



# MPLS Forwarding Commands

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This module describes the commands used to configure and use Multiprotocol Label Switching (MPLS) forwarding.

For detailed information about MPLS concepts, configuration tasks, and examples, see *MPLS Configuration Guide for Cisco NCS 6000 Series Routers*.

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# mpls ip-ttl-propagate

To configure the behavior controlling the propagation of the IP Time-To-Live (TTL) field to and from the MPLS header, use the **mpls ip-ttl-propagate** command in global configuration mode. To return to the default behavior, use the **no** form of this command.

**mpls ip-ttl-propagate disable** [**forwarded** | **local**]

**no mpls ip-ttl-propagate**

## Syntax Description

<b>disable</b>	Disables the propagation of IP TTL to and from the MPLS header for both forwarded and local packets.
<b>forwarded</b>	(Optional) Disables the propagation of IP TTL to and from the MPLS header for only the forwarded packets. This prevents the <b>traceroute</b> command from displaying the MPLS-enabled nodes beyond the device under the configuration.
<b>local</b>	(Optional) Disables the propagation of IP TTL to the MPLS header for only locally generated packets. This prevents the <b>traceroute</b> command from displaying the MPLS-enabled nodes beyond the device under the configuration.

## Command Default

Enabled

## Command Modes

Global configuration

## Command History

Release	Modification
Release 5.0.0	This command was introduced.

## Usage Guidelines

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

By default, the IP TTL is propagated to the MPLS header when IP packets enter the MPLS domain. Within the MPLS domain, the MPLS TTL is decremented at each MPLS hop. When an MPLS encapsulated IP packet exits the MPLS domain, the MPLS TTL is propagated to the IP header. When propagation is disabled, the MPLS TTL is set to 255 during the label imposition phase and the IP TTL is not altered.

## Task ID

Task ID	Operations
mpls-te	read, write

Task ID	Operations
mpls-ldp	read, write

## Examples

The following example shows how to disable IP TTL propagation:

```
RP/0/RP0/CPU0:router(config)# mpls ip-ttl-propagate disable
```

The following example shows how to disable IP TTL propagation for forwarded MPLS packets:

```
RP/0/RP0/CPU0:router(config)# mpls ip-ttl-propagate disable forwarded
```

The following example shows how to disable IP TTL propagation for locally generated MPLS packets:

```
RP/0/RP0/CPU0:router(config)# mpls ip-ttl-propagate disable local
```

# mpls label range

To configure the dynamic range of local labels available for use on packet interfaces, use the **mpls label range** command in global configuration mode. To return to the default behavior, use the **no** form of this command.

**mpls label range table** *table-id minimum maximum*

**no mpls label range table** *table-id minimum maximum*

## Syntax Description

<b>table</b> <i>table-id</i>	Identifies a specific label table; the global label table has table-id = 0. If no table is specified, the global table is assumed. Currently, you can specify table 0 only.
<i>minimum</i>	Smallest allowed label in the label space. Default is 16000.
<i>maximum</i>	Largest allowed label in the label space. Default is 1048575.

## Command Default

*table-id*: 0

*minimum*: 16000

*maximum*: 1048575

## Command Modes

Global configuration

## Command History

Release	Modification
Release 5.0.0	This command was introduced.

## Usage Guidelines

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

After configuring the **mpls label range** command, restart the router for the configuration to take effect.

The label range defined by the **mpls label range** command is used by all MPLS applications that allocate local labels (for dynamic label switching Label Distribution Protocol [LDP], MPLS traffic engineering, and so on).

Labels 0 through 15 are reserved by the Internet Engineering Task Force (IETF) (see the draft-ietf-mpls-label-encaps-07.txt for details) and cannot be included in the range using the **mpls label range** command.

Labels 16 through 15999 are reserved for Layer 2 VPN static pseudowires. You should not configure Layer 2 VPN static pseudowires which fall within the dynamic range. If more Layer 2 VPN static pseudowires are required, restrict the dynamic label range using this configuration.

**Note**

- Labels outside the current range and which are allocated by MPLS applications remain in circulation until released.
- You must understand the maximum labels that are supported for each platform versus the labels that are supported for the CLI.

