



mpls static binding ipv4 vrf through mpls traffic-eng logging tunnel

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mpls static binding ipv4 vrf

To bind a prefix to a local label, use the **mpls static binding ipv4 vrf** command in global configuration mode. To remove static binding between the prefix and label, use the **no** form of this command.

```
mpls static binding ipv4 vrf vpn-name prefix mask [input labellabel]
no mpls static binding ipv4 vrf vpn-name prefix mask [input labellabel]
```

Syntax Description

| | |
|---------------------------|-----------------------------------------------------------------------------------------------|
| <i>vpn-name</i> | The VPN routing and forwarding (VRF) instance. |
| <i>prefix mask</i> | The destination prefix and mask. |
| input <i>label</i> | A local (incoming) label. This argument is optional for the no form of the command. |
| <i>label</i> | A local label. This argument is optional for the no form of the command. |

Command Default

Label bindings are dynamically assigned.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|---------------------------|-------------------------------------------------------------------|
| 12.0(26)S | This command was introduced. |
| 12.3(14)T | This command was integrated into Cisco IOS Release 12.3(14)T. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 12.2(33)SB | This command was integrated into Cisco IOS Release 12.2(33)SB. |
| Cisco IOS XE Release 2.1 | This command was integrated into Cisco IOS XE Release 2.1. |
| Cisco IOS XE Release 3.5S | This command was implemented on the Cisco ASR 903 series routers. |

Usage Guidelines

The **mpls static binding ipv4 vrf** command is used only when you configure input labels.

Depending on how you configure the MPLS LDP VRF-Aware Static Labels feature, static labels are advertised one of the following ways:

- By Label Distribution Protocol (LDP) between provider edge (PE) and customer edge (CE) routers within a VRF instance.
- In VPNv4 Border Gateway Protocol (BGP) in the service provider's backbone.

If you do not specify the **input** keyword, an input (local) label is assumed.

The **no** form of the command functions as follows:

- Omitting the prefix and the subsequent parameters removes all static bindings.
- Specifying the prefix and mask but no label parameters removes all static bindings for that prefix or mask.

Examples

The following example binds a prefix to local label 17:

```
Router(config)# mpls static binding ipv4 vrf vpn100 10.66.0.0 255.255.0.0 input 17
```

Related Commands

| Command | Description |
|------------------------------------------|--------------------------------------|
| show mpls static binding ipv4 vrf | Displays configured static bindings. |

mpls static crossconnect

To configure a Label Forwarding Information Base (LFIB) entry for the specified incoming label and outgoing interface, use the **mpls static crossconnect** command in global configuration mode. To remove the LFIB entry, use the **no** form of this command.

```
mpls static crossconnect inlabel out-interface nexthop {outlabel | explicit-null | implicit-null}
no mpls static crossconnect inlabel out-interface nexthop {outlabel | explicit-null | implicit-null}
```

Syntax Description

| | |
|----------------------|-------------------------------------------------------------------------------------------------------------------------|
| <i>inlabel</i> | The incoming label. |
| <i>out-interface</i> | The outgoing interface. |
| <i>nexthop</i> | The destination next hop router. (Use for multiaccess interfaces only.) |
| <i>outlabel</i> | The outgoing label. |
| explicit-null | Specifies the Internet Engineering Task Force (IETF) Multiprotocol Label Switching (MPLS) IPv4 explicit null label (0). |
| implicit-null | Specifies the IETF MPLS implicit null label (3). |

Command Default

Cross connects are not created.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|-------------|-----------------------------------------------------------------|
| 12.0(23)S | This command was introduced. |
| 12.3(14)T | This command was integrated into Cisco IOS Release 12.3(14)T. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 12.2(33)SB | This command was integrated into Cisco IOS Release 12.2(33)SB. |

Usage Guidelines

You must specify the next hop address for multiaccess interfaces.

Examples

In the following example, the **mpls static crossconnect** command configures a cross connect from incoming label 45 to outgoing label 46 through POS interface POS5/0:

```
Router(config)# mpls static crossconnect 45 pos5/0 46
```

Related Commands

| Command | Description |
|--------------------------------------|----------------------------------------------|
| show mpls static crossconnect | Displays statically configured LFIB entries. |

mpls tp

To configure Multiprotocol Label Switching (MPLS)-Transport Profile (TP) parameters and enter MPLS-TP configuration mode, use the **mpls tp** command in global configuration mode. To remove all MPLS-TP forwarding, use the **no** form of this command.

mpls tp
no mpls tp

Syntax Description This command has no arguments or keywords.

Command Default No MPLS-TP parameters are configured.

Command Modes Global configuration (config)

| Release | Modification |
|-----------|--------------------------------------------------------------|
| 15.1(1)SA | This command was introduced. |
| 15.1(3)S | This command was integrated into Cisco IOS Release 15.1(3)S. |

Usage Guidelines Use this command to enter MPLS-TP configuration mode. From that mode, you can configure the parameters listed in the table below.

Table 1: Parameters for mpls tp Command

| Command | Parameter |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fault-oam refresh-timer <i>secs</i> | (Optional) Specifies the maximum time between successive fault Operation, Administration, and Maintenance (OAM) messages, specified in seconds. The range is from 1 to 20. The default is 5. |
| global-id <i>num</i> | (Optional) Specifies the default global ID used for all endpoints and midpoints. The range is from 0 to 2147483647. The default is 0. This command makes the router ID globally unique in a multiprovider tunnel. Otherwise, the router ID is only locally meaningful. The global ID is an autonomous system number, which is a controlled number space by which providers can identify each other. |

| Command | Parameter |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| protection trigger [ais ldi lkr] | <p>(Optional) Specifies protection triggers for alarm indication signal (AIS), link down indication (LDI), lock report (LKR) messages.</p> <p>These triggers should be used in rare cases. They allow you to change the default protection-switching behavior for fault notifications on all tunnels. The default for these global settings is to trigger protection on receipt of LDI and LKR, but not AIS. (AIS is a nonfatal indication of potential issues, which turns into LDI when it is known to be fatal.)</p> <p>This command is useful when other devices send AIS or LDI in unexpected ways. For example, you can configure the protection trigger ais command to interoperate with another vendor whose devices send AIS when there are link failures and never send AIS with the LDI flag.</p> <p>Another example is if a device sends LDI when there is no actual failure, but there is a possible failure, and you want bidirectional forwarding detection (BFD) to detect the actual failure and cause protection switching, you can configure the no protection trigger ldi command.</p> <p>To undo these configuration settings and revert to the default settings, use the default protection trigger [ais ldi lkr] command.</p> |
| router-id <i>router-id</i> | <p>(Required) Specifies the default MPLS-TP router ID, which is used as the source node ID for all MPLS-TP tunnels configured on the router. This is required for MPLS-TP forwarding.</p> <p>This router ID is used in fault OAM messaging to identify the source of a fault on a midpoint router.</p> |
| wtr-timer | Specifies the wait-to-restore (WTR) timer. This timer controls the length of time to wait before reversion following the repair of a fault on the original working path. |

Examples

The following example shows how to enter MPLS-TP configuration mode and set the default router ID:

```
Router(config)# mpls tp
Router(config-mpls-tp)# router-id 10.10.10.10
Router(config-mpls-tp)# exit
```

Related Commands

| Command | Description |
|----------------------------|---------------------------------------------------------------------------------|
| interface tunnel-tp | Specifies the parameters for a MPLS tunnel. |
| mpls tp lsp | Specifies parameters for two ends of the MPLS-TP tunnel from a tunnel midpoint. |
| psc | Enables PSC. |
| working-lsp | Enters working LSP mode on a TP tunnel interface. |

mpls tp link

To configure Multiprotocol Label Switching (MPLS) transport profile (TP) link parameters, use the **mpls tp link** command in interface configuration mode.

```
mpls tp link link-num {ipv4 ip-address | tx-mac mac-address} rx-mac mac-address
no mpls tp link link-num
```

Syntax Description

| | |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>link-num</i> | Number assigned to the link. It must be unique on the device. Only one link number can be assigned per interface. Range: 1 to 2147483647. |
| ipv4 <i>ip-address</i> | The next-hop address that Address Resolution Protocol (ARP) uses to discover the destination MAC address. |
| tx-mac <i>mac-address</i> | Specifies a per-interface transmit multicast MAC address. This keyword is available on point-to-point Ethernet interfaces and non point-to-point interfaces where the MAC address is a unicast address. It is not available on serial interfaces. |
| rx-mac <i>mac-address</i> | Specifies a per-interface receive multicast MAC address. This keyword is available only when the tx-mac keyword is used. It is not available on serial interfaces. |

Command Default

No MPLS-TP link parameters are configured.

Command Modes

Interface configuration (config-if)

Command History

| Release | Modification |
|-----------|------------------------------|
| 15.1(1)SA | This command was introduced. |
| 15.1(3)S | This command was integrated. |

Usage Guidelines

The link number must be unique on the device. Only one link number can be assigned per interface.

MPLS-TP link numbers may be assigned to physical interfaces only. Bundled interfaces and virtual interfaces are not supported for MPLS-TP link numbers.

When an MPLS-TP link is configured without an IP address on an Ethernet interface, Cisco uses an IEEE Bridge Group MAC address (0180.c200.0000) for communication by default.

