



# MPLS Traffic Engineering Commands

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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.
	<b>min</b> <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	
	<i>percentage: 5</i> <i>minimum bandwidth: 10</i>

Command Modes	
	MPLS-TE automatic bandwidth interface configuration

Command History	Release	Modification
	Release 6.1.42	This command was introduced.

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

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

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

# 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*

<b>Syntax Description</b>	<i>minutes</i> Frequency, in minutes, for the automatic bandwidth application. The range is from 5 to 10080 (7 days). The default is 1440.				
<b>Command Default</b>	<i>minutes</i> : 1440 (24 hours)				
<b>Command Modes</b>	MPLS-TE automatic bandwidth interface configuration				
<b>Command History</b>	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 6.1.42</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 6.1.42	This command was introduced.
Release	Modification				
Release 6.1.42	This command was introduced.				
<b>Usage Guidelines</b>	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.				
<b>Task ID</b>	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read, write</td> </tr> </tbody> </table>	Task ID	Operations	mpls-te	read, write
Task ID	Operations				
mpls-te	read, write				
<b>Examples</b>	<p>The following example shows how to configure application frequency to 1000 minutes for MPLS-TE interface 1:</p> <pre>RP/0/RP0:hostname# <b>configure</b> RP/0/RP0:hostname(config)# <b>interface tunnel-te 1</b> RP/0/RP0:hostname(config-if)# <b>auto-bw</b> RP/0/RP0:hostname(config-if-tunte-autobw)# <b>application 1000</b></pre>				

## 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

<b>min</b> <i>bandwidth</i>	Configures the minimum automatic bandwidth, in kbps, on a tunnel. The range is from 0 to 4294967295. The default is 0.
<b>max</b> <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 6.1.42	This command was introduced.

### Usage Guidelines

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

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

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

### Task ID

Task ID	Operations
mpls-te	read, write

### Examples

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

```
RP/0/RP0:hostname# configure  
RP/0/RP0:hostname(config)# interface tunnel-te 1  
RP/0/RP0:hostname(config-if)# auto-bw
```

```
RP/0/RP0:hostname(config-if-tunte-autobw)# bw-limit min 30 max 80
```

## 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 the 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.
	<b>internal</b>	Clears all the automatic bandwidth internal data structures.
	<b>tunnel-te</b> <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 6.1.42	This command was introduced.

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

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

Task ID	Task 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:hostname# show mpls traffic-eng tunnels 0 auto-bw brief

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

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

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

```
RP/0/RP0:hostname# 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

# 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 the 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

Command History	Release	Modification
	Release 6.1.42	This command was introduced.

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

Task ID	Task ID	Operations
	mpls-te	read, write

## Examples

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

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

Node	Protected LSPs 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:hostname# clear mpls traffic-eng fast-reroute log
```



## 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*

<b>Syntax Description</b>	<i>ip-address</i> Destination address of the MPLS-TE router ID.
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<b>Command Default</b>	No default behavior or values
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<b>Command Modes</b>	Interface configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Release 6.1.42	This command was introduced.

### Usage Guidelines



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

Use the **interface tunnel-mte** command to configure destinations for the Point-to-Multipoint (P2MP) TE tunnel and to enter P2MP destination interface configuration mode. The maximum number of destinations, which are configured under P2MP tunnels, is 500.

For P2MP tunnels, the **destination** command acts as a configuration mode. The **path-option** command is under the destination for P2MP; whereas, it is under the tunnel-te interface configuration mode for P2P tunnels.

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

<b>Task ID</b>	<b>Task ID</b>	<b>Operations</b>
	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:hostname# configure
RP/0/RP0:hostname(config)# interface tunnel-te1
RP/0/RP0:hostname(config-if)# destination 10.10.10.10
```

The following example shows how to set the destination address for tunnel-mte 10 to 150.150.150.150:

**destination (MPLS-TE)**

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface tunnel-mte10
RP/0/RP0:hostname(config-if)# destination 150.150.150.150
RP/0/RP0:hostname(config-if-p2mp-dest)#
```

# 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

Command History	Release	Modification
	Release 6.1.42	This command was introduced.

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

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



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

Task ID	Task ID	Operations
	mpls-te	read, write

## Examples

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

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

# 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.
	<b>tunnel-te</b> <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 6.1.42	This command was introduced.

