MPLS Forwarding Commands on Cisco IOS XR Software

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

For detailed information about MPLS concepts, configuration tasks, and examples, refer to the *Cisco IOS XR MPLS Configuration Guide*.

clear mpls forwarding counters

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

clear mpls forwarding counters

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

Use the **clear mpls forwarding counters** command to set all MPLS forwarding counters to zero so that you can easily see 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/RP0/CPU0:router# 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/RP0/CPU0:router# clear mpls forwarding counters

RP/0/RP0/CPU0:router# 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	Displays the contents of MPLS forwarding table.

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

no mpls ip-ttl-propagate

Syntax Description

disable	Stops the propagation of IP TTL to and from the MPLS header.

Defaults

Enabled

Command Modes

Global configuration

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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
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
```

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

table *table-id*	(Optional) 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.

Defaults

table-id: 0

minimum: 16000

maximum: 1048575

Command Modes

Global configuration

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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 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 L2VPN static pseudowires. You should not configure L2VPN static pseudowires which fall within the dynamic range. If more L2VPN 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.

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
show mpls label range	Displays the range of the MPLS local label space.

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

table *table-id*	(Optional) 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.

Defaults

table-id: 0

minimum: 16000

maximum: 1048575

Command Modes

Global configuration

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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 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 L2VPN static pseudowires. You should not configure L2VPN static pseudowires which fall within the dynamic range. If more L2VPN 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.

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
show mpls label range	Displays the range of the MPLS local label space.

mpls mtu

To configure the maximum packet size or maximum transmission unit (MTU) size on an MPLS interface, use the **mpls mtu** command in global configuration mode. To disable this feature, use the **no** form of this command.

mpls mtu *bytes*

no mpls mtu *bytes*

Syntax Description

bytes	MTU size, in bytes. The range is from 68 to 65535.

Defaults

The default MTU value is 1500.

Command Modes

Global configuration

Command History

Release	Modification
Release 3.6.0	This command was introduced on the Cisco XR 12000 Series Router.
Release 3.7.0	No modification.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

Each interface has a default maximum packet size or MTU size. This number generally defaults to the largest size possible for that interface type. On serial interfaces, the MTU size varies, but cannot be set smaller than 68 bytes.

Task ID

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

Examples

The following example specifies an MTU of 70 bytes on an MPLS interface:

```
RP/0/0/CPU0:router# configure
RP/0/0/CPU0:router(config-if)# mpls mtu 70
```

Related Commands

Commands	Description
mtu (VPLS)	Adjusts the maximum packet size or maximum transmission unit (MTU) size for a bridge domain.

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** | {**label** *label number*} | **interface** *interface-id* | **labels** *value* | **location** | **prefix** [*network/mask* | *length*] | **private** | **summary** | **tunnels** *tunnel-id*]

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).
label *label number*	(Optional) Displays the exact path for a source and destination address pair.
interface	(Optional) Displays information for the specified interface.
interface-id	Identifies a 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 *value*	(Optional) Entries with a local labels range.
location *node-id*	(Optional) Displays hardware resource counters on the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
prefix *network/mask* | *length*	(Optional) Destination address and mask/prefix length. **Note** The forward slash (/) between *network* and *mask* is required.
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.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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

Task ID

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

Examples

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

```
RP/0/RP0/CPU0:router# show mpls forwarding location 0/1/CPU0

Local  Outgoing    Outgoing     Next Hop        Bytes
Label  Label       Interface                    Switched
------ ----------- ------------ --------------- ------------
22     Pop Label   PO0/1/0/0    10.1.1.2        0
23     Pop Label   PO0/1/0/0    10.1.1.2        0
24     Pop Label   PO0/1/0/0    10.1.1.2        0
25     Unlabeled  tt13         point2point     0
```

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

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

Tunnel   Outgoing    Outgoing     Next Hop        Bytes
Name     Label       Interface                    Switched
-------- ----------- ------------ --------------- ------------
tt13     18          PO0/1/0/0    10.1.1.2        13200
```

Table 17 describes the significant fields shown in the display.

Table 17 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: Indicates 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	Maximum transmission unit (MTU) 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) 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 traffic-engineering (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.