Examples

This example creates an MPLS-TP link without an IP address:

```
interface e0/0
  medium p2p
  mpls tp link 1
```

This example configures the unicast MAC address of the next-hop device:


```
interface e0/0
  medium p2p
  mpls tp link 1 tx-mac 0000.0c00.1234
```

This example configures transmit and receive parameters for a different multicast address:

```
interface e0/0
  medium p2p
  mpls tp link 1 tx-mac 0100.0c99.8877 rx-mac 0100.0c99.8877
```

This example configures a link with an IP address:

```
interface e0/0
  ip address 10.0.0.1 255.255.255.0
  mpls tp link 1 ipv4 10.0.0.2
```

Related Commands

| Command | Description |
|----------------------------|----------------------------------------------------------------------------------|
| mpls tp lsp | Specifies the parameters for forwarding of a MPLS-TP LSP at the tunnel midpoint. |
| interface tunnel-tp | Specifies the parameters for the MPLS tunnel. |

mpls tp lsp

To configure Multiprotocol Label Switching (MPLS) transport profile (TP) midpoint connectivity, use the **mpls tp lsp** command in global configuration mode.

mpls tp lsp source *node-id* [**global-id** *num*] **tunnel-tp** *num* **lsp** {*lsp-num* | **protect** | **working**}
destination *node-id* [**global-id** *num*] **tunnel-tp** *num*

Syntax Description

| | |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| source <i>node-id</i> | Specifies the source node ID of the MPLS-TP tunnel. |
| global-id <i>num</i> | (Optional) Specifies the global ID of the tunnel source. |
| tunnel-tp <i>num</i> | Specifies the tunnel-TP number of MPLS-TP tunnel source. |
| lsp { <i>lsp-num</i> protect working } | Specifies the label switched path (LSP) within the MPLS-TP tunnel. <ul style="list-style-type: none"> • <i>lsp-num</i>— the number of the LSP. • protect— Indicates that the LSP is a backup for the primary, or working, LSP. When you specify the protect keyword, the LSP number is 1. • working—Indicates that the LSP is the primary LSP. When you specify the working keyword, the LSP number is 0. <p>A protect LSP is a backup for a working LSP. When the working LSP fails, traffic is switched to the protect LSP until the working LSP is restored, at which time forwarding reverts back to the working LSP.</p> |
| destination <i>node-id</i> | Specifies the destination node ID of the MPLS-TP tunnel. |
| global-id <i>num</i> | (Optional) Specifies the global ID of the tunnel destination. Range: 0 to 2147483647 Default: 0. |
| tunnel-tp <i>num</i> | Specifies the tunnel number of MPLS-TP tunnel destination. |

Command Default

No MPLS-TP parameters are configured.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|-----------|------------------------------|
| 15.1(1)SA | This command was introduced. |
| 15.1(3)S | This command was integrated. |

Usage Guidelines

Use this command on midpoint routers to specify the source and destination parameters of the MPLS-TP tunnel. You can use the **mpls trace** command from the MPLS-TP endpoint to validate that traffic is traversing the correct tunnel at each midpoint.

This command also enters MPLS-TP LSP configuration mode (config-mpls-tp-lsp). From that mode, you can configure the following parameters:

| Command | Parameter |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| forward-lsp | Enters MPLS-TP LSP forward LSP configuration mode (config-mpls-tp-lsp-forw). From this mode, you can configure the following parameters: <ul style="list-style-type: none"> • Bandwidth (bandwidth) • Incoming label (in-label) and outgoing label and link numbers (out-label out-link) |
| reverse-lsp | Enters MPLS-TP LSP reverse LSP configuration mode (config-mpls-tp-lsp-rev). From this mode, you can configure the following parameters: <ul style="list-style-type: none"> • Bandwidth (bandwidth) • Incoming label (in-label) and outgoing label and link numbers (out-label out-link) |
| tunnel-name <i>name</i> | Specifies the name of the MPLS-TP tunnel. |

Examples

The following examples show the configuration of an MPLS-TP LSP midpoint.

The following example configures a midpoint LSP carrying the working LSP of an MPLS-TP tunnel between node 10.10.10.10, tunnel-number 1 and 10.11.11.11, tunnel-number 2, using 1000 kbits/sec bandwidth in both directions:

```
Router(config)# mpls tp lsp source 10.10.10.10 tunnel-tp 1 lsp working destination 10.11.11.11
tunnel-tp 2
Router(config-mpls-tp-lsp)# forward-lsp
Router(config-mpls-tp-lsp-forw)# bandwidth 1000
Router(config-mpls-tp-lsp-forw)# in-label 20 out-label 40 out-link 10
Router(config-mpls-tp-lsp-forw)# exit
Router(config-mpls-tp-lsp)# reverse-lsp
Router(config-mpls-tp-lsp-rev)# bandwidth 1000
Router(config-mpls-tp-lsp-rev)# in-label 21 out-label 50 out-link 11
```

The following example configures a midpoint LSP on the protect LSP between node 10.10.10.10, tunnel 4 and 10.11.11.11, tunnel 12. No bandwidth is reserved:

```
Router(config)# mpls tp lsp source 10.10.10.10 global-id 2 tunnel-tp 4 lsp protect destination
10.11.11.11 global-id 14 tunnel-tp 12
Router(config-mpls-tp-lsp)# forward-lsp
Router(config-mpls-tp-lsp-forw)# in-label 30 out-label 100 out-link 27
Router(config-mpls-tp-lsp-forw)# exit
Router(config-mpls-tp-lsp)# reverse-lsp
Router(config-mpls-tp-lsp-rev)# in-label 31 out-label 633 out-link 30
```

Related Commands

| Command | Description |
|------------------------|--------------------------------------------------|
| interface tunnel-tp | Specifies the parameters for the MPLS-TP tunnel. |

| Command | Description |
|----------------|----------------------------------------------------------------------------------------|
| mpls tp | Specifies the parameters for the MPLS-TP tunnel and enters MPLS-TP configuration mode. |
| mpls tp link | Specifies MPLS-TP link parameters. |

mpls traffic-eng

To configure a router running Intermediate System-to-Intermediate System (IS-IS) so that it floods Multiprotocol Label Switching (MPLS) traffic engineering (TE) link information into the indicated IS-IS level, use the **mpls traffic-eng** command in router configuration mode. To disable the flooding of MPLS TE link information into the indicated IS-IS level, use the **no** form of this command.

```
mpls traffic-eng {level-1 | level-2}
no mpls traffic-eng {level-1 | level-2}
```

Syntax Description

| | |
|----------------|-----------------------------------------------------|
| level-1 | Floods MPLS TE link information into IS-IS level 1. |
| level-2 | Floods MPLS TE link information into IS-IS level 2. |

Command Default

Flooding is disabled.

Command Modes

Router configuration (config-router)

Command History

| Release | Modification |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.0(5)S | This command was introduced. |
| 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |
| 12.2(33)SCA | This command was integrated into Cisco IOS Release 12.2(33)SCA. |
| 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Usage Guidelines

This command, which is part of the routing protocol tree, causes link resource information (such as available bandwidth) for appropriately configured links to be flooded in the IS-IS link-state database.

Examples

The following example shows how to configure MPLS TE link information flooding for IS-IS level 1:

```
Router(config-router)# mpls traffic-eng level-1
```

Related Commands

| Command | Description |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| mpls traffic-eng router-id | Specifies that the traffic engineering router identifier for the node is the IP address associated with a given interface. |

mpls traffic-eng administrative-weight

To override the Interior Gateway Protocol (IGP) administrative weight (cost) of the link, use the **mpls traffic-eng administrative-weight** command in interface configuration mode. To disable the override, use the **no** form of this command.

```
mpls traffic-eng administrative-weight weight
no mpls traffic-eng administrative-weight
```

| | |
|---------------------------|---------------------------------|
| Syntax Description | <i>weight</i> Cost of the link. |
|---------------------------|---------------------------------|

| | |
|------------------------|------|
| Command Default | None |
|------------------------|------|

| | |
|----------------------|-------------------------------------|
| Command Modes | Interface configuration (config-if) |
|----------------------|-------------------------------------|

| Command History | Release | Modification |
|------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |
| | 12.2(33)SCA | This command was integrated into Cisco IOS Release 12.2(33)SCA. |

Examples

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

```
Router(config-if)# mpls traffic-eng administrative-weight 20
```

| Related Commands | Command | Description |
|-------------------------|-----------------------------------------|-----------------------------------------------------------|
| | mpls traffic-eng attribute-flags | Sets the user-specified attribute flags for an interface. |

mpls traffic-eng area

To configure a router running Open Shortest Path First (OSPF) Multiprotocol Label Switching (MPLS) so that it floods traffic engineering for the indicated OSPF area, use the **mpls traffic-eng area** command in router configuration mode. To disable flooding of traffic engineering for the indicated OSPF area, use the **no** form of this command.

mpls traffic-eng area *number*
no mpls traffic-eng area *number*

| | | |
|---------------------------|---------------|-------------------------------------------------------------|
| Syntax Description | <i>number</i> | The OSPF area on which MPLS traffic engineering is enabled. |
|---------------------------|---------------|-------------------------------------------------------------|

Command Default Flooding is disabled.

Command Modes Router configuration (config-router)

| Command History | Release | Modification |
|------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |
| | Cisco IOS XE Release 2.3 | This command was integrated into Cisco IOS XE Release 2.3. |

Usage Guidelines This command is in the routing protocol configuration tree and is supported for both OSPF and IS-IS. The command affects the operation of MPLS traffic engineering only if MPLS traffic engineering is enabled for that routing protocol instance. Currently, only a single level can be enabled for traffic engineering.

Examples The following example shows how to configure a router running OSPF MPLS to flood traffic engineering for OSPF 0:

```
Router(config-router)# mpls traffic-eng area 0
```

| Related Commands | Command | Description |
|-------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng router-id | Specifies that the traffic engineering router identifier for the node is the IP address associated with a given interface. |
| | network area | Defines the interfaces on which OSPF runs and defines the area ID for those interfaces. |

| Command | Description |
|-------------|-------------------------------------------------|
| router ospf | Configures an OSPF routing process on a router. |

mpls traffic-eng atm cos global-pool



Note Effective with Cisco IOS Release 12.4(20)T, the **mpls traffic-eng atm cos global-pool** command is not available in Cisco IOS software.

To specify the class of service for all global pools in traffic engineering tunnels traversing XTagATM interfaces on an ATM-label switch router (LSR), use the **mpls traffic-eng atm cos global-pool** command in global configuration mode.

mpls traffic-eng atm cos global-pool [{available | standard | premium | control}]

Syntax Description

available | **standard** | **premium** | **control**

(Optional) Four classes of service, ordered from lowest priority (**available**) to highest priority (**control**). The default is **available**.

Command Default

The default class is the lowest, **available**.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|-----------|------------------------------|
| 12.2(8)T | This command was introduced. |
| 12.4(20)T | This command was removed. |

Usage Guidelines

Because this command works at the global rather than at the interface level, it sets the same class of service for global pool traffic engineering (TE) tunnel traffic on *all* XTagATM interfaces of the device.

