:.....	5
4. Label Transport Option:.....	5
Static Routing (only):.....	6

Introduction

AT&T Managed IP Network Service (MIPNS) provides high speed circuits into the AT&T IP Backbone coupled with an enhanced customer care model that allows the customer's circuits to be viewed as one virtual network by AT&T. MIPNS is designed to aggregate customer traffic in a given region, and then use the AT&T IP Backbone for inter-regional traffic using an array of access methods. MPLS Private Network Transport ("MPLS PNT" or the "Service") is an optional component for MIPNS customers who require network-based virtual private network capabilities to transport their traffic between regions, or to transport packets with private addresses in a shared environment. It is implemented based on IETF RFC2547, a VPN technology that is designed to provide a logical separation of customer networks and from other traffic on the Internet, thereby denying access to traffic from anyone other than from the authorized sources. This Service does not include the encryption function. Customers wishing to encrypt their traffic in conjunction with this Service are solely responsible, at their sole expense, for providing or procuring and for operating such encryption function.

This document is intended to provide customers a technical configuration guide for interfacing with AT&T's network once they've purchased the Service. This Guide has two major sections: the Service Overview provides information on technologies and service models, and The Customer Benefits and Technical Configuration Guidelines provide details regarding customer interface requirements and sample router configurations.

Overview

1. Technology Background

Multiprotocol Label Switching (MPLS) combines the benefits of Layer 2 switching with Layer 3 routing. It is a convergence of various IP switching implementations that use ATM and Frame Relay-like label swapping functionality to enable features such as VPN, Traffic Engineering, and QoS. On a high level, the label is a packet header with 32 bits. As the DLCI identifies PVC in the Frame Relay network, the MPLS label identifies a Forward Equivalence Class (FEC), which indicates who one can talk to, what class the packets belong to, etc.

When used with other enabling technologies, MPLS provides the capability of building an IP network infrastructure that delivers virtual private network services over a shared infrastructure.

AT&T's MPLS PNT service operates as follows: The AT&T IP Backbone network is MPLS enabled. The Provider Edge (PE) router (or access router) will terminate Customer Edge (CE) router's MPLS PNT ports and assign a VPN label to it. It will then add on another label for packet forwarding purposes. Once the packet gets into the backbone core, the Provider (P) router (or backbone router) will have no knowledge of this VPN label, where it terminates, or its IP addresses. The P router will just blindly forward the labeled packets, following the normal network routing mechanism. Once the packet reaches the destination PE router, the P router will then strip off the forwarding label. Based on the VPN label, the destination PE router will determine which port is to receive the packets. The PE router will then take off the VPN label, and send the packets to the port and in turn to the destination CE router.

2. MPLS PNT Offer Models

AT&T currently offers two models of MPLS PNT:

A. MPLS IP Transport:

This model is targeted to customers who wish to transport their private data or data with private addresses between regions across the IP backbone. In this model, Customer Edge (CE) routers connect to AT&T Provider Edge (PE) routers via an MPLS PNT port. MPLS and other enabling technologies are used within the AT&T IP Backbone to join customer sites into a VPN configuration. Attributes of the service include:

- **Any-to-any connectivity within a customer's VPN** – Authorized customer locations are provided with VPN connectivity to *all* other authorized customer sites within the same VPN without the need for dedicated point-to-point connections or the need to tandem route through a hub location. The Service is designed to prevent traffic from unauthorized sources from accessing customer's VPN.
- **Support for any customer IP addressing** - Because a specific customer's routing information is only known within the context of the customer's VPN, customers are allowed to use any IP addressing they wish, as long as uniqueness is maintained within the customer's VPN so that after reaching a VPN site, packets are able to get to the destination device (i.e. a server).
- **Ease of use** – Connecting to the MPLS IP transport offer is very simple. The IP Transport offers both static routing and BGP4 as the routing protocols between the PE and CE routers. Customers need not run MPLS on their equipment to use the IP Transport model.

B. MPLS Label Transport:

This model is targeted to customers who want to incorporate AT&T's network/service features into their own offers or to run MPLS within their regional networks. In this model, Customer Edge (CE) routers connect to AT&T Provider Edge (PE) routers via an MPLS PNT port. CE routers and PE routers are configured for IP static routing and the Label Distribution Protocol (LDP) to allow the exchange of MPLS labels between AT&T and the customer. By exchanging labels between AT&T and the customer, AT&T is able to provide the VPN connectivity required without having to know the network information associated with the customer's end customers. Also, because the label is exchanged, this model enables the customer to offer MPLS VPN to its down stream customers. Attributes of the service include:

- **Any-to-any connectivity within a customer's VPN** - Authorized customer locations are provided with VPN connectivity to *all* other authorized customer sites within the same VPN without the need for dedicated point-to-point connections or the need to tandem route through a hub location. The Service is designed to prevent traffic from unauthorized sources from accessing customer's VPN.
- **Support for any customer IP addressing** - Because a specific customer's routing information is only known within the context of the customer's VPN, customers are allowed to use any IP addressing they wish, as long as uniqueness is maintained within the customer's VPN so that after reaching the VPN site, packets are able to get to the destination device (i.e. a server).
- **End Customer Transparency** – Because labels are exchanged between CE routers and PE routers, AT&T does not need to know the carrier's end-customer network information in order to provide VPN services.
- **Ease of use** –The Label Transport Model requires static routing and LDP between the CE and PE routers. While customers may have their own MPLS infrastructure outside the AT&T PNT offer, customers are not required to run MPLS beyond the CE into their

environment to use the Label Transport model. AT&T only requires that LDP be present on the CE-PE interface.