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



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

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

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

1. Configure the minimum and maximum automatic bandwidth to the bandwidth value that you want to apply by using the 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:hostname# mpls traffic-eng auto-bw apply tunnel-te 1
```

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

# r-mpls-te-path-protection-switchover

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**Syntax Description** 

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**Command Default**

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**Command Modes**

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**Command History** 

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<b>Release</b>	<b>Modification</b>
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**Usage Guidelines**

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<b>Task ID</b>	<b>Task</b>	<b>Operation</b>
	<b>ID</b>	

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**Example**

# r-mpls-te-reroute

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## Syntax Description

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## Command Default

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## Command Modes

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## Command History

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Release	Modification
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## Usage Guidelines

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### Task ID

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Task ID	Operation ID
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## Example



## 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.
<b>min</b> <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.
<b>limit</b> <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 6.1.42	This command was introduced.

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

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

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

Task ID	Task 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:hostname# configure
RP/0/RP0:hostname(config)# interface tunnel-te 1
```

**overflow threshold (MPLS-TE)**

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

## 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 [protecting number] { dynamic [pce [address ipv4
address]] | explicit { name path-name | identifier path-number } [protected-by path-option-level
]} [attribute-set name] [isis instance-name level level] [lockdown] [sticky ] [ospf
instance-name area {value address} ] [verbatim]
no path-option preference-priority {dynamic [pce [address ipv4 address]] | explicit {name
path-name | identifier path-number}[protected-by path-option-level]} [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.
<b>protecting</b> <i>number</i>	Specifies a path setup option to protect a path. The range is from 1 to 1000.
<b>dynamic</b>	Specifies that label switched paths (LSP) are dynamically calculated.
<b>pce</b>	(Optional) Specifies that the LSP is computed by a Path Computation Element (PCE).
<b>address</b>	(Optional) Configures the address for the PCE.
<b>ipv4</b> <i>address</i>	Configures the IPv4 address for the PCE.
<b>explicit</b>	Specifies that LSP paths are IP explicit paths.
<b>name</b> <i>path-name</i>	Specifies the path name of the IP explicit path.
<b>identifier</b> <i>path-number</i>	Specifies a path number of the IP explicit path.
<b>protected-by</b> <i>path-option-level</i>	(Optional) Configures path protection for an explicit path that is protected by another explicit path.
<b>isis</b> <i>instance-name</i>	(Optional) Limits CSPF to a single IS-IS instance and area.
<b>attribute-set</b> <i>name</i>	(Optional) Specifies the attribute set for the LSP.
<b>level</b> <i>level</i>	Configures the level for IS-IS. The range is from 1 to 2.
<b>lockdown</b>	(Optional) Specifies that the LSP cannot be reoptimized.
<b>sticky</b>	(Optional) Extended version of lockdown. LSP stays on the same path after change in resources.  <b>Note</b> The sticky option can be configured only on the primary path option.
<b>ospf</b> <i>instance-name</i>	(Optional) Limits CSPF to a single OSPF instance and area.
<b>area</b>	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.
<b>verbatim</b>	(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 6.1.42	This command was introduced.

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

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

The **protecting** keyword specifies that you can configure path-protection for the primary LSP. The **protecting** keyword is available only for tunnel-gte interfaces.

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.

The **dynamic** keyword is required to configure path-protection.

Any primary explicit path on a path protection enabled tunnel can be configured to be protected by an explicit path option level using **protected-by** keyword. Only one explicit protecting path is supported per path option.

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

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

## path-selection cost-limit

To set the upper limit on the path aggregate admin-weight when computing paths for MPLS-TE LSPs, use the **path-selection cost-limit** command in an appropriate configuration mode. To remove the upper limit, use the no form of this command.

**path-selection cost-limit** *cost-limit*

**no path-selection cost-limit** *cost-limit*

<b>Syntax Description</b>	<i>cost-limit</i> Configures the path-selection cost-limit value. The range is from 1 to 4294967295.
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<b>Command Default</b>	None
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<b>Command Modes</b>	Global configuration Interface tunnel TE configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Release 6.1.42	This command was introduced.

<b>Usage Guidelines</b>	Path-selection cost-limit configuration works on MPLS TE tunnels and enables the creation of LSPs, only if the path aggregate admin-weight is less than the specified path cost limit.
-------------------------	--

### Example

This example shows how to use the **path-selection cost-limit** command:

```
RP/0/RP0:hostname:router # mpls traffic-eng path-selection cost-limit 16777199
```

# show mpls traffic-eng tunnels

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

**show mpls traffic-eng tunnels** [*tunnel-id*] [**detail** | **tabular**]

Syntax Description	
<i>tunnel-id</i>	Tunnel identification number. Range is from 0 to 65535.
<b>detail</b>	Displays detailed information for the specified tunnel-id.
<b>tabular</b>	Displays tunnel information in table-format.

