



MPLS Traffic Engineering Commands

This module describes the commands used to configure Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) on .

Your network must support the following Cisco features before you can enable MPLS-TE:

- MPLS
- IP Cisco Express Forwarding (CEF)
- Intermediate System-to-Intermediate System (IS-IS) or Open Shortest Path First (OSPF) routing protocol
- Resource Reservation Protocol (RSVP)

MPLS Label Distribution Protocol (LDP), Resource Reservation Protocol (RSVP), and Universal Control Plane (UCP) command descriptions are documented separately.

For detailed information about MPLS concepts, configuration tasks, and examples, see .

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adjustment-threshold (MPLS-TE)

To configure the tunnel bandwidth change threshold to trigger an adjustment, use the **adjustment-threshold** command in MPLS-TE automatic bandwidth interface configuration mode. To disable this feature, use the **no** form of this command.

adjustment-threshold *percentage* [**min** *minimum bandwidth*]

| Syntax Description | | |
|--------------------|-------------------------------------|---|
| | <i>percentage</i> | Bandwidth change percent threshold to trigger an adjustment if the largest sample percentage is higher or lower than the current tunnel bandwidth. The range is from 1 to 100. The default is 5. |
| | min <i>minimum bandwidth</i> | (Optional) Configures the bandwidth change value to trigger an adjustment. The tunnel bandwidth is changed only if the largest sample is higher or lower than the current tunnel bandwidth, in kbps. The range is from 10 to 4294967295. The default is 10. |

Command Default

percentage: 5
minimum bandwidth: 10

Command Modes MPLS-TE automatic bandwidth interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines

If you configure or modify the adjustment threshold while the automatic bandwidth is already running, the next band-aids application is impacted for that tunnel. The new adjustment threshold determines if an actual bandwidth takes place.

Examples

The following example configures the tunnel bandwidth change threshold to trigger an adjustment:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# auto-bw
RP/0/RP0/CPU0:router(config-if-tunte-autobw)# adjustment-threshold 20 min 500
```

| Related Commands | Command | Description |
|------------------|---|---|
| | application (MPLS-TE), on page 14 | Configures the application frequency, in minutes, for the applicable tunnel. |
| | auto-bw (MPLS-TE), on page 19 | Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode. |

| Command | Description |
|--|--|
| bw-limit (MPLS-TE), on page 30 | Configures the minimum and maximum automatic bandwidth to set on a tunnel. |
| collect-bw-only (MPLS-TE), on page 40 | Enables only the bandwidth collection without adjusting the automatic bandwidth. |
| overflow threshold (MPLS-TE), on page 90 | Configures tunnel overflow detection. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

admin-weight

To override the Interior Gateway Protocol (IGP) administrative weight (cost) of the link, use the **admin-weight** command in MPLS-TE interface configuration mode. To return to the default behavior, use the **no** form of this command.

admin-weight *weight*

Syntax Description

weight Administrative weight (cost) of the link. Range is 0 to 4294967295.

Command Default

weight: IGP Weight (default OSPF 1, ISIS 10)

Command Modes

MPLS-TE interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

To use MPLS the **admin-weight** command for MPLS LSP path computations, path-selection metric must be configured to TE.

Task ID

| Task ID | Operations |
|---------|------------------------|
| | mpls-te read, write |

Examples

The following example shows how to override the IGP cost of the link and set the cost to 20:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router (config)# mpls traffic-eng
RP/0/RP0/CPU0:router (config-mpls-te)# interface POS 0/7/0/0
RP/0/RP0/CPU0:router (config-mpls-te-if)# admin-weight 20
```

Related Commands

| Command | Description |
|--|--|
| interface (MPLS-TE), on page 65 | Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| path-selection metric (interface), on page 103 | Specifies an MPLS-TE tunnel path-selection metric type. |

affinity

To configure an affinity (the properties the tunnel requires in its links) for an MPLS-TE tunnel, use the **affinity** command in interface configuration mode. To disable this behavior, use the **no** form of this command.

```
affinity { affinity-value mask mask-value | exclude name | exclude-all | ignore | include
name | include-strict name }
```

Syntax Description

| | |
|-----------------------------------|--|
| <i>affinity-value</i> | Attribute values that are required for links to carry this tunnel. A 32-bit decimal number. Range is from 0x0 to 0xFFFFFFFF, representing 32 attributes (bits), where the value of an attribute is 0 or 1. |
| mask <i>mask-value</i> | Checks the link attribute. A 32-bit decimal number. Range is 0x0 to 0xFFFFFFFF, representing 32 attributes (bits), where the value of an attribute mask is 0 or 1. |
| exclude <i>name</i> | Configures a particular affinity to exclude. |
| exclude-all | Excludes all affinities. |
| ignore | Ignore affinity attributes. |
| include <i>name</i> | Configures the affinity to include in the loose sense. |
| include-strict <i>name</i> | Configures the affinity to include in the strict sense. |

Command Default

affinity-value: 0X00000000

mask-value: 0x0000FFFF

Interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

Affinity determines the link attributes of the tunnel (that is, the attributes for which the tunnel has an affinity). The attribute mask determines which link attribute the router should check. If a bit in the mask is 0, the attribute value of a link or that bit is irrelevant. If a bit in the mask is 1, the attribute value of that link and the required affinity of the tunnel for that bit must match.

A tunnel can use a link if the tunnel affinity equals the link attributes and the tunnel affinity mask.

Any properties set to 1 in the affinity should be 1 in the mask. The affinity and mask should be set as follows:

```
tunnel_affinity=tunnel_affinity and tunnel_affinity_mask
```

You can configure up to 16 affinity constraints under a given tunnel. These constraints are used to configure affinity constraints for the tunnel:

Include

Specifies that a link is considered for constrained shortest path first (CSPF) if it contains all affinities associated with the include constraint. An acceptable link contains more affinity attributes than those associated with the include statement. You can have multiple include statements under a tunnel configuration.

Include-strict

Specifies that a link is considered for CSPF if it contains only the colors associated with the include-strict statement. The link cannot have any additional colors. In addition, a link without a color is rejected.

Exclude

Specifies that a link satisfies an exclude constraint if it does not have all the colors associated with the constraint. In addition, a link that does not have any attribute satisfies an exclude constraint.

Exclude-all

Specifies that only the links without any attribute are considered for CSPF. An exclude-all constraint is not associated with any color; whereas, all other constraint types are associated with up to 10 colors.

Ignore

Ignores affinity attributes while considering links for CSPF.

You set one bit for each color; however, the sample output shows multiple bits at the same time. For example, you can configure red and orange colors on GigabitEthernet0/4/1/3 from the **interface** command. The sample output from the [show mpls traffic-eng link-management interfaces, on page 156](#) command shows that the Attributes field is set to 0x21, which means that there are 0x20 and 0x1 bits on the link.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

This example shows how to configure the tunnel affinity and mask:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity 0101 mask 303
```

This example shows that a link is eligible for CSPF if the color is red. The link can have any additional colors.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity include red
```

This example shows that a link is eligible for CSPF if it has at least red and orange colors. The link can have any additional colors.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
```



```
RP/0/RP0/CPU0:router(config-if)# affinity include red orange
```

This example shows how to configure a tunnel to ignore the affinity attributes on links.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity ignore
```

This sample output shows that the include constraint from the **show mpls traffic-eng tunnels** command is 0x20 and 0x1:

```
Name: tunnel-te1 Destination: 0.0.0.0
Status:
  Admin:    up Oper: down  Path: not valid  Signalling: Down
  G-PID: 0x0800 (internally specified)

Config Parameters:
  Bandwidth:    0 kbps (CT0) Priority:  7  7
  Number of configured name based affinity constraints: 1
  Name based affinity constraints in use:
  Include bit map      : 0x21
  Metric Type: TE (default)
  AutoRoute: disabled LockDown: disabled
  Loadshare:         0 equal loadshares
  Auto-bw: disabled(0/0) 0 Bandwidth Requested:      0
  Direction: unidirectional
  Endpoint switching capability: unknown, encoding type: unassigned
  Transit switching capability: unknown, encoding type: unassigned

Reason for the tunnel being down: No destination is configured
History:
```

This example shows that a tunnel can go over a link that contains red or orange affinity. A link is eligible for CSPF if it has a red color or an orange color. Thus, a link with red and any other colors and a link with orange and other additional colors must meet the constraint.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity include red
RP/0/RP0/CPU0:router(config-if)# affinity include orange
```

This sample output shows that the include constraint from the **show mpls traffic-eng tunnels** command is 0x20 or 0x1:

```
Name: tunnel-te1 Destination: 0.0.0.0
Status:
  Admin:    up Oper: down  Path: not valid  Signalling: Down
  G-PID: 0x0800 (internally specified)

Config Parameters:
  Bandwidth:    0 kbps (CT0) Priority:  7  7
  Number of configured name based affinity constraints: 2
  Name based affinity constraints in use:
  Include bit map      : 0x1
  Include bit map      : 0x20
  Metric Type: TE (default)
```

```

AutoRoute: disabled LockDown: disabled
Loadshare:          0 equal loadshares
Auto-bw: disabled(0/0) 0 Bandwidth Requested:          0
Direction: unidirectional
Endpoint switching capability: unknown, encoding type: unassigned
Transit switching capability: unknown, encoding type: unassigned

Reason for the tunnel being down: No destination is configured
History:

```

This example shows that a link is eligible for CSPF if it has only red color. The link must not have any additional colors.

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity include-strict red

```

This example shows that a link is eligible for CSPF if it does not have the red attribute:

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity exclude red

```

This example shows that a link is eligible for CSPF if it does not have red and blue attributes. Thus, a link that has only a red attribute or only a blue attribute is eligible for CSPF.

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity exclude red blue

```

This example shows that a link is eligible for CSPF if it does not have either a red or a blue attribute:

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# affinity exclude red
RP/0/RP0/CPU0:router(config-if)# affinity exclude blue

```

Related Commands

| Command | Description |
|---|---|
| affinity-map, on page 12 | Assigns a numerical value to each affinity name. |
| attribute-names, on page 18 | Configures attribute names for the interface. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| show mpls traffic-eng affinity-map, on page 126 | Displays the color name-to-value mappings configured on the router. |

| Command | Description |
|--|---|
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

affinity-map

To assign a numerical value to each affinity name, use the **affinity-map** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

affinity-map *affinity name* {*affinity value* | **bit-position** *value*}

| Syntax Description | |
|-----------------------|--|
| <i>affinity name</i> | Affinity map name-to-value designator (in hexadecimal, <i>0-ffffff</i>). |
| <i>affinity value</i> | Affinity map value designator. Range is from 1 to 80000000. |
| bit-position | Configures the value of an affinity map for the bit position of the 32-bit number. |
| <i>value</i> | Range is from 0 to 31. |

Command Default No default behavior or values

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note The name-to-value mapping must represent a single bit of a 32-bit value.

Repeat the affinity-map command to define multiple colors up to a maximum of 256 colors.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to assign a numerical value to each affinity name:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# affinity-map red 1
RP/0/RP0/CPU0:router(config-mpls-te)# affinity-map blue 2
```

The following example shows how to configure the value of 15 for an affinity map by bit position:

```
RP/0/RP0/CPU0:router# configure  
RP/0/RP0/CPU0:router(config)# mpls traffic-eng  
RP/0/RP0/CPU0:router(config-mpls-te)# affinity-map red2 bit-position 15
```

Related Commands

| Command | Description |
|---|---|
| affinity, on page 7 | Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| show mpls traffic-eng affinity-map, on page 126 | Displays the color name-to-value mappings configured on the router. |

application (MPLS-TE)

To configure the application frequency, in minutes, for the applicable tunnel, use the **application** command in MPLS-TE automatic bandwidth interface configuration mode. To disable this feature, use the **no** form of this command.

application *minutes*

Syntax Description

minutes Frequency, in minutes, for the automatic bandwidth application. The range is from 5 to 10080 (7 days). The default is 1440.

Command Default

minutes : 1440 (24 hours)

Command Modes

MPLS-TE automatic bandwidth interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

If you configure and modify the application frequency, the application period can reset and restart for that tunnel. The next bandwidth application for the tunnel happens within the specified minutes.

Task ID

| Task ID | Operations |
|------------------------|------------|
| mpls-te read, write | |

Examples

The following example shows how to configure application frequency to 1000 minutes for MPLS-TE interface 1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# auto-bw
RP/0/RP0/CPU0:router(config-if-tunte-autobw)# application 1000
```

Related Commands

| Command | Description |
|---|---|
| adjustment-threshold (MPLS-TE), on page 4 | Configures the tunnel-bandwidth change threshold to trigger an adjustment. |
| auto-bw (MPLS-TE), on page 19 | Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth configuration mode. |
| bw-limit (MPLS-TE), on page 30 | Configures the minimum and maximum automatic bandwidth to set on a tunnel. |

| Command | Description |
|--|--|
| collect-bw-only (MPLS-TE), on page 40 | Enables only the bandwidth collection without adjusting the automatic bandwidth. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| overflow threshold (MPLS-TE), on page 90 | Configures tunnel overflow detection. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

attribute-flags

To configure attribute flags for an interface, use the **attribute-flags** command in MPLS-TE interface configuration mode. To return to the default behavior, use the **no** form of this command.

attribute-flags *attribute-flags*

| | |
|---------------------------|--|
| Syntax Description | <i>attribute -flags</i> Links attributes that are compared to the affinity bits of a tunnel during selection of a path. Range is 0x0 to 0xFFFFFFFF, representing 32 attributes (bits) where the value of an attribute is 0 or 1. |
|---------------------------|--|

| | |
|------------------------|-------------------------|
| Command Default | <i>attributes</i> : 0x0 |
|------------------------|-------------------------|

| | |
|----------------------|---------------------------------|
| Command Modes | MPLS-TE interface configuration |
|----------------------|---------------------------------|

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|---|
| Usage Guidelines | The attribute-flags command assigns attributes to a link so that tunnels with matching attributes (represented by their affinity bits) prefer this link instead of others that do not match. |
|-------------------------|---|

The interface attribute is flooded globally so that it can be used as a tunnel headend path selection criterion.

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | read, write |

Examples The following example shows how to set attribute flags to 0x0101:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# interface POS 0/7/0/0
RP/0/RP0/CPU0:router(config-mpls-te-if)# attribute-flags 0x0101
```

| | | |
|-------------------------|---|---|
| Related Commands | Command | Description |
| | admin-weight, on page 6 | Overrides the IGP administrative weight of the link. |
| | affinity, on page 7 | Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel. |
| | attribute-names, on page 18 | Configures the attribute names for the interface. |

| Command | Description |
|---|--|
| interface (MPLS-TE), on page 65 | Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |

attribute-names

To configure attributes for the interface, use the **attribute-names** command in MPLS-TE interface configuration mode. To return to the default behavior, use the **no** form of this command.

attribute-names *attribute name*

Syntax Description *attribute name* Attribute name expressed using alphanumeric or hexadecimal characters.

Command Default No default behavior or values

Command Modes MPLS-TE interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The name-to-value mapping must represent a single bit of a 32-bit value.

| Task ID | Task ID | Operations |
|---------|------------------------|------------|
| | mpls-te read, write | |

Examples The following example shows how to assign an attribute name (in this case, red) to a TE link:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# interface pos 0/2/0/1
RP/0/RP0/CPU0:router(config-mpls-te-if)# attribute-name red
```

| Related Commands | Command | Description |
|------------------|---|---|
| | affinity, on page 7 | Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel. |
| | attribute-flags, on page 16 | Configures attribute flags for the interface. |
| | interface (MPLS-TE), on page 65 | Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode. |
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |

auto-bw (MPLS-TE)

To configure automatic bandwidth on a tunnel interface and to enter MPLS-TE automatic bandwidth interface configuration mode, use the **auto-bw** command in MPLS-TE interface configuration mode. To disable the automatic bandwidth on that tunnel, use the **no** form of this command.

auto-bw

| | | |
|---------------------------|---|------------------------------|
| Syntax Description | This command has no arguments or keywords. | |
| Command Default | By default, automatic bandwidth is not enabled. | |
| Command Modes | MPLS-TE interface configuration | |
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Use the **auto-bw** command to enter MPLS-TE automatic bandwidth interface configuration mode.

The **auto-bw** and **load-share unequal** commands should not be used together.

The **load-share unequal** command determines the load-share for a tunnel based on the bandwidth. However, the MPLS-TE automatic bandwidth feature changes the bandwidth around. If you are configuring both the **load-share unequal** command and the MPLS-TE automatic bandwidth feature, we recommend that you specify an explicit load-share value configuration under each MPLS-TE automatic bandwidth tunnel.

The following automatic bandwidth scenarios are described:

- If you configure the automatic bandwidth on a tunnel, the automatic bandwidth is enabled on that tunnel. If no other configuration is specified, defaults for the various parameters are used, the operation stops.
- The automatic operation (for example, output rate collection) starts as soon as the automatic bandwidth is enabled on one tunnel. If automatic bandwidth is disabled from all tunnels, the operation stops.
- If the output rate collection is already active when the automatic bandwidth is configured on a tunnel, the statistics collection for that tunnel starts at the next collection configuration.



Note Because the collection timer is already running, the first collection event for that tunnel happens in less than C minutes (for example, on an average of C/2 minutes).

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to enter MPLS-TE automatic bandwidth interface configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# auto-bw
RP/0/RP0/CPU0:router(config-if-tunte-autobw)#
```

Related Commands

| Command | Description |
|--|--|
| adjustment-threshold (MPLS-TE), on page 4 | Configures the tunnel-bandwidth change threshold to trigger an adjustment. |
| application (MPLS-TE), on page 14 | Configures the application frequency, in minutes, for the applicable tunnel. |
| bw-limit (MPLS-TE), on page 30 | Configures the minimum and maximum automatic bandwidth to set on a tunnel. |
| collect-bw-only (MPLS-TE), on page 40 | Enables only the bandwidth collection without adjusting the automatic bandwidth. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| overflow threshold (MPLS-TE), on page 90 | Configures tunnel overflow detection. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

auto-bw collect frequency (MPLS-TE)

To configure the automatic bandwidth collection frequency, use the **auto-bw collect frequency** command in MPLS-TE configuration mode. To reset the automatic bandwidth frequency to its default value, use the **no** form of this command.

auto-bw collect frequency *minutes*

Syntax Description *minutes* Interval between automatic bandwidth adjustments, in minutes. The range is from 1 to 10080. The default is 5.

Command Default *minutes: 5*
In addition, the **no** form of this command resets to the default.

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The **auto-bw collect frequency** command configures the automatic bandwidth collection frequency for all the tunnels.
Modifying the global collection frequency does not restart the tunnel for the current application period. The application period continues with the modified collection frequency.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example configures a tunnel for an automatic bandwidth adjustment of 100 minutes:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# auto-bw collect frequency 100
```

| Related Commands | Command | Description |
|------------------|--|---|
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | mpls traffic-eng auto-bw apply (MPLS-TE), on page 76 | Configures the highest bandwidth available on a tunnel without waiting for the current application period to end. |
| | show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

autoroute announce

To specify that the Interior Gateway Protocol (IGP) should use the tunnel (if the tunnel is up) in its enhanced shortest path first (SPF) calculation, use the **autoroute announce** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

autoroute announce

Command Default Announces IPv4 tunnel

Command Modes Interface configuration

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines When more than one IGP is configured, the tunnel is announced as autoroute to the IGP that is used to compute the TE tunnel path.

When the **autoroute announce** command is configured, the route metric of the tunnel path to the destination equals the route metric of the shortest IGP path to that destination.

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read, write |

Examples

This example shows how to configure IGP to use the tunnel in its enhanced SPF calculation when the tunnel is up:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# autoroute announce
```

Related Commands

| Command | Description |
|---|---|
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |

autoroute metric

To specify the MPLS-TE tunnel metric that the Interior Gateway Protocol (IGP) enhanced Shortest Path First (SPF) calculation uses, use the **autoroute metric** command in interface configuration mode. If no specific metric is to be specified, use the **no** form of this command.

autoroute metric {**absolute** | **relative**} *value*

Syntax Description

absolute Enables the absolute metric mode; you can enter a positive metric value.

relative Enables the relative metric mode; you can enter a positive, negative, or zero value.

value Metric that the IGP enhanced SPF calculation uses. Relative value range is from -10 to 10. Absolute value range is from 1 to 2147483647.

Command Default

The relative value is 0.

Command Modes

Interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

The **autoroute metric** command overwrites the default tunnel route metric of the shortest IGP path to the destination.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following example shows how to configure the IGP enhanced SPF calculation using MPLS-TE tunnel metric as relative negative 1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# autoroute metric relative -1
```

Related Commands

| Command | Description |
|---|--|
| autoroute announce, on page 22 | Instructs the IGP to use the tunnel (if it is up) in its enhanced SPF calculation. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |

| Command | Description |
|--|---|
| show mpls traffic-eng autoroute, on page 128 | Displays the tunnels announced to the IGP, including interface, destination, and bandwidth. |

backup-bw

To configure the backup bandwidth for an MPLS-TE backup tunnel (that is used to protect a physical interface), use the **backup-bw** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

```
backup-bw {backup bandwidth {any-class-type | class-type ct} | global-pool {bandwidth | unlimited} | sub-pool {bandwidth | unlimited} | unlimited {any-class-type | class-type ct}}
```

| Syntax Description | |
|-------------------------------------|--|
| <i>backup bandwidth</i> | Backup bandwidth in any-pool provided by an MPLS-TE backup tunnel. Bandwidth is specified in kilobits per second (kbps). Range is 1 to 4294967295. |
| any-class-type | Displays the backup bandwidth assigned to any class-type protected tunnels. |
| class-type <i>ct</i> | Displays the class type of the backup bandwidth. Range is 0 to 1. |
| global-pool <i>bandwidth</i> | (In Prestandard DS-TE with RDM) Displays the backup bandwidth in global pool provided by an MPLS-TE backup tunnel. Bandwidth is specified in kilobits per second. Range is 1 to 4294967295. |
| unlimited | Displays the unlimited bandwidth. |
| sub-pool <i>bandwidth</i> | (In Prestandard DS-TE with RDM) Displays the backup bandwidth in sub-pool provided by an MPLS-TE backup tunnel. Bandwidth is specified in kilobits per second. Range bandwidth is 1 to 4294967295. Only label switched paths (LSPs) using bandwidth from the sub-pool can use the backup tunnel. |

Command Default Any class-type unlimited.

Command Modes Interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Backup bandwidth can be limited or unlimited or specific to a global pool, sub-pool, or non-specific any-pool. Backup with backup-bw in global-pool protects global-pool LSPs only; backup-bw in sub-pool protects sub-pool LSPs only.

Backup tunnels configured with limited backup bandwidth (from any/global/sub pool) are not assigned to protect LSPs configured with zero signaled bandwidth.

Backup bandwidth provides bandwidth protection for fast reroute (FRR). Bandwidth protection for FRR supports DiffServ-TE with two bandwidth pools (class-types).

Class-type 0 is strictly equivalent to global-pool; class-type 1 is strictly equivalent to sub-pool bandwidth using the Russian Doll Model (RDM).

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to configure backup tunnel 1 for use only by LSPs that take their bandwidth from the global pool (class-type 0 tunnels). Backup tunnel 1 does not provide bandwidth protection.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# backup-bw global-pool unlimited
```

or

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# backup-bw unlimited class-type 0
```

In the following example, backup tunnel 2 is used by LSPs that take their bandwidth from the sub-pool (class-type 1 tunnels) only. Backup tunnel 2 provides bandwidth protection for up to 1000 units.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 2
RP/0/RP0/CPU0:router(config-if)# backup-bw sub-pool 1000
```

or

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 2
RP/0/RP0/CPU0:router(config-if)# backup-bw 1000 class-type 1
```

Related Commands

| Commands | Description |
|---|--|
| backup-path tunnel-te, on page 27 | Assigns one or more backup tunnels to a protected interface. |
| fast-reroute, on page 51 | Enables FRR protection for an MPLS-TE tunnel. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |

backup-path tunnel-te

To set an MPLS-TE tunnel to protect a physical interface against failure, use the **backup-path tunnel-te** command in MPLS-TE interface configuration mode. To return to the default behavior, use the **no** form of this command.

backup-path tunnel-te *tunnel-number*

Syntax Description

tunnel-number Number of the tunnel protecting the interface. Range is 0 to 65535.

Command Default

No default behavior or values

Command Modes

MPLS-TE interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

When the protected interface is down (shut down or removed), the traffic it was carrying (for the other label switched paths [LSPs], referred to as the protected LSPs) is rerouted, using fast reroute (FRR) onto the backup tunnels.

The following guidelines pertain to the FRR process:

- Multiple (backup) tunnels can protect the same interface by entering this command multiple times for different tunnels. The same (backup) tunnel can protect multiple interfaces by entering this command for each interface.
- The backup tunnel used to protect a physical interface must have a valid IP address configured.
- The backup tunnel cannot pass through the same interface that it is protecting.
- TE tunnels that are configured with the FRR option, cannot be used as backup tunnels.
- For the backup tunnel to provide protection to the protected LSP, the backup tunnel must have a terminating-end node in the path of a protected LSP.
- The source IP address of the backup tunnel and the merge point (MP) address (the terminating-end address of the backup tunnel) must be reachable.



Note You must configure record-route on TE tunnels that are protected by multiple backup tunnels merging at a single node.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following example shows how to protect PoS interface 0/7/0/0 using tunnel 100 and tunnel 150:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# interface POS 0/7/0/0
RP/0/RP0/CPU0:router(config-mpls-te-if)# backup-path tunnel-te 100
RP/0/RP0/CPU0:router(config-mpls-te-if)# backup-path tunnel-te 150
```

Related Commands

| Command | Description |
|--|--|
| backup-bw, on page 25 | Configures backup bandwidth for bandwidth protection. |
| fast-reroute, on page 51 | Enables FRR protection for an MPLS-TE tunnel. |
| interface (MPLS-TE), on page 65 | Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

bidirectional

To configure a bidirectional LSP for a MPLS TE tunnel and define other parameters for the LSP, use the **bidirectional** command in the MPLS-TE interface configuration mode.

bidirectional association { **id** *value* | **source-address** *IP address* | **global-id** *value* | **type** **co-routed** | **fault-oam** }

| Syntax Description | Parameter | Description |
|--------------------|------------------------------------|---|
| | bidirectional | Configures a bidirectional LSP. |
| | association | Specifies association parameters for the bidirectional LSP. |
| | id <i>value</i> | Value number that identifies the association. Range is 0 to 65535. |
| | source-address <i>value</i> | Specifies the source IP address of the LSP from which a reverse path is required. |
| | global-id <i>value</i> | Value number that identifies the global ID. Range is 0 to 4294967295. The default value is 0. |
| | co-routed | Configures co-routed LSPs with bidirectional CSPF. |
| | fault-oam | Configures fault OAM for the bidirectional co-routed LSPs. |

Command Default Tunnel interfaces are disabled.

Command Modes Interface configuration mode

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.2.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task | Operation |
|---------|---------|----------------|
| | mpls-te | read, write |

Example

This example shows you how to configure an associated bidirectional co-routed MPLS-TE tunnel.

```
RP/0/RSP0/CPU0:router# configure
RRP/0/RSP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RSP0/CPU0:router(config-if)# bidirectional
RP/0/RSP0/CPU0:router(config-if-bidir)# association id 1 source-address 11.0.0.1
RP/0/RSP0/CPU0:router(config-if-bidir)#association type co-routed
```

bw-limit (MPLS-TE)

To configure the minimum and maximum automatic bandwidth to be set on a tunnel, use the **bw-limit** command in MPLS-TE automatic bandwidth interface configuration mode. To disable this feature, use the **no** form of this command.

bw-limit min *bandwidth* {**max** *bandwidth*}

| Syntax Description | min <i>bandwidth</i> | max <i>bandwidth</i> |
|--------------------|--|---|
| | Configures the minimum automatic bandwidth, in kbps, on a tunnel. The range is from 0 to 4294967295. The default is 0. | Configures the maximum automatic bandwidth, in kbps, on a tunnel. The range is from 0 to 4294967295. The default is 4294967295. |

| Command Default |
|---|
| min: 0 max: 4294967295 |

| Command Modes |
|---|
| MPLS-TE automatic bandwidth interface configuration |

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Both the **min** and **max** keywords must be configured.

The **bw-limit** command automatically sets the minimum bandwidth to the default value of 0, or the **bw-limit** command automatically sets the maximum to the default value of 4294967295 kbps.

