



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*]

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 17	Configures the application frequency, in minutes, for the applicable tunnel.
auto-bw (MPLS-TE), on page 27	Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode.
bw-limit (MPLS-TE), on page 42	Configures the minimum and maximum automatic bandwidth to set on a tunnel.
collect-bw-only (MPLS-TE), on page 59	Enables only the bandwidth collection without adjusting the automatic bandwidth.
overflow threshold (MPLS-TE), on page 129	Configures tunnel overflow detection.
show mpls traffic-eng tunnels, on page 237	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*

no admin-weight *weight*

Syntax Description

<i>weight</i>	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 this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
path-selection metric (interface), on page 144	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*}

no 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

Command Modes

Interface configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 black colors on GigabitEthernet0/4/1/3 from the **interface** command. The sample output from the [show mpls traffic-eng link-management interfaces](#), on page 212 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 black 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 black
```

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 black affinity. A link is eligible for CSPF if it has a red color or a black color. Thus, a link with red and any other colors and a link with black 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 black
```

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 15	Assigns a numerical value to each affinity name.
attribute-names, on page 21	Configures attribute names for the interface.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng affinity-map, on page 171	Displays the color name-to-value mappings configured on the router.

Command	Description
show mpls traffic-eng tunnels , on page 237	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*}

no 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>	Bit position value. 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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 10	Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng affinity-map, on page 171	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*

no application *minutes*

Syntax Description

<i>minutes</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 6	Configures the tunnel-bandwidth change threshold to trigger an adjustment.
auto-bw (MPLS-TE), on page 27	Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth configuration mode.
bw-limit (MPLS-TE), on page 42	Configures the minimum and maximum automatic bandwidth to set on a tunnel.
collect-bw-only (MPLS-TE), on page 59	Enables only the bandwidth collection without adjusting the automatic bandwidth.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
overflow threshold (MPLS-TE), on page 129	Configures tunnel overflow detection.
show mpls traffic-eng tunnels, on page 237	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*

no attribute-flags *attribute-flags*

Syntax Description

attribute -flags

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

attributes : 0x0

Command Modes

MPLS-TE interface configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 8	Overrides the IGP administrative weight of the link.
affinity, on page 10	Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel.
attribute-names, on page 21	Configures the attribute names for the interface.
interface (MPLS-TE), on page 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	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*

no attribute-names *attribute name*

Syntax Description

<i>attribute name</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 10	Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel.
attribute-flags, on page 19	Configures attribute flags for the interface.
interface (MPLS-TE), on page 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.

attribute-set

To configure attribute-set for auto-mesh tunnels, use the **attribute-set** command in MPLS-TE configuration mode.

```
attribute-set auto-mesh attribute-set-name {affinity {affinity-value mask mask-value| exclude name|  
exclude-all| include name| include-strict name}}| auto-bw collect-bw-only| autoroute announce| bandwidth  
bandwidth| fast-reroute [protect {bandwidth node| node bandwidth}]| logging events lsp-status  
{insufficient-bandwidth| reoptimize| reroute| state}| priority setup-range hold-range| record-route|  
signalled-bandwidth bandwidth [class-type cl]| soft-preemption}
```

To configure attribute-set for a path-option, use the **attribute-set** command in MPLS-TE configuration mode.

```
attribute-set path-option attribute-set-name {affinity {affinity-value mask mask-value| exclude name|  
exclude-all| include name| include-strict name}}| signalled-bandwidth bandwidth [class-type cl]}
```

To disable this behavior, use the **no** form of this command.

no attribute-set

Syntax Description

auto-mesh	Specifies the values of an attribute set for the auto-mesh group.
path-option	Specifies the values of an attribute set for the path option.
<i>attribute-set-name</i>	A 32-bit character string, specifies the name of the attribute-set template.
<i>affinity-value</i>	Attribute values that are required for links to carry this tunnel. A 32-bit decimal number, representing 32 attributes (bits), where the value of an attribute is 0 or 1. Range is from 0x0 to 0xFFFF.
mask <i>mask-value</i>	Checks the link attribute. A 32-bit decimal number, representing 32 attributes (bits), where the value of an attribute mask is 0 or 1. Range is from 0x0 to 0xFFFF.
exclude <i>name</i>	Configures a specific affinity that is to be excluded.
exclude-all	Excludes all affinities.
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.

logging	Per-interface logging configuration.
events	Per-interface logging events.
lsp-status	Enables interface LSP state change alarms.
reoptimize	Enables interface LSP REOPT change alarms.
state	Enables interface LSP UP/DOWN change alarms.
priority	Specifies the tunnel priority.
<i>setup-range</i>	Specifies setup priority. Range is 0 to 7.
<i>hold-range</i>	Specifies hold priority. Range is 0 to 7.
record-route	Records the route used by the tunnel.
signalled-bandwidth	Specifies the tunnel bandwidth requirement to be signalled.
<i>bandwidth</i>	Bandwidth required for an MPLS-TE tunnel, specified in kilobits per second. By default, bandwidth is reserved in the global pool. Range is from 0 to 4294967295.
class-type <i>ct</i>	(Optional) Configures the class type of the tunnel bandwidth request. Range is 0 to 1. Class-type 0 is equivalent to global-pool. Class-type 1 is equivalent to subpool.
soft-preemption	Enables the soft-preemption feature on this tunnel.

Command Default

affinity-value: 0x0
mask-value: 0xFFFF

Command Modes

MPLS TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The values specified for an attribute within a **path-option attribute-set** does not prevent the configuration of the same attribute at the tunnel level. However, only one level is taken into consideration. The configuration at the **path-option** level is considered more specific than the one at the level of the tunnel, and is therefore used.

Attributes that are **not** specified within an **attribute-set** picks their default values, as usual, from the configuration at the tunnel level, the configuration at the global mpls level, or default values.

An XRO attribute-set can be specified as part of the path-option, if required. An empty XRO attribute set results in the GMPLS tunnel being signaled with no exclusions, and therefore no XRO.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

This example shows how to configure an attribute-set to a TE interface for an auto-mesh tunnel:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# auto-tunnel mesh
RP/0/RP0/CPU0:router(config-te-auto-mesh)# group 1
RP/0/RP0/CPU0:router(config-te-mesh-group)# attribute-set aml
RP/0/RP0/CPU0:router(config-te-mesh-group)# destination-list d11
```

This example shows how to configure the tunnel affinity and signalled-bandwidth for a path-option:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# attribute-set path-option myset
RP/0/RP0/CPU0:router(config-te-attribute-set)# affinity 0x3 mask 0x3
RP/0/RP0/CPU0:router(config-te-attribute-set)# signalled-bandwidth 2000
```

Related Commands

Command	Description
affinity-map, on page 15	Assigns a numerical value to each affinity name.
attribute-names, on page 21	Configures attribute names for the interface.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng affinity-map, on page 171	Displays the color name-to-value mappings configured on the router.

Command	Description
show mpls traffic-eng tunnels , on page 237	Displays information about MPLS-TE tunnels.

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

no 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
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Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 6	Configures the tunnel-bandwidth change threshold to trigger an adjustment.
application (MPLS-TE), on page 17	Configures the application frequency, in minutes, for the applicable tunnel.
bw-limit (MPLS-TE), on page 42	Configures the minimum and maximum automatic bandwidth to set on a tunnel.
collect-bw-only (MPLS-TE), on page 59	Enables only the bandwidth collection without adjusting the automatic bandwidth.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
overflow threshold (MPLS-TE), on page 129	Configures tunnel overflow detection.
show mpls traffic-eng tunnels, on page 237	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*

no auto-bw collect frequency *minutes*

Syntax Description

<i>minutes</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.
mpls traffic-eng auto-bw apply (MPLS-TE), on page 108	Configures the highest bandwidth available on a tunnel without waiting for the current application period to end.
show mpls traffic-eng tunnels, on page 237	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

no autoroute announce

Syntax Description This command has no arguments or keywords.

Command Default Announces IPv4 tunnel

Command Modes Interface configuration

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 96	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*

no 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.
<i>value</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 31	Instructs the IGP to use the tunnel (if it is up) in its enhanced SPF calculation.
interface tunnel-te , on page 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng autoroute , on page 175	Displays the tunnels announced to the IGP, including interface, destination, and bandwidth.

auto-tunnel backup (MPLS-TE)

To automatically build next-hop (NHOP) and next-next-hop (NNHOP) backup tunnels, and to enter auto-tunnel backup configuration mode, use the **auto-tunnel backup** command in MPLS-TE configuration mode. To clear the NHOP and NNHOP backup tunnels, use the **no** form of this command.

auto-tunnel backup

no auto-tunnel backup

Syntax Description This command has no arguments or keywords.

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 To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The range of *tunnel-ID* is required to be mentioned for the auto-tunnel backup tunnels; otherwise, none of the tunnels are created.

The **no** form of this command deletes both NHOP and NNHOP backup tunnels that are configured using either the **auto-tunnel backup** command or the **nhop-only** command.

Task ID	Task ID	Operation
	mpls-te	read, write

Examples The following example automatically builds NHOP and NNHOP backup tunnels:

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

Related Commands

Command	Description
clear mpls traffic-eng auto-tunnel backup unused, on page 46	Clears the unused automatic backup tunnels.
<code>mpls traffic-eng <i>interface-path-id</i> auto-tunnel backup</code>	Configures the automatic backup tunnel for a specific interface.
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.
tunnel-id (auto-tunnel backup), on page 288	Configures range of tunnel interface numbers for automatic backup tunnels.

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*}}

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 40	Assigns one or more backup tunnels to a protected interface.
fast-reroute , on page 74	Enables FRR protection for an MPLS-TE tunnel.
interface tunnel-te , on page 96	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*

no backup-path tunnel-te *tunnel-number*

Syntax Description

<i>tunnel-number</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 37	Configures backup bandwidth for bandwidth protection.
fast-reroute, on page 74	Enables FRR protection for an MPLS-TE tunnel.
interface (MPLS-TE), on page 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.

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*]

no **bw-limit**

Syntax Description

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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 6	Configures the tunnel-bandwidth change threshold to trigger an adjustment.
application (MPLS-TE), on page 17	Configures the application frequency, in minutes, for the applicable tunnel.
auto-bw (MPLS-TE), on page 27	Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode.
collect-bw-only (MPLS-TE), on page 59	Enables only the bandwidth collection without adjusting the automatic bandwidth.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
overflow threshold (MPLS-TE), on page 129	Configures tunnel overflow detection.
show mpls traffic-eng tunnels, on page 237	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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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

Related Commands

Command	Description
clear mpls traffic-eng counters signaling, on page 52	Clears the automatic bandwidth configuration in a tunnel.
show mpls traffic-eng tunnels auto-bw brief, on page 264	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 auto-tunnel backup unused

To remove unused automatic backup tunnels, use the **clear mpls traffic-eng auto-tunnel backup unused** command in global configuration mode.

clear mpls traffic-eng auto-tunnel backup unused [**all** | **tunnel-te** *tunnel-number*]

Syntax Description

all	Clears all the unused automatic backup tunnels.
tunnel-te <i>tunnel-number</i>	Clears a specific unused automatic backup tunnel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **unused** auto-tunnel backup tunnel is the tunnel that is not assigned to protect any FRR tunnel.

The behavior of this command is the same as the expiration of the **timers removal unused** command in which, when the timeout value is reached, the automatic backup tunnel is removed.

