MPLS Traffic Engineering (Basic)

Terminology

TE tunnel: a unidirectional Label Switched Path (LSP) across an MPLS network

RSVP: Resource Reservation Protocol; the protocol used to establish MPLS TE tunnels

RSVP-TE: RSVP extensions for MPLS TE (RFC 3209)

CR-LDP: Constraint-based LSP setup using LDP (RFC 3212)

CBR: Constraint-based routing

Head-end: The router initiating an MPLS TE tunnel

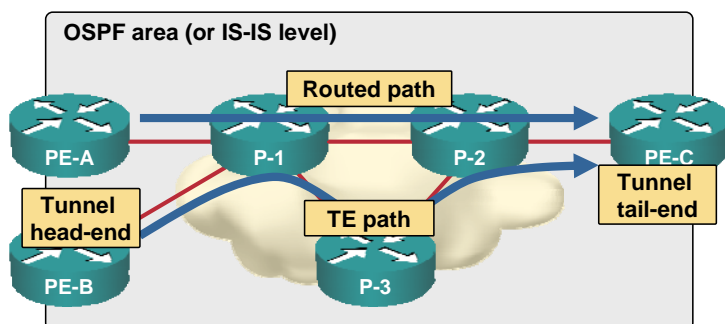**Tail-end**: The router on which an MPLS TE tunnel terminates

Standards

RFC 2702	Requirements for Traffic Engineering Over MPLS
RFC 4105	Requirements for Inter-Area MPLS TE
RFC 3209	RSVP extensions for MPLS TE
RFC 3212	Constraint-Based LSP Setup using LDP [1]
RFC 3630	Traffic Engineering extensions to OSPF version 2
RFC 5329	Traffic Engineering extensions to OSPF version 3 [2]
RFC 5305	IS-IS Extensions for Traffic Engineering
RFC 4090	Fast Reroute extensions to MPLS-TE

[1] Not implemented in Cisco IOS
[2] Not implemented in Cisco IOS as of February 1st 2009

Reference diagram

Explicit path with dynamic backup

```
interface Tunnel0
 ip unnumbered Loopback0
 tunnel destination remote-router-MPLS-TE-ID
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng autoroute announce
 tunnel mpls traffic-eng requested-path-BW
 tunnel mpls traffic-eng path-opt 1 explicit name PE-C
 tunnel mpls traffic-eng path-opt 2 dynamic
!
ip explicit-path name PE-C enable
 next-address P1-MPLS-TE-RID
 next-address P2-MPLS-TE-RID
 next-address P3-MPLS-TE-RID
```

Common and interface configuration

```
ip cef
!
mpls traffic-eng tunnels
!
interface POS1/0
 description core link with MPLS TE
 bandwidth actual-interface-bandwidth
 ip rsvp bandwidth MPLS-TE-reservable-bandwidth
 mpls traffic-eng tunnels
```

Use **ip rsvp bandwidth percent** *number* if available.

Head-end tunnel configuration

```
interface Tunnel0
 ip unnumbered Loopback0
 tunnel destination remote-router-MPLS-TE-ID
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng autoroute announce
 tunnel mpls traffic-eng bandwidth requested-path-BW
 tunnel mpls traffic-eng path-option 1 dynamic
 tunnel mpls traffic-eng priority 7 7 (1)
 mpls ip (2)
```

[1] Tunnel priority is optional
[2] LDP over MPLS TE tunnels is needed to establish end-to-end LSP if the tunnel terminates on a P-router.

Tail-end configuration

```
mpls ldp discovery targeted-hello accept [ACL]
```

Required when running LDP over MPLS TE tunnel

OSPF configuration

```
interface Loopback0
 ip address IP-address 255.255.255.255
 ip ospf 1 area MPLS-TE-area
!
router ospf 1
 log-adjacency-changes
 mpls traffic-eng router-id Loopback0
 mpls traffic-eng area MPLS-TE-area
```

IS-IS configuration

```
interface Loopback0
 ip address IP-address 255.255.255.255
 ip router isis
!
router isis
 net NSAP
 metric-style wide
 log-adjacency-changes
 mpls traffic-eng router-id Loopback0
 mpls traffic-eng level-1 | level-2
```

MPLS TE Resources

Service Provider training	http://www.nil.com/go/Service+Provider
MPLS TE articles	http://wiki.nil.com/MPLS_TE
MPLS TE tips & tricks	http://blog.ioshints.info/search/label/traffic%20engineering