If the value of the **min** keyword is greater than the **max** keyword, the **bw-limit** command is rejected. If you configure and modify the minimum or maximum bandwidth while the automatic bandwidth is already running, the next bandwidth application for that tunnel is impacted. For example, if the current tunnel requested bandwidth is 30 Mbps and the minimum bandwidth is modified to 50 Mbps, the next application sets the tunnel bandwidth to 50 Mbps.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example shows how to configure the minimum and maximum bandwidth for the tunnel:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# auto-bw
RP/0/RP0/CPU0:router(config-if-tunte-autobw)# bw-limit min 30 max 80
```

Related Commands

| Command | Description |
|--|---|
| adjustment-threshold (MPLS-TE), on page 4 | Configures the tunnel-bandwidth change threshold to trigger an adjustment. |
| application (MPLS-TE), on page 14 | Configures the application frequency, in minutes, for the applicable tunnel. |
| auto-bw (MPLS-TE), on page 19 | Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode. |
| collect-bw-only (MPLS-TE), on page 40 | Enables only the bandwidth collection without adjusting the automatic bandwidth. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| overflow threshold (MPLS-TE), on page 90 | Configures tunnel overflow detection. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

clear mpls traffic-eng auto-bw (MPLS-TE EXEC)

To clear automatic bandwidth sampled output rates and to restart the application period for the specified tunnel, use the **clear mpls traffic-eng auto-bw** command in XR EXEC mode.

clear mpls traffic-eng auto-bw{all | internal | tunnel-te *tunnel-number*}

| Syntax Description | all | Clears the automatic bandwidth sampled output rates for all tunnels. |
|--------------------|---------------------------------------|---|
| | internal | Clears all the automatic bandwidth internal data structures. |
| | tunnel-te <i>tunnel-number</i> | Clears the automatic bandwidth sampled output rates for a specific tunnel. The <i>tunnel-number</i> argument is the tunnel ID used to clear the sampled output rates. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines If no tunnel is specified, the **clear mpls traffic-eng auto-bw** command clears all the automatic bandwidth enabled tunnels.

For each tunnel in which the automatic bandwidth adjustment is enabled, information is maintained about the sampled output rates and the time remaining until the next bandwidth adjustment. The application period is restarted and values such as the largest collected bandwidth get reset. The tunnel continues to use the current bandwidth until the next application.

| Task ID | Task Operations ID |
|---------|--------------------|
| | mpls-te execute |

Examples The following example displays the information for the automatic bandwidth for tunnel number 0 from the **show mpls traffic-eng tunnels auto-bw brief** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 0 auto-bw brief

Tunnel      LSP      Last appl  Requested  Signalled   Highest    Application
          Name      ID    BW (kbps)  BW (kbps)  BW (kbps)  BW (kbps)  Time Left
-----
 tunnel-te0  278      100      100        100        100        150        12m 38s
```

The following example shows how to clear the automatic bandwidth sampled output rates for tunnel number 0:


```
RP/0/RP0/CPU0:router# clear mpls traffic-eng auto-bw tunnel-te 0
```

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 0 auto-bw brief
```

```

Tunnel      LSP   Last appl  Requested  Signalled   Highest   Application
           Name    ID   BW (kbps)  BW (kbps)  BW (kbps)  BW (kbps)  Time Left
-----
 tunnel-te0  278    100      100       100        100        0          24m 0s

```

Related Commands

| Command | Description |
|--|---|
| clear mpls traffic-eng counters signaling, on page 35 | Clears the automatic bandwidth configuration in a tunnel. |
| show mpls traffic-eng tunnels auto-bw brief, on page 190 | Displays the list of automatic-bandwidth-enabled tunnels, and indicates if the current signaled bandwidth of the tunnel is identical to the bandwidth that is applied by the automatic bandwidth. |

clear mpls traffic-eng counters global

To clear the internal MPLS-TE tunnel counters, use the **clear mpls traffic-eng counters global** command in XR EXEC mode.

clear mpls traffic-eng counters global

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | execute |

Examples

The following example shows how to clear the internal MPLS-TE tunnel counters:

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng counters global
```

clear mpls traffic-eng counters signaling

To clear (set to zero) the MPLS tunnel signaling counters, use the **clear mpls traffic-eng counters signaling** command in XR EXEC mode.

```
clear mpls traffic-eng counters signaling {all | [{heads | mids | tails}] | name name | summary}
```

| Syntax Description | all | Clears counters for all MPLS-TE tunnels. |
|--------------------|-------------------------|--|
| | heads | (Optional) Displays tunnels with their heads at this router. |
| | mids | (Optional) Displays tunnels with their midpoints at this router. |
| | tails | (Optional) Displays tunnels with their tails at this router. |
| | name <i>name</i> | Clears counters for an MPLS-TE tunnel with the specified name. |
| | summary | Clears the counter's summary. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Use the **clear mpls traffic-eng counters signaling** command to set all MPLS counters to zero so that changes can be seen easily.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example shows how to clear all counters:

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng counters signaling all
```

| Related Commands | Command | Description |
|------------------|---|---------------------------------------|
| | show mpls traffic-eng counters signaling, on page 132 | Displays tunnel signaling statistics. |

clear mpls traffic-eng counters soft-preemption

To clear (set to zero) the counters for soft-preemption statistics, use the **clear mpls traffic-eng counters soft-preemption** command in XR EXEC mode.

clear mpls traffic-eng counters {all | soft-preemption}

| Syntax Description | all | Clears counters for all MPLS-TE tunnels. |
|--------------------|------------------------|---|
| | soft-preemption | Clears the statistics for soft preemption counters. |

Command Default None

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines When all counters are cleared using the **clear mpls traffic-eng counters all** command, the counters for soft-preemption statistics are automatically cleared.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | execute |

Examples This example shows how to clear all counters:

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng counters signaling all
```

| Related Commands | Command | Description |
|------------------|---|---------------------------------------|
| | show mpls traffic-eng counters signaling, on page 132 | Displays tunnel signaling statistics. |

clear mpls traffic-eng fast-reroute log

To clear the log of MPLS fast reroute (FRR) events, use the **clear mpls traffic-eng fast-reroute log** command in XR EXEC mode.

clear mpls traffic-eng fast-reroute log

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows sample output before clearing the log of FRR events:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute log
```

| Node | Protected Interface | LSPs | Rewrites | When | Switching Time (usec) |
|----------|---------------------|------|----------|------------------------|-----------------------|
| 0/0/CPU0 | PO0/1/0/1 | 1 | 1 | Feb 27 19:12:29.064000 | 147 |
| 0/1/CPU0 | PO0/1/0/1 | 1 | 1 | Feb 27 19:12:29.060093 | 165 |
| 0/2/CPU0 | PO0/1/0/1 | 1 | 1 | Feb 27 19:12:29.063814 | 129 |
| 0/3/CPU0 | PO0/1/0/1 | 1 | 1 | Feb 27 19:12:29.062861 | 128 |

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng fast-reroute log
```

clear mpls traffic-eng link-management statistics

To clear all the MPLS-TE admission control statistics, use the **clear mpls traffic-eng link-management statistics** command in XR EXEC mode.

clear mpls traffic-eng link-management statistics

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example shows how to clear all the MPLS-TE statistics for admission control:

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng link-management statistics
```

clear mpls traffic-eng pce

To clear the path computation element (PCE) statistics, use the **clear mpls traffic-eng pce** command in XR EXEC mode.

```
clear mpls traffic-eng pce [peer ipv4 address]
```

| Syntax Description | |
|---------------------|---|
| peer | (Optional) Clears the statistics for one peer. |
| ipv4 address | (Optional) Configures the IPv4 address for PCE. |

Command Default Clears statistics for all the PCE peers.

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | execute |

Examples The following example shows how to clear the statistics for the PCE:

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng pce
```

| Related Commands | Command | Description |
|------------------|---|--|
| | show mpls traffic-eng pce peer, on page 163 | Displays the status of the PCE peer address and state. |

collect-bw-only (MPLS-TE)

To configure only the bandwidth collection without adjusting the bandwidth automatically, use the **collect-bw-only** command in MPLS-TE automatic bandwidth interface configuration mode. To disable this feature, use the **no** form of this command.

collect-bw-only

| | | |
|---------------------------|---|------------------------------|
| Syntax Description | This command has no arguments or keywords. | |
| Command Default | Bandwidth collection is either enabled or disabled. | |
| Command Modes | MPLS-TE automatic bandwidth interface configuration | |
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines

If you enable the **collect-bw-only** command while the automatic bandwidth is already running on a tunnel, the bandwidth application is disabled from that moment. Before you enable the actual bandwidth application, you can get the status of the automatic bandwidth behavior.

If you disable the **collect-bw-only** command on a tunnel from which the automatic bandwidth is already running, the actual bandwidth application takes place on the tunnel at the next application period.

It is also possible to manually activate a bandwidth application regardless of the collect bandwidth only flag that is being specified on a tunnel. To activate the bandwidth application, use the [mpls traffic-eng auto-bw apply \(MPLS-TE\), on page 76](#) command in EXEC mode.

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | read, write |

Examples

The following example shows how to enable only the bandwidth collection without adjusting the automatic bandwidth:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# auto-bw
RP/0/RP0/CPU0:router(config-if-tunte-autobw)# collect-bw-only
```

| | | |
|-------------------------|---|--|
| Related Commands | Command | Description |
| | adjustment-threshold (MPLS-TE), on page 4 | Configures the tunnel-bandwidth change threshold to trigger an adjustment. |

| Command | Description |
|--|---|
| application (MPLS-TE), on page 14 | Configures the application frequency, in minutes, for the applicable tunnel. |
| auto-bw (MPLS-TE), on page 19 | Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode. |
| bw-limit (MPLS-TE), on page 30 | Configures the minimum and maximum automatic bandwidth to set on a tunnel. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| overflow threshold (MPLS-TE), on page 90 | Configures tunnel overflow detection. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

destination (MPLS-TE)

To configure the destination address of a TE tunnel, use the **destination** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

destination *ip-address*

| | |
|---------------------------|---|
| Syntax Description | <i>ip-address</i> Destination address of the MPLS-TE router ID. |
|---------------------------|---|

| | |
|------------------------|-------------------------------|
| Command Default | No default behavior or values |
|------------------------|-------------------------------|

| | |
|----------------------|-------------------------|
| Command Modes | Interface configuration |
|----------------------|-------------------------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note The tunnel destination address must be a unique MPLS-TE router ID; it cannot be an MPLS-TE link address on a node.

For Point-to-Point (P2P) tunnels, the **destination** command is used as a single-line command.

| Task ID | Task ID | Operations |
|----------------|----------------|------------------------|
| | | mpls-te read, write |

Examples

The following example shows how to set the destination address for tunnel-te1 to 10.10.10.10:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te1
RP/0/RP0/CPU0:router(config-if)# destination 10.10.10.10
```

Related Commands

| Command | Description |
|--|---|
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

disable (explicit-path)

To prevent the path from being used by MPLS-TE tunnels while it is configured, use the **disable** command in explicit path configuration mode. To return to the default behavior, use the **no** form of this command.

disable

Syntax Description This command has no arguments or keywords.

Command Default Explicit path is enabled.

Command Modes Explicit path configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task Operations ID |
|---------|---------------------|
| | mpls-te read, write |

Examples

The following example shows how to disable explicit path 200:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# explicit-path identifier 200
RP/0/RP0/CPU0:router(config-expl-path)# disable
```

| Related Commands | Command | Description |
|------------------|---|--|
| | index exclude-address, on page 61 | Specifies the next IP address to exclude from the explicit path. |
| | index next-address, on page 63 | Specifies path entries at a specific index. |
| | show explicit-paths, on page 124 | Displays the configured IP explicit paths. |

disable (P2MP TE)

To disable the given destination for the Point-to-Multipoint (P2MP) tunnel interface, use the **disable** command in P2MP destination interface configuration mode. To return to the default behavior, use the **no** form of this command.

disable

Syntax Description This command has no arguments or keywords.

Command Default None

Command Modes P2MP destination interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines If the **disable** command is not configured, the destination is enabled.

We recommend that you disable those destinations about which you have prior knowledge. This is because those destinations do not have valid MPLS-TE paths; therefore these destinations can be excluded from the P2MP tree computation.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to disable destination 140.140.140.140:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-mte 10
RP/0/RP0/CPU0:router(config-if)# destination 140.140.140.140
RP/0/RP0/CPU0:router(config-if-p2mp-dest)# disable
```

Related Commands

| Command | Description |
|---|--|
| destination (MPLS-TE), on page 42 | Configures the destination address of a TE tunnel. |

ds-te bc-model

To enable a specific bandwidth constraint model (Maximum Allocation Model or Russian Doll Model) on the entire label switched router (LSR), use the **ds-te bc-model** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

ds-te bc-model mam

Syntax Description

mam Enables the Maximum Allocation Model (MAM) bandwidth constraints model.

Command Default

RDM is the default bandwidth constraint model.

Command Modes

MPLS-TE configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

You can configure both the MAM and RDM bandwidth values on a single interface before swapping to an alternate global MPLS-TE BC model.

If you configure bandwidth constraints without configuring the corresponding bandwidth constraint values, the router uses default bandwidth constraint values.

MAM is not supported in prestandard DS-TE mode. MAM and RDM are supported in IETF DS-TE mode; RDM is supported in prestandard DS-TE mode.



Note Changing the bandwidth constraints model affects the entire router and may have a major impact on system performance as nonzero-bandwidth tunnels are torn down.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following example shows how to enable the MAM bandwidth constraints model:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# ds-te bc-model mam
```

Related Commands

| Command | Description |
|---|---|
| ds-te mode, on page 47 | Configures standard DS-TE mode. |
| ds-te te-classes, on page 49 | Enters DS-TE te-class map configuration mode. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| show mpls traffic-eng ds-te te-class, on page 137 | Displays the Diff-Serv TE-class map in use. |

ds-te mode

To configure standard differentiated-service TE mode (DS-TE), use the **ds-te mode** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

ds-te mode ietf

Syntax Description

ietf Enables IETF standard mode.

Command Default

Prestandard DS-TE is the default differentiated service mode.

Command Modes

MPLS-TE configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

The following two DS-TE modes are supported:

- Prestandard mode
 - The Cisco proprietary mechanism for IGP and RSVP signalling are used and DS-TE does not interoperate with third-party vendor equipment.
- IETF mode
 - Standard defined extensions are used for IGP and RSVP signalling and DS-TE in this mode interoperates with third-party equipment.
 - IETF mode supports two bandwidth constraint models: the Russian Doll Model (RDM) and Maximum Allocation Model (MAM).
 - RDM is the default model.
 - Router advertises variable-length bandwidth constraints, max-reservable- bandwidth, and unreserved bandwidths in TE-classes.
 - tunnels must have valid class-type and priority configured as per TE-class map in use; otherwise, tunnels remain down.
 - TE-class map (a set of tunnel priority and class-type values) is enabled to interpret unreserved bandwidth values advertised in IGP; therefore, TE-class map must be identical on all nodes for TE tunnels to be successfully established

For DS-TE to function properly, DS-TE modes must be configured identically on all MPLS-TE nodes.

If you need to change the DS-TE mode, you must bring down all tunnel interfaces and after the change, you should flood the updated bandwidth values through the network.



Note Changing the DS-TE mode affects the entire LSR and can have a major impact on system performance when tunnels are torn down.

Task ID

Task ID **Operations**

mpls-te read,
write

Examples

The following example shows how to enable IETF standard mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# ds-te mode ietf
```

Related Commands

| Command | Description |
|---|--|
| ds-te bc-model, on page 45 | Enables a specific bandwidth constraint model (Maximum Allocation Model or Russian Doll Model) on the LSR. |
| ds-te te-classes, on page 49 | Configures MPLS DS-TE TE-class maps. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| mpls traffic-eng fast-reroute promote, on page 78 | Configures the router to assign new or more efficient backup MPLS-TE tunnels to protected MPLS-TE tunnels. |
| show mpls traffic-eng ds-te te-class, on page 137 | Displays the Diff-Serv TE-class map in use. |

ds-te te-classes

To enter DS-TE te-class map configuration mode, use the **ds-te te-classes** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

```
ds-te te-classes te-class te_class_index {class-type class_type_number {priority pri_number} | unused}
```

Syntax Description

| | |
|--------------------------|--|
| te-class | Configures the te-class map. |
| <i>te_class_index</i> | TE class-map index. Range is 0 to 7. |
| class-type | Configures the class type. |
| <i>class_type_number</i> | Class type value in the te-class map. Range is 0 to 1. |
| priority | Configures the TE tunnel priority. |
| <i>pri_number</i> | TE tunnel priority value. Range is 0 to 7. |
| unused | Marks the TE-class as unused. |

Command Default

The following default te-class maps are used in IETF DS-TE mode:

| te-class index | class-type | priority |
|-----------------------|-------------------|-----------------|
| 0 | 0 | 7 |
| 1 | 1 | 7 |
| 2 | UNUSED | — |
| 3 | UNUSED | — |
| 4 | 0 | 0 |
| 5 | 1 | 0 |
| 6 | UNUSED | — |
| 7 | UNUSED | — |



Note The default mapping has 4 TE-classes used with 2 class-types and, 4 TE-classes are unused. TE-class map is not used in prestandard DS-TE mode.

Command Modes

MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines In IETF DS-TE mode, modified semantic of the unreserved bandwidth TLV is used. Each of the eight available bandwidth values advertised in the IGP corresponds to a TE class. Because IGP advertises only eight bandwidth values, only eight TE-Classes can be supported in a IETF DS-TE network. The TE-Class mapping must be configured the same way on every router in a DS-TE domain. There is, however, no method to automatically detect or enforce this required consistency.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example shows how to configure a TE-class 7 parameter:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# ds-te te-classes te-class 7 class-type 0 priority 4
```

| Related Commands | Command | Description |
|------------------|---|--|
| | ds-te bc-model, on page 45 | Enables a specific bandwidth constraint model (Maximum Allocation Model or Russian Doll Model) on the LSR. |
| | ds-te mode, on page 47 | Configures standard DS-TE mode. |
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | show mpls traffic-eng ds-te te-class, on page 137 | Displays the Diff-Serv TE-class map in use. |

fast-reroute

To enable fast-reroute (FRR) protection for an MPLS-TE tunnel, use the **fast-reroute** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

fast-reroute

Syntax Description This command has no arguments or keywords.

Command Default FRR is disabled.

Command Modes Interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines When a protected link used by the fast-reroutable label switched path (LSP) fails, the traffic is rerouted to a previously assigned backup tunnel. Configuring FRR on the tunnel informs all the nodes that the LSP is traversing that this LSP desires link/node/bandwidth protection.

You must allow sufficient time after an switchover before triggering FRR on standby to synchronize with the active (verified using the **show redundancy** command). All TE tunnels must be in the recovered state and the database must be in the ready state for all ingress and egress line cards. To verify this information, use the **show mpls traffic-eng tunnels** and **show mpls traffic-eng fast-reroute database** commands.



Note Wait approximately 60 seconds before triggering FRR after verifying the database state.

| Task ID | Task Operations ID |
|---------|---------------------|
| | mpls-te read, write |

Examples

The following example shows how to enable FRR on an MPLS-TE tunnel:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# fast-reroute
```

| Related Commands | Command | Description |
|------------------|---|---|
| | fast-reroute protect , on page 53 | Configures node and bandwidth protection for an MPLS-TE tunnel. |

| Command | Description |
|---|---|
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| show mpls traffic-eng forwarding, on page 139 | Displays the contents of the FRR database. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

fast-reroute protect

To enable node and bandwidth protection for an MPLS-TE tunnel, use the **fast-reroute protect** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

fast-reroute protect {**bandwidth** | **node**}

| Syntax Description | |
|--------------------|---------------------------------------|
| bandwidth | Enables bandwidth protection request. |
| node | Enables node protection request. |

Command Default FRR is disabled.

Command Modes Interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to enable bandwidth protection for a specified TE tunnel:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)#interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# fast-reroute protect bandwidth
```

| Related Commands | Command | Description |
|------------------|--|---|
| | fast-reroute, on page 51 | Enables FRR protection for an MPLS-TE tunnel. |
| | interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| | show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

fast-reroute timers promotion

To configure how often the router considers switching a protected MPLS-TE tunnel to a new backup tunnel if additional backup-bandwidth or a better backup tunnel becomes available, use the **fast-reroute timers promotion** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

fast-reroute timers promotion *interval*

| | |
|---------------------------|---|
| Syntax Description | <i>interval</i> Interval, in seconds, between scans to determine if a label switched path (LSP) should use a new, better backup tunnel. Range is 0 to 604800. A value of 0 disables backup tunnel promotions. |
|---------------------------|---|

| | |
|------------------------|-----------------------|
| Command Default | <i>interval</i> : 300 |
|------------------------|-----------------------|

| | |
|----------------------|-----------------------|
| Command Modes | MPLS-TE configuration |
|----------------------|-----------------------|

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|---|
| Usage Guidelines | Setting the interval to a low value puts more load on the CPU because it has to scan all protected LSPs more frequently. It is not recommended that the timer be configured below the default value of 300 seconds. |
|-------------------------|---|

Pacing mechanisms have been implemented to distribute the load on the CPU when backup promotion is active. Because of this, when a large number of protected LSPs are promoted, some delay is noticeable in backup promotion. If the promotion timer is configured to a very low value (depending on the number of protected LSPs) some protected LSPs may never get promoted.

To disable the timer, set the value to zero.

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | read, write |

| | |
|-----------------|--|
| Examples | The following example shows how to specify that LSPs are scanned every 600 seconds (10 minutes) to determine if they should be promoted to a better backup tunnel: |
|-----------------|--|

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# fast-reroute timers promotion 600
```

| | | |
|-------------------------|--|------------------------------------|
| Related Commands | Command | Description |
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |

| Command | Description |
|---|---|
| mpls traffic-eng fast-reroute promote, on page 78 | Configures the router to use a new or more efficient backup MPLS-TE tunnel when a current tunnel is overloaded. |

flooding threshold

To set the reserved bandwidth thresholds for a link as a percentage of the total bandwidth change, use the **flooding threshold** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

flooding threshold {**up** | **down**} *percent*

Syntax Description

| | |
|----------------|--|
| up | Configures the upward flooding threshold as a percentage of the total link bandwidth change. |
| down | Configures the downward flooding threshold as a percentage of the total link bandwidth change. |
| <i>percent</i> | Bandwidth threshold level. Range is 0 to 100 . |

Command Default

No default behavior or values.

Command Modes

MPLS-TE configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.3.4 | This command was introduced. |

Usage Guidelines

Use the **flooding threshold** command to set the up and down thresholds as a percentage of the total bandwidth change. If the **flooding threshold** command is configured, flooding occurs only if the change from the previous flooding is greater than the configured thresholds.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following example shows how to set the reserved bandwidth thresholds as a percentage of the total bandwidth change. Flooding occurs only if the change from the previous flooding is greater than the configured thresholds. In this example, the up and down thresholds are configured as 10 percent. That means, if the last flooded bandwidth percentage is 50 percent, then the flooding occurs only if the bandwidth goes below 40 percent, or if the bandwidth goes above 60 percent.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# flooding threshold up 10 down 10
```


flooding thresholds

To set the reserved bandwidth thresholds for a link, use the **flooding thresholds** command in MPLS-TE interface configuration mode. To return to the default behavior, use the **no** form of this command.

flooding thresholds {**down** | **up**} *percent* [{*percent1 percent2 percent3 ... percent 15*}]

| Syntax Description | down | Configures the threshold for decreased resource availability. |
|--------------------|-----------------------------------|---|
| | up | Configures the threshold for increased resource availability. |
| | <i>percent</i> [<i>percent</i>] | Bandwidth threshold level. Range is 0 to 100 for all 16 levels. |

| Command Default | down: <i>100, 99, 98, 97, 96, 95, 90, 85, 80, 75, 60, 45, 30, 15</i> |
|-----------------|---|
| | up: <i>5, 30, 45, 60, 75, 80, 85, 90, 95, 97, 98, 99, 100</i> |

| Command Modes | MPLS-TE interface configuration |
|---------------|---------------------------------|
|---------------|---------------------------------|

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You can configure up to 16 flooding threshold values. The first value is mandatory; the next 15 are optional. When a threshold is crossed, MPLS-TE link management advertises updated link information. If no thresholds are crossed, changes can be flooded periodically unless periodic flooding was disabled.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example shows how to set the reserved bandwidth threshold for the link for decreased resource availability (down) and for increased resource availability (up) thresholds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# interface POS 0/7/0/0
RP/0/RP0/CPU0:router(config-mpls-te-if)# flooding thresholds down 100 75 25
RP/0/RP0/CPU0:router(config-mpls-te-if)# flooding thresholds up 25 50 100
```

| Related Commands | Command | Description |
|------------------|---|--|
| | interface (MPLS-TE), on page 65 | Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode. |

| Command | Description |
|---|---|
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| link-management timers periodic-flooding, on page 73 | Sets the length of the interval used for periodic flooding. |
| show mpls traffic-eng link-management advertisements, on page 146 | Displays local link information currently being flooded by MPLS-TE link management into the global TE topology. |
| show mpls traffic-eng link-management bandwidth-allocation, on page 149 | Displays current local link information. |

forwarding-adjacency

To configure an MPLS-TE forwarding adjacency, use the **forwarding-adjacency** command in interface configuration mode. By configuring forwarding adjacency, the MPLS-TE tunnels are considered to be links by the IGP. If no forwarding adjacency is to be defined, use the **no** form of this command.

forwarding-adjacency [**holdtime** *time*]

| Syntax Description | holdtime <i>time</i> (Optional) Configures the hold time value, in milliseconds, that is associated with each forwarding-adjacency LSP. The hold time is the duration after which the state change of LSP is advertised to IGP. The default value is 0. | | | | |
|---------------------------|--|---------|--------------|---------------|------------------------------|
| Command Default | holdtime <i>time</i> : 0 | | | | |
| Command Modes | Interface configuration | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |

| | |
|-------------------------|---|
| Usage Guidelines | <p>If you do not specify a holdtime <i>time</i> value, a delay is introduced with the following results:</p> <ul style="list-style-type: none"> • When forwarding-adjacency is configured on a tunnel that is up, TE notifies IGP without any additional delay. • When forwarding-adjacency is configured on a tunnel that is down, TE does not notify IGP. • When a tunnel on which forwarding-adjacency has been configured comes up, TE holds the notification to IGP for the period of holdtime (assuming non-zero holdtime). When the holdtime elapses, TE notifies IGP if the tunnel is still up. |
|-------------------------|---|

The paths that traffic is taking to the destination can be manipulated by adjusting the forwarding adjacency link metric. To do that, use the **bandwidth** command. The unit of possible bandwidth values is in kbps.

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | read, write |

| | |
|-----------------|--|
| Examples | This example shows how to configure forwarding adjacency with a holdtime value of 60 milliseconds: |
|-----------------|--|

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 888
RP/0/RP0/CPU0:router(config-if)# forwarding-adjacency holdtime 60
```

Related Commands

| Command | Description |
|---|---|
| bandwidth (RSVP) | Configures RSVP bandwidth on an interface using prestandard DS-TE mode. |
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |
| show mpls traffic-eng forwarding-adjacency, on page 141 | Displays forwarding-adjacency information. |

index exclude-address

To exclude an address from a tunnel path entry at a specific index, use the **index exclude-address** command in explicit path configuration mode. To return to the default behavior, use the **no** form of this command.

```
index index-id exclude-address { ipv4 unicast IP address }
```

| | | |
|---------------------------|---------------------------------------|--|
| Syntax Description | <i>index-id</i> | Index number at which the path entry is inserted or modified. Range is 1 to 65535. |
| | ipv4 unicast <i>IP address</i> | Excludes the IPv4 unicast address. |

Command Default No default behavior or values

Command Modes Explicit path configuration

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You cannot include or exclude addresses from an IP explicit path unless explicitly configured using the **exclude-address** keyword.

Use the **exclude-address** keyword only after entering the explicit path configuration mode.

If you use the **exclude-address** keyword and specify the IP address of a link, the constraint-based routine does not consider that link when it sets up MPLS-TE paths. If the excluded address is a flooded MPLS-TE router ID, the constraint-based shortest path first (SPF) routine does not consider that entire node.



Note The person who performs the configuration must know the IDs of the routers, as it may not be apparent if the value refers to the link or to the node.

MPLS-TE accepts IP explicit paths composed of all excluded addresses configured using the **exclude-address** keyword.

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read, write |

Examples

The following example shows how to exclude address 192.168.3.2 at index 3 of the explicit path 200:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# explicit-path identifier 200
RP/0/RP0/CPU0:router(config-expl-path)# index 3 exclude-address ipv4 unicast 192.168.3.2
```

Related Commands

| Command | Description |
|--|---|
| index next-address, on page 63 | Specifies path entries at a specific index. |
| show explicit-paths, on page 124 | Displays the configured IP explicit paths. |

index next-address

To include a path entry at a specific index, use the **index next-address** command in explicit path configuration mode. To return to the default behavior, use the **no** form of this command.

index *index-id* **next-address** [{**loose** | **strict**}] **ipv4 unicast** *IP-address*

| Syntax Description | | |
|--|------------|--|
| <i>index-id</i> | | Index number at which the path entry is inserted or modified. Range is 1 to 65535. |
| ipv4 unicast <i>IP-address</i> | | Includes the IPv4 unicast address (strict address). |
| loose ipv4 unicast <i>IP-address</i> | (Optional) | Specifies the next unicast address in the path as a loose hop. |
| strict ipv4 unicast <i>IP-address</i> | (Optional) | Specifies the next unicast address in the path as a strict hop. |

Command Default No default behavior or values

Command Modes Explicit path configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You cannot include addresses from an IP explicit path unless explicitly configured using the **next-address** keyword.