Task ID

Task ID	Operation
mpls-te	execute

Examples

The following example displays the information for the unused backup automatic tunnels from the **show mpls traffic-eng tunnels unused** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels unused
```

The following example shows how to clear the unused backup automatic tunnels:

```
RP/0/RP0/CPU0:router# clear mpls traffic-eng auto-tunnel backup unused all
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels unused
```

Related Commands

Command	Description
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.

clear mpls traffic-eng auto-tunnel mesh

To clear all unused auto-tunnel mesh destinations, use the **clear mpls traffic-eng auto-tunnel mesh** command in EXEC mode.

clear mpls traffic-eng auto-tunnel mesh unused {all| tunnel-te}

Syntax Description

all	Clears all applicable unused auto-tunnel destinations.
tunnel-te <i>id</i>	Clears an unused auto-tunnel destinations identified by a tunnel identifier.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
mpls-te	execute

Examples

This is sample output from the **clear mpls traffic-eng auto-tunnel mesh** command:

```
clear mpls traffic-eng auto-tunnel mesh
```


clear mpls traffic-eng counters auto-tunnel mesh

To clear all auto-tunnel mesh counters, use the **clear mpls traffic-eng counters auto-tunnel mesh** command in EXEC mode.

clear mpls traffic-eng counters auto-tunnel mesh

This command has no arguments or keywords.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
mpls-te	execute

Examples

This is sample output from the **clear mpls traffic-eng counters auto-tunnel mesh** command:

```
RP/0/RP0/CPU0:routerclear mpls traffic-eng counters auto-tunnel mesh
```

clear mpls traffic-eng counters auto-tunnel backup

To clear MPLS-TE automatic tunnel backup counters, use the **clear mpls traffic-eng counters auto-tunnel backup** command in EXEC mode.

clear mpls traffic-eng counters auto-tunnel backup

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
	mpls-te	execute

Examples The following example removes all counters for the automatic backup tunnels:

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

Related Commands	Command	Description
	show mpls traffic-eng counters auto-tunnel backup	Displays the MPLS-TE automatic tunnel backup counters.
	show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.

clear mpls traffic-eng counters global

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

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 184	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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 184	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 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 EXEC

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 222	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

no 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 To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 108](#) 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 6	Configures the tunnel-bandwidth change threshold to trigger an adjustment.
application (MPLS-TE), on page 17	Configures the application frequency, in minutes, for the applicable tunnel.
auto-bw (MPLS-TE), on page 27	Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode.
bw-limit (MPLS-TE), on page 42	Configures the minimum and maximum automatic bandwidth to set on a tunnel.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
overflow threshold (MPLS-TE), on page 129	Configures tunnel overflow detection.
show mpls traffic-eng tunnels, on page 237	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*

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng tunnels, on page 237	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

no 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 To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	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 86	Specifies the next IP address to exclude from the explicit path.
	index next-address, on page 90	Specifies path entries at a specific index.

Command	Description
show explicit-paths, on page 169	Displays the configured IP explicit paths.

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

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 67	Configures standard DS-TE mode.
ds-te te-classes, on page 69	Enters DS-TE te-class map configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng ds-te te-class, on page 190	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

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The following two DS-TE modes are supported:

- Prestandard mode
 - The Cisco proprietary mechanism for IGPs and RSVP signalling are used and DS-TE does not interoperate with third-party vendor equipment.
- IETF mode
 - Standard defined extensions are used for IGPs 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 65	Enables a specific bandwidth constraint model (Maximum Allocation Model or Russian Doll Model) on the LSR.
ds-te te-classes, on page 69	Configures MPLS DS-TE TE-class maps.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
mpls traffic-eng fast-reroute promote, on page 110	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 190	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**}

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 65	Enables a specific bandwidth constraint model (Maximum Allocation Model or Russian Doll Model) on the LSR.
ds-te mode, on page 67	Configures standard DS-TE mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng ds-te te-class, on page 190	Displays the Diff-Serv TE-class map in use.

exclude srlg (auto-tunnel backup)

To specify that automatic backup tunnels should avoid Shared Risk Link Groups (SRLGs) of protected interface, use the **exclude srlg** command in auto-tunnel backup configuration mode. To disable this feature, use the **no** form of this command.

exclude srlg [preferred]

no exclude srlg [preferred]

Syntax Description

preferred	(Optional) Causes the backup tunnel to avoid SRLGs of its protected interface(s); however, the backup tunnel is created if SRLGs are not avoided.
------------------	---

Command Default

Strict SRLG

Command Modes

Auto-tunnel backup configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Strict SRLG configuration of this command means that the path computed for the backup tunnel that is automatically created, must not contain any links that are part of the excluded SRLG groups. If such a path cannot be found, the backup tunnel does not come up.

Configuration of the preferred option allows the automatic backup tunnel to come up even if a path that excludes SRLGs can not be found.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

In the following example, automatic backup tunnels must avoid SRLGs of the protected interface.

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



```
RP/0/RP0/CPU0:router(config-mpls-te-if)# auto-tunnel backup  
RP/0/RP0/CPU0:router(config-mpls-te-if-auto-backup)# exclude srlg preferred
```

Related Commands

Command	Description
auto-tunnel backup (MPLS-TE), on page 35	Builds automatic next-hop and next-next-hop tunnels, and enters auto-tunnel configuration mode.

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

no fast-reroute

Syntax Description This command has no arguments or keywords.

Command Default FRR is disabled.

Command Modes Interface configuration

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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	Operations
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 76	Configures node and bandwidth protection for an MPLS-TE tunnel.
interface tunnel-te, on page 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng forwarding, on page 192	Displays the contents of the FRR database.
show mpls traffic-eng tunnels, on page 237	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}

no fast-reroute protect

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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 74	Enables FRR protection for an MPLS-TE tunnel.
interface tunnel-te , on page 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng tunnels , on page 237	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*

no fast-reroute timers promotion

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

interval: 300

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.
mpls traffic-eng fast-reroute promote, on page 110	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*

no flooding thresholds {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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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*]

no flooding thresholds {**down** | **up**}

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: 100, 99, 98, 97, 96, 95, 90, 85 , 80, 75 , 60, 45, 30, 15

up: 5, 30, 45, 60, 75, 80, 85, 90, 95, 97 , 98, 99, 100

Command Modes

MPLS-TE interface configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
link-management timers periodic-flooding, on page 102	Sets the length of the interval used for periodic flooding.
show mpls traffic-eng link-management advertisements, on page 202	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 205	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*]

no 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 *time*: 0

Command Modes

Interface configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you do not specify a **holdtime** *time* value, a delay is introduced with the following results:

- 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 96	Configures an MPLS-TE tunnel interface.
show mpls traffic-eng forwarding-adjacency , on page 195	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* }

no **index** *index-id*

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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 90	Specifies path entries at a specific index.
show explicit-paths, on page 169	Displays the configured IP explicit paths.

index exclude-srlg

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

index *index-id* **exclude-srlg** **ipv4 unicast** *IP address*

no **index** *index-id*

Syntax Description

<i>index-id</i>	Index number at which the path entry is inserted or modified. Range is 1 to 65535.
exclude-srlg	Specifies an IP address to get SRLG values from for exclusion.
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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

The following example shows how to exclude the SRLG values from the IP address 192.168.3.2 at index 1 of the explicit path 100:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# explicit-path identifier 100
RP/0/RP0/CPU0:router(config-expl-path)# index 1 exclude-srlg ipv4 unicast 192.168.3.2
```

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*

no **index** *index-id*

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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 86	Specifies the next IP address to exclude from the explicit path.
show explicit-paths, on page 169	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 global configuration mode. To return to the default behavior, use the **no** form of this command.

interface *type interface-path-id*

no 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

Global configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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*

no 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

SRLG configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

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 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.

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*

no 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

Global configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 10	Configures affinity (the properties that the tunnel requires in its links) for an MPLS-TE tunnel.
autoroute metric, on page 33	Instructs the IGP to use the tunnel in its enhanced SPF calculation, if the tunnel is in an up state.
backup-bw, on page 37	Configures backup bandwidth for FRR.
fast-reroute, on page 74	Enables FRR protection for an MPLS-TE tunnel.
path-option (MPLS-TE), on page 131	Configures a path option for an MPLS tunnel.
path-selection metric (interface), on page 144	Configures a path selection metric—TE or IGP.
policy-class	Configures PBTS to direct traffic into specific TE tunnels.
priority (MPLS-TE), on page 160	Configures setup and reservation priority for an MPLS-TE tunnel.
record-route, on page 162	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*

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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*

no link-management timers bandwidth-hold *holdtime*

Syntax Description

<i>holdtime</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 102	Sets the length of the interval used for periodic flooding.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng link-management bandwidth-allocation, on page 205	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*

no link-management timers periodic-flooding

Syntax Description

<i>interval</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 ID	Operations
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 82	Sets the reserved bandwidth flooding thresholds for a link.
link-management timers bandwidth-hold, on page 100	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 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng link-management summary, on page 217	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

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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

Task ID	Operation
mpls-te	read, write

Examples

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
```


maxabs (MPLS-TE)

To specify the maximum number of MPLS-TE tunnels that can be configured, use the **maxabs** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

maxabs tunnels *tunnel-limit destinations dest-limit*

no maxabs tunnels *tunnel-limit destinations dest-limit*

Syntax Description

tunnels	Configures all tunnels for MPLS-TE.
<i>tunnel-limit</i>	Maximum number of tunnel TE interfaces. Range is 1 to 65536.
destinations	Configures all destinations for MPLS-TE.
<i>dest-limit</i>	Maximum total number of destinations that can be configured. Range is 1 to 65536.

Command Default

tunnel-limit: 4096

dest-limit: 4096

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
mpls-te	read, write

Examples

The following example shows how to set the tunnel-te configuration limit to 1000:

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

```
RP/0/RP0/CPU0:router(config-mpls-te)# maxabs tunnels 1000 destinations 1000
```

Related Commands

Command	Description
show mpls traffic-eng maximum tunnels, on page 219	Displays the configuration of the maximum tunnel-te interfaces allowed.

mpls traffic-eng

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

mpls traffic-eng

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes Global 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 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 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 <i>tunnel-number</i>	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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 to 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 42](#) 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 29	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 264	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 EXEC mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng fast-reroute promote

no mpls traffic-eng fast-reroute promote

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 74	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*

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 123	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 EXEC mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng link-management flood

no mpls traffic-eng link-management flood

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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 202	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 EXEC mode. To return to the default behavior, use the **no** form of this command.

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

no mpls traffic-eng pce activate-pcep {*address* | **all**}

Syntax Description

<i>address</i>	Address of the idle peer.
all	Activates all the idle peers.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 117	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 EXEC mode. To disable this feature, use the **no** form of this command.

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

no mpls traffic-eng pce reoptimize [*tunnel ID*] [force]

Syntax Description

<i>tunnel ID</i>	(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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 115	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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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.

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 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*

no mpls traffic-eng router-id *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 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 111	Configures a router running OSPF MPLS so that it floods TE for the indicated IS-IS level.

mpls traffic-eng reoptimize mesh group

To reoptimize all tunnels of a mesh group, use the **mpls traffic-eng reoptimize mesh group** command in EXEC mode.

mpls traffic-eng reoptimize auto-tunnel mesh group *group_id*

Syntax Description

<i>group_id</i>	Defines auto-tunnel mesh group ID that is to be reoptimized. Range is 0 to 4294967295.
-----------------	--

Command Default

None

Command Modes

MPLS Transport profile configuration

Command History

Release	Modification
Release 4.1.1	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
mpls-te	execute

Examples

This is sample out from the **mpls traffic-eng reoptimize mesh group** command:

```
RP/0/RP0/CPU0:router mpls traffic-eng reoptimize mesh group 10
```

named-tunnels tunnel-te

To name the TE (Traffic Engineering) tunnels in the network with unique tunnel IDs (STRING names), use the **named-tunnels tunnel-te** command in MPLS-TE configuration mode. To delete the named tunnels, use the **no** form of this command.

named-tunnels tunnel-te *tunnel-name*

no named-tunnels

Syntax Description

tunnel-name

Configures the given name to the TE tunnel.

Note If the tunnel name contains more than one word, use hyphens to separate the words.

Command Default

None

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

The following example shows how to name a TE tunnel:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)#mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)#named-tunnels
RP/0/RP0/CPU0:router(config-mpls-te-named-tunnels)#tunnel-te FROM-NY-TO-LA
```

nhop-only (auto-tunnel backup)

To configure only a next-hop automatic backup tunnel with only link protection, use the **nhop-only** command in MPLS-TE auto-tunnel backup interface configuration mode. To return to the default configuration setting for automatic backup tunnels, use the **no** form of this command.

nhop-only

no nhop-only

Syntax Description This command has no arguments or keywords.

Command Default Both NHOP and NNHOP protection are enabled.

Command Modes Auto-tunnel backup configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you configure the **nhop-only** command, you destroy any next-next-hop (NNHOP) tunnel created to provide node protection for tunnels running over the specified interface.

If you unconfigure the **nhop-only** command, you trigger a backup assignment on primary tunnels running over that link. The automatic backup tunnel feature attempts to create NNHOP backup tunnels to provide node protection for the specified tunnels.

Task ID	Task ID	Operation
	mpls-te	read, write

Examples In the following example, NNHOP automatic backup tunnels are destroyed and only NHOP tunnels with link protection is configured:

```
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# interface pos 0/1/0/1
RP/0/RP0/CPU0:router(config-mpls-te-if)# auto-tunnel backup
RP/0/RP0/CPU0:router(config-mpls-te-if-auto-backup)# nhop-only
```

Related Commands

Command	Description
auto-tunnel backup (MPLS-TE), on page 35	Builds automatic NHOP and NNHOP backup tunnels.

