

MPLS Forwarding Commands

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 ASR 9000 Series Routers*.

- clear mpls forwarding counters, on page 2
- hw-module l3 feature per-prefix-egress-stats enable , on page 4
- mpls ip-ttl-propagate, on page 5
- mpls label range, on page 7
- mpls label-security, on page 9
- show mpls ea interfaces, on page 11
- show mpls forwarding, on page 12
- show mpls forwarding tunnels, on page 17
- show mpls forwarding exact-route, on page 20
- show mpls forwarding label-security interface, on page 24
- show mpls forwarding label-security summary location, on page 26
- show mpls forwarding labels, on page 27
- show mpls forwarding summary, on page 29
- show mpls interfaces, on page 33
- show mpls label range, on page 36
- show mpls label table, on page 38
- show mpls lsd applications, on page 41
- show mpls lsd clients, on page 43
- show mpls lsd forwarding labels, on page 45
- show mpls lsd forwarding summary, on page 46
- show mpls traffic-eng fast-reroute database, on page 47
- show mpls traffic-eng fast-reroute log, on page 52

clear mpls forwarding counters

To clear (set to zero) the MPLS forwarding counters, use the **clear mpls forwarding counters** command in EXEC modeXR EXEC mode.

clear mpls forwarding counters

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.2	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	No modification.

Usage Guidelines

Use the **clear mpls forwarding counters** command to set all MPLS forwarding counters to zero so that you can easily see the future changes.

Task ID

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

Examples

The following example shows sample output before and after clearing all counters:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding

  Local  Outgoing    Prefix            Outgoing     Next Hop        Bytes       T
  Label  Label       or ID             Interface                    Switched    O
  ----- -------- ------------- ---------- ------------ --------- -
  18     Exp-Null-v4 33.33.33.33/32    PO0/2/0/0    10.1.2.3        16762

RP/0/RP0RSP0/CPU0:router:hostname# clear mpls forwarding counters

RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding

  Local  Outgoing    Prefix            Outgoing     Next Hop        Bytes       T
  Label  Label       or ID             Interface                    Switched    O
  ----- -------- ------------- ---------- ------------ --------- -
  18     Exp-Null-v4 33.33.33.33/32    PO0/2/0/0    10.1.2.3        17000
```

Related Commands

Command	Description
show mpls forwarding, on page 12	Displays the contents of MPLS forwarding table.

hw-module l3 feature per-prefix-egress-stats enable

To enable per-prefix egress statistics collection on the router, use the **hw-module l3 feature per-prefix-egress-stats enable** command in Global Configuration Mode.

hw-module l3 feature per-prefix-egress-stats enable

This command has no keywords or arguments.

Command Default

Per-prefix statistics collection is disabled by default.

Command Modes

Global Configuration Mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

You must reload the router after you change the statistics collection mode.

Task ID

Task ID	Operation
root-lr	read, write

Example

The following example shows you how to enable per-prefix egress statistics collection.

```
Router(config)#hw-module l3 feature per-prefix-egress-stats enable
Router(config)#commit
Router(config)#exit
Router#reload location all
```

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 modeXR Config mode.

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

Syntax Description

disable	Disables the propagation of IP TTL to and from the MPLS header for both forwarded and local packets.
forwarded	(Optional) Disables the propagation of IP TTL to and from the MPLS headed for only the forwarded packets. This prevents the **traceroute** command from displaying the MPLS-enabled nodes beyond the device under the configuration.
local	(Optional) Disables the propagation of IP TTL to the MPLS header for only locally generated packets. This prevents the **traceroute** 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 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	Both **forwarded** and **local** keywords were added as optional.

Usage Guidelines

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.

BFD multipath session hosted on an ASR 9000 Ethernet Line Card does not come up if the router has **mpls ip-ttl-propagate disable** command configured.

Task ID

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

Examples

The following example shows how to disable IP TTL propagation:

```
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls ip-ttl-propagate disable
```

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

```
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls ip-ttl-propagate disable forwarded
```

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

```
RP/0/RP0RSP0/CPU0:router:hostname(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 modeXR Config mode.

mpls label range table *table-id minimum maximum*

Syntax Description

table *table-id*	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.
minimum	Smallest allowed label in the label space. Default is 16000.
maximum	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 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.

