MPLS Label Distribution Protocol Commands

This module describes the commands used to configure Label Distribution Protocol (LDP) in a Multiprotocol Label Switching (MPLS) network on the .

LDP provides a standard methodology for hop-by-hop (or dynamic label) distribution in an MPLS network by assigning labels to routes that have been chosen by the underlying Interior Gateway Protocol (IGP) routing protocols. The resulting labeled paths, called *label switch paths* (LSPs), forward labeled traffic across an MPLS backbone.

LDP also provides the means for label switching routers (LSRs) to request, distribute, and release label prefix binding information to peer routers in a network. LDP enables LSRs to discover potential peers and establish LDP sessions with those peers to exchange label binding information.

For detailed information about MPLS concepts, configuration tasks, and examples, see *MPLS Configuration Guide for Cisco NCS 5000 Series Routers*.

backoff

To configure the parameters for the Label Distribution Protocol (LDP) backoff mechanism, use the **backoff** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

backoff *initial maximum*
no backoff

Syntax Description	*initial*	Initial backoff delay, in seconds. Range is 5 to 2147483 50331.
	maximum	Maximum backoff delay, in seconds. Range is 5 to 2147483 50331.

Command Default

initial : 15

maximum : 120

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The LDP backoff mechanism prevents two incompatibly configured label switch routers from engaging in an unthrottled sequence of session setup failures. If a session setup attempt fails (due to incompatibility), each Label Switching Router (LSR) delays the next attempt, increasing the delay exponentially with each successive failure until the maximum backoff delay is reached.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to configure the initial backoff delay to 30 seconds and the maximum backoff delay to 240 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# backoff 30 240
```

clear mpls ldp forwarding

To clear (or reset) the MPLS Label Distribution Protocol (LDP) forwarding rewrites, use the **clear mpls ldp forwarding** command in XR EXEC mode.

clear mpls ldp [{**ipv4** }] **forwarding** [*prefix/length*]

Syntax Description		
ipv4	(Optional) Specifies IP version 4 address family.
prefix	(Optional) Destination prefix, written in A.B.C.D format.
length	(Optional) Network mask length, in bits. Range is 0 to 32.

Command Default   No default behavior or values

Command Modes   XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   This command resets LDP installed forwarding state for all prefixes or a given prefix. It is useful when installed LDP forwarding state needs to be reprogrammed in LSD and MPLS forwarding.

Task ID

Task ID	Operations
mpls-ldp	read, write

Example

This example shows how to clear (or reset) the MPLS LDP forwarding rewrites using the **clear mpls ldp forwarding** command:

```
RP/0/RP0/CPU0:router# clear mpls ldp forwarding
```

clear mpls ldp msg-counters neighbor

To clear the Label Distribution Protocol (LDP) message counters, use the **clear mpls ldp msg-counters neighbor** command in XR EXEC mode.

clear mpls ldp   msg-counters neighbor [{*lsr-id ldp-id*}]

Syntax Description		
lsr-id		LSR ID of neighbor in A.B.C.D format.
ldp-id		LDP ID of neighbor in A.B.C.D: format.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **clear mpls ldp msg-counters neighbor** command to clear the statistics on message counters for a specific neighbor (IP address) or for all neighbors. These message counters count the number of LDP protocol messages sent to and received from LDP neighbors.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to clear message counters for neighbor 10.20.20.20:

```
RP/0/RP0/CPU0:router# clear mpls ldp msg-counters neighbor 10.20.20.20
```

clear mpls ldp neighbor

To force Label Distribution Protocol (LDP) session restart, use the **clear mpls ldp neighbor** command in XR EXEC mode.

clear mpls ldp **neighbor** [{*ip-address ldp-id*}]

Syntax Description	*ip-address*	(Optional) Neighbor IP address.
	ldp-id	(Optional) Neighbor LDP ID in A.B.C.D: format.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines Use the **clear mpls ldp neighbor** command to restart a single LDP session or all LDP sessions (without restarting the LDP process itself).

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples The following example shows how to force an unconditional LDP session restart:

```
RP/0/RP0/CPU0:router# clear mpls ldp neighbor 10.20.20.20
```

default-route

To enable Multiprotocol Label Switching (MPLS) switching for IP default route by allocating and advertising non-null label, use the **default-route** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

default-route
no default-route

Syntax Description	This command has no arguments or keywords.

Command Default	Allocates null (implicit or explicit) local label for IP default route prefix 0.0.0.0/0.

Command Modes	MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When the IP default route 0.0.0.0/0 is configured on an egress router, it is advertised through Interior Gateway Protocol (IGP) to other routers to enable default IP forwarding. When MPLS LDP is configured and establishing label switch paths (LSPs) for other prefixes, you can emulate default forwarding and switching for MPLS in the same way as IP forwarding. To do so, allocate a non-null local label and advertise this label to its peers.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to enable default MPLS switching for default prefix:

```
RP/0/RP0/CPU0:router(config-ldp)# default-route
```

discovery hello

To configure the interval between transmission of consecutive Label Distribution Protocol (LDP) discovery hello messages and the holdtime for a discovered LDP neighbor, use the **discovery hello** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

discovery hello {**holdtime** *seconds* | **interval** *seconds*}
no discovery hello {**holdtime** | **interval**}

Syntax Description	**holdtime**	Sets the time, in seconds, a discovered LDP neighbor is remembered without receipt of an LDP hello message from the neighbor. Default is 15.
	interval	Sets the time, in seconds, between consecutive hello messages. Default is 5.
	seconds	Time value, in seconds. Range is 1 to 65535 (65535 means infinite).

Command Default

holdtime: 15

interval: 5

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to configure the link hello holdtime to 30 seconds:

```
RP/0/RP0/CPU0:router(config-ldp)# discovery hello holdtime 30
```

The following example shows how to configure the link hello interval to 10 seconds:

```
RP/0/RP0/CPU0:router(config-ldp)# discovery hello interval 10
```

discovery instance-tlv disable

To disable transmit and receive processing for Type-Length-Value (TLV), use the **discovery instance-tlv disable** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

discovery instance-tlv disable
no   discovery instance-tlv disable

Syntax Description   This command has no arguments or keywords.

Command Default   No default behavior or values

Command Modes   MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples   The following example shows how to disable transmit and receive processing for TLV:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# discovery instance-tlv disable
```

discovery targeted-hello

To configure the interval between transmission of consecutive Label Distribution Protocol (LDP) discovery targeted-hello messages, the hold time for a discovered targeted LDP neighbor, and to accept targeted hello from peers, use the **discovery targeted-hello** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

discovery targeted-hello{**holdtime** *seconds* | **interval** *seconds*}{**address-family ipv4 discovery targeted-hello**}{**accept** | [**from** *acl*]}
no discovery targeted-hello {**accept** | **holdtime** | **interval**}

Syntax Description		
accept	Accepts targeted hellos from any source.
ipv4	Specifies IP version 4 address family.
from *acl*	(Optional) Accepts targeted hellos from LDP peers as permitted by the access-list.
holdtime	Configures the time a discovered LDP neighbor is remembered without receipt of an LDP hello message from a neighbor.
interval	Displays time between consecutive hello messages.
seconds	Time value, in seconds. Range is 1 to 65535.