**Task ID**

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

**Examples**

The following example shows how to configure the size of the local label space using a *minimum* of 16200 and a *maximum* of 120000:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls label range 16200 120000
```

**Related Commands**

Command	Description
<a href="#">show mpls label range, on page 17</a>	Displays the range of the MPLS local label space.

# show mpls forwarding

To display the contents of the MPLS Label Forwarding Information Base (LFIB), use the **show mpls forwarding** command in EXEC mode.

**show mpls forwarding** [**detail**] [**hardware**{**ingress** | **egress**}] [**interface** *type interface-path-id*] [**location** *node-id*] [**labels** *low-value* [ *high-value* ] ] [**prefix**{*network/mask*| **ipv4 unicast** *network/mask*} ] [**private**] [**summary**] [**tunnels** *tunnel-id*] [**vrf** *vrf-name*]

## Syntax Description

<b>detail</b>	(Optional) Displays information in long form (includes length of encapsulation, length of Media Access Control [MAC] string, maximum transmission unit [MTU], Packet switched, and label stack).
<b>hardware</b>	(Optional) Displays the hardware location entry.
<b>ingress</b>	(Optional) Reads information from the ingress PSE.
<b>egress</b>	(Optional) Reads information from the egress PSE.
<b>interface</b>	(Optional) Displays information for the specified interface.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or a virtual interface.  <b>Note</b> Use the <b>show interfaces</b> command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
<b>labels</b> <i>low-value</i> [ <i>high-value</i> ]	(Optional) Entries with a local labels range. Ranges for both <i>low-value</i> and <i>high-value</i> are 0 to 1048575.
<b>location</b> <i>node-id</i>	(Optional) Displays hardware resource counters on the designated node.
<b>prefix</b> <i>network/mask</i> [/length]	(Optional) Displays the destination address and mask/prefix length.  <b>Note</b> The forward slash (/) between <i>network</i> and <i>mask</i> is required.
<b>ipv4 unicast</b>	(Optional) Displays the IPv4 unicast address.
<b>private</b>	(Optional) Displays private information.
<b>summary</b>	(Optional) Displays summarized information.
<b>tunnels</b> <i>tunnel-id</i>	(Optional) Displays entries either for a specified label switch path (LSP) tunnel or all LSP tunnel entries.

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**vrf** *vrf-name* (Optional) Displays entries for VPN routing and forwarding (VRF).

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**Command Modes**

EXEC

**Command History**

Release	Modification
Release 5.0.0	This command was introduced.

**Usage Guidelines**

The optional keywords and arguments described allow specification of a subset of the entire MPLS forwarding table.

The *node-id* argument is entered in the *rack/slot/module* notation.

**Task ID**

Task ID	Operations
mpls-te	read, write
mpls-ldp	read, write
mpls-static	read, write

**Examples**

The following sample output is from the **show mpls forwarding** command using the **location** keyword and a specific node ID:

```
RP/0/RP0/CPU0:router# show mpls forwarding location 0/2/CPU0
```

Local Label	Outgoing Label	Outgoing Interface	Next Hop	Bytes Switched
16000	Unlabelled	ce01::ce01/128[V]	Gi0/1/0/0	ce01:10::2
16001	Aggregate	router: Per-VRF Aggr[V]	\	
		router 0		
16021	16020	P2MP TE:10	Gi0/2/0/3	172.99.1.2
	16040	P2MP TE:10	Gi0/2/0/3	172.99.2.2
	16045	P2MP TE:10	P00/1/0/4	172.16.1.2

The following sample output shows detailed information for the LSP tunnels:

```
RP/0/RP0/CPU0:router# show mpls forwarding prefix 10.241.4.0/24 detail
```

Local Label	Outgoing Label	Prefix or ID	Outgoing Interface	Next Hop	Bytes Switched
16057	16058	10.241.4.0/24	Gi0/1/0/23	10.114.4.11	0
Updated May 10 20:00:15.983					
MAC/Encaps: 14/18, MTU: 9202					
Label Stack (Top -> Bottom): { 16058 }					
Packets Switched: 0					

```

16058      10.241.4.0/24      Te0/4/0/0      10.114.8.11      0
Updated May 10 20:00:15.983
MAC/Encaps: 14/18, MTU: 9086
Label Stack (Top -> Bottom): { 16058 }
Packets Switched: 0

```

The following sample output shows the number of P2MP TE heads and midpoints and the number of P2MP route updates that are received from the MRIB from the **summary** keyword:

```
RP/0/RP0/CPU0:router# show mpls forwarding summary
```

```

Forwarding entries:
Label switching: 91647
MPLS TE tunnel head: 1351, protected: 1
MPLS TE midpoint: 0, protected: 0
MPLS TE internal: 1351, protected: 1
MPLS P2MP TE tunnel head: 499
MPLS P2MP TE tunnel midpoint/tail: 999 Forwarding updates:
messages: 3925
  p2p updates: 229115
  p2mp updates: 13519
    add/modify:12020, deletes:1499,
    dropped:0 (iir trigger drops:0) Labels in use:
Reserved: 3
Lowest: 0
Highest: 112979
Deleted stale label entries: 0

```

This table describes the significant fields shown in the display.

**Table 1: show mpls forwarding Field Descriptions**

Field	Description
Local Label	Label assigned by this router.
Outgoing Label	<p>Label assigned by the next hop or downstream peer. Some of the entries that display in this column are:</p> <p><b>Unlabeled</b></p> <p>No label for the destination from the next hop, or label switching is not enabled on the outgoing interface.</p> <p><b>Pop Label</b></p> <p>Next hop advertised an implicit-null label for the destination.</p>
Prefix or Tunnel ID	Address or tunnel to which packets with this label are going.
Outgoing Interface	Interface through which packets with this label are sent.
Next Hop	IP address of neighbor that assigned the outgoing label.
Bytes Switched	Number of bytes switched with this incoming label.



Field	Description
TO	Timeout: Indicated by an "*" if entry is being timed out in forwarding.
Mac/Encaps	Length in bytes of Layer 2 header, and length in bytes of packet encapsulation, including Layer 2 header and label header.
MTU	MTU <sup>1</sup> of labeled packet.
Label Stack	All the outgoing labels on the forwarded packet.
Packets Switched	Number of packets switched with this incoming label.
Label switching	Number of Label switching LFIB <sup>2</sup> forwarding entries.
IPv4 label imposition	Number of IPv4 label imposition forwarding entries (installed at ingress LSR).
MPLS TE tunnel head	Number of forwarding entries (installed at ingress LSR) on MPLS TE tunnel head.
MPLS TE fast-reroute	Number of forwarding entries (installed at PLR) for MPLS-TE fast reroute.
Forwarding updates	Number of forwarding updates sent from LSD (RP/DRP) to LFIB/MPLS (RP/DRP/LC) using BCDL mechanism, indicating the total number of updates and total number of BCDL messages.
Labels in use	Local labels in use (installed in LFIB). These usually indicate the lowest and highest label in use (allocated by applications). Furthermore, some reserved labels, such as explicit-nullv4, explicit-nullv6, are installed in the forwarding plane. The label range is 0 to 15.

<sup>1</sup> MTU = Maximum Transmission Unit.

<sup>2</sup> LFIB = Label Forwarding Information Base.

## Related Commands

Command	Description
<a href="#">show mpls forwarding exact-route</a> , on page 10	Displays the exact path for the source and destination address pair.

## show mpls forwarding exact-route

To display the exact path for the source and destination address pair, use the **show mpls forwarding exact-route** command in EXEC mode.

**show mpls forwarding exact-route** *label label-number* [**bottom-label** *value*] [**ipv4** *source-address destination-address*] [**ipv6** *source-address destination-address*] [**detail**] [**protocol** *protocol*] [**source-port** *source-port*] [**destination-port** *destination-port*] [**ingress-interface** *type interface-path-id*] [**location** *node-id*] [**policy-class** *value*] [**hardware** {**ingress** | **egress**}]

### Syntax Description

<b>label</b> <i>label-number</i>	Displays the exact path for a source and destination address pair.
<b>bottom-label</b> <i>value</i>	Displays the bottom label value. Range is 0 to 1048575.
<b>ipv4</b> <i>source-address destination-address</i>	Displays the exact path for IPv4 payload. The IPv4 source address in x.x.x.x format. The IPv4 destination address in x.x.x.x format.
<b>ipv6</b> <i>source-address destination-address</i>	Displays the exact path for IPv6 payload. The IPv6 source address in x:x::x format. The IPv6 destination address in x:x::x format.
<b>detail</b>	(Optional) Displays detailed information.
<b>protocol</b> <i>protocol</i>	(Optional) Displays the specified protocol for the route.
<b>source-port</b> <i>source-port</i>	Sets the UDP source port. The range is from 0 to 65535.
<b>destination-port</b> <i>destination-port</i>	Sets the UDP destination port. The range is from 0 to 65535.
<b>ingress-interface</b>	Sets the ingress interface.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or a virtual interface.  <b>Note</b> Use the <b>show interfaces</b> command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
<b>location</b> <i>node-id</i>	(Optional) Displays hardware resource counters on the designated node.
<b>policy-class</b> <i>value</i>	(Optional) Displays the policy-based tunnel selection (PBTS) to direct traffic into specific TE tunnels. The policy-class attribute maps the correct traffic class to this policy. The range for the policy-class value is from 1 to 7.
<b>hardware</b>	(Optional) Displays the hardware location entry.

<b>ingress</b>	(Optional) Reads information from the ingress PSE.
<b>egress</b>	(Optional) Reads information from the egress PSE.

**Command Default** No default behavior or values

**Command Modes** EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Release 5.0.0	This command was introduced.

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

The **show mpls forwarding exact-route** command displays information in long form and includes the following information:

- Encapsulation length
- Media Access Control (MAC) string length
- Maximum transmission unit (MTU)
- Packet switching information
- Label stacking information

<b>Task ID</b>	<b>Task ID</b>	<b>Operations</b>
	mpls-te	read, write
	mpls-ldp	read, write
	mpls-static	read, write

**Examples** The following shows a sample output from the **show mpls forwarding exact-route** command:

```
RP/0/RP0/CPU0:router# show mpls forwarding exact-route label 16000 ipv4 10.74.1.6 127.0.0.15
protocol tcp source-port 3503 destination-port 3503 ingress-interface pos 0/3/4/3
```

Local Label	Outgoing Label	Prefix or ID	Outgoing Interface	Next Hop	Bytes Switched
----------------	-------------------	-----------------	-----------------------	----------	-------------------

```

-----
16000 16001      5.5.5.5/32      PO0/1/5/1      1.24.1.192      N/A
Via: PO0/1/5/1, Next Hop: point2point
MAC/Encaps: 4/8, MTU: 1500
Label Stack (Top -> Bottom): { 16001 }

```

This table describes the significant fields shown in the display.

**Table 2: show mpls forwarding exact-route Field Descriptions**

Field	Description
Local Label	Label assigned by this router.
Outgoing Label	<p>Label assigned by the next hop or downstream peer. Some of the entries that display in this column are:</p> <p><b>Unlabeled</b></p> <p>No label for the destination from the next hop, or label switching is not enabled on the outgoing interface.</p> <p><b>Pop Label</b></p> <p>Next hop advertised an implicit-null label for the destination.</p>
Prefix or Tunnel ID	Address or tunnel to which packets with this label are going.
Outgoing Interface	Interface through which packets with this label are sent.
Next Hop	IP address of neighbor that assigned the outgoing label.
Bytes Switched	Number of bytes switched with this incoming label.
TO	Timeout: Indicated by an "*" if entry is being timed out in forwarding.
MAC/Encaps	Length in bytes of Layer 2 header, and length in bytes of packet encapsulation, including Layer 2 header and label header.
MTU	MTU <sup>3</sup> of labeled packet.
Label Stack	All the outgoing labels on the forwarded packet.
Packets Switched	Number of packets switched with this incoming label.
Label switching	Number of Label switching LFIB <sup>4</sup> forwarding entries.

Field	Description
IPv4 label imposition	Number of IPv4 label imposition forwarding entries (installed at ingress LSR).
MPLS TE tunnel head	Number of forwarding entries (installed at ingress LSR) on MPLS TE tunnel head.
MPLS TE fast-reroute	Number of forwarding entries (installed at PLR) for MPLS-TE fast reroute.
Forwarding updates	Number of forwarding updates sent from LSD (RP/DRP) to LFIB/MPLS (RP/DRP/LC) using BCDL mechanism, indicating the total number of updates and total number of BCDL messages.
Labels in use	Local labels in use (installed in LFIB). These usually indicate the lowest and highest label in use (allocated by applications). Furthermore, some reserved labels, such as explicit-nullv4, explicit-nullv6, are installed in the forwarding plane. The label range is 0 to 15.

<sup>3</sup> MTU = Maximum Transmission Unit.

<sup>4</sup> LFIB = Label Forwarding Information Base.

#### Related Commands

Command	Description
<a href="#">show mpls forwarding, on page 6</a>	Displays the contents of the MPLS LFIB.

# show mpls interfaces

To display information about one or more interfaces that have been configured for MPLS, use the **show mpls interfaces** command in EXEC mode.

**show mpls interfaces** [*type interface-path-id*] [**location** *node-id*] [**detail**]

## Syntax Description

<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or a virtual interface.  <b>Note</b> Use the <b>show interfaces</b> command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
<b>location</b> <i>node-id</i>	(Optional) Displays hardware resource counters on the designated node.
<b>detail</b>	(Optional) Displays detailed information for the designated node.

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

Release	Modification
Release 5.0.0	This command was introduced.

## Usage Guidelines

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

This command displays MPLS information about a specific interface or about all interfaces where MPLS is configured.

## Task ID

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

Task ID	Operations
mpls-static	read, write

## Examples

The following shows a sample output from the **show mpls interfaces** command:

```
RP/0/RP0/CPU0:router# show mpls interfaces
```

Interface	LDP	Tunnel	Enabled
POS0/4/0/0	Yes	Yes	Yes
POS0/4/0/1	Yes	Yes	Yes
POS0/4/0/2	Yes	Yes	Yes

The following shows a sample output from the **show mpls interfaces** command using the **detail** keyword:

```
RP/0/RP0/CPU0:router# show mpls interfaces detail
```

```
Interface POS0/4/0/0:
  LDP labelling enabled
  LSP labelling enabled (TE-Control)
  MPLS enabled
  MTU = 4474
Interface POS0/4/0/1:
  LDP labelling enabled
  LSP labelling enabled (TE-Control)
  MPLS enabled
  MTU = 4474
Interface POS0/4/0/2:
  LDP labelling enabled
  LSP labelling enabled (TE-Control)
  MPLS enabled
  MTU = 4474
```

The following shows a sample output from the **show mpls interfaces** command using the **location** keyword:

```
RP/0/RP0/CPU0:router# show mpls interfaces location pos 0/4/0/0
```

Interface	LDP	Tunnel	Enabled
POS0/4/0/0	Yes	Yes	Yes

```
RP/0/RP0/CPU0:router# show mpls interfaces pos 0/4/0/0 detail
```

```
Interface POS0/4/0/0:
  LDP labelling enabled
  LSP labelling enabled (TE-Control)
  MPLS enabled
  MTU = 4474
```

This table describes the significant fields in the sample display.

**Table 3: show mpls interfaces Command Field Descriptions**

Field	Description
LDP	State of LDP labelling.
Tunnel	State of LSP Tunnel labelling.

Field	Description
MTU	MTU <sup>5</sup> of labeled packet.
Caps	Capsulation switching chains installed on an interface.
M	MPLS switching capsulation/switching chains are installed on the interface and are ready to switch MPLS traffic.

<sup>5</sup> MTU = Maximum Transmission Unit.



# show mpls label range

To display the range of local labels available for use on packet interfaces, use the **show mpls label range** command in EXEC mode.

**show mpls label range**

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

**Command Default** No default behavior or values

**Command Modes** EXEC

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

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

You can use the **show mpls label range** command to configure a range for local labels that is different from the default range.

Task ID	Task ID	Operations
	mpls-te	read, write
	mpls-ldp	read, write
	mpls-static	read, write

**Examples** The following shows a sample output from the **show mpls label range** command:

```
RP/0/RP0/CPU0:router# show mpls label range
Range for dynamic labels: Min/Max: 16000/144000
```

This table describes the significant fields shown in the display.

**Table 4: show mpls label range Command Field Descriptions**

Field	Description
Range for dynamic labels	Minimum and maximum allowable range for local labels (which differs from the default range).

**Related Commands**

Command	Description
<a href="#">mpls label range, on page 4</a>	Configures a range of values for use as local labels.

# show mpls label table

To display the local labels contained in the MPLS label table, use the **show mpls label table** command in EXEC mode.

**show mpls label table** *table-index* [**application** *application*] [**label** *label-value*] [**summary**] [**detail**]

## Syntax Description

<i>table-index</i>	Index of the label table to display. The global label table is 0. Currently, you can specify table 0 only.
<b>application</b> <i>application</i>	(Optional) Displays all labels owned by the selected application. Options are: <b>bgp-ipv4</b> , <b>bgp-spr</b> , <b>bgp-vpn-ipv4</b> , <b>internal</b> , <b>ldp</b> , <b>none</b> , <b>l2vpn</b> , <b>static</b> , <b>te-control</b> , <b>te-link</b> , and <b>test</b> .
<b>label</b> <i>label-value</i>	(Optional) Displays a selected label based on the label value. Range is 0 to 1048575.
<b>summary</b>	(Optional) Displays a summary of local labels.
<b>detail</b>	(Optional) Displays detailed information for the MPLS label table.

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

Release	Modification
Release 3.9.0	The <b>detail</b> keyword was added.
Release 5.0.0	This command was introduced.

## Usage Guidelines

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



### Note

Labels 16 to 15999 are reserved for static Layer 2 VPN pseudowires.

**Task ID**

Task ID	Operations
mpls-te	read, write
mpls-ldp	read, write
mpls-static	read, write

**Examples**

The following shows a sample output from the **show mpls label table** command:

```
RP/0/RP0/CPU0:router# show mpls label table 0
```

Table	Label	Owner	State	Rewrite
0	0	LSD	InUse	Yes
0	1	LSD	InUse	Yes
0	2	LSD	InUse	Yes
0	3	LSD	InUse	Yes
0	16	TE-Link	InUse	Yes

This table describes the significant fields shown in the display.

**Table 5: show mpls label table Command Field Descriptions**

Field	Description
Table	Table ID.
Label	Label index.
Owner	Application that allocated the label. All labels displaying “InUse” state have an owner.

Field	Description
State	<p><b>InUse</b></p> <p>Label allocated and in use by an application.</p> <p><b>Alloc</b></p> <p>Label allocated but is not yet in use by an application.</p> <p><b>Pend</b></p> <p>Label was in use by an application that has terminated unexpectedly, and the application has not reclaimed the label.</p> <p><b>Pend-S</b></p> <p>Label was in use by an application, but the MPLS LSD (Label Switching Database) server has recently restarted and the application has not reclaimed the label.</p>
Rewrite	Number of initiated rewrites.

#### Related Commands

Command	Description
<a href="#">show mpls forwarding, on page 6</a>	Displays entries in the MPLS forwarding table. Label switching entries are indexed by their local label.
<a href="#">show mpls lsd applications, on page 22</a>	Displays MPLS applications that are registered with the MPLS LSD server.

# show mpls lsd applications

To display the MPLS applications registered with the MPLS Label Switching Database (LSD) server, use the **show mpls lsd applications** command in EXEC mode.

**show mpls lsd applications** [**application** *application*]

## Syntax Description

**application** *application* (Optional) Displays all labels owned by the selected application. Options are: **bgp-ipv4**, **bgp-spkr**, **bgp-vpn-ipv4**, **internal**, **ldp**, **none**, **l2vpn**, **static**, **te-control**, **te-link**, and **test**.

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

Release	Modification
Release 3.9.0	The <b>application</b> keyword was added.
Release 5.0.0	This command was introduced.

## Usage Guidelines

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

MPLS applications include Traffic Engineering (TE) control, TE Link Management, and label distribution protocol (LDP). The application must be registered with MPLS LSD for its features to operate correctly. All applications are clients (see the [show mpls lsd clients, on page 24](#) command), but not all clients are applications.

## Task ID

Task ID	Operations
mpls-te	read, write
mpls-ldp	read, write
mpls-static	read, write

## Examples

The following shows a sample output from the **show mpls lsd applications** command:

```
RP/0/RP0/CPU0:router# show mpls lsd applications
```

Type	State	RecoveryTime	Node
LDP	Active	300	0/0/CPU0
TE-Control	Active	100	0/0/CPU0
TE-Link	Active	600	0/0/CPU0

This table describes the significant fields shown in the display.

**Table 6: show mpls lsd applications Command Field Descriptions**

Field	Description
Type	LSD application type.
State	<p><b>Active</b></p> <p>Application registered with MPLS LSD and is functioning correctly.</p> <p><b>Recover</b></p> <p>Application registered with MPLS LSD and is recovering after recently restarting. In this state, the RecoveryTime value indicates how many seconds are left before the application becomes active.</p> <p><b>Zombie</b></p> <p>Application not reregistered after an unexpected termination. In this case, RecoveryTime indicates how many seconds are left before MPLS LSD gives up on the application.</p>
RecoveryTime	Seconds remaining before MPLS LSD gives up or resumes the application.
Node	Node expressed in standard <i>rack/slot/module</i> notation.

## Related Commands

Command	Description
<a href="#">show mpls lsd clients, on page 24</a>	Displays MPLS clients connected to the MPLS LSD server.

# show mpls lsd clients

To display the MPLS clients connected to the MPLS Label Switching Database (LSD) server, use the **show mpls lsd clients** command in EXEC mode.

**show mpls lsd clients**

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

**Command Default** No default behavior or values

**Command Modes** EXEC

Release	Modification
Release 5.0.0	This command was introduced.

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

MPLS clients include Traffic Engineering (TE) Control, TE Link Management, Label Distribution Protocol (LDP), and Bulk Content Downloader (BCDL) Agent. Not all clients are applications (see the **show mpls lsd applications** command), but all applications are clients.

Task ID	Operations
mpls-te	read, write
mpls-ldp	read, write
mpls-static	read, write

**Examples** The following shows a sample output from the **show mpls lsd clients** command:

```
RP/0/RP0/CPU0:router# show mpls lsd clients
```

Id	Services	Node
0	BA(p=none)	0/0/CPU0
1	A(TE-Link)	0/0/CPU0
2	A(LDP)	0/0/CPU0



```
3 A(TE-Control) 0/0/CPU0
```

The following table describes the significant fields shown in the display.

**Table 7: show mpls lsd clients Command Field Descriptions**

Field	Description
Id	Client identification number.
Services	A(xxx) means that this client is an application and xxx is the application name, BA(yyy) means that this client is a BCDL Agent and yyy is expert data. Depending on system conditions, there can be multiple BCDL Agent clients (this is normal).
Node	Node expressed in standard rack/slot/module notation.

#### Related Commands

Command	Description
show mpls lsd applications	Displays MPLS applications registered with the MPLS LSD server.

# show mpls traffic-eng fast-reroute database

To display the contents of the fast reroute (FRR) database, use the **show mpls traffic-eng fast-reroute database** command in EXEC mode.

**show mpls traffic-eng fast-reroute database** [*ip-address*] [*ip-address /length*] [**afi-all** { **safi-all** | **unicast** } {*ip-address* | *ip-address/length*}] [**backup-interface**] [**tunnel** *tunnel-id*] [**unresolved**] [**interface** *type interface-path-id*] [**ipv4** { **safi-all** | **unicast** } {*ip-address* | *ip-address/length*}] [**labels** *low-number high-number*] [**state** {**active** | **complete** | **partial** | **ready**}] [**role** {**head** | **midpoint**}] [**summary**] [**location** *node-id*]

## Syntax Description

<i>ip-address</i>	(Optional) IP address of the destination network.
<i>ip-address/length</i>	(Optional) Bit combination indicating the portion of the IP address that is being used for the subnet address.
<b>afi-all</b>	(Optional) Returns data for all specified address family identifiers.
<b>safi-all</b>	(Optional) Returns data for all sub-address family identifiers.
<b>unicast</b>	(Optional) Returns unicast data only.
<b>backup-interface</b>	(Optional) Displays entries with the specified backup interface.
<b>tunnel</b> <i>tunnel-id</i>	(Optional) Tunnel and tunnel ID to which packets with this label are going. The <b>summary</b> suboption is available.
<b>unresolved</b>	(Optional) Displays entries whose backup interface has not yet been fully resolved.
<b>interface</b>	(Optional) Displays entries with this primary outgoing interface. The <b>summary</b> keyword is available.
<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or a virtual interface.  <b>Note</b> Use the <b>show interfaces</b> command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
<b>ipv4</b>	(Optional) Displays only IPv4 data.
<b>labels</b>	(Optional) Displays database entries that possess in-labels assigned by this router (local labels). Specify either a starting value or a range of values. The <b>state</b> suboption is available.

<b>state</b>	(Optional) Filters the database according to the state of the entry:  <b>active</b>  FRR rewrite is in the forwarding active database (where it can be placed onto appropriate incoming packets).  <b>complete</b>  FRR rewrite is assembled, ready or active.  <b>partial</b>  FRR rewrite is fully created; its backup routing information is still incomplete.  <b>ready</b>  FRR rewrite was created but is not in the forwarding active state.
<b>role</b>	(Optional) Displays entries associated either with the tunnel <b>head</b> or tunnel <b>midpoint</b> . The <b>summary</b> suboption is available.
<b>summary</b>	(Optional) Displays summarized information about the FRR database.
<b>location</b> <i>node-id</i>	(Optional) Displays hardware resource counters on the designated node.

**Command Default** No default behavior or values

**Command Modes** EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Release 5.0.0	This command was introduced.

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

For fast reroute (FRR) information in regards to multicast label forwarding, see *Multicast Command Reference*.

If the location is specified, Fast-Reroute (FRR) entries for both Point-to-Point (P2P) and P2MP tunnels are available. If the location is not specified, only P2P tunnel entries are available.

## Task ID

Task ID	Operations
mpls-te	read

## Examples

The following shows a sample output from the **show mpls traffic-eng fast-reroute database** command:

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

