MPLS Benefits & Experience

- *Presented by*

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WHY MPLS ?

IP Network Issues

- *Per Hop Routing (Latency, High CPU)*
- *Traffic Engineering*
- *Layer 2 Connectivity not possible*
- *Costly VPN Solution (High Operating Cost at Customer End)*
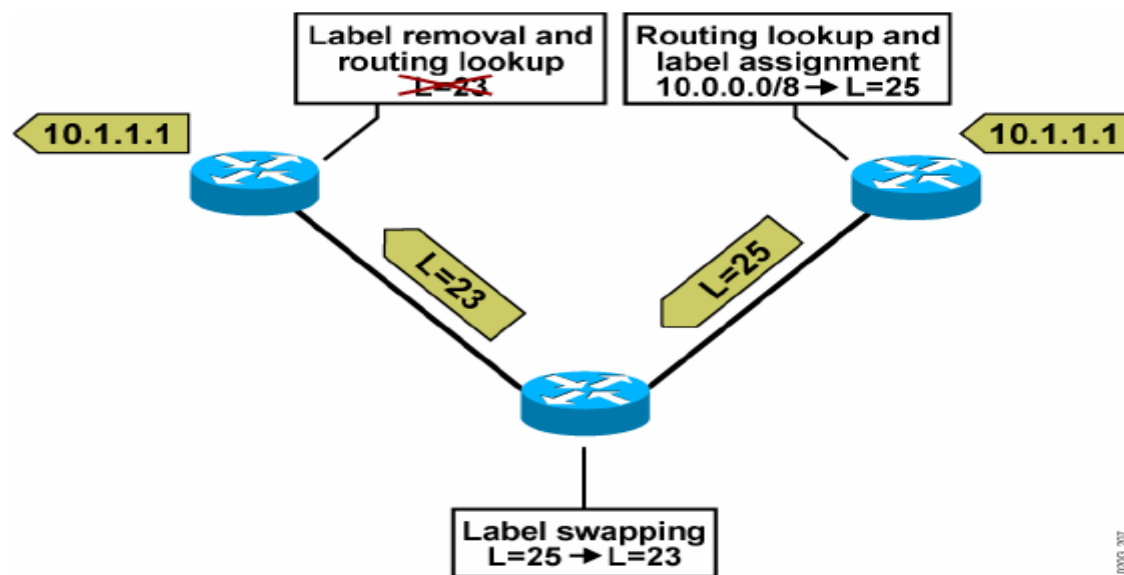
MPLS Benefits

- *Packet Switching*
- *IP Mobility*
- *Secured Low cost L3 & L2 VPN Connectivity (Low Operating Cost at Customer End)*
- *Traffic Engineering (Load Balancing and Load Sharing)*