Use the **next-address** keyword only after entering the explicit path configuration mode.



Note The person who performs the configuration must know the IDs of the routers, as it may not be apparent if the value refers to the link or to the node.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to insert the **next-address** 192.168.3.2 at index 3 of the explicit path 200:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# explicit-path identifier 200
RP/0/RP0/CPU0:router(config-expl-path)# index 3 next-address ipv4 unicast 192.168.3.2
```

Related Commands

| Command | Description |
|---|--|
| index exclude-address, on page 61 | Specifies the next IP address to exclude from the explicit path. |
| show explicit-paths, on page 124 | Displays the configured IP explicit paths. |

interface (MPLS-TE)

To enable MPLS-TE on an interface and to enter MPLS-TE interface configuration mode, use the **interface** command in XR Config mode. To return to the default behavior, use the **no** form of this command.

interface *type interface-path-id*

| | | |
|---------------------------|--------------------------|---|
| Syntax Description | <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| | <i>interface-path-id</i> | Physical interface or virtual interface. |
| | Note | Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| | | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No default behavior or values

Command Modes

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You must enter MPLS-TE interface mode to configure specific interface parameters on physical interfaces. Configuring MPLS-TE links or a tunnel TE interface begins the TE-control process on .

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to enter the MPLS-TE interface configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# interface POS 0/7/0/1
```

The following example shows how to remove an interface from the MPLS-TE domain:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# no interface POS 0/7/0/1
```

interface (SRLG)

To enable Shared Risk Link Groups (SRLGs) on an interface and to enter SRLG interface configuration mode, use the **interface** command in SRLG configuration mode. To return to the previous configuration mode, use the **no** form of this command.

interface *type interface-path-id*

Syntax Description

type Interface type. For more information, use the question mark (?) online help function.

interface-path-id Physical interface or virtual interface.

Note Use the **show interfaces** command to see a list of all possible interfaces currently configured on the router.

For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

SRLG configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Task ID

| Task ID | Operation |
|---------|----------------|
| mpls-te | read, write |

Example

The following example shows how to enter SRLG interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# srlg
RP/0/RP0/CPU0:router(config-srlg)# interface POS 0/1/0/1
RP/0/RP0/CPU0:router(config-srlg-if)# value 10
RP/0/RP0/CPU0:router(config-srlg-if)#value 50
```

Related Commands

| Command | Description |
|---|--|
| interface (MPLS-TE), on page 65 | Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |

interface tunnel-mte

To configure an MPLS-TE P2MP tunnel interface, use the **interface tunnel-mte** command in XR Config mode. To return to the default behavior, use the **no** form of this command.

```
interface tunnel-mte tunnel-id
```

| | |
|---------------------------|---|
| Syntax Description | <i>tunnel-id</i> Tunnel number. Range is from 0 to 65535. |
|---------------------------|---|

| | |
|------------------------|---------------------------------|
| Command Default | Tunnel interfaces are disabled. |
|------------------------|---------------------------------|

Command Modes

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines

Configuring MPLS-TE links or tunnel-te, tunnel-gte, or tunnel-mte interfaces begins the TE-control process on route processor (RP).

The **interface tunnel-mte** command indicates that the tunnel interface is for an MPLS-TE P2MP tunnel and enables these MPLS-TE P2MP configuration options.



Note You must configure record-route on TE tunnels that are protected by multiple backup tunnels merging at a single node.

To use the P2MP tunnels, you must configure a Loopback address and use the **ipv4 unnumbered** command for the Loopback interface type.

Task ID

Task ID Operations

```
interface read,  
write
```

Examples

This example shows how to configure tunnel interface 1:

```
RP/0/RP0/CPU0:router# configure  
RP/0/RP0/CPU0:router(config)# interface tunnel-mte 1  
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback0
```

Related Commands

| Command | Description |
|-------------------------------------|---|
| affinity, on page 7 | Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel. |

| Command | Description |
|--|---|
| backup-bw, on page 25 | Configures backup bandwidth for FRR. |
| fast-reroute, on page 51 | Enables FRR protection for an MPLS-TE tunnel. |
| path-selection metric (interface), on page 103 | Configures a path selection metric—TE or IGP. |
| priority (MPLS-TE), on page 117 | Configures setup and reservation priority for an MPLS-TE tunnel. |
| record-route, on page 119 | Configures record-route on an MPLS-TE tunnel. |
| signalled-bandwidth | Configures the bandwidth required for an MPLS-TE tunnel. |
| signalled-name, on page 194 | Configures the name of the tunnel required for an MPLS-TE tunnel. |

interface tunnel-te

To configure an MPLS-TE tunnel interface, use the **interface tunnel-te** command in XR Config mode. To return to the default behavior, use the **no** form of this command.

interface tunnel-te *tunnel-id*

| Syntax Description | <i>tunnel-id</i> Tunnel number. Range is 0 to 65535. | | | | |
|---------------------------|---|---------|--------------|---------------|------------------------------|
| Command Default | Tunnel interfaces are disabled. | | | | |
| Command Modes | | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |

Usage Guidelines

You cannot have two tunnels using the same encapsulation mode with exactly the same source and destination address. The workaround is to create a loopback interface and to use the loopback interface address as the source address of the tunnel.

Configuring MPLS-TE links or Tunnel-TE interface begins the TE-control process on .

The **interface tunnel-te** command indicates that the tunnel interface is for an MPLS-TE tunnel and enables the various tunnel MPLS configuration options.



Note You must configure record-route on TE tunnels that are protected by multiple backup tunnels merging at a single node.

Task ID

Task ID Operations

interface read,
write

Examples

The following example shows how to configure tunnel interface 1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback0
```

The following example shows how to set the tunnel-class attribute to map the correct traffic class to the tunnel:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
```

```
RP/0/RP0/CPU0:router(config-if)# policy-class 1
```

Related Commands

| Command | Description |
|--|---|
| affinity, on page 7 | Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel. |
| autoroute metric, on page 23 | Instructs the IGP to use the tunnel in its enhanced SPF calculation, if the tunnel is in an up state. |
| backup-bw, on page 25 | Configures backup bandwidth for FRR. |
| fast-reroute, on page 51 | Enables FRR protection for an MPLS-TE tunnel. |
| path-option (MPLS-TE), on page 92 | Configures a path option for an MPLS tunnel. |
| path-selection metric (interface), on page 103 | Configures a path selection metric—TE or IGP. |
| policy-class | Configures PBTS to direct traffic into specific TE tunnels. |
| priority (MPLS-TE), on page 117 | Configures setup and reservation priority for an MPLS-TE tunnel. |
| record-route, on page 119 | Configures record-route on an MPLS-TE tunnel. |

ipv4 unnumbered (MPLS)

To specify the MPLS-TE tunnel Internet Protocol Version 4 (IPv4) address, use the **ipv4 unnumbered** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

ipv4 unnumbered *type interface-path-id*

| | | |
|---------------------------|--------------------------|--|
| Syntax Description | <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| | <i>interface-path-id</i> | Physical interface or virtual interface. |
| | Note | Use the show interfaces command to see a list of all interfaces currently configured on the router. |
| | | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No IP address is set.

Command Modes Interface configuration

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Tunnel-te is not signaled until an IP address is configured on the tunnel interface; therefore, the tunnel state stays down without IP address configuration.

Loopback is commonly used as the interface type.

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | network | read, write |

Examples

The following example shows how to configure the MPLS-TE tunnel to use the IPv4 address used on loopback interface 0:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback0
```

link-management timers bandwidth-hold

To set the length of time that bandwidth is held for a Resource Reservation Protocol (RSVP) Path (setup) message to wait for the corresponding RSVP Resv message to return, use the **link-management timers bandwidth-hold** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

link-management timers bandwidth-hold *holdtime*

Syntax Description *holdtime* Number of seconds that bandwidth can be held. Range is 1 to 300. Default is 15.

Command Default *holdtime: 15*

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The **link-management timers bandwidth-hold** command determines the time allowed for an RSVP message to return from a neighbor RSVP node.

| Task ID | Task ID | Operations |
|---------|------------------------|------------|
| | mpls-te read, write | |

Examples The following example shows how to set the bandwidth to be held for 10 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# link-management timers bandwidth-hold 10
```

Related Commands

| Command | Description |
|---|--|
| link-management timers periodic-flooding, on page 73 | Sets the length of the interval used for periodic flooding. |
| mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| show mpls traffic-eng link-management bandwidth-allocation, on page 149 | Displays current local link information and bandwidth hold time. |

link-management timers periodic-flooding

To set the length of the interval for periodic flooding, use the **link-management timers periodic-flooding** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

link-management timers periodic-flooding *interval*

Syntax Description *interval* Length of the interval, in seconds, for periodic flooding. Range is 0 to 3600. A value of 0 turns off periodic flooding. The minimum value is 30.

Command Default *interval*: 180

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The **link-management timers periodic-flooding** command advertises the link state information changes that do not trigger immediate action, such as a change to the allocated bandwidth that does not cross a threshold.

| Task ID | Task Operations ID |
|---------|------------------------|
| | mpls-te read, write |

Examples The following example shows how to set the interval length for periodic flooding to 120 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# link-management timers periodic-flooding 120
```

| Related Commands | Command | Description |
|------------------|--|---|
| | flooding thresholds, on page 57 | Sets the reserved bandwidth flooding thresholds for a link. |
| | link-management timers bandwidth-hold, on page 72 | Sets the length of time that bandwidth is held for a RSVP Path (setup) message to wait for the corresponding RSVP Resv message to return. |
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | show mpls traffic-eng link-management summary, on page 161 | Displays the current periodic flooding interval. |

link-management timers preemption-delay

To set the length of the interval for delaying LSP preemption, use the **link-management timers preemption-delay** command in MPLS-TE configuration mode. To disable this behavior, use the **no** form of this command.

link-management timers preemption-delay bundle-capacity *sec*

| Syntax Description | bundle-capacity <i>sec</i> Specifies the bundle-capacity preemption timer value in seconds. | | | | |
|---------------------------|--|---------|--------------|---------------|------------------------------|
| Command Default | None | | | | |
| Command Modes | MPLS-TE configuration | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |
| Usage Guidelines | The value 0 as bundle-capacity value in the link-management timers preemption-delay command disables this timer. This means there is no delay before preemption sets in when the bundle capacity goes down. | | | | |
| Task ID | <table border="1"> <thead> <tr> <th>Task ID</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read, write</td> </tr> </tbody> </table> | Task ID | Operation | mpls-te | read, write |
| Task ID | Operation | | | | |
| mpls-te | read, write | | | | |

This example shows how to set the interval length for preemption-delay:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# link-management timers preemption-delay bundle-capacity
180
```

mpls traffic-eng

To enter MPLS-TE configuration mode, use the **mpls traffic-eng** command in XR Config mode.

mpls traffic-eng

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following example shows how to enter MPLS-TE configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)#
```

mpls traffic-eng auto-bw apply (MPLS-TE)

To apply the highest bandwidth collected on a tunnel without waiting for the current application period to end, use the **mpls traffic-eng auto-bw apply** command in XR EXEC mode.

```
mpls traffic-eng auto-bw apply {all | tunnel-te tunnel-number}
```

| | | |
|---------------------------|--------------------------------|---|
| Syntax Description | all | Applies the highest bandwidth collected instantly on all the automatic bandwidth-enabled tunnels. |
| | tunnel-te tunnel-number | Applies the highest bandwidth instantly to the specified tunnel. The range is from 0 to 65535. |
| Command Default | No default behavior or values | |
| Command Modes | XR EXEC | |
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The **mpls traffic-eng auto-bw apply** command can forcefully expire the current application period on a specified tunnel and immediately apply the highest bandwidth recorded so far instead of waiting for the application period to end on its own.



Note The predefined threshold check still applies on the configuration, and if the delta is not significant enough, the automatic bandwidth functionality overrides this command.

The bandwidth application is performed only if at least one output rate sample has been collected for the current application period.

To guarantee the application of a specific signaled bandwidth value when triggering a manual bandwidth application, follow these steps:

1. Configure the minimum and maximum automatic bandwidth to the bandwidth value that you want to apply by using the **bw-limit (MPLS-TE)**, on page 30 command.
2. Trigger a manual bandwidth application by using the **mpls traffic-eng auto-bw apply** command.
3. Revert the minimum and maximum automatic bandwidth value back to their original value.

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | execute |

Examples

The following example applies the highest bandwidth to a specified tunnel:

```
RP/0/RP0/CPU0:router# mpls traffic-eng auto-bw apply tunnel-te 1
```

| Related Commands | Command | Description |
|------------------|--|---|
| | auto-bw collect frequency (MPLS-TE), on page 21 | Configures the automatic bandwidth collection frequency and controls the manner in which the bandwidth for a tunnel collects output rate information, but does not adjust the tunnel bandwidth. |
| | show mpls traffic-eng tunnels auto-bw brief, on page 190 | Displays the list of automatic-bandwidth-enabled tunnels, and indicates if the current signaled bandwidth of the tunnel is identical to the bandwidth that is applied by the automatic bandwidth. |

mpls traffic-eng fast-reroute promote

To configure the router to assign new or more efficient backup MPLS-TE tunnels to protected MPLS-TE tunnels, use the **mpls traffic-eng fast-reroute promote** command in XR EXEC mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng fast-reroute promote

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples The following example shows how to initiate backup tunnel promote and assignment:

```
RP/0/RP0/CPU0:router# mpls traffic-eng fast-reroute promote
```

| Related Commands | Command | Description |
|------------------|--|---|
| | fast-reroute, on page 51 | Enables FRR protection for an MPLS-TE tunnel. |

mpls traffic-eng level

To configure a router running Intermediate System-to-System (IS-IS) MPLS-TE at IS-IS Level 1 and Level 2, use the **mpls traffic-eng level** command in router configuration mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng level *isis-level*

| | |
|---------------------------|---|
| Syntax Description | <i>isis-level</i> IS-IS level (1, 2, or both) where MPLS-TE is enabled. |
|---------------------------|---|

| | |
|------------------------|-------------------------------|
| Command Default | No default behavior or values |
|------------------------|-------------------------------|

| | |
|----------------------|----------------------|
| Command Modes | Router configuration |
|----------------------|----------------------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|--|
| Usage Guidelines | The mpls traffic-eng level command is supported for IS-IS and affects the operation of MPLS-TE only if MPLS-TE is enabled for that routing protocol instance. |
|-------------------------|--|

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | isis | read, write |

| | |
|-----------------|---|
| Examples | The following example shows how to configure a router running IS-IS MPLS to flood TE for IS-IS level 1: |
|-----------------|---|

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router isis 1
RP/0/RP0/CPU0:router(config-isis)# address-family ipv4 unicast
RP/0/RP0/CPU0:router(config-isis-af)# mpls traffic-eng level 1
RP/0/RP0/CPU0:router(config-isis-af)# metric-style wide
```

| Related Commands | Command | Description |
|-------------------------|---|---|
| | mpls traffic-eng router-id (MPLS-TE router), on page 85 | Specifies that the TE router identifier for the node is the IP address associated with a given interface. |

mpls traffic-eng link-management flood

To enable immediate flooding of all the local MPLS-TE links, use the **mpls traffic-eng link-management flood** command in XR EXEC mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng link-management flood

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note If there is no change in the LSA since last flooding, IGP may dampen the advertisement.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to initiate flooding of the local MPLS-TE links:

```
RP/0/RP0/CPU0:router# mpls traffic-eng link-management flood
```

Related Commands

| Command | Description |
|---|--|
| show mpls traffic-eng link-management advertisements, on page 146 | Displays MPLS-TE link-management advertisements. |

mpls traffic-eng pce activate-pcep

To force idle peers to be reestablished without waiting for a timer, use the **mpls traffic-eng pce activate-pcep** command in XR EXEC mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng pce activate-pcep {*address* | **all**}

Syntax Description

address Address of the idle peer.

all Activates all the idle peers.

Command Default

No default behavior or values

Command Modes

XR EXEC

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

| Task ID | Operations |
|---------|----------------------|
| mpls-te | read, write, execute |

Examples

The following example shows how to trigger a path computation client (PCC) or PCE to activate an idle path computation element protocol (PCEP) session:

```
RP/0/RP0/CPU0:router# mpls traffic-eng pce activate-pcep all
```

Related Commands

| Command | Description |
|---|---|
| mpls traffic-eng pce reoptimize, on page 82 | Triggers reoptimization manually either for all tunnels or a specific PCE-based tunnel. |

mpls traffic-eng pce reoptimize

To trigger reoptimization manually either for all or a specific PCE-based tunnel, use the **mpls traffic-eng pce reoptimize** command in XR EXEC mode. To disable this feature, use the **no** form of this command.

mpls traffic-eng pce reoptimize [*tunnel ID*] [**force**]

Syntax Description

tunnel ID (Optional) Tunnel ID to be reoptimized. Range is from 0 to 65535.

force (Optional) Forces the router to start using the newly calculated route even if the used path has a better metric.

Command Default

Reoptimizes all the PCE tunnels.

Command Modes

XR EXEC

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

If you do not run the **mpls traffic-eng pce reoptimize** command, the system tries to reoptimize at an interval of 3600 seconds.

Task ID

| Task ID | Operations |
|---------|----------------------|
| mpls-te | read, write, execute |

Examples

The following example shows how to trigger reoptimization for all PCE-based tunnels:

```
RP/0/RP0/CPU0:router# mpls traffic-eng pce reoptimize
```

Related Commands

| Command | Description |
|--|---|
| mpls traffic-eng pce activate-pcep, on page 81 | Forces idle peers to be re-established without waiting for a timer. |

mpls traffic-eng reoptimize (EXEC)

To trigger the reoptimization interval of all TE tunnels, use the **mpls traffic-eng reoptimize** command in XR EXEC mode.

mpls traffic-eng reoptimize [*tunnel-id*] [*tunnel-name*] [**p2p**{**all** *tunnel-id*}]

| Syntax Description | |
|--------------------|---|
| <i>tunnel-id</i> | (Optional) MPLS-TE tunnel identification expressed as a number. Range is from 0 to 65535. |
| <i>tunnel-name</i> | (Optional) TE tunnel identification expressed as a name. |
| p2p | (Optional) Forces an immediate reoptimization of all P2P TE tunnels. |
| all | (Optional) Forces an immediate reoptimization for all P2P tunnels. |
| <i>tunnel-id</i> | P2P TE tunnel identification to be reoptimized. Range is from 0 to 65535. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | execute |

Examples

The following example shows how to immediately reoptimize all TE tunnels:

```
RP/0/RP0/CPU0:router# mpls traffic-eng reoptimize
```

The following example shows how to immediately reoptimize TE tunnel-te90:

```
RP/0/RP0/CPU0:router# mpls traffic-eng reoptimize tunnel-te90
```

The following example shows how to immediately reoptimize all P2P TE tunnels:

```
RP/0/RP0/CPU0:router# mpls traffic-eng reoptimize p2p all
```

mpls traffic-eng resetup (EXEC)

To trigger the re-setup of TE tunnels, clearing the LSP states, use the **mpls traffic-eng resetup** command in XR EXEC mode.

mpls traffic-eng resetup {P2MP | P2P | name}

| Syntax Description | | |
|--------------------|------------------|--|
| P2MP | <i>tunnel-id</i> | Re-setup a specific P2MP tunnel by tunnel-id. The P2MP tunnel ID range is from 0 to 65535. |
| P2P | <i>tunnel-id</i> | Re-setup a specific P2P tunnel by tunnel-id. The P2MP tunnel ID range is from 0 to 65535. |
| name | <i>name</i> | Re-setup a specific tunnel by the given name. |

Command Default No default behavior or values

Command Modes XR EXEC mode

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.1.1 | This command was introduced. |

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | execute |

Examples

The following example shows how to re-setup a specific tunnel by the given name (tunnel-te1):

```
RP/0/RP0/CPU0:router#mpls traffic-eng resetup name tunnel-te1
```

The following example shows how to re-setup a specific P2P tunnel based on the specified tunnel-id (tunnel-id 1):

```
RP/0/RP0/CPU0:router#mpls traffic-eng resetup P2P tunnel-id 1
```

The following example shows how to re-setup a P2MP tunnel based on the specified tunnel-id (tunnel-id 2):

```
RP/0/RP0/CPU0:router#mpls traffic-eng resetup P2MP tunnel-id 2
```

mpls traffic-eng router-id (MPLS-TE router)

To specify that the TE router identifier for the node is the IP address associated with a given interface, use the **mpls traffic-eng router-id** command in the appropriate mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng router-id *type interface-path-id*

Syntax Description

type Interface type. For more information, use the question mark (?) online help function.

interface-path-id Physical interface or virtual interface.

Note Use the **show interfaces** command to see a list of all interfaces currently configured on the router.

For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

OSPF configuration

IS-IS address family configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

A routers identifier acts as a stable IP address for the TE configuration. This IP address is flooded to all nodes. You must set the destination on the destination node TE router identifier for all affected tunnels. This router ID is the address that the TE topology database at the tunnel head uses for its path calculation.



Note When the **mpls traffic-eng router-id** command is not configured, global router ID is used by MPLS-TE if there is one configured.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following examples show how to specify the TE router identifier as the IP address associated with loopback interface:

```
RP/0/RP0/CPU0:router# configure
```

```
RP/0/RP0/CPU0:router(config)# router ospf CORE_AS
RP/0/RP0/CPU0:router(config-ospf)# mpls traffic-eng router-id 7.7.7.7

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router isis 811
RP/0/RP0/CPU0:router(config-isis)# address-family ipv4 unicast
RP/0/RP0/CPU0:router(config-isis-af)# mpls traffic-eng router-id 8.8.8.8
```

Related Commands

| Command | Description |
|--|---|
| mpls traffic-eng level, on page 79 | Configures a router running OSPF MPLS so that it floods TE for the indicated IS-IS level. |

mpls traffic-eng tunnel preferred

By default, IS-IS installs multiple ECMPs for a route in the RIB through MPLS TE tunnels and physical interfaces. To limit IS-IS to use only MPLS TE tunnels for ECMP, use the **mpls traffic-eng tunnel preferred** command in XR Config Mode. To return to the default behavior, use the **no** form of this command.

```
mpls traffic-eng tunnel preferred
no mpls traffic-eng tunnel preferred
```

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR Config Mode

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 7.6.1 | This command was introduced. |

Usage Guidelines The **mpls traffic-eng tunnel preferred** command is supported for IS-IS and affects the operation of MPLS-TE only if MPLS-TE is enabled for that routing protocol instance.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | isis | read, write |

Examples The following example shows how to configure the tunnel preference:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router isis 1
RP/0/RP0/CPU0:router(config-isis)# address-family ipv4 unicast
RP/0/RP0/CPU0:router(config-isis-af)# mpls traffic-eng tunnel preferred
```

mpls traffic-eng tunnel restricted

To specify an autoroute tunnel as a designated path, use the **mpls traffic-eng tunnel restricted** command in IS-IS address family mode config mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng tunnel restricted

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes IS-IS address family mode

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 7.6.2 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | isis | read, write |

Examples

The following example shows how to specify an autoroute tunnel as designated path:

```
Router# configure
Router(config)# router isis 1
Router(config-isis)# address-family ipv4 unicast
Router(config-isis-af)# mpls traffic-eng tunnel restricted
```


mpls traffic-eng timers backoff-timer

To update MPLS-TE backoff timer duration, use the **mpls traffic-eng timers backoff-timer** command in global configuration mode. To revert to the default backoff timer duration, use the **no** form of the command.

```
mpls traffic-eng timers backoff-timer initial-interval seconds final-interval seconds
no mpls traffic-eng timers backoff-timer
```

| Syntax Description | initial-interval <i>seconds</i> | Specifies the initial wait period after which the head-end router attempts to send traffic over an LSP, when a path error occurs. The default value of the initial wait period after an LSP error occurs is 3 seconds. | | | | |
|---------------------------|---|---|--------------|---------------|------------------------------|--|
| | final-interval <i>seconds</i> | Specifies the total time duration for which the head-end router attempts to send traffic over the LSP after an LSP error occurs. The default value of the total time is 300 seconds. | | | | |
| Command Default | The MPLS-TE backoff timer duration is enabled with the default values mentioned in the Syntax Description section. | | | | | |
| Command Modes | Global configuration (config) | | | | | |
| Command History | <table border="1"> <thead> <tr> <th data-bbox="386 1035 521 1066">Release</th> <th data-bbox="537 1035 678 1066">Modification</th> </tr> </thead> <tbody> <tr> <td data-bbox="386 1087 472 1150">Release 7.3.2</td> <td data-bbox="537 1087 862 1119">This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 7.3.2 | This command was introduced. | |
| Release | Modification | | | | | |
| Release 7.3.2 | This command was introduced. | | | | | |
| Usage Guidelines | If you want MPLS-TE to send traffic over a different LSP immediately after a path error occurs, set the initial and final backoff timer values to 0. | | | | | |

Example

This example shows how to set an MPLS-TE backoff timer initial duration of 10 seconds, for a total timer duration of 600 seconds.

```
Router# configure
Router(config)# mpls traffic-eng timers backoff-timer initial-interval 10 final-interval 600
Router(config)# commit
```

This example shows how to enable MPLS-TE to send traffic over a different LSP, immediately after an LSP error occurs.

```
Router# configure
Router(config)# mpls traffic-eng timers backoff-timer initial-interval 0 final-interval 0
Router(config)# commit
```

overflow threshold (MPLS-TE)

To configure the tunnel overflow detection, use the **overflow threshold** command in MPLS-TE automatic bandwidth interface configuration mode. To disable the overflow detection feature, use the **no** form of this command.

overflow threshold *percentage* [**min** *bandwidth*] **limit** *limit*

| Syntax Description | |
|-----------------------------|---|
| <i>percentage</i> | Bandwidth change percent to trigger an overflow. The range is from 1 to 100. |
| min <i>bandwidth</i> | (Optional) Configures the bandwidth change value, in kbps, to trigger an overflow. The range is from 10 to 4294967295. The default is 10. |
| limit <i>limit</i> | Configures the number of consecutive collection intervals that exceeds the threshold. The bandwidth overflow triggers an early tunnel bandwidth update. The range is from 1 to 10. The default is none. |

Command Default The default value is disabled.

Command Modes MPLS-TE automatic bandwidth interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines

If you modify the **limit** keyword, the consecutive overflows counter for the tunnel is also reset.

If you enable or modify the minimum value, the current consecutive overflows counter for the tunnel is also reset, which effectively restarts the overflow detection from scratch.

Several number of consecutive bandwidth samples are greater than the overflow threshold (bandwidth percentage) and the minimum bandwidth configured, then a bandwidth application is updated immediately instead of waiting for the end of the application period.

Overflow detection applies only to bandwidth increase. For example, an overflow can not be triggered even if bandwidth decreases by more than the configured overflow threshold.

| Task ID | Task Operations ID |
|---------|------------------------|
| | mpls-te read, write |

Examples The following example shows how to configure the tunnel overflow detection for tunnel-te 1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router (config)# interface tunnel-te 1
```

```
RP/0/RP0/CPU0:router(config-if)# auto-bw
RP/0/RP0/CPU0:router(config-if-tunte-autobw)# overflow threshold 50 limit 3
```

| Related Commands | Command | Description |
|------------------|--|---|
| | adjustment-threshold (MPLS-TE), on page 4 | Configures the tunnel bandwidth change threshold to trigger an adjustment. |
| | application (MPLS-TE), on page 14 | Configures the application frequency in minutes for the applicable tunnel. |
| | auto-bw (MPLS-TE), on page 19 | Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode. |
| | bw-limit (MPLS-TE), on page 30 | Configures the minimum and maximum automatic bandwidth to set on a tunnel. |
| | collect-bw-only (MPLS-TE), on page 40 | Enables only the bandwidth collection without adjusting the automatic bandwidth. |
| | show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

path-option (MPLS-TE)

To configure a path option for an MPLS-TE tunnel, use the **path-option** command in tunnel-te interface configuration mode. To return to the default behavior, use the **no** form of this command.

```
path-option preference-priority {dynamic [pce [address ipv4 address]] | explicit {name path-name | identifier path-number}} [attribute-set name] [isis instance-name level level] [lockdown] [ospf instance-name area {value address}] [verbatim]
```

Syntax Description

| | |
|--------------------------------------|--|
| <i>preference-priority</i> | Path option number. Range is from 1 to 1000. |
| dynamic | Specifies that label switched paths (LSP) are dynamically calculated. |
| pce | (Optional) Specifies that the LSP is computed by a Path Computation Element (PCE). |
| address | (Optional) Configures the address for the PCE. |
| ipv4 <i>address</i> | Configures the IPv4 address for the PCE. |
| explicit | Specifies that LSP paths are IP explicit paths. |
| name <i>path-name</i> | Specifies the path name of the IP explicit path. |
| identifier <i>path-number</i> | Specifies a path number of the IP explicit path. |
| isis <i>instance-name</i> | (Optional) Limits CSPF to a single IS-IS instance and area. |
| attribute-set <i>name</i> | (Optional) Specifies the attribute set for the LSP. |
| level <i>level</i> | Configures the level for IS-IS. The range is from 1 to 2. |
| lockdown | (Optional) Specifies that the LSP cannot be reoptimized. |
| ospf <i>instance-name</i> | (Optional) Limits CSPF to a single OSPF instance and area. |
| area | Configures the area for OSPF. |
| <i>value</i> | Decimal value for the OSPF area ID. |
| <i>address</i> | IP address for the OSPF area ID. |
| verbatim | (Optional) Bypasses the Topology/CSPF check for explicit paths. |

Command Default

No default behavior or values

Command Modes

Tunnel-te interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

You can configure several path options for a single tunnel. For example, there can be several explicit path options and a dynamic option for one tunnel. The path setup preference is for lower (not higher) numbers, so option 1 is preferred.