Usage Guidelines

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.

The default label limit is 273999 when ASR 9000 Ethernet Line Card and ASR 9000 Enhanced Ethernet Line Card are installed.

The maximum allowed label limit is 1000000 when ASR 9000 Enhanced Ethernet Line Card is used.



Note

- Labels outside the current range and which are allocated by MPLS applications remain in circulation until released.
- The maximum labels that are available are 144K.
- You must understand the maximum labels that are supported for each platform versus the labels that are supported for the CLI.



Note Restart the router after changing the mpls label range.

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/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls label range 16200 120000
```

Related Commands

Command	Description
show mpls label range, on page 36	Displays the range of the MPLS local label space.

mpls label-security

To configure the MPLS label security for the interface, use the **mpls label-security** command in interface configuration mode.

mpls label-security multi-label-packet [drop] rpf

Syntax Description

multi-label-packet	Handles incoming packets with multiple labels on the stack.
drop	Drops packets with multiple labels on the stack.
rpf	Checks for RPF label on incoming packets.

Command Modes

Interface configuration.

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of an MPLS label security information.

Task ID

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

Examples

This example shows how to configure MPLS label RPF check:

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)#interface tunnel-te 1
RP/0/RP0RSP0/CPU0:router:hostname(config-if)#mpls label-security rpf
```

Related Commands

Command	Description
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls forwarding summary, on page 29	Displays the contents of the MPLS label security information.
show mpls forwarding label-security interface, on page 24	Display MPLS label interface security information.
show mpls forwarding label-security summary location, on page 26	Displays MPLS label security information summary.

Command	Description
show mpls ea interfaces, on page 11	Displays the interface label security information.
show mpls lsd forwarding labels, on page 45	Displays the LSD label RPF information.
show mpls lsd forwarding summary, on page 46	Display the LSD label RPF summary information.

show mpls ea interfaces

To display the interface label security information, use the **show mpls ea interfaces**command in EXEC modeXR EXEC mode.

show mpls ea interface [**location** *node-id*]

Syntax Description

location *node-id*	Displays hardware resource counters on the designated node.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of the interface label security information.

Task ID

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

Examples

The following sample output is from the **show mpls forwarding label-security interface** command and specific interface and location:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls ea interfaces location 0/1/CPU0
Interface      IFH         MTU  Flags      Type
-------------- ----------- ----- ---------- ----------
FI0/1/CPU0     0x02000080  8000 0x01000000 0x0000001b
tt1            0x08000320  1500 0x01000000 0x00000024
```

Related Commands

Command	Description
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls forwarding summary, on page 29	Displays the contents of the MPLS label security information.

show mpls forwarding

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

detail	(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).
hardware	(Optional) Displays the hardware location entry.
ingress	(Optional) Reads information from the ingress PSE.
egress	(Optional) Reads information from the egress PSE.
interface	(Optional) Displays information for the specified interface.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or a virtual interface. **Note** Use the **show interfaces** command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
labels *low-value* [*high-value*]	(Optional) Entries with a local labels range. Ranges for both *low-value* and *high-value* are 0 to 1048575.
location *node-id*	(Optional) Displays hardware resource counters on the designated node.
prefix *network/mask / length*	(Optional) Displays the destination address and mask/prefix length. **Note** The forward slash (/) between *network* and *mask* is required.
ipv4 unicast	(Optional) Displays the IPv4 unicast address.
private	(Optional) Displays private information.
summary	(Optional) Displays summarized information.
tunnels *tunnel-id*	(Optional) Displays entries either for a specified label switch path (LSP) tunnel or all LSP tunnel entries.
vrf *vrf-name*	(Optional) Displays entries for VPN routing and forwarding (VRF).

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	The **hardware**, **egress**, and **ingress** keywords were added. The **ipv4** and **unicast** keywords were added.

Usage Guidelines

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

Note When the **show mpls forwarding detail** command is executed with the **location** keyword (for example, with the address, 0/1/cpu0), it displays the forwarding information available on this node. If this node hosts a displayed interface, then the FIB displays a configured MTU; otherwise, it displays the default value of 1500. This is because in Cisco IOS XR software, interface information is available only on nodes hosting the interface. Note that for bundle interfaces, the information is available in line cards with bundle-member links. If the location is not specified, the FIB displays the data from the node where the interface is created. For physical interfaces, this **location** keyword value would match the actual address; therefore, FIB displays correct information. It is different in the case of bundles--bundles are created on RP, but located on LC(s); therefore, you would see default values. This is also applicable to any per-interface data; for example, adjacencies.

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/RP0RSP0/CPU0:router:hostname# show mpls forwarding location 0/2/CPU0

  Local  Outgoing    Outgoing     Next Hop                        Bytes
  Label  Label       Interface                                    Switched
  ------ ----------- ------------ --------------- ---------------------------
  16000  Unlabelled  ce01::ce01/128[V]  Gi0/1/0/0    ce01:10::2      0
  16001  Aggregate   router: Per-VRF Aggr[V]   \
                                    router 0
  16021  16020       P2MP TE:10     Gi0/2/0/3    172.99.1.2      13912344
         16040       P2MP TE:10     Gi0/2/0/3    172.99.2.2      13912344
         16045       P2MP TE:10     PO0/1/0/4    172.16.1.2      13912344
```

