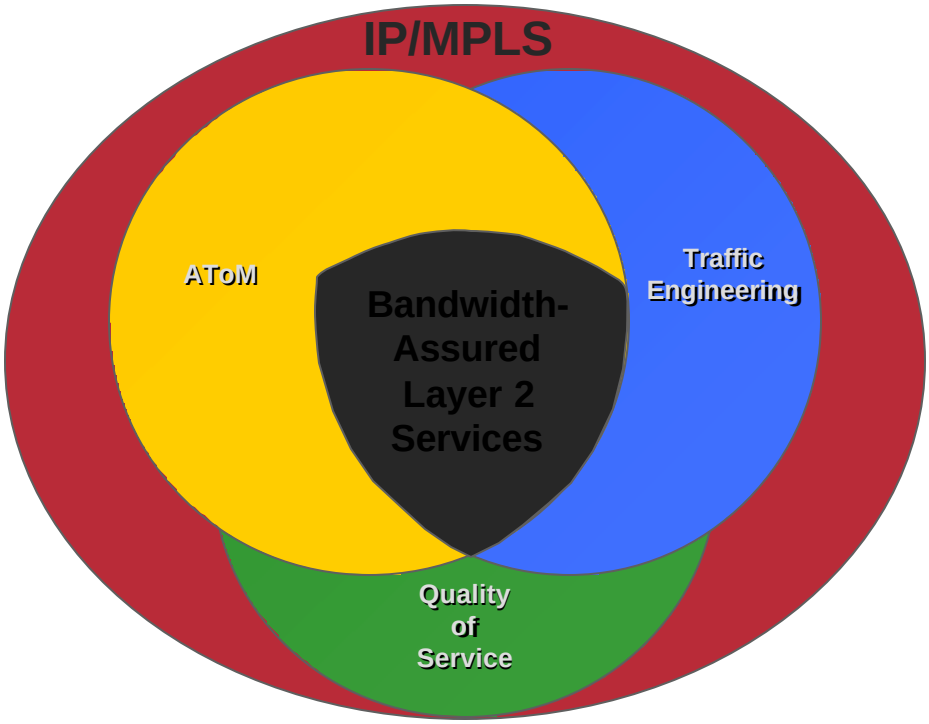
Application Brief

Cisco IOS® MPLS Bandwidth-Assured Layer 2 Services

Cisco IOS MPLS Bandwidth-Assured Layer 2 Services is a standards-based solution that enables the deployment of premium Layer 2 services over a Multi Protocol Label Switching (MPLS) network. Using MPLS as the core technology, service providers can take advantage of a single network infrastructure to offer Layer 2 and 3 services to meet a wide range of customer networking needs. In this manner, service providers can offer Frame Relay, ATM, Ethernet, Point-to-Point Protocol (PPP) and High-Level Data Link Control (HDLC) services for a wide range of speeds and levels of granularity over a converged network. These services can be easily integrated with native Layer 2 networks to provide a smooth transition to a converged network infrastructure.

Cisco IOS MPLS Bandwidth-Assured Layer 2 Services are enabled by the combination of Cisco Any Transport over MPLS (AToM), Cisco MPLS Traffic Engineering (TE), and Cisco quality of service (QoS) (Figure 1). The functionality offered by these Cisco Systems technologies are unique in the industry and allow service providers to transport Layer 2 services with different levels of protection and service guarantees. In addition, Cisco offers a comprehensive operations support system (OSS) solution for Layer 2 services based on Cisco IP Solution Center (ISC).

Figure 1. Components of Bandwidth-Assured Layer 2 Services



Layer 2 Services Using Cisco AToM

Cisco MPLS AToM provides the foundation to emulate Layer 2 services such as Frame Relay, ATM, Ethernet, PPP, or HDLC across an MPLS network. Cisco AToM provides a very high level of flexibility that supports the transport of individual circuits (ATM permanent virtual circuit/path [PVC/PVP], Frame Relay PVC, or Ethernet virtual LANs [VLANs]) or the transport of aggregate Layer 2 traffic at a physical port level. In addition, Cisco's implementation supports Layer 2 services between disparate technologies (also known as Layer 2 Interworking). This functionality adds flexibility to service offerings. It facilitates the extension of geographical coverage of a given Layer 2 service and the introduction of emerging Layer 2 services such as Ethernet. Two types of Layer 2 Interworking—Ethernet and IP—are available to satisfy very different service requirements.