When the lower number path option fails, the next path option is used to set up a tunnel automatically (unless using the lockdown option).

You specify the backup path for the **path-option** command in case of the primary path failure.

CSPF areas are configured on a per-path-option basis.

Task ID**Task Operations ID**

```
mpls-te read,
write
```

Examples

The following example shows how to configure the tunnel to use a named IPv4 explicit path as verbatim and lockdown options for the tunnel. This tunnel cannot reoptimize when the FRR event goes away, unless you manually reoptimize it:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# path-option 1 explicit name test verbatim lockdown
```

The following example shows how to enable path protection on a tunnel to configure an explicit path:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# path-option 1 explicit name po4
RP/0/RP0/CPU0:router(config-if)# path-option protecting 1 explicit name po6
```

The following example shows how to limit CSPF to a single OSPF instance and area:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# path-option 1 explicit name router1 ospf 3 area 7 verbatim
```

The following example shows how to limit CSPF to a single IS-IS instance and area:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# path-option 1 dynamic isis mtbf level 1 lockdown
```

Related Commands

| Command | Description |
|--|---|
| show explicit-paths, on page 124 | Displays the configured IP explicit paths. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

path-option (P2MP TE)

To configure the primary or fallback path setup option for a Point-to-Multipoint (P2MP) TE tunnel, use the **path-option** command in P2MP destination interface configuration mode. To return to the default behavior, use the **no** form of this command.

```
path-option preference-priority {dynamic | explicit {name path-name | identifier path-number} }
[verbatim] [lockdown]
```

| Syntax Description | | |
|--------------------|--------------------------------------|---|
| | <i>preference-priority</i> | Path option number. Range is from 1 to 1000. |
| | dynamic | Specifies that label switched paths (LSP) are dynamically calculated. |
| | explicit | Specifies that LSP paths are IP explicit paths. |
| | name <i>path-name</i> | Specifies the path name of the IP explicit path. |
| | identifier <i>path-number</i> | Specifies a path number of the IP explicit path. |
| | verbatim | (Optional) Bypasses the Topology/CSPF check for explicit paths. |
| | lockdown | (Optional) Specifies that the LSP cannot be reoptimized. |

Command Default None

Command Modes P2MP destination interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You can configure several path options for each destination of a P2MP tunnel. For example, for one tunnel, there can be several explicit path options and a dynamic option. The path preference is for lower (not higher) numbers, so option 1 is preferred over higher options.

When the lower number path option fails, the next path option under the destination is attempted.

Several path-options can be configured for each destination under a tunnel.

When configuring multiple path-options under each destination of a P2MP tunnel, the PCALC on the TE tunnel source attempts to generate the P2MP tree starting from the preferred path-options (lower numbers) for each destination. If some destinations use explicit paths that cause remerges with the dynamic generated paths for other destinations in the P2MP tree, the PCALC source modifies the dynamic paths (for example, optimal path); therefore, it follows the explicit path to correct the remerge problem.

The **path-option** command is common for both Point-to-Point (P2P) and P2MP tunnels.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

This example shows how to configure a P2MP tunnel with two destinations and several path-options per destination:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-mte 100
RP/0/RP0/CPU0:router(config-if)# destination 10.0.0.1
RP/0/RP0/CPU0:router(config-if-p2mp-dest)# path-option 1 explicit name po_dest1
RP/0/RP0/CPU0:router(config-if-p2mp-dest)# path-option 2 dynamic
```

This example shows that the fallback path option is dynamic:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-mte 100
RP/0/RP0/CPU0:router(config-if)# destination 172.16.0.1
RP/0/RP0/CPU0:router(config-if-p2mp-dest)# path-option 1 explicit name po_dest2
RP/0/RP0/CPU0:router(config-if-p2mp-dest)# path-option 2 dynamic
```

Related Commands

| Command | Description |
|--|---|
| destination (MPLS-TE), on page 42 | Configures the destination address of a TE tunnel. |
| mpls traffic-eng path-protection switchover gmpls | Specifies a switchover for path protection. |
| show explicit-paths, on page 124 | Displays the configured IP explicit paths. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |
| show mrrib mpls traffic-eng fast-reroute | Displays information about Multicast Routing Information Base (MRIB) MPLS traffic engineering fast reroute. |

path-selection ignore overload (MPLS-TE)

To ignore the Intermediate System-to-Intermediate System (IS-IS) overload bit setting for MPLS-TE, use the **path-selection ignore overload** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

path-selection ignore overload {head | mid | tail}

| Syntax Description | head | The tunnel stays up if set-overload-bit is set by ISIS on the head router. Ignores overload node during CSPF for the head node. |
|--------------------|-------------|--|
| | mid | The tunnel stays up if set-overload-bit is set by ISIS on the mid router. Ignores overload node during CSPF for the mid node. |
| | tail | The tunnel stays up if set-overload-bit is set by ISIS on the tail router. Ignores overload node during CSPF for the tail node. |

Command Default None

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Use the **path-selection ignore overload** command to ensure that label switched paths (LSPs) are not broken because of routers that have IS-IS overload bit as enabled.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples This example shows how to use the **path-selection ignore overload** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# path-selection ignore overload
RP/0/RP0/CPU0:router(config-mpls-te)# path-selection ignore overload head
```


path-selection invalidation

To configure the path invalidation timer such that when the timer expires, the path is either removed or the data is dropped, use the **path-selection invalidation** command in MPLS-TE configuration mode. To remove the path invalidation timer, use the **no** form of this command.

path-selection invalidation *path-invalidation-timer-value*{**drop** | **tear**}

| Syntax Description | |
|--------------------------------------|---|
| <i>path-invalidation-timer-value</i> | Configures the path invalidation timer value in milliseconds. The range is from 0 to 60000. |
| drop | The data is dropped after the path invalidation timer expires. |
| tear | The path is torn down after the path invalidation timer expires. |

Command Default None

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|-------------|------------------------------|
| | Release 6.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operation |
|---------|---------|----------------|
| | mpls-te | read, write |

This example shows how to set the **path-selection invalidation** timer in MPLS TE configuration mode.

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router(config)#mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)#path-selection invalidation 1 drop
```

path-selection loose-expansion affinity (MPLS-TE)

To specify the affinity value to be used to expand a path to the next loose hop for a tunnel on an area border router, use the **path-selection loose-expansion affinity** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

path-selection loose-expansion affinity *affinity-value* **mask** *affinity-mask* [**class-type** *type*]

| Syntax Description | | |
|----------------------------------|------------|--|
| <i>affinity-value</i> | | Attribute values required for links carrying this tunnel. A 32-bit decimal number. Range is 0x0 to 0xFFFFFFFF, representing 32 attributes (bits), where the value of an attribute is 0 or 1. |
| mask <i>affinity-mask</i> | | Checks the link attribute, a 32-bit decimal number. Range is 0x0 to 0xFFFFFFFF, representing 32 attributes (bits), where the value of an attribute mask is 0 or 1. |
| class-type <i>type</i> | (Optional) | Requests the class-type of the tunnel bandwidth. Range is 0 to 1. |

Command Default

affinity-value : 0X00000000
mask-value : 0xFFFFFFFF

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note The new affinity scheme (based on names) is not supported for loose-hop expansion. New configuration does not affect the already up tunnels.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to configure affinity 0x55 with mask 0xFFFFFFFF:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# path-selection loose-expansion affinity 55 mask
FFFFFFFF
```

Related Commands

| Command | Description |
|--|---|
| path-selection loose-expansion metric (MPLS-TE), on page 101 | Configures a metric type to be used to expand a path to the next loose hop for a tunnel on an area border router. |
| path-selection metric (MPLS-TE), on page 102 | Configures the MPLS-TE tunnel path-selection metric. |

path-selection loose-expansion domain-match

To match the domain of the subsequent auto-discovered ABR (Area Border Router) with the domain of the incoming interface where the Path message is received, use the **path-selection loose-expansion domain-match** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

path-selection loose-expansion domain-match

| | | |
|---------------------------|--|------------------------------|
| Syntax Description | This command has no arguments or keywords. | |
| Command Default | None | |
| Command Modes | MPLS-TE configuration | |
| Command History | Release | Modification |
| | Release 5.2.5 | This command was introduced. |
| Usage Guidelines | No specific guidelines impact the use of this command. | |
| Task ID | Task ID | Operation |
| | mpls-te | read, write |

Example

The following example shows how to configure domain-match:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# path-selection loose-expansion domain-match
```

path-selection loose-expansion metric (MPLS-TE)

To configure a metric type to be used to expand a path to the next loose hop for a tunnel on an area border router, use the **path-selection loose-expansion metric** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

path-selection loose-expansion metric {igp | te} [**class-type** *type*]

| Syntax Description | igp | Configures an Interior Gateway Protocol (IGP) metric. |
|--------------------|------------------------|--|
| | te | Configures a TE metric. This is the default. |
| | class-type <i>type</i> | (Optional) Requests the class type of the tunnel bandwidth. Range is 0 to 1. |

Command Default The default is TE metric.

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note New configurations do not affect tunnels that are already up.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to set the path-selection metric to use the IGP metric overwriting default:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# path-selection loose-expansion metric igp
```

| Related Commands | Command | Description |
|------------------|--|---|
| | path-selection loose-expansion affinity (MPLS-TE) , on page 98 | Specifies the affinity value to be used to expand a path to the next loose hop for a tunnel on an area border router. |

path-selection metric (MPLS-TE)

To specify the MPLS-TE tunnel path-selection metric, use the **path-selection metric** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

path-selection metric {igp | te}

| Syntax Description | |
|--------------------|--|
| | igp Configures an Interior Gateway Protocol (IGP) metric. |
| | te Configures a TE metric. |

| Command Default | |
|-----------------|---------------------------|
| | The default is TE metric. |

| Command Modes | |
|---------------|-----------------------|
| | MPLS-TE configuration |

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| Usage Guidelines | |
|------------------|--|
| | The metric type to be used for path calculation for a given tunnel is determined as follows: <ul style="list-style-type: none"> • If the path-selection metric command was entered to specify a metric type for the tunnel, use that metric type. • Otherwise, use the default (TE) metric. |

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

| Examples | |
|----------|---|
| | The following example shows how to set the path-selection metric to use the IGP metric overwriting default: |

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# path-selection metric igp
```

| Related Commands | Command | Description |
|------------------|--|---|
| | path-selection loose-expansion affinity (MPLS-TE) , on page 98 | Specifies the affinity value to be used to expand a path to the next loose hop for a tunnel on an area border router. |

path-selection metric (interface)

To configure an MPLS-TE tunnel path-selection metric type, use the **path-selection metric** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

path-selection metric {**igp** | **te**}

Syntax Description

igp Configures Interior Gateway Protocol (IGP) metrics.

te Configures TE metrics. This is the default.

Command Default

The default is TE metrics.

Command Modes

Interface configuration

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

The metric type to be used for path calculation for a given tunnel is determined as follows:

- If the **path-selection metric** command was entered to either a metric type for the tunnel or only a metric type, use that metric type.
- Otherwise, use the default (TE) metric.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

The following example shows how to set the path-selection metric to use the IGP metric overwriting default:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# path-selection metric igp
```

Related Commands

| Command | Description |
|--------------------------------|--------------------------------|
| show mpls traffic-eng topology | Displays the tunnel path used. |

pce address (MPLS-TE)

To configure the IPv4 self address for Path Computation Element (PCE), use the **pce address** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

pce address ipv4 address

| | |
|---------------------------|--|
| Syntax Description | ipv4 address Configures the IPv4 address for PCE. |
|---------------------------|--|

| | |
|------------------------|-------------------------------|
| Command Default | No default behavior or values |
|------------------------|-------------------------------|

| | |
|----------------------|-----------------------|
| Command Modes | MPLS-TE configuration |
|----------------------|-----------------------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|---|
| Usage Guidelines | The IP address is used in the TCP communication with the other PCEs or PCCs. In addition, this address is advertised using IGP. |
|-------------------------|---|

| Task ID | Task ID | Operations |
|----------------|------------------------|-------------------|
| | mpls-te read, write | |

Examples The following example shows how to configure the IPv4 self address for PCE:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# pce address ipv4 10.10.10.10
```

| Related Commands | Command | Description |
|-------------------------|--|---|
| | pce keepalive (MPLS-TE), on page 107 | Configures a PCEP keepalive interval. |
| | path-option (MPLS-TE), on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce peer (MPLS-TE), on page 109 | Configures an IPv4 self address for a PCE peer. |
| | pce reoptimize (MPLS-TE), on page 111 | Configures a periodic reoptimization timer. |
| | pce request-timeout (MPLS-TE), on page 113 | Configures a PCE request-timeout. |
| | pce tolerance keepalive (MPLS-TE), on page 115 | Configures a PCE tolerance keepalive (which is the minimum acceptable peer proposed keepalive). |

pce deadtimer (MPLS-TE)

To configure a path computation element (PCE) deadtimer, use the **pce deadtimer** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

pce deadtimer *value*

| Syntax Description | <i>value</i> Keepalive dead interval, in seconds. The range is 0 to 255. | | | | |
|---------------------------|---|---------|--------------|---------------|------------------------------|
| Command Default | <i>value</i> : 120 | | | | |
| Command Modes | MPLS-TE configuration | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |
| Usage Guidelines | When the dead interval is 0, the LSR does not time out a PCEP session to a remote peer. | | | | |
| Task ID | <table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read, write</td> </tr> </tbody> </table> | Task ID | Operations | mpls-te | read, write |
| Task ID | Operations | | | | |
| mpls-te | read, write | | | | |

Examples

The following example shows how to configure a PCE deadtimer:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# pce deadtimer 50
```

| Related Commands | Command | Description |
|------------------|--|---|
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | path-option (MPLS-TE), on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce address (MPLS-TE), on page 104 | Configures the IPv4 self address for a PCE. |
| | pce keepalive (MPLS-TE), on page 107 | Configures a PCEP keepalive interval. |
| | pce peer (MPLS-TE), on page 109 | Configures an IPv4 self address for a PCE peer. |
| | pce reoptimize (MPLS-TE), on page 111 | Configures a periodic reoptimization timer. |
| | pce request-timeout (MPLS-TE), on page 113 | Configures a PCE request-timeout. |

| Command | Description |
|--|---|
| pce tolerance keepalive (MPLS-TE), on page 115 | Configures a PCE tolerance keepalive (which is the minimum acceptable peer proposed keepalive). |

pce keepalive (MPLS-TE)

To configure a path computation element protocol (PCEP) keepalive interval, use the **pce keepalive** command in MPLS-TE configuration mode. To disable this command, use the **no** form of this command.

pce keepalive *interval*

Syntax Description *interval* Keepalive interval, in seconds. The range is 0 to 255.

Command Default *interval: 30*

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines When the keepalive interval is 0, the LSR does not send keepalive messages.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to configure PCEP keepalive interval for 10 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router#(config-mpls-te) pce keepalive 10
```

| Related Commands | Command | Description |
|------------------|--|---|
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | path-option (MPLS-TE), on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce address (MPLS-TE), on page 104 | Configures the IPv4 self address for a PCE. |
| | pce deadtimer (MPLS-TE), on page 105 | Configures a PCE deadtimer. |
| | pce peer (MPLS-TE), on page 109 | Configures an IPv4 self address for a PCE peer. |
| | pce reoptimize (MPLS-TE), on page 111 | Configures a periodic reoptimization timer. |
| | pce request-timeout (MPLS-TE), on page 113 | Configures a PCE request-timeout. |

| Command | Description |
|--|---|
| pce tolerance keepalive (MPLS-TE), on page 115 | Configures a PCE tolerance keepalive (which is the minimum acceptable peer proposed keepalive). |

pce peer (MPLS-TE)

To configure an IPv4 self address for a path computation element (PCE) peer, use the **pce peer** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

pce peer ipv4 *address*

| | |
|---------------------------|---|
| Syntax Description | ipv4 <i>address</i> Configures the IPv4 address for PCE. |
|---------------------------|---|

| | |
|------------------------|-----------|
| Command Default | TE metric |
|------------------------|-----------|

| | |
|----------------------|-----------------------|
| Command Modes | MPLS-TE configuration |
|----------------------|-----------------------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|--|
| Usage Guidelines | No specific guidelines impact the use of this command. |
|-------------------------|--|

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read, write |

Examples

The following example shows how to configure an IPv4 self address for a PCE peer:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# pce peer ipv4 11.11.11.11
```

| Related Commands | Command | Description |
|-------------------------|---|---|
| | mpls traffic-eng , on page 75 | Enters MPLS-TE configuration mode. |
| | path-option (MPLS-TE) , on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce address (MPLS-TE) , on page 104 | Configures the IPv4 self address for a PCE. |
| | pce deadtimer (MPLS-TE) , on page 105 | Configures a PCE deadtimer. |
| | pce keepalive (MPLS-TE) , on page 107 | Configures a PCEP keepalive interval. |
| | pce reoptimize (MPLS-TE) , on page 111 | Configures a periodic reoptimization timer. |
| | pce request-timeout (MPLS-TE) , on page 113 | Configures a PCE request-timeout. |

| Command | Description |
|--|---|
| pce tolerance keepalive (MPLS-TE), on page 115 | Configures a PCE tolerance keepalive (which is the minimum acceptable peer proposed keepalive). |

pce reoptimize (MPLS-TE)

To configure a periodic reoptimization timer, use the **pce reoptimize** command in MPLS-TE configuration mode. To disable this feature, use the **no** form of this command.

pce reoptimize *value*

| | |
|---------------------------|--|
| Syntax Description | <i>value</i> Periodic reoptimization timer value, in seconds. The range is 60 to 604800. |
|---------------------------|--|

| | |
|------------------------|---------------------|
| Command Default | <i>value</i> : 3600 |
|------------------------|---------------------|

| | |
|----------------------|-----------------------|
| Command Modes | MPLS-TE configuration |
|----------------------|-----------------------|

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|---|
| Usage Guidelines | When the dead interval is 0, the LSR does not time out a path computation element protocol (PCEP) session to a remote peer. |
|-------------------------|---|

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | read, write |

Examples

The following example shows how to configure a periodic reoptimization timer for 200 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# pce reoptimize 200
```

| Related Commands | Command | Description |
|------------------|---|---|
| | mpls traffic-eng , on page 75 | Enters MPLS-TE configuration mode. |
| | path-option (MPLS-TE) , on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce address (MPLS-TE) , on page 104 | Configures the IPv4 self address for a PCE. |
| | pce deadtimer (MPLS-TE) , on page 105 | Configures a PCE deadtimer. |
| | pce keepalive (MPLS-TE) , on page 107 | Configures a PCEP keepalive interval. |
| | pce peer (MPLS-TE) , on page 109 | Configures an IPv4 self address for a PCE peer. |

| Command | Description |
|--|---|
| pce request-timeout (MPLS-TE), on page 113 | Configures a PCE request-timeout. |
| pce tolerance keepalive (MPLS-TE), on page 115 | Configures a PCE tolerance keepalive (which is the minimum acceptable peer proposed keepalive). |

pce request-timeout (MPLS-TE)

To configure a path computation element (PCE) request-timeout, use the **pce request-timeout** command in MPLS-TE configuration mode. To disable this feature, use the **no** form of this command.

pce request-timeout *value*

| Syntax Description | <i>value</i> PCE request-timeout, in seconds. The range is 5 to 100. | | | | |
|---------------------------|---|---------|--------------|---------------|------------------------------|
| Command Default | <i>value</i> : 10 | | | | |
| Command Modes | MPLS-TE configuration | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |
| Usage Guidelines | PCC or PCE keeps a pending path request only for the request-timeout period. | | | | |
| Task ID | <table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read, write</td> </tr> </tbody> </table> | Task ID | Operations | mpls-te | read, write |
| Task ID | Operations | | | | |
| mpls-te | read, write | | | | |

Examples

The following example shows how to configure a PCE request-timeout for 10 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# pce request-timeout 10
```

| Related Commands | Command | Description |
|------------------|--|---|
| | mpls traffic-eng , on page 75 | Enters MPLS-TE configuration mode. |
| | path-option (MPLS-TE) , on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce address (MPLS-TE) , on page 104 | Configures the IPv4 self address for a PCE. |
| | pce deadtimer (MPLS-TE) , on page 105 | Configures a PCE deadtimer. |
| | pce keepalive (MPLS-TE) , on page 107 | Configures a PCEP keepalive interval. |
| | pce peer (MPLS-TE) , on page 109 | Configures an IPv4 self address for a PCE peer |
| | pce reoptimize (MPLS-TE) , on page 111 | Configures a periodic reoptimization timer. |

| Command | Description |
|--|---|
| pce tolerance keepalive (MPLS-TE), on page 115 | Configures a PCE tolerance keepalive (which is the minimum acceptable peer proposed keepalive). |

pce tolerance keepalive (MPLS-TE)

To configure a path computation element (PCE) tolerance keepalive (which is the minimum acceptable peer proposed keepalive), use the **pce tolerance keepalive** command in MPLS-TE configuration mode. To disable this feature, use the **no** form of this command.

pce tolerance keepalive *value*

| | |
|---------------------------|--|
| Syntax Description | <i>value</i> PCE tolerance keepalive value, in seconds. The range is 0 to 255. |
|---------------------------|--|

| | |
|------------------------|-------------------|
| Command Default | <i>value</i> : 10 |
|------------------------|-------------------|

| | |
|----------------------|-----------------------|
| Command Modes | MPLS-TE configuration |
|----------------------|-----------------------|

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|--|
| Usage Guidelines | No specific guidelines impact the use of this command. |
|-------------------------|--|

| | | |
|----------------|----------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te | read, write |

Examples

The following example shows how to configure a PCE tolerance keepalive for 10 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# pce tolerance keepalive 10
```

| Related Commands | Command | Description |
|------------------|---|---|
| | mpls traffic-eng , on page 75 | Enters MPLS-TE configuration mode. |
| | path-option (MPLS-TE) , on page 92 | Configures a path option for an MPLS-TE tunnel. |
| | pce address (MPLS-TE) , on page 104 | Configures the IPv4 self-address for a PCE. |
| | pce deadtimer (MPLS-TE) , on page 105 | Configures a PCE deadtimer. |
| | pce keepalive (MPLS-TE) , on page 107 | Configures a PCEP keepalive interval. |
| | pce peer (MPLS-TE) , on page 109 | Configures an IPv4 self address for a PCE peer |

| Command | Description |
|--|---|
| pce reoptimize (MPLS-TE), on page 111 | Configures a periodic reoptimization timer. |
| pce request-timeout (MPLS-TE), on page 113 | Configures a PCE request-timeout. |

priority (MPLS-TE)

To configure the setup and reservation priority for an MPLS-TE tunnel, use the **priority** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

priority *setup-priority hold-priority*

| Syntax Description | |
|-----------------------|---|
| <i>setup-priority</i> | Priority used when signaling a label switched path (LSP) for this tunnel to determine which existing tunnels can be preempted. Range is 0 to 7 (in which a lower number indicates a higher priority). Therefore, an LSP with a setup priority of 0 can preempt any LSP with a non-0 priority. |
| <i>hold-priority</i> | Priority associated with an LSP for this tunnel to determine if it should be preempted by other LSPs that are being signaled. Range is 0 to 7 (in which a lower number indicates a higher priority). |

| Command Default | |
|-----------------|---|
| | <i>setup-priority: 7</i> <i>hold-priority: 7</i> |

| Command Modes | |
|---------------|-------------------------|
| | Interface configuration |

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| Usage Guidelines | |
|------------------|--|
| | When an LSP is signaled and an interface does not currently have enough bandwidth available for that LSP, the call admission software (if necessary) preempts lower-priority LSPs to admit the new LSP. Accordingly, the new LSP priority is the setup priority and the existing LSP priority is the hold priority. The two priorities make it possible to signal an LSP with a low setup priority (so that the LSP does not preempt other LSPs on setup) and a high hold priority (so that the LSP is not preempted after it is established). Setup priority and hold priority are typically configured to be equal, and setup priority cannot be numerically smaller than the hold priority. |

| Task ID | Task | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

| Examples | |
|----------|--|
| | The following example shows how to configure a tunnel with a setup and hold priority of 1: |

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# priority 1 1
```

Related Commands

| Command | Description |
|---|---|
| interface tunnel-te, on page 69 | Configures an MPLS-TE tunnel interface. |

record-route

To record the route used by a tunnel, use the **record-route** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

record-route

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes Interface configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note You must configure record-route on TE tunnels that are protected by multiple backup tunnels merging at a single node.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to enable record-route on the TE tunnel:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# record-route
```

| Related Commands | Command | Description |
|------------------|--|---|
| | show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

reoptimize timers delay (MPLS-TE)

To delay removal or relabeling of the old label switched paths (LSPs) (reoptimized LSP from the forwarding plane) after tunnel reoptimization, use the **reoptimize timers delay** command in MPLS-TE configuration mode. To restore the default value, use the **no** form of this command.

```
reoptimize timers delay {after-frr seconds | cleanup delay-time | installation delay-time | path-protection seconds}
```

| Syntax Description | | |
|------------------------|--|---|
| after-frr | | Delays the LSP reoptimization in the event of the FRR. |
| <i>seconds</i> | | Reoptimization initiation delay time of the tunnel, in seconds, after an FRR event. Range is from 0 to 120. |
| cleanup | | Delays removal of the old LSPs after tunnel reoptimization. |
| <i>delay-time</i> | | Reoptimization delay time, in seconds. A value of 0 disables delay. The valid range is from 0 to 300 for cleanup time. |
| installation | | Delays installation of a new label after tunnel reoptimization. |
| <i>delay-time</i> | | Reoptimization delay time, in seconds. A value of 0 disables delay. The valid range is 0 to 3600 for installation time. |
| path-protection | | Delays the time between path protection switchover event and tunnel reoptimization. |
| <i>seconds</i> | | Time, in seconds, between path protection switchover event and tunnel reoptimization. A value of 0 disables delay. Range is from 0 to 604800. |

| Command Default | |
|---------------------------------------|--|
| after-frr <i>delay</i> : 0 | |
| cleanup <i>delay</i> : 20 | |
| <i>delay-time</i> : 20 | |
| installation <i>delay</i> : 20 | |
| path-protection : 180 | |

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines A device with Multiprotocol Label Switching traffic engineering (MPLS-TE) tunnels periodically examines tunnels with established LSPs to discover whether more efficient LSPs (paths) are available. If a better LSP is available, the device signals the more efficient LSP; if the signaling is successful, the device replaces the older LSP with the new, more efficient LSP.

Sometimes the slower router-point nodes may not yet utilize the new label's forwarding plane. In this case, if the headend node replaces the labels quickly, it can result in brief packet loss. By delaying the cleanup of the old LSP using the **reoptimize timers delay cleanup** command, packet loss is avoided.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to set the reoptimization cleanup delay time to 1 minute:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# reoptimize timers delay cleanup 60
```

The following example shows how to set the reoptimization installation delay time to 40 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# reoptimize timers delay installation 40
```

The following example shows how to set the reoptimization delay time after the event of the FRR to 50 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# reoptimize timers delay after-frr 50
```

The following example shows how to set the reoptimization delay time between path protection switchover event and tunnel reoptimization to 80:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# reoptimize timers delay path-protection 80
```

Related Commands

| Command | Description |
|--|--|
| mpls traffic-eng reoptimize (EXEC), on page 83 | Reoptimizes all traffic engineering tunnels immediately. |

router-id secondary (MPLS-TE)

To configure a secondary TE router identifier in MPLS-TE to be used locally (not advertised through IGP), use the **router-id secondary** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

router-id secondary *IP address*

| | |
|---------------------------|--|
| Syntax Description | <i>IP address</i> IPv4 address to be used as secondary TE router ID. |
|---------------------------|--|

| | |
|------------------------|-------------------------------|
| Command Default | No default behavior or values |
|------------------------|-------------------------------|

| | |
|----------------------|-----------------------|
| Command Modes | MPLS-TE configuration |
|----------------------|-----------------------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|--|
| Usage Guidelines | Use the router-id secondary command on tail end nodes to terminate verbatim tunnels to secondary TE RIDs as destinations. |
|-------------------------|--|

You can configure up to 32 IPv4 addresses as TE secondary router IDs.