Command Default

accept : Targeted hello messages are not accepted from any source (neighbor).

holdtime : 90

interval : 10

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

LDP supports IPv4 standard access lists only.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to configure the targeted-hello holdtime to 45 seconds:

```
RP/0/RP0/CPU0:router(config-ldp)# discovery targeted-hello holdtime 45
```

The following example shows how to configure the targeted-hello interval to 5 seconds:

```
RP/0/RP0/CPU0:router(config-ldp)# discovery targeted-hello interval 5
```

The following example shows how to configure acceptance of targeted hellos from all peers:

```
RP/0/RP0/CPU0:router(config-ldp)# address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-af)# discovery targeted-hello accept
```

The following example shows how to configure acceptance of targeted hello from peers 10.1.1.1 and 10.2.2.2 only:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list peer_acl_10
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.1.1.1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.2.2.2
RP/0/RP0/CPU0:router(config-ipv4-acl)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-af)# discovery targeted-hello accept from peer_acl_10
```

discovery transport-address

To provide an alternative address for a TCP connection, use the **discovery transport-address** command in MPLS LDP interface configuration mode. To return to the default behavior, use the **no** form of this command.

[**interface** *type interface-path-id*] **address-family ipv4**
discovery transport-address {*ip-address* }
no [**interface** *type interface-path-id* **address-family**]{**ipv4** } **discovery transport-address** {*ip-address* }

Syntax Description		
interface *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.
address-family ipv4		Specifies IP version 4 address family.
ip-address		IP address to be advertised as the transport address in discovery hello messages.

Command Default   LDP advertises its LDP router ID as the transport address in LDP discovery hello messages.

Command Modes   MPLS LDP interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   Establishing an LDP session between two routers requires a TCP session connection. To establish the TCP session connection, each router must know the transport address (IP address) of the other router.

The LDP discovery mechanism provides the means for a router to advertise transport addresses. Transport address is implicit or explicit. Implicit addresses do not appear as part of the contents of the discovery hello

messages sent to the peer. If explicit, the advertisement appears as part of the contents of discovery hello messages sent to the peer.

The **discovery transport-address** command modifies the default behavior described above. Using the **interface** keyword, LDP advertises the IP address of the interface in LDP discovery hello messages sent from the interface. Using the *ip-address* argument, LDP advertises the IP address in LDP discovery hello messages sent from the interface.

✎

Note   When a router has multiple links connecting it to its peer device, the router must advertise the same transport address in the LDP discovery hello messages it sends on all such interfaces.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to specify an exiting address (10.10.3.1) as the transport address on an interface tenGigE 0/1/0/0:

```
RP/0/RP0/CPU0:router(config-ldp)# interface POS 0/1/0/0interface tenGigE 0/0/0/1
RP/0/RP0/CPU0:router(config-ldp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-if-af)#discovery transport-address 10.10.3.1

RP/0/RP0/CPU0:router# show mpls ldp neighbor

  Peer LDP Identifier: 10.44.44.44:0
    TCP connection: 10.44.44.44:65520 - 10.10.3.1:646
    Graceful Restart: Yes (Reconnect Timeout: 15 sec, Recovery: 180 sec)
    State: Oper; Msgs sent/rcvd: 13/9
    Up time: 00:00:11
    LDP Discovery Sources:
        tenGigE  0/0/0/1
    Addresses bound to this peer:
      10.10.3.2       10.44.44.44
```

downstream-on-demand

To configure MPLS Label Distribution Protocol (LDP) downstream-on-demand mode, use the **downstream-on-demand** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

session
downstream-on-demand **with** *access-list*
no **session** **downstream-on-demand** **with** *access-list*

Syntax Description		
session		(Optional) Configures session parameters.
with		Displays access list of LDP peers.
access-list		IPv4 access-list name.

Command Default No default behavior or values

Command Modes MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
mpls-ldp	read, write

Examples This is a sample output from the **downstream-on-demand** command:

```
RP/0/RP0/CPU0:router(config-ldp)# downstream-on-demand with acl1
```

explicit-null

To configure a router to advertise explicit null labels instead of implicit null labels, use the **explicit-null** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

address-family {**ipv4** } **label local advertise**
explicit-null [{**to** *peer-acl* | **for** *prefix-acl* [**to** *peer-acl*]}]
no address-family {**ipv4** } **label local advertise explicit-null** [{**to** *peer-acl* | **for** *prefix-acl* [**to** *peer-acl*]}]

Syntax Description		
	address-family ipv4	Specifies IP version 4 address family.
	label	Configures label control and policies.
	local	Configures local label control and policies.
	advertise	Configures outbound label advertisement control.
	to *peer-acl*	(Optional) Specifies LDP peers for which explicit-null is advertised instead of implicit-null. Range is 1 to 99.
	for *prefix-acl*	(Optional) Specifies prefixes for which explicit-null is advertised instead of implicit-null. Range is 1 to 99.

Command Default Implicit null is advertised as default null label for routes, such as directly connected routes.

Command Modes MPLS LDP configuration

Command History	Release	Modification
	Release 6.0	This command was introduced.

Usage Guidelines Normally, LDP advertises an implicit null label for directly connected routes. The implicit null label causes the previous hop router to perform next to last router hop popping.

The **explicit-null** command advertises the explicit-null labels in place of implicit null labels for directly connected prefixes.

LDP supports IPv4 standard access lists only.

■ **explicit-null**

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following command shows how to advertise explicit null for all directly connected routes to all LDP peers:

```
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# explicit-null
```

The following command sequence shows how to advertise explicit-null for directly connected route 192.168.0.0 to all LDP peers and implicit-null for all other directly connected routes:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list pfx_acl_192_168
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 192.168.0.0
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# explicit-null for pfx_acl_192_168
```

The following command sequence shows how to send explicit-null for all directly connected routes to peers 10.1.1.1 and 10.2.2.2 and implicit-null to all other peers:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list peer_acl_10
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.1.1.1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.2.2.2
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# explicit-null to peer_acl_10
```

The following command shows how to advertise explicit-null for prefix 192.168.0.0 to peers 10.1.1.1 and 10.2.2.2 and advertise implicit-null for all other applicable routes to all other peers:

```
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# explicit-null for pfx_acl_192_168 to
peer_acl_10
```

graceful-restart (MPLS LDP)

To configure graceful restart, use the **graceful-restart** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

graceful-restart [{**reconnect-timeout** *seconds* | **forwarding-state-holdtime** *seconds*}]
no graceful-restart [{**reconnect-timeout** | **forwarding-state-holdtime**}]

Syntax Description		
reconnect-timeout *seconds*		(Optional) Configures the time that the local LDP sends to its graceful restartable peer, indicating how long its neighbor should wait for reconnection in the event of a LDP session failure, in seconds. Range is 60 to 1800.
forwarding-state-holdtime *seconds*		(Optional) Configures the time the local forwarding state is preserved (without being reclaimed) after the local LDP control plane restarts, in seconds. Range is 60 to 1800.

Command Default

By default, graceful restart is disabled.

reconnect-timeout: 120

forwarding-state-holdtime: 180

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the LDP graceful restart capability to achieve nonstop forwarding (NSF) during an LDP control plane communication failure or restart. To configure graceful restart (MPLS LDP) between two peers, enable LDP graceful restart on both label switch routers (LSRs).

When an LDP graceful restart session is established and there is control plane failure, the peer LSR starts graceful restart procedures, initially keeps the forwarding state information pertaining to the restarting peer, and marks this state as stale. If the restarting peer does not reconnect within the reconnect timeout, the stale forwarding state is removed. If the restarting peer reconnects within the reconnect time period, it is provided recovery time to resynchronize with its peer. After this time, any unsynchronized state is removed.

The value of the forwarding state hold time keeps the forwarding plane state associated with the LDP control-plane in case of a control-plane restart or failure. If the control plane fails, the forwarding plane retains the LDP forwarding state for twice the forwarding state hold time. The value of the forwarding state hold time is also used to start the local LDP forwarding state hold timer after the LDP control plane restarts. When the LDP graceful restart sessions are renegotiated with its peers, the restarting LSR sends the remaining value

of this timer as the recovery time to its peers. Upon local LDP restart with graceful restart enabled, LDP does not replay forwarding updates to MPLS forwarding until the forwarding state hold timer expires.

> **Note** In the presence of a peer relationship, any change to the LDP graceful restart configuration will restart LDP sessions. If LDP configuration changes from nongraceful restart to graceful restart, all the sessions are restarted. Only graceful restart sessions are restarted upon graceful restart to nongraceful restart configuration changes.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to configure an existing session for graceful restart:

```
RP/0/RP0/CPU0:router(config-ldp)# graceful-restart

RP/0/RP0/CPU0:router:Apr  3 10:56:05.392 : mpls_ldp[336]: %ROUTING-LDP-5-NBR_CHANGE : Nbr
172.16.0.1:0, DOWN
RP/0/RP0/CPU0:router:Apr  3 10:56:05.392 : mpls_ldp[336]: %ROUTING-LDP-5-NBR_CHANGE : Nbr
192.168.0.1:0, DOWN
RP/0/RP0/CPU0:router:Apr  3 10:56:09.525 : mpls_ldp[336]: %ROUTING-LDP-5-NBR_CHANGE : Nbr
192.168.0.1:0, UP
RP/0/RP0/CPU0:router:Apr  3 10:56:11.114 : mpls_ldp[336]: %ROUTING-LDP-5-NBR_CHANGE : Nbr
172.16.0.1:0, UP