Cisco MPLS TE and AToM

Cisco MPLS TE enhances the transport of Layer 2 services across an MPLS network. The Fast Reroute (FRR) and bandwidth protection functionality offered by Cisco MPLS TE allow a service provider to offer protected Layer 2 services in a very cost-effective manner. Traditional protection mechanisms are more expensive and have limited flexibility. In addition, the combination of Cisco QoS and Cisco MPLS

TE offers a scalable implementation of the traditional point-to-point guarantees that customers have come to expect from Layer 2 services. Similarly, they can be used to create new styles of service guarantees that were not available for these services. Lastly, Cisco MPLS TE gives the service provider a tool to optimize bandwidth utilization in the MPLS backbone. This optimization can directly or indirectly benefit the Layer 2 services offered over such traffic-engineered infrastructure.

Enhanced Cisco QoS for Layer 2 Services

Cisco QoS offers the mechanisms needed to offer a long array of QoS-enhanced Layer 2 services. Different Layer 2 services create different QoS challenges. Frame Relay and ATM are widely deployed Layer 2 services that have well-defined service-level agreements (SLAs) and the transport of those services over an MPLS network requires no loss of functionality. QoS plays a critical role in growing Layer 2 services, such as Ethernet, by offering sophisticated SLAs that allow service providers to differentiate their offerings. Cisco IOS MPLS Bandwidth-Assured Layer 2 Services provides a smooth integration between the required Layer 2 QoS mechanisms and Cisco MPLS QoS functionality. These Layer 2 mechanisms support marking, policing, shaping, queuing, and dropping features that act on frame or cells, as appropriate, to provide faithful service emulation. The integration of these services to an MPLS network does not conflict with the implementation of QoS guarantees for other services, such as MPLS (Layer 3) VPN, Internet, and others.

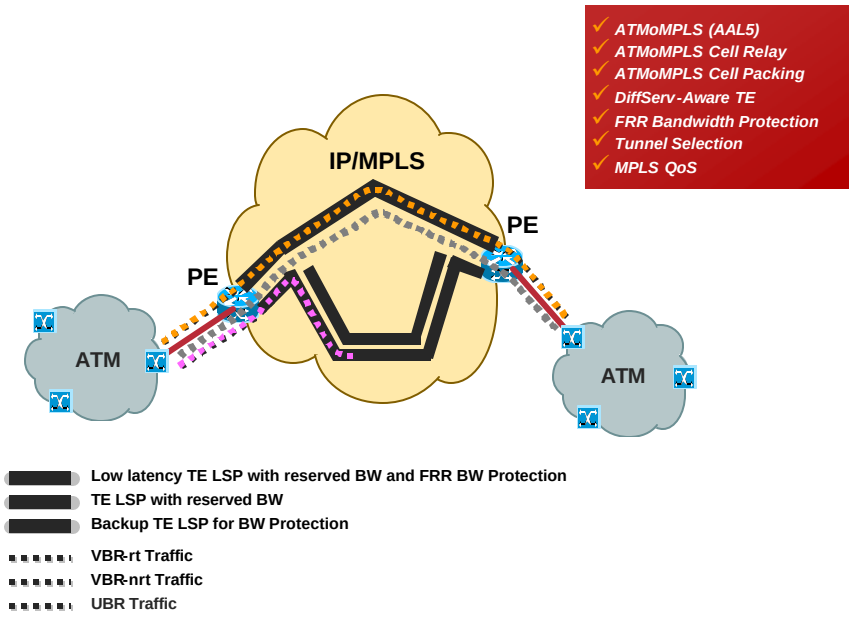
Managing Layer 2 Services

Cisco ISC provides service providers an end-to-end, unified service-management solution for Cisco routing, switching, and network security products. Cisco ISC also provides a robust and centralized management platform that minimizes the deployment costs, guarantees accuracy of service deployment, and effectively deploys and manages the entire life cycle of the service, including policy-based VPNs, management VPNs, SLAs, and QoS provisioning.