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read, write |

Examples

The following example shows how to configure a secondary TE router identifier in MPLS-TE:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# router-id secondary 10.0.0.1
RP/0/RP0/CPU0:router(config-mpls-te)# router-id secondary 172.16.0.1
```

| Related Commands | Command | Description |
|-------------------------|---|---|
| | mpls traffic-eng router-id (MPLS-TE router), on page 85 | Specifies that the TE router identifier for the node is the IP address associated with a given interface. |

show explicit-paths

To display the configured IP explicit paths, use the **show explicit-paths** command in XR EXEC mode.

show explicit-paths [{**name** *path-name* | **identifier** *number*}]

| | |
|---------------------------|---|
| Syntax Description | name <i>path-name</i> (Optional) Displays the name of the explicit path. |
| | identifier <i>number</i> (Optional) Displays the number of the explicit path. Range is 1 to 65535. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines An IP explicit path is a list of IP addresses that represent a node or link in the explicit path.

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read |

Examples

The following shows a sample output from the **show explicit-paths** command:

```
RP/0/RP0/CPU0:router# show explicit-paths

Path ToR2      status enabled
  0x1: next-address 192.168.1.2
  0x2: next-address 10.20.20.20
Path ToR3      status enabled
  0x1: next-address 192.168.1.2
  0x2: next-address 192.168.2.2
  0x3: next-address 10.30.30.30
Path 100       status enabled
  0x1: next-address 192.168.1.2
  0x2: next-address 10.20.20.20
Path 200       status enabled
  0x1: next-address 192.168.1.2
  0x2: next-address 192.168.2.2
  0x3: next-address 10.30.30.30
```

This table describes the significant fields shown in the display.

Table 1: show explicit-paths Command Field Descriptions

| Field | Description |
|--------------------|--|
| Path | Pathname or number, followed by the path status. |
| 1: next-address | First IP address in the path. |
| 2: next-address | Second IP address in the path. |

The following shows a sample output from the **show explicit-paths** command using a specific path name:

```
RP/0/RP0/CPU0:router# show explicit-paths name ToR3

  Path ToR3      status enabled
    0x1:  next-address 192.168.1.2
    0x2:  next-address 192.168.2.2
    0x3:  next-address 10.30.30.30
```

The following shows a sample output from the **show explicit-paths** command using a specific path number:

```
RP/0/RP0/CPU0:router# show explicit-paths identifier 200

  Path 200      status enabled
    0x1:  next-address 192.168.1.2
    0x2:  next-address 192.168.2.2
    0x3:  next-address 10.30.30.30
```

Related Commands

| Command | Description |
|---|--|
| index exclude-address, on page 61 | Specifies the next IP address to exclude from the explicit path. |
| index next-address, on page 63 | Specifies path entries at a specific index. |

show mpls traffic-eng affinity-map

To display the color name-to-value mappings configured on the router, use the **show mpls traffic-eng affinity-map** command in XR EXEC mode.

show mpls traffic-eng affinity-map

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines If the affinity value of an affinity associated with an affinity constraint is unknown, the **show mpls traffic-eng affinity-map** command output displays: "(refers to undefined affinity name)"

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | read |

Examples

The following shows a sample output from the **show mpls traffic-eng affinity-map** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng affinity-map
```

| Affinity Name | Bit-position | Affinity Value |
|----------------------------------|--------------|----------------|
| bcdefghabcdefghabcdefghabcdefgha | 0 | 1 |
| red1 | 1 | 2 |
| red2 | 2 | 4 |
| red3 | 3 | 8 |
| red4 | 4 | 10 |
| red5 | 5 | 20 |
| red6 | 6 | 40 |
| red7 | 7 | 80 |
| red8 | 8 | 100 |
| red9 | 9 | 200 |
| red10 | 10 | 400 |
| red11 | 11 | 800 |
| red12 | 12 | 1000 |
| red13 | 13 | 2000 |
| red14 | 14 | 4000 |
| red15 | 15 | 8000 |
| red16 | 16 | 10000 |
| cdefghabcdefghabcdefghabcdefghab | 17 | 20000 |
| red18 | 18 | 40000 |
| red19 | 19 | 80000 |
| red20 | 20 | 100000 |

```

red21          21          200000
red22          22          400000
red23          23          800000
red24          24          1000000
red25          25          2000000
red26          26          4000000
red27          27          8000000
orange28       28          10000000
red28          29          20000000
red30          30          40000000
abcdefghabcde 31          80000000

```

Table 2: [show mpls traffic-eng affinity-map Field Descriptions, on page 127](#) describes the significant fields shown in the display.

Table 2: show mpls traffic-eng affinity-map Field Descriptions

| Field | Description |
|----------------|--|
| Affinity Name | Affinity name associated with the tunnel affinity constraints. |
| Bit-position | Bit position set in the 32-bit affinity value |
| Affinity Value | Affinity value associated with the affinity name. |

Related Commands

| Command | Description |
|--|---|
| affinity, on page 7 | Configures an affinity (the properties the tunnel requires in its links) for an MPLS-TE tunnel. |
| affinity-map, on page 12 | Assigns a numerical value to each affinity name. |

show mpls traffic-eng autoroute

To display tunnels that are announced to the Interior Gateway Protocol (IGP), including information about next hop and destinations, use the **show mpls traffic-eng autoroute** command in XR EXEC mode.

show mpls traffic-eng autoroute [*IP-address*]

| | |
|---------------------------|--|
| Syntax Description | <i>IP-address</i> (Optional) Tunnel leading to this address. |
|---------------------------|--|

| | |
|------------------------|------|
| Command Default | None |
|------------------------|------|

| | |
|----------------------|---------|
| Command Modes | XR EXEC |
|----------------------|---------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|---|
| Usage Guidelines | The traffic-engineering tunnels are taken into account for the enhanced shortest path first (SPF) calculation of the IGP. The show mpls traffic-eng autoroute command displays those tunnels that IGP is currently using in its enhanced SPF calculation (that is, those tunnels that are up and have autoroute configured). |
|-------------------------|---|

Tunnels are organized by destination. All tunnels to a destination carry a share of the traffic tunneled to that destination.

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read |

Examples

The following shows a sample output from the **show mpls traffic-eng autoroute** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng autoroute

Destination 103.0.0.3 has 2 tunnels in OSPF 0 area 0
 tunnel-te1 (traffic share 1, nexthop 103.0.0.3)
 tunnel-te2 (traffic share 1, nexthop 103.0.0.3)
```

This table describes the significant fields shown in the display.

Table 3: show mpls traffic-eng autoroute Command Field Descriptions

| Field | Description |
|-------------|---|
| Destination | Multiprotocol Label Switching (MPLS) TE tail-end router ID. |

| Field | Description |
|-----------------|---|
| traffic share | A factor, based on bandwidth, indicating how much traffic this tunnel should carry, relative to other tunnels, to the same destination. If two tunnels go to a single destination, one with a traffic share of 200 and the other with a traffic share of 100, the first tunnel carries two-thirds of the traffic. |
| Nexthop | Next-hop router ID of the MPLS-TE tunnel. |
| absolute metric | Metric with mode absolute for the MPLS-TE tunnel. |
| relative metric | Metric with mode relative for the MPLS-TE tunnel. |

Related Commands

| Command | Description |
|---|--|
| autoroute metric, on page 23 | Specifies the MPLS-TE tunnel metric that the IGP-enhanced SPF calculation uses. |
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |
| topology holddown sigerr (MPLS-TE), on page 199 | Specifies the time that a router should ignore a link in its TE topology database in tunnel path CSPF computations following a TE tunnel signalling error on the link. |

show mpls traffic-eng collaborator-timers

To display the current status of the MPLS-TE collaborator timers, use the **show mpls traffic-eng collaborator-timers** command in XR EXEC mode.

show mpls traffic-eng collaborator-timers

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The MPLS-TE process maintains the timers for all of the collaborators such as RSVP, LSD, and so forth. The **show mpls traffic-eng collaborator-timers** command shows the status of these timers.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | read |

Examples

The following sample output shows the current status of the collaborator timers:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng collaborator-timers

Collaborator Timers
-----
Timer Name: [LMRIB Restart] Index:[0]
  Duration: [60] Is running: NO
  Last start time: 02/09/2009 11:57:59
  Last stop time: 02/09/2009 11:58:00
  Last expiry time: Never expired
Timer Name: [LMRIB Recovery] Index:[1]
  Duration: [60] Is running: YES
  Last start time: 02/09/2009 11:58:00
  Last stop time: Never Stopped
  Last expiry time: 19/08/2009 17:45:24
Timer Name: [RSVP Restart] Index:[2]
  Duration: [180] Is running: NO
  Last start time: 26/08/2009 18:59:18
  Last stop time: 26/08/2009 18:59:20
  Last expiry time: Never expired
Timer Name: [RSVP Recovery] Index:[3]
  Duration: [1800] Is running: NO
  Last start time: 26/08/2009 18:59:20
  Last stop time: 26/08/2009 19:03:19
  Last expiry time: 19/08/2009 18:12:39
Timer Name: [LSD Restart] Index:[4]
```

```

Duration: [60] Is running: NO
Last start time: 19/08/2009 17:44:26
Last stop time: 19/08/2009 17:44:26
Last expiry time: Never expired
Timer Name: [LSD Recovery] Index:[5]
Duration: [600] Is running: NO
Last start time: 19/08/2009 17:44:26
Last stop time: Never Stopped
Last expiry time: 19/08/2009 17:53:44
Timer Name: [Clearing in progress BW for the whole topology] Index:[6]
Duration: [60] Is running: YES
Last start time: 02/09/2009 11:57:50
Last stop time: Never Stopped
Last expiry time: 02/09/2009 11:57:50

```

This table describes the significant fields shown in the display.

Table 4: show mpls traffic-eng collaborator-timers Command Field Descriptions

| Field | Description |
|------------------|--|
| Timer Name | Timer name that is associated to a collaborator. |
| Index | Identification number of the timer. |
| Duration | Expiry delay of the timer, in seconds. For example, the duration indicates the timer interval. |
| Is running | Timer is running low or not. |
| Last start time | Last time that the collaborator process for MPLS LSD was restarted. |
| Last stop time | Time TE was able to reconnect to the MPLS LSD process. |
| Last expiry time | Time that timer expired. |

show mpls traffic-eng counters signaling

To display tunnel signaling statistics, use the **show mpls traffic-eng counters signaling** command in XR EXEC mode.

```
show mpls traffic-eng counters { signaling } { tunnel-number | all } [{ heads | mids | tails } ] |
name tunnel-name | summary }
```

| Syntax Description | | |
|----------------------|--|---|
| signaling | | Displays signaling counters. |
| <i>tunnel-number</i> | | Statistics for the input tunnel number. The range is from 0 to 65535. |
| all | | Displays statistics for all tunnels. |
| heads | | (Optional) Displays statistics for all tunnel heads. |
| mids | | (Optional) Displays statistics for all tunnel midpoints. |
| tails | | (Optional) Displays statistics for all tunnel tails. |
| name | | Displays statistics for a specified tunnel. |
| <i>tunnel-name</i> | | Name of the specified tunnel. |
| summary | | Displays a summary of signaling statistics. |

Command Default None

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operations |
|---------|--------------|------------|
| | mpls-te read | |

Examples

This is a sample output from the **show mpls traffic-eng counters signaling** command, using the **all** keyword, which displays tunnel signaling statistics for all tunnels:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng counters signaling all
```

```
Tunnel Head: tunnel-te100
```

```
Cumulative Tunnel Counters:
```

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 1 | 1 | ResvCreate | 1 | 0 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 18 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 1 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

```
Destination 100.0.0.4
```

```
Cumulative counters
```

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 1 | 1 | ResvCreate | 1 | 0 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 18 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 1 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

```
S2L LSP ID: 2 Sub-Grp ID: 0 Destination: 100.0.0.4
```

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 1 | 1 | ResvCreate | 1 | 0 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 1 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

```
Tunnel Head: tunnel-mte200
```

```
Cumulative Tunnel Counters:
```

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 2 | ResvCreate | 2 | 0 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 20 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 2 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

```
Destination 100.0.0.4
```

```
Cumulative counters
```

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 2 | ResvCreate | 2 | 0 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 20 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 2 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

```
S2L LSP ID: 10021 Sub-Grp ID: 1 Destination: 100.0.0.4
```

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 1 | 1 | ResvCreate | 1 | 0 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 1 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

show mpls traffic-eng counters signaling

Tunnel Mid/Tail: router Source: 100.0.0.1 P2MP ID: 1677721603 Tunnel ID: 1 LSP ID: 21
Cumulative LSP Counters:

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

S2L LSP ID: 21 Sub-Grp ID: 0 Destination: 100.0.0.3

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

Tunnel Mid/Tail: router Source: 100.0.0.1 P2MP ID: 1677721603 Tunnel ID: 2 LSP ID: 21
Cumulative LSP Counters:

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

S2L LSP ID: 21 Sub-Grp ID: 0 Destination: 100.0.0.3

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

Tunnel Mid/Tail: router-1_t3 Source: 100.0.0.1 P2MP ID: 1677721603 Tunnel ID: 3 LSP ID:
18

Cumulative LSP Counters:

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

S2L LSP ID: 18 Sub-Grp ID: 0 Destination: 100.0.0.3

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |
| PathQuery | 0 | 0 | Unknown | 0 | 0 |

Tunnel Mid/Tail: router-3_t33 Source: 100.0.0.3 P2MP ID: 1677721605 Tunnel ID: 33 LSP ID:
2

Cumulative LSP Counters:

| Signalling Events | Recv | Xmit | | Recv | Xmit |
|-------------------|------|------|-------------|------|------|
| PathCreate | 2 | 1 | ResvCreate | 2 | 1 |
| PathChange | 0 | 0 | ResvChange | 0 | 0 |
| PathError | 0 | 0 | ResvError | 0 | 0 |
| PathTear | 0 | 0 | ResvTear | 0 | 0 |
| BackupAssign | 0 | 0 | BackupError | 0 | 0 |

```

PathQuery                0      0      Unknown                0      0
S2L LSP ID: 2 Sub-Grp ID: 0 Destination: 100.0.0.5
Signalling Events      Recv      Xmit
PathCreate              2        1      ResvCreate             2        1
PathChange              0        0      ResvChange             0        0
PathError               0        0      ResvError              0        0
PathTear                0        0      ResvTear               0        0
BackupAssign           0        0      BackupError            0        0
PathQuery               0        0      Unknown                0        0

Signaling Counter Summary:
Signalling Events      Recv      Xmit                Recv      Xmit
PathCreate             11        7      ResvCreate             11        4
PathChange             0        0      ResvChange             0        0
PathError              0        0      ResvError              0        0
PathTear               0        38     ResvTear               0        0
BackupAssign           0        3      BackupError            0        0
PathQuery              0        0      Unknown                0        0

```

This is a sample output from the **show mpls traffic-eng counters signaling** command using the *tunnel number* argument, which displays statistics for the input tunnel number:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng counters signaling 200
```

```

Tunnel Head: tunnel-te200
Cumulative Tunnel Counters:
Signalling Events  Recv      Xmit                Recv      Xmit
PathCreate         4         4      ResvCreate          4         0
PathChange         0         0      ResvChange          0         0
PathError          0         0      ResvError           0         0
PathTear           0         1      ResvTear            0         0
BackupAssign       0         4      BackupError         0         0
PathQuery          0         0      Unknown             0         0

Destination 192.168.0.1
Cumulative counters
Signalling Events  Recv      Xmit                Recv      Xmit
PathCreate         4         4      ResvCreate          4         0
PathChange         0         0      ResvChange          0         0
PathError          0         0      ResvError           0         0
PathTear           0         1      ResvTear            0         0
BackupAssign       0         4      BackupError         0         0
PathQuery          0         0      Unknown             0         0
S2L LSP ID: 3 Sub-Grp ID: 0 Destination: 192.168.0.1
Signalling Events  Recv      Xmit                Recv      Xmit
PathCreate         3         3      ResvCreate          3         0
PathChange         0         0      ResvChange          0         0
PathError          0         0      ResvError           0         0
PathTear           0         0      ResvTear            0         0
BackupAssign       0         3      BackupError         0         0
PathQuery          0         0      Unknown             0         0

```

This table describes the significant fields shown in the display.

Table 5: show mpls traffic-eng counters signaling Command Field Descriptions

| Field | Description |
|-------------|-------------------------|
| Tunnel Head | Tunnel head identifier. |

| Field | Description |
|-------------------|--|
| Match Resv Create | Number of RSVP Reservation create messages received. |
| Sender Create | Number of Sender Create messages sent by TE to RSVP. |
| Path Error | Number of RSVP Path Error messages received. |
| Match Resv Change | Number of RSVP Reservation change messages received. |
| Sender Modify | Number of Sender Modify messages sent by TE to RSVP. |
| Path Change | Number of RSVP Path Change messages received. |
| Match Resv Delete | Number of RSVP Reservation delete messages received. |
| Sender Delete | Number of Sender Delete messages sent by TE to RSVP. |
| Path Delete | Number of RSVP Path Delete messages received. |
| Total | Total signaling messages received from RSVP. |
| Unknown | Unknown messages include fast reroute events and internal messages related to process restart. |

Related Commands

| Command | Description |
|---|--|
| clear mpls traffic-eng counters signaling, on page 35 | Clears the counters for MPLS-TE tunnels. |
| clear mpls traffic-eng fast-reroute log, on page 37 | Clears the counters for MPLS-TE tunnels. |

show mpls traffic-eng ds-te te-class

To display the Diff-Serv TE-class map in use, use the **show mpls traffic-eng ds-te te-class** command in XR EXEC mode.

show show mpls traffic-eng ds-te te-class

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines



Note TE-class is used only in IETF DS-TE mode.

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following shows a sample output from the **show mpls traffic-eng ds-te te-class** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng ds-te te-class

te-class 0: class-type 0 priority 7 status default
te-class 1: class-type 1 priority 7 status default
te-class 2: unused
te-class 3: unused
te-class 4: class-type 0 priority 0 status default
te-class 5: class-type 1 priority 0 status default
te-class 6: unused
te-class 7: unused
```

This table describes the significant fields shown in the display.

Table 6: show mpls traffic-eng ds-te te-class Command Field Descriptions

| Field | Description |
|----------|---|
| te-class | TE-class map, pair of class-type, and priority. |

show mpls traffic-eng ds-te te-class

| Field | Description |
|--------------|--|
| class-type | class-type of the tunnel. |
| status | Source of the TE-class map, either default or user configured. |

show mpls traffic-eng forwarding

To display forwarding information on tunnels that were admitted locally, use the **show mpls traffic-eng forwarding** command in XR EXEC mode.

show mpls traffic-eng forwarding [**backup-name** *tunnel-name*] [**signalled-name** *tunnel-name*] [**source** *source-address*][**tunnel-id** *tunnel-id*] [**interface** {**in** | **inout** | **out**} *type interface-path-id*] [**detail**]

| Syntax Description | | |
|--|-------------------------------|--|
| backup-name <i>tunnel-name</i> | | (Optional) Restricts tunnels with this backup tunnel name. |
| signalled-name <i>tunnel-name</i> | | (Optional) Restricts tunnels with this signalled tunnel name. |
| source <i>source-address</i> | | (Optional) Restricts tunnels for this specified tunnel source IPv4 address. |
| tunnel-id <i>tunnel-id</i> | | (Optional) Restricts tunnels for this tunnel identifier. Range for the <i>tunnel-id</i> argument is from 0 to 65535. |
| interface | | (Optional) Displays information on the specified interface. |
| <i>type</i> | | (Optional) Interface type. For more information, use the question mark (?) online help function. |
| <i>interface-path-id</i> | | Physical interface or a virtual interface. Note Use the show interfaces command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function. |
| in | | Displays information for the input interface. |
| inout | | Displays information for either the input or output interface. |
| out | | Displays information for the output interface. |
| p2p | | (Optional) Displays only Point-to-Point (P2P) information. |
| detail | | (Optional) Displays detailed forwarding information. |
| Command Default | No default behavior or values | |

show mpls traffic-eng forwarding

Command Modes XR EXEC

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Task ID

| Task ID | Operations |
|--------------|------------|
| mpls-te read | |

Examples

The following shows a sample output from the **show mpls traffic-eng forwarding** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng forwarding
Tue Sep 15 14:22:39.609 UTC P2P tunnels
Tunnel ID          Ingress IF    Egress IF     In lbl    Out lbl    Backup tunnel
-----
2.2.2.2 2_2        Gi0/0/0/3    Gi0/0/0/4  16004    16020    unknown
6.6.6.6 1_23        -            Gi0/0/0/3  16000    3        tt1300
6.6.6.6 1100_9       -            Gi0/0/0/3  16002    16001    unknown
6.6.6.6 1200_9       -            Gi0/0/0/3  16001    16000    unknown
6.6.6.6 1300_2       -            Gi0/0/0/4  16005    16021    unknown
6.6.6.6 1400_9       -            Gi0/0/0/3  16003    16002    unknown
```

This table describes the significant fields shown in the display.

Table 7: show mpls traffic-eng forwarding Field Descriptions

| Field | Description |
|---------------|--|
| TUNNEL ID | Tunnel identification. |
| Ingress IF | Ingress interface of the tunnel. |
| Egress IF | Egress interface of the tunnel. |
| In lbl | Incoming label associated with the tunnel. |
| Out lbl | Outgoing label associated with the tunnel. |
| Backup tunnel | Fast Reroute backup tunnel |

show mpls traffic-eng forwarding-adjacency

To display forwarding-adjacency information for an IPv4 address, use the **show mpls traffic-eng forwarding-adjacency** command in XR EXEC mode.

```
show mpls traffic-eng forwarding-adjacency [IP-address]
```

| | |
|---------------------------|---|
| Syntax Description | <i>IP-address</i> (Optional) Destination IPv4 address for forwarding adjacency. |
|---------------------------|---|

| | |
|------------------------|-------------------------------|
| Command Default | No default behavior or values |
|------------------------|-------------------------------|

| | |
|----------------------|---------|
| Command Modes | XR EXEC |
|----------------------|---------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|--|
| Usage Guidelines | No specific guidelines impact the use of this command. |
|-------------------------|--|

| Task ID | Task Operations ID |
|----------------|---------------------------|
| | mpls-te read |

Examples This is a sample output from the **show mpls traffic-eng forwarding-adjacency** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng forwarding-adjacency

destination 3.3.3.3 has 1 tunnels
tunnel-tel (traffic share 0, next-hop 3.3.3.3)
(Adjacency Announced: yes, holdtime 0)
```

| Related Commands | Command | Description |
|-------------------------|--|--------------------|
| | forwarding-adjacency, on page 59 | |

show mpls traffic-eng igp-areas

To display MPLS-TE internal area storage, use the **show mpls traffic-eng igp-areas** command in XR EXEC mode.

show mpls traffic-eng igp-areas [detail]

| | |
|---------------------------|---|
| Syntax Description | detail (Optional) Displays detailed information about the configured MPLS-TE igp-areas and communication statistics with IGPs. |
|---------------------------|---|

| | |
|------------------------|-------------------------------|
| Command Default | No default behavior or values |
|------------------------|-------------------------------|

| | |
|----------------------|---------|
| Command Modes | XR EXEC |
|----------------------|---------|

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| | |
|-------------------------|--|
| Usage Guidelines | No specific guidelines impact the use of this command. |
|-------------------------|--|

| Task ID | Task Operations ID |
|----------------|---------------------------|
| | mpls-te read |

Examples This table describes the significant fields shown in the display.

Table 8: show mpls traffic-eng igp-areas Command Field Descriptions

| Field | Description |
|-------------------|---|
| Global router-id | Global router ID on this node. |
| IGP ID | IGP System ID. |
| area | IGP area. |
| TE index | Internal index in the IGP area table. |
| IGP config for TE | Whether the IGP configuration is complete or missing. |

show mpls traffic-eng link-management admission-control

To display which tunnels were admitted locally and their parameters, use the **show mpls traffic-eng link-management admission-control** command in XR EXEC mode.

show mpls traffic-eng link-management admission-control [*interface type interface-path-id*]

| Syntax Description | interface | (Optional) Displays information on the specified interface. |
|--------------------|--------------------------|---|
| | <i>type</i> | (Optional) Interface type. For more information, use the question mark (?) online help function. |
| | <i>interface-path-id</i> | Physical interface or virtual interface. |
| | Note | Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| | | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task Operations ID |
|---------|--------------------|
| | mpls-te read |

Examples The following shows a sample output from the **show mpls traffic-eng link-management admission-control** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management admission-control

S System Information:
  Tunnels Count      : 2
  Tunnels Selected   : 2
Bandwidth descriptor legend:
  B0 = bw from pool 0, B1 = bw from pool 1, R = bw locked, H = bw held

TUNNEL ID              UP IF      DOWN IF    PRI STATE          BW (kbits/sec)
-----
10.10.10.10 1_34      -          PO0/2/0/1  7/7 Resv Admitted 100      RB0
```

```
10.10.10.10 15_2 - P00/2/0/2 7/7 Resv Admitted 0 B0
```

This table describes the significant fields shown in the display.

Table 9: show mpls traffic-eng link-management admission-control Command Field Descriptions

| Field | Description |
|-----------------------------|--|
| Tunnels Count | Total number of tunnels admitted. |
| Tunnels Selected | Number of tunnels displayed. |
| Bandwidth descriptor legend | BW pool type and status displayed with the tunnel entry. Shown as RG (Locked BW in global pool) in the preceding sample output. |
| TUNNEL ID | Tunnel identification. |
| UP IF | Upstream interface used by the tunnel. |
| DOWN IF | Downstream interface used by the tunnel. |
| PRI | Tunnel setup priority and hold priority. |
| STATE | Tunnel admission status. |
| BW (kbps) | Tunnel bandwidth in kilobits per second. If an R follows the bandwidth number, the bandwidth is reserved. If an H follows the bandwidth number, the bandwidth is temporarily being held for a Path message. If a G follows the bandwidth number, the bandwidth is from the global pool. If an S follows the bandwidth number the bandwidth is from the sub-pool. |

The following shows a sample output from the **show mpls traffic-eng link-management interface** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management interface pos 0/2/0/1
```

```
System Information::
  Links Count      : 1

Link ID:: POS0/2/0/1 (35.0.0.5)
Local Intf ID: 7
Link Status:

Link Label Type      : PSC (inactive)
Physical BW          : 155520 kbits/sec
BCID                 : RDM
Max Reservable BW    : 0 kbits/sec (reserved: 100% in, 100% out)
BC0 (Res. Global BW): 0 kbits/sec (reserved: 100% in, 100% out)
BC1 (Res. Sub BW)    : 0 kbits/sec (reserved: 100% in, 100% out)
MPLS-TE Link State   : MPLS-TE on, RSVP on
Inbound Admission    : allow-all
Outbound Admission   : allow-if-room
IGP Neighbor Count   : 0
Max Res BW (RDM)     : 0 kbits/sec
BC0 (RDM)            : 0 kbits/sec
BC1 (RDM)            : 0 kbits/sec
Max Res BW (MAM)     : 0 kbits/sec
BC0 (MAM)           : 0 kbits/sec
```



```

BC1 (MAM)                : 0 kbits/sec
Admin Weight              : 1 (OSPF), 10 (ISIS)
Attributes                 : 0x5 (name-based)
Flooding Status: (1 area)
  IGP Area[1]: ospf 100 area 0, not flooded
                (Reason: Interface has been administratively disabled)

```

This table describes the significant fields shown in the display.

Table 10: show mpls traffic-eng link-management interface Command Field Descriptions

| Field | Description |
|----------------------|--|
| Links Count | Number of links configured for MPLS-TE. |
| Link ID | Index of the link described. |
| Local Intf ID | Local interface ID. |
| Link Label Type | Label type of the link, for instance: PSC ¹ , TDM ² , FSC ³ . |
| Physical BW | Link bandwidth capacity (in kilobits per second). |
| BCID | Bandwidth constraint model ID (RDM or MAM). |
| Max Reservable BW | Maximum reservable bandwidth on this link. |
| BC0 (Res. Global BW) | Bandwidth constraint value for class-type 0. |
| BC1 (Res. Sub BW) | Bandwidth constraint value for class-type 1. |
| MPLS-TE Link State | Status of the link MPLS-TE-related functions. |
| Inbound Admission | Link admission policy for incoming tunnels. |
| Outbound Admission | Link admission policy for outgoing tunnels. |
| IGP Neighbor Count | IGP neighbors directly reachable over this link. |
| Max Res BW (RDM) | Maximum reservable bandwidth on this link for RDM. |
| BC0 (RDM) | Bandwidth constraint value for RDM. |
| BC1 (RDM) | Bandwidth constraint value for RDM. |
| Admin Weight | Administrative weight associated with this link. |
| Attributes | Interface attributes referring to one or more affinity names. |
| IGP Area[1] | IGP type and area and level used for TE flooding. |

¹ PSC = Packet switch capable.

² TDM = Time-division multiplexing.

³ FSC = Fiber switch capable.

show mpls traffic-eng link-management advertisements

To display local link information that MPLS-TE link management is currently flooding into the global TE topology, use the **show mpls traffic-eng link-management advertisements** command in XR EXEC mode.

show mpls traffic-eng link-management advertisements

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The **show mpls traffic-eng link-management advertisements** command has two output formats depending on the Diff-Serv TE Mode: one for prestandard mode and one for IETF mode.

The SRLG values are advertised for the link.

| Task ID | Task ID | Operations |
|---------|--------------|------------|
| | mpls-te read | |

Examples

The following shows a sample output from the **show mpls traffic-eng link-management advertisements** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management advertisements
```

```
Link ID:: 0 (GigabitEthernet0/2/0/1)
  Link IP Address      : 12.9.0.1
  O/G Intf ID         : 28
  Designated Router   : 12.9.0.2
  TE Metric           : 1
  IGP Metric          : 1
  Physical BW         : 1000000 kbits/sec
  BCID                : RDM
  Max Reservable BW   : 10000 kbits/sec
  Res Global BW       : 10000 kbits/sec
  Res Sub BW          : 0 kbits/sec
  SRLGs               : 10, 20

Downstream::
          Global Pool  Sub Pool
          -----
Reservable BW[0]:      10000      0 kbits/sec
Reservable BW[1]:      10000      0 kbits/sec
Reservable BW[2]:       9800      0 kbits/sec
```

```

Reservable BW[3]:          9800          0 kbits/sec
Reservable BW[4]:          9800          0 kbits/sec
Reservable BW[5]:          9800          0 kbits/sec
Reservable BW[6]:          9800          0 kbits/sec
Reservable BW[7]:          9800          0 kbits/sec

Attribute Flags: 0x00000004
Attribute Names: red2

Link ID:: 1 (GigabitEthernet0/2/0/2)
Link IP Address      : 14.9.0.1
O/G Intf ID         : 29
Designated Router   : 14.9.0.4
TE Metric           : 1
IGP Metric          : 1
Physical BW         : 1000000 kbits/sec
BCID                : RDM
Max Reservable BW   : 750000 kbits/sec
Res Global BW       : 750000 kbits/sec
Res Sub BW          : 0 kbits/sec

Downstream::

Global Pool      Sub Pool
-----
Reservable BW[0]: 750000          0 kbits/sec
Reservable BW[1]: 750000          0 kbits/sec
Reservable BW[2]: 750000          0 kbits/sec
Reservable BW[3]: 750000          0 kbits/sec
Reservable BW[4]: 750000          0 kbits/sec
Reservable BW[5]: 750000          0 kbits/sec
Reservable BW[6]: 750000          0 kbits/sec
Reservable BW[7]: 750000          0 kbits/sec

Attribute Flags: 0x00000000
Attribute Names:

```

This table describes the significant fields shown in the display.