RP/0/RP0/CPU0:router# show mpls ldp neighbor brief

  Peer             GR Up Time         Discovery Address
  ---------------- -- --------------- --------- -------
  192.168.0.1:0       Y  00:01:04              3      8
  172.16.0.1:0        N  00:01:02              2      5

RP/0/RP0/CPU0:router# show mpls ldp graceful-restart

  Forwarding State Hold timer : Not Running
  GR Neighbors           : 1

  Neighbor ID     Up  Connect Count  Liveness Timer      Recovery Timer
  --------------- --  -------------  -----------------   -----------------
  192.168.0.1        Y       1              -                   -
```

session holdtime (MPLS LDP)

To change the time for which an Label Distribution Protocol (LDP) session is maintained in the absence of LDP messages from the session peer, use the **session holdtime** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

session holdtime *seconds*
no session holdtime

Syntax Description	*seconds*	Time, in seconds, that an LDP session is maintained in the absence of LDP messages from the session peer. Range is 15 to 65535.

Command Default

seconds: 180

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to change the hold time of LDP sessions to 30 seconds:

```
RP/0/RP0/CPU0:router(config-ldp)# session holdtime 30
```

igp auto-config disable

To disable Label Distribution Protocol (LDP) auto-configuration, use the **igp auto-config disable** command in MPLS LDP interface configuration mode. To return to the default behavior, use the **no** form of this command.

igp auto-config disable
no igp auto-config disable

Syntax Description   This command has no arguments or keywords.

Command Default   No default behavior or values

Command Modes   MPLS LDP interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   IGP auto-configuration can be enabled on ISIS and OSPF. Configuration details are described in *Routing Configuration Guide for Cisco NCS 5000 Series Routers*.

Task ID

Task ID	Operations
mpls-ldp	read, write

igp sync delay

To enable Label Distribution Protocol (LDP) Interior Gateway Protocol (IGP) sync delay timer feature, use the **igp sync delay** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

igp sync delay *seconds*
no igp sync delay

Syntax Description	*seconds* Time, in seconds, that declaration of LDP sync state being up is delayed after session establishment upon link coming up. Range is 5 to 300.

Command Default   LDP does not delay declaration of sync up and notifies IGP as soon as sync up conditions are met for a link.

Command Modes   MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines
- By default, LDP declares LDP sync up as soon as all the requisite conditions are met, namely:
  - LDP session is up.
  - LDP has sent all its label bindings to at least one peer.
  - LDP has received at least one label binding from a peer.

  This minimizes traffic loss on link up but can still lead to substantial traffic loss under certain circumstances (for example, when interoperating with an LSR with ordered mode operation). It may be necessary to delay declaration of sync up after the session comes up by configuring a timeout period.

- When the graceful-restart event is configured, the IGP sync delay timer does not take effect.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples   The following example shows how to configure LDP to delay declaration of sync-up to 30 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# igp sync delay 30
```

igp sync delay on-proc-restart

To delay the declaration of synchronization events to the Interior Gateway Protocol (IGP) when the label distribution protocol (LDP) fails or restarts, use the **igp sync delay on-proc restart** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

igp sync delay on-proc restart *seconds*
no igp sync delay on-proc restart *seconds*

Syntax Description	*seconds*	Time, in seconds, duration of process-level delay for synchronization events when the LDP fails or restarts. Range is from 60 to 600.

Command Default   This command is disabled by default.

Command Modes   MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   The **igp sync delay on-proc restart** command enables a process-level delay for synchronization events when the LDP fails or restarts. This delay defers the sending of sync-up events to the IGP until most or all the LDP sessions converge and also allows the LDP to stabilize. This allows the LDP process failure to be less stressful because IGPs receive all the sync-up events in bulk. This means that the IGP is required to run the shortest path first (SPF) and link-state advertisements (LSAs) only one time with an overall view of the sync-up events.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples   The following example shows how to configure LDP to delay the declaration of synchronization events to IGP by 60 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# igp sync delay on-proc restart 60
```

The following example shows the status following execution of the command:

```
RP/0/RP0/CPU0:router# show mpls ldp igp sync

  Process Restart Sync Delay: 60 sec, Gloal timer running (15 sec remaining)
  GigabitEthernet0/3/0/2:
  Sync status: Deferred
  ….
```

When the timer is not running, the output displays the following:

```
Process Restart Sync Delay: 60 sec, Global timer not running
```

implicit-null-override

To configure a router to advertise implicit null labels to a set of prefixes, for which a non-null label is to be advertised by default, use the **implicit-null-override** command in MPLS LDP label configuration mode. To return to the default behavior, use the **no** form of this command.

address-family {**ipv4** } **label local**
implicit-null-override {**for** *prefix-acl*}
no **address-family** {**ipv4** } **label local implicit-null-override**

Syntax Description		
	address-family ipv4	Specifies IP version 4 address family.
	label	Configure label control and policies.
	local	Configure local label control and policies.
	for *prefix-acl*	Specifies the usage of implicit-null label to a set of prefixes. Range is 1 to 99.
		Note This command works with any prefix including static, IGP, and BGP, when specified in the ACL.

Command Default   Implicit null is advertised as default null label for routes, such as directly connected routes, whereas a non-null label is advertised for IGP, BGP, and static prefixes.

Command Modes   MPLS LDP label configuration

Command History	Release	Modification
	Release 6.0	This command was introduced.

Usage Guidelines   No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
mpls-ldp	read, write

The following command shows how to advertise implicit-null label to a specific LDP peer:

```
RP/0/RP0/CPU0:router(config)#mpls ldp
```

```
RP/0/RP0/CPU0:router(config-ldp)#address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-af)#label
RP/0/RP0/CPU0:router(config-ldp-af-lbl)#locl
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl)#implicit-null-override for 80
```

interface (MPLS LDP)

To configure or enable Multiprotocol Label Switching (MPLS) Label Distribution Protocol (LDP) on an interface, use the **interface** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

interface *type interface-path-id*
no interface *type interface-path-id*

Syntax Description	*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.

Command Default	No default behavior or values

Command Modes	MPLS LDP configuration

Command History	**Release**	**Modification**
	Release 6.0	This command was introduced.

Usage Guidelines   When you configure LDP on an interface, the LDP process begins neighbor discovery, sending link hello messages on the interface. This can result in a session setup with discovered neighbors.

LDP interface configuration supports forward reference; accordingly, it is possible to configure a nonexisting interface under LDP.

Note   You cannot enable LDP on loopback and GRE tunnel interfaces.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

This example shows how to configure MPLS LDP over tenGigE interfaces:

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router(config)#mpls ldp
RP/0/RP0/CPU0:router(config-ldp)#interface tenGigE 0/0/0/1
RP/0/RP0/CPU0:router(config-ldp-if)#
```

label accept

To control the receipt of labels (remote bindings) for a set of prefixes from a peer, use the **label accept** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

address-family ipv4 label {**local** | **remote**} {**accept from** *ip-address*} { **for** *prefix-acl*}
no label accept for *prefix-acl* **from** *ip-address*

Syntax Description	**for** *prefix-acl* Accepts and retains remote bindings for prefixes that are permitted by the prefix access list *prefix-acl* argument.
	from *ip-address* Displays the peer IP address.

Command Default LDP accepts and retains label bindings for all prefixes from all peers.

Command Modes MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines By default, LDP accepts labels (as remote bindings) for all prefixes from all its peers. To save resources (such as memory) configure the access list to specify label and binding acceptance for a set of prefixes from a peer.

If the inbound label filtering policy changes such that it now allows previously denied prefixes from a peer, you must reset the LDP session with the peer using the **clear mpls ldp neighbor** command.

LDP supports IPv4 standard access lists only.