Applications

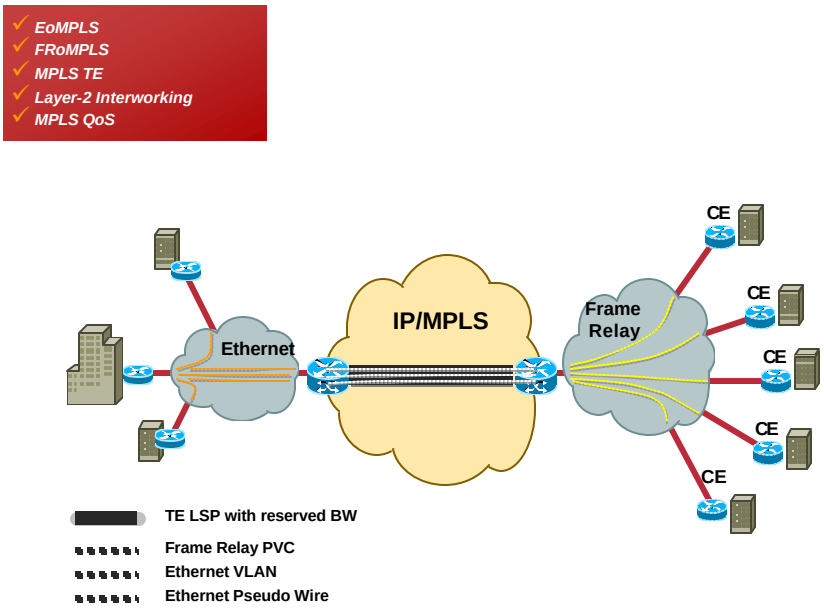
The flexibility of Cisco IOS MPLS Bandwidth-Assured Layer 2 Services makes this solution applicable to many deployment scenarios. One example is that of service providers that are faced with the challenge of extending the geographical coverage of an existing Layer 2 service (Figure 2). This requirement can be driven by a consolidation of networks, network expansion in some regions, or even an acquisition. Many of these service providers have a high-speed IP infrastructure that currently uses MPLS or can be easily migrated to use MPLS. Cisco IOS MPLS Bandwidth-Assured Layer 2 Services provide the functions required for transparently interconnecting the existing Layer 2 networks, while maintaining the service guarantees on which customers have come to rely.

Figure 2. Extending a Layer 2 service using Cisco IOS MPLS Bandwidth-Assured Layer 2 Services



The introduction of Ethernet to the portfolio of Layer 2 services offered by a service provider is another scenario where Cisco IOS MPLS Bandwidth-Assured Layer 2 Services have great applicability. In this case, the high-speed Ethernet service is expected to support the proper internetworking functionality with a large installed base of sites relying on traditional Frame Relay service. At the same time, the high-speed Ethernet service is expected to offer a multi-class SLA with strong point-to-point guarantees between multiple destinations. The combination of Cisco MPLS TE FRR, bandwidth protection, and QoS makes possible strong and elaborate guarantees that can be met even during failure conditions on the MPLS network. This solution allows the service provider to provide highly flexible and cost-effective services that meet the requirements of data, voice, and video applications.

Figure 3. Integrating Frame Relay and Ethernet Services using Cisco IOS MPLS Bandwidth-Assured Layer 2 Services



The previous two scenarios illustrate some of the possible applications for Cisco IOS MPLS Bandwidth-Assured Layer 2 Services. Many more Layer 2 services could be implemented to take advantage of the same network infrastructure and simultaneously include a rich portfolio of IP services.

References

Cisco IOS MPLS Page

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Cisco MPLS QoS White Paper

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Deploying Guaranteed Bandwidth Services with MPLS
http://www.cisco.com/warp/public/732/Tech/mpls/docs/deploying_gb_white_paper_final.pdf

Advanced Topics in MPLS-TE Deployment http://www.cisco.com/warp/public/cc/pd/iosw/prodlit/mwglp_wp.htm

Voice Trunking and Toll-Bypass Trunking Using Cisco MPLS DiffServ-Aware Traffic Engineering

http://www.cisco.com/cpropart/salestools/cc/pd/iosw/prodlit/mpvoc_wp.htm

Virtual Leased Line Services Using Cisco MPLS DiffServ-Aware Traffic Engineering

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Cisco IOS Software Release 12.0S Documentation

http://www.cisco.com/en/US/partner/products/sw/iosswrel/ps1829/index.html

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