Examples

The following example shows how to specify the second-lowest possible priority class of service for the global pool traffic:

```
Router(config)# mpls traffic-eng atm cos global-pool standard
```

Related Commands

| Command | Description |
|------------------------------------------|-------------------------------------------------------------------------------|
| mpls traffic-eng atm cos sub-pool | Specifies class of service for subpool traffic traversing XtagATM interfaces. |

mpls traffic-eng atm cos sub-pool



Note Effective with Cisco IOS Release 12.4(20)T, the **mpls traffic-eng atm cos sub-pool** command is not available in Cisco IOS software.

To specify the class of service for all subpools in traffic engineering tunnels traversing XTagATM interfaces on an ATM-label switch router (LSR), use the **mpls traffic-eng atm cos sub-pool** command in global configuration mode.

mpls traffic-eng atm cos sub-pool [{**available** | **standard** | **premium** | **control**}]

Syntax Description

| | |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| available standard premium control | Four classes of service, ordered from lowest priority (available) to highest priority (control). The default is control . |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default

The default class is the highest, **control**.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|-----------|------------------------------|
| 12.2(8)T | This command was introduced. |
| 12.4(20)T | This command was removed. |

Usage Guidelines

Because this command works at the global rather than at the interface level, it sets the same class of service for subpool traffic engineering (TE) tunnel traffic on *all* XTagATM interfaces of the device.

Examples

The following example shows how to specify the second-highest possible priority class of service for the subpool traffic:

```
Router(config)# mpls traffic-eng atm cos sub-pool premium
```

Related Commands

| Command | Description |
|---------------------------------------------|-----------------------------------------------------------------------------------|
| mpls traffic-eng atm cos global-pool | Specifies class of service for global-pool traffic traversing XTagATM interfaces. |

mpls traffic-eng attribute-flags

To set the user-specified attribute flags for the interface, use the **mpls traffic-eng attribute-flags** command in interface configuration mode. To disable the user-specified attribute flags for the interface, use the **no** form of this command.

mpls traffic-eng attribute-flags *attributes*
no mpls traffic-eng attribute-flags

| | | |
|---------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <i>attributes</i> | Attributes that will be compared to a tunnel's affinity bits during selection of a path. Valid values are from 0x0 to 0xFFFFFFFF, representing 32 attributes (bits) where the value of an attribute is 0 or 1. |
|---------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default None

Command Modes Interface configuration (config-if)

| Command History | Release | Modification |
|------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |
| | 12.2(33)SCA | This command was integrated into Cisco IOS Release 12.2(33)SCA. |

Usage Guidelines This command assigns attributes to a link so that tunnels with matching attributes (represented by their affinity bits) prefer this link to others that do not match.

The interface is flooded globally so that it can be used as a tunnel head-end path selection criterion.

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

```
Router(config-if)# mpls traffic-eng attribute-flags 0x0101
```

| Related Commands | Command | Description |
|-------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng administrative-weight | Overrides the IGP administrative weight of the link. |
| | tunnel mpls traffic-eng affinity | Configures affinity (the properties that the tunnel requires in its links) for an MPLS traffic engineering tunnel. |

mpls traffic-eng auto-bw timers

To enable automatic bandwidth adjustment for a platform and to start output rate sampling for tunnels configured for automatic bandwidth adjustment, use the **mpls traffic-eng auto-bw timers** command in global configuration mode. To disable automatic bandwidth adjustment for the platform, use the **no** form of this command.

mpls traffic-eng auto-bw timers [*frequency seconds*]
no mpls traffic-eng auto-bw timers

Syntax Description

| | |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| frequency seconds | (Optional) Interval, in seconds, for sampling the output rate of each tunnel configured for automatic bandwidth. The range is 1 to 604800. The recommended value is 300. |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default

When the optional **frequency** keyword is not specified, the sampling interval is 300 seconds (5 minutes).

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|-------------|-----------------------------------------------------------------|
| 12.2(4)T | This command was introduced. |
| 12.2(11)S | This command was integrated into Cisco IOS Release 12.2(11)S. |
| 12.2(14)S | This command was integrated into Cisco IOS Release 12.2(14)S. |
| 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXI | This command was integrated into Cisco IOS Release 12.2(33)SXI. |

Usage Guidelines

The **mpls traffic-eng auto-bw timers** command enables automatic bandwidth adjustment on a platform by causing traffic engineering to periodically sample the output rate for each tunnel configured for bandwidth adjustment.

The **no mpls traffic-eng auto-bw timers** command disables automatic bandwidth adjustment for a platform by terminating the output rate sampling and bandwidth adjustment for tunnels configured for adjustment. In addition, the **no** form of the command restores the configured bandwidth for each tunnel where “configured bandwidth” is determined as follows:

- If the tunnel bandwidth was explicitly configured via the **tunnel mpls traffic-eng bandwidth** command after the running configuration was written (if at all) to the startup configuration, the "configured bandwidth" is the bandwidth specified by that command.
- Otherwise, the "configured bandwidth" is the bandwidth specified for the tunnel in the startup configuration.

Examples

The following example shows how to designate that for each Multiprotocol Label Switching (MPLS) traffic engineering tunnel, the output rate is sampled once every 10 minutes (every 600 seconds):

```
Router(config)# mpls traffic-eng auto-bw timers frequency 600
```

Related Commands

| Command | Description |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tunnel mpls traffic-eng auto-bw | Enables automatic bandwidth adjustment for a tunnel, specifies the frequency with which tunnel bandwidth can be automatically adjusted, and designates the allowable range of bandwidth adjustments. |
| tunnel mpls traffic-eng bandwidth | Configures bandwidth required for an MPLS traffic engineering tunnel. |

mpls traffic-eng auto-tunnel backup

To automatically build next-hop (NHOP) and next-next hop (NNHOP) backup tunnels, use the **mpls traffic-eng auto-tunnel backup** command in global configuration mode. To delete the NHOP and NNHOP backup tunnels, use the **no** form of this command.

mpls traffic-eng auto-tunnel backup
no mpls traffic-eng auto-tunnel backup

Syntax Description This command has no arguments or keywords.

Command Default No backup tunnels exist.

Command Modes Global configuration (config)

| Release | Modification |
|---------------------------|----------------------------------------------------------------------------------------------------------------|
| 12.0(27)S | This command was introduced. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| 15.2(2)S | This command was modified. The usage guidelines changed on hardware that supports dual Route Processors (RPs). |
| Cisco IOS XE Release 3.6S | This command was modified. The usage guidelines changed on hardware that supports dual RPs. |
| 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Usage Guidelines The **no** form of this command deletes both NHOP and NNHOP backup tunnels that were configured using either the **mpls traffic-eng auto-tunnel backup** command or the **mpls traffic-eng auto-tunnel backup nhop-only** command.

On hardware that supports dual RPs, once this command is enabled, the tunnel is created on both the active and the standby RPs. When the **no** form of the command is executed, the tunnel is deleted on both the active and the standby RPs.

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

```
Router(config)# mpls traffic-eng auto-tunnel backup
```

Related Commands

| Command | Description |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| mpls traffic-eng auto-tunnel backup config | Enables IP processing without an explicit address. |
| mpls traffic-eng auto-tunnel backup nhop-only | Enables the creation of only dynamic next-hop backup tunnels. |
| mpls traffic-eng auto-tunnel backup timers | Configures how frequently a timer will scan backup autotunnels and remove tunnels that are not being used. |
| mpls traffic-eng auto-tunnel backup tunnel-num | Configures the range of tunnel interface numbers for backup autotunnels. |

mpls traffic-eng auto-tunnel backup config

To configure a specific unnumbered interface for all backup auto-tunnels, use the **mpls traffic-eng auto-tunnel backup config** command in global configuration mode. To remove the specific interface and resume the default interface for all backup auto-tunnels, use the **no** form of this command.

```
mpls traffic-eng auto-tunnel backup config unnumbered-interface interface
no mpls traffic-eng auto-tunnel backup config unnumbered-interface
```

| | | |
|---------------------------|----------------------------------------------|------------------------------------------------------------|
| Syntax Description | unnumbered-interface <i>interface</i> | Interface for all backup auto-tunnels. Default: Loopback0. |
|---------------------------|----------------------------------------------|------------------------------------------------------------|

Command Default Loopback0

Command Modes Global configuration (config)

| Command History | Release | Modification |
|------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | 15.1(1)S | This command was modified. In Cisco IOS Release 15.1(1)S, this command changed so that you do not need to specify the interface name when you specify the no form of this command. In releases prior to 15.1(1)S, you had to specify the interface name as part of the no form of the command. |
| | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Usage Guidelines In Cisco IOS Release 15.1(1)S, this command changed so that you do not need to specify the interface name when you specify the **no** form of this command. In release prior to 15.1(1)S, you had to specify the interface name as part of the **no** form of the command. If you upgrade to Cisco IOS Release 15.1(1)S, check that your configuration does not contain the interface name as part of the **mpls traffic-eng auto-tunnel backup config** command.

Examples

The following example assigns interface Ethernet 1/0 to all backup auto-tunnels:

```
Router# mpls traffic-eng auto-tunnel backup config unnumbered-interface ethernet1/0
```

The following example assigns the default interface of loopback0 to all backup auto-tunnels:

```
Router# no
mpls traffic-eng auto-tunnel backup config unnumbered-interface
```


Related Commands

| Command | Description |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| mpls traffic-eng auto-tunnel backup | Automatically builds NHOP and NNHOP backup tunnels. |
| mpls traffic-eng auto-tunnel backup nhop-only | Enables the creation of only dynamic next-hop backup tunnels. |
| mpls traffic-eng auto-tunnel backup timers | Configures how frequently a timer will scan backup autotunnels and remove tunnels that are not currently being used. |
| mpls traffic-eng auto-tunnel backup tunnel-num | Configures the range of tunnel interface numbers for backup autotunnels. |

mpls traffic-eng auto-tunnel backup config affinity

To specify an affinity on dynamically created Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) backup tunnels, use the **mpls traffic-eng auto-tunnel backup config affinity** command in global configuration mode. To return to the default values, use the **no** form of the command.

mpls traffic-eng auto-tunnel backup config affinity *affinity-value* [**mask** *mask-value*]
no mpls traffic-eng auto-tunnel backup config affinity

Syntax Description

| | |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>affinity-value</i> | Values that will be compared to the link attributes during selection of a path. Valid values are from 0x0 to 0xFFFFFFFF, representing 32 attributes (bits) where the value of an attribute is 0 or 1. |
| mask <i>mask-value</i> | (Optional) Affinity value flag. A 32-bit decimal number. Valid values are from 0x0 to 0xFFFFFFFF, representing 32 attributes (bits), where the value of the affinity bit is 0 or 1. A value of 0 means ignore the corresponding affinity bit. |

Command Default

Affinity: 0x0 mask: 0xFFFF

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|----------|------------------------------|
| 15.1(1)S | This command was introduced. |

Usage Guidelines

This command is used with the **mpls traffic-eng attribute-flags** command, which specifies attributes for a link so that tunnels with matching affinity bits will use that link.