IP Routing /Forwarding Limitations
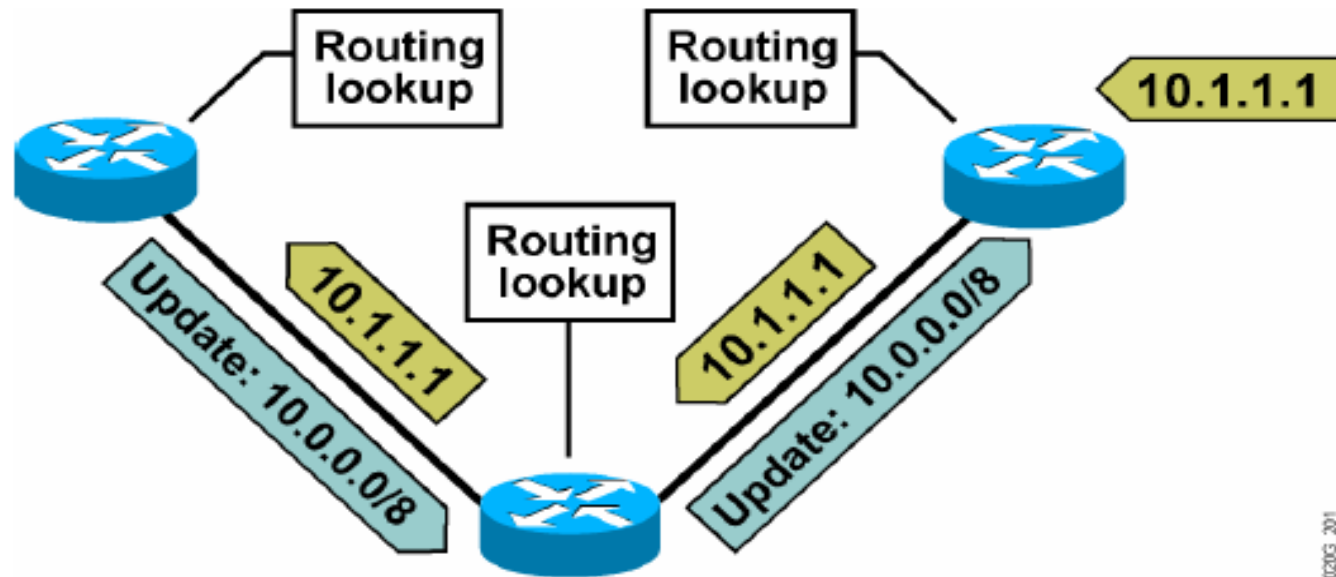
Destination-based routing lookup is needed on every hop.
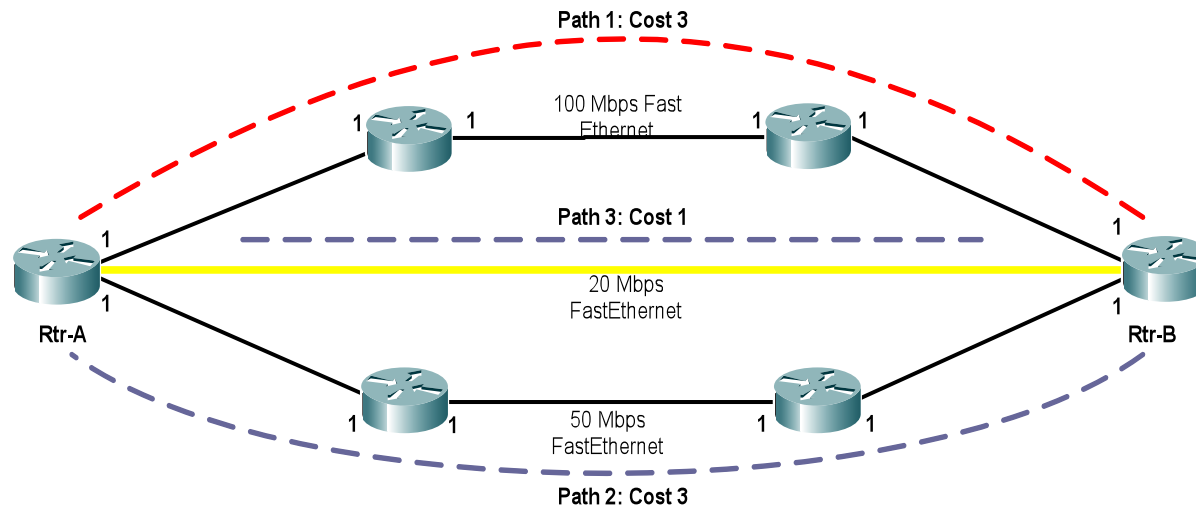
# Forward packets based on Label

Benefits of MPLS:

➢Core routers forward packets based on MPLS label lookups.
➢ Core router can be any device capable of doing label forwarding, so we might as well use a switch, if needed.

Traffic Engineering

Path 1: Cost 3

100 Mbps Fast Ethernet

Path 3: Cost 1

20 Mbps FastEthernet

Rtr-A

Rtr-B

50 Mbps FastEthernet

Path 2: Cost 3

➢Based on Routing Protocol forwarding, all traffic between Router A and Router B takes the 20 Mb link (for OSPF cost), even if this link is congested. The alternate 50Mb and 100Mb links may be unutilized

➢Destination-based routing does not provide any mechanism for unequal cost balancing (except for variance in EIGRP).