> **Note** Label acceptance control is also referred to as LDP inbound label filtering.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples The following example shows how to configure inbound label filtering policy. In this example, an LSR is configured to accept and retain label bindings for prefixes 192.168.1.1 (pfx_acl_1) from peer 10.0.0.1, prefix 192.168.2.2 (pfx_acl_2) from peer 172.16.0.1, and prefixes 192.168.1.1, 192.168.2.2, 192.168.3.3 (pfx_acl_3) from peer 209.165.201.1:

```
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-af)# label
RP/0/RP0/CPU0:router(config-ldp-af-lbl)# remote
```

```
RP/0/RP0/CPU0:router(config-ldp-af-lbl-rmt)# accept from 13.13.13.13:0 for acl1
```

label advertise

To control the advertisement of local labels, use the **label advertise** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

address-family ipv4 label local advertise [disable | explicit-null | for *prefix-acl* **[to***prefix-acl***] interface** *type interface-path-id* **]**
no label advertise [{**disable** | **for** *prefix-acl* [**to** *peer-acl*] | **interface** *type interface-path-id*}]

Syntax Description

disable	(Optional) Disables label advertisement to all peers for all prefixes.
for *prefix-acl*	(Optional) Specifies prefix destinations for which labels will be advertised.
to *peer-acl*	(Optional) Specifies which LDP neighbors will receive label advertisements.
interface	(Optional) Specifies an interface for label allocation and advertisement of its interface IP address.
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.

Command Default

LDP advertises labels for all known prefixes to all peers. LDP does not advertise labels for local interfaces addresses other than Loopback interfaces.

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **label advertise** command determines how the label switch router (LSR) advertises local labels. The following rules describe the effects of running multiple commands:

- Every command has a prefix-acl or peer-acl pair associated with it, as follows:

    - In the absence of the **for** or **to** keywords, the access list pair is (none, none).

    - When using the **for** keyword without the **to** keyword, the access list is (prefix-acl, none).

- A prefix can have a maximum of one (prefix-acl, peer-acl) pair, as follows:

    - A (prefix-acl, peer-acl) pair applies to a prefix only if the prefix-acl matches the prefix. A match occurs if the prefix-acl permits the prefix.

- If more than one (prefix-acl, peer-acl) pair from multiple **label advertise** commands matches a prefix, the (prefix-acl, peer-acl) pair in the first command applies to the prefix. The order in which the **label advertise** commands are processed is sorted based on the ACL names in a MIB-lexicographical way (shorter ACL name length is processed first, if two ACLs are of equal length, then dictionary ordering is used).

- When an LSR is ready to advertise a label for a prefix, the LSR determines whether a (prefix-acl, peer-acl) pair applies to the prefix.

  - If none applies, and if the **disable** keyword has been configured for the command, the label for the prefix is not advertised to any peer; otherwise, the label is advertised to all peers.

  - If a (prefix-acl, peer-acl) pair applies to the prefix, and if the prefix-acl denies the prefix, the label is not advertised to any peer.

  - If (prefix-acl, peer-acl) pair applies to the prefix and if the prefix-acl denies the prefix, the label is not advertised to peers defined in the peer-acl. Nevertheless, the prefix may be matched in subsequent (prefix-acl, peer-acl) entries and advertised to other peers.

  - If the prefix-acl permits the prefix and there is a peer-acl, the label is advertised to all peers permitted by the peer-acl.

Normally, LDP advertises labels for non-BGP routes present in the routing table. Additionally, LDP advertises labels from /32 IP addresses on Loopback interfaces and does not advertise /32 addresses for other non-Loopback interfaces. To control advertisement of labels for /32 IP addresses on these interfaces, use the **label advertise interface** command.

LDP supports IPv4 standard access lists only.

> **Note** Label advertisement control is also referred to as LDP outbound label filtering.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to disable advertisement of all locally assigned labels to all peers:

```
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)# address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-af)# label
RP/0/RP0/CPU0:router(config-ldp-af-lbl)# local
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl)# advertise
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# disable
```

The following example shows how to send labels only for prefixes 10.1.1.0 and 20.1.1.0 to all peers:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list pfx_acl_1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.1.1.0
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 20.1.1.0
```

```
RP/0/RP0/CPU0:router(config-ldp-af)# label local advertise
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# disable
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# for pfx_acl_1
```

The following example shows how to send labels for prefix 10.0.0.0 to peers 10.1.1.1 and 10.2.2.2, labels for prefix 20.0.0.0 to peer 20.1.1.1, and labels for all other prefixes to all other peers:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list pfx_acl_10
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.0.0.0

RP/0/RP0/CPU0:router(config)# ipv4 access-list pfx_acl_20
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 20.0.0.0

RP/0/RP0/CPU0:router(config)# ipv4 access-list peer_acl_10
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.1.1.1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 10.2.2.2

RP/0/RP0/CPU0:router(config)# ipv4 access-list peer_acl_20
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 20.1.1.1

RP/0/RP0/CPU0:router(config-ldp-af)# label local advertise
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# for pfx_acl_10 to peer_acl_10
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# for pfx_acl_20 to peer_acl_20
```

Note　To advertise pfx_acl_10 to peer_acl_10 and pfx_acl_20 to peer_acl_20 and disable all other advertisements to all other peers, include the **disable** keyword with the **label advertise** command.

The following example shows how to use the **interface** keyword to advertise /32 IP address for tenGigE 0/0/0/1:

```
RP/0/RP0/CPU0:router(config-ldp-af)# label local advertise
RP/0/RP0/CPU0:router(config-ldp-af-lbl-lcl-advt)# interface tenGigE 0/0/0/1
```

label allocate

To control allocation of local label only for a set of prefixes, use the **label allocate** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

address-family ipv4 label allocate for {*prefix-acl* | **host-routes**}
no label allocate

Syntax Description	**for**	Specifies set of prefixes for which local label needs to be allocated.
	prefix-acl	IP access-list name or number. Range is from 1 to 99.
	host-routes	Allocates the label for host routes only.

Command Default LDP allocates local label for all learned routes (prefixes).

Command Modes MPLS LDP configuration

Command History	**Release**	**Modification**
	Release 6.0	This command was introduced.

Usage Guidelines Local label allocation control lets you override the default label allocation policy and provides many benefits, including reduced memory usage and fewer forwarding and network updates.

By default, LDP allocates local labels for all learned routes. There are times when you may want to limit label allocation for a given set of prefixes; for example, when using LDP in the core network to provide MPLS transport from one edge to another edge. In such cases, it is necessary to set up label switch packets (LSPs) for Loopback /32 addresses for provider edge (PE) routers (rendering it unnecessary to allocate and advertise local labels for other Interior Gateway Protocol (IGP) prefixes).

LDP supports IPv4 standard access lists only.

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

Examples The following example shows how to configure LDP to limit allocation of local labels to prefixes 192.168.1.1, 192.168.2.2, and 192.168.3.3 only:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list pfx_acl_1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 192.168.1.1
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 192.168.2.2
RP/0/RP0/CPU0:router(config-ipv4-acl)# permit 192.168.3.3

RP/0/RP0/CPU0:router(config-ldp)# address-family ipv4
RP/0/RP0/CPU0:router(config-ldp-af)# label
RP/0/RP0/CPU0:router(config-ldp-af-lbl)# local
```

```
RP/0/RP0/CPU0:router(config-ldp0-af-lbl-lcl)# allocate for pfx_acl_1
```

log graceful-restart

To set up notification describing graceful-restart (GR) session events, use the **log graceful-restart** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

log graceful-restart
no log graceful-restart

Syntax Description   This command has no arguments or keywords.

Command Default   No default behavior or values

Command Modes   MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   Use the **log graceful-restart** command to receive a syslog/console message when a graceful restart-related session event occurs, including LDP graceful restart session disconnection, reconnection, and timeout.

✎

Note   A logging message is issued upon graceful restart session events.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples   The following example shows how to enable logging messages for graceful restart session events:

```
RP/0/RP0/CPU0:router(config-ldp)# log graceful-restart
```

The following sample output shows the logging events that can be displayed on the console:

```
RP/0/RP0/CPU0:router: mpls_ldp[340]: %ROUTING-LDP-5-GR : GR session 4.4.4.4:0 (instance 1)
 disconnected

RP/0/RP0/CPU0:router: mpls_ldp[340]: %ROUTING-LDP-5-GR : GR session 4.4.4.4:0 (instance 2)
 reconnected

RP/0/RP0/CPU0:router: mpls_ldp[340]: %ROUTING-LDP-5-GR : GR session 5.5.5.5:0 (instance 3)
 timed out