With the autotunnel backup feature, you can use the **mpls traffic-eng attribute-flags** and **mpls traffic-eng auto-tunnel backup config affinity** commands to include or exclude links when calculating a path for a dynamically created backup tunnel.

The affinity determines the attributes of the links that this tunnel will use (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, an attribute value of a link or that bit is irrelevant. If a bit in the mask is 1, the attribute value of a link and the required affinity of the tunnel for that bit must match.

A tunnel can use a link if:

```
tunnel affinity = the link attributes && the tunnel affinity mask
```

Any properties set to 1 in the affinity should also be 1 in the mask.

Examples

The following example configures all dynamically created backup with affinity 0x22, mask 0x22:

```
Router (config)# mpls traffic-eng auto-tunnel backup config affinity 0x22 mask 0x22
```

Related Commands

| Command | Description |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------|
| mpls traffic-eng attribute-flags | Specifies attributes for a link so that tunnels with matching affinity bits will use that link. |
| mpls traffic-eng auto-tunnel backup | Automatically builds NHOP and NNHOP backup tunnels. |
| show mpls traffic-eng auto-tunnel backup | Displays information about dynamically created backup tunnels. |
| tunnel mpls traffic-eng affinity | Configure an affinity for the interface. |

mpls traffic-eng auto-tunnel backup nhop-only

To automatically build next-hop (NHOP) backup tunnels, use the **mpls traffic-eng auto-tunnel backup nhop-only** command in global configuration mode. To delete the NHOP backup tunnels, use the **no** form of this command.

mpls traffic-eng auto-tunnel backup nhop-only
no mpls traffic-eng auto-tunnel backup nhop-only

Syntax Description This command has no arguments or keywords.

Command Default The dynamically created backup tunnel uses Loopback0.

Command Modes Global configuration (config)

| Release | Modification |
|-------------|-------------------------------------------------------------------------------------|
| 12.0(27)S | This command was introduced. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Usage Guidelines This command permits the creation of only NHOP backup tunnels; next-next hop (NNHOP) backup tunnels are not created. The **no** form of this command deletes only the NHOP backup tunnels; NNHOP backup tunnels are not deleted.

Examples The following example enables the creation of only dynamic NHOP backup tunnels:

```
Router# mpls traffic-eng auto-tunnel backup nhop-only
```

| Command | Description |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| mpls traffic-eng auto-tunnel backup | Automatically builds NHOP and NNHOP backup tunnels. |
| mpls traffic-eng auto-tunnel backup config | Enables IP processing without an explicit address. |
| mpls traffic-eng auto-tunnel backup timers | Configures how frequently a timer will scan backup autotunnels and remove tunnels that are not being used. |
| mpls traffic-eng auto-tunnel backup tunnel-num | Configures the range of tunnel interface numbers for backup autotunnels. |

mpls traffic-eng auto-tunnel backup srlg exclude

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

```
mpls traffic-eng auto-tunnel backup srlg exclude {force | preferred}
no mpls traffic-eng auto-tunnel backup srlg exclude
```

| Syntax Description | force | Forces the backup tunnel to avoid SRLGs of its protected interfaces. |
|--------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| | preferred | Causes the backup tunnel to <i>try</i> to avoid SRLGs of its protected interfaces, but the backup tunnel can be created if SRLGs cannot be avoided. |

Command Default Autocreated backup tunnels are created without regard to SRLGs.

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|---------------------------|---------------------------------------------------------------|
| | 12.0(28)S | This command was introduced. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | Cisco IOS XE Release 3.5S | This command was integrated into Cisco IOS XE Release 3.5S. |

Usage Guidelines If you enter the command with either the **force** or the **preferred** keyword and then reenter the command with the other keyword, only the last command entered is effective.

Examples

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

```
Router# configure terminal
Router(config)# mpls traffic-eng auto-tunnel backup srlg exclude force
```

In the following example, backup tunnels should *try* to avoid SRLGs of the protected interface:

```
Router# configure terminal
Router(config)# mpls traffic-eng auto-tunnel backup srlg exclude preferred
```

| Related Commands | Command | Description |
|------------------|------------------------------|-------------------------------------------------------|
| | mpls traffic-eng srlg | Configures the SRLG membership of a link (interface). |

mpls traffic-eng auto-tunnel backup timers

To configure how frequently a timer will scan backup autotunnels and remove tunnels that are not being used, use the **mpls traffic-eng auto-tunnel backup timers** command in global configuration mode. To disable this configuration, use the **no** form of this command.

mpls traffic-eng auto-tunnel backup timers removal unused [*sec*]

no mpls traffic-eng auto-tunnel backup timers removal unused [*sec*]

| | | |
|---------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | removal unused [<i>sec</i>] | Configures how frequently (in seconds) a timer will scan the backup autotunnels and remove tunnels that are not being used. The range is 0 to 604,800. |
|---------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|------------------------|-----------------------------------------------------------------------------------------------------------------|
| Command Default | The timer scans backup autotunnels and removes tunnels that are not being used every 3600 seconds (60 minutes). |
|------------------------|-----------------------------------------------------------------------------------------------------------------|

| | |
|----------------------|-------------------------------|
| Command Modes | Global configuration (config) |
|----------------------|-------------------------------|

| Command History | <table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>12.0(27)S</td> <td>This command was introduced.</td> </tr> <tr> <td>12.2(33)SRA</td> <td>This command was integrated into Cisco IOS Release 12.2(33)SRA.</td> </tr> <tr> <td>12.2(33)SXH</td> <td>This command was integrated into Cisco IOS Release 12.2(33)SXH.</td> </tr> <tr> <td>12.4(20)T</td> <td>This command was integrated into Cisco IOS Release 12.4(20)T.</td> </tr> <tr> <td>15.2(2)SNG</td> <td>This command was integrated into Cisco ASR 901 Series Aggregation Services Routers.</td> </tr> </tbody> </table> | Release | Modification | 12.0(27)S | This command was introduced. | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|-----------|------------------------------|-------------|-----------------------------------------------------------------|-------------|-----------------------------------------------------------------|-----------|---------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|
| Release | Modification | | | | | | | | | | | | |
| 12.0(27)S | This command was introduced. | | | | | | | | | | | | |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. | | | | | | | | | | | | |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. | | | | | | | | | | | | |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. | | | | | | | | | | | | |
| 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. | | | | | | | | | | | | |

Examples

The following example shows that a timer scans backup autotunnels every 80 seconds and remove tunnels that are not being used:

```
Router(config)# mpls traffic-eng auto-tunnel backup timers removal unused 80
```

| Related Commands | <table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>mpls traffic-eng auto-tunnel backup</td> <td>Automatically builds NHOP and NNHOP backup tunnels.</td> </tr> <tr> <td>mpls traffic-eng auto-tunnel backup config</td> <td>Enables IP processing without an explicit address.</td> </tr> <tr> <td>mpls traffic-eng auto-tunnel backup nhop-only</td> <td>Enables the creation of only dynamic next-hop backup tunnels.</td> </tr> <tr> <td>mpls traffic-eng auto-tunnel backup tunnel-num</td> <td>Configures the range of tunnel interface numbers for backup autotunnels.</td> </tr> </tbody> </table> | Command | Description | mpls traffic-eng auto-tunnel backup | Automatically builds NHOP and NNHOP backup tunnels. | mpls traffic-eng auto-tunnel backup config | Enables IP processing without an explicit address. | mpls traffic-eng auto-tunnel backup nhop-only | Enables the creation of only dynamic next-hop backup tunnels. | mpls traffic-eng auto-tunnel backup tunnel-num | Configures the range of tunnel interface numbers for backup autotunnels. |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|--------------------------------------------|-----------------------------------------------------|---------------------------------------------------|----------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|
| Command | Description | | | | | | | | | | |
| mpls traffic-eng auto-tunnel backup | Automatically builds NHOP and NNHOP backup tunnels. | | | | | | | | | | |
| mpls traffic-eng auto-tunnel backup config | Enables IP processing without an explicit address. | | | | | | | | | | |
| mpls traffic-eng auto-tunnel backup nhop-only | Enables the creation of only dynamic next-hop backup tunnels. | | | | | | | | | | |
| mpls traffic-eng auto-tunnel backup tunnel-num | Configures the range of tunnel interface numbers for backup autotunnels. | | | | | | | | | | |

mpls traffic-eng auto-tunnel backup tunnel-num

To configure the range of tunnel interface numbers for backup autotunnels, use the **mpls traffic-eng auto-tunnel backup tunnel-num** command in global configuration mode. To disable this configuration, use the **no** form of this command.

```
mpls traffic-eng auto-tunnel backup tunnel-num [min num] [max num]
no mpls traffic-eng auto-tunnel backup tunnel-num [min num] [max num]
```

| Syntax Description | min num | (Optional) Minimum number of the backup tunnels. The range is 0 to 65535. Default: 65436. |
|--------------------|---------|-------------------------------------------------------------------------------------------|
| | max num | (Optional) Maximum number of the backup tunnels. The range is 0 to 65535. Default: 65535. |

Command Default None

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|-------------|-------------------------------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Examples

The following example configures the range of backup autotunnel numbers to be between 1000 and 1100:

```
Router(config)# mpls traffic-eng auto-tunnel backup tunnel-num min 1000 max 1100
```

| Related Commands | Command | Description |
|------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng auto-tunnel backup | Automatically builds NHOP and NNHOP backup tunnels. |
| | mpls traffic-eng auto-tunnel backup config | Enables IP processing without an explicit address. |
| | mpls traffic-eng auto-tunnel backup nhop-only | Enables the creation of only dynamic next-hop backup tunnels. |
| | mpls traffic-eng auto-tunnel backup timers | Configures how frequently a timer will scan backup autotunnels and remove tunnels that are not being used. |

mpls traffic-eng auto-tunnel mesh

To enable autotunnel mesh groups globally, use the **mpls traffic-eng auto-tunnel mesh** command in global configuration mode. To disable autotunnel mesh groups globally, use the **no** form of this command.

mpls traffic-eng auto-tunnel mesh
no mpls traffic-eng auto-tunnel mesh

Syntax Description This command has no arguments or keywords.