Related Commands

Command	Description
show mpls forwarding exact-route	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*}} [**protocol** *protocol name*] [**source-port** *source-port*] [**destination-port** *destination-port*] [**ingress-interface** *type instance*]

Syntax Description

label *label number*	Displays the exact path for a source and destination address pair.
bottom label *value*	Bottom label value. Range is 0 to 1048575.
ipv4 {*source-address destination-address***}**	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*}	Exact path for IPv6 payload. The IPv6 source address in x:x::x format. The IPv6 destination address in x:x::x format.
protocol *protocol name*	(Optional) Displays the specified protocol for the route.
source-port *source-port*	(Optional) Sets the UDP source port. The range is from 0 to 65535.
destination-port *destination-port*	(Optional) Sets the UDP destination port. The range is from 0 to 65535.
ingress-interface	(Optional) Sets the ingress interface.
type	Interface type. For more information, use the question mark (**?**) online help function.
instance	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. – *rack*: Chassis number of the rack. – *slot*: Physical slot number of the modular services card or line card. – *module*: Module number. A physical layer interface module (PLIM) is always 0. – *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RP0 or RP1) and the module is CPU0. Example: interface MgmtEth0/RP1/CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
Release 3.3.0	No modification.
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	Added command parameters for 7-tuple.
Release 3.7.0	No modification.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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 is 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 prot tcp source 3503 dest 3503 ingress 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 }
```

Table 18 describes the significant fields shown in the display.

Table 18 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: Indicates 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	Maximum transmission unit (MTU) 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) 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 traffic-engineering (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.

Related Commands

Command	Description
show mpls forwarding	Displays the contents of the MPLS Label Forwarding Information Base (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-id*] [**location** *node-id*] | [**detail**]

Syntax Description

type	Interface type. For more information, use the question mark (**?**) online help function.
interface-id	Identifies a 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. The *node-id* argument is entered in the *rack/slot/module* notation
detail	(Optional) Displays detailed information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*..

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
mpls-static	read, write

Examples

The following is 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 is 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 is 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/0/0/CPU0:tops2-4#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
```

Table 19 describes the significant fields shown in the display.

Table 19 show mpls interfaces Field Descriptions

Field	Description
LDP	Indicates state of LDP labelling.
Tunnel	Indicates state of LSP Tunnel labelling.
MTU	Maximum transmission unit (MTU) 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.

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 *range*

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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 is sample output from the **show mpls label range** command:

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

Range for dynamic labels: Min/Max: 16000/1048575
```

Table 20 describes the significant fields shown in the display.

Table 20 show mpls label range 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	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**]

Syntax Description

table-index	The 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-vpn-ipv4, internal**, **ldp**, **none**, **rsvp**, **static**, **te-control**, **te-link**, **test**, **snmp**.
label *label value*	Displays a selected label based on the label value. Range is 0-1048575.
summary	Displays a summary of local labels.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

Note Labels 16 to 15999 are reserved for static L2VPN pseudowires.

Task ID

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

Examples

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

```
RP/0/RP0/CPU0:router# show mpls label table 17001

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
```

Table 21 describes the significant fields shown in the display.

Table 21 show mpls label table Field Descriptions

Value	Description
Table	Table ID.
Label	Label index.
Owner	Application that allocated the label. All labels displaying “InUse” state have an owner.
State	• In Use—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 Label Switching Database (LSD) server has recently restarted and the application has not reclaimed the label.
Rewrite	Number of initiated rewrites.

Related Commands

Command	Description
show mpls forwarding	Displays entries in the MPLS forwarding table. Label switching entries are indexed by their local label.
show mpls lsd applications	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

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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** 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 is 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
```

Table 22 describes the significant fields shown in the display.

Table 22 show mpls lsd applications Field Descriptions

Value	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 re-registered 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	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 Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