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*
no overflow threshold

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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 ID	Operations
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 6	Configures the tunnel bandwidth change threshold to trigger an adjustment.
application (MPLS-TE), on page 17	Configures the application frequency in minutes for the applicable tunnel.
auto-bw (MPLS-TE), on page 27	Configures automatic bandwidth on a tunnel interface and enters MPLS-TE automatic bandwidth interface configuration mode.
bw-limit (MPLS-TE), on page 42	Configures the minimum and maximum automatic bandwidth to set on a tunnel.
collect-bw-only (MPLS-TE), on page 59	Enables only the bandwidth collection without adjusting the automatic bandwidth.
show mpls traffic-eng tunnels, on page 237	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**]

no path-option *preference-priority* {**dynamic** [**pce** [**address ipv4 address**]]| **explicit** {**name** *path-name*| **identifier** *path-number*}} [**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 address	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 To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 ID	Operations
	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 169	Displays the configured IP explicit paths.
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.

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}

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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.

When the IS-IS overload bit avoidance (OLA) feature is activated, all nodes with the overload bit set, which includes head nodes, mid nodes, and tail nodes, are ignored. This means that they are still available for use with label switched paths (LSPs). This feature allows you to include an overloaded node in constraint-based shortest path first (CSPF).

Task ID

Task ID	Operations
mpls-te	read, write

Examples

This example shows how to use the **path-selection ignore overload head** 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

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*]

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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 140	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 142	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

no 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

Examples 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*]

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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 137	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}

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 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 137	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}

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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, on page 228	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*

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 150	Configures a PCEP keepalive interval.
path-option (MPLS-TE), on page 131	Configures a path option for an MPLS-TE tunnel.
pce peer (MPLS-TE), on page 152	Configures an IPv4 self address for a PCE peer.
pce reoptimize (MPLS-TE), on page 154	Configures a periodic reoptimization timer.
pce request-timeout (MPLS-TE), on page 156	Configures a PCE request-timeout.
pce tolerance keepalive (MPLS-TE), on page 158	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*

no pce deadtimer *value*

Syntax Description

<i>value</i>	Keepalive dead interval, in seconds. The range is 0 to 255.
--------------	---

Command Default

value: 120

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When the dead interval is 0, the LSR does not time out a PCEP session to a remote peer.

Task ID

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 107	Enters MPLS-TE configuration mode.

Command	Description
path-option (MPLS-TE) , on page 131	Configures a path option for an MPLS-TE tunnel.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self address for a PCE.
pce keepalive (MPLS-TE) , on page 150	Configures a PCEP keepalive interval.
pce peer (MPLS-TE) , on page 152	Configures an IPv4 self address for a PCE peer.
pce reoptimize (MPLS-TE) , on page 154	Configures a periodic reoptimization timer.
pce request-timeout (MPLS-TE) , on page 156	Configures a PCE request-timeout.
pce tolerance keepalive (MPLS-TE) , on page 158	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*

no pce keepalive *interval*

Syntax Description

<i>interval</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.

Command	Description
path-option (MPLS-TE) , on page 131	Configures a path option for an MPLS-TE tunnel.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self address for a PCE.
pce deadtimer (MPLS-TE) , on page 148	Configures a PCE deadtimer.
pce peer (MPLS-TE) , on page 152	Configures an IPv4 self address for a PCE peer.
pce reoptimize (MPLS-TE) , on page 154	Configures a periodic reoptimization timer.
pce request-timeout (MPLS-TE) , on page 156	Configures a PCE request-timeout.
pce tolerance keepalive (MPLS-TE) , on page 158	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*

no pce peer *ipv4 address*

Syntax Description

ipv4 address	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.

Command	Description
path-option (MPLS-TE) , on page 131	Configures a path option for an MPLS-TE tunnel.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self address for a PCE.
pce deadtimer (MPLS-TE) , on page 148	Configures a PCE deadtimer.
pce keepalive (MPLS-TE) , on page 150	Configures a PCEP keepalive interval.
pce reoptimize (MPLS-TE) , on page 154	Configures a periodic reoptimization timer.
pce request-timeout (MPLS-TE) , on page 156	Configures a PCE request-timeout.
pce tolerance keepalive (MPLS-TE) , on page 158	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*

no pce reoptimize *value*

Syntax Description

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

Command Default

value: 3600

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.
path-option (MPLS-TE) , on page 131	Configures a path option for an MPLS-TE tunnel.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self address for a PCE.
pce deadtimer (MPLS-TE) , on page 148	Configures a PCE deadtimer.
pce keepalive (MPLS-TE) , on page 150	Configures a PCEP keepalive interval.
pce peer (MPLS-TE) , on page 152	Configures an IPv4 self address for a PCE peer.
pce request-timeout (MPLS-TE) , on page 156	Configures a PCE request-timeout.
pce tolerance keepalive (MPLS-TE) , on page 158	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*

no pce request-timeout *value*

Syntax Description

<i>value</i>	PCE request-timeout, in seconds. The range is 5 to 100.
--------------	---

Command Default

value: 10

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

PCC or PCE keeps a pending path request only for the request-timeout period.

Task ID

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 107	Enters MPLS-TE configuration mode.

Command	Description
path-option (MPLS-TE) , on page 131	Configures a path option for an MPLS-TE tunnel.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self address for a PCE.
pce deadtimer (MPLS-TE) , on page 148	Configures a PCE deadtimer.
pce keepalive (MPLS-TE) , on page 150	Configures a PCEP keepalive interval.
pce peer (MPLS-TE) , on page 152	Configures an IPv4 self address for a PCE peer
pce reoptimize (MPLS-TE) , on page 154	Configures a periodic reoptimization timer.
pce tolerance keepalive (MPLS-TE) , on page 158	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*

no pce tolerance keepalive *value*

Syntax Description

value PCE tolerance keepalive value, in seconds. The range is 0 to 255.

Command Default

value: 10

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.

Command	Description
path-option (MPLS-TE) , on page 131	Configures a path option for an MPLS-TE tunnel.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self-address for a PCE.
pce deadtimer (MPLS-TE) , on page 148	Configures a PCE deadtimer.
pce keepalive (MPLS-TE) , on page 150	Configures a PCEP keepalive interval.
pce peer (MPLS-TE) , on page 152	Configures an IPv4 self address for a PCE peer
pce reoptimize (MPLS-TE) , on page 154	Configures a periodic reoptimization timer.
pce request-timeout (MPLS-TE) , on page 156	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*

no 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

setup-priority: 7

hold-priority: 7

Command Modes

Interface configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 ID	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 96	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

no record-route

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes Interface configuration

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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 237	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*}

no 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 delay: 0

cleanup delay: 20
delay-time: 20
installation delay: 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 119	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*

no 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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 1.1.1.1
RP/0/RP0/CPU0:router(config-mpls-te)# router-id secondary 2.2.2.2
```

Related Commands

Command	Description
mpls traffic-eng router-id (MPLS-TE router), on page 123	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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 86	Specifies the next IP address to exclude from the explicit path.
index next-address, on page 90	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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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
bcdefghabcbdefghabcbdefghabcbdefgha	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
cdefghab  17    20000
cdefghab  18    40000
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
black28    28 10000000
red28      29  20000000
red30      30  40000000
abdefgha  31  80000000

```

Table 2: [show mpls traffic-eng affinity-map Field Descriptions, on page 172](#) 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 10	Configures an affinity (the properties the tunnel requires in its links) for an MPLS-TE tunnel.
affinity-map, on page 15	Assigns a numerical value to each affinity name.

show mpls traffic-eng attribute-set

To display the attribute set for MPLS-TE, use the **show mpls traffic-eng attribute-set** command in EXEC mode.

show mpls traffic-eng attribute-set [**auto-backup**| **auto-mesh**| **path-option**] [*attribute-set-name*]]

Syntax Description

auto-backup	Displays information for the auto-backup attribute type.
auto-mesh	Displays information for the auto-mesh attribute type.
path-option	Displays information for the path-option attribute type.
<i>attribute-set-name</i>	Specifies the name of the attribute set to be displayed.

Command Default

Displays information about all types of attribute sets.

Command Modes

EXEC mode

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To use this command, first enable the MPLS-TE application.

Task ID

Task ID	Operation
mpls-te	read

Examples

The following command shows the attribute set for auto-backup attribute type.

```
RP/0/RP0/CPU0:router# show mpls traffic-eng attribute-set auto-backup autol
```

```
Attribute Set Name: autol (Type: auto-backup)
  Affinity: 0x0/0xffff (Default)
  Priority: 7 7 (Default)
  Record-route: Enabled
  Policy-class: 0 (Not configured)
  Logging: None
  List of protected interfaces (count 0)
  List of tunnel IDs (count 0)
```

The following command shows the attribute set for auto-mesh attribute type.

```
RP/0/RP0/CPU0:router# show mpls traffic-eng attribute-set auto-mesh mesh1
```

```
Attribute Set Name: mesh1 (Type: auto-mesh)
  Bandwidth: 0 kbps (CT0) (Default)
  Affinity: 0x0/0xffff (Default)
  Priority: 7 7 (Default)
  Interface Bandwidth: 0 kbps (Default)
  AutoRoute Announce: Disabled
  Auto-bw: Disabled
  Soft Preemption: Disabled
  Fast Reroute: Disabled, Protection Desired: None
  Record-route: Disabled
  Policy-class: 0 (Not configured)
  Logging: None
  List of Mesh Groups (count 0)
```

The following command shows the attribute set for path-option attribute type.

```
RP/0/RP0/CPU0:router# show mpls traffic-eng attribute-set path-option path1
```

```
Attribute Set Name: path1 (Type: path option)
  Bandwidth: 0 kbps (CT0) (Default)
  Affinity: 0x0/0xffff (Default)
  List of tunnel IDs (count 0)
```

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 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	EXEC
---------------	------

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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.
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 33	Specifies the MPLS-TE tunnel metric that the IGP-enhanced SPF calculation uses.
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.
topology holddown sigerr (MPLS-TE), on page 286	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 auto-tunnel backup

To display information about automatically build MPLS-TE backup tunnels, use the **show mpls traffic-eng auto-tunnel backup** command in EXEC mode.

show mpls traffic-eng auto-tunnel {backup [private| summary| unused]}

Syntax Description

backup	Displays information about auto-tunnel backup.
private	(Optional) Displays private information about the automatically build MPLS-TE backup tunnels.
summary	(Optional) Displays the automatically build MPLS-TE backup tunnels summary information.
unused	(Optional) Displays only unused MPLS-TE backup tunnels.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
mpls-te	read

Examples

This is sample output from the **show mpls traffic-eng auto-tunnel backup** command:

```
AutoTunnel Backup Configuration:
  Interfaces count: 4
  Unused removal timeout: 1h 0m 0s
  Configured tunnel number range: 2000-2500
```

show mpls traffic-eng auto-tunnel backup

```

AutoTunnel Backup Summary:
  AutoTunnel Backups:
    1 created, 1 up, 0 down, 0 unused
    1 NHOP, 0 NNHOP, 0 SRLG strict, 0 SRLG preferred
  Protected LSPs:
    1 NHOP, 0 NHOP+SRLG
    0 NNHOP, 0 NNHOP+SRLG
  Protected S2L Sharing Families:
    0 NHOP, 0 NHOP+SRLG
    0 NNHOP, 0 NNHOP+SRLG
  Protected S2Ls:
    0 NHOP, 0 NHOP+SRLG
    0 NNHOP, 0 NNHOP+SRLG

Cumulative Counters (last cleared 05:17:19 ago):
      Total  NHOP  NNHOP
Created:      1      1      0
Connected:    1      1      0
Removed (down): 0      0      0
Removed (unused): 0      0      0
Removed (in use): 0      0      0
Range exceeded: 0      0      0

AutoTunnel Backups:
      Tunnel      State      Protection      Prot.      Protected      Protected
      Name              Offered    Flows*      Interface      Node
-----
tunnel-te2000      up NHOP              1      Gi0/2/0/2      N/A

*Prot. Flows = Total Protected LSPs, S2Ls and S2L Sharing Families

This is sample output from the show mpls traffic-eng auto-tunnel mesh command:

RP/0/RP0/CPU0:router#show mpls traffic-eng auto-tunnel mesh

Auto-tunnel Mesh Global Configuration:
  Unused removal timeout: 2h
  Configured tunnel number range: 10000-12000

Auto-tunnel Mesh Groups Summary:
  Mesh Groups count: 5
  Mesh Groups Destinations count: 50

Mesh Group 40 (2 Destinations, 1 Up, 1 Down):
  Destination-list: dl-40
  Attribute-set: ta_name
  Destination: 40.40.40.40, tunnel-id: 10000, State: Up
  Destination: 10.10.10.10, tunnel-id: 10001, State: Down
Mesh Group 41 (3 Destinations, 2 Up, 1 Down):
  Destination-list: dl-40
  Attribute-set: ta_name
  Destination: 4.4.4.4, tunnel-id: 10005, State: Up
  Destination: 3.3.3.3, tunnel-id: 10006, State: Up
  Destination: 1.1.1.1, tunnel-id: 10007, State: Down
Mesh Group 51 (0 Destinations, 0 Up, 0 Down):
  Destination-list: Not configured
  Attribute-set: Not configured
Mesh Group 52 (0 Destinations, 0 Up, 0 Down):
  Destination-list: NAME1 (Not defined)
  Attribute-set: NAME2 (Not defined)
Mesh Group 53 (2 Destinations, 1 Up, 1 Down):
  Destination-list: dl-53
  Attribute-set: Not configured
  Destination: 40.40.40.40, tunnel-id: 10000, State: Up
  Destination: 10.10.10.10, tunnel-id: 10001, State: Down

Cumulative Counters (last cleared 7h ago):
      Total
Created:      100
Connected:    50
Removed (unused): 50