**Command Default** None

**Command Modes** EXEC

Command History	Release	Modification
	Release 6.1.42	This command was introduced.

**Usage Guidelines** No specific usage guidelines.

Task ID	Task ID	Operation
	mpls-te	read

## Example

This example shows how to use the **show mpls traffic-eng tunnels** command with the **detail** keyword:

```
show mpls traffic-eng tunnels 1000 detail
Name: tunnel-te1000 Destination: 104.0.0.1 Ifhandle:0x8001afc
  Signalled-Name: NCS4K-R11_t1000
  Status:
    Admin:    up Oper:    up Path:  valid Signalling: connected

  path option 1, type explicit path01 (Basis for Setup, path weight 30)
  G-PID: 0x0800 (derived from egress interface properties)
  Bandwidth Requested: 10 kbps CT0
  Creation Time: Sat Jan 7 16:33:48 2017 (00:01:21 ago)
  Config Parameters:
    Bandwidth:      10 kbps (CT0) Priority:  7 7 Affinity: 0x0/0xffff
    Metric Type: TE (interface)
    Path Selection:
      Tiebreaker: Min-fill (default)
    Hop-limit: disabled
    Cost-limit: disabled
    Path-invalidation timeout: 10000 msec (default), Action: Tear (default)
```

## show mpls traffic-eng tunnels

```

AutoRoute: disabled  LockDown: disabled  Policy class: not set
Forward class: 0 (default)
Forwarding-Adjacency: disabled
Autoroute Destinations: 0
Loadshare:          0 equal loadshares
Auto-bw: disabled
Fast Reroute: Enabled, Protection Desired: Any
Path Protection: Not Enabled
BFD Fast Detection: Disabled
Reoptimization after affinity failure: Enabled
Soft Preemption: Disabled
SNMP Index: 133
Binding SID: None
History:
  Tunnel has been up for: 00:01:06 (since Sat Jan 07 16:34:03 UTC 2017)
  Current LSP:
    Uptime: 00:01:06 (since Sat Jan 07 16:34:03 UTC 2017)
Current LSP Info:
  Instance: 2, Signaling Area: IS-IS 100 level-2
  Uptime: 00:01:06 (since Sat Jan 07 16:34:03 UTC 2017)
  Outgoing Interface: TenGigE0/4/0/2, Outgoing Label: 24099
  Router-IDs: local    102.0.0.1
               downstream 107.0.0.1
  Soft Preemption: None
  SRLGs: not collected
  Path Info:
    Outgoing:
      Explicit Route:
        Strict, 3.27.1.2
        Strict, 3.67.1.2
        Strict, 3.67.1.1
        Strict, 3.46.1.2
        Strict, 3.46.1.1
        Strict, 104.0.0.1

    Record Route: Disabled
    Tspec: avg rate=10 kbits, burst=1000 bytes, peak rate=10 kbits
    Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set
                       Soft Preemption Desired: Not Set
  Resv Info:
    Record Route:
      IPv4 107.0.0.1, flags 0x20 (Node-ID)
      Label 24099, flags 0x1
      IPv4 3.27.1.2, flags 0x0
      Label 24099, flags 0x1
      IPv4 106.0.0.1, flags 0x20 (Node-ID)
      Label 24099, flags 0x1
      IPv4 3.67.1.1, flags 0x0
      Label 24099, flags 0x1
      IPv4 104.0.0.1, flags 0x20 (Node-ID)
      Label 3, flags 0x1
      IPv4 3.46.1.1, flags 0x0
      Label 3, flags 0x1
    Fspec: avg rate=10 kbits, burst=1000 bytes, peak rate=10 kbits
  Persistent Forwarding Statistics:
    Out Bytes: 0
    Out Packets: 0

LSP Tunnel 104.0.0.1 1000 [2] is signalled, Signaling State: up
Tunnel Name: NCS4K-R10 t1000 Tunnel Role: Tail
InLabel: TenGigE0/4/0/2, implicit-null
Signalling Info:
  Src 104.0.0.1 Dst 102.0.0.1, Tun ID 1000, Tun Inst 2, Ext ID 104.0.0.1
  Router-IDs: upstream 107.0.0.1

```



```

                local      102.0.0.1
Bandwidth: 10 kbps (CT0) Priority: 7 7 DSTE-class: 0
Soft Preemption: None
SRLGs: not collected
Path Info:
  Incoming Address: 3.27.1.1
  Incoming:
  Explicit Route:
    Strict, 3.27.1.1
    Strict, 102.0.0.1

  Record Route: Disabled
  Tspec: avg rate=10 kbits, burst=1000 bytes, peak rate=10 kbits
  Session Attributes: Local Prot: Set, Node Prot: Not Set, BW Prot: Not Set
                    Soft Preemption Desired: Not Set

Resv Info: None
  Record Route: Empty
  Fspec: avg rate=10 kbits, burst=1000 bytes, peak rate=10 kbits
Displayed 1 (of 100) heads, 0 (of 0) midpoints, 1 (of 100) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads
```

# 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 the 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

Command History	Release	Modification
	Release 6.1.42	This command was introduced.