Command Default Autotunnel mesh groups are not enabled globally.

Command Modes Global configuration (config)

Command History

| Release | Modification |
|---------------------------|----------------------------------------------------------------------------------------------------------------|
| 12.0(27)S | This command was introduced. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| 15.2(2)S | This command was modified. The usage guidelines changed on hardware that supports dual Route Processors (RPs). |
| Cisco IOS XE Release 3.6S | This command was modified. The usage guidelines changed on hardware that supports dual RPs. |

Usage Guidelines

On hardware that supports dual processors, once this command is enabled, the tunnel is created on both the active and the standby RPs. When the **no** form of the command is executed, the tunnel is disabled on both the active and the standby RPs.

Examples

The following example shows how to enable autotunnel mesh groups globally:

```
Router(config)# mpls traffic-eng auto-tunnel mesh
```

Related Commands

| Command | Description |
|--------------------------------|---------------------------------|
| interface auto-template | Creates the template interface. |

mpls traffic-eng auto-tunnel mesh tunnel-num

To configure a range of mesh tunnel interface numbers, use the **mpls traffic-eng auto-tunnel mesh tunnel-num** command in global configuration mode. To use the default values, use the **no** form of this command.

mpls traffic-eng auto-tunnel mesh tunnel-num min num max num
no mpls traffic-eng auto-tunnel mesh tunnel-num

| Syntax Description | min num | max num |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| | Specifies the beginning number of the range of mesh tunnel interface numbers. The range is 1 to 65535. The default value is 64336. | Specifies the ending number of the range of mesh tunnel interface numbers. The range is 1 to 65535. The default value is 65335. |

Command Default The **min** default is 64336. The **max** default is 65335.

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|---------------------------|-----------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | Cisco IOS XE Release 3.6S | This command was integrated into Cisco IOS XE Release 3.6S. |

Usage Guidelines If you change an access control list (ACL) and tunnels are deleted because they no longer match the ACL, tunnels that are re-created might not be numbered sequentially; that is, the range of tunnel numbers might not be sequential.

Examples The following example shows how to specify 1000 as the beginning number of the mesh tunnel interface and 2000 as the ending number:

```
Router(config)# mpls traffic-eng auto-tunnel mesh tunnel-num min 1000 max 2000
```

| Related Commands | Command | Description |
|------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| | show mpls traffic-eng auto-tunnel mesh | Displays the cloned mesh tunnel interfaces of each autotemplate interface and the current range of mesh tunnel interface numbers. |

mpls traffic-eng auto-tunnel primary config

To enable IP processing without an explicit address, use the **mpls traffic-eng auto-tunnel primary config** command in global configuration mode. To disable this capability, use the **no** form of this command.

mpls traffic-eng auto-tunnel primary config unnumbered *interface*
no mpls traffic-eng auto-tunnel primary config unnumbered *interface*

| | | |
|---------------------------|------------------------------------|-------------------------------------------------------------------------------|
| Syntax Description | unnumbered <i>interface</i> | Interface on which IP processing will be enabled without an explicit address. |
|---------------------------|------------------------------------|-------------------------------------------------------------------------------|

Command Default Loopback0

Command Modes Global configuration (config)

| Command History | Release | Modification |
|------------------------|----------------|-------------------------------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Examples

The following example enables IP processing on an Ethernet interface:

```
Router# mpls traffic-eng auto-tunnel primary config unnumbered ethernet1/0
```

| Related Commands | Command | Description |
|-------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng auto-tunnel primary config mpls ip | Enables LDP on primary autotunnels. |
| | mpls traffic-eng auto-tunnel primary onehop | Automatically creates primary tunnels to all next-hops. |
| | mpls traffic-eng auto-tunnel primary timers | Configures how many seconds after a failure primary autotunnels are removed. |
| | mpls traffic-eng auto-tunnel primary tunnel-num | Configures the range of tunnel interface numbers for primary autotunnels. |
| | show ip rsvp fast-reroute | Displays information about fast reroutable primary tunnels and their corresponding backup tunnels that provide protection. |

mpls traffic-eng auto-tunnel primary config mpls ip

To enable Label Distribution Protocol (LDP) on primary autotunnels, use the **mpls traffic-eng auto-tunnel primary config mpls ip** command in global configuration mode. To disable LDP on primary autotunnels, use the **no** form of this command.

```
mpls traffic-eng auto-tunnel primary config mpls ip
no mpls traffic-eng auto-tunnel primary config mpls ip
```

Syntax Description This command has no arguments or keywords.

Command Default LDP is not enabled.

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|-------------|-------------------------------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Examples

The following example enables LDP on primary autotunnels:

```
Router(config)# mpls traffic-eng auto-tunnel primary config mpls ip
```

| Related Commands | Command | Description |
|------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng auto-tunnel primary config | Enables IP processing without an explicit address. |
| | mpls traffic-eng auto-tunnel primary onehop | Automatically creates primary tunnels to all next hops. |
| | mpls traffic-eng auto-tunnel primary timers | Configures how many seconds after a failure primary autotunnels are removed. |
| | mpls traffic-eng auto-tunnel primary tunnel-num | Configures the range of tunnel interface numbers for primary autotunnels. |
| | show ip rsvp fast-reroute | Displays information about fast reroutable primary tunnels and their corresponding backup tunnels that provide protection. |

mpls traffic-eng auto-tunnel primary onehop

To automatically create primary tunnels to all next hops, use the **mpls traffic-eng auto-tunnel primary onehop** command in global configuration mode. To disable the automatic creation of primary tunnels to all next hops, use the **no** form of this command.

mpls traffic-eng auto-tunnel primary onehop
no mpls traffic-eng auto-tunnel primary onehop

Syntax Description This command has no arguments or keywords.

Command Default The dynamically created one-hop tunnels use Loopback0.

Command Modes Global configuration (config)

Command History

| Release | Modification |
|---------------------------|----------------------------------------------------------------------------------------------------------------|
| 12.0(27)S | This command was introduced. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| 15.2(2)S | This command was modified. The usage guidelines changed on hardware that supports dual Route Processors (RPs). |
| Cisco IOS XE Release 3.6S | This command was modified. The usage guidelines changed on hardware that supports dual RPs. |
| 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Usage Guidelines On hardware that supports dual processors, once this command is enabled, the tunnel is created on both the active and the standby RPs. When the **no** form of the command is executed, the tunnel is disabled on both the active and the standby RPs.

Examples

The following example automatically creates primary tunnels to all next hops:

```
Router(config)# mpls traffic-eng auto-tunnel primary onehop
```

Related Commands

| Command | Description |
|----------------------------------------------------|----------------------------------------------------|
| mpls traffic-eng auto-tunnel primary config | Enables IP processing without an explicit address. |
| mpls traffic-eng auto-tunnel primary onehop | Enables LDP on primary autotunnels. |

| Command | Description |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| mpls traffic-eng auto-tunnel primary timers | Configures how many seconds after a failure primary autotunnels are removed. |
| mpls traffic-eng auto-tunnel primary tunnel-num | Configures the range of tunnel interface numbers for primary autotunnels. |
| show ip rsvp fast-reroute | Displays information about fast reroutable primary tunnels and their corresponding backup tunnels that provide protection. |

mpls traffic-eng auto-tunnel primary timers

To configure how many seconds after a failure primary autotunnels are removed, use the **mpls traffic-eng auto-tunnel primary timers** command in global configuration mode. To disable this configuration, use the **no** form of this command.

mpls traffic-eng auto-tunnel primary timers removal rerouted *sec*
no mpls traffic-eng auto-tunnel primary timers removal rerouted *sec*

| | |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | removal rerouted <i>sec</i> Number of seconds after a failure that primary autotunnels are removed. The range is 30 to 604,800. Default: 0. |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default None

Command Modes Global configuration (config)

| Command History | Release | Modification |
|------------------------|----------------|-------------------------------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Examples

The following example shows that primary autotunnels are removed 100 seconds after a failure:

```
Router(config)# mpls traffic-eng auto-tunnel primary timers removal rerouted 100
```

| Related Commands | Command | Description |
|-------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng auto-tunnel primary config | Enables IP processing without an explicit address. |
| | mpls traffic-eng auto-tunnel primary config mpls ip | Enables LDP on primary autotunnels. |
| | mpls traffic-eng auto-tunnel primary onehop | Automatically creates primary tunnels to all next hops. |
| | mpls traffic-eng auto-tunnel primary tunnel-num | Configures the range of tunnel interface numbers for primary autotunnels. |
| | show ip rsvp fast-reroute | Displays information about fast reroutable primary tunnels and their corresponding backup tunnels that provide protection. |

mpls traffic-eng auto-tunnel primary tunnel-num

To configure the range of tunnel interface numbers for primary autotunnels, use the **mpls traffic-eng auto-tunnel primary tunnel-num** command in global configuration mode. To disable this configuration, use the **no** form of this command.

```
mpls traffic-eng auto-tunnel primary tunnel-num [min num] [max num]
no mpls traffic-eng auto-tunnel primary tunnel-num [min num] [max num]
```

| Syntax Description | <i>min num</i> | (Optional) Minimum number of the primary tunnels. The range is 0 to 65535. Default: 65436. |
|--------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------|
| | <i>max num</i> | (Optional) Maximum number of the primary tunnels. The max number is the minimum number plus 99. The range is 0 to 65535. |