```

```
Removed (in use):      0
Range exceeded:        0
```

This is sample output from the **show mpls traffic-eng auto-tunnel private** command:

```
Auto-tunnel Mesh Private Information:
ID allocator overall maximum ID: 4096
ID allocator last allocated ID: 50999
ID allocator number IDs allocated: 1000
```

show mpls traffic-eng auto-tunnel mesh

To display information about automatically built MPLS-TE mesh tunnels, use the **show mpls traffic-eng auto-tunnel mesh** command in EXEC mode.

show mpls traffic-eng auto-tunnel mesh {*mesh-value*| **unused**| **summary**| **attribute-set** *name*| **destination** *address*| **destination-list** *name*| **down**| **up**| **tunnel** {**created**| **not-created**} | **onehop**}

Syntax Description

mesh <i>mesh-value</i>	Displays the tunnels that belong to the specified auto-tunnel mesh group. The range of mesh group ID is from 0 to 4294967295.
attribute-set <i>name</i>	Displays mesh-groups configured with a specific attribute set.
destination <i>address</i>	Displays only the destinations with a specified address.
destination-list <i>name</i>	Displays mesh-groups configured with a specified prefix-list.
down	Displays only those tunnels that are down.
up	Displays only those tunnels that are up.
summary	Displays auto-tunnel mesh summary information.
unused	Displays only the down tunnels with no destination in the topology.
tunnel created not-created	Specifies either created destinations with tunnels, or not-created destinations without tunnels.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
MPLS-TE	read

Examples

This is sample output from the **show mpls traffic-eng auto-tunnel mesh** command:

```
RP/0/RP0/CPU0:router show mpls traffic-eng auto-tunnel mesh
```

```
Auto-tunnel Mesh Global Configuration:
  Unused removal timeout: 1h 0m 0s
  Configured tunnel number range: 1000-1200
```

```
Auto-tunnel Mesh Groups Summary:
  Mesh Groups count: 1
  Mesh Groups Destinations count: 3
  Mesh Groups Tunnels count:
    3 created, 0 up, 3 down, 0 FRR enabled
```

```
Mesh Group: 65 (3 Destinations)
  Status: Enabled
  Attribute-set: am-65
  Destination-list: dl-65 (Not a prefix-list)
  Recreate timer: Not running
  -----
  Destination      Tunnel ID      State      Unused timer
  -----
    192.168.0.2      1000          up      Not running
    192.168.0.3      1001          up      Not running
    192.168.0.4      1002          up      Not running
  Displayed 3 tunnels, 0 up, 3 down, 0 FRR enabled
```

```
Auto-mesh Cumulative Counters:
  Last cleared: Wed Nov 9 12:56:37 2011 (02:39:07 ago)
  Total
  Created: 3
  Connected: 0
  Removed (unused): 0
  Removed (in use): 0
  Range exceeded: 0
```

This shows how to configure the **auto-tunnel mesh** command with **destination-list** and **attribute-set** keywords:

```
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# auto-tunnel mesh
RP/0/RP0/CPU0:router(config-te-auto-mesh)# group 65
RP/0/RP0/CPU0:router(config-te-mesh-group)# disable
RP/0/RP0/CPU0:router(config-te-mesh-group)# destination-list dl-65
RP/0/RP0/CPU0:router(config-te-mesh-group)# attribute-set am-65
```



Note

This **attribute-set** is an optional configuration. Without this configuration, all tunnels use default tunnel attribute values. If you configure an non-existent attribute-set, this mesh group does not create any tunnel.



Note

This **destination-list** configuration is mandatory. If there is no IPv4 prefix-list by this name on the this mesh group create tunnels with all routers in the network.

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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 EXEC mode.

show mpls traffic-eng counters {signaling| soft-preemption} {*tunnel -number*| all} [**heads** | **mids** | **tails**]|
name *tunnel-name*| **summary**}

Syntax Description

signaling	Displays signaling counters.
soft-preemption	Displays the statistics for the soft-preemption.
<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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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

show mpls traffic-eng counters signaling

```

    PathQuery          0          0      Unknown          0          0
S2L LSP ID: 10021 Sub-Grp ID: 1 Destination: 100.0.0.4
  Signalling Events   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 Mid/Tail: router Source: 100.0.0.1 P2MP ID: 1677721603 Tunnel ID: 1 LSP ID: 21
Cumulative LSP Counters:
  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
S2L LSP ID: 21 Sub-Grp ID: 0 Destination: 100.0.0.3
  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

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
    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
    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
    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
    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
    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                      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 3.3.3.3
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: 3.3.3.3
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.
Match Resv Create	Number of RSVP Reservation create messages received.
Sender Create	Number of Sender Create messages sent by TE to RSVP.

Field	Description
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.

This is sample output from the **show mpls traffic-eng counters soft-preemption** command, which displays statistics for the soft preempted LSPs:

```
RP/0/RP0/CPU0:router#show mpls traffic-eng counters soft-preemption

Soft Preemption Global Counters:
Last Cleared: Never
Preemption Node Stats:
  Number of soft preemption events: 1
  Number of soft preempted LSPs: 1
  Number of soft preempted LSPs that timed out: 0
  Number of soft preempted LSPs that were torn down: 0
  Number of soft preempted LSPs that were fast rerouted: 0
  Minimum Time in Soft Preemption Pending State (sec): 0
  Maximum Time in Soft Preemption Pending State (sec): 0
  Average Time in Soft Preemption Pending State (sec): 0
Headend Stats:
  Number of soft preempted LSPs: 1
  Number of reoptimized soft preempted headend-LSPs: 0
  Number of path protected switchover soft preempted headend-LSPs: 0
  Number of torn down soft preempted headend-LSPs: 0
```

Related Commands

Command	Description
clear mpls traffic-eng counters signaling, on page 52	Clears the counters for MPLS-TE tunnels.
clear mpls traffic-eng fast-reroute log, on page 56	Clears the counters for MPLS-TE tunnels.

Command	Description
soft-preemption	Enables soft-preemption on a head-end for the MPLS TE tunnel.

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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



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.
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 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

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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.

Field	Description
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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	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-te1 (traffic share 0, next-hop 3.3.3.3)
(Adjacency Announced: yes, holdtime 0)
```

Related Commands	Command	Description
	forwarding-adjacency , on page 84	Configures an MPLS-TE forwarding adjacency.

show mpls traffic-eng igp-areas

To display MPLS-TE internal area storage, use the **show mpls traffic-eng igp-areas** command in 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	EXEC
---------------	------

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.
------------------	---

Task ID	Task ID	Operations
	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.

Field	Description
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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
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    -            PO0/2/0/2    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.

Field	Description
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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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).

Field	Description
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.
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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Advertised and current information may differ depending on how flooding is configured.

Task ID

Task ID	Operations
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
  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.

Field	Description
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
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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
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 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 <i>isis-address</i>	Displays the specified Intermediate System-to-Intermediate System (IS-IS) neighbor system ID when neighbors are displayed by IGP ID.
ospf <i>ospf-id</i>	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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 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.
<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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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.

Field	Description
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.
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 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.
<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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **show mpls traffic-eng link-management statistics** command displays resource and configuration information for all configured interfaces.

Task ID

Task ID	Operations
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 Requests	Setup Admits	Setup Rejects	Setup Errors	Tear Requests	Tear Preempts	Tear 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 216 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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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
```

show mpls traffic-eng link-management summary

```

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
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 maximum tunnels

To display the maximum number of MPLS-TE tunnels that you can configure, use the **show mpls traffic-eng maximum tunnels** command in EXEC mode.

show mpls traffic-eng maximum tunnels

Syntax Description This command has no keywords or arguments.

Command Default None

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	mpls-te	read

Examples This is sample output from the **show mpls traffic-eng maximum tunnels** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng maximum tunnels
```

```
Maximum Global Tunnel Count:
```

Maximum	Current Count
-----	-----
4096	2

```
Maximum Global Destination Count:
```

Maximum	Current Count
-----	-----
4096	2

Maximum AutoTunnel Backup Count:

Maximum	Current Count
-----	-----
200	122

This is sample output of the automatic mesh tunnels from the **show mpls traffic-eng maximum tunnels** command:

RP/0/RP0/CPU0:router# **show mpls traffic-eng maximum tunnels**

Maximum Global Tunnel Count:

Maximum	Current Count
-----	-----
4096	12

Maximum Static Tunnel Count:

Maximum	Current Count
-----	-----
4096	8

Maximum Auto-tunnel Mesh Count:

Maximum	Current Count
-----	-----
201	3

Maximum P2MP Tunnel Count:

Maximum	Current Count
-----	-----
500	1

Maximum Global Destination Count:

Maximum	Current Count
-----	-----
4096	13

Maximum GMPLS-UNI Tunnel Count:

Maximum	Current Count
-----	-----
500	39

[Table 18: show mpls traffic-eng maximum tunnels Command Field Descriptions](#), on page 220 describes the significant fields shown in the display.

Table 18: show mpls traffic-eng maximum tunnels Command Field Descriptions

Field	Description
Maximum P2MP Tunnel Count	Maximum number of P2MP tunnels that can be configured.
Maximum Global Destination Count	Maximum number of tunnel destinations that can be configured.

Field	Description
Maximum	Table heading for the maximum number in each category.
Current Count	Table heading for the current count in each category.
Maximum AutoTunnel Backup Count	Maximum number of automatic backup tunnels that can be configured.
Maximum GMPLS UNI Tunnel Count	Maximum number of Generalized Multiprotocol Label Switching (GMPLS) User-Network Interface (UNI) tunnels that can be configured and the current tunnel count.
Maximum AutoTunnel Mesh Count	Maximum number of automatic mesh tunnels that can be configured.

Related Commands

Command	Description
maxabs (MPLS-TE), on page 105	Specifies the maximum number of tunnel TE interfaces that can be configured.
tunnel-id (auto-tunnel backup), on page 288	Configures the range of tunnel interface numbers used for automatic backup tunnels.

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 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 EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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
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 19: 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 58	Clears the PCE statistics.
pce address (MPLS-TE) , on page 146	Configures the IPv4 self address for a PCE.
pce peer (MPLS-TE) , on page 152	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 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

EXEC

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

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 20: 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.
Admin weight	Administrative weight (cost) of the link.

Related Commands

Command	Description
pce address (MPLS-TE), on page 146	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 EXEC mode.

show mpls traffic-eng preemption log

Syntax Description	log	Displays a log of preemption events.
--------------------	-----	--------------------------------------

Command Default None

Command Modes EXEC

Command History	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 To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
	mpls-te	read

Examples 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
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 topology

To display the current MPLS-TE network topology for the node, use the **show mpls traffic-eng topology** command in EXEC mode.

show mpls traffic-eng topology [*IP-address*] [**affinity**] [**brief**] [**link-only**] [**bandwidth** *number*] [**exclude-srlg** *exclude-srlg-interface-address*] [**explicit-path** {**identifier** *explicit-path-id-number* | **name** *explicit-path-name*}] [**priority** *level*] [**isis** *nsap-address*] [**ospf** *ospf-address*] [**path** { **destination** *IP-address* | **tunnel** *P2P-tunnel-number* }] | {**router** | **network**}] [**model-type** {**rdm** | **mam**}]

Syntax Description

<i>IP-address</i>	(Optional) Node IP address (router identifier to interface address).
destination <i>IP-address</i>	Displays the LSP destination IPv4 address.
exclude-srlg	Specifies an IP address to get SRLG values from for exclusion.
explicit-path	Displays the explicit LSP path.
tunnel	Displays the topology path that is based on the Point-to-Point (P2P) tunnel number.
<i>P2P -tunnel-number</i>	P2P tunnel number. Range is 0 to 65535.
affinity	(Optional) Displays 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.
bandwidth <i>number</i>	(Optional) Displays the bandwidth value that is required by this label switched path (LSP).
priority <i>level</i>	(Optional) Displays the priority used when signaling a LSP for this tunnel, to determine which existing tunnels can be preempted.
isis <i>nsap-address</i>	(Optional) Displays the node router identification, if Intermediate System-to-Intermediate System (IS-IS) is enabled.

ospf <i>ospf-address</i>	(Optional) Displays the node router identifier, if Open Shortest Path First (OSPF) is enabled.
path	(Optional) Displays the path to a destination from this router.
router	Displays the given OSPF address type of the router node.
network	Displays the given OSPF address type of the network node.
brief	(Optional) Displays the brief form of the output that provides a less detailed version of the topology.
link-only	(Optional) Displays the MPLS-TE topology that is filtered by the given neighbor address.
model-type { rdm mam }	(Optional) Displays the bandwidth constraints model type, RDM or MAM.

Command Default No default behavior or values

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	mpls-te	read, write

Examples

The following shows a sample output from the **show mpls traffic-eng topology** command specifying the tunnel number in brief form:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng topology path tunnel 160

Tunnell160 Path Setup to 10.10.10.10: FULL_PATH
bw 100 (CT0), min_bw 0, metric: 10
setup_pri 7, hold_pri 7
affinity_bits 0x0, affinity_mask 0xffff
Hop0:10.2.2.1
Hop1:10.10.10.10
```