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 is 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
```

Table 23 describes the significant fields shown in the display.

Table 23 show mpls lsd clients Field Descriptions

Value	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 [*A.B.C.D.* | *A.B.C.D./length* | **afi-all [safi-all** {*A.B.C.D.* | *A.B.C.D./length}]* | *[***unicast** {*A.B.C.D.* | *A.B.C.D./length}]* | **backup-interface** [**tunnel** *tunnel ID* [**summary**] | **unresolved**] | **interface** *interface* [**summary**] | **ipv4** [**safi-all** {*A.B.C.D.* | *A.B.C.D./length}]* | *[***unicast** {*A.B.C.D.* | *A.B.C.D./length}]* | **labels** *number* [*number* [**state** [**active** | **complete** | **partial** | **ready**]] | [**location** *node-id*] | **role** [**head** [**summary**] | **midpoint** [**summary**]] | **state** [**active** | **complete** | **partial** | **ready**]] | **summary]**

Syntax Description

A.B.C.D.	(Optional) IP address of the destination network.
A.B.C.D/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*	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** suboption is available.
ipv4	(Optional) Displays IPv4 data only.
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.
location *node-id*	(Optional) Displays hardware resource counters on the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
role	(Optional) Displays entries associated either with the tunnel **head** or tunnel **midpoint**. The **summary** suboption is available.
state	(Optional) Filter 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.
summary	(Optional) Displays summarized information about the FRR database.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

Task ID

Task ID	Operations
mpls-te	read

Examples

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

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

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

Table 24 describes the significant fields shown in the display.

Table 24 show mpls traffic-eng fast-reroute database Field Descriptions

Field	Description
Tunnel	Short form of tunnel interface name.
In-label	Label advertised to other routers to signify a particular prefix. The value “Tun hd” indicates that no label is advertised.
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.

Table 24 show mpls traffic-eng fast-reroute database Field Descriptions (continued)

Field	Description
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.

The following command displays filtering of the FRR database using the *prefix* argument:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute database 175.10.200.253

Tunnel head FRR information:
Prefix             Tunnel     In-label Out intf/label   FRR intf/label   Status
------------------ ---------- -------- ---------------- ---------------- -------
175.10.200.253/32  tu4000     Tun hd   PO0/3/0/0:34     tt1000:34        Ready
```

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

The following command displays filtering of the FRR database using the **backup-interface** option:

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast database backup-interface tunnel-te 1000

Tunnel head FRR information:
Tunnel     In-label Out intf/label   FRR intf/label   Status
---------- -------- ---------------- ---------------- -------
tu4000     Tun hd   PO0/3/0/0:34     tt1000:34        Ready
```

The following command 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     In-label Out intf/label   FRR intf/label   Status
---------- -------- ---------------- ---------------- -------
tt4000     Tun hd   PO0/3/0/0:34     tt1000:34        Ready
tt4001     Tun hd   PO0/3/0/0:35     tt1001:35        Ready
tt4002     Tun hd   PO0/3/0/0:36     tt1001:36        Ready
```

The following command shows 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
Other      0
```

The following command shows the FRR database filtered according to the state of the entries (note that FRR is triggered):

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute database state active
Tunnel head FRR information:
Tunnel     In-label Out intf/label   FRR intf/label   Status
---------- -------- ---------------- ---------------- -------
tt4000     Tun hd   tt1000:34                         Active
tt4001     Tun hd   tt1001:35                         Active
tt4002     Tun hd   tt1001:36                         Active
```

The following command shows the FRR database with protected midpoints:

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

LSP midpoint FRR information:
LSP identifier                In-label Out intf/label   FRR intf/label   Status
----------------------------- -------- ---------------- ---------------- -------
10.10.10.10 5000 [48]         18       PO0/1/0/1:18     tt2001:18        Ready
10.10.10.10 8000 [105]        19       PO0/1/0/1:19     tt2000:19        Ready
```

The following command shows the FRR database filtered according to the inbound label (this output applies only to LSP midpoint entries):

```
RP/0/RP0/CPU0:router# show mpls traffic-eng fast-reroute database labels 18 18

LSP midpoint FRR information:
LSP identifier                In-label Out intf/label   FRR intf/label   Status
----------------------------- -------- ---------------- ---------------- -------
10.10.10.10 5000 [48]         18       PO0/1/0/1:18     tt2001:18        Ready
```

The following output shows 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
Other      0
```

Related Commands

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

Syntax Description

interface	(Optional) Displays all FRR events for the selected protected interface.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-id	Identifies a 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*	Displays all FRR events that occurred on the selected node.

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This command was supported on the Cisco XR 12000 Series Router.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. For detailed information about user groups and task IDs, see the *Configuring AAA Services on Cisco IOS XR Software* module of the *Cisco IOS XR System Security Configuration Guide*.

Task ID

Task ID	Operations
mpls-te	read

Examples

The following is 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                                           (usec)
--------- --------- ----- -------- ---------------------- --------------
0/0/CPU0 PO0/1/0/1 1     1        Feb 27 19:12:29.064000      147
0/1/CPU0 PO0/1/0/1 1     1        Feb 27 19:12:29.060093      165
0/2/CPU0 PO0/1/0/1 1     1        Feb 27 19:12:29.063814      129
0/3/CPU0 PO0/1/0/1 1     1        Feb 27 19:12:29.062861      128
```

Table 25 describes the significant fields shown in the display.

Table 25 show mpls traffic-eng fast-reroute log Field Descriptions

Value	Description
Node	Node address.
Protected Interface	Type and interface-id that is being protected.
LSPs	Link-state packet (LSP) 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 micro-seconds.

Related Commands

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