

# QoS DESIGN FOR MPLS VPN SERVICE PROVIDERS

## AT-A-GLANCE

In order to support enterprise-subscriber voice, video, and data networks, service providers must include QoS provisioning within their Multiprotocol Label Switching (MPLS) VPN service offerings.

This is due to the any-to-any/full-mesh nature of MPLS VPNs, where enterprise subscribers depend on their service providers to provision Provider-Edge (PE) to Customer-Edge (CE) QoS policies consistent with their CE-to-PE policies.

In addition to these PE-to-CE policies, service providers will likely implement ingress policers on their PEs to identify whether traffic flows are in- or out-of-contract. Optionally, service providers may also provision QoS policies within their core networks, using Differentiated Services and/or MPLS Traffic Engineering (TE).

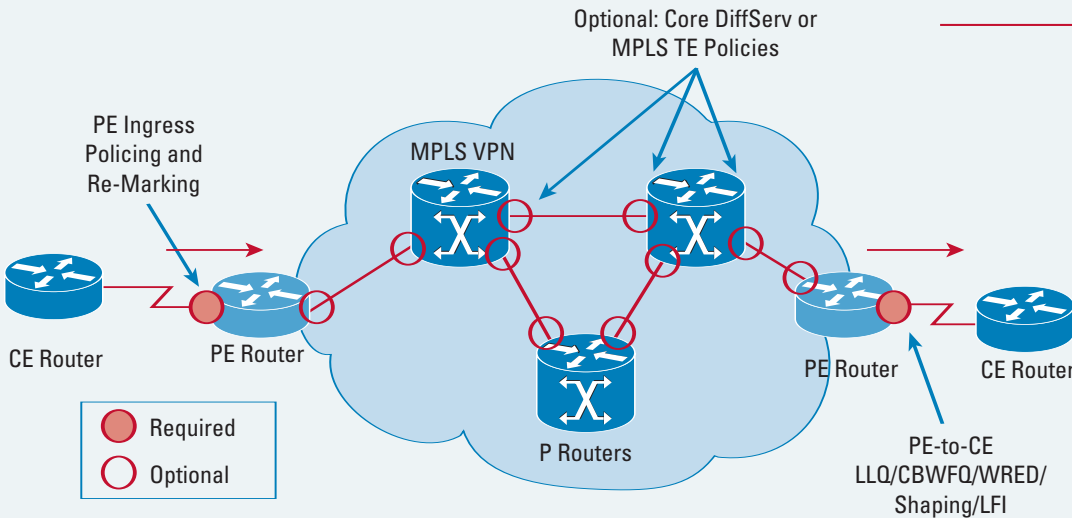
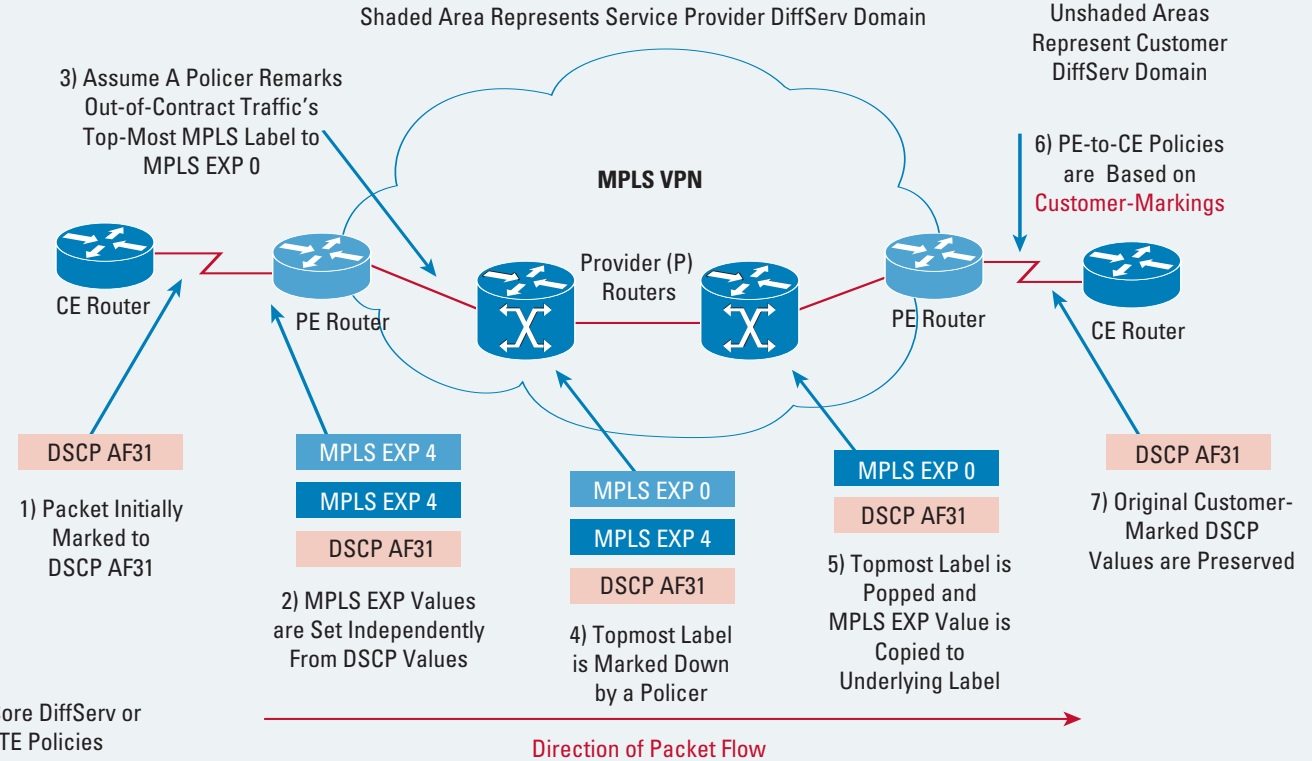
In order to guarantee end-to-end QoS, enterprises must co-manage QoS with their MPLS VPN service providers; their policies must be both consistent and complementary.

Service providers can mark at Layer 2 (MPLS EXP) or at Layer 3 (DSCP).

RFC 3270 presents three modes of MPLS/DiffServ marking for service providers:

- 1) Uniform Mode:** SP can remark customer DSCP values
- 2) Pipe Mode:** SP does not remark customer DSCP values (SP uses independent MPLS EXP markings); final PE-to-CE policies are based on *service provider's* markings

- 3) Short Pipe Mode** (shown below): SP does not remark customer DSCP values (SP uses independent MPLS EXP markings); final PE-to-CE policies are based on *customer's* markings



Service providers can guarantee service levels within their core by:

- 1) Aggregate Bandwidth Overprovisioning:** adding redundant links when utilization hits 50% (simple to implement, but expensive and inefficient)
- 2) Core DiffServ Policies:** simplified DiffServ policies for core links
- 3) MPLS TE:** TE provides granular policy-based control over traffic flows within the core

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