The following shows a sample output from the **show mpls traffic-eng topology** command specifying the destination IP address:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng topology path destination 10.10.10.10

Path Setup to 10.10.10.10:
bw 0 (CT0), min_bw 999900, metric: 10
setup_pri 7, hold_pri 7
affinity_bits 0x0, affinity_mask 0xffffffff
Hop0:10.2.2.1
Hop1:10.10.10.10
```

The following sample output shows the MPLS-TE network topology with the name of the affinity attribute of the link:

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

Link[1]:Point-to-Point, Nbr IGP Id:3.3.3.3, Nbr Node Id:9, gen:23
Frag Id:25, Intf Address:13.9.1.1, Intf Id:0
Nbr Intf Address:13.9.1.3, Nbr Intf Id:0
TE Metric:1, IGP Metric:1, Attribute Flags:0x0
Attribute Names:
Switching Capability:, Encoding:
BC Model ID:RDM
Physical BW:155520 (kbps), Max Reservable BW Global:116640 (kbps)
Max Reservable BW Sub:0 (kbps)

          Total Allocated      Global Pool      Sub Pool
          BW (kbps)           Reservable
          -----           BW (kbps)           BW (kbps)
bw[0]:           0           116640           0
bw[1]:           0           116640           0
bw[2]:           0           116640           0
bw[3]:           0           116640           0
bw[4]:           0           116640           0
bw[5]:           0           116640           0
bw[6]:           0           116640           0
bw[7]:           0           116640           0

Link[2]:Broadcast, DR:12.9.0.2, Nbr Node Id:1, gen:23
Frag Id:28, Intf Address:12.9.0.1, Intf Id:0
Nbr Intf Address:0.0.0.0, Nbr Intf Id:0
TE Metric:1, IGP Metric:1, Attribute Flags:0x4
Attribute Names: red2
Switching Capability:, Encoding:
BC Model ID:RDM
Physical BW:1000000 (kbps), Max Reservable BW Global:10000 (kbps)
Max Reservable BW Sub:0 (kbps)

          Total Allocated      Global Pool      Sub Pool
          BW (kbps)           Reservable
          -----           BW (kbps)           BW (kbps)
bw[0]:           0           10000           0
bw[1]:           0           10000           0
```

```

bw[2]:          0          10000          0
bw[3]:          0          10000          0
bw[4]:          0          10000          0
bw[5]:          0          10000          0
bw[6]:          0          10000          0
bw[7]:          0          10000          0

```

The following shows a sample output from the **show mpls traffic-eng topology** command in detail form in prestandard DS-TE mode:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology

My_System_id: 0000.0000.0002.00 (isis level-2)
My_System_id: 20.20.20.20 (ospf area 0)
My_BC_Model_Type: RDM

Signalling error holddown: 10 sec Global Link Generation 36

IGP Id: 0000.0000.0002.00, MPLS-TE Id: 20.20.20.20 Router Node (isis level-2)

Link[0]:Point-to-Point, Nbr IGP Id:0000.0000.0003.00, Nbr Node Id:3, gen:36
Frag Id:0, Intf Address:7.3.3.1, Intf Id:0
Nbr Intf Address:7.3.3.2, Nbr Intf Id:0
TE Metric:10, IGP Metric:10, Attribute Flags:0x0
,

BC Model ID:RDM
Physical BW:155520 (kbps), Max Reservable BW Global:100000 (kbps)
Max Reservable BW Sub:50000 (kbps)

          Total Allocated   Global Pool   Sub Pool
          BW (kbps)         Reservable    Reservable
          -----         -
bw[0]:          0          100000          50000
bw[1]:          0          100000          50000
bw[2]:          0          100000          50000
bw[3]:          0          100000          50000
bw[4]:          0          100000          50000
bw[5]:          0          100000          50000
bw[6]:          0          100000          50000
bw[7]:          0          100000          50000

```

The following shows a sample output from the **show mpls traffic-eng topology** command in detail form in IETF DS-TE mode.

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology

My_System_id: 0000.0000.0001.00 (isis 1 level-2)
My_System_id: 10.10.10.10 (ospf 100 area 0)
My_BC_Model_Type: MAM

Signalling error holddown: 10 sec Global Link Generation 84

IGP Id: 0000.0000.0001.00, MPLS-TE Id: 10.10.10.10 Router Node (isis 1 level-2)

Link[0]:Point-to-Point, Nbr IGP Id:0000.0000.0002.00, Nbr Node Id:6, gen:84
Frag Id:0, Intf Address:7.2.2.1, Intf Id:0
Nbr Intf Address:7.2.2.2, Nbr Intf Id:0

10,
Switching Capability:, Encoding:
BC Model ID:MAM
Physical BW:155520 (kbps), Max Reservable BW:1000 (kbps)
BC0:600 (kbps) BC1:400 (kbps)

          Total Allocated   Reservable
          BW (kbps)         BW (kbps)
          -----         -
TE-class[0]:          10          590
TE-class[1]:          0          400
TE-class[2]:          0          0

```

show mpls traffic-eng topology

```

      TE-class[3]:          0          0
      TE-class[4]:          0          600
      TE-class[5]:          0          400
Link[1]:Point-to-Point, Nbr IGP Id:0000.0000.0002.00, Nbr Node Id:6, gen:84
Frag Id:0, Intf Address:7.1.1.1, Intf Id:0
      Nbr Intf Address:7.1.1.2, Nbr Intf Id:0

10,
Switching Capability:, Encoding:
BC Model ID:MAM
Physical BW:155520 (kbps), Max Reservable BW:1000 (kbps) BC0:600 (kbps) BC1:400
(kbps)

```

	Total Allocated BW (kbps)	Reservable BW (kbps)
	-----	-----
TE-class[0]:	10	590
TE-class[1]:	0	400
TE-class[2]:	0	0
TE-class[3]:	0	0
TE-class[4]:	0	600
TE-class[5]:	0	400
TE-class[6]:	0	0
TE-class[7]:	0	0

The following shows a sample output for the **show mpls traffic-eng topology** command in brief form:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology 192.168.0.145 brief

IGP Id: 0000.0000.0010.00, MPLS TE Id: 192.168.0.145 Router Node (ISIS test level-1)
Link[0]:Point-to-Point, Nbr IGP Id:0000.0000.0234.00, Nbr Node Id:4, gen:5
Frag Id:0, Intf Address:10.3.11.145, Intf Id:0
Nbr Intf Address:10.3.11.143, Nbr Intf Id:0
TE Metric:10, IGP Metric:10, Attribute Flags:0x0

Attribute Names: red2
Switching Capability:, Encoding:
BC Model ID:RDM
Physical BW:155520 (kbps), Max Reservable BW Global:0 (kbps)
Max Reservable BW Sub:0 (kbps)

```

The following sample output shows a brief topology for the affinity attributes:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology affinity

affinity
Mon Mar 23 13:25:47.236 EST EST
My_System_id: 1.1.1.1 (OSPF 100 area 0)
My_System_id: 0000.0000.0001.00 (IS-IS 100 level-2)
My_BC_Model_Type: RDM

Signalling error holddown: 10 sec Global Link Generation 233

IGP Id: 0000.0000.0001.00, MPLS TE Id: 11.11.1.1 Router Node (IS-IS 100 level-2)

IGP Id: 1.1.1.1, MPLS TE Id: 1.1.1.1 Router Node (OSPF 100 area 0)
Link[0]:      Intf Address: 12.9.1.1, Nbr Intf Address: 12.9.1.2
      Attribute Flags: 0x0
      Attribute Names:
Link[1]:      Intf Address: 13.9.1.1, Nbr Intf Address: 13.9.1.3
      Attribute Flags: 0x0
      Attribute Names:
Link[2]:      Intf Address: 12.9.0.1, DR: 12.9.0.2
      Attribute Flags: 0x4
      Attribute Names: red2
Link[3]:      Intf Address: 14.9.0.1, DR: 14.9.0.4
      Attribute Flags: 0x0
      Attribute Names:
Link[4]:      Intf Address: 13.9.0.1, DR: 13.9.0.3
      Attribute Flags: 0x0
      Attribute Names:

```



```

IGP Id: 4.4.4.4, MPLS TE Id: 4.4.4.4 Router Node (OSPF 100 area 0)
Link[0]:      Intf Address: 34.9.1.4, Nbr Intf Address: 34.9.1.3
             Attribute Flags: 0x0
             Attribute Names:
Link[1]:      Intf Address: 14.9.0.4, DR: 14.9.0.4
             Attribute Flags: 0x1e
             Attribute Names: red1 red2 red3 red4
Link[2]:      Intf Address: 24.9.0.4, DR: 24.9.0.4
             Attribute Flags: 0x0
             Attribute Names:
Link[3]:      Intf Address: 34.9.0.4, DR: 34.9.0.3
             Attribute Flags: 0x0
             Attribute Names:
Link[4]:      Intf Address: 24.9.1.4, Nbr Intf Address: 24.9.1.2
             Attribute Flags: 0x0
             Attribute Names:

```

The following sample output for the **show mpls traffic-eng topology** command that shows the output to a single link:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng topology 12.9.1.1 link-only
```

```
Wed Sep  2 13:24:48.821 EST
```

```
IGP Id: 0000.0000.0002.00, MPLS TE Id: 2.2.2.2 Router Node (IS-IS 100 level-2)
```

```

Link[0]:Point-to-Point, Nbr IGP Id:0000.0000.0001.00, Nbr Node Id:-1, gen:277740
Frag Id:0, Intf Address:12.9.1.2, Intf Id:0
Nbr Intf Address:12.9.1.1, Nbr Intf Id:0
TE Metric:10, IGP Metric:10, Attribute Flags:0x0
Attribute Names:
Switching Capability:, Encoding:
BC Model ID:RDM
Physical BW:155520 (kbps), Max Reservable BW Global:116640 (kbps)
Max Reservable BW Sub:0 (kbps)

```

	Total Allocated BW (kbps)	Global Pool Reservable BW (kbps)	Sub Pool Reservable BW (kbps)
	-----	-----	-----
bw[0]:	0	116640	0
bw[1]:	0	116640	0
bw[2]:	0	116640	0
bw[3]:	0	116640	0
bw[4]:	0	116640	0
bw[5]:	0	116640	0
bw[6]:	0	116640	0
bw[7]:	0	116640	0