Command Default None

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|-------------|-------------------------------------------------------------------------------------|
| | 12.0(27)S | This command was introduced. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2(33)SXH | This command was integrated into Cisco IOS Release 12.2(33)SXH. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |
| | 15.2(2)SNG | This command was integrated into Cisco ASR 901 Series Aggregation Services Routers. |

Examples

The following example shows that the primary tunnel numbers can be between 2000 and 2100:

```
Router(config)# mpls traffic-eng auto-tunnel primary tunnel-num min 2000 max 2100
```

| Related Commands | Command | Description |
|------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------|
| | mpls traffic-eng auto-tunnel primary config | Enables IP processing without an explicit address. |
| | mpls traffic-eng auto-tunnel primary config mpls ip | Enables LDP on primary autotunnels. |
| | mpls traffic-eng auto-tunnel primary onehop | Automatically creates primary tunnels to all next hops. |
| | mpls traffic-eng auto-tunnel primary timers | Configures how many seconds after a failure primary autotunnels are removed. |

| Command | Description |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| show ip rsvp fast-reroute | Displays information about fast reroutable primary tunnels and their corresponding backup tunnels that provide protection. |

mpls traffic-eng autoroute-exclude prefix list

To configure or to allow specific destinations or prefixes to avoid routing through traffic engineering (TE) tunnels, use the **mpls traffic-eng autoroute-exclude prefix list** command in router configuration mode. To allow the specified destinations to route through TE tunnels, use the **no** form of this command.

mpls traffic-eng autoroute-exclude prefix list *prefix-list-name*
no mpls traffic-eng autoroute-exclude prefix list *prefix-list-name*

| Syntax Description | Command | Description |
|--------------------|--------------------------------------------|-------------------------------------------------------------|
| | autoroute-exclude | MPLS TE auto route that is excluded from the prefix list. |
| | prefix list <i>prefix-list-name</i> | Filter prefixes that are not routed through the TE tunnels. |

Command Default IP routes are sent over all MPLS/TE IP tunnels.

Command Modes Router configuration (config-router)

| Command History | Release | Modification |
|-----------------|--------------------|------------------------------|
| | Cisco IOS XE 3.13S | This command was introduced. |

Usage Guidelines The **mpls traffic-eng autoroute-exclude prefix list** command allows specific destinations or prefixes to avoid TE tunnels. However, other prefixes can still be configured to use TE tunnels. Autoroute exclude is configured using a prefix list. IP addresses and prefixes that are members of this prefix list are excluded from TE tunnels, even when autoroute is enabled on them. If the IP addresses or prefixes are added to the prefix list, they are dynamically routed without passing through the TE tunnel. If the IP addresses or prefixes are removed from the prefix list, they are dynamically rerouted back on the TE tunnel path.

Examples The following example shows how to configure specific destinations without routing through TE tunnels:

```
Router(config-router)# mpls traffic-eng autoroute-exclude prefix-list XX
```

| Related Commands | Command | Description |
|------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng router-id | Specifies that the traffic engineering router identifier for the node is the IP address associated with a given interface. |
| | router ospf | Configures an OSPF routing process on a router. |

mpls traffic-eng backup-path

To assign one or more backup tunnels to a protected interface, use the **mpls traffic-eng backup-path** command in interface configuration mode.

mpls traffic-eng backup-path tunnel *tunnel-id*

Syntax Description

| | |
|--------------------------------|-----------------------------------------------------------------------|
| tunnel <i>tunnel-id</i> | Tunnel ID of the backup tunnel that can be used in case of a failure. |
|--------------------------------|-----------------------------------------------------------------------|

Command Default

No backup tunnels are used if this interface goes down.

Command Modes

Interface configuration (config-if)

Command History

| Release | Modification |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.0(10)ST | This command was introduced. |
| 12.0(16)ST | With Link Protection, this command selected the one-and-only backup tunnel for a given protected interface. If you enter the command twice, the second occurrence overwrites the first occurrence. |
| 12.0(22)S | You can now enter this command multiple times to select multiple backup tunnels for a given protected interface. This can be done for both Link and Node Protection. The command is supported on the Cisco 10000 series ESRs. |
| 12.2(18)SXD1 | This command was integrated into Cisco IOS Release 12.2(18)SXD1. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(31)SB2 | This command was integrated into Cisco IOS Release 12.2(31)SB2. |

Usage Guidelines

Enter this command on the interface to be protected (Link Protection), or on the interface whose downstream node is being protected (Node Protection). You can enter this command multiple times to select multiple backup tunnels for a given protected interface. An unlimited number of backup tunnels can be assigned to protect an interface. The only limitation is memory. By entering this command on a physical interface, LSPs using this interface (sending data *out of* this interface) can use the indicated backup tunnels if there is a link or node failure.

Examples

The following example assigns backup tunnel 34 to interface POS5/0:

```
Router(config)# interface pos5/0
Router(config-if)# mpls traffic-eng backup-path tunnel134
```

Related Commands

| Command | Description |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| tunnel mpls traffic-eng fast-reroute | Enables an MPLS traffic engineering tunnel to use a backup tunnel if there is a link or node failure (provided that a backup tunnel exists). |

mpls traffic-eng backup-path tunnel

To configure the physical interface to use a backup tunnel in the event of a detected failure on that interface, use the **mpls traffic-eng backup-path tunnel** command in interface configuration mode.

mpls traffic-eng backup-path tunnel *interface*

| | |
|---------------------------|--------------------------------------------------------------------------------------------|
| Syntax Description | <i>interface</i> String that identifies the tunnel interface being created and configured. |
|---------------------------|--------------------------------------------------------------------------------------------|

Command Default This command is disabled by default.

Command Modes Interface configuration (config-if)

| Command History | Release | Modification |
|------------------------|----------------|-------------------------------------------------------------------------------------|
| | 12.0(8)ST | This command was introduced. |
| | 12.2(18)S | This command was integrated into Cisco IOS Release 12.2(18)S. |
| | 12.2(18)SXD | This command was implemented on the Catalyst 6000 series with the SUP720 processor. |
| | 12.2(28)SB | This command was implemented on the Cisco 10000(PRE-2) router. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |

Examples

The following example specifies the traffic engineering backup tunnel with the identifier 1000:

```
Router(config-if) # mpls traffic-eng backup-path Tunnel 1000
```

| Related Commands | Command | Description |
|-------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| | show mpls traffic-eng fast-reroute database | Displays information about existing Fast Reroute configurations. |
| | tunnel mpls traffic-eng fast-reroute | Enables an MPLS traffic engineering tunnel to use a backup tunnel in the event of a link failure (assuming a backup tunnel exists). |

mpls traffic-eng ds-te bc-model

To enable a Bandwidth Constraints Model to be used by a router in DiffServ-aware Traffic Engineering, use the **mpls traffic-eng ds-te bc-model** global configuration command. (Using the **no** form of this command selects the default model, which is the Russian Dolls Model.)

```
mpls traffic-eng ds-te bc-model [{rdm | mam}]
no mpls traffic-eng ds-te bc-model [{rdm | mam}]
```

Syntax Description

| | |
|------------|--------------------------------------------------------------------------|
| rdm | Russian Dolls Model. (Described in IETF RFC 4127). |
| mam | Maximum Allocation Model. (Described in IETF RFC 4125). |

Command Default

Russian Dolls Model is the default.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|---------------------------|-------------------------------------------------------------|
| 12.2(33)SRB | This command was introduced. |
| Cisco IOS XE Release 3.5S | This command was integrated into Cisco IOS XE Release 3.5S. |

Usage Guidelines

1. The Maximum Allocation Model should be selected when the network administrator needs to ensure isolation across all Class Types without having to use pre-emption, and can afford to risk some QoS degradation of Class Types other than the Premium Class.
2. The Russian Dolls Model should be selected when the network administrator needs to prevent QoS degradation of all Class Types and can impose pre-emption.

Examples

In the following example, the Maximum Allocation Model is being selected:

```
Router(config)# mpls traffic-eng ds-te bc-model mam
```

mpls traffic-eng ds-te mode

To configure a router to enter DiffServ-aware Traffic Engineering modes which incorporate degrees of the IETF Standard, use the **mpls traffic-eng ds-te mode** global configuration command. To return the router to the pre-IETF-Standard mode, use the **no** form of this command.

```
mpls traffic-eng ds-te mode [{migration | ietf}]
no mpls traffic-eng ds-te mode [{migration | ietf}]
```

| Syntax Description | migration | ietf |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | A mode by which the router generates IGP and tunnel signaling according to the pre-IETF standard, but adds TE-class mapping and accepts advertisement in both the pre-IETF and the IETF-Standard formats. | The “Liberal” IETF mode, by which the router generates IGP advertisement and tunnel signaling according to the IETF Standard and responds to TE-class mapping, yet also accepts advertisement in both the pre-IETF-Standard and IETF-Standard formats. |

Command Default Pre-IETF-Standard mode is the default.

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|---------------------------|-------------------------------------------------------------|
| | 12.2(33)SRB | This command was introduced. |
| | Cisco IOS XE Release 3.5S | This command was integrated into Cisco IOS XE Release 3.5S. |

Usage Guidelines

1. Place the router into Migration Mode only if it is still in the pre-IETF Standard (“Traditional”) mode, and you want to begin upgrading its network to operate the IETF-Standard form of DS-TE.
2. Place the router into Liberal-IETF Mode only if its network is already in the Migration Mode, and you want to complete the upgrade of that network so it will operate the IETF-Standard form of DS-TE.

