

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

percentage	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 *minimum bandwidth*	(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 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*

Syntax Description

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

Command Default

minutes : 1440 (24 hours)

Command Modes

MPLS-TE automatic bandwidth interface configuration

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operations
mpls-te	read, write

Examples

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

```
RP/0/RP0: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)# application 1000
```

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 *bandwidth*	Configures the minimum automatic bandwidth, in kbps, on a tunnel. The range is from 0 to 4294967295. The default is 0.
max *bandwidth*	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.
internal	Clears all the automatic bandwidth internal data structures.
tunnel-te *tunnel-number*	Clears the automatic bandwidth sampled output rates for a specific tunnel. The *tunnel-number* 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  Last appl  Requested  Signalled    Highest    Application
            Name     ID   BW(kbps)   BW(kbps)   BW(kbps)   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  Rewrites When                   Switching Time
           Interface                                          (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*

Syntax Description

ip-address	Destination address of the MPLS-TE router ID.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
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.

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: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:

```
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.
tunnel-te *tunnel-number*	Applies the highest bandwidth instantly to the specified tunnel. The range is from 0 to 65535.

Command Default

No default behavior or values

Command Modes

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 configurtion 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

Syntax Description

Command Default

Command Modes

Command History

Release	Modification

Usage Guidelines

Task ID

Task ID	Operation

Example

r-mpls-te-reroute

Syntax Description

Command Default

Command Modes

Command History

Release	Modification

Usage Guidelines

Task ID

Task ID	Operation

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

percentage	Bandwidth change percent to trigger an overflow. The range is from 1 to 100.
min *bandwidth*	(Optional) Configures the bandwidth change value, in kbps, to trigger an overflow. The range is from 10 to 4294967295. The default is 10.
limit *limit*	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
```

```
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

preference-priority	Path option number. Range is from 1 to 1000.
protecting *number*	Specifies a path setup option to protect a path. The 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 *path-name*	Specifies the path name of the IP explicit path.
identifier *path-number*	Specifies a path number of the IP explicit path.
protected-by *path-option-level*	(Optional) Configures path protection for an explicit path that is protected by another explicit path.
isis *instance-name*	(Optional) Limits CSPF to a single IS-IS instance and area.
attribute-set *name*	(Optional) Specifies the attribute set for the LSP.
level *level*	Configures the level for IS-IS. The range is from 1 to 2.
lockdown	(Optional) Specifies that the LSP cannot be reoptimized.
sticky	(Optional) Extended version of lockdown. LSP stays on the same path after change in resources. **Note** The sticky option can be configured only on the primary path option.
ospf *instance-name*	(Optional) Limits CSPF to a single OSPF instance and area.
area	Configures the area for OSPF.

value	Decimal value for the OSPF area ID.
address	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 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*

Syntax Description

cost-limit	Configures the path-selection cost-limit value. The range is from 1 to 4294967295.

Command Default

None

Command Modes

Global configuration

Interface tunnel TE configuration

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

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

tunnel-id	Tunnel identification number. Range is from 0 to 65535.
detail	Displays detailed information for the specified tunnel-id.
tabular	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)
```

```
    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         50      2h 5m
  tunnel-te1      5          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              When                    Switching Time
         Interface                                          (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**]

Syntax Description

tunnel-id	Tunnel identification number. Displays forwarding information for the specified tunnel-id.
detail	Displays tunnel information in detail.

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 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 pce ipv4

To display the status of the path computation element (PCE) peer, prefix, tunnel, or topology, use the **show pce ipv4** command in EXEC mode.



Note This command should be run for NCS 5500.

show pce ipv4 { **peer** | **topology** [**summary**] }

Syntax Description

peer	Displays the PCE peer database.
topology	Displays detailed PCE topology information.
summary	Displays a summary of the PCE topology information.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.31	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation

Example

This example shows how to display the PCE peer information:

```
RP/0/RP0/CPU0:NCS5500-10#show pce ipv4 peer
PCE's peer database:
--------------------
Peer address: 198.51.100.1
  State: Up
  Capabilities: Stateful, Update, Instantiation
RP/0/RP0/CPU0:NCS5500-10#show pce lsp tabular
PCC               Tunnel Name   Color   Source          Destination    TunID  LSPID  Admin
  Oper
198.51.100.1       PCEP-TEST       0     198.51.100.1     198.51.100.3   00     141    up
    up  □ Manual
198.51.100.1       m1              0     198.51.100.1     198.51.100.3   5000   8      up
    up  □ PCE Initiated (CURL)
```

This example shows how to display summary of the PCE topology information:

```
RP/0/RP0/CPU0:NCS5500-10#show pce ipv4 topology summary
PCE's topology database summary:
--------------------------------
Topology nodes:                4
Prefixes:                      4
Prefix SIDs:
  Total:                       0
  Regular:                     0
  Strict:                      0
Links:
  Total:                       8
  EPE:                         0
Adjacency SIDs:
  Total:                       0
  Unprotected:                 0
  Protected:                   0
  EPE:                         0
Private Information:
Lookup Nodes                   4
Consistent                   yes
Update Stats (from IGP and/or BGP):
  Nodes added:                 4
  Nodes deleted:               0
  Links added:                11
  Links deleted:               3
  Prefix added:               12
  Prefix deleted:              0
Topology Ready Summary:
  Ready:                     yes
  PCEP allowed:              yes
  Last HA case:          startup
  Timer value (sec):         300
  Timer:
    Running: no
```

show pce lps

To display the detailed information of an LSP present in the PCE's LSP database, in table format, use the **show pce lps** command in EXEC mode.



Note This command should be run for NCS 5500.

show pce lps { **tabular** }

Syntax Description

tabular	Displays lsp information in table-format.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.31	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation

Example

This example shows how to display the lsp information:

```
RP/0/RP0/CPU0:NCS5500-10#show pce lsp tabular
Tue Feb 9 11:14:08.858 UTC
PCC           TunnelName      Color  Source      Destination  TunID  LSPID  Admin Oper
198.51.100.1  NCS4016-1_t1000   0   198.51.100.1 198.51.100.2 1000   10     up    up
198.51.100.1  NCS4016-1_t300    0   198.51.100.1 198.51.100.2 300    6      up    up
198.51.100.1  m                 0   198.51.100.1 198.51.100.2 5000   3      up    up
198.51.100.1  mapm1             0   198.51.100.1 198.51.100.2 5003   3      up    up
198.51.100.1  te99              0   198.51.100.1 198.51.100.2 5002   4      up    up
198.51.100.1  tunnel-te500      0   198.51.100.1 198.51.100.2 5001   3      up    up
```

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 XR EXEC mode.

show mpls traffic-eng pce peer

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 6.5.31	This command was introduced.

Usage Guidelines

No specific usage guidelines.

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:NCS4016-1#show mpls tr pce peer
Address          Precedence    State         Learned From
---------------- ------------ ------------ --------------------
203.0.113.1        10           Up           Static config
RP/0/RP0:NCS4016-1#show mpls tr pce lsp-database brief
PCE ID Tun ID LSP ID Symbolic-name  Destination     State Type DLG
------ ------ ------ -------------------- --------------- ----- ---- ---
301    300    130    PCEP-TEST     198.51.100.3        Up    Conf yes *Manual + PCE Delegated
5001    5000   8      m1        198.51.100.3        Up    Init yes . .Curl or PCE Initiated
• CURL COMMAND INITIATED TUNNEL
*Manually CONFIGURED under HEADEND Node (Tunnel-te 300)\
```

show mpls traffic-eng pce lsp-database

To display information about all LSPs and their attributes, use the **show mpls traffic-eng pce lsp-database** command in EXEC mode XR EXEC mode.

show mpls traffic-eng pce lsp-database

Syntax Description This command has no keywords or arguments.

Command Default None

Command Modes EXECXR EXEC

Command History

Release	Modification
Release 6.5.31	This command was introduced.

Usage Guidelines No specific usage guidelines.

Task ID

Task ID	Operation
mpls-te	read

Example

The following shows a sample output for the **show mpls traffic-eng pce lsp-database** command:

```
RP/0/RP0:NCS4016-1#show mpls tr pce lsp-database symbolic-name PCEP-TEST detail
Thu Jul 30 16:50:05.121 IST
Symbolic name: PCEP-TEST
Session internal LSP ID: 301
Stateful Request Parameters ID: 0
Path Setup Type: 0 - (RSVP)
Request queue size: 0
Create: FALSE
    Created by: Not set
Delegatable: TRUE
    Delegation status: Delegated
    Delegated to: Speaker-entity-id: Not set ip: 203.0.113.1
Destination: 198.51.100.3    Source: 198.51.100.1
LSP Object:
    Administrative: Up
    Operational state: Up
    Identifiers:
        Sender Address: 198.51.100.1
        TE LSP ID: 141
        Tunnel ID: 300
        Extended tunnel ID: 0x3030303
    Binding SID: 24012
LSP Path Object:
    Explicit Route Object:
        Cost: 0
```

```
        1.  ipv4: 209.165.200.4/32 (strict)
        2.  ipv4: 51.0.0.2/32 (strict)
LSP Attributes:
        Exclude any: 0
        Include any: 0
        Include all: 0
        Setup priority: 7
        Hold priority: 7
        Local Protection Bit: TRUE
    Reported Route Object:
        Cost: 0
        1.  ipv4: 198.51.100.2/32
        2. label: 26004 (global)
        3.  ipv4: 209.165.200.4/32
        4. label: 26004 (global)
        5.  ipv4: 198.51.100.3/32
        6. label: 0 (global)
        7.  ipv4: 51.0.0.2/32
        8. label: 0 (global)
    Bandwidth:  0 Bps (0 kbps)
    Reoptimized bandwidth: Not set
    Applied bandwidth: Not set
    Metric:
        Cost: 20        Type: IGP
    Vendor Specific Information:
        Forward-Class: Not set
        Load Share: Not set
        Backup path: Not set
```