```
IGP Id: 2.2.2.2, MPLS TE Id: 2.2.2.2 Router Node (OSPF 100 area 0)
```

```

Link[3]:Point-to-Point, Nbr IGP Id:1.1.1.1, Nbr Node Id:-1, gen:277737
Frag Id:29, Intf Address:12.9.1.2, Intf Id:0
Nbr Intf Address:12.9.1.1, Nbr Intf Id:0
TE Metric:1, IGP Metric:1, Attribute Flags:0x0
Attribute Names:
Switching Capability:, Encoding:
BC Model ID:RDM
Physical BW:155520 (kbps), Max Reservable BW Global:116640 (kbps)
Max Reservable BW Sub:0 (kbps)

```

	Total Allocated BW (kbps)	Global Pool Reservable BW (kbps)	Sub Pool Reservable BW (kbps)
	-----	-----	-----
bw[0]:	0	116640	0
bw[1]:	0	116640	0
bw[2]:	0	116640	0
bw[3]:	0	116640	0
bw[4]:	0	116640	0
bw[5]:	0	116640	0
bw[6]:	0	116640	0

show mpls traffic-eng topology

```

      bw[7]:          0          116640          0

```

The following shows a sample output for the **show mpls traffic-eng topology model-type mam** command:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology model-type mam

IGP Id: 0000.0000.0001.00, MPLS-TE Id: 10.10.10.10 Router Node (isis 1 level-2)
  Link[0]:      Intf Address:7.2.2.1, Nbr Intf Address:7.2.2.2
  Link[1]:      Intf Address:7.1.1.1, Nbr Intf Address:7.1.1.2

IGP Id: 0000.0000.0002.00, MPLS-TE Id: 20.20.20.20 Router Node (isis 1 level-2)
  Link[0]:      Intf Address:7.2.2.2, Nbr Intf Address:7.2.2.1
  Link[1]:      Intf Address:7.1.1.2, Nbr Intf Address:7.1.1.1
  Link[2]:      Intf Address:7.3.3.1, Nbr Intf Address:7.3.3.2

IGP Id: 0000.0000.0003.00, MPLS-TE Id: 30.30.30.30 Router Node (isis 1 level-2)
  Link[0]:      Intf Address:7.3.3.2, Nbr Intf Address:7.3.3.1

```

The following shows a sample output from the **show mpls traffic-eng topology** command specifying the topology for the SRLG interfaces:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology srlg

```

```

Tue Oct  6 13:10:30.342 UTC
My_System_id: 0000.0000.0005.00 (IS-IS 1 level-2)

```

SRLG	Interface Addr	TE Router ID	IGP Area ID
1	51.1.2.1	100.0.0.1	IS-IS 1 level-2
2	51.1.2.1	100.0.0.1	IS-IS 1 level-2
3	51.1.2.1	100.0.0.1	IS-IS 1 level-2
4	51.1.2.1	100.0.0.1	IS-IS 1 level-2
5	51.1.2.1	100.0.0.1	IS-IS 1 level-2
6	51.1.2.1	100.0.0.1	IS-IS 1 level-2
7	51.1.2.1	100.0.0.1	IS-IS 1 level-2
8	51.1.2.1	100.0.0.1	IS-IS 1 level-2
10	50.4.5.5	100.0.0.5	IS-IS 1 level-2
30	50.4.5.5	100.0.0.5	IS-IS 1 level-2
77	50.4.5.5	100.0.0.5	IS-IS 1 level-2
88	50.4.5.5	100.0.0.5	IS-IS 1 level-2
1500	50.4.5.5	100.0.0.5	IS-IS 1 level-2
10000000	50.4.5.5	100.0.0.5	IS-IS 1 level-2
4294967290	50.4.5.5	100.0.0.5	IS-IS 1 level-2
4294967295	50.4.5.5	100.0.0.5	IS-IS 1 level-2

The following shows a sample output from the **show mpls traffic-eng topology path destination** command specifying the topological path with SRLG exclusion:

```

RP/0/RP0/CPU0:router# show mpls traffic-eng topology path destination 100.0.0.2 exclude-srlg
50.4.5.5 isis 1 level 2

Tue Oct  6 13:13:44.053 UTC
Path Setup to 100.0.0.2:
bw 0 (CT0), min_bw 0, metric: 20
setup_pri 7, hold_pri 7
affinity_bits 0x0, affinity_mask 0xffff
Exclude SRLG Intf Addr : 50.4.5.5
SRLGs Excluded: 10, 30, 77, 88, 1500, 10000000
                  4294967290, 4294967295

Hop0:50.5.1.5
Hop1:50.5.1.1
Hop2:51.1.2.1
Hop3:51.1.2.2
Hop4:100.0.0.2

```

The following shows a sample output from the **show mpls traffic-eng topology path destination** command specifying the topological path based on a given explicit path:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng topology path destination 100.0.0.2 explicit-path
name exclude-srlg isis 1 level 2
```

```
Tue Oct 6 13:16:44.233 UTC
Path Setup to 100.0.0.2:
bw 0 (CT0), min_bw 0, metric: 20
setup_pri 7, hold_pri 7
affinity_bits 0x0, affinity_mask 0xffff
SRLGs Excluded: 10, 30, 77, 88, 1500, 10000000
                  4294967290, 4294967295, 1, 2, 3, 4
                  5, 6, 7, 8
Hop0:50.5.1.5
Hop1:50.5.1.1
Hop2:50.1.2.1
Hop3:50.1.2.2
Hop4:100.0.0.2
```

This table describes the significant fields shown in the display.

Table 21: show mpls traffic-eng topology Field Descriptions

Field	Description
My_System_id	IGP ¹⁰ system or IGP router ID.
Signalling error holddown	Link hold-down timer configured to handle path error events to exclude link from topology.
IGP Id	Identification of the advertising router.
Link	MPLS-TE link.
Frag Id	GP LSA ¹¹ fragment identifier.
Nbr Intf Address	Neighbor Interface address of this link.
TE Metric	TE cost of link.
Switching Capability	Switching capability: packet, optical, lambda.
Physical BW	Physical line rate.
BC Model ID	Bandwidth constraint model ID (RDM or MAM).
Max Reservable BW	Maximum bandwidth (in kilobits per second) that you can reserve on a link.
Max Reservable BW Global	Maximum bandwidth (in kilobits per second) that you can reserve on a link in global-pool (prestandard and RDM).
Max Reservable BW Sub	Maximum bandwidth (in kilobits per second) that you can reserve on a link in subpool (prestandard and RDM).

Field	Description
BC0	Maximum bandwidth (in kilobits per second) that you can reserve on a link in BC0.
BC1	Maximum bandwidth (in kilobits per second) that you can reserve on a link in BC1.
TE-class[index]	Available bandwidth in TE-class (map of class-type and priority) at given index.
Total Allocated BW	Bandwidth (in Kbps) allocated at that priority.
Global Pool Reservable BW	Available bandwidth (in kbps) reservable at that priority in global pool (prestandard RDM).
Sub Pool Reservable BW	Available bandwidth (in kbps) reservable at that priority in sub-pool (prestandard RDM).
Attribute Names	Brief topology and the associated affinity attributes. The names of the affinity attribute of the link are displayed.

¹⁰ IGP = Interior Gateway Protocol.

¹¹ LSA = link-state advertisement.

Related Commands

Command	Description
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.
interface (SRLG), on page 94	Enables SRLG on an interface and enters SRLG interface configuration mode.
srlg, on page 279	Configures an MPLS traffic engineering SRLG values for a link on an interface.
show srlg, on page 268	Displays the SRLG interface and configuration information.

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**] [**auto-tunnel**] [**backup** [*tunnel-number* | **auto-tunnel** [**mesh**] *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** [**unused**]] [**reoptimized within-last** *interval*] [**role** { **all** | **head** | **tail** | **middle** }] [**soft-preemption** { **desired** | **triggered** }]] [**source** *source-address*] [**suboptimal constraints** { **current** | **max** | **none** }] [**summary**] [**tabular**] [**unused**] [**up**] [**class-type** *ct*] [**igp** { **isis** | **ospf** }] [**within-last** *interval*]

Syntax Description

<i>tunnel-number</i>	(Optional) Number of the tunnel. Range is from 0 to 65535.
attribute-set	(Optional) Restricts the display of tunnels with an attribute set.
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.
auto-tunnel	(Optional) Restricts the display of automatically created tunnels.
mesh <i>mesh-value</i>	Displays the tunnels that belong to the specified auto-tunnel mesh group.
backup	(Optional) Displays FRR ¹² backup tunnels information. The information includes the physical interface protected by the tunnel, the number of TE LSPs ¹³ protected, and the bandwidth protected. (Optional) Displays backup information for automatic tunnels and FRR tunnels.
name <i>tunnel-name</i>	(Optional) Displays the tunnel with given name.
promotion-timer <i>promotion-timer</i>	(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.
auto-tunnel	(Optional) Displays protected automatic backup tunnels.
brief	(Optional) Displays the brief form of this command.
destination <i>destination-address</i>	(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.
soft-preemption	Displays tunnels on which the soft-preemption feature is enabled.
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.
unused	(Optional) Displays only unused backup tunnels.
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.

¹² FRR = Fast Reroute.

¹³ LSPs = Label Switched Paths.

Command Default None

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.
	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 You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 rlr2r3gig_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
```

show mpls traffic-eng tunnels

```

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
  Periodic FRR Promotion: every 300 seconds, next in 295 seconds
  Periodic auto-bw collection: disabled

Name: tunnel-tel  Destination: 1.1.1.1
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 22: show mpls traffic-eng tunnels Command Field Descriptions

Field	Description
LSP Tunnels Process	Status of the LSP ¹⁴ 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 ¹⁵ 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.
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.

¹⁴ LSP = Link-State Packet.¹⁵ 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-te11 Destination: 3.3.3.3
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

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 section shows a sample output that results when automatic backup tunnels are created:

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

```

.
.
.
TUNNEL NAME      DESTINATION      STATUS  STATE
      tunnel-te0      200.0.0.3      up up
      tunnel-te1      200.0.0.3      up up
      tunnel-te2      200.0.0.3      up up
      *tunnel-te50     200.0.0.3      up up
      *tunnel-te60     200.0.0.3      up up
      *tunnel-te70     200.0.0.3      up up
      *tunnel-te80     200.0.0.3      up up
.
.
.

```

* = automatically created backup tunnel

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

```

```

AutoTunnel Backup Summary:
  AutoTunnel Backups:
    50 created, 50 up, 0 down, 8 unused
    25 NHOP, 25 NNHOP, 10 SRLG strict, 10 SRLG pref
  Protected LSPs:
    10 NHOP, 20 NHOP+SRLG
    15 NNHOP, 5 NNHOP+SRLG
  Protected S2L Sharing Families:

```

```

10 NHOP, 20 NHOP+SRLG
15 NNHOP, 5 NNHOP+SRLG
Protected S2Ls:          10 NHOP, 20 NHOP+SRLG
15 NNHOP, 5 NNHOP+SRLG

```

This table describes the significant fields shown in the display.

Table 23: 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 ¹⁶ .
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.
LSP Tunnels Process	Status of the TE process ¹⁷ .

¹⁶ LSP = Link-State Packet.

¹⁷ LSP = Label Switched Path

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 lsps: 0
Backup BW: any-class unlimited, Inuse: 0 kbps

```

This table describes the significant fields shown in the display.

Table 24: 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 25: 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-te11 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
    Periodic auto-bw collection: disabled

Name: tunnel-te11 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-tel 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
    Espec: 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-tel060	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-tel	1	200.0.0.3	200.0.0.1	up	Inact	Head InAct
tunnel-tel00	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 26: 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 27: 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.