Table 11: show mpls traffic-eng link-management advertisements Command Field Descriptions

| Field | Description |
|-------------------|---|
| Link ID | Index of the link described. |
| Link IP Address | Local IP address of the link. |
| TE Metric | Metric value for the TE link configured under MPLS-TE. |
| IGP Metric | Metric value for the TE link configured under IGP. |
| Physical BW | Link bandwidth capacity (in kilobits per second). |
| BCID | Bandwidth constraint model ID (RDM or MAM). |
| Max Reservable BW | Maximum reservable bandwidth on this link. |
| Res Global BW | Maximum reservable of global pool/BC0 bandwidth on this link. |

| Field | Description |
|--------------------|---|
| Res Sub BW | Reservable sub-bandwidth for sub-pool /BC1 bandwidth on this link. |
| SRLGs ⁴ | Links that share a common fiber or a common physical attribute. If one link fails, other links in the group may also fail. Links in the group have a shared risk. |
| Downstream | Direction of the LSP path message. |
| Reservable BW[x] | Bandwidth available for reservations in the global TE topology and subpools. |
| Attribute Flags | Link attribute flags being flooded. |
| Attribute Names | Name of the affinity attribute of a link. |
| BC0 | Bandwidth constraint value for class-type 0 |
| BC1 | Bandwidth constraint value for class-type 1 |
| TE-class [index] | TE-class configured on this router at given index (mapping of class-type and priority), shows available bandwidth in that class. |

⁴ SRLGs = Shared Risk Link Groups.

show mpls traffic-eng link-management bandwidth-allocation

To display current local link information, use the **show mpls traffic-eng link-management bandwidth-allocation** command in XR EXEC mode.

show mpls traffic-eng link-management bandwidth-allocation [*interface type interface-path-id*]

| Syntax Description | interface | (Optional) Displays information on the specified interface. |
|--------------------|--------------------------|---|
| | <i>type</i> | (Optional) Interface type. For more information, use the question mark (?) online help function. |
| | <i>interface-path-id</i> | Physical interface or a virtual interface. |
| | Note | Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| | | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Advertised and current information may differ depending on how flooding is configured.

| Task ID | Task Operations ID |
|---------|--------------------|
| | mpls-te read |

Examples The following shows a sample output from the **show mpls traffic-eng link-management bandwidth-allocation** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link bandwidth-allocation interface POS 0/2/0/1
```

```
System Information::
  Links Count          : 4
  Bandwidth Hold time : 15 seconds

Link ID:: POS0/2/0/1 (7.2.2.1)
  Local Intf ID: 4
  Link Status:
  Link Label Type   : PSC
```

show mpls traffic-eng link-management bandwidth-allocation

```

Physical BW      : 155520 kbits/sec
BCID            : MAM
Max Reservable BW : 1000 kbits/sec (reserved: 0% in, 0% out)
BC0            : 600 kbits/sec (reserved: 2% in, 2% out)
BC1            : 400 kbits/sec (reserved: 0% in, 0% out)
MPLS-TE Link State : MPLS-TE on, RSVP on, admin-up, flooded
Inbound Admission : allow-all
Outbound Admission : allow-if-room
IGP Neighbor Count : 2
BW Descriptors   : 1 (including 0 BC1 descriptors)
Admin Weight     : 1 (OSPF), 10 (ISIS)
Up Thresholds    : 15 30 45 60 75 80 85 90 95 96 97 98 99 100 (default)
Down Thresholds  : 100 99 98 97 96 95 90 85 80 75 60 45 30 15 (default)

```

Bandwidth Information::

Downstream BC0 (kbits/sec):

| KEEP | PRIORITY | BW HELD | BW TOTAL HELD | BW LOCKED | BW TOTAL LOCKED |
|------|----------|---------|---------------|-----------|-----------------|
| 0 | | 0 | 0 | 0 | 0 |
| 1 | | 0 | 0 | 0 | 0 |
| 2 | | 0 | 0 | 0 | 0 |
| 3 | | 0 | 0 | 0 | 0 |
| 4 | | 0 | 0 | 0 | 0 |
| 5 | | 0 | 0 | 0 | 0 |
| 6 | | 0 | 0 | 0 | 0 |
| 7 | | 0 | 0 | 10 | 10 |

Downstream BC1 (kbits/sec):

| KEEP | PRIORITY | BW HELD | BW TOTAL HELD | BW LOCKED | BW TOTAL LOCKED |
|------|----------|---------|---------------|-----------|-----------------|
| 0 | | 0 | 0 | 0 | 0 |
| 1 | | 0 | 0 | 0 | 0 |
| 2 | | 0 | 0 | 0 | 0 |
| 3 | | 0 | 0 | 0 | 0 |
| 4 | | 0 | 0 | 0 | 0 |
| 5 | | 0 | 0 | 0 | 0 |
| 6 | | 0 | 0 | 0 | 0 |

This table describes the significant fields shown in the display.

Table 12: show mpls traffic-eng link-management bandwidth-allocation Command Field Descriptions

| Field | Description |
|---------------------|--|
| Links Count | Number of links configured for MPLS-TE. |
| Bandwidth Hold Time | Time, in seconds, that bandwidth can be held. |
| Link ID | Interface name and IP address of the link. |
| Link Label type | Label type of the link, for example: <ul style="list-style-type: none"> • PSC⁵ • TDM⁶ • FSC⁷ |

| Field | Description |
|--------------------|---|
| Physical BW | Link bandwidth capacity (in bits per second). |
| BCID | Bandwidth constraint model ID (RDM or MAM). |
| Max Reservable BW | Maximum reservable bandwidth on this link. |
| BC0 | Maximum RSVP bandwidth in BC0. |
| BC1 | Maximum RSVP bandwidth in BC1. |
| BW Descriptors | Number of bandwidth allocations on this link. |
| MPLS-TE Link State | Status of the link MPLS-TE-related functions. |
| Inbound Admission | Link admission policy for incoming tunnels. |
| Outbound Admission | Link admission policy for outgoing tunnels. |
| IGP Neighbor Count | IGP neighbors directly reachable over this link. |
| BW Descriptors | Internal bandwidth descriptors created when tunnels are admitted. |
| Admin Weight | Administrative weight associated with this link. |
| Up Thresholds | Threshold values used to determine link advertisement when available bandwidth increases. |
| Down Thresholds | Threshold values used to determine link advertisement when available bandwidth decreases. |

⁵ PSC = Packet switch capable.

⁶ TDM = Time-division multiplexing.

⁷ FSC = Fiber switch capable.

show mpls traffic-eng link-management bfd-neighbors

To display TE-enabled Bidirectional Forwarding Detection (BFD) neighbors, use the **show mpls traffic-eng link-management bfd-neighbors** command in XR EXEC mode.

show mpls traffic-eng link-management bfd-neighbors [**interface** *type interface-path-id*]

| Syntax Description | interface | (Optional) Displays information about the specified interface. |
|--------------------|--------------------------|---|
| | <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| | <i>interface-path-id</i> | Physical interface or virtual interface. |
| | Note | Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| | | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task Operations ID |
|---------|--------------------|
| | mpls-te read |

Examples The following shows a sample output from the **show mpls traffic-eng link-management bfd-neighbors** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management bfd-neighbors

Link ID:: POS0/6/0/0
BFD Neighbor Address: 7.3.3.1, State: Up
Link ID:: POS0/6/0/1
No BFD Neighbor
Link ID:: POS0/6/0/2
BFD Neighbor Address: 7.4.4.1, State: Down
```


This table describes the significant fields shown in the display.

Table 13: show mpls traffic-eng link-management bfd Command Field Descriptions

| Field | Description |
|----------------------|--|
| Link ID | Link by which the neighbor is reached. |
| BFD Neighbor Address | Neighbor address and Up/Down state. |

Related Commands

| Command | Description |
|---------------------------------------|--|
| bfd fast-detect (MPLS-TE) | Enables BFD for communication failure detection. |
| bfd minimum-interval (MPLS-TE) | Sets the BFD interval. |
| bfd multiplier (MPLS-TE) | Sets the BFD multiplier. |

show mpls traffic-eng link-management igp-neighbors

To display Interior Gateway Protocol (IGP) neighbors, use the **show mpls traffic-eng link-management igp-neighbors** command in XR EXEC mode.

```
show mpls traffic-eng link-management igp-neighbors [igp-id {isis isis-address | ospf ospf-id}
[ {interface type interface-path-id IP-address} ]]
```

Syntax Description

| | |
|--------------------------|--|
| igp-id | (Optional) Displays the IGP neighbors that are using a specified IGP identification. |
| isis isis-address | Displays the specified Intermediate System-to-Intermediate System (IS-IS) neighbor system ID when neighbors are displayed by IGP ID. |
| ospf ospf-id | Displays the specified Open Shortest Path first (OSPF) neighbor OSPF router ID when neighbors are displayed by IGP ID. |
| interface | (Optional) Displays information on the specified interface. |
| <i>type</i> | Interface type. For more information, use the question mark (?) online help function. |
| <i>interface-path-id</i> | Physical interface or a virtual interface. |
| Note | Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| | For more information about the syntax for the router, use the question mark (?) online help function. |
| <i>IP-address</i> | (Optional) IGP neighbors that are using a specified IGP IP address. |

Command Modes

XR EXEC

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

| Task ID | Operations |
|--------------|------------|
| mpls-te read | |

Examples

The following shows a sample output from the **show mpls traffic-eng link-management igp-neighbors** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link igp-neighbors
```

```
Link ID: POS0/7/0/0  
No Neighbors
```

```
Link ID: POS0/7/0/1  
Neighbor ID: 10.90.90.90 (area: ospf area 0, IP: 10.15.12.2)
```

This table describes the significant fields shown in the display.

Table 14: show mpls traffic-eng link-management igp-neighbors Command Field Descriptions

| Field | Description |
|-------------|--|
| Link ID | Link by which the neighbor is reached. |
| Neighbor ID | IGP identification information for the neighbor. |

show mpls traffic-eng link-management interfaces

To display interface resources, or a summary of link management information, use the **show mpls traffic-eng link-management interfaces** command in XR EXEC mode.

show mpls traffic-eng link-management interfaces [*type interface-path-id*]

| | |
|---------------------------|---|
| Syntax Description | <i>type</i> (Optional) Interface type. For more information, use the question mark (?) online help function. |
| Syntax Description | <i>interface-path-id</i> Physical interface or a virtual interface. |
| Syntax Description | Note Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| Syntax Description | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You cannot configure more than 250 links under MPLS-TE.

| Task ID | Task ID | Operations |
|----------------|----------------|-------------------|
| | mpls-te | read |

Examples The following sample output is from the **show mpls traffic-eng link-management interfaces** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management interfaces GigabitEthernet0/1/1/0
```

```
System Information::
  Links Count          : 16 (Maximum Links Supported 800)
Link ID:: GigabitEthernet0/1/1/0 (10.12.110.1)
  Local Intf ID: 22
Link Status:
  Link Label Type      : PSC
  Physical BW          : 1000000 kbits/sec
  BCID                 : RDM
  Max Reservable BW    : 743346 kbits/sec (reserved: 40% in, 40% out)
  BC0 (Res. Global BW) : 743346 kbits/sec (reserved: 40% in, 40% out)
```

```

BC1 (Res. Sub BW)      : 0 kbits/sec (reserved: 100% in, 100% out)
MPLS TE Link State    : MPLS TE on, RSVP on, admin-up
IGP Neighbor Count    : 1
Max Res BW (RDM)     : 900000 kbits/sec
BC0 (RDM)            : 900000 kbits/sec
BC1 (RDM)            : 0 kbits/sec
Max Res BW (MAM)     : 0 kbits/sec
BC0 (MAM)            : 0 kbits/sec
BC1 (MAM)            : 0 kbits/sec

Attributes            : 0x0
Ext Admin Group      :
  Length : 256 bits
  Value  : 0x::
Attribute Names      :
Flooding Status: (1 area)
  IGP Area[1]: IS-IS 0 level 2, flooded
  Nbr: ID 0000.0000.0002.00, IP 10.12.110.2 (Up)
  Admin weight: not set (TE), 10 (IGP)
Lockout Status: Never

```

This table describes the significant fields shown in the display.

Table 15: show mpls traffic-eng link-management interfaces Command Field Descriptions

| Field | Description |
|--------------------|---|
| Links Count | Number of links configured for MPLS-TE. Maximum number of links supported is 100. |
| Link ID | Link identification index. |
| Link Label Type | Label type assigned to the link. |
| Physical Bandwidth | Link bandwidth capacity (in kilobits per second). |
| BCID | Bandwidth constraint model ID (RDM or MAM). |
| Max Reservable BW | Maximum reservable bandwidth on this link. |
| BC0 | Reservable bandwidth (in kbps) on this link in BC0. |
| BC1 | Reservable bandwidth (in kbps) on this link in BC1. |
| Attributes | TE link attribute in hexadecimal. |
| Attribute Names | Name of the affinity attribute of a link. |
| MPLS-TE Link State | Status of the MPLS link. |
| Inbound Admission | Link admission policy for inbound tunnels. |
| Outbound Admission | Link admission policy for outbound tunnels. |
| IGP Neighbor Count | IGP ⁸ neighbors directly reachable over this link. |

| Field | Description |
|-----------------|---|
| Admin. Weight | Administrative weight associated with this link. |
| Flooding Status | Status for each configured area or Flooding status for the configured area. |
| IGP Area | IGP type and area and level used for TE flooding. |

⁸ IGP = Interior Gateway Protocol .

show mpls traffic-eng link-management statistics

To display interface resources or a summary of link management information, use the **show mpls traffic-eng link-management statistics** command in XR EXEC mode.

show mpls traffic-eng link-management statistics [{summary | interface *type interface-path-id*}]

| Syntax Description | summary | (Optional) Displays the statistics summary. |
|--------------------|-------------------|---|
| | interface | (Optional) Displays the interface for which information is requested. |
| | type | (Optional) Interface type. For more information, use the question mark (?) online help function. |
| | interface-path-id | Physical interface or virtual interface. |
| | | Note Use the show interfaces command to see a list of all possible interfaces currently configured on the router. |
| | | For more information about the syntax for the router, use the question mark (?) online help function. |

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines The **show mpls traffic-eng link-management statistics** command displays resource and configuration information for all configured interfaces.

| Task ID | Task Operations ID |
|---------|--------------------|
| | mpls-te read |

Examples

The following shows a sample output from the **show mpls traffic-eng link-management statistics** command using the **summary** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management statistics summary

LSP Admission Statistics:

      Setup      Setup      Setup      Setup      Tear      Tear      Tear
      Requests Admits  Rejects  Errors  Requests Preempts  Errors
-----
Path          13         12          1          0         10          0          0
```

```

Resv      8      8      0      0      5      0      0

```

Table 16: [show mpls traffic-eng link-management statistics summary Command Field Descriptions](#), on page 160 describes the significant fields shown in the display.

Table 16: show mpls traffic-eng link-management statistics summary Command Field Descriptions

| Field | Description |
|----------------|--|
| Path | Path information. |
| Resv | Reservation information. |
| Setup Requests | Number of requests for a setup. |
| Setup Admits | Number of admitted setups. |
| Setup Rejects | Number of rejected setups. |
| Setup Errors | Number of setup errors. |
| Tear Requests | Number of tear requests. |
| Tear Preempts | Number of paths torn down due to preemption. |
| Tear Errors | Number of tear errors. |

show mpls traffic-eng link-management summary

To display a summary of link management information, use the **show mpls traffic-eng link-management summary** command in XR EXEC mode.

show mpls traffic-eng link-management summary

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines You cannot configure more than 250 links for MPLS-TE/FRR.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | read |

Examples

The following sample output is from the **show mpls traffic-eng link-management summary** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management summary
```

```
System Information::
  Links Count          : 6 (Maximum Links Supported 100)
  Flooding System     : enabled
  IGP Areas Count     : 2
```

```
IGP Areas
-----
```

```
IGP Area[1]:: isis level-2
  Flooding Protocol   : ISIS
  Flooding Status     : flooded
  Periodic Flooding  : enabled (every 180 seconds)
  Flooded Links       : 4
  IGP System ID       : 0000.0000.0002.00
  MPLS-TE Router ID  : 20.20.20.20
  IGP Neighbors       : 8
```

```
IGP Area[2]:: ospf area 0
  Flooding Protocol   : OSPF
  Flooding Status     : flooded
  Periodic Flooding  : enabled (every 180 seconds)
  Flooded Links       : 4
  IGP System ID       : 20.20.20.20
```

show mpls traffic-eng link-management summary

```

MPLS-TE Router ID   : 20.20.20.20
IGP Neighbors       : 8

```

This table describes the significant fields shown in the display.

Table 17: show mpls traffic-eng link-management summary Command Field Descriptions

| Field | Description |
|-------------------|---|
| Links Count | Number of links configured for MPLS-TE. Maximum number of links supported is 100. |
| Flooding System | Enable status of the MPLS-TE flooding system. |
| IGP Areas Count | Number of IGP ⁹ areas described. |
| IGP Area | IGP type and area and level used for TE flooding. |
| Flooding Protocol | IGP flooding information for this area. |
| Flooding Status | Status of flooding for this area. |
| Periodic Flooding | Status of periodic flooding for this area. |
| Flooded Links | Links that were flooded. |
| IGP System ID | IGP for the node associated with this area. |
| MPLS-TE Router ID | MPLS-TE router ID for this node. |
| IGP Neighbors | Number of reachable IGP neighbors associated with this area. |

⁹ IGP = Interior Gateway Protocol.

show mpls traffic-eng pce peer

To display the status of the path computation element (PCE) peer address and state, use the **show mpls traffic-eng pce peer** command in XR EXEC mode.

```
show mpls traffic-eng pce peer [ { address | all } ]
```

| Syntax Description | |
|--------------------|---|
| | <i>address</i> (Optional) IPv4 peer address for the PCE. |
| | all (Optional) Displays all the peers for the PCE. |

| Command Default | |
|-----------------|-------------------------------|
| | No default behavior or values |

| Command Modes | |
|---------------|---------|
| | XR EXEC |

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| Usage Guidelines | |
|------------------|--|
| | No specific guidelines impact the use of this command. |

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | read |

Examples

The following sample output shows the status of both the PCE peer and state:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng pce peer

PCE Address 202.202.88.8
State Up
  PCEP has been up for: 04:18:31
Learned through:
  OSPF 1
Sending KA every 30 s
Time out peer if no KA received for 120 s
Tolerance: Minimum KA 10 s
KA messages rxed 518 txed 517
PCEReq messages rxed 0, txed 0
PCERep messages rxed 0, txed 0
PCEErr messages rxed 0, txed 0
  Last error received: None
  Last error sent: None
PCE OPEN messages: rxed 1, txed 2
PCEP session ID: local 0, remote 0

Average reply time from peer: 0 ms
Minimum reply time from peer: 0 ms
Maximum reply time from peer: 0 ms
0 requests timed out with this peer
```

```
show mpls traffic-eng pce peer
```

```
Transmit TCP buffer: Current 0, Maximum 12
Receive TCP buffer: Current 0, Maximum 12
```

This table describes the significant fields shown in the display.

Table 18: show mpls traffic-eng pce peer Field Descriptions

| Field | Description |
|---|---|
| KA | PCEP keepalive. |
| Learned through | Learned through is how the peer was learned which is either through a static configuration or an IGP. |
| Average reply time from peer | Average reply time for the peer to respond to PCEReq request messages with PCERep response messages. |
| Minimum reply time from peer | Minimum reply time for the peer to respond to PCEReq request messages with PCERep response messages. |
| Maximum reply time from peer | Maximum reply for the peer to respond to PCEReq request messages with PCERep response messages. |
| Transmit TCP buffer Receive TCP Buffer | Number of messages that are in the TCP buffer with the peer waiting to be sent or processed locally. |
| 0 requests timed out with this peer | Number of PCEReq messages that timed out waiting for a response from this peer. |

Related Commands

| Command | Description |
|---|---|
| clear mpls traffic-eng pce , on page 39 | Clears the PCE statistics. |
| pce address (MPLS-TE) , on page 104 | Configures the IPv4 self address for a PCE. |
| pce peer (MPLS-TE) , on page 109 | Configures an IPv4 self address for a PCE peer. |

show mpls traffic-eng pce tunnels

To display the status of the path computation element (PCE) tunnels, use the **show mpls traffic-eng pce tunnels** command in XR EXEC mode.

```
show mpls traffic-eng pce tunnels [tunnel-id]
```

| Syntax Description | <i>tunnel-id</i> (Optional) Tunnel identifier. The range is 0 to 4294967295. | | | | |
|---------------------------|---|---------|--------------|---------------|------------------------------|
| Command Default | No default behavior or values | | | | |
| Command Modes | XR EXEC | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |
| Task ID | <table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read</td> </tr> </tbody> </table> | Task ID | Operations | mpls-te | read |
| Task ID | Operations | | | | |
| mpls-te | read | | | | |

Examples

The following sample output shows the status of the PCE tunnels:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng pce tunnels

Tunnel : tunnel-te10
  Destination : 205.205.10.10
  State : down, PCE failed to find path

Tunnel : tunnel-te30
  Destination : 3.3.3.3
  State : up
  Current path option: 10, path obtained from dynamically learned PCE 1.2.3.4
  Admin weight : 15
  Hop Count : 3
```

This table describes the significant fields shown in the display.

Table 19: show mpls traffic-eng pce tunnels Command Field Descriptions

| Field | Description |
|-------------|--|
| Tunnel | Tunnel number for the MPLS-TE tunnel interface. |
| Destination | IP address of the destination of the tunnel. |
| State | State of the tunnel. Values are up, down, or admin-down. |

show mpls traffic-eng pce tunnels

| Field | Description |
|--------------|---|
| Admin weight | Administrative weight (cost) of the link. |

Related Commands

| Command | Description |
|--|---|
| pce address (MPLS-TE), on page 104 | Configures the IPv4 self address for a PCE. |

show mpls traffic-eng preemption log

To display the log of preemption events, use the **show mpls traffic-eng preemption log** command in XR EXEC mode.

show mpls traffic-eng preemption log

| Syntax Description | log Displays a log of preemption events. | | | | | | |
|---------------------------|--|---------|--------------|---------------|------------------------------|---------------|---|
| Command Default | None | | | | | | |
| Command Modes | XR EXEC | | | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> <tr> <td>Release 5.1.2</td> <td>The command output was modified to display the log of soft-preemption over FRR backup tunnels events.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. | Release 5.1.2 | The command output was modified to display the log of soft-preemption over FRR backup tunnels events. |
| Release | Modification | | | | | | |
| Release 5.0.0 | This command was introduced. | | | | | | |
| Release 5.1.2 | The command output was modified to display the log of soft-preemption over FRR backup tunnels events. | | | | | | |
| Usage Guidelines | No specific guidelines impact the use of this command. | | | | | | |
| Task ID | <table border="1"> <thead> <tr> <th>Task ID</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read</td> </tr> </tbody> </table> | Task ID | Operation | mpls-te | read | | |
| Task ID | Operation | | | | | | |
| mpls-te | read | | | | | | |

This is sample output from the **show mpls traffic-eng preemption log** command displaying the log of preemption events:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng preemption log
Bandwidth Change on GigabitEthernet0/0/0/0
Old BW (BC0/BC1): 200000/100000, New BW (BC0/BC1): 1000/500 kbps
BW Overshoot (BC0/BC1): 1000/0 kbps
Preempted BW (BC0/BC1): 35000/0 kbps; Soft 30000/0 kbps; Hard 5000/0 kbps;
Preempted 2 tunnels; Soft 1 tunnel; Hard 1 tunnel
-----
TunID LSP ID          Source      Destination Preempt  Pri  Bandwidth  BW Type
                    Type      S/H      (in kbps)
-----
    1  10002      192.168.0.1      1.0.0.0   Hard  7/7      5000      BC0
    1    2      192.168.0.1      192.168.0.4 Soft  7/7      30000     BC0
```

This sample output displays the log of soft-preemption over FRR backup tunnels events:

```
RP/0/RP0/CPU0:router#show mpls traffic-eng preemption log
Thu Apr 25 13:12:04.863 EDT
Bandwidth Change on GigabitEthernet0/0/0/1 at 04/25/2013 12:56:14
Old BW (BC0/BC1): 200000/100000, New BW (BC0/BC1): 100000/0 kbps
```

show mpls traffic-eng preemption log

BW Overshoot (BC0/BC1): 30000/0 kbps
 Preempted BW (BC0/BC1): 130000/0 kbps; Soft 60000/0 kbps; Hard 0/0 kbps; FRRSoft 70000/0

Preempted 2 tunnel, 2 LSP; Soft 1 tunnel, 1 LSP; Hard 0 tunnels, 0 LSPs; FRRSoft 1 tunnel, 1 LSP

| TunID | LSP ID | Source | Destination | Preempt Type | Pri S/H | Bandwidth (in kbps) | BW Type |
|-------|--------|-------------|-------------|--------------|---------|---------------------|---------|
| 1 | 13 | 192.168.0.1 | 192.168.0.3 | FRRSoft | 7/7 | 70000 | BC0 |
| 2 | 22 | 192.168.0.1 | 192.168.0.3 | Soft | 7/7 | 60000 | BC0 |

show mpls traffic-eng tunnels

To display information about MPLS-TE tunnels, use the **show mpls traffic-eng tunnels** command in XR EXEC mode .