RP/0/RP0/CPU0:router: mpls_ldp[336]: %ROUTING-LDP-5-GR_RESTART_COMPLETE : GR forwarding
state hold timer has expired
```

log neighbor

To enable logging of notices describing session changes, use the **log neighbor** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

log neighbor
no log neighbor

Syntax Description   This command has no arguments or keywords.

Command Default   No default behavior or values

Command Modes   MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   Use the **log neighbor** command to receive a syslog or console message when a neighbor goes up or down.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples   The following example shows how to enable logging messages for neighbor session up and down events:

```
RP/0/RP0/CPU0:router(config-ldp)# log neighbor
```

Note   A logging message is issued when an LDP session state changes from up to down (and down to up).

The following shows sample output of logging events that can be displayed on the console:

```
RP/0/RP0/CPU0:router:10 21:11:32.111:mpls_ldp[113]:%LDP-5-NBR_CHANGE: Nbr 10.44.44.44:0,
DOWN
```

log session-protection

To enable logging of notices describing LDP session protection events, use the **log session-protection** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

log session-protection
no log session-protection

Syntax Description   This command has no arguments or keywords.

Command Default   No default behavior or values

Command Modes   MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   Use the **log session-protection** command to receive a syslog or console message when LDP session protection event occurs. These events include LDP session protection initiation, recovery, and timeout.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples   The following example shows how to enable logging messages for session protection events:

```
RP/0/RP0/CPU0:router(config-ldp)# log session-protection
```

Note   Logging messages are issued when session protection events occur.

The following sample output shows the logging events that are displayed on the console:

```
RP/0/RP0/CPU0:router:Apr 21 12:15:01.742: mpls_ldp[315]:%ROUTING-LDP-5-SESSION_PROTECTION:
 Session hold up initiated for peer 4.4.4.4:0

RP/0/RP0/CPU0:router:Apr 21 12:18:04.987: mpls_ldp[315]:%ROUTING-LDP-5-SESSION_PROTECTION:
 Session recovery succeeded for peer 4.4.4.4:0
```

mpls ldp

To enter MPLS Label Distribution Protocol (LDP) configuration mode, use the **mpls ldp** command in XR Config mode mode.

mpls ldp

Syntax Description	This command has no arguments or keywords.
Command Default	No default behavior or values
Command Modes	XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples The following example shows how to MPLS LDP configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# mpls ldp
RP/0/RP0/CPU0:router(config-ldp)
```

neighbor password

To configure password authentication using the TCP Message Digest 5 (MD5) option for a neighbor, use the **neighbor password** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

neighbor *ldp-id* **password** {**clear** | **disable** | **encrypted** *password* }
no **neighbor** *ldp-id* **password**

Syntax Description		
	ldp-id	LDP ID of neighbor in A.B.C.D:0 format.
	clear	Clears the password for the encyrption parameter to specify that an unencrypted password will follow.
	disable	Disables the global password from the specified neighbor.
	encrypted	Specifies that an encrypted password will follow.
	password	(Clear text) Encrypted or unencrypted password string.

Command Default LDP sessions are negotiated without any password (and MD5).

Command Modes MPLS LDP configuration

Command History	Release	Modification
	Release 6.0	This command was introduced.

Usage Guidelines This security feature is enabled per neighbor, so that a session establishment attempt is allowed only when a password match has been configured. This option must be configured so that both peer passwords match.

To override the default password for a specific neighbor, use the **neighbor** *ldp-id* **password** command, where the *ldp-id* argument is the LDP ID of the neighbor.

Note The global default password must be configured before being able to override the default password for a specific neighbor.

Task ID	Task ID	Operations
	mpls-ldp	read, write

Examples

The following example shows how to configure the password *abc* for neighbor 10.20.20.20 and how to clear it:

```
RP/0/RP0/CPU0:router(config-ldp)#neighbor 10.20.20.20:0 password encrypted abc
RP/0/RP0/CPU0:router(config-ldp)#neighbor 10.20.20.20:0 password clear abc
```

neighbor targeted

To configure transmission of targeted hellos toward a neighbor for setting up an LDP session, use the **neighbor targeted** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

address-family {**ipv4** } **neighbor** *Ip-address* **targeted**
no **address-family** {**ipv4** } **neighbor** *ip-address* **targeted**

Syntax Description	*ip-address*	Neighbor IP address.
	ipv4	Specifies IP version 4 address family.

Command Default
No default behavior or values

Command Modes
MPLS LDP configuration

Command History

Release	**Modification**
Release 6.0	This command was introduced.

Usage Guidelines
No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples
The following example shows how to set up a targeted discovery session for neighbor 200.1.1.1:

```
RP/0/RP0/CPU0:router (config-ldp)# clear mpls ldp forwarding
RP/0/RP0/CPU0:router (config-ldp-af)# neighbor 200.1.1.1 targeted
```

router-id (MPLS LDP)

To specify an IPv4 address to act as the router ID, use the **router-id** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

router-id *lsr-id*
no **router-id**

Syntax Description	*lsr-id*	LSR ID in A.B.C.D format.

Command Default LDP uses router ID as determined by global router ID agent, IP Address Repository Manager (IP ARM).

Command Modes MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines LDP uses the router ID from different sources in the following order:

1. Configured LDP router ID.
2. Global router ID (if configured).
3. Calculated (computed) using the primary IPv4 address of the highest numbered configured loopback address. We recommend configuring at least one loopback address.

✎

Note We recommend that you configure an IP address for the LDP router-id to avoid unnecessary session flaps.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples The following example shows how to specify an LSR ID as the router ID:

```
RP/0/RP0/CPU0:router(config-ldp)#router-id 10.0.0.1
```

router ospf

To enable Open Shortest Path First (OSPF) LDP IGP synchronization for area interface, use the **router ospf** command in XR Config mode.

router ospf *process-id* [[**area** {*area-id ip-address*}] [**interface** *type interface-path-id*] **mpls ldp sync**]

Syntax Description		
process-id		Internally used identification parameter for an OSPF routing process. It is locally assigned and can be any positive integer. A unique value is assigned for each OSPF routing process.
area		(Optional) Enters the OSPF area configuration submode.
area-id		Specifies the OSPF area ID as a decimal value.
ip-address		Specifies the OSPF area ID as an IP address in A.B.C.D format.
interface		(Optional) Enters the OSPF interface configuration submode.
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.
sync		Enables LDP IGP synchronization on the specified interface.

Command Default   No default behavior or values

Command Modes	XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines	No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
mpls-ldp	read, write

Example

The following example shows how to enable OSPF LDP IGP synchronization:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)#router ospf 109
RP/0/RP0/CPU0:router(config-ospf)# mpls ldp sync
```

session protection

To enable the LDP session protection feature for keeping LDP peer session up by means of targeted discovery following the loss of link discovery with a peer, use the **session protection** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

session protection [{**duration** *seconds*}] [**for** *peer-acl*]
no **session protection**

Syntax Description		
duration *seconds*		(Optional) Specifies the protection duration, that is, the number of seconds that targeted discovery should continue following the loss of link discovery to a neighbor. Range is 30 to 2147483.
for *peer-acl*		(Optional) Specifies set of LDP peers for which session protection is to be enabled.

Command Default

By default, session protection is disabled. When enabled without peer-acl and duration, session protection is provided for all LDP peers and continues for 24 hours after a link discovery loss.

Command Modes

MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

LDP session protection feature allows you to enable the automatic setup of targeted hello adjacencies with all or a set of peers and specify the duration for which session needs to be maintained using targeted hellos after loss of link discovery.

LDP supports only IPv4 standard access lists.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to enable session protection for all discovered peers with unlimited duration to maintain the session after link discovery loss:

```
RP/0/RP0/CPU0:router(config-ldp)# session protection
```

The following example shows how to enable session protection for a set of peers (as permitted by a peer ACL) with duration of 30 seconds to maintain the session after link discovery loss:

```
RP/0/RP0/CPU0:router(config-ldp)# session protection for peer_acl duration 30
```

show mpls ldp backoff

To display information about the configured session setup backoff parameters and any potential LDP peers with which session setup attempts are being throttled, use the **show mpls ldp backoff** command in XR EXEC mode.

show mpls ldp backoff [{**location** *node-id*}]

Syntax Description

location	*node-id*	(Optional) Displays location information for the specified node ID.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

You must enable the MPLS LDP application to use the **show mpls ldp backoff** command.

Task ID

Task ID	Operations
mpls-ldp	read

Examples

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