Field	Description
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 after the NNHOP SRLG preferred automatic backup tunnel is configured:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 1
```

Signalling Summary:

```

    LSP Tunnels Process: running
    RSVP Process: running
    Forwarding: enabled
    Periodic reoptimization: every 3600 seconds, next in 2524 seconds
    Periodic FRR Promotion: every 300 seconds, next in 49 seconds
    Auto-bw enabled tunnels: 1

```

Name: tunnel-tel Destination: 200.0.0.3 (auto backup)

Status:

```
Admin: up Oper: up Path: valid Signalling: connected
```

path option 10, type explicit (autob_nnhop_srlg_tunnell) (Basis for Setup, path weight 11)

```

path option 20, type explicit (autob_nnhop_tunnell)
G-PID: 0x0800 (derived from egress interface properties)
Bandwidth Requested: 0 kbps CT0
Creation Time: Fri Jul 10 01:53:25.581 PST (1h 25m 17s 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

```

```

Auto Backup:
  Protected LSPs: 4
  Protected S2L Sharing Families: 0
  Protected S2Ls: 0
  Protected i/f: Gi0/1/0/0      Protected node: 20.0.0.2
  Protection: NNHOP+SRLG
  Unused removal timeout: not running
History:
  Tunnel has been up for: 00:00:08
  Current LSP:
    Uptime: 00:00:08
  Prior LSP:
    ID: path option 1 [545]
    Removal Trigger: configuration changed

Path info (OSPF 0 area 0):
Hop0: 10.0.0.2
Hop1: 100.0.0.2
Hop2: 100.0.0.3
Hop3: 200.0.0.3

```

This table describes the significant fields shown in the display.

Table 28: show mpls traffic-eng tunnels Command Field Descriptions

Field	Description
Auto Backup	Auto backup section header.
Creation Time	Time when the tunnel was created and for what period was the tunnel created.
Protected LSPs	Number of ready and active LSPs protected by this backup.
Protected S2L Sharing Familes	Number of ready and active sharing families protected by this backup.
Protected S2Ls	Number of ready and active primary tunnels protected by this backup.
Protected i/f Protected node	Interface and NNHOP node protected by this backup.
Protection: NNHOP+SRLG	Type of protection provided by this backup. Note Protection can be different when a preferred SRLG is configured and an SRLG path is not found.
Example when backup is in use: Unused removal timeout: not running Example when backup is unused: Unused removal timeout: 1h26m	Amount of time left before the unused removal timeout expires. This timer only runs when the backup is in the unused state. After the timer expires, the automatic backup tunnel is removed.

This is sample output from the **show mpls traffic-eng tunnels** command using the **detail** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels 999 detail

Name: tunnel-te999 Destination: 1.1.1.1
Status:
  Admin:      up Oper:      up Path:  valid Signalling: connected

  path option 1, type dynamic (Basis for Setup, path weight 2)
  Path-option attribute: po
    Number of affinity constraints: 2
      Include bit map      : 0x4
      Include name         : blue
      Exclude bit map      : 0x2
      Exclude name         : red

    Bandwidth: 300 (CT0)
    G-PID: 0x0800 (derived from egress interface properties)
    Bandwidth Requested: 300 kbps CT0
    Creation Time: Tue Aug 14 23:35:58 2012 (00:00:42 ago)
Config Parameters:
  Bandwidth:      100 kbps (CT0) Priority:  7  7 Affinity: 0x0/0xffff
  Metric Type: TE (default)
  Hop-limit: disabled
  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
  Soft Preemption: Disabled
SNMP Index: 42
History:
  Tunnel has been up for: 00:00:30 (since Tue Aug 14 23:36:10 EST 2012)
  Current LSP:
    Uptime: 00:00:30 (since Tue Aug 14 23:36:10 EST 2012)
  Current LSP Info:
    Instance: 2, Signaling Area: OSPF 100 area 16909060
    Uptime: 00:00:30 (since Tue Aug 14 23:36:10 EST 2012)
    Outgoing Interface: GigabitEthernet0/2/0/2, Outgoing Label: 16005
    Router-IDs: local 3.3.3.3
                  downstream 2.2.2.2
    Soft Preemption: None
  Path Info:
    Outgoing:
      Explicit Route:
        Strict, 23.9.0.2
        Strict, 12.9.0.2
        Strict, 12.9.0.1
        Strict, 1.1.1.1

    Record Route: Disabled
    Tspec: avg rate=300 kbits, burst=1000 bytes, peak rate=300 kbits
    Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set
                      Soft Preemption Desired: Not Set
  Resv Info:
    Record Route:
      IPv4 2.2.2.2, flags 0x20
      Label 16005, flags 0x1
      IPv4 23.9.0.2, flags 0x0
      Label 16005, flags 0x1
      IPv4 1.1.1.1, flags 0x20
      Label 3, flags 0x1
      IPv4 12.9.0.1, flags 0x0
      Label 3, flags 0x1
    Fspec: avg rate=300 kbits, burst=1000 bytes, peak rate=300 kbits Displayed 1 (of 8)
    heads, 0 (of 3) midpoints, 0 (of 0) tails Displayed 1 up, 0 down, 0 recovering, 0 recovered
    heads
```


This is sample output from the **show mpls traffic-eng tunnels** command using the **auto-tunnel backup** keywords:

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

```
AutoTunnel Backup Configuration:
  Interfaces count: 30
  Unused removal timeout: 2h
  Configured tunnel number range: 0-100
AutoTunnel Backup Summary:
  50 created, 50 up, 0 down, 8 unused
  25 NHOP, 25 NNHOP, 10 SRLG strict, 10 SRLG pref
Protected LSPs:
  10 NHOP, 20 NHOP+SRLG
  15 NNHOP, 5 NNHOP+SRLG
Protected S2L Sharing Families:
  10 NHOP, 20 NHOP+SRLG
  15 NNHOP, 5 NNHOP+SRLG
Protected S2Ls:
  10 NHOP, 20 NHOP+SRLG
  15 NNHOP, 5 NNHOP+SRLG

Cumulative Counters (last cleared 1h ago):
      Total      NHOP      NNHOP
Created:         550        300        250
Connected:       500        250        250
Removed (down):    0         0         0
Removed (unused): 200        100        100
Removed (in use):  0         0         0
Range exceeded:   0         0         0
```

This table describes the significant fields shown in the display.

Table 29: show mpls traffic-eng tunnels auto-tunnel backup Command Field Descriptions

Field	Description
AutoTunnel Backup Configuration	Header for the automatic tunnel backup configuration.
Interfaces count	Number of interfaces that have automatic tunnel backup enabled.
Unused removal timeout	Configured value and time left before expiration of the unused removal timeout attribute.
Configured tunnel number range	Configured tunnel number range.
AutoTunnel Backup Summary	Header for the automatic tunnel backup summary information.
50 created	Number of automatic backup tunnels created.
50 up	Number of automatic backup tunnels in the up state.
0 down	Number of automatic backup tunnels in the down state.
8 unused	Number of automatic backup tunnels in the unused state.
25 NHOP	Number of automatic backup tunnels created for NHOP protection.

Field	Description
25 NNHOP	Number of automatic backup tunnels created for NNHOP protection.
10 SRLG strict	Number of automatic backup tunnels created with the SRLG preferred attribute.
10 SRLG pref	Number of automatic backup tunnels created with the SRLG preferred attribute.
Protected LSPs Protected S2L Sharing Families Protected S2Ls	Headings for summary information showing current status of LSPs, S2L Sharing Families, and S2Ls that are protected by the automatic tunnel backups. Numbers include primary tunnels in FRR ready and active state.
10 NHOP	Number of automatic backup tunnels that are link protected.
20 NHOP+SRLG	Number of automatic backup tunnels that are link protected and using an SRLG diverse backup path.
15 NNHOP	Number of automatic backup tunnels that are node protected.
20 NNHOP+SRLG	Number of automatic backup tunnels that are node protected and use an SRLG diverse backup path.
Cumulative Counters (last cleared 1h ago):	Cumulative counters for automatic backup tunnels.
Headers: Total, NHOP, NNHOP	Total number of counters and breakdown of NHOP and NNHOP counters.
Created:	Cumulative number of created automatic backup tunnels since the last counter was cleared.
Connected:	Cumulative number of the connected automatic backup tunnels since the last counter was cleared. Note Counter increments only the first time that a tunnel connects.
Removed (down/unused/in use)	Number of automatic backup tunnels that are removed based on state.
Range exceeded	Number of automatic backup tunnels attempted and later rejected when the total number exceeds the configured range.

This is sample output from the **show mpls traffic-eng tunnels name tunnel-te1 detail** command, which displays the soft preemption information for the tunnel-te1 tunnel:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng tunnels name tunnel-te1 detail
Name: tunnel-te1 Destination: 192.168.0.4
Status:
  Admin:      up Oper:      up Path:  valid Signalling: connected

  path option 1, type explicit ABC1 (Basis for Setup, path weight 2)
  Last PCALC Error [Reopt]: Thu Oct 13 16:40:24 2011
  Info: Can't reach 10.10.10.2 on 192.168.0.2, from node 192.168.0.1 (bw)
  Last Signalled Error: Thu Oct 13 16:38:53 2011
  Info: [2] PathErr(34,1)-(reroute, flow soft-preempted) at 10.10.10.1
  G-PID: 0x0800 (derived from egress interface properties)
  Bandwidth Requested: 30000 kbps CT0
  Creation Time: Thu Oct 13 15:46:45 2011 (00:53:44 ago)
Config Parameters:
  Bandwidth:      30000 kbps (CT0) Priority:  7  7 Affinity: 0x0/0xffff
  Metric Type: TE (default)
  Hop-limit: disabled
  AutoRoute: enabled 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
  Soft Preemption: Enabled
Soft Preemption:
  Current Status: Preemption pending
  Last Soft Preemption: Thu Oct 13 16:38:53 2011 (00:01:36 ago)
  Addresses of preempting links:
    10.10.10.1: Thu Oct 13 16:38:53 2011 (00:01:36 ago)
  Duration in preemption pending: 96 seconds
  Preemption Resolution: Pending
Stats:
  Number of preemption pending events: 1
  Min duration in preemption pending: 0 seconds
  Max duration in preemption pending: 0 seconds
  Average duration in preemption pending: 0 seconds
  Resolution Counters: 0 reopt complete, 0 torn down
                      0 path protection switchover
SNMP Index: 9
History:
  Tunnel has been up for: 00:52:46 (since Thu Oct 13 15:47:43 EDT 2011)
  Current LSP:
    Uptime: 00:52:46 (since Thu Oct 13 15:47:43 EDT 2011)
  Reopt. LSP:
    Last Failure:
      LSP not signalled, has no S2Ls
      Date/Time: Thu Oct 13 16:40:24 EDT 2011 [00:00:05 ago]
  Prior LSP:
    ID: path option 1 [2]
    Removal Trigger: path error
Current LSP Info:
  Instance: 2, Signaling Area: OSPF ring area 0
  Uptime: 00:52:46 (since Thu Oct 13 15:47:43 EDT 2011)
  Outgoing Interface: GigabitEthernet0/0/0/0, Outgoing Label: 16002
  Router-IDs: local 192.168.0.1
               downstream 192.168.0.2
  Soft Preemption: Pending
  Preemption Link: GigabitEthernet0/0/0/0; Address: 10.10.10.1
  Preempted at: Thu Oct 13 16:38:53 2011 (00:01:36 ago)
  Time left before hard preemption: 204 seconds
Path Info:
  Outgoing:
  Explicit Route:
    Strict, 10.10.10.2
    Strict, 14.14.14.2
    Strict, 14.14.14.4
    Strict, 192.168.0.4
```

show mpls traffic-eng tunnels

```

Record Route: Empty
Tspec: avg rate=30000 kbits, burst=1000 bytes, peak rate=30000 kbits
Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set
                    Soft Preemption Desired: Set

Resv Info:
Record Route:
  IPv4 192.168.0.2, flags 0x20
  Label 16002, flags 0x1
  IPv4 10.10.10.2, flags 0x0
  Label 16002, flags 0x1
  IPv4 192.168.0.4, flags 0x20
  Label 3, flags 0x1
  IPv4 14.14.14.4, flags 0x0
  Label 3, flags 0x1
  Rspec: avg rate=30000 kbits, burst=1000 bytes, peak rate=30000 kbits
Displayed 1 (of 4) heads, 0 (of 0) midpoints, 0 (of 2) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads
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

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: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

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)

```

show mpls traffic-eng tunnels

```

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
auto-tunnel backup (MPLS-TE)	Builds automatic NHOP and NNHOP backup tunnels.
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.
srlg	Configures an SRLG membership for a link on a given interface.
soft-preemption	Enables soft-preemption on a head-end for the MPLS TE tunnel.

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 EXEC

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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	Operations
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	50	2h 5m	
tunnel-te1	5	500	300	420	1h 10m	

This table describes the significant fields shown in the display.

Table 30: 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.
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 237	Displays information about MPLS-TE tunnels.

show mpls traffic-eng link-management soft-preemption

To display information about soft-preemption activity on a MPLS TE link, use the **show mpls traffic-eng link-management soft-preemption** command in EXEC mode.

show mpls traffic-eng link-management soft-preemption [*interfacetype interface-path-id*]

Syntax Description

interface	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.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 4.2.0	This command was introduced .