Examples

In the following example, the router is configured to operate in Migration Mode:

```
Router(config)# mpls traffic-eng ds-te migration
```

mpls traffic-eng fast-reroute backup-prot-preemption

To change the backup protection preemption algorithm to minimize the amount of bandwidth that is wasted, use the **mpls traffic-eng fast-reroute backup-prot-preemption** command in global configuration mode. To use the default algorithm of minimizing the number of label-switched paths (LSPs) that are demoted, use the **no** form of this command.

mpls traffic-eng fast-reroute backup-prot-preemption [optimize-bw]
no mpls traffic-eng fast-reroute backup-prot-preemption

Syntax Description

| | |
|--------------------|------------------------------------------------------|
| optimize-bw | (Optional) Minimizes the amount of bandwidth wasted. |
|--------------------|------------------------------------------------------|

Command Default

A minimum number of LSPs are preempted.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|-------------|-----------------------------------------------------------------|
| 12.0(29)S | This command was introduced. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |

Usage Guidelines

The **mpls traffic-eng fast-reroute backup-prot-preemption** command allows you to determine the criteria the router will use when selecting the LSPs that will be preempted.

If you enter the command with the **optimize-bw** keyword, the router chooses LSPs that will waste the least amount of bandwidth.

If you do not enter the **mpls traffic-eng fast-reroute backup-prot-preemption optimize-bw** command, the router preempts as few LSPs as possible.

Each router in the network does not have to use the same algorithm; that is, you can specify **optimize-bw** for some routers in the network but not for others.

You can enter the **mpls traffic-eng fast-reroute backup-prot-preemption** command at any time. If you change the algorithm, it does not affect LSPs that already are protected. It only affects the placement of new LSPs signaled after you enter this command. The command can affect LSPs during the next periodic promotion cycle.

Examples

In the following examples, a next-next hop (NNHOP) backup tunnel has the following characteristics:

- Total backup capacity: 240 units
- Used backup bandwidth: 220 units
- Available backup bandwidth: 20 units

The backup tunnel currently is protecting LSP1 through LSP5, which have the following bandwidth, and do not have backup bandwidth protection (that is, the “bandwidth protection desired” bit was not set via the **tunnel mpls traffic-eng fast-reroute** command):

- LSP1: 10 units
- LSP2: 20 units
- LSP3: 30 units
- LSP4: 60 units
- LSP5: 100 units

As shown, LSP1 through LSP5 use 220 units of bandwidth.

LSP6 has backup bandwidth protection and needs 95 units of bandwidth. Twenty units of bandwidth are available, so 75 more units of bandwidth are needed.

In the following example, backup bandwidth protection is enabled and the amount of wasted bandwidth is minimized:

```
Router(config)# mpls traffic-eng fast-reroute backup-prot-preemption optimize-bw
```

LSP2 and LS4 are preempted so that the least amount of bandwidth is wasted.

In the following example, backup protection preemption is enabled and the number of preempted LSPs is minimized:

```
Router(config)# no mpls traffic-eng fast-reroute backup-prot-preemption
```

The router selects the LSP whose bandwidth is next-greater than the required bandwidth. Therefore, the router picks LSP5 because it has the next larger amount of bandwidth over 75. One LSP is demoted, and 25 units of bandwidth are wasted.

Related Commands

| Command | Description |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| show ip rsvp fast bw-protect | Displays information about whether backup bandwidth protection is enabled and the status of backup tunnels that may be used to provide that protection. |

mpls traffic-eng fast-reroute promote

To configure the router to assign new or more efficient backup Multiprotocol Label Switching traffic engineering (MPLS-TE) tunnels to protect MPLS-TE tunnels, use the **mpls traffic-eng fast-reroute promote** command in privileged EXEC mode.

mpls traffic-eng fast-reroute promote

Syntax Description This command has no arguments or keywords.

Command Default No MPLS-TE backup tunnels are assigned.

Command Modes Privileged EXEC (#)

| Command History | Release | Modification |
|-----------------|--------------------------|----------------------------------------------------------------------------------------|
| | 15.0(1)M | This command was introduced in a release earlier than Cisco IOS Release 15.0(1)M. |
| | 12.2(33)SRC | This command was integrated into a release earlier than Cisco IOS Release 12.2(33)SRC. |
| | 12.2(33)SXI | This command was integrated into a release earlier than Cisco IOS Release 12.2(33)SXI. |
| | Cisco IOS XE Release 2.1 | This command was implemented on Cisco ASR 1000 Series Aggregation Services Routers. |

Usage Guidelines To use the **mpls traffic-eng fast-reroute promote** command, you must be in a user group associated with a task group.

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

```
Router# mpls traffic-eng fast-reroute promote
```

| Related Commands | Command | Description |
|------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| | mpls traffic-eng fast-reroute backup-prot-preemption | Changes the backup protection preemption algorithm to minimize the amount of bandwidth that is wasted. |
| | mpls traffic-eng fast-reroute timers | Specifies how often the router considers switching an LSP to a new (better) backup tunnel if additional backup bandwidth becomes available. |

mpls traffic-eng fast-reroute timers

To specify how often the router considers switching a label switched path (LSP) to a new (better) backup tunnel if additional backup bandwidth becomes available, use the **mpls traffic-eng fast-reroute timers** command in global configuration mode. To disable this timer, set the seconds value to zero or use the **no** form of this command.

mpls traffic-eng fast-reroute timers [**promotion** *seconds*]
no mpls traffic-eng fast-reroute timers

Syntax Description

| | |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| promotion <i>seconds</i> | (Optional) Sets the interval, in seconds, between scans to determine if an LSP should use a new, better backup tunnel. The range is 0 to 604800. A value of 0 disables promotions to a better LSP. |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default

The timer is running and is set to a frequency of every 300 seconds (5 minutes). If you enter the **no mpls traffic-eng fast-reroute timers** command, the router returns to this default behavior.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|--------------|------------------------------------------------------------------|
| 12.0(22)S | This command was introduced. |
| 12.2(18)SXD1 | This command was integrated into Cisco IOS Release 12.2(18)SXD1. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2(31)SB2 | This command was integrated into Cisco IOS Release 12.2(31)SB2. |
| 12.4(20)T | This command was integrated into Cisco IOS Release 12.4(20)T. |

Examples

In the following example, LSPs are scanned every 2 minutes (120 seconds). The router uses this information to consider if the LSPs should be promoted to a better backup tunnel:

```
Router(config)# mpls traffic-eng fast-reroute timers promotion 120
```

mpls traffic-eng flooding thresholds

To set a reserved bandwidth thresholds for a link, use the **mpls traffic-eng flooding thresholds** command in interface configuration mode. To return to the default settings, use the **no** form of this command.

```
mpls traffic-eng flooding thresholds {down | up} percent [percent . . . ]
no mpls traffic-eng flooding thresholds {down | up}
```

Syntax Description

| | |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| down | Sets the thresholds for decreased reserved bandwidth. |
| up | Sets the thresholds for increased reserved bandwidth. |
| <i>percent</i> [<i>percent</i>] | Bandwidth threshold level. For the down keyword, the range is 0 through 99. For the up keyword, the range is 1 through 100. |

Command Default

None

Command Modes

Interface configuration (config-if)

Command History

| Release | Modification |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.0(5)S | This command was introduced. |
| 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |
| 12.2(33)SCA | This command was integrated into Cisco IOS Release 12.2(33)SCA. |

Usage Guidelines

When a threshold is crossed, Multiprotocol Label Switching (MPLS) traffic engineering link management advertises updated link information. If no thresholds are crossed, changes can be flooded periodically unless periodic flooding is disabled.

Examples

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

```
Router(config-if)# mpls traffic-eng flooding thresholds down 100 75 25
Router(config-if)# mpls traffic-eng flooding thresholds up 25 50 100
```

Related Commands

| Command | Description |
|-------------------------------------------------------|-------------------------------------------------------------|
| mpls traffic-eng link timers periodic-flooding | Sets the length of the interval used for periodic flooding. |

| Command | Description |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| show mpls traffic-eng link-management advertisements | Displays local link information currently being flooded by MPLS traffic engineering link management into the global traffic engineering topology. |
| show mpls traffic-eng link-management bandwidth-allocation | Displays current local link information. |

mpls traffic-eng interface

To enable Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) link-state advertisement (LSA) for an interface to be advertised into the Open Shortest Path First (OSPF) area 0, use the **mpls traffic-eng interface** command in router configuration mode. To restore the setting of the MPLS TE LSA to the same area as the router LSA, use the **no** form of this command.

mpls traffic-eng interface interface area 0
no mpls traffic-eng interface interface area 0

Syntax Description

| | |
|------------------|-------------------------------------------------------------------------------------------------------------|
| <i>interface</i> | The interface to be advertised with an MPLS TE LSA into OSPF area 0. The interface may be one or two words. |
|------------------|-------------------------------------------------------------------------------------------------------------|

Command Default

The default is to advertise the area assigned to the interface by the OSPF network configuration.

Command Modes

Router configuration

Command History

| Release | Modification |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.0(12)S | This command was introduced. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |

Usage Guidelines

Usually, the MPLS TE LSA is advertised into the same area as the router LSA. If a link between two Area Border Routers (ABRs) is in an OSPF area besides area 0, you can advertise the link between ABRs into area 0. This solves for TE the same problem that virtual links solve for IP routing. This command is valid only for OSPF. Issue the command on both ABRs for the interfaces at both ends of the link.