**Usage Guidelines** Use the **show mpls traffic-eng tunnels auto-bw brief** command to determine if the automatic bandwidth application has been applied on a specified tunnel. If a single tunnel is specified, only the information for that tunnel is displayed.

Task ID	Task ID	Operations
	mpls-te	read

## Examples

The following sample output shows the list of automatic bandwidth enabled tunnels:

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

Tunnel      LSP  Last appl  Requested  Signalled  Highest  Application
Name        ID   BW (kbps)  BW (kbps)  BW (kbps)  BW (kbps)  Time Left
-----
tunnel-te0  1    10         10         10         50        2h 5m
tunnel-te1  5    500        500        300        420       1h 10m
```

This table describes the significant fields shown in the display.

**Table 1: show mpls traffic-eng tunnels auto-bw brief Field Descriptions**

Field	Description
Tunnel Name	Name for the tunnel.
LSP ID	ID of the Label Switched Path that is used by the tunnel.
Last appl BW (kbps)	Last bandwidth applied (for example, requested) by the automatic-bandwidth feature for the tunnel.

Field	Description
Requested BW (kbps)	Bandwidth that is requested for the tunnel.
Signalled BW (kbps)	Bandwidth that is actually signalled for the tunnel.
Highest BW (kbps)	Highest bandwidth measured since the last start of the application interval.
Application Time Left	Time left until the application period ends for this tunnel.

# show mpls traffic-eng fast-reroute database

To display the fast reroute database information, use the **show mpls traffic-eng fast-reroute database** command in the EXEC mode.

## show mpls traffic-eng fast-reroute database

**Syntax Description** This command has no keywords or arguments.

**Command Default** None

**Command Modes** EXEC

Command History	Release	Modification
	Release 6.1.42	This command was introduced.
	Release 6.5.3.1	LAG interface was supported.

**Usage Guidelines** No specific usage guidelines.

Task ID	Task ID	Operation
	mpls-te	read

## Example

This example shows how to use the **show mpls traffic-eng fast-reroute database** command:

```
show mpls traffic-eng fast-reroute database
Tunnel head FRR information:
Tunnel      Out Intf : Label      FRR Intf : Label      Status
-----
tt1000      Hu0/3/0/0:24201      tt4000:24201          Ready
tt1002      Hu0/3/0/0:24103      tt4000:24103          Ready
tt1003      Hu0/3/0/0:24104      tt4000:24104          Ready
tt1001      Hu0/3/0/0:24102      tt4000:24102          Ready
tt1004      Hu0/3/0/0:24105      tt4000:24105          Ready
tt1005      Hu0/3/0/0:24106      tt4000:24106          Ready
tt1006      Hu0/3/0/0:24107      tt4000:24107          Ready
tt1007      Hu0/3/0/0:24108      tt4000:24108          Ready
tt1008      Hu0/3/0/0:24109      tt4000:24109          Ready
tt1009      Hu0/3/0/0:24110      tt4000:24110          Ready
tt1010      Hu0/3/0/0:24111      tt4000:24111          Ready
tt1011      Hu0/3/0/0:24112      tt4000:24112          Ready
tt1012      Hu0/3/0/0:24113      tt4000:24113          Ready
tt1013      Hu0/3/0/0:24114      tt4000:24114          Ready
tt1014      Hu0/3/0/0:24115      tt4000:24115          Ready
tt1015      Hu0/3/0/0:24116      tt4000:24116          Ready
tt1016      Hu0/3/0/0:24117      tt4000:24117          Ready
tt1017      Hu0/3/0/0:24118      tt4000:24118          Ready
```

tt1018	Hu0/3/0/0:24119	tt4000:24119	Ready
tt1019	Hu0/3/0/0:24120	tt4000:24120	Ready
tt1020	Hu0/3/0/0:24121	tt4000:24121	Ready
tt1021	Hu0/3/0/0:24122	tt4000:24122	Ready
tt1022	Hu0/3/0/0:24123	tt4000:24123	Ready
tt1023	Hu0/3/0/0:24124	tt4000:24124	Ready
tt1024	Hu0/3/0/0:24125	tt4000:24125	Ready
tt1025	Hu0/3/0/0:24126	tt4000:24126	Ready
tt1026	Hu0/3/0/0:24127	tt4000:24127	Ready
tt1027	Hu0/3/0/0:24128	tt4000:24128	Ready
tt1028	Hu0/3/0/0:24129	tt4000:24129	Ready
tt1029	Hu0/3/0/0:24130	tt4000:24130	Ready
tt1030	Hu0/3/0/0:24131	tt4000:24131	Ready

This example shows the sample output of **show mpls traffic-eng fast-reroute database** command with LAG interface:

```
show mpls traffic-eng fast-reroute database
Sun Jun  7 18:45:12.640 UTC
Tunnel head FRR information:
Tunnel      Out Intf : Label    FRR Intf : Label    Status
-----
tt1         BE1:20010          tt3001:20010        Ready
tt2         BE1:20011          tt3001:20011        Ready
tt3         BE1:20012          tt3001:20012        Ready
tt4         BE1:20013          tt3001:20013        Ready
tt5         BE1:20014          tt3001:20014        Ready
tt6         BE1:20015          tt3001:20015        Ready
tt7         BE1:20016          tt3001:20016        Ready
tt8         BE1:20017          tt3001:20017        Ready
tt9         BE1:20018          tt3001:20018        Ready
tt10        BE1:20019          tt3001:20019        Ready
tt11        BE1:20020          tt3001:20020        Ready
tt12        BE1:20021          tt3001:20021        Ready
tt13        BE1:20022          tt3001:20022        Ready
tt14        BE1:20023          tt3001:20023        Ready
tt15        BE1:20024          tt3001:20024        Ready
tt16        BE1:20025          tt3001:20025        Ready
tt17        BE1:20026          tt3001:20026        Ready
tt18        BE1:20027          tt3001:20027        Ready
tt19        BE1:20028          tt3001:20028        Ready
tt20        BE1:20029          tt3001:20029        Ready
```

# show mpls traffic-eng fast-reroute log

To display the log of MPLS FRR events, use the **show mpls traffic-eng fast-reroute log** command in the EXEC mode.

**show mpls traffic-eng fast-reroute log**

**Syntax Description** This command has no keywords or arguments.

**Command Default** None

**Command Modes** EXEC

Command History	Release	Modification
	Release 6.5.3.1	This command was introduced.

**Usage Guidelines** No specific usage guidelines.

Task ID	Task ID	Operation
	mpls-te	read

## Example

This example shows how to use the **show mpls traffic-eng fast-reroute log** command:

```
show mpls traffic-eng fast-reroute log
Sun Jun  7 18:47:48.643 UTC
```

Location	Protected Interface	When	Switching Time (usec)
0/RP0	BE1	Jun  7 18:47:43.371781	0

# show mpls traffic-eng forwarding tunnels

To display the forwarding information of tunnels, use the **show mpls traffic-eng forwarding tunnels** command in EXEC mode.

**show mpls traffic-eng forwarding tunnels** [*tunnel-id*] [**detail** ]

<b>Syntax Description</b>	<i>tunnel-id</i> Tunnel identification number. Displays forwarding information for the specified tunnel-id.				
	<b>detail</b> Displays tunnel information in detail.				
<b>Command Default</b>	None				
<b>Command Modes</b>	EXEC				
<b>Command History</b>	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 6.1.42</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 6.1.42	This command was introduced.
Release	Modification				
Release 6.1.42	This command was introduced.				
<b>Usage Guidelines</b>	No specific usage guidelines.				
<b>Task ID</b>	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>mpls-te</td> <td>read</td> </tr> </tbody> </table>	Task ID	Operation	mpls-te	read
Task ID	Operation				
mpls-te	read				

## Example

This example show how to use the **show mpls traffic-eng forwarding tunnels** command with the **detail** keyword:

```

Tunnel          Outgoing    Outgoing    Next Hop    Bytes
Name           Label       Interface               Switched
-----
tt1000         24201       Hu0/3/0/0   3.46.1.2    0
    Updated: Jan  7 16:35:00.454
    Version: 108324, Priority: 2
    Label Stack (Top -> Bottom): { 24201 }
    Local Label: 24184
    NHID: 0x0, Encap-ID: N/A, Path idx: 0, Backup path idx: 0, Weight: 0
    MAC/Encaps: 14/18, MTU: 1500
    Packets Switched: 0

Interface Name: tunnel-te1000, Interface Handle: 0x0800002c, Local Label: 24184
Forwarding Class: 0, Weight: 0
Packets/Bytes Switched: 0/0

```

```
show mpls traffic-eng forwarding tunnels
```