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
mpls-te	read

Examples

This is sample output from the **show mpls traffic-eng link-management soft-preemption** command:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng link-management soft-preemption interface
POS0/1/0/1
```

Name: POS0/1/0/1; IPv4 Address: 1.2.3.10

Total Soft Preempted Bandwidth (BC0/BC1) kbps: 1500/1000

Currently Soft Preempted Bandwidth (BC0/BC1) kbps: 1200/800

Released Soft Preempted Bandwidth (BC0/BC1) kbps: 300/200

Currently Over-subscribed Bandwidth (BC0/BC1) kbps: 1000/600

Currently Soft Preempted Tunnels: 5 tunnels

TunID	LSPID	Source	Destination	Pri S/H	BW Kbps	Class Type	Time out
50	10	4.4.4.40	1.1.1.10	2/2	400	BC0	100
51	11	4.4.4.40	1.1.1.10	2/2	600	BC0	100
52	12	4.4.4.40	1.1.1.10	3/3	200	BC0	80
53	11	4.4.4.40	1.1.1.10	3/3	500	BC1	90
54	12	4.4.4.40	1.1.1.10	4/4	300	BC1	90

show srlg

To show the SRLG interface and configuration information, use the **show srlg** command in EXEC mode.

show srlg [**interface** *type interface-path-id*] [**location** {*node-id*| **all**| **mgmt-nodes**}] [**value** *value-number*]
 [**trace**{**file** *filename* **original**| **hexdump** | **last** *entries*| **reverse** | **stats**| **tailf** | **unique** | **verbose** | **wrapping**}]

Syntax Description

interface <i>type</i>	(Optional) Displays information on the specific 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.
location	(Optional) Specifies a node.
<i>node-id</i>	Node ID. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
all	Specifies all locations.
mgmt-nodes	Specifies all management nodes.
value <i>value-number</i>	(Optional) Displays SRLG value numbers.
trace	(Optional) Displays trace information for SRLG.
file <i>filename</i>	(Optional) Displays trace information for a specific file name.
original	Displays the original location of the file.
hexdump	(Optional) Displays traces in hexadecimal format.
last	(Optional) Displays trace information for a specific number of entries.
<i>entries</i>	Number of entries. Replace entries with the number of entries you want to display. For example, if you enter 5, the display shows the last 5 entries in the trace data. Range is 1 to 4294967295.
reverse	(Optional) Displays the latest traces first.

stats	(Optional) Displays the statistics in the command output.
tailf	(Optional) Displays the new traces as they are added in the command output.
unique	(Optional) Displays the unique entries with counts in the command output.
verbose	(Optional) Displays the information for internal debugging in the command output.
wrapping	(Optional) Displays the wrapping entries in the command output.

Command Default No default behavior or values

Command Modes EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
	ip-services	read

Examples The following sample output is from the **show srlg value** command.

```


System Information::
Interface Count    : 2 (Maximum Interfaces Supported 250)

Interface   : POS0/1/0/0, Value Count : 2
SRLG Values : 10,20

Interface   : POS0/1/0/1, Value Count : 2
SRLG Values : 10,30

Interface   : POS0/1/0/2, Value Count : 2

```

 show srlg

```
SRLG Values : 10,40
```

```
Interface : POS0/2/0/0, Value Count : 1  
SRLG Values : 100
```

Related Commands

Command	Description
interface (MPLS-TE), on page 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.

signalled-bandwidth

To configure the bandwidth required for an MPLS-TE tunnel, use the **signalled-bandwidth** command in interface configuration mode. To disable the behavior, use the **no** form of this command.

signalled-bandwidth {*bandwidth* [**class-type** *ct*]| **sub-pool** *bandwidth*}

no signalled-bandwidth {*bandwidth* [**class-type** *ct*]| **sub-pool** *bandwidth*}

Syntax Description

<i>bandwidth</i>	Bandwidth required for an MPLS-TE tunnel. Bandwidth is specified in kilobits per second. By default, bandwidth is reserved in the global pool. Range is from 0 to 4294967295.
class-type <i>ct</i>	(Optional) Configures the class type of the tunnel bandwidth request. Range is from 0 to 1. Class-type 0 is strictly equivalent to global-pool. Class-type 1 is strictly equivalent to subpool.
sub-pool <i>bandwidth</i>	Reserves the bandwidth in the subpool instead of the global pool. Range is 1 to 4294967295. A subpool bandwidth value of 0 is not allowed.

Command Default

The default is 0 in class-type 0.

Command Modes

Interface configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **signalled-bandwidth** command supports two bandwidth pools (class-types) for the Diff-Serv Aware TE (DS-TE) feature.



Note

The Cisco Diff-Serve Aware TE feature is compliant to IETF standard and will interoperate with third party vendor DS-TE. Both Russian Doll Model and Maximum Allocation Model for bandwidth allocation are supported. We recommended that IETF terminology be used in DS-TE bandwidth configurations, namely, Class-type (CT) and Bandwidth Constraints (BC).

Task ID

Task ID	Operations
mpls-te	read, write

Examples

This example shows how to set the bandwidth required for an MPLS-TE tunnel to 1000 in the global pool (class-type 0):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# signalled-bandwidth 1000

RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# signalled-bandwidth 1000 class-type 0
```

This example shows how to set the bandwidth required for an MPLS-TE tunnel to 1000 in the sub-pool (class-type 1):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# signalled-bandwidth sub-pool 1000

RP/0/RP0/CPU0:router(config)# interface tunnel-te 1
RP/0/RP0/CPU0:router(config-if)# signalled-bandwidth 1000 class-type 1
```

Related Commands

Command	Description
show mpls traffic-eng tunnels, on page 237	Displays information about MPLS-TE tunnels.

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*

no signalled-bandwidth *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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 237	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

no 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 To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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 107	Enters MPLS-TE configuration mode.
path-selection loose-expansion metric (MPLS-TE) , on page 140	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 global configuration mode. To disable this behavior, use the **no** form of this command.

snmp traps mpls traffic-eng [*notification-option*] **preempt**

no snmp traps mpls traffic-eng [*notification-option*]

Syntax Description

<i>notification-option</i>	(Optional) Notification option to enable the sending of notifications to indicate changes in the status of MPLS-TE tunnels. Use one of these values: <ul style="list-style-type: none"> • up • down • reoptimize • reroute • cisco-ext
preempt	Enables MPLS-TE tunnel preempt trap.

Command Default

None

Command Modes

Global configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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.
soft-preemption	Enables soft-preemption on a head-end for the MPLS TE tunnel.

soft-preemption

To enable soft-preemption with default timeout on a head-end for the MPLS TE tunnel, use the **soft-preemption** command in MPLS TE mode. To disable this feature, use the **no** form of this command.

soft-preemption timeout *seconds*

no soft-preemption

timeout <i>seconds</i>	Defines the timeout for soft-preempted LSP, in seconds. The default timeout is 60. Range is from 30 to 300.
-------------------------------	---

Command Default

The default *timeout seconds* is 60 seconds.

Command Modes

MPLS TE configuration
Tunnel Interface configuration

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
MPLS-TE	write

Examples

This example shows how to enable soft-preemption on a specific tunnel:

```
RP/0/RP0/CPU0:router(config)#interface tunnel-te 50
RP/0/RP0/CPU0:router(config-if)#soft-preemption
```

This example shows how to enable soft-preemption on a node :

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

srlg

To configure an MPLS traffic engineering shared-risk link group (SRLG) value for a link on a given interface, use the **srlg** command in global configuration mode. To disable this configuration, use the **no** form of this command.

srlg *value*

no srlg *value*

Syntax Description

<i>value</i>	Value number that identifies the SRLG. Range is 0 to 4294967295.
--------------	--

Command Default

Shared Risk Link Group memberships are not configured.

Command Modes

Global configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

You can enter up to 30 SRLG entries on the ingress and egress ports of the interface. SRLG entries configured over 30 are silently dropped.

Task ID

Task ID	Operations
mpls-te	read, write

Examples

The following example shows how to configure an SRLG with 10 member links:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router#(config)# srlg
RP/0/RP0/CPU0:router#(config-srlg)# interface POS 0/3/0/2
RP/0/RP0/CPU0:router#(config-srlg-if)# value 10
```

Related Commands

Command	Description
interface (MPLS-TE), on page 92	Enables MPLS-TE on an interface and enters MPLS-TE interface configuration mode.
mpls traffic-eng, on page 107	Enters MPLS-TE configuration mode.

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*

no timers loose-path retry-period *value*

Syntax Description

retry-period <i>value</i>	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

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
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 107	Enters MPLS-TE configuration mode.

Command	Description
path-selection loose-expansion affinity (MPLS-TE), on page 137	Specifies the affinity value to be used to expand a path to the next loose hop for a tunnel on an area border router.

timers removal unused (auto-tunnel backup)

To configure the frequency at which a timer scans backup autotunnels and removes tunnels that are not in use, use the **timers removal unused (auto-tunnel backup)** command in auto-tunnel backup configuration mode. To return to the default behavior, use the **no** form of this command.

timers removal unused *frequency*

no timers removal unused *frequency*

Syntax Description

<i>frequency</i>	Frequency, in minutes, between backup autotunnel scans to remove tunnels that are not used. Range is 0; 5 to 10080 minutes (7 days). A value of 0 disables the scanning and removal of tunnels.
------------------	---

Command Default

frequency: 60

Command Modes

auto-tunnel backup configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **unused** auto-tunnel backup tunnel is the tunnel that is not assigned to protect any FRR tunnel.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

The following example shows that unused automatic backup tunnels are removed after the 10 minute timer scan is reached.

```
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# auto-tunnel backup
RP/0/RP0/CPU0:router(config-te-auto-bk)# timers removal unused 10
```

Related Commands

Command	Description
show mpls traffic-eng auto-tunnel backup unused	Displays the unused backup tunnels only.
auto-tunnel backup (MPLS-TE), on page 35	Builds automatic next-hop and next-next-hop tunnels, and enters auto-tunnel configuration mode.

timeout (soft-preemption)

To override the soft-preemption default timeout, use the **timeout** command in MPLS TE mode. To remove this configuration, use the **no** form of this command.

soft-preemption timeout *seconds*

no soft-preemption

Syntax Description	timeout <i>seconds</i>	Defines the timeout for soft-preempted LSP, in seconds. The default timeout is 60. Range is from 30 to 300.
--------------------	-------------------------------	---

Command Default	The default <i>timeout seconds</i> is 60 seconds.
-----------------	---

Command Modes	MPLS TE configuration
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Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines	You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.
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Task ID	Task ID	Operation
	MPLS-TE	write

Examples	This example shows how to override the soft-preemption default timeout:
----------	---

```
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# soft-preemption
RP/0/RP0/CPU0:router(config-soft-preemption)# timeout 60
```

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*

no 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

seconds: 10

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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

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 , on page 107	Enters MPLS-TE configuration mode.
show mpls traffic-eng topology , on page 228	Displays the current MPLS-TE global topology of this node as well as the signaling error holddown time.

tunnel-id (auto-tunnel backup)

To configure the range of tunnel interface numbers to be used for automatic backup tunnels, use the **tunnel-id** command in auto-tunnel backup configuration mode. To delete the automatic backup tunnels, use the **no** form of this command.

tunnel-id *min number max number*

no tunnel-id

Syntax Description

min	(Optional) Minimum number for automatic backup tunnels.
<i>number</i>	Valid values are from 0 to 65535.
max	(Optional) Maximum number for automatic backup tunnels.

Command Default

No default behavior or values

Command Modes

Auto-tunnel backup configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you increase the tunnel ID range, the automatic backup tunnels that failed earlier will get created the next time automatic backup assignments are processed.

Restrictions:

- Command is rejected if the **max** value minus **min** value is $\geq 1K$.
- Command is rejected if **min** value $>$ **max** value.
- Command is rejected if **min** value is greater than the tunnel ID of an existing automatic backup tunnel.
- Command is rejected if **max** value is smaller than the tunnel ID of an existing automatic backup tunnel.
- Command is rejected if a statically configured tunnel ID matches with the configured **min** and **max** range of values.
- Command is rejected if a static backup assignment is already configured to a tunnel with an ID within the **min** value / **max** value range.

Task ID

Task ID	Operation
mpls-te	read, write

Examples

The following example allows 800 automatic backup tunnels to be created:

```
RP/0/RP0/CPU0:router(config)# mpls traffic-eng
RP/0/RP0/CPU0:router(config-mpls-te)# auto-tunnel backup
RP/0/RP0/CPU0:router(config-te-auto-bk)# tunnel-id min 1200 max 2000
```

Related Commands

Command	Description
auto-tunnel backup (MPLS-TE), on page 35	Builds automatic next-hop and next-next-hop tunnels, and enters auto-tunnel configuration mode.

tunnel-id (auto-tunnel backup)