➢Policy-based routing can be used to forward packets based on other parameters, but this is not a scalable solution.
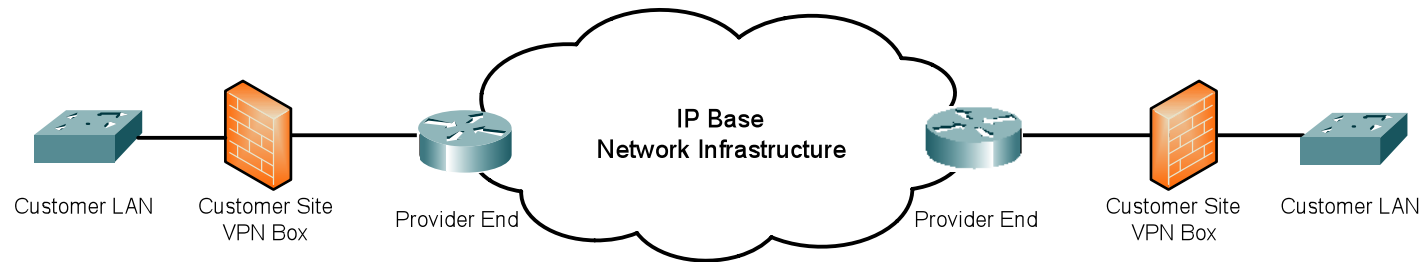
Traffic Engineering
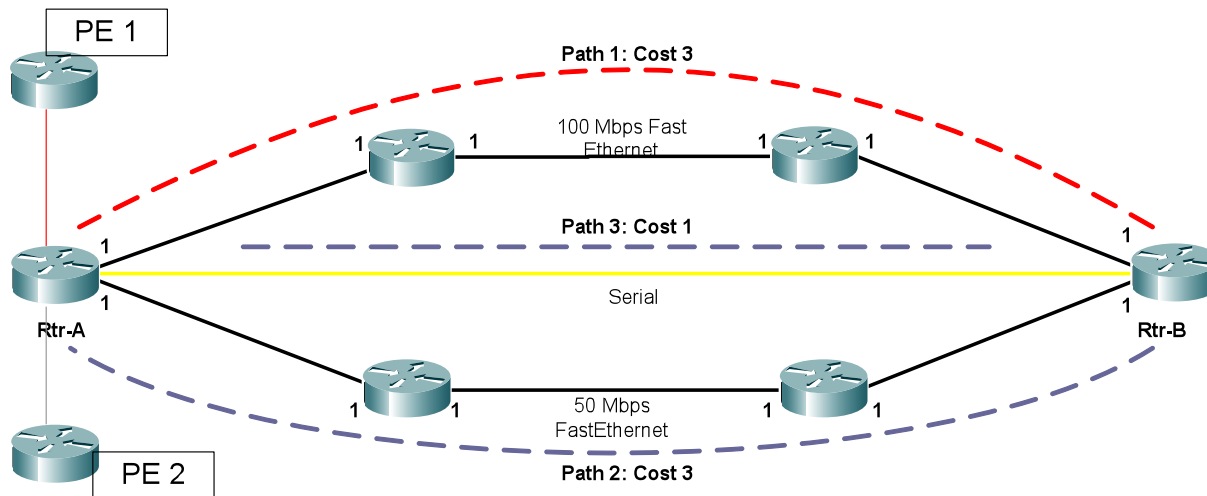
Benefits of MPLS:

➤ MPLS Traffic Engineering we can use all 3 paths

➤ Traffic can be sent by percentage basis from Router A to Router B.

➤ Even each PE can take different paths.

VPN

Customer LAN — Customer Site VPN Box — Provider End — IP Base Network Infrastructure — Provider End — Customer Site VPN Box — Customer LAN
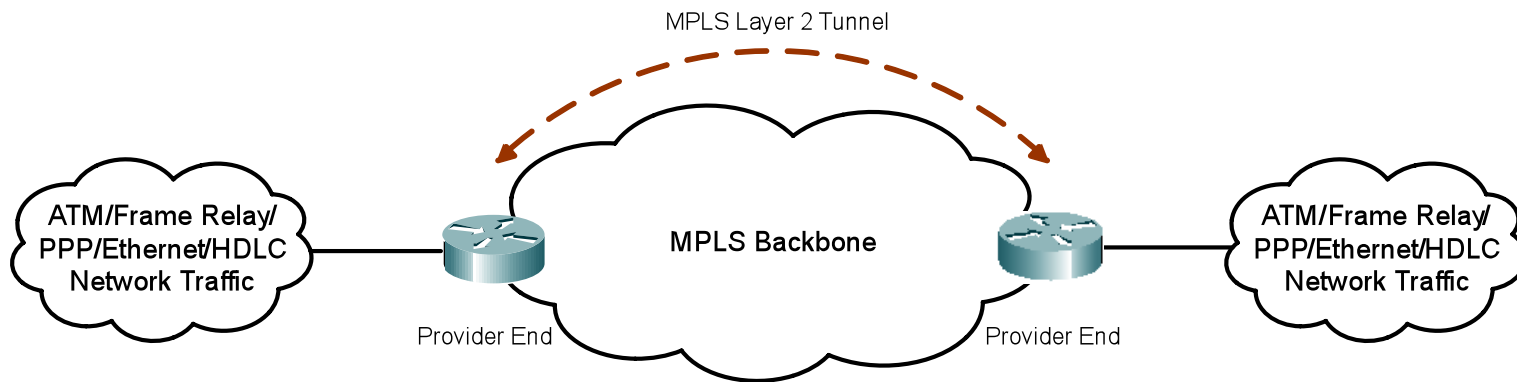
➢ Traditional IP VPN Connectivity requires Customer site VPN box to establish a site to site and/or a site to multisite VPN over the IP network of service provider