- **Capability to run MPLS in the regional network and to offer MPLS VPN –** This model enables service provider customers to run MPLS, and to offer MPLS VPN services to their downstream customers.

Customer Benefits

AT&T MPLS Private Network Transport offers customer virtual private network transport with simplicity, flexibility, and scalability. Unlike IPsec-based VPNs built over a public infrastructure, tunnel provisioning and maintenance are not required. Similarly, no FR/ATM PVC management is required.

Technical Configuration Guidelines

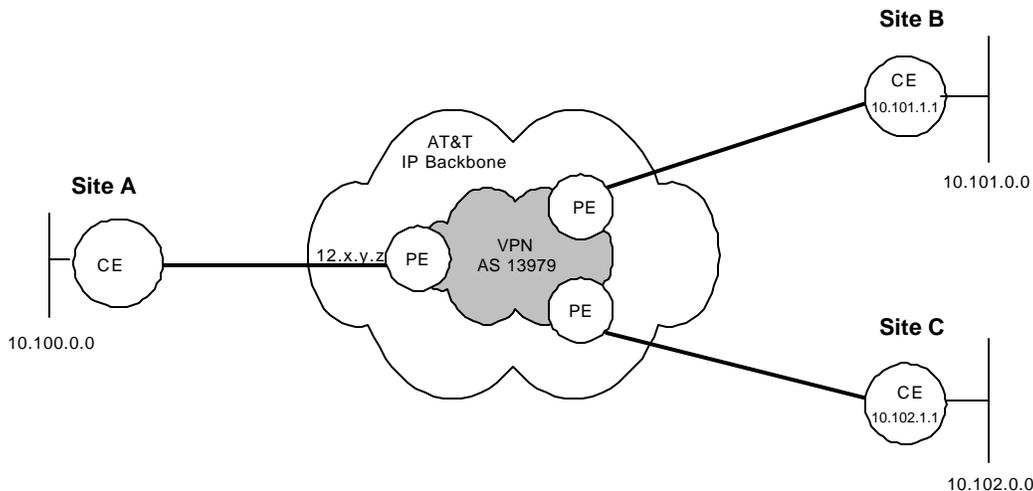
1. Service Interfaces and Protocols

Physical Interfaces are available at OC-3, OC-12, and OC-48 speeds with Packet Over SONET (POS) encoding. Customer can choose either static routing or external BGP4 to provide routing information to AT&T. For MPLS Label transport, the CE router is required to support static routing and LDP.

The service will function with any customer router platform supporting the above protocols and interface types. Customers should work with their router vendors to identify appropriate hardware and software releases based on the above service requirements.

2. Customer Edge (CE) Router Configuration Guidelines

This section provides a set of simple configuration examples intended to illustrate the type of customer CE configuration required to interface with the service. The configuration examples use Cisco Systems¹ syntax; but, customer's may choose other vendor equipment provided that it meets the service interface requirements listed in the "Service Interfaces and Protocols" Section above. Please refer to the following diagram when reviewing the sample configurations.



¹ Cisco, Cisco Systems, the Cisco Systems logo, Cisco IOS, and Networking Academy are registered trademarks or trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries."

3. IP Transport Option:

The IP Transport option provides IP VPN connectivity between customer sites. Mesh connectivity between sites is achieved, while maintaining customer routing information as separate and independent from global registered address space. Configuration of the AT&T/customer interface is simple, using static or dynamic (BGP) routing.

A. Using Static Routing:

This example illustrates how to configure static routing information on the customer CE to interface to the AT&T PNT IP Transport Model.

12.x.y.z is the IP address for the AT&T PE interface connecting to the CE in Site A.

Site A CE partial configuration:

```
ip route 10.101.0.0 255.255.0.0 12.x.y.z          !Static route to Remote
                                                    ! Site B through AT&T
ip route 10.102.0.0 255.255.0.0 12.x.y.z          ! Static route to Remote
                                                    ! Site C through AT&T
```

B. Using BGP:

This example illustrates how to configure BGP routing on the CE to interface to the AT&T PNT IP Transport Model.

! Turn on E-BPG and advertise your site information.

```
router bgp xxxx                                ! Use your ASN
neighbor 12.x.y.z remote-as 13979              ! ATT PE Address & ASN
network 10.100.0.0 mask 255.255.0.0           ! Advertise summary address for site.
```

```
IP ROUTE 10.100.0.0 255.255.0.0 NULL 0        ! REQUIRED IF SITE SUMMARY
                                                    ADDRESS
                                                    ! is not explicitly in routing table.
```

4. Label Transport Option:

The Label Transport option provides several additional functional capabilities for customer networks. This option extends the MPLS Label Switched Path to the customer site. This allows the flexibility to provision the service for use with multiple customer VPNs within the customer network, and/or to provide VPN services to their own customers. It also allows the customer to take advantage of MPLS within their own network. And finally, it keeps all of the customers routing information within their own networking equipment. The Label Transport option requires Static Routing and Label Distribution Protocol on the customer/AT&T interface.

Static Routing (only):

This example illustrates how to configure static routing and LDP on the CE to interface to the AT&T PNT Label Model.

```
! Turn on LDP for the CE/PE interface
mpls label-distribution ldp
interface pos0/0/0
mpls ip
!
! Insert static routing information for each remote CE. *
! Use LB Addresses
! * Additional advertisements may be necessary for other customer routers.

! 12.x.y.z is AT&T PE router interface.

ip route 10.101.1.1 255.255.255.255 12.x.y.z      ! Static route to Remote
                                                    ! CE B through AT&T
ip route 10.102.1.1 255.255.255.255 12.x.y.z      ! Static route to Remote
                                                    ! CE C through AT&T
```

The examples provided above are simple so as to illustrate the type of configuration CE required.