```
Tunnel head FRR information:
Tunnel      Out intf/label    FRR intf/label    Status
-----
tt4000      PO0/3/0/0:34      tt1000:34         Ready
tt4001      PO0/3/0/0:35      tt1001:35         Ready
tt4002      PO0/3/0/0:36      tt1001:36         Ready
```



## Note

The Prefix field indicates the IP address where packets with this label are headed.

The following sample output displays filtering of the FRR database using the **backup-interface** keyword:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast database backup-interface
```

```
LSP midpoint FRR information:
LSP Identifier      Out Intf/      FRR Intf/      Status
                    Label          Label
-----
10.10.10.10 1006 [54]      Gi0/6/5/2:Pop  tt1060:Pop     Ready
```

The following sample output displays the FRR database filtered by the primary outgoing interface:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute database interface pos0/3/0/0
```

```
Tunnel head FRR information:
Tunnel      Out intf/label    FRR intf/label    Status
-----
tt4000      PO0/3/0/0:34      tt1000:34         Ready
tt4001      PO0/3/0/0:35      tt1001:35         Ready
tt4002      PO0/3/0/0:36      tt1001:36         Ready
```

The following sample output displays a summary of the FRR database with the role as head:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute database role head summary
```

```
Status      Count
-----
Active      0
Ready       3
Partial     0
```

The following sample output displays summarized information for the FRR database with the role as midpoint:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute database role midpoint summary
```

```
Status      Count
-----
Active      0
Ready       2
```

Partial 0

This table describes the significant fields shown in the display.

**Table 8: show mpls traffic-eng fast-reroute database Command Field Descriptions**

Field	Description
Tunnel	Short form of tunnel interface name.
Out intf/label	<p><b>Out interface</b></p> <p>Short name of the physical interface through which traffic goes to the protected link.</p> <p><b>Out label</b></p> <p>At a tunnel head, this is the label that the tunnel destination device advertises. The value “Unlabeled” indicates that no such label is advertised.</p> <p>At a tunnel midpoint, this is the label selected by the next hop device. The value “Pop Label” indicates that the next hop is the final hop for the tunnel.</p>
FRR intf/label	<p><b>Fast reroute interface</b></p> <p>Backup tunnel interface.</p> <p><b>Fast reroute label</b></p> <p>At a tunnel head, this is the label that the tunnel tail selected to indicate the destination network. The value “Unlabeled” indicates that no label is advertised.</p> <p>At a tunnel midpoint, this has the same value as the Out label.</p>

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

Field	Description
Status	State of the rewrite: partial, ready, or active.

**Related Commands**

Command	Description
<a href="#">show mpls traffic-eng fast-reroute log, on page 31</a>	Displays the contents of the FRR event log.

# show mpls traffic-eng fast-reroute log

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

**show mpls traffic-eng fast-reroute log** [*interface* *type* *interface-path-id* | *location* *node-id*]

## Syntax Description

<b>interface</b>	(Optional) Displays all FRR events for the selected protected interface.
<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface.  <b>Note</b> Use the <b>show interfaces</b> command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
<b>location</b> <i>node-id</i>	(Optional) Displays all FRR events that occurred on the selected node.

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

Release	Modification
Release 3.9.0	Sample output was modified.
Release 5.0.0	This command was introduced.

## Usage Guidelines

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

## Task ID

Task ID	Operations
mpls-te	read

**Examples**

The following shows a sample output from the **show mpls traffic-eng fast-reroute log** command:

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

Node          Protected LSPs  Rewrites When          Switching Time
Interface
-----
0/0/CPU0 PO0/1/0/1 1      1      Feb 27 19:12:29.064000 147
```

This table describes the significant fields shown in the display.

**Table 9: show mpls traffic-eng fast-reroute log Field Descriptions**

Field	Description
Node	Node address.
Protected Interface	Type and interface-path-id that is being protected.
LSPs	LSP <sup>6</sup> associated with each interface being protected.
Rewrites	Number of rewrites initiated on the LSP.
When	Date the interface was protected.
Switching Time	Time required to switch the protected interface in microseconds.

<sup>6</sup> LSP = Link-state Packet.

**Related Commands**

Command	Description
<a href="#">show mpls traffic-eng fast-reroute database</a> , on page 26	Displays the contents of the FRR database.