VPLS AND VPWS—AT-A-GLANCE

WHY SHOULD I CARE ABOUT LAYER 2 VPNS?

Originally designed using network technologies at Layer 2 (for example, Frame Relay), VPNs now are being augmented by packet-based technologies such as IP and Multiprotocol Label Switching (MPLS). IP and MPLS allow continued support of existing Layer 2 VPNs while adding support for new Layer 3 services, such as MPLS VPNs, over a single infrastructure. Supporting Layer 2 VPNs over an IP or MPLS infrastructure offers the following benefits:

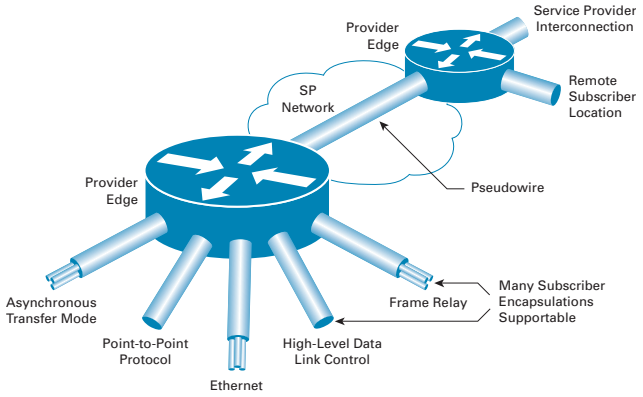
- Consolidation of multiple Layer 2 networks within enterprise or service providers environments into one core network with Layer 2 services running over a common IP/MPLS core. See Figure 1.
- The ability to seamlessly extend LANs as private virtual LANs across a service provider's network and to deliver multipoint Ethernet services.

WHAT PROBLEMS ARE SOLVED?

A shift is underway within service provider networks from circuit-switched to packet-based technology. It presents opportunities for increased revenues and cost containment from consolidation and better utilization of infrastructure. Virtual Private LAN Service (VPLS) and Virtual Private Wire Service (VPWS) represent advanced packet-switched VPN solutions that blend Layer 2 and Layer 3 technologies to make it possible to operate private, point-to-point, and multipoint virtual LANs through public networks.

Multiple Layer 2 networks can be consolidated within enterprise or service provider environments into single networks with Layer 2 services running over a common IP/MPLS core. LANs also can be smoothly extended as private virtual LANs across a WAN.

Figure 1. Layer 2 VPN



A Layer 2 VPN comprises switched connections between subscriber endpoints over a shared network. Non-subscribers do not have access to those same endpoints.

COMPARISONS

VPLS

VPLS is an attractive option for service providers because it uses a Layer 2 architecture to offer multipoint Ethernet VPNs that connect multiple sites over a metropolitan-area network (MAN) or WAN. Other technologies also enable Ethernet across the WAN, including Ethernet over MPLS, Ethernet over Layer 2 Tunneling Protocol Version 3 (L2TPv3), Ethernet over SONET/SDH, and Ethernet bridging over Any-Transport over MPLS AToM. However, they provide only point-to-point connectivity and VPLS is designed for applications that require multipoint or broadcast access.

For larger VPLS networks supporting applications requiring multipoint or broadcast access, VPLS scalability is achieved by using a hierarchy to reduce the signaling overhead and packet replication requirements for the provider edge.

Using VPLS, service providers can create a Layer 2 "virtual switch" over an MPLS core to establish a distributed Network Access Point (NAP). The NAP allows transparent private peering between multiple ISPs and delivers robust connections to multiple sites within a specific metro region. Service provider-to-service provider VPLS can be supported using either Border Gateway Protocol (BGP) or Label Distribution Protocol (LDP). LDP provides more granular control of communication and quality of service between VPLS nodes, more control per node, and is a consistent signaling option to support MPLS, VPLS, or VPWS. BGP is less versatile because typically it communicates the same information to all nodes participating in a VPLS.

The hierarchical VPLS architecture includes customer edge devices connected to provider edge routers that aggregate VPLS traffic before it reaches the network provider edge routers, where the VPLS forwarding takes place.

VPWS

VPWS makes the integration of existing Layer 2 and Layer 3 services possible on a point-to-point basis across a service provider's IP/MPLS cloud.

Two pseudowire technologies are available from Cisco Systems®: AToM is the Cisco® pseudowire technology that targets MPLS networks; and L2TPv3 is the Cisco pseudowire technology for native IP networks.

Both AToM and L2TPv3 support the transport of Frame Relay, ATM, High-Level Data Link Control (HDLC), and Ethernet traffic over an IP or MPLS core.

WHY CISCO?

Cisco Layer 2 technologies such as VPLS and VPWS encompass the attachment technologies (including Ethernet, ATM, Frame Relay, HDLC, and Point-to-Point Protocol), MPLS, IP, and management components needed to implement an end-to-end strategy for Layer 2 VPNs, based on IETF standards.

FOR MORE INFORMATION ON LAYER 2 VPNS

Please visit:

http://www.cisco.com/en/US/tech/tk436/tk891/tech_protocol_family_home.html

SM/LW6883 0804