```
show mpls traffic-eng tunnels [tunnel-number] [affinity] [all] [auto-bw] [backup [{
tunnel-number | mesh-value | [ name tunnel-name ] | promotion-timer promotion-timer |
protected-interface type interface-path-id | { static | auto } }}] [brief] [destination
destination-address] [detail] [down] [interface { in | out | inout } type interface-path-id ]
[ name tunnel-name ] [p2p] [property { backup-tunnel | fast-reroute } ] [ protection
] [ reoptimized within-last interval ] [ role { all | head | tail | middle } ] [ source
source-address ] [ suboptimal constraints { current | max | none } ] [summary] [tabular]
[unused] [up] [ class-type ct ] [ igp { isis | ospf } ] [ within-last interval ]
```

Syntax Description

| | |
|--|--|
| tunnel-number | (Optional) Number of the tunnel. Range is from 0 to 65535. |
| affinity | (Optional) Displays the affinity attributes for all outgoing links. The links, which are used by the tunnel, display color information. |
| all | (Optional) Displays all MPLS-TE tunnels. |
| auto-bw | (Optional) Restricts the display to tunnels when the automatic bandwidth is enabled. |
| backup | (Optional) Displays FRR ¹⁰ backup tunnels information. The information includes the physical interface protected by the tunnel, the number of TE LSPs ¹¹ protected, and the bandwidth protected. |
| name tunnel-name | (Optional) Displays the tunnel with given name. |
| promotion-timer promotion-timer | (Optional) Displays the configured FRR backup tunnel promotion timer value, in seconds. |
| protected-interface | (Optional) Displays FRR protected interfaces. |
| static | (Optional) Displays static backup tunnels. |
| brief | (Optional) Displays the brief form of this command. |
| destination destination-address | (Optional) Restricts the display to tunnels destined for the specified IP address. |
| detail | (Optional) Displays detail information about headend tunnels. |
| down | (Optional) Displays tunnels that are down. |

| | |
|--|--|
| interface in | (Optional) Displays tunnels that use the specified input interface. |
| interface out | (Optional) Displays tunnels that use the specified output interface. |
| interface inout | (Optional) Displays tunnels that use the specified interface as an input or output interface. |
| <i>type</i> | (Optional) Interface type. For more information, use the question mark (?) online help function. |
| <i>interface-path-id</i> | Physical interface or a virtual interface. Note Use the show interfaces command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function. |
| p2p | (Optional) Displays only P2P tunnels. |
| property backup-tunnel | (Optional) Displays tunnels with property of backup tunnel. Selects MPLS-TE tunnels used to protect physical interfaces on this router. A tunnel configured to protect a link against failure is a backup tunnel and has the backup tunnel property. |
| property fast-reroute | (Optional) Displays tunnels with property of fast-reroute configured. Selects FRR-protected MPLS-TE tunnels originating on (head), transmitting (router), or terminating (tail) on this router. |
| protection | (Optional) Displays all protected tunnels (configured as fast-reroutable). Displays information about the protection provided to each tunnel selected by other options specified with this command. The information includes whether protection is configured for the tunnel, the protection (if any) provided to the tunnel by this router, and the tunnel bandwidth protected. |
| reoptimized within-last <i>interval</i> | (Optional) Displays tunnels reoptimized within the last given time interval. |
| role all | (Optional) Displays all tunnels. |
| role head | (Optional) Displays tunnels with their heads at this router. |

| | |
|---------------------------------------|---|
| role middle | (Optional) Displays tunnels at the middle of this router. |
| role tail | (Optional) Displays tunnels with their tails at this router. |
| source <i>source-address</i> | (Optional) Restricts the display to tunnels with a matching source IP address. |
| suboptimal constraints current | (Optional) Displays tunnels whose path metric is greater than the current shortest path constrained by the tunnel's configured options. |
| suboptimal constraints max | (Optional) Displays tunnels whose path metric is greater than the current shortest path, constrained by the configured options for the tunnel, and taking into consideration only the network capacity. |
| suboptimal constraints none | (Optional) Displays tunnels whose path metric is greater than the shortest unconstrained path. |
| summary | (Optional) Displays summary of configured tunnels. |
| tabular | (Optional) Displays a table showing TE LSPs, with one entry per line. |
| up | (Optional) Displays tunnels when the tunnel interface is up. |
| class-type <i>ct</i> | (Optional) Displays tunnels using the given class-type value configuration. |
| igp <i>isis</i> | (Optional) Displays tunnels with the path calculated as the IS-IS type for IGP. |
| igp <i>ospf</i> | (Optional) Displays tunnels with the path calculated as the OSPF type for IGP. |
| within-last <i>interval</i> | (Optional) Displays tunnels that has come up within the last given time interval. |

¹⁰ FRR = Fast Reroute.

¹¹ LSPs = Label Switched Paths.

Command Default None

Command Modes XR EXEC

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

| Release | Modification |
|---------------|--|
| Release 5.1.2 | <p>These changes were made to support the path-selection cost-limit feature:</p> <ul style="list-style-type: none"> • The command output was modified to show the configured cost-limit. • The shown PCALC error was modified to show cost-limit failure: applies for new paths and verification of existing paths. • The 'Reopt Reason' field in the show output was modified to show the cost-limit. • The path-protection switchover reason in the show output was modified to show the cost-limit. <p>The command output was modified to display the 'Traffic switched to FRR backup tunnel-te' message as part of Soft-preemption over FRR backup tunnels feature implementation.</p> |

Usage Guidelines

Use the **brief** form of the **show mpls traffic-eng tunnels** command to display information specific to a tunnel interface. Use the command without the **brief** keyword to display information that includes the destination address, source ID, role, name, suboptimal constraints, and interface.

The **affinity** keyword is available for only the source router.

Selected tunnels would have a shorter path if they were reoptimized immediately.

Task ID

| Task ID | Operations |
|---------|----------------|
| mpls-te | read, write |

Examples

This sample output is not changed when no area is specified for the active path-option. If the area is specified, it is added on a line of its own after the existing path-option information.

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 20 detail
```

```
Signalling Summary:
```

```

  LSP Tunnels Process: running
    RSVP Process: running
      Forwarding: enabled
  Periodic reoptimization: every 3600 seconds, next in 2400 seconds
  Periodic FRR Promotion: every 300 seconds, next in 16 seconds
  Auto-bw enabled tunnels: 6
```

```
Name: tunnel-te20 Destination: 130.130.130.130
```

```
Status:
```

```
Admin: up Oper: up Path: valid Signalling: connected
```

```
path option 1, type explicit r1r2r3gig_path (Basis for Setup, path weight 200)
```

```

G-PID: 0x0800 (derived from egress interface properties)
Bandwidth Requested: 113 kbps CT0

Config Parameters:
Bandwidth:      100 kbps (CT0) Priority:  7  7 Affinity: 0x0/0xffff
Metric Type: TE (interface)
AutoRoute: enabled LockDown: disabled Policy class: not set
Forwarding-Adjacency: disabled
Loadshare:      0 equal loadshares
Auto-bw: enabled
  Last BW Applied: 113 kbps CT0 BW Applications: 1
  Last Application Trigger: Periodic Application
  Bandwidth Min/Max: 0-4294967295 kbps
  Application Frequency: 5 min Jitter: 0s Time Left: 4m 19s
  Collection Frequency: 1 min
  Samples Collected: 0 Next: 14s
  Highest BW: 0 kbps Underflow BW: 0 kbps
  Adjustment Threshold: 10% 10 kbps
  Overflow Detection disabled
  Underflow Detection disabled
  Fast Reroute: Disabled, Protection Desired: None
  Path Protection: Not Enabled

History:
Tunnel has been up for: 00:18:54 (since Sun Mar 14 23:48:23 UTC 2010)
Current LSP:
  Uptime: 00:05:41 (since Mon Mar 15 00:01:36 UTC 2010)
Prior LSP:
  ID: path option 1 [3]
  Removal Trigger: reoptimization completed
Current LSP Info:
  Instance: 4, Signaling Area: IS-IS 1 level-2
  Uptime: 00:05:41 (since Mon Mar 15 00:01:36 UTC 2010)
  Outgoing Interface: GigabitEthernet0/5/0/21, Outgoing Label: 16009
  Router-IDs: local 110.110.110.110
               downstream 120.120.120.120
Path Info:
  Outgoing:
  Explicit Route:
    Strict, 61.10.1.2
    Strict, 61.15.1.1
    Strict, 61.15.1.2
    Strict, 130.130.130.130
  Record Route: Disabled
  Tspec: avg rate=113 kbits, burst=1000 bytes, peak rate=113 kbits
  Session Attributes: Local Prot: Not Set, Node Prot: Not Set, BW Prot: Not Set
Resv Info: None
  Record Route: Disabled
  Fspec: avg rate=113 kbits, burst=1000 bytes, peak rate=113 kbits
Displayed 1 (of 6) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads

```

This is a sample output from the **show mpls traffic-eng tunnels** command using the **property** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels property backup interface out pos 0/6/0/0
```

```

Signalling Summary:
  LSP Tunnels Process: running, not registered with RSVP
  RSVP Process: not running
  Forwarding: enabled
  Periodic reoptimization: every 3600 seconds, next in 3595 seconds

```

show mpls traffic-eng tunnels

```

        Periodic FRR Promotion:  every 300 seconds, next in 295 seconds
        Periodic auto-bw collection:  disabled

Name: tunnel-te1  Destination: 10.0.0.1
Status:
  Admin:    up Oper:    up  Path:  valid  Signalling: connected

  path option 1,  type dynamic  (Basis for Setup, path weight 1)
  G-PID: 0x0800 (derived from egress interface properties)

Config Parameters:
  Bandwidth:          1000 kbps (CT0) Priority:  7  7 Affinity: 0x0/0xffff
  Metric Type: TE (default)
  AutoRoute: disabled LockDown: disabled
  Loadshare:         10000 bandwidth-based
  Auto-bw: disabled(0/0) 0 Bandwidth Requested:      0
  Direction: unidirectional
  Endpoint switching capability: unknown, encoding type: unassigned
  Transit switching capability: unknown, encoding type: unassigned
  Backup FRR EXP Demotion: 1 ' 7, 2 ' 1
  Class-Attributes: 1, 2, 7
  Bandwidth-Policer: off

History:
  Tunnel has been up for: 00:00:08
  Current LSP:
    Uptime: 00:00:08

  Path info (ospf 0 area 0):
    Hop0: 10.0.0.2
    Hop1: 102.0.0.2
  Displayed 1 (of 1) heads, 0 (of 0) midpoints, 0 (of 0) tails
  Displayed 0 up, 1 down, 0 recovering, 0 recovered heads

```

This table describes the significant fields shown in the display.

Table 20: show mpls traffic-eng tunnels Command Field Descriptions

| Field | Description |
|-----------------------------|---|
| LSP Tunnels Process | Status of the LSP ¹² tunnels process. |
| RSVP Process | Status of the RSVP process. |
| Forwarding | Status of forwarding (enabled or disabled). |
| Periodic reoptimization | Time, in seconds, until the next periodic reoptimization. |
| Periodic FRR Promotion | Time, in seconds, till the next periodic FRR ¹³ promotion. |
| Periodic auto-bw collection | Time, in seconds, till the next periodic auto-bw collection. |
| Name | Interface configured at the tunnel head. |
| Destination | Tail-end router identifier. |
| Admin/STATUS | Configured up or down. |
| Oper/STATE | Operationally up or down. |

| Field | Description |
|------------------------------|--|
| Signalling | Signaling connected or down or proceeding. |
| Config Parameters | Configuration parameters provided by tunnel mode MPLS traffic-eng, including those specific to unequal load-balancing functionality (bandwidth, load-share, backup FRR EXP demotion, class-attributes, and bandwidth-policer). |
| History: Current LSP: Uptime | Time LSP has been up. |
| Path Info | Hop list of current LSP. |

¹² LSP = Link-State Packet.

¹³ FRR = Fast Reroute.

This sample output shows the link attributes of links that are traversed by the tunnel (color information):

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 11 affinity
```

Signalling Summary:

```

    LSP Tunnels Process:  running
      RSVP Process:      running
      Forwarding:        enabled
  Periodic reoptimization: every 3600 seconds, next in 2710 seconds
  Periodic FRR Promotion:  every 300 seconds, next in 27 seconds

```

Auto-bw enabled tunnels: 0 (disabled)

Name: tunnel-tell Destination: 192.168.0.1

Status:

```
Admin:    up Oper:    up Path:  valid Signalling: connected
```

```

path option 1, type explicit gige_1_2_3 (Basis for Setup, path weight 2)
G-PID: 0x0800 (derived from egress interface properties)
Bandwidth Requested: 200 kbps CT0

```

Config Parameters:

```

Bandwidth:      200 kbps (CT0) Priority:  2  2
Number of affinity constraints: 1
  Include bit map      : 0x4
  Include name         : red2

```

Metric Type: TE (default)

```
AutoRoute: disabled LockDown: disabled Policy class: not set
```

```
Forwarding-Adjacency: disabled
```

```
Loadshare:      0 equal loadshares
```

```
Auto-bw: disabled
```

```
Fast Reroute: Enabled, Protection Desired: Any
```

```
Path Protection: Not Enabled
```

History:

```
Tunnel has been up for: 02:55:27
```

Current LSP:

```
Uptime: 02:02:19
```

Prior LSP:

```
ID: path option 1 [8]
```

```
Removal Trigger: reoptimization completed
```

show mpls traffic-eng tunnels

```

Path info (OSPF 100 area 0):
  Link0: 12.9.0.1
    Attribute flags: 0x4
    Attribute names: red2
  Link1: 23.9.0.2
    Attribute flags: 0x4
    Attribute names: red2

Displayed 1 (of 8) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads

```

This sample output shows the brief summary of the tunnel status and configuration:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels brief
```

```

Signalling Summary:
  LSP Tunnels Process: running
  RSVP Process: running
  Forwarding: enabled
  Periodic reoptimization: every 3600 seconds, next in 2538 seconds
  Periodic FRR Promotion: every 300 seconds, next in 38 seconds
  Auto-bw enabled tunnels: 0 (disabled)

```

| TUNNEL NAME | DESTINATION | STATUS | STATE |
|-------------------|-------------|--------|-------|
| tunnel-te1060 | 10.6.6.6 | up | up |
| PE6_C12406_t607 | 10.7.7.7 | up | up |
| PE6_C12406_t608 | 10.8.8.8 | up | up |
| PE6_C12406_t609 | 10.9.9.9 | up | up |
| PE6_C12406_t610 | 10.10.10.10 | up | up |
| PE6_C12406_t621 | 10.21.21.21 | up | up |
| PE7_C12406_t706 | 10.6.6.6 | up | up |
| PE7_C12406_t721 | 10.21.21.21 | up | up |
| Tunnel_PE8-PE6 | 10.6.6.6 | up | up |
| Tunnel_PE8-PE21 | 10.21.21.21 | up | up |
| Tunnel_PE9-PE6 | 10.6.6.6 | up | up |
| Tunnel_PE9-PE21 | 10.21.21.21 | up | up |
| Tunnel_PE10-PE6 | 10.6.6.6 | up | up |
| Tunnel_PE10-PE21 | 10.21.21.21 | up | up |
| PE21_C12406_t2106 | 10.6.6.6 | up | up |
| PE21_C12406_t2107 | 10.7.7.7 | up | up |
| PE21_C12406_t2108 | 10.8.8.8 | up | up |
| PE21_C12406_t2109 | 10.9.9.9 | up | up |
| PE21_C12406_t2110 | 10.10.10.10 | up | up |
| PE6_C12406_t6070 | 10.7.7.7 | up | up |
| PE7_C12406_t7060 | 10.6.6.6 | up | up |
| tunnel-te1 | 200.0.0.3 | up | up |
| OUNI POS0/1/0/1 | 100.0.0.1 | up | up |
| OUNI POS0/1/0/2 | 200.0.0.1 | up | up |

```

Displayed 1 (of 1) heads, 20 (of 20) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads

```

This is sample output that shows a summary of configured tunnels by using the **summary** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels summary
```

```

LSP Tunnels Process: not running, disabled
  RSVP Process: running
  Forwarding: enabled
  Periodic reoptimization: every 3600 seconds, next in 2706 seconds
  Periodic FRR Promotion: every 300 seconds, next in 81 seconds

```



```

Periodic auto-bw collection: disabled

Signalling Summary:
  Head: 1 interfaces, 1 active signalling attempts, 1 established
        0 explicit, 1 dynamic
        1 activations, 0 deactivations
        0 recovering, 0 recovered
  Mids: 0
  Tails: 0

Fast ReRoute Summary:
  Head:    0 FRR tunnels, 0 protected, 0 rerouted
  Mid:     0 FRR tunnels, 0 protected, 0 rerouted
  Summary: 0 protected, 0 link protected, 0 node protected, 0 bw protected

```

This table describes the significant fields shown in the display.

Table 21: show mpls traffic-eng tunnels protection Command Field Descriptions

| Field | Description |
|--------------------|--|
| Tunnel# | Number of the MPLS-TE backup tunnel. |
| LSP Head/router | Node is either head or router for this LSP ¹⁴ . |
| Instance | LSP ID. |
| Backup tunnel | Backup tunnel protection for NHOP/NNHOP. |
| out if | Backup tunnel's outgoing interface |
| Original | Outgoing interface, label, and next-hop of the LSP when not using backup. |
| With FRR | Outgoing interface and label when using backup tunnel. |
| LSP BW | Signaled bandwidth of the LSP. |
| Backup level | Type of bandwidth protection provided—pool type and limited/unlimited bandwidth. |

¹⁴ LSP = Link-State Packet.

This is sample output from the **show mpls traffic-eng tunnels** command using the **backup** keyword. This command selects every MPLS-TE tunnel known to the router, and displays information about the FRR protection that each selected tunnel provides for interfaces on this route. The command does not generate output for tunnels that do not provide FRR protection of interfaces on this router:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels backup

tunnel160
  Admin: up, Oper: up
  Src: 10.20.20.20, Dest: 10.10.10.10, Instance: 28

```

```

Fast Reroute Backup Provided:
Protected I/fs: POS0/7/0/0
Protected lsp: 0
Backup BW: any-class unlimited, Inuse: 0 kbps

```

This table describes the significant fields shown in the display.

Table 22: show mpls traffic-eng tunnels backup Command Field Descriptions

| Field | Description |
|----------------|---|
| Tunnel# | MPLS-TE backup tunnel number. |
| Dest | IP address of backup tunnel destination. |
| State | State of the backup tunnel. Values are up, down, or admin-down. |
| Instance | LSP ID of the tunnel. |
| Protected I/fs | List of interfaces protected by the backup tunnel. |
| Protected lsp | Number of LSPs currently protected by the backup tunnel. |
| Backup BW | Configured backup bandwidth type and amount. Pool from which bandwidth is acquired. Values are any-class, CT0, and CT1. Amount is either unlimited or a configured limit in kbps. |
| Inuse | Backup bandwidth currently in use on the backup tunnel. |

This shows a sample output from the **show mpls traffic-eng tunnels** command using the **backup** and **protected-interface** keywords:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels backup protected-interface

Interface: POS0/5/0/1
Tunnel100 UNUSED : out I/f:                               Admin: down Oper: down

Interface: POS0/7/0/0
Tunnel160 NHOP : out I/f: POS0/6/0/0 Admin: up Oper: up

```

This table describes the significant fields shown in the display.

Table 23: show mpls traffic-eng tunnels backup protected-interface Command Field Descriptions

| Field | Description |
|-------------------|--|
| Interface | MPLS-TE-enabled FRR protected interface. |
| Tunnel# | FRR protected tunnel on the interface. |
| NHOP/NNHOP/UNUSED | State of Protected tunnel. Values are unused, next hop, next-next hop. |
| out I/f | Outgoing interface of the backup tunnel providing the protection. |

This shows a sample output from the **show mpls traffic-eng tunnels up** command using the **igp ospf** keywords:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels up igp ospf

Signalling Summary:
    LSP Tunnels Process: running
    RSVP Process: running
    Forwarding: enabled
    Periodic reoptimization: every 3600 seconds, next in 3381 seconds
    Periodic FRR Promotion: every 300 seconds, next in 81 seconds
    Periodic auto-bw collection: disabled

Name: tunnel-tell Destination: 30.30.30.30
Status:
    Admin: up Oper: up Path: valid Signalling: connected

    path option 1, type explicit back (Basis for Setup, path weight 1)
G-PID: 0x0800 (derived from egress interface properties)

Config Parameters:
    Bandwidth: 0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
    Number of configured name based affinities: 2
    Name based affinity constraints in use:
        Include bit map : 0x4 (refers to undefined affinity name)
        Include-strict bit map: 0x4

    Metric Type: TE (default)
    AutoRoute: disabled LockDown: disabled Loadshare: 0 bw-based
    Auto-bw: disabled(0/0) 0 Bandwidth Requested: 0
    Direction: unidirectional
Endpoint switching capability: unknown, encoding type: unassigned
Transit switching capability: unknown, encoding type: unassigned

History:
    Tunnel has been up for: 00:00:21
    Current LSP:
        Uptime: 00:00:21
    Prior LSP:
        ID: path option 1 [4]
        Removal Trigger: tunnel shutdown

Path info (ospf area 0):
Hop0: 7.4.4.2
Hop1: 30.30.30.30

Displayed 1 (of 3) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads
```

This shows a sample output from the **show mpls traffic-eng tunnels** command using the **up within-last** keywords:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels up within-last 200

Signalling Summary:
    LSP Tunnels Process: running
    RSVP Process: running
    Forwarding: enabled
    Periodic reoptimization: every 3600 seconds, next in 3381 seconds
    Periodic FRR Promotion: every 300 seconds, next in 81 seconds
```

show mpls traffic-eng tunnels

```

        Periodic auto-bw collection: disabled

Name: tunnel-tel1 Destination: 30.30.30.30
Status:
  Admin:    up Oper:    up Path: valid Signalling: connected

        path option 1, type explicit back (Basis for Setup, path weight 1)
G-PID: 0x0800 (derived from egress interface properties)

Config Parameters:
  Bandwidth:      0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
  Number of configured name based affinities: 2
  Name based affinity constraints in use:
    Include bit map      : 0x4 (refers to undefined affinity name)
    Include-strict bit map: 0x4
Metric Type: TE (default)
  AutoRoute: disabled LockDown: disabled Loadshare:      0 bw-based
  Auto-bw: disabled(0/0) 0 Bandwidth Requested:      0
  Direction: unidirectional
Endpoint switching capability: unknown, encoding type: unassigned
Transit switching capability: unknown, encoding type: unassigned

History:
  Tunnel has been up for: 00:00:21
  Current LSP:
    Uptime: 00:00:21
  Prior LSP:
    ID: path option 1 [4]
    Removal Trigger: tunnel shutdown

Path info (ospf area 0):
Hop0: 7.4.4.2
Hop1: 30.30.30.30

Displayed 1 (of 3) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads

```

This shows a sample output from the **show mpls traffic-eng tunnels** command using the **reoptimized within-last** keywords:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels reoptimized within-last 600

Signalling Summary:
  LSP Tunnels Process: running
  RSVP Process: running
  Forwarding: enabled
  Periodic reoptimization: every 60000 seconds, next in 41137 seconds
  Periodic FRR Promotion: every 300 seconds, next in 37 seconds
  Periodic auto-bw collection: disabled

Name: tunnel-tel1 Destination: 30.30.30.30
Status:
  Admin:    up Oper:    up Path: valid Signalling: connected

        path option 1, type explicit prot1 (Basis for Setup, path weight 1)
G-PID: 0x0800 (derived from egress interface properties)

Config Parameters:
  Bandwidth:      66 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
  Metric Type: IGP (global)
  AutoRoute: enabled LockDown: disabled Loadshare:      66 bw-based
  Auto-bw: disabled(0/0) 0 Bandwidth Requested:      66

```

```

Direction: unidirectional
Endpoint switching capability: unknown, encoding type: unassigned
Transit switching capability: unknown, encoding type: unassigned

History:
Tunnel has been up for: 00:14:04
Current LSP:
  Uptime: 00:03:52
  Selection: reoptimization
Prior LSP:
  ID: path option 1 [2013]
  Removal Trigger: reoptimization completed

Path info (ospf area 0):
Hop0: .2.2.2
Hop1: 7.3.3.2
Hop2: 30.30.30.30
Displayed 1 (of 1) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads

```

This is a sample output from the **show mpls traffic-eng tunnels** command using the **detail** keyword:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 100 detail

Name: tunnel-tel Destination: 24.24.24.24
Status:
  Admin:    up Oper:    up

      Working Path: valid Signalling: connected
      Protecting Path: valid Protect Signalling: connected
      Working LSP is carrying traffic

path option 1, type explicit po4 (Basis for Setup, path weight 1)
(Basis for Standby, path weight 2)
G-PID: 0x001d (derived from egress interface properties)
Path protect LSP is present.

path option 1, type explicit po6 (Basis for Setup, path weight 1)

Config Parameters:
Bandwidth:      10 kbps (CT0) Priority:  7 7 Affinity: 0x0/0xffff
Metric Type: TE (default)
AutoRoute:     enabled LockDown: disabled Loadshare:      10 bw-based
Auto-bw: disabled(0/0) 0 Bandwidth Requested:      10
Direction: unidirectional
Endpoint switching capability: unknown, encoding type: unassigned
Transit switching capability: unknown, encoding type: unassigned

History:
Tunnel has been up for: 00:04:06
Current LSP:
  Uptime: 00:04:06
Prior LSP:
  ID: path option 1 [5452]
  Removal Trigger: path verification failed
Current LSP Info:
Instance: 71, Signaling Area: ospf optical area 0
Uptime: 00:10:41
Incoming Label: explicit-null
Outgoing Interface: POS0/4/0/0, Outgoing Label: implicit-null
Path Info:
  Explicit Route:
    Strict, 100.0.0.3

```

```

    Strict, 24.24.24.24
    Record Route: None
    Tspec: avg rate=2488320 kbits, burst=1000 bytes, peak rate=2488320 kbits
Resv Info:
    Record Route:
      IPv4 100.0.0.3, flags 0x0
    Fspec: avg rate=2488320 kbits, burst=1000 bytes, peak rate=2488320 kbits
Protecting LSP Info:
    Instance: 72, Signaling Area: ospf optical area 0
    Incoming Label: explicit-null
    Outgoing Interface: POS0/6/0/0, Outgoing Label: implicit-null
    Path Info:
      Explicit Route:
        Strict, 101.0.0.3
        Strict, 24.24.24.24
      Record Route: None
      Tspec: avg rate=2488320 kbits, burst=1000 bytes, peak rate=2488320 kbits
Resv Info:
    Record Route:
      IPv4 101.0.0.3, flags 0x0
    Fspec: avg rate=2488320 kbits, burst=1000 bytes, peak rate=2488320 kbits

```

This is a sample output from the **show mpls traffic-eng tunnels** command using the **role mid** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels role mid
```