```
RP/0/RP0/CPU0:router# show mpls ldp backoff

Backoff Time:
  Initial:15 sec, Maximum:120 sec

Backoff Table: (2 entries)

  LDP Id              Backoff (sec)  Waiting (sec)
  ------------------- -------------- ----------------
  33.33.33.33:0           15               15
  11.11.11.11:0           30               30
```

This table describes the significant fields shown in the display.

Table 1: show mpls ldp backoff Command Field Descriptions

Field	Description
Backoff Time	Initial and maximum backoff time parameters, in seconds.

Field	Description
Backoff Table	List of discovered LDP neighbors for which session setup is being delayed because of previous failures to establish a session due to incompatible configuration. The backoff table incorporates the following information: **LDP Id** Identifies the LDP neighbors. **Backoff (sec)** Specifies the time that the session setup is delayed. **Waiting (sec)** Specifies an approximate time the session setup has been delayed.

show mpls ldp bindings

To display the contents of the Label Information Base (LIB), use the **show mpls ldp bindings** command in XR EXEC mode command.

show mpls ldp [**afi-all**] [{**ipv4** }] **bindings** [*prefix/length*] [**advertisement-acls**] [**brief**] [**detail**] [**local**] [**local-label** *label* [**to** *label*]] [**local-only**] [**neighbor** *address*] [**remote-only**][**remote-label** *label* [**to** *label*]] [**summary**] [{**location** *node-id* }] [**all**]

Syntax Description

afi-all	(Optional) Displays all address families.
ipv4	(Optional) Specifies IP version 4 address family.
prefix	(Optional) Destination prefix, written in A.B.C.D format.
length	(Optional) Network mask length, in bits. Range is 0 to 32.
advertisement-acls	(Optional) Displays the label bindings as applied for (advertisement) outbound label filtering ACLs.
brief	(Optional) Displays all the prefixes in the LDP database.
detail	(Optional) Displays the total counts of advertised-to and remote-binding peers in IP address sort order, with remote bindings in tabular format.
local	(Optional) Displays the local label bindings.
local-label *label* [**to** *label*]	(Optional) Displays entries matching local label values. Add the *label* **to** *label* argument to indicate the label range.
local-only	(Optional) Displays binding matches with a local label only.
neighbor *address*	(Optional) Displays the label bindings assigned by the selected neighbor.
remote-only	(Optional) Displays bindings matches with a remote label only.

remote-label *label* [**to** *label*]	(Optional) Displays entries matching the label values assigned by a neighbor router. Add the *label* **to** *label* argument to indicate the label range. Range is from 0 to 2147483647.
summary	(Optional) Displays a summary of the contents of the Label Information Base (LIB).
location *node-id*	(Optional) Displays location information for the specified node ID.
all	(Optional) Displays the aggregate summary across LDP processes and all VRFs.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The **show mpls ldp bindings** command displays local and remote label bindings learned from neighbors for non-BGP routes (such as IGP prefixes and static routes).

You can choose to view the entire database or a subset of entries according to the following criteria:

- Prefix
- Input or output label values or ranges
- Neighbor advertising the label

Note The **show mpls ldp bindings summary** command displays summarized information from the LIB and is used when testing scalability or when deployed in a large scale network.

Task ID

Task ID	Operations
mpls-ldp	read

Examples The following sample output displays the contents of the LIB for the default routing domain:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings

    5.41.0.0/16 , rev 4
```

```
              local binding: label:IMP-NULL
              No remote bindings
5.43.9.98/32 , rev 6
              local binding: label:IMP-NULL
              No remote bindings
10.10.2.0/24 , rev 12
              local binding: label:IMP-NULL
              remote bindings :
                  lsr:10.255.255.255:0, label:16
                  lsr:10.256.256.256:0, label:IMP-NULL
10.10.3.0/24 , rev 10
              local binding: label:IMP-NULL
              remote bindings :
                  lsr:10.255.255.255:0, label:IMP-NULL
                  lsr:10.256.256.256:0, label:22
22.22.22.22/32 , rev 14
              local binding: label:16
              remote bindings :
                  lsr:10.255.255.255:0, label:17
                  lsr:10.256.256.256:0, label:IMP-NULL
33.33.33.33/32 , rev 2
              local binding: label:IMP-NULL
              remote bindings :
                  lsr:10.255.255.255:0, label:18
                  lsr:10.256.256.256:0, label:23
```

The following sample output shows detailed information for the total counts of advertised-to and remote-binding peers in IP address sort order, with remote bindings for 150.150.150.150/32:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings 150.150.150.150/32 detail

  150.150.150.150/32, rev 2
      Local binding: label: IMP-NULL
        Advertised to: (6 peers)
           120.120.120.120:0  130.130.130.130:0  150.150.150.1:0  150.150.150.2:0
           150.150.150.3:0    150.150.150.4:0
      Remote bindings:    (3 peers)
          Peer              Label
    -----------------      --------
          120.120.120.120:0    27018
          130.130.130.130:0    26017
          160.160.160.160:0    27274
```

The following sample output specifies a network number and displays labels learned from label switched router (LSR) 10.255.255.255 for all networks. The **neighbor** keyword is used to suppress the output of remote labels learned from other neighbors:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings neighbor 10.255.255.255

  10.10.2.0/24 , rev 12
          local binding: label:IMP-NULL
          remote bindings :
              lsr:10.255.255.255, label:16
  10.10.3.0/24 , rev 10
          local binding: label:IMP-NULL
          remote bindings :
              lsr:10.255.255.255:0, label:IMP-NULL
  22.22.22.22/32 , rev 14
          local binding: label:16
          remote bindings :
```

```
            lsr:10.255.255.255:0, label:17
  33.33.33.33/32 , rev 2
        local binding: label:IMP-NULL
        remote bindings :
            lsr:10.255.255.255:0, label:18
  44.44.44.44/32 , rev 16
        local binding: label:17
        remote bindings :
            lsr:10.255.255.255:0, label:IMP-NULL
```

This table describes the significant fields shown in the display.

Table 2: show mpls ldp bindings and show mpls ldp bindings neighbor Command Field Descriptions

Field	Description
a.b.c.d/n	IP prefix and mask for a particular destination (network/mask).
rev	Revision number (rev) that is used internally to manage label distribution for this destination.
local binding	Locally assigned label for a prefix.
remote bindings	Outgoing labels for this destination learned from other LSRs.[1] Each item in this list identifies the LSR from which the outgoing label was learned and reflects the label associated with that LSR. Each LSR in the transmission path is identified by its LDP identifier.
(rewrite)	Binding has been written into MPLS forwarding and is in use.
(no route)	Route is not valid. LDP times it out before the local binding is deleted.

[1] Label switched routers.

The following sample output summarizes the content by using the **summary** keyword:

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

  LIB Summary:
    Total Prefix   : 20
    Revision No    : Current:34, Advertised:34
    Local Bindings : 14
        NULL    : 10 (implicit:10, explicit:0)
        Non-NULL: 4 (lowest:48, highest:51)
    Remote Bindings: 24
```

This table describes the significant fields shown in the display.

Table 3: show mpls ldp bindings summary Command Field Descriptions

Field	Description
Total Prefix	Number of prefixes (routes) known to LDP LIB. All invalid and timed-out routes display as no-routes.
Revision No	Current revision number of LIB entries as well as the minimum revision number that has been advertised to all peers.
Local Bindings	Total number of local bindings, with information on how many of them are Null, non-null, and lowest/highest label assigned or allocated by LDP.
Remote Bindings	Number of remote bindings.

The following sample output shows the access-list advertisement:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings advertisement-acls

  Advertisement Spec:
        Prefix ACL = 'pfx_11'
        Prefix ACL = 'pfx_22'
        Prefix ACL = 'pfx_40_1'; Peer ACL = 'peer_11'

  5.41.0.0/16 , rev 82
  11.11.11.11/32 , rev 69
        Advert ACL(s): Prefix ACL 'pfx_11'
  20.20.20.20/32 , rev 83
  22.22.22.22/32 , rev 78
        Advert ACL(s): Prefix ACL 'pfx_22'
  40.1.1.0/24 , rev 79
        Advert ACL(s): Prefix ACL 'pfx_40_1'; Peer ACL 'peer_11'
```

This table describes the significant fields shown in the display.