Examples

In the following example, OSPF advertises the MPLS TE LSA for interface pos2/0 to area 0:

```
Router(config)# router ospf 1
Router(config-router)# mpls traffic-eng interface pos2/0 area 0
```

Related Commands

| Command | Description |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| mpls traffic-eng multicast-intact | Enables multicast-intact support from the OSPF routing protocol to maintain and publish the native IP nexthops (paths) for every OSPF route. |

mpls traffic-eng link timers bandwidth-hold

To set the length of time that bandwidth is held for a Resource Reservation Protocol (RSVP) PATH (Set Up) message while waiting for the corresponding RSVP RESV message to come back, use the **mpls traffic-eng link timers bandwidth-hold** command in global configuration mode.

mpls traffic-eng link timers bandwidth-hold *hold-time*

| | |
|---------------------------|-----------------------------------------------------------------------------------------------------|
| Syntax Description | <i>hold-time</i> Sets the length of time that bandwidth can be held. The range is 1 to 300 seconds. |
|---------------------------|-----------------------------------------------------------------------------------------------------|

| | |
|------------------------|------------|
| Command Default | 15 seconds |
|------------------------|------------|

| | |
|----------------------|-------------------------------|
| Command Modes | Global configuration (config) |
|----------------------|-------------------------------|

| Command History | Release | Modification |
|------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |

Examples

The following example sets the length of time that bandwidth is held to 10 seconds.

```
Router(config)# mpls traffic-eng link-management timers bandwidth-hold 10
```

| Related Commands | Command | Description |
|-------------------------|-------------------------------------------------------------------|------------------------------------------|
| | show mpls traffic-eng link-management bandwidth-allocation | Displays current local link information. |

mpls traffic-eng link timers periodic-flooding

To set the length of the interval used for periodic flooding, use the **mpls traffic-eng link timers periodic-flooding** command in global configuration mode.

mpls traffic-eng link timers periodic-flooding *interval*

| | | |
|---------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <i>interval</i> | Length of interval used for periodic flooding (in seconds). The range is 0 to 3600. If you set this value to 0, you turn off periodic flooding. If you set this value anywhere in the range of 1 to 29, it is treated as 30. |
|---------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default 180 seconds

Command Modes Global configuration (config)

| Command History | Release | Modification |
|------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |

Usage Guidelines Use this command to set the interval for periodic flooding of traffic engineering (TE) topology information. Changes in the Multiprotocol Label Switching (MPLS) TE topology database are flooded by the link state Interior Gateway Protocol (IGP). Some changes, such as those to link status (up/down) or configured parameters, trigger immediate flooding. Other changes are considered less urgent and are flooded periodically. For example, changes to the amount of link bandwidth allocated to TE tunnels are flooded periodically unless the change causes the bandwidth to cross a configurable threshold.

Examples The following example sets the interval length for periodic flooding to advertise flooding changes to 120 seconds.

```
Router(config)# mpls traffic-eng timers periodic-flooding 120
```

| Related Commands | Command | Description |
|-------------------------|---------------------------------------------|---------------------------------------------------|
| | mpls traffic-eng flooding thresholds | Sets the reserved bandwidth thresholds of a link. |

mpls traffic-eng link-management timers bandwidth-hold

To set the length of time that bandwidth is held for an RSVP path (setup) message while you wait for the corresponding RSVP Resv message to come back, use the **mpls traffic-eng link-management timers bandwidth-hold** command in global configuration mode. To disable this function, use the **no** form of this command.

mpls traffic-eng link-management timers bandwidth-hold *hold-time*
no mpls traffic-eng link-management timers bandwidth-hold

| | | |
|---------------------------|------------------|---------------------------------------------------------------------------|
| Syntax Description | <i>hold-time</i> | Length of time that bandwidth can be held. The range is 1 to 300 seconds. |
|---------------------------|------------------|---------------------------------------------------------------------------|

Command Default 15 seconds

Command Modes Global configuration (config)

| Command History | Release | Modification |
|------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.1(3)T | This command was integrated into Cisco IOS Release 12.1(3)T. |
| | 12.0(10)ST | This command was integrated into Cisco IOS Release 12.0(10)ST. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |

Examples

In the following example, bandwidth is set to be held for 10 seconds:

```
Router(config)# mpls traffic-eng link-management timers bandwidth-hold 10
```

| Related Commands | Command | Description |
|-------------------------|-------------------------------------------------------------------|------------------------------------------|
| | show mpls traffic-eng link-management bandwidth-allocation | Displays current local link information. |

mpls traffic-eng link-management timers periodic-flooding

To set the length of the interval for periodic flooding, use the **mpls traffic-eng link-management timers periodic-flooding** command in global configuration mode. To disable the specified interval length for periodic flooding, use the **no** form of this command.

mpls traffic-eng link-management timers periodic-flooding *interval*
no mpls traffic-eng link-management timers periodic-flooding

| | | |
|---------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <i>interval</i> | Length of the interval (in seconds) for periodic flooding. The range is 0 to 3600. A value of 0 turns off periodic flooding. If you set this value from 1 to 29, it is treated as 30. |
|---------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Command Default 180 seconds (3 minutes)

Command Modes Global configuration (config)

| Command History | Release | Modification |
|------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.0(5)S | This command was introduced. |
| | 12.1(3)T | This command was integrated into Cisco IOS Release 12.1(3)T. |
| | 12.0(10)ST | This command was integrated into Cisco IOS Release 12.0(10)ST. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |

Usage Guidelines Use this command to advertise link state information changes that do not trigger immediate action. For example, a change to the amount of allocated bandwidth that does not cross a threshold.

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

```
Router(config)# mpls traffic-eng link-management timers periodic-flooding 120
```

| Related Commands | Command | Description |
|-------------------------|---------------------------------------------|----------------------------------------------|
| | mpls traffic-eng flooding thresholds | Sets a link's reserved bandwidth thresholds. |

mpls traffic-eng logging lsp

To log traffic engineering label switched path (LSP) events, use the **mpls traffic-eng logging lsp** command in global configuration mode. To disable logging of LSP events, use the **no** form of this command.

```
mpls traffic-eng logging lsp {path-errors | reservation-errors | preemption | setups | teardowns}
[acl-number]
```

```
no mpls traffic-eng logging lsp {path-errors | reservation-errors | preemption | setups | teardowns}
[acl-number]
```

Syntax Description

| | |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| path-errors | Logs Resource Reservation Protocol (RSVP) path errors or headend path calculation failures for traffic engineering LSPs |
| reservation-errors | Logs RSVP reservation errors for traffic engineering LSPs. |
| preemption | Logs events related to the preemption of traffic engineering LSPs. |
| setups | Logs events related to the establishment of traffic engineering LSPs. |
| teardowns | Logs events related to the removal of traffic engineering LSPs. |
| <i>acl-number</i> | (Optional) The specified access list to filter the events that are logged. Events are only for LSPs that match the access list. |

Command Default

Logging of LSP events is disabled.

Command Modes

Global configuration (config)

Command History

| Release | Modification |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.1(3)T | This command was introduced. |
| 12.0(10)ST | This command was integrated into Cisco IOS Release 12.0(10)ST. |
| 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |
| 15.2(2)S | This command was modified to generate traffic engineering log messages when a traffic engineering headend path calculation fails. For details, see the “Usage Guidelines” section. |
| Cisco IOS XE Release 3.6S | This command was modified to generate traffic engineering log messages when a traffic engineering headend path calculation fails. For details, see the “Usage Guidelines” section. |

Usage Guidelines

When a traffic engineering headend path calculation fails and the **mpls traffic-eng logging lsp path-errors** command is configured, the following traffic engineering log messages are generated and sent to the console, log file, or syslog depending on the logging configuration. Duplicate successive log entries of the same message for the same tunnel are suppressed.

Point-to-point (P2P) tunnels:

- When a destination is not present in the traffic engineering topology database:
00:00:08: %MPLS_TE-5-LSP: LSP 10.30.30.3 1_1: Destination IP address, 10.30.30.2, not found
- When a link that was previously used as part of an LSP path is no longer usable (for example, insufficient bandwidth):
00:16:09: %MPLS_TE-5-LSP: LSP 10.30.30.3 1_31: Can't use link 10.0.1.2 on node 10.30.30.3
- When an explicit path has an unknown address:
00:25:54: %MPLS_TE-5-LSP: LSP 10.30.30.3 1_76: Explicit path has unknown address, 10.0.1.3
- When an Interior Gateway Protocol (IGP) neighbor adjacency goes down:
00:04:28: %MPLS_TE-5-LSP: LSP 10.30.30.3 1_30: No addresses to connect 10.30.30.3 to 10.0.1.3
- When a dynamic path is present with no valid path to the destination:
01:18:19: %MPLS_TE-5-LSP: LSP 10.30.30.3 3_36: No path to destination, 10.30.30.2

Point-to-multipoint (P2MP) tunnels:

- When there is no valid path that meets constraints to a destination in the destination list:
00:00:12: %MPLS_TE-5-LSP: Sub-LSP 10.30.30.3[1:1]->10.30.30.2_4: pealc failed to find a path for 10.30.30.2



Note For a short period after a reboot or network reconvergence, you may see some spurious log entries (due to temporary path calculation failures) until the topology converges.

Examples

The following example shows how to log path errors for LSPs that match access list 3:

```
Device(config)# mpls traffic-eng logging lsp path-errors 3
```

Related Commands

| Command | Description |
|----------------------------------------|------------------------------------------------------|
| access-list (extended) | Defines an extended IP access list. |
| logging console | Limits the number of messages logged to the console. |
| mpls traffic-eng logging tunnel | Logs certain traffic engineering tunnel events. |
| show logging | Displays the messages that are logged in the buffer. |

mpls traffic-eng logging tunnel

To log certain traffic engineering tunnel events, use the **mpls traffic-eng logging tunnel** command in global configuration mode. To disable logging of traffic engineering tunnel events, use the **no** form of this command.

mpls traffic-eng logging tunnel lsp-selection [*acl-number*]
no mpls traffic-eng logging tunnel lsp-selection [*acl-number*]

| Syntax Description | |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| lsp-selection | Logs events related to the selection of a label switched path (LSP) for a traffic engineering tunnel. |
| <i>acl-number</i> | (Optional) Uses the specified access list to filter the events that are logged. Logs events only for tunnels that match the access list. |

Command Default Logging of tunnel events is disabled.

Command Modes Global configuration (config)

| Command History | Release | Modification |
|-----------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 12.1(3)T | This command was introduced. |
| | 12.0(10)ST | This command was integrated into Cisco IOS Release 12.0(10)ST. |
| | 12.0(22)S | This command was integrated into Cisco IOS Release 12.0(22)S. |
| | 12.2(28)SB | This command was integrated into Cisco IOS Release 12.2(28)SB. |
| | 12.2(33)SRA | This command was integrated into Cisco IOS Release 12.2(33)SRA. |
| | 12.2SX | This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware. |

Examples

The following example shows how to log traffic engineering tunnel events associated with access list 3:

```
Router(config)# mpls traffic-eng logging tunnel lsp-selection 3
```

| Related Commands | Command | Description |
|------------------|-------------------------------------|------------------------------------------------------|
| | access-list (extended) | Creates an extended access list. |
| | logging console | Limits the number of messages logged to the console. |
| | mpls traffic-eng logging lsp | Logs certain traffic engineering LSP events. |
| | show logging | Displays the messages that are logged in the buffer. |