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

```
RP/0/RP0RSP0/CPU0:router:hostname#  show mpls forwarding prefix 10.241.4.0/24 detail

Local  Outgoing    Prefix             Outgoing     Next Hop        Bytes
Label  Label       or ID              Interface                    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/RP0RSP0/CPU0:router:hostname# 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	Label assigned by the next hop or downstream peer. Some of the entries that display in this column are: **Unlabeled** No label for the destination from the next hop, or label switching is not enabled on the outgoing interface. **Pop Label** Next hop advertised an implicit-null label for the destination.
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[1] 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[2] 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.

[1] MTU = Maximum Transmission Unit.
[2] LFIB = Label Forwarding Information Base.

Related Commands

Command	Description
show mpls forwarding exact-route, on page 20	Displays the exact path for the source and destination address pair.

show mpls forwarding tunnels

To display the contents of the **MPLS** forwarding tunnel, use the **show mpls forwarding tunnel** command in EXEC modeXR EXEC mode.

show mpls forwarding tunnels [**detail**][**tunnels** *tunnel-id*] [**vrf** *vrf-name*]

Syntax Description

detail	(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).
tunnels *tunnel-id*	(Optional) Displays entries either for a specified label switch path (LSP) tunnel or all LSP tunnel entries.
vrf *vrf-name*	(Optional) Displays entries for VPN routing and forwarding (VRF).

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	The **hardware**, **egress**, and **ingress** keywords were added. The **ipv4** and **unicast** keywords were added.
Release 5.3.2	This command was introduced.

Usage Guidelines

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

Note When the **show mpls forwarding tunnels detail** command is executed with the **location** keyword

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 tunnels** command using the **location** keyword and a specific node ID:

```
show mpls forwarding tunnels

RP/0/RSP0/CPU0:PE1#sh mpls forwarding tunnels 1999 detail
Thu Jul 23 22:56:09.726 PDT
Tunnel        Outgoing    Outgoing     Next Hop        Bytes
Name          Label       Interface                    Switched
------------- ----------- ------------ --------------- ------------
tt1999        50045       BE10         point2point     0
     Updated: Jul 23 20:04:57.416
     Version: 82681, Priority: 2
     Label Stack (Top -> Bottom): { 50045 }
     Local Label: 27972
     NHID: 0x0, Path idx: 0, Backup path idx: 0, Weight: 0
     MAC/Encaps: 14/18, MTU: 1500
     Packets Switched: 0

  Interface Handle: 0x0801f4a0, Local Label: 27972
  Forwarding Class: 0, Weight: 0
  Packets/Bytes Switched: 7045837/7116295370