Table 4: show mpls ldp bindings advertisement-acls Command Field Descriptions

Field	Description
Advertisement Spec	Lists all prefix and peer access-lists used as outbound label advertisement control.
Advert ACL(s)	Lists the first matching rule (if any) for the prefix entry for outbound label advertisement control (for prefix-acl).

The following sample output shows all the prefixes in the LDP database using the **brief** keyword:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings brief

  Prefix            Local Advertised Remote Bindings
                    Label (peers)        (peers)
  ----------------- -------- ---------- ---------------
  1.1.2.2/32          -          0          1
  1.2.3.4/32        16010      396          0
  4.4.4.4/32        16004      396          3
```

```
      10.0.0.0/24              19226      396           395
```

The following sample output shows that the binding matches with a local label:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings local-only

  10.12.32.2/32, rev 4
          Local binding: label: IMP-NULL
          No remote bindings
```

The following sample output shows that the binding matches with a remote label:

```
RP/0/RP0/CPU0:router# show mpls ldp bindings remote-only

  10.26.4.0/24, rev 0
          No local binding
          Remote bindings: (1 peers)
              Peer                Label
              ----------------   --------
              10.6.6.6:0          IMP-NULL
  10.43.4.0/24, rev 0
          No local binding
          Remote bindings: (1 peers)
              Peer                Label
              ----------------   --------
              10.4.4.4:0          IMP-NULL
  10.46.4.0/24, rev 0
          No local binding
          Remote bindings: (2 peers)
              Peer                Label
              ----------------   --------
              10.4.4.4:0          IMP-NULL
              10.6.6.6:0          IMP-NULL
```

show mpls ldp capabilities

To display the database capability information for an LDP session, use the **show mpls ldp capabilities** command in XR EXEC mode.

show mpls ldp capabilities [**detail**] **location***node-id*

Syntax Description		
detail		(Optional) Displays detailed database capability information for an LDP session.
location *node-id*		(Optional) Displays location information for the specified node ID.

Command Default   No default behavior or values

Command Modes   XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
mpls-ldp	read

Example

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

```
RP/0/RP0/CPU0:router# show mpls ldp capabilities

  Type     Description                             Owner
  ------   --------------------------------------  ------------
  0x50b    Typed Wildcard FEC                      LDP
  0x3eff   Cisco IOS-XR                            LDP
  0x508    MP: Point-to-Multipoint (P2MP)          mLDP
  0x509    MP: Multipoint-to-Multipoint (MP2MP)    mLDP
                                        L2VPN-AToM
```

show mpls ldp discovery

To display the status of the LDP discovery process, use the **show mpls ldp discovery** command in XR EXEC mode.

show mpls ldp [**afi-all**] [{**ipv4** }] **discovery** [{*lsr-id ldp-id*}] [{*type interface-path-id* | **brief** | **link** | **targeted** | **summary** [**all**]}] [**detail**] [{**location** *node-id* }]

Syntax Description		
afi-all	(Optional) Displays all address families.	
ipv4	(Optional) Specifies IP version 4 address family.	
lsr-id	(Optional) Neighbor LSR ID in A.B.C.D format.	
ldp-id	(Optional) Neighbor LDP ID in A.B.C.D: format.	
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.	
brief	(Optional) Displays concise information about a specified LDP-enabled interface.	
link	(Optional) Displays link information for LDP discovery.	
targeted	(Optional) Displays targeted information for LDP discovery.	
summary	(Optional) Displays summarized information for LDP discovery.	

all	(Optional) Displays the aggregate summary across LDP processes and all VRFs.
detail	(Optional) Displays detailed information (including, inbound label filtering, session KAs, and session protection state) for an LDP session.
location *node-id*	(Optional) Displays location information for the specified node ID.

Command Default   No default behavior or values

Command Modes   XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   The **show mpls ldp discovery** command shows both link discovery and targeted discovery. When no interface filter is specified, this command generates a list of interfaces running the LDP discovery process. This command also displays neighbor discovery information for the default routing domain.

Task ID

Task ID	Operations
mpls-ldp	read

Examples   The following sample output is from the **show mpls ldp discovery** command:

```
RP/0/RP0/CPU0:router# show mpls ldp discovery

  Local LDP Identifier: 10.44.44.44:0
  Discovery Sources:
    Interfaces:
      tenGigE 0/0/0/1 : xmit/recv
        LDP Id: 10.33.33.33:0, Transport address: 10.33.33.33
          Hold time: 15 sec (local:15 sec, peer:15 sec)
```

This table describes the significant fields shown in the display.

Table 5: show mpls ldp discovery Command Field Descriptions

Field	Description
Local LDP Identifier	LDP identifier for the local router. An LDP identifier is a 6-byte construct displayed in the form IP address:number. By convention, the first 4 bytes of the LDP identifier constitute the router ID; integers, starting with 0, constitute the final two bytes of the IP address:number construct.

Field	Description
Interfaces	Interfaces engaged in LDP discovery activity, as follows: **xmit field** Indicates that the interface is transmitting LDP discovery hello packets. **recv field** indicates that the interface is receiving LDP discovery hello packets. The LDP identifiers indicate the LDP neighbors discovered on the interface.
Transport Address	Address associated with this LDP peer (advertised in hello messages).
LDP Id	LDP identifier of the LDP peer.
Hold time	State of the forwarding hold timer and its current value.

The following sample output summarizes information for LDP discovery by using the **summary** keyword:

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

  LDP Identifier: 139.0.0.1:0
  Interfaces:
    Configured: 2
    Enabled   : 1
  Discovery:
    Hello xmit: 1 (1 link)
    Hello recv: 1 (1 link)
```

This table describes the significant fields shown in the display.

Table 6: show mpls ldp discovery summary Command Field Descriptions

Field	Description
LDP Identifier	The LDP identifier for the local router.
Interfaces	Summary of interfaces engaged in LDP activity. **Configured** Number of interfaces configured for LDP. **Enabled** Number of interfaces on which LDP is actively enabled and is thus sending LDP hellos. An interface configured for LDP is enabled only if running IP and not in the down state.

Field	Description
Discovery	Summary of LDP discovery process.
	Hello xmit
	Number of local LDP discovery sources (including link and targeted hellos) emitting LDP hellos.
	Hello recv
	Number of discovered hello sources via link or targeted hello mechanics.

The following sample output shows the MPLS LDP discovery hello information in brief form:

```
RP/0/RP0/CPU0:router# show mpls ldp discovery brief

  Local LDP Identifier: 1.2.34:0

  Discovery Source        VRF Name       Peer LDP Id         Holdtime   Session
  ----------------------  ------------   ------------------  ---------  ----------
  Te0/0/0/0               default        13.13.13.13:0       15         Y
```

The following sample shows the MPLS LDP afi-all discovery brief command output:

```
RP/0/0/CPU0:router#show mpls ldp afi-all discovery brief

Local LDP Identifier: 1.2.3.4:0

Discovery Source     AFI  VRF Name         Peer LDP Id          Holdtime Session
-------------------  ---- ---------------  -------------------- -------- -------
Te0/0/0/0            IPv4 default          13.13.13.13:0        15       Y
Te0/0/0/0.1          IPv4 default          13.13.13.13:0        15       Y
Te0/0/0/4            IPv4 default          8.8.8.8:0            15       Y
```

show mpls ldp forwarding

To display the Label Distribution Protocol (LDP) forwarding state installed in MPLS forwarding, use the **show mpls ldp forwarding** command in XR EXEC mode mode.

show mpls ldp [**afi-all**]   [{**ipv4** }] **forwarding** [*prefix/length*] [**fast-reroute**] [**detail**] [**next-hop** {**address** *ip-address* | **interface** *interface-path-id* | **label** *label-value* | **neighbor** *ldp-id* | **unlabelled**}] [**local-label** *label-value*] [{**location** *node-id* | **summary** | **standby**}] [**all**]

Syntax Description		
afi-all		(Optional) Displays all address families.
ipv4		(Optional) Specifies IP version 4 address family.
prefix		(Optional) Destination prefix, written in A.B.C.D format.
length		(Optional) Network mask length, in bits. Range is 0 to 32.
detail		(Optional) Displays detailed informati on for the LDP timestamp that is used for the routing and forwarding update.
fast-reroute		(Optional) Displays the prefix that is LFA FRR protected in nature.
next-hop		Matches prefixes by next-hop IP address.
local-label *label-value*		(Optional) Displays the prefix with the specified local label. Range is from 0 to 1048575.
neighbor		Matches prefixes with a path through specified LDP neighbor.
unlabelled		Matches prefixes containing unlabelled paths.
location *node-id*		(Optional) Displays location information for the specified node ID.
summary		(Optional) Displays the summary information for the LDP forwarding information base (LFIB).
standby		(Optional) Displays standby-node specific information.
all		(Optional) Displays the aggregate summary across LDP processes and all VRFs.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show mpls ldp forwarding** command displays the LDP forwarding entries and provides LDP view of its installed forwarding entries.

Task ID

Task ID	Operations
mpls-ldp	read

Examples

This is a sample output from the **show mpls ldp forwarding** command:

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

Codes:
-  = GR label recovering, (!) = LFA FRR pure backup path
{} = Label stack with multi-line output for a routing path
G  = GR, S = Stale, R = Remote LFA FRR backup

  Prefix            Label Label     Outgoing     Next Hop        GR Stale
                    In    Out       Interface
  ----------------- ----- --------- ------------ --------------- -- -----
  1.0.0.2/32        24001 ExpNull   Te0/0/0/2    5.0.0.1
  1.2.3.4/32        24000 ImpNull   Te0/0/0/1    12.1.1.1
  4.4.4.0/24        24052 24040     Te0/0/0/1    12.1.1.1
  5.5.5.5/32        24011 ImpNull   Te0/0/0/0    22.1.1.1
  10.1.2.0/24       24010 24039     Te0/0/0/4    12.2.2.2
                          24038     Te0/0/0/6.2  16.2.1.1
                          24037     Te0/0/0/6.3  16.3.1.1
                          24036     Te0/0/0/6.4  16.4.1.1


RP/0/RP0/CPU0:router# show mpls ldp forwarding

Codes:
-  = GR label recovering, (!) = LFA FRR pure backup path
{} = Label stack with multi-line output for a routing path
G  = GR, S = Stale, R = Remote LFA FRR backup

  Prefix            Label Label     Outgoing     Next Hop        GR Stale
                    In    Out       Interface
  ----------------- ----- --------- ------------ --------------- -- -----
  1.0.0.2/32        24001 ExpNull   Te0/0/0/2    5.0.0.1
  1.2.3.4/32        24000 ImpNull   Te0/0/0/1    12.1.1.1
  4.4.4.0/24        24052 24040     Te0/0/0/1    12.1.1.1
  5.5.5.5/32        24011 ImpNull   Te0/0/0/0    22.1.1.1
  10.1.2.0/24       24010 24039     Te0/0/0/4    12.2.2.2
                          24038     Te0/0/0/6.2  16.2.1.1
                          24037     Te0/0/0/6.3  16.3.1.1
                          24036     Te0/0/0/6.4  16.4.1.1
```

✎

Note   The (!) symbol referes to a non-primary LFA backup path.

This sample output shows detailed information for the LDP timestamp that is used for routing and forwarding update from the **detail** keyword:

```
RP/0/RP0/CPU0:router# show mpls ldp forwarding 12.12.12.12/32 detail

Codes:
-  = GR label recovering, (!) = LFA FRR pure backup path
{} = Label stack with multi-line output for a routing path
G  = GR, S = Stale, R = Remote LFA FRR backup
```

```
   Prefix          Label   Label      Outgoing     Next Hop        GR Stale
                   In      Out        Interface
---------------- ------- ---------- ------------ --------------- -- -----
12.12.12.12/32   24000   24007      Te0/0/0/0    10.1.0.2
                         [ table-id 0xe0000000, RIB flags 0x0000, load-metric 0,
                         path-id 7;
                         label from: peer 13.13.13.13:0 ]
                         24007      Te0/0/0/0.1   10.1.1.2
                         [ table-id 0xe0000000, RIB flags 0x0000, load-metric 0,
                         path-id 4;
                         label from: peer 13.13.13.13:0 ]
                         24007      Te0/0/0/0.2   10.1.2.2
                         [ table-id 0xe0000000, RIB flags 0x0000, load-metric 0,
                         path-id 1;
                         label from: peer 13.13.13.13:0 ]


   RIB route: table-id 0xe0000000, version 15, priority 7, metric 10
   source 3, type 0x80, flags 0x0
   Updates:
   Routing : Total 1, Last at Nov 23 15:54:25.679 (01:44:53 ago)
   Forwarding: Total 3, Last at Nov 23 15:54:47.937 (01:44:31 ago)
```

✎

Note   The (!) symbol referes to a non-primary LFA backup path.

This sample output shows only LDP prefixes with protection (ECMP or secondary LFA backups) update from the **fast-reroute** keyword:

This sample output shows the statistics of protected prefixes and protected paths from the **summary** keyword:

```
RP/0/RP0/CPU0:router# show mpls ldp forwarding summary
Forwarding Server (LSD):
  Connected: Yes
  Forwarding State Holdtime: 360 sec
Forwarding States:
  Interfaces: 10
  Local labels: 8
  Rewrites:
    Prefix:
      Total: 8 (0 with ECMP, 8 FRR protected)
      Labelled:
        Primary pathset : 8 labelled (0 partial), 0 unlabelled
        Backup pathset  : 8 labelled (0 partial), 0 unlabelled
        Complete pathset: 8 labelled (0 partial), 0 unlabelled
    Paths:
      Total: 16 (8 backup, 8 FRR protected)
      Labelled: 16 (8 backup)
```

This table describes the significant fields shown in the display.

Table 7: show mpls ldp forwarding Command Field Descriptions

Field	Description
Prefix/mask	Prefix on the FEC[2] for an MPLS forwarding entry.

Field	Description
Label In	Local label assigned to the prefix/mask.
Label Out	Outgoing label for the prefix/mask.
Outgoing Interface	Outgoing physical interface.
Next Hop	Next Hop address.
GR	Graceful restart status (Y or N).
Stale	Status of the entry, stale or not stale. An entry is marked stale when the next-hop graceful restart neighbor disconnects and is unmarked when neighbor reconnects and refreshes the label.
Chkpt	Status of the entry, checkpointed or not checkpointed.
path-id	Primary Path-id.
Backup-path-id	The backup path-id is the path-id of the path protecting a given primary path. A protecting path can be primary path or a non-primary path.
Peer	Displays next-hop LDP peer's LDP identifier.
Connected	Displays LDP connection state with LSD forwarding server.
Forwarding State Holdtime	Displays time that LDP has registered with LSD server to keep LDP forwarding state intact upon LDP disconnect event.
Interfaces	Number of LDP enabled MPLS interfaces.
Local Labels	Number of LDP allocated local labels from LSD.
Rewrites	Counts of Forwarding rewrites. Displays total number of known IPv4 prefixes alongwith information on number of prefixes with more than one ECMP path. This also displays number of prefixes with LFA-FRR protection. The labelled set prints the counts related to prefixes with none, all, partial labelled paths as shown by unlabeled, labelled, and partial keywords. This information is available for primary, backup, and complete path set. **Note** **backup** path and **FRR** are not supported in 6.0
Paths	Forwarding path counts. Displays count of total number of known forwarding paths, along with number of backup paths and number of FRR protected paths. It also displays the count of labelled paths indicating how many of non-primary paths are labelled. **Note** **backup** path and **FRR** are not supported in 6.0

[2] Forwarding Equivalence Class.

show mpls ldp graceful-restart

To display the status of the Label Distribution Protocol (LDP) graceful restart, use the **show mpls ldp graceful-restart** command in XR EXEC mode.

show mpls ldp   **graceful-restart** [{**location** *node-id*}]   **[detail]**

Syntax Description		
	location *node-id*	(Optional) Displays location information for the specified node ID.
	detail	(Optional) Displays detailed information about the specified VRF.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show mpls ldp graceful-restart** command displays LDP graceful-restart-related information when the **graceful-restart** command is enabled.

Task ID

Task ID	Operations
mpls-ldp	read

Examples

The following shows a sample output from the **show mpls ldp graceful-restart** command:

```
RP/0/