```

Signalling Summary:
    LSP Tunnels Process: running
    RSVP Process: running
    Forwarding: enabled
    Periodic reoptimization: every 3600 seconds, next in 1166 seconds
    Periodic FRR Promotion: every 300 seconds, next in 90 seconds
    Periodic auto-bw collection: disabled
LSP Tunnel 10.10.10.10 1 [5508] is signalled, connection is up
Tunnel Name: FRR1_t1 Tunnel Role: Mid
InLabel: POS0/2/0/1, 33
OutLabel: POS0/3/0/0, implicit-null
Signalling Info:
    Src 10.10.10.10 Dst 30.30.30.30, Tunnel ID 1, Tunnel Instance 5508
    Path Info:1
    Incoming Address: 7.3.3.1
Incoming Explicit Route:
    Strict, 7.3.3.1
    Loose, 30.30.30.30
ERO Expansion Info:
    ospf 100 area 0, Metric 1 (TE), Affinity 0x0, Mask 0xffff, Queries 0
Outgoing Explicit Route:
    Strict, 7.2.2.1
    Strict, 30.30.30.30
Record Route: None
    Tspec: avg rate=10 kbits, burst=1000 bytes, peak rate=10 kbits
Resv Info:
    Record Route:
      IPv4 30.30.30.30, flags 0x20
      Label 3, flags 0x1
      IPv4 7.3.3.2, flags 0x0
      Label 3, flags 0x1
    Fspec: avg rate=10 kbits, burst=1000 bytes, peak rate=10 kbits
Displayed 0 (of 1) heads, 1 (of 1) midpoints, 0 (of 1) tails

```

Displayed 0 up, 0 down, 0 recovering, 0 recovered heads

This sample output shows a tabular table for TE LSPs by using the **tabular** keyword:

RP/0/RP0/CPU0:router# **show mpls traffic-eng tunnels tabular**

| Tunnel Name | LSP ID | Destination Address | Source Address | Tun State | FRR State | LSP Role |
|-------------------|--------|---------------------|----------------|-----------|-----------|------------|
| tunnel-te1060 | 2 | 10.6.6.6 | 10.1.1.1 | up | Inact | Head |
| PE6_C12406_t607 | 2 | 10.7.7.7 | 10.6.6.6 | up | Inact | Mid |
| PE6_C12406_t608 | 2 | 10.8.8.8 | 10.6.6.6 | up | Inact | Mid |
| PE6_C12406_t609 | 2 | 10.9.9.9 | 10.6.6.6 | up | Inact | Mid |
| PE6_C12406_t610 | 2 | 10.10.10.10 | 10.6.6.6 | up | Inact | Mid |
| PE6_C12406_t621 | 2 | 10.21.21.21 | 10.6.6.6 | up | Inact | Mid |
| PE7_C12406_t706 | 835 | 10.6.6.6 | 10.7.7.7 | up | Inact | Mid |
| PE7_C12406_t721 | 603 | 10.21.21.21 | 10.7.7.7 | up | Inact | Mid |
| Tunnel_PE8-PE6 | 4062 | 10.6.6.6 | 10.8.8.8 | up | Inact | Mid |
| Tunnel_PE8-PE21 | 6798 | 10.21.21.21 | 10.8.8.8 | up | Inact | Mid |
| Tunnel_PE9-PE6 | 4062 | 10.6.6.6 | 10.9.9.9 | up | Inact | Mid |
| Tunnel_PE9-PE21 | 6795 | 10.21.21.21 | 10.9.9.9 | up | Inact | Mid |
| Tunnel_PE10-PE6 | 4091 | 10.6.6.6 | 10.10.10.10 | up | Inact | Mid |
| Tunnel_PE10-PE21 | 6821 | 10.21.21.21 | 10.10.10.10 | up | Inact | Mid |
| PE21_C12406_t2106 | 2 | 10.6.6.6 | 10.21.21.21 | up | Ready | Mid |
| PE21_C12406_t2107 | 2 | 10.7.7.7 | 10.21.21.21 | up | Inact | Mid |
| PE21_C12406_t2108 | 2 | 10.8.8.8 | 10.21.21.21 | up | Inact | Mid |
| PE21_C12406_t2109 | 2 | 10.9.9.9 | 10.21.21.21 | up | Inact | Mid |
| PE21_C12406_t2110 | 2 | 10.10.10.10 | 10.21.21.21 | up | Inact | Mid |
| PE6_C12406_t6070 | 2 | 10.7.7.7 | 10.6.6.6 | up | Inact | Mid |
| PE7_C12406_t7060 | 626 | 10.6.6.6 | 10.7.7.7 | up | Inact | Mid |
| tunnel-te1 | 1 | 200.0.0.3 | 200.0.0.1 | up | Inact | Head InAct |
| tunnel-te100 | 1 | 200.0.0.3 | 200.0.0.1 | up | Ready | Head InAct |
| OUNI POS0/1/0/1 | 2 | 100.0.0.1 | 200.0.0.1 | up | Inact | Head InAct |
| OUNI POS0/1/0/2 | 6 | 200.0.0.1 | 100.0.0.1 | up | Inact | Tail InAct |

This sample output shows a tabular table indicating automatic backup tunnels when using the **tabular** keyword:

RP/0/RP0/CPU0:router# **show mpls traffic-eng tunnels tabular**

| Tunnel Name | LSP ID | Destination Address | Source Address | State | FRR State | LSP Role | Path Prot |
|--------------|--------|---------------------|----------------|-------|-----------|----------|-----------|
| tunnel-te0 | 549 | 200.0.0.3 | 200.0.0.1 | up | Inact | Head | InAct |
| tunnel-te1 | 546 | 200.0.0.3 | 200.0.0.1 | up | Inact | Head | InAct |
| tunnel-te2 | 6 | 200.0.0.3 | 200.0.0.1 | up | Inact | Head | InAct |
| *tunnel-te50 | 6 | 200.0.0.3 | 200.0.0.1 | up | Active | Head | InAct |
| *tunnel-te60 | 4 | 200.0.0.3 | 200.0.0.1 | up | Active | Head | InAct |
| *tunnel-te70 | 4 | 200.0.0.3 | 200.0.0.1 | up | Active | Head | InAct |
| *tunnel-te80 | 3 | 200.0.0.3 | 200.0.0.1 | up | Active | Head | InAct |

* = automatically created backup tunnel

This table describes the significant fields shown in the display.

Table 24: show mpls traffic-eng tunnels tabular Command Field Descriptions

| Field | Description |
|---------------------|---|
| Tunnel Name | MPLS-TE tunnel name. |
| LSP ID | LSP ID of the tunnel. |
| Destination Address | Destination address of the TE tunnel (identified in Tunnel Name). |
| Source Address | Source address for the filtered tunnels. |
| Tunnel State | State of the tunnel. Values are up, down, or admin-down. |
| FRR State | FRR state identifier. |
| LSP Role | Role identifier. Values are All, Head, or Tail. |

This sample output shows the MPLS-TE tunnel information only for tunnels in which the automatic bandwidth is enabled using the **auto-bw** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels auto-bw

  Signalling Summary:
    LSP Tunnels Process:  running
    RSVP Process:        running
    Forwarding:          enabled
    Periodic reoptimization: every 3600 seconds, next in 636 seconds
    Periodic FRR Promotion: every 300 seconds, next in 276 seconds
    Auto-bw enabled tunnels: 1

  Name: tunnel-te1  Destination: 0.0.0.0
  Status:
    Admin:    up Oper: down  Path: not valid  Signalling: Down
    G-PID: 0x0800 (internally specified)
    Bandwidth Requested: 0 kbps  CT0

  Config Parameters:
    Bandwidth:          0 kbps (CT0) Priority:  7  7 Affinity: 0x0/0xffff
    Metric Type: TE (default)
    AutoRoute: disabled LockDown: disabled  Policy class: not set
    Loadshare:         0 equal loadshares

  Auto-bw: (collect bw only)
    Last BW Applied: 500 kbps (CT0)  BW Applications: 25
    Last Application Trigger: Periodic Application
    Bandwidth Min/Max: 10-10900 kbps
    Application Frequency: 10 min (Cfg: 10 min)  Time Left: 5m 34s
    Collection Frequency: 2 min
    Samples Collected: 2  Highest BW: 450 kbps  Next: 1m 34s
    Adjustment Threshold: 5%
    Overflow Threshold: 15%  Limit: 1/4  Early BW Applications: 0
    Direction: unidirectional
    Endpoint switching capability: unknown, encoding type: unassigned
    Transit switching capability: unknown, encoding type: unassigned
    Fast Reroute: Disabled, Protection Desired: None

  Reason for the tunnel being down: No destination is configured
  History:
```


Displayed 1 (of 1) heads, 0 (of 0) midpoints, 0 (of 0) tails
 Displayed 0 up, 1 down, 0 recovering, 0 recovered heads

This table describes the significant fields shown in the display.

Table 25: show mpls traffic-eng tunnels auto-bw Command Field Descriptions

| Field | Description |
|--------------------------|--|
| collect bw only | Field is displayed only if the bandwidth collection is configured in the tunnel automatic bandwidth configuration. |
| Last BW Applied | Last bandwidth change that is requested by the automatic bandwidth for the tunnel. In addition, this field indicates which pool is used for the bandwidth. |
| BW Applications | Total number of bandwidth applications that is requested by the automatic bandwidth, which includes the applications triggered by an overflow condition. |
| Last Application Trigger | These last application options are displayed: <ul style="list-style-type: none"> • Periodic Application • Overflow Detected • Manual Application |
| Bandwidth Min/Max | Bandwidth configured is either minimum or maximum. |
| Application Frequency | Configured application frequency. The Time Left field indicates the time left before the next application executes. |
| Collection Frequency | Globally configured collection frequency, which is the same value for all the tunnels. |
| Samples Collected | Number of samples that are collected during the current application period. This field is replaced by the Collection Disabled field if Collection Frequency is not currently configured. |
| Highest BW | Highest bandwidth that is collected for the application period. |
| Next | Time left before the next collection event. |
| Overflow Threshold | Overflow threshold that is configured. The Overflow field appears only if the overflow detection is configured in the tunnel automatic bandwidth configuration. |
| Limit | Consecutive overflow detected or configured limit. |
| Early BW Applications | Number of early bandwidth applications that are triggered by an overflow condition. |

This is sample output from the **show mpls traffic-eng tunnels** command with the **mesh** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels auto-tunnel
Signalling Summary:
  LSP Tunnels Process:  running
    RSVP Process:      running
      Forwarding:      enabled
Periodic reoptimization: every 3600 seconds, next in 3098 seconds
  Periodic FRR Promotion: every 300 seconds, next in 238 seconds
Auto-bw enabled tunnels: 1000
```

show mpls traffic-eng tunnels

```

Name: tunnel-te9000 Destination: 20.20.20.20 (auto-tunnel mesh)
Status:
  Admin:    up Oper:    up Path:  valid Signalling: connected
  path option 10, type dynamic (Basis for Setup, path weight 11)
  G-PID: 0x0800 (derived from egress interface properties)
  Bandwidth Requested: 0 kbps CT0
  Creation Time: Thu Jan 14 09:09:31 2010 (01:41:20 ago)
Config Parameters:
  Bandwidth:      0 kbps (CT0) Priority:  7 7 Affinity: 0x0/0xffff
  Metric Type: TE (default)
  AutoRoute: disabled LockDown: disabled Policy class: not set
  Forwarding-Adjacency: disabled
  Loadshare:      0 equal loadshares
  Auto-bw: disabled
  Fast Reroute: Disabled, Protection Desired: None
  Path Protection: Not Enabled
  Attribute-set: TA-NAME (type auto-mesh)
Auto-tunnel Mesh:
  Group 40: Destination-list dl-40
  Unused removal timeout: not running
History:
  Tunnel has been up for: 01:40:53 (since Thu Jan 14 09:09:58 EST 2010)
  Current LSP:
    Uptime: 01:41:00 (since Thu Jan 14 09:09:51 EST 2010)
  Reopt. LSP:
    Last Failure:
      LSP not signalled, identical to the [CURRENT] LSP
      Date/Time: Thu Jan 14 09:42:30 EST 2010 [01:08:21 ago]

Path info (OSPF 100 area 0):
Hop0: 7.0.15.1
Hop1: 20.20.20.20

```

This shows an auto-tunnel mesh summary sample output from the **show mpls traffic-eng tunnels** command using the **summary** keyword:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels summary
Thu Jan 14 10:46:34.677 EST

      LSP Tunnels Process: running
      RSVP Process:      running
      Forwarding:        enabled
      Periodic reoptimization: every 3600 seconds, next in 3354 seconds
      Periodic FRR Promotion:  every 300 seconds, next in 193 seconds
      Periodic auto-bw collection: 1000

Signalling Summary:
  Head: 2000 interfaces, 2000 active signalling attempts, 2000 established
        2000 explicit, 0 dynamic
        9250 activations, 7250 deactivations
        0 recovering, 2000 recovered
  Mids: 0
  Tails: 0

Fast ReRoute Summary:
  Head: 1000 FRR tunnels, 1000 protected, 0 rerouted
  Mid:  0 FRR tunnels, 0 protected, 0 rerouted
  Summary: 1000 protected, 500 link protected, 500 node protected, 0 bw protected

P2MP Summary:
  Tunnel Head: 250 total, 250 connected
  Destination Head: 500 total, 500 connected
  S2L Head: 500 established, 0 proceeding

```

```
S2L Mid: 0 established, 0 proceeding
S2L Tail: 0 established
```

P2MP Fast ReRoute Summary:

```
Tunnel Head: 250 FRR enabled
S2L Head: 500 FRR, 500 protected, 0 rerouted
S2L Mid: 0 FRR, 0 protected, 0 rerouted
Summary: 500 protected, 500 link protected, 0 node protected, 0 bw protected
```

<snip>

Auto-tunnel Mesh Summary:

```
Auto-mesh Tunnels:
    50 created, 50 up, 0 down, 25 FRR, 20 FRR enabled
Mesh Groups:
    4 groups, 50 destinations
```

This shows an auto-tunnel mesh summary sample output from the **show mpls traffic-eng tunnels** command using the **auto-mesh** keyword:

```
RP/0/RP0/CPU0:routershow mpls traffic-eng tunnels auto-tunnel
```

Signalling Summary:

```
LSP Tunnels Process: running
RSVP Process: running
Forwarding: enabled
Periodic reoptimization: every 3600 seconds, next in 3098 seconds
Periodic FRR Promotion: every 300 seconds, next in 238 seconds
Auto-bw enabled tunnels: 1000
```

```
Name: tunnel-te9000 Destination: 20.20.20.20 (auto-tunnel mesh)
```

Status:

```
Admin: up Oper: up Path: valid Signalling: connected
path option 10, type dynamic (Basis for Setup, path weight 11)
G-PID: 0x0800 (derived from egress interface properties)
Bandwidth Requested: 0 kbps CT0
Creation Time: Thu Jan 14 09:09:31 2010 (01:41:20 ago)
```

Config Parameters:

```
Bandwidth: 0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
Metric Type: TE (default)
AutoRoute: disabled LockDown: disabled Policy class: not set
Forwarding-Adjacency: disabled
Loadshare: 0 equal loadshares
Auto-bw: disabled
Fast Reroute: Disabled, Protection Desired: None
Path Protection: Not Enabled
```

```
Attribute-set: TA-NAME (type auto-mesh)
```

Auto-tunnel Mesh:

```
Group 40: Destination-list dl-40
Unused removal timeout: not running
```

History:

```
Tunnel has been up for: 01:40:53 (since Thu Jan 14 09:09:58 EST 2010)
```

Current LSP:

```
Uptime: 01:41:00 (since Thu Jan 14 09:09:51 EST 2010)
```

Reopt. LSP:

Last Failure:

```
LSP not signalled, identical to the [CURRENT] LSP
Date/Time: Thu Jan 14 09:42:30 EST 2010 [01:08:21 ago]
```

Path info (OSPF 100 area 0):

```
Hop0: 7.0.15.1
Hop1: 20.20.20.20
```

This example includes output for Generalized Multiprotocol Label Switching (GMPLS) User-Network Interface (UNI) configuration for the **show mpls traffic-eng tunnels** command using the **summary** keyword:

```
RP/0/RP0/CPU0:router#show mpls traffic-eng tunnels auto-tunnel
Thu Jan 14 10:46:34.677 EST

      LSP Tunnels Process:  running
          RSVP Process:    running
          Forwarding:      enabled
      Periodic reoptimization: every 3600 seconds, next in 3354 seconds
      Periodic FRR Promotion:  every 300 seconds, next in 193 seconds
      Periodic auto-bw collection: 1000

Signalling Summary:
  Head: 2000 interfaces, 2000 active signalling attempts, 2000 established
        2000 explicit, 0 dynamic
        9250 activations, 7250 deactivations
        0 recovering, 2000 recovered
  Mids: 0
  Tails: 0

Fast ReRoute Summary:
  Head:   1000 FRR tunnels, 1000 protected, 0 rerouted
  Mid:    0 FRR tunnels, 0 protected, 0 rerouted
  Summary: 1000 protected, 500 link protected, 500 node protected, 0 bw protected

P2MP Summary:
  Tunnel Head:      250 total, 250 connected
  Destination Head: 500 total, 500 connected
  S2L Head: 500 established, 0 proceeding
  S2L Mid: 0 established, 0 proceeding
  S2L Tail: 0 established

P2MP Fast ReRoute Summary:
  Tunnel Head: 250 FRR enabled
  S2L Head: 500 FRR, 500 protected, 0 rerouted
  S2L Mid: 0 FRR, 0 protected, 0 rerouted
  Summary: 500 protected, 500 link protected, 0 node protected, 0 bw protected

<snip>
GMPLS UNI Summary:
  Heads: 23 up, 4 down
  Tails: 13 up, 2 down
```

This sample output displays the cost-limit configuration information:

```
RP/0/RP0/CPU0:router#show mpls traffic-eng tunnels detail
Name: tunnel-tel
  Signalled-Name: ios_t1
  Status:
    Admin:   up Oper: down Path: not valid Signalling: Down
    G-PID: 0x0800 (derived from egress interface properties)
    Bandwidth Requested: 0 kbps CT0
    Creation Time: Tue Apr 15 13:00:29 2014 (5d06h ago)
  Config Parameters:
    Bandwidth:      0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
    Metric Type: TE (default)
    Hop-limit: disabled
    Cost-limit: 2
    AutoRoute: disabled LockDown: disabled Policy class: not set
```

```

Forward class: 0 (default)
Forwarding-Adjacency: disabled
Loadshare:          0 equal loadshares
Auto-bw: disabled
Fast Reroute: Disabled, Protection Desired: None
Path Protection: Not Enabled
BFD Fast Detection: Disabled
Reoptimization after affinity failure: Enabled
Soft Preemption: Disabled
Reason for the tunnel being down: No destination is configured
SNMP Index: 10
Displayed 1 (of 1) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 0 up, 1 down, 0 recovering, 0 recovered heads

```

This sample output displays the 'Traffic switched to FRR backup tunnel' message, when the FRR backup is activated as part of soft-preemption:

```

RP/0/RP0/CPU0:router#show mpls traffic-eng tunnels detail
.
.
.
Soft Preemption: Pending
  Preemption Link: GigabitEthernet0/0/0/1; Address: 14.14.14.2
  Traffic switched to FRR backup tunnel-te 1000
  Preempted at: Thu Apr 25 12:56:14 2013 (00:00:03 ago)
  Time left before hard preemption: 96 seconds
.
.
.

```

Related Commands

| Command | Description |
|------------------|--|
| backup-bw | Specifies the bandwidth type that LSPs can use for a backup tunnel, whether the backup tunnel should provide bandwidth protection, and if yes, how much and in which bandwidth pool. |

show mpls traffic-eng tunnels auto-bw brief

To display the list of automatic bandwidth enabled tunnels, and to indicate if the current signaled bandwidth of the tunnel is identical to the bandwidth that is applied by the automatic bandwidth, use the **show mpls traffic-eng tunnels auto-bw brief** command in XR EXEC mode.

show mpls traffic-eng tunnels auto-bw brief

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes XR EXEC

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Use the **show mpls traffic-eng tunnels auto-bw brief** command to determine if the automatic bandwidth application has been applied on a specified tunnel. If a single tunnel is specified, only the information for that tunnel is displayed.

| Task ID | Task Operations ID |
|---------|--------------------|
| | mpls-te read |

Examples

The following sample output shows the list of automatic bandwidth enabled tunnels:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels auto-bw brief
```

| Tunnel Name | LSP ID | Last appl BW (kbps) | Requested BW (kbps) | Signalled BW (kbps) | Highest BW (kbps) | Application Time Left |
|-------------|--------|---------------------|---------------------|---------------------|-------------------|-----------------------|
| tunnel-te0 | 1 | 10 | 10 | 10 | 50 | 2h 5m |
| tunnel-te1 | 5 | 500 | 500 | 300 | 420 | 1h 10m |

This table describes the significant fields shown in the display.

Table 26: show mpls traffic-eng tunnels auto-bw brief Field Descriptions

| Field | Description |
|---------------------|--|
| Tunnel Name | Name for the tunnel. |
| LSP ID | ID of the Label Switched Path that is used by the tunnel. |
| Last appl BW (kbps) | Last bandwidth applied (for example, requested) by the automatic-bandwidth feature for the tunnel. |

| Field | Description |
|-----------------------|--|
| Requested BW (kbps) | Bandwidth that is requested for the tunnel. |
| Signalled BW (kbps) | Bandwidth that is actually signalled for the tunnel. |
| Highest BW (kbps) | Highest bandwidth measured since the last start of the application interval. |
| Application Time Left | Time left until the application period ends for this tunnel. |

Related Commands

| Command | Description |
|--|---|
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

show mpls traffic-eng tunnels bidirectional-associated

To display information about bidirectional associated LSP for an MPLS-TE tunnel, use the **show mpls traffic-eng tunnels bidirectional-associated** command in the MPLS tunnel-te interface.

```
show mpls traffic-eng tunnels bidirectional-associated [{ [affinity] | [associated-lsp] | [{
association id value | source-address IP address | global-id value }] | [bfd-down] | [brief] |
[class-type] | [co-routed] | [concise] | [destination] | [detail] | [down] | [hold-priority] | [interface]
| [non-associated-lsp] | [non-co-routed] [path-option] | [property] | [reoptimized] | [role] |
[setup-priority] | [signame] | [soft-preemption] | [source] | [standby] | [static] | [suboptimal] |
[sync-pending] | [tabular] | [up] ]}
```

| Syntax Description | | |
|---|--|--|
| affinity | | (Optional) Display the attribute values that are required for links carrying this tunnel. A 32-bit decimal number. Range is 0x0 to 0xFFFFFFFF, representing 32 attributes (bits), where the value of an attribute is 0 or 1. |
| associated-lsp | | (Optional) Show tunnels with associated reverse LSPs. |
| association id <i>values</i> source-address <i>IP address</i> global-id <i>value</i> | | (Optional) Show tunnels with the specified association information. |
| bfd-down | | (Optional) Show tunnels with BFD session down. |
| brief | | (Optional) Display a brief form of the output of the tunnel status and configuration. |
| class-type | | (Optional) Display tunnels that are signaled in this class type. |
| co-routed | | (Optional) Show co-routed tunnels. |
| concise | | (Optional) Show concise information. |
| destination | | (Optional) Restrict display to tunnels with this destination. |
| detail | | (Optional) Include extra detail of the tunnel status and configuration. |
| down | | (Optional) Restrict display to tunnels in down state. |
| hold-priority | | (Optional) Display tunnels that are signaled using this hold-priority. |
| interface | | (Optional) Restrict display to tunnels using a specified interface. |
| non-associated-lsp | | (Optional) Show tunnels with no associated reverse LSPs. |
| non-co-routed | | (Optional) Show non-co-routed tunnels. |
| path-option | | (Optional) Restrict display to tunnels with specified path-option. |
| property | | (Optional) Restrict display to tunnels with specified property. |
| reoptimized | | (Optional) Restrict display to tunnels that have been re-optimized. |

| | |
|------------------------|--|
| role | (Optional) Restrict display to tunnels with specified role. |
| setup-priority | (Optional) Tunnels that are signaled using this setup priority. |
| signame | (Optional) Tabular summary of tunnel status and configuration showing signaled name. |
| soft-preemption | (Optional) Show tunnels with soft-preemption enabled. |
| source | (Optional) Restrict display to tunnels with this source. |
| standby | (Optional) Standby node specific information. |
| static | (Optional) Show only static (not auto) head-end tunnels. |
| suboptimal | (Optional) Restrict display to tunnels using a sub-optimal path. |
| sync-pending | (Optional) Display tunnels that are in sync-pending state. |
| tabular | (Optional) Display tabular summary of tunnel status and configuration |
| up | (Optional) Restrict display to tunnels whose status is UP. |

Command Default None

Command Modes MPLS tunnel-te interface

| Command History | Release | Modification |
|------------------------|----------------|------------------------------|
| | Release 5.2.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task ID | Operation |
|----------------|----------------|------------------|
| | mpls-te | read |

signalled-name

To configure the name of the tunnel required for an MPLS-TE tunnel, use the **signalled-name** command in interface configuration mode. To return to the default behavior, use the **no** form of this command.

signalled-name *name*

| | |
|---------------------------|---|
| Syntax Description | <i>name</i> Name used to signal the tunnel. |
|---------------------------|---|

Command Default Default name is the hostname_tID, where ID is the tunnel interface number.

Command Modes Interface configuration

| | | |
|------------------------|----------------|------------------------------|
| Command History | Release | Modification |
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| | | |
|----------------|------------------------|-------------------|
| Task ID | Task ID | Operations |
| | mpls-te read, write | |

Examples

The following example shows how to set the tunnel name:

```
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# signalled-name tunnel-from-NY-to-NJ
```

Related Commands

| Command | Description |
|--|---|
| show mpls traffic-eng tunnels, on page 169 | Displays information about MPLS-TE tunnels. |

signalling advertise explicit-null (MPLS-TE)

To specify that tunnels terminating on a router use explicit-null labels, use the **signalling advertise explicit-null** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

signalling advertise explicit-null

Syntax Description This command has no arguments or keywords.

Command Default Implicit-null labels are advertised.

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines Use the **signalling advertise explicit-null** command to specify that tunnels terminating on this router use explicit-null labels. This command applies to tunnel labels advertised to next to last (penultimate) hop. The explicit label is used to carry quality-of-service (QoS) information up to the terminating-end router of the label switched path (LSP).

| Task ID | Task ID | Operations |
|---------|---------|----------------|
| | mpls-te | read, write |

Examples

The following example shows how to configure explicit null tunnel labels:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# signalling advertise explicit-null
```

| Related Commands | Command | Description |
|------------------|--|---|
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | path-selection loose-expansion metric (MPLS-TE), on page 101 | Configures a metric type to be used to expand a path to the next loose hop for a tunnel on an area border router. |

snmp traps mpls traffic-eng

To enable the router to send Multiprotocol Label Switching traffic engineering (MPLS-TE) Simple Network Management Protocol (SNMP) notifications or informs, use the **snmp traps mpls traffic-eng** command in XR Config mode. To disable this behavior, use the **no** form of this command.

snmp traps mpls traffic-eng [*notification-option*] **preempt**

Syntax Description

notification-option (Optional) Notification option to enable the sending of notifications to indicate changes in the status of MPLS-TE tunnels. Use one of these values:

- up
- down
- reoptimize
- reroute
- cisco-ext

Command Default

None

Command Modes

Command History

| Release | Modification |
|---------------|------------------------------|
| Release 5.0.0 | This command was introduced. |

Usage Guidelines

If the command is entered without the *notification-option* argument, all MPLS-TE notification types are enabled.

SNMP notifications can be sent as either traps or inform requests.

The **snmp-server enable traps mpls traffic-eng** command enables both traps and inform requests for the specified notification types. To specify whether the notifications should be sent as traps or informs, use the **snmp-server host** command and specify the keyword **trap** or **informs**.

If you do not enter the **snmp traps mpls traffic-eng** command, no MPLS-TE notifications controlled by this command are sent. To configure the router to send these MPLS-TE SNMP notifications, you must enter at least one **snmp enable traps mpls traffic-eng** command. If you enter the command with no keywords, all MPLS-TE notification types are enabled. If you enter the command with a keyword, only the notification type related to that keyword is enabled. To enable multiple types of MPLS-TE notifications, you must issue a separate **snmp traps mpls traffic-eng** command for each notification type and notification option.

The **snmp traps mpls traffic-eng** command is used in conjunction with the **snmp host** command. Use the **snmp host** command to specify which host or hosts receive MPLS-TE SNMP notifications. To send notifications, you must configure at least one **snmp host** command.

For a host to receive an MPLS-TE notification controlled by this command, both the **snmp traps mpls traffic-eng** command and the **snmp host** command for that host must be enabled.

| Task ID | Task ID | Operations |
|---------|---------|------------|
| | mpls-te | read/write |

Examples

This example shows how to configure a router to send MPLS-TE tunnel up SNMP notifications when a configured MPLS-TE tunnel leaves the down state and enters the up state:

```
RP/0/RP0/CPU0:router(config)# snmp traps mpls traffic-eng up
```

Related Commands

| Command | Description |
|-------------------------|---|
| snmp-server host | Specifies the recipient of a SNMP notification operation. |

timers loose-path (MPLS-TE)

To configure the period between the headend retries after path errors, use the **timers loose-path** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

timers loose-path **retry-period** *value*

Syntax Description **retry-period** *value* Configures the time, in seconds, between retries upon a path error. Range is 30 to 600.

Command Default *value*: 120

Command Modes MPLS-TE configuration

| Command History | Release | Modification |
|-----------------|---------------|------------------------------|
| | Release 5.0.0 | This command was introduced. |

Usage Guidelines No specific guidelines impact the use of this command.

| Task ID | Task Operations ID |
|---------|------------------------|
| | mpls-te read, write |

Examples The following example shows how to the period between retries after path errors to 300 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# timers loose-path retry-period 300
```

| Related Commands | Command | Description |
|------------------|---|---|
| | mpls traffic-eng, on page 75 | Enters MPLS-TE configuration mode. |
| | path-selection loose-expansion affinity (MPLS-TE), on page 98 | Specifies the affinity value to be used to expand a path to the next loose hop for a tunnel on an area border router. |

topology holddown sigerr (MPLS-TE)

To specify the time that a router should ignore a link in its TE topology database in tunnel path constrained shortest path first (CSPF) computations following a TE tunnel signaling error on the link, use the **topology holddown sigerr** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

topology holddown sigerr *seconds*

| Syntax Description | <i>seconds</i> Time that the router ignores a link during tunnel path calculations, following a TE tunnel error on the link, specified in seconds. Range is 0 to 300. Default is 10. | | | | |
|---------------------------|--|---------|--------------|---------------|------------------------------|
| Command Default | <i>seconds</i> : 10 | | | | |
| Command Modes | MPLS-TE configuration | | | | |
| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table> | Release | Modification | Release 5.0.0 | This command was introduced. |
| Release | Modification | | | | |
| Release 5.0.0 | This command was introduced. | | | | |
| Usage Guidelines | A router at the headend for TE tunnels can receive a Resource Reservation Protocol (RSVP) No Route error message before the router receives a topology update from the IGP routing protocol announcing that the link is down. When this happens, the headend router ignores the link in subsequent tunnel path calculations to avoid generating paths that include the link and are likely to fail when signaled. The link is ignored until the router receives a topology update from its IGP or a link holddown timeout occurs. Use the topology holddown sigerr command to change the link holddown time from its 10-second default value. | | | | |
| Task ID | <table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read, write</td> </tr> </tbody> </table> | Task ID | Operations | mpls-te | read, write |
| Task ID | Operations | | | | |
| mpls-te | read, write | | | | |

Examples

The following example shows how to set the link holddown time for signaling errors at 15 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# topology holddown sigerr 15
```

| Related Commands | Command | Description |
|------------------|--------------------------------|---|
| | mpls traffic-eng | Enters MPLS-TE configuration mode. |
| | show mpls traffic-eng topology | Displays the current MPLS-TE global topology of this node as well as the signaling error holddown time. |