RP/0/RSP0/CPU0:PE1#sh mpls forwarding tunnels 1999 detail location 0/0/CPU0
Thu Jul 23 22:56:14.526 PDT
Tunnel        Outgoing    Outgoing     Next Hop        Bytes
Name          Label       Interface                    Switched
------------- ----------- ------------ --------------- ------------
tt1999        50045       BE10         point2point     0
     Updated: Jul 23 20:04:57.640
     Version: 82681, Priority: 2
     Label Stack (Top -> Bottom): { 50045 }
     Local Label: 27972
     NHID: 0x0, Path idx: 0, Backup path idx: 0, Weight: 0
     MAC/Encaps: 14/18, MTU: 1500
     Packets Switched: 0

  Interface Handle: 0x0801f4a0, Local Label: 27972
  Forwarding Class: 0, Weight: 0
 Packets/Bytes Switched: 7045837/7116295370

RP/0/RSP0/CPU0:PE1#sh mpls forwarding tunnels 1999
Thu Jul 23 22:56:19.717 PDT
Tunnel        Outgoing    Outgoing     Next Hop        Bytes
Name          Label       Interface                    Switched
------------- ----------- ------------ --------------- ------------
tt1999        50045       BE10         point2point     0
```

Related Commands

Command	Description
show mpls forwarding exact-route, on page 20	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 modeXR EXEC mode.

show mpls forwarding exact-route label *label-number* {**entropy label** *entropy-label-value*} {**bottom-label** *value* | **ipv4** *source-address destination-address* | **ipv6***source-addressdestination-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

label *label-number*	Displays the exact path for a source and destination address pair.
entropy label *entropy-label-value*	Sets the entropy label value for enhanced load balancing. The range is from 16 to 1048575.
bottom-label *value*	Displays the bottom label value. Range is 0 to 1048575.
ipv4 *source-address destination-address*	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.
ipv6 *source-address destination-address*	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.
detail	(Optional) Displays detailed information.
protocol *protocol*	(Optional) Displays the specified protocol for the route.
source-port *source-port*	Sets the UDP source port. The range is from 0 to 65535.
destination-port *destination-port*	Sets the UDP destination port. The range is from 0 to 65535.
ingress-interface	Sets the ingress interface.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or a virtual interface. **Note** Use the **show interfaces** command to see a list of all possible interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	(Optional) Displays hardware resource counters on the designated node.
policy-class *value*	(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.
hardware	(Optional) Displays the hardware location entry.

ingress	(Optional) Reads information from the ingress PSE.
egress	(Optional) Reads information from the egress PSE.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.2	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	The following keywords and arguments were added: • **detail** keyword • **location** keyword and *node-id* argument • **policy-class** keyword and *value* argument • **hardware**, **ingress**, and **egress** keywords

Usage Guidelines

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

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 forwarding exact-route** command:

```
RP/0/RP0RSP0/CPU0:router:hostname# 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  Outgoing    Prefix             Outgoing     Next Hop        Bytes
  Label  Label       or ID              Interface                    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	Label assigned by the next hop or downstream peer. Some of the entries that display in this column are: **Unlabeled** No label for the destination from the next hop, or label switching is not enabled on the outgoing interface. **Pop Label** Next hop advertised an implicit-null label for the destination.
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[3] 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[4] forwarding entries.
IPv4 label imposition	Number of IPv4 label imposition forwarding entries (installed at ingress LSR).

Field	Description
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.

[3] MTU = Maximum Transmission Unit.
[4] LFIB = Label Forwarding Information Base.

Related Commands

Command	Description
show mpls forwarding, on page 12	Displays the contents of the MPLS LFIB.

show mpls forwarding label-security interface

To display the contents of the MPLS label interface security information, use the **show mpls forwarding label-security interface**command inEXEC modeXR EXEC mode.

show mpls forwarding label-security[**interface** *type* *interface-path-id*] [**location** *node-id*]

Syntax Description

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

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of an MPLS label security information.