➢ Additional equipment cost for all Customer site equipments

➢ Administration overhead for all Customers equipments

MPLS VPN

MPLS Backbone

Customer LAN   Provider Edge Router   Provider Edge Router   Customer LAN
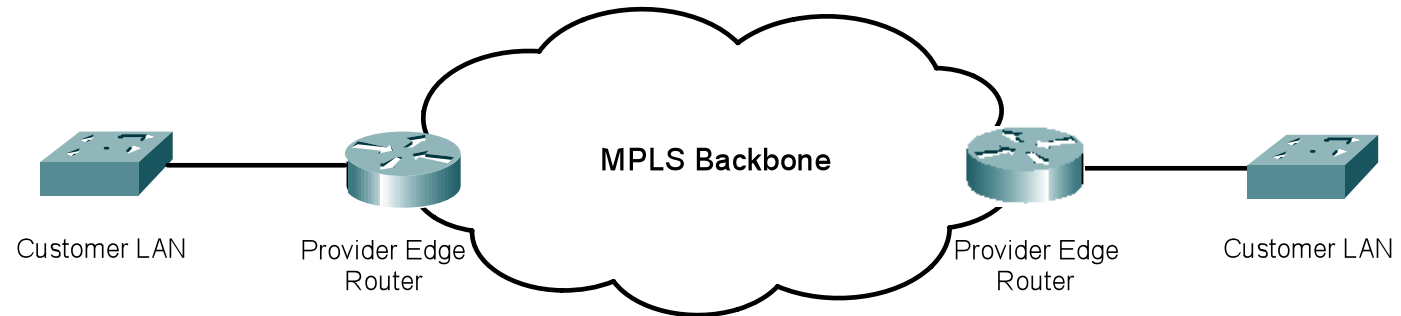
➢ Benefits of MPLS:

➢ For MPLS VPN, dose not require any Customer site VPN device

➢ All VPNs [site to site and/or site to multisite] are created and maintained by the Service Provider

➢ Separate routing table for each customer

➢ Less administrative overhead

Any Transport over MPLS [AToM]

MPLS Layer 2 Tunnel

ATM/Frame Relay/
PPP/Ethernet/HDLC
Network Traffic

MPLS Backbone

ATM/Frame Relay/
PPP/Ethernet/HDLC
Network Traffic

Provider End

Provider End

➢ Any Transport over MPLS [AToM] is a solution for transporting Layer 2 packets over an MPLS Backbone

➢ Allows Ethernet, Frame Relay, ATM, PPP, HDLC to be traversed over MPLS backbone

➢ In all cases a Layer 2 tunnel is created between the PE to PE directly.

Problems

- 1. MTU size in different media
- 2. MSS (Message Segment Size)
- 3. 10 Base Ethernet in Layer 2 Tunnel

MTU Size

- In Ethernet

- MTU= 1500

    - Ethernet Header of 14bytes and FCS 4 bytes

    - MPLS imposes Labels of 4 bytes

    - MPLS VPN [L2/L3]: 4 byte header

    - MPLS TE: 4 bytes header = Which is 1530

- BUT My Experience

    - FOR EoMPLS

    - Possible MPLS MTU value is: 9196

TCP MSS

➢ TCP MSS: Size consideration

    ➢ Default MSS: MTU – TCP HDR – IP HDR [1500 – X – Y]

➢ TCP MSS size should be (1500-20-20)=1460

➢ BUY My Experience

➢ TCP MSS size I am using 1430

AToM & MPLS L3 VPN over 10/100/1000 Mbps links & duplex modes

- ➢ MPLS L3 VPN can operate on 10/100/1000 mbps links and in both full/half-duplex links

- ➢ AToM on the other hand cannot operate smoothly in 10 Mbps links or in half-duplex links

- ➢ For AToM connectivity mode has to be 100 Mbps full-duplex or GBIC

Routers dependency

- For MPLS Layer 3 VPN
  - Cisco 2600 and above

- For MPLS Layer 2
  - Cisco 7200 VXR and above

Questions?

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