Task ID

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

Examples

The following sample output is from the **show mpls forwarding label-security interface** command and specific interface and location:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding label-security interface
GigabitEthernet location 0/1/CPU0
```

Related Commands

Command	Description
show mpls forwarding summary, on page 29	Displays the contents of the MPLS label security information.
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls forwarding label-security summary location, on page 26	Displays MPLS label security information summary.

show mpls forwarding label-security summary location

To display the contents of the MPLS label security information summary, use the **show mpls forwarding label-security summary location**command in EXEC modeXR EXEC mode.

show mpls forwarding label-security summary location *node-id*

Syntax Description

location*node-id*	Displays label security information on the designated node.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of an MPLS label security information.

Task ID

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

Examples

The following sample output is from the **show mpls forwarding label-security summary location** command and a specific location:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding label-security summary location
0/1/CPU0
```

Related Commands

Command	Description
show mpls forwarding summary, on page 29	Displays the contents of the MPLS label security information.
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls forwarding label-security interface, on page 24	Display MPLS label interface security information.

show mpls forwarding labels

To display the contents of the MPLS label RPF information, use the **show mpls forwarding labels**command in EXEC modeXR EXEC mode.

show mpls forwarding [**labels** *low-value high-value*][**detail**] **[rpf]**

Syntax Description

labels*low-value high-value*	(Optional) Entries with a local labels range. Ranges for both *low-value* and *high-value* are 0 to 1048575.
detail	
rpf	(Optional) Displays label RPF information.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of MPLS label security and RPF information.

Task ID

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

Examples

The following sample output is from the **show mpls forwarding labels** command using the **rpf**:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding labels rpf
Forwarding entries:
   Label switching: 0, protected: 0
   MPLS TE tunnel head: 0, protected: 0
   MPLS TE midpoint: 0, protected: 0
   MPLS TE internal: 0, protected: 0
   MPLS P2MP TE tunnel head: 0
   MPLS P2MP TE tunnel midpoint/tail: 0
   MPLS P2MP MLDP tunnel head: 0
   MPLS P2MP MLDP tunnel midpoint/tail: 0
Forwarding updates:
   messages: 2
      p2p updates: 4
Labels in use:
   Reserved: 4
```

```
   Lowest: 0
   Highest: 13
   Deleted stale label entries: 0

Pkts dropped:    0
Pkts fragmented: 0
Failed lookups:  0
```

Related Commands

Command	Description
show mpls forwarding summary, on page 29	Displays the contents of the MPLS label security information.
show mpls forwarding label-security interface, on page 24	Display MPLS label interface security information.
show mpls forwarding label-security summary location, on page 26	Displays MPLS label security information summary.

show mpls forwarding summary

To display the contents of the MPLS label security information, use the **show mpls forwarding summary**command in EXEC modeXR EXEC mode.

show mpls forwarding summary [**debug**] [**location** *node-id*] **no-counters private rpf**

Syntax Description

debug	(Optional) Displays the information for internal debugging in the command output.
location*node-id*	(Optional) Displays hardware resource counters on the designated node.
no-counters	(Optional) Skips displaying counters.
private	(Optional) Displays private information.
rpf	(Optional) Displays label RPF information.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of an MPLS label security information.

Task ID

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

Examples

The following sample output is from the **show mpls forwarding summary** command using the **debug** keyword:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding summary debug
Forwarding entries:
   Label switching: 0, protected: 0
   MPLS TE tunnel head: 0, protected: 0
   MPLS TE midpoint: 0, protected: 0
   MPLS TE internal: 0, protected: 0
   MPLS P2MP TE tunnel head: 0
   MPLS P2MP TE tunnel midpoint/tail: 0
   MPLS P2MP MLDP tunnel head: 0
   MPLS P2MP MLDP tunnel midpoint/tail: 0
Forwarding updates:
   messages: 2
      p2p updates: 4
Labels in use:
```

```
   Reserved: 4
   Lowest: 0
   Highest: 13
   Deleted stale label entries: 0

Pkts dropped:    0
Pkts fragmented: 0
Failed lookups:  0
```

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

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding summary location 0/1/CPU0
Forwarding entries:
   Label switching: 0, protected: 0
   MPLS TE tunnel head: 0, protected: 0
   MPLS TE midpoint: 0, protected: 0
   MPLS TE internal: 0, protected: 0
   MPLS P2MP TE tunnel head: 0
   MPLS P2MP TE tunnel midpoint/tail: 0
   MPLS P2MP MLDP tunnel head: 0
   MPLS P2MP MLDP tunnel midpoint/tail: 0
Forwarding updates:
   messages: 2
      p2p updates: 4
Labels in use:
   Reserved: 4
   Lowest: 0
   Highest: 13
   Deleted stale label entries: 0

Pkts dropped:    0
Pkts fragmented: 0
Failed lookups:  0
```

The following sample output is from the **show mpls forwarding summary** command using the **no-counters**:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding summary no-counters
Forwarding entries:
   Label switching: 0, protected: 0
   MPLS TE tunnel head: 0, protected: 0
   MPLS TE midpoint: 0, protected: 0
   MPLS TE internal: 0, protected: 0
   MPLS P2MP TE tunnel head: 0
   MPLS P2MP TE tunnel midpoint/tail: 0
   MPLS P2MP MLDP tunnel head: 0
   MPLS P2MP MLDP tunnel midpoint/tail: 0
Forwarding updates:
   messages: 2
      p2p updates: 4
Labels in use:
   Reserved: 4
   Lowest: 0
   Highest: 13
   Deleted stale label entries: 0
```

The following sample output is from the **show mpls forwarding summary** command using the **private**:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding summary private
Forwarding entries:
   Label switching: 0, protected: 0
   MPLS TE tunnel head: 0, protected: 0
   MPLS TE midpoint: 0, protected: 0
   MPLS TE internal: 0, protected: 0
   MPLS P2MP TE tunnel head: 0
   MPLS P2MP TE tunnel midpoint/tail: 0
   MPLS P2MP MLDP tunnel head: 0
   MPLS P2MP MLDP tunnel midpoint/tail: 0
Forwarding updates:
   messages: 2
      p2p updates: 4
Labels in use:
   Reserved: 4
   Lowest: 0
   Highest: 13
   Deleted stale label entries: 0
Path count:
   Unicast: 0

Pkts dropped:    0
Pkts fragmented: 0
Failed lookups:  0
fwd-flags: 0x5, ttl-expire-pop-cnt: 0
```

The following sample output is from the **show mpls forwarding summary** command using the **rpf**:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls forwarding summary rpf
Forwarding entries:
   Label switching: 0, protected: 0
   MPLS TE tunnel head: 0, protected: 0
   MPLS TE midpoint: 0, protected: 0
   MPLS TE internal: 0, protected: 0
   MPLS P2MP TE tunnel head: 0
   MPLS P2MP TE tunnel midpoint/tail: 0
   MPLS P2MP MLDP tunnel head: 0
   MPLS P2MP MLDP tunnel midpoint/tail: 0
Forwarding updates:
   messages: 2
      p2p updates: 4
Labels in use:
   Reserved: 4
   Lowest: 0
   Highest: 13
   Deleted stale label entries: 0

Pkts dropped:    0
Pkts fragmented: 0
Failed lookups:  0
```

This table describes the significant fields shown in the display.

Table 3: show mpls forwarding summary Field Descriptions

Field	Description
Label switching	Number of Label switching Label Forwarding Information Base (LFIB) forwarding entries.

Field	Description
MPLS TE tunnel head	Number of forwarding entries (installed at ingress LSR) on MPLS TE tunnel head.
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.

Related Commands

Command	Description
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls forwarding label-security interface, on page 24	Display MPLS label interface security information.
show mpls forwarding label-security summary location, on page 26	Displays MPLS label security information summary.
show mpls ea interfaces, on page 11	Displays the interface label security information.
show mpls lsd forwarding labels, on page 45	Displays the LSD label RPF information.
show mpls lsd forwarding summary, on page 46	Display the LSD label RPF summary information.

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 modeXR EXEC mode.

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

Syntax Description

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

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 6.3.3	The output does not display tunnel statistics.

Usage Guidelines

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

From Release 6.3.3 onwards, the **show mpls interface** command output does not display tunnel statistics. To view the tunnel statistics, use the **show mpls traffic-eng tunnels** command.

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 interfaces** command:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls interfaces

Interface                  LDP      Tunnel   Static   Enabled
-------------------------- -------- -------- -------- --------
TenGigE0/3/2/1             No       Yes      No       Yes
TenGigE0/3/1/1             Yes      Yes      No       Yes
TenGigE0/2/0/3             Yes      No       No       Yes
GigabitEthernet0/1/3/1     Yes      No       No       Yes
Bundle-Ether18             Yes      Yes      No       Yes
Bundle-Ether150            Yes      Yes      No       Yes
Bundle-Ether5              Yes      Yes      No       Yes
Bundle-Ether2              Yes      Yes      No       Yes
HundredGigE0/6/3/1         Yes      Yes      No       Yes
TenGigE0/5/4/2             Yes      Yes      No       Yes
HundredGigE0/6/5/0         Yes      Yes      No       Yes
HundredGigE0/6/3/1         Yes      Yes      No       Yes
```

Note The above command output doesn not show tunnel information.

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

```
RP/0/RP0RSP0/CPU0:router:hostname# 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/RP0RSP0/CPU0:router:hostname# 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/RP0RSP0/CPU0:router:hostname# show mpls interfaces location pos 0/4/0/0

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

RP/0/RP0RSP0/CPU0:router:hostname# 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 4: show mpls interfaces Command Field Descriptions

Field	Description
LDP	State of LDP labelling.
Tunnel	State of LSP Tunnel labelling.
MTU	MTU[5] 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.

[5] 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 modeXR EXEC mode.

show mpls label range

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.

Usage Guidelines

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/RP0RSP0/CPU0:router:hostname# show mpls label range
```

```
Range for dynamic labels: Min/Max: 16000/144000
```

This table describes the significant fields shown in the display.

Table 5: 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
mpls label range, on page 7	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 modeXR EXEC mode.

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

Syntax Description

table-index	Index of the label table to display. The global label table is 0. Currently, you can specify table 0 only.
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**.
label *label-value*	(Optional) Displays a selected label based on the label value. Range is 0 to 1048575.
summary	(Optional) Displays a summary of local labels.
detail	(Optional) Displays detailed information for the MPLS label table.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	The **detail** keyword was added.

Usage Guidelines

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/RP0RSP0/CPU0:router:hostname# 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 6: 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.
State	**InUse** Label allocated and in use by an application. **Alloc** Label allocated but is not yet in use by an application. **Pend** Label was in use by an application that has terminated unexpectedly, and the application has not reclaimed the label. **Pend-S** 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.
Rewrite	Number of initiated rewrites.

Related Commands

Command	Description
show mpls forwarding, on page 12	Displays entries in the MPLS forwarding table. Label switching entries are indexed by their local label.
show mpls lsd applications, on page 41	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 modeXR 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

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.9.0	The **application** keyword was added.

Usage Guidelines

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 43 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/RP0RSP0/CPU0:router:hostname# 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 7: show mpls lsd applications Command Field Descriptions

Field	Description
Type	LSD application type.
State	**Active** Application registered with MPLS LSD and is functioning correctly. **Recover** 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. **Zombie** 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.
RecoveryTime	Seconds remaining before MPLS LSD gives up or resumes the application.
Node	Node expressed in standard *rack*/*slot*/*module* notation.

Related Commands

Command	Description
show mpls lsd clients, on page 43	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 modeXR EXEC mode.

show mpls lsd clients

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	No modification.

Usage Guidelines

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

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/RP0RSP0/CPU0:router:hostname# 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 8: 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 lsd forwarding labels

To display the LSD label RPF information, use the **show mpls lsd forwarding labels**command in EXEC modeXR EXEC mode.

show mpls lsd forwarding [**labels** *low-value high-value*] [**location** *node-id*]

Syntax Description

labels*low-value high-value*	(Optional) Entries with a local labels range. Ranges for both *low-value* and *high-value* are 0 to 1048575.
location*node-id*	Displays hardware resource counters on the designated node.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Task ID

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

Examples

The following sample output is from the **show mpls lsd forwarding labels** command using a specific location:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls lsd forwarding labels 1 13 detail location
0/1/CPU0
```

Related Commands

Command	Description
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls lsd forwarding summary, on page 46	Display the LSD label RPF summary information.

show mpls lsd forwarding summary

To display the LSD label RPF information, use the **show mpls lsd forwarding summary**command in EXEC modeXR EXEC mode.

show mpls lsd forwarding summary [**location** *node-id*]

Syntax Description

location*node-id*	Displays hardware resource counters on the designated node.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

The optional keywords and arguments described allow display of the interface label security information.

Task ID

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

Examples

The following sample output is from the **show mpls lsd forwarding summary** command and a specific location:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls lsd forwarding summary location 0/1/CPU0
Interface      IFH         MTU  Flags      Type
-------------- ----------- ----- ---------- ----------
FI0/1/CPU0     0x02000080  8000 0x01000000 0x0000001b
tt1            0x08000320  1500 0x01000000 0x00000024
```

Related Commands

Command	Description
show mpls forwarding labels, on page 27	Display MPLS label RPF information.
show mpls forwarding summary, on page 29	Displays the contents of the MPLS label security information.
show mpls lsd forwarding labels, on page 45	Displays the LSD label RPF information.

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 modeXR 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**] [**fullname**] [**location** *node-id*]

Syntax Description

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

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

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	No modification.
Release 7.5.4	The **fullname** keyword was added to the command.

Usage Guidelines

For fast reroute (FRR) information in regards to multicast label forwarding, see *Cisco ASR 9000 Series Aggregation Services Router 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.

The **show mpls traffic-eng fast-reroute database** command when used with the **fullname** option, displays a complete name of the named interfaces in the output.

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/RP0RSP0/CPU0:router:hostname# 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/RP0RSP0/CPU0:router:hostname# 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/RP0RSP0/CPU0:router:hostname# 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/RP0RSP0/CPU0:router:hostname# 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/RP0RSP0/CPU0:router:hostnamer# show mpls traffic-eng fast-reroute database role midpoint
 summary

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

This example displays entries associated with the midpoint tunnel on the designated node with a complete name of the interfaces using the **fullname** option:

```
Router# show mpls traffic-eng fast-reroute database role midpoint fullname location 0/0/CPU0

Wed Feb  1 13:55:43.534 EST
LSP midpoint FRR information:
LSP identifier                                        In-label Out Intf : Label
        FRR Intf : Label                          Status
------------------------------------------------------ --------
-------------------------------- ---------------------------------------- -------
R1_t1                                                 24005    GigabitEthernet0/2/0/3:24005
     tunnel-te10000:Pop                          Ready
Router#
```

This table describes the significant fields shown in the display.

Table 9: show mpls traffic-eng fast-reroute database Command Field Descriptions

Field	Description
Tunnel	Short form of tunnel interface name.

Field	Description
Out intf/label	**Out interface** Short name of the physical interface through which traffic goes to the protected link. **Out label** At a tunnel head, this is the label that the tunnel destination device advertises. The value "Unlabeled" indicates that no such label is advertised. 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.
FRR intf/label	**Fast reroute interface** Backup tunnel interface. **Fast reroute label** 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. At a tunnel midpoint, this has the same value as the Out label.
Status	State of the rewrite: partial, ready, or active.

Related Commands

Command	Description
#unique_111	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 modeXR EXEC mode.

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

Syntax Description

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

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	No modification.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	Sample output was modified.

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/RP0RSP0/CPU0:router:hostname# show mpls traffic-eng fast-reroute log

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

This table describes the significant fields shown in the display.

Table 10: 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[6] 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.

[6] LSP = Link-state Packet.

Related Commands

Command	Description
show mpls traffic-eng fast-reroute database, on page 47	Displays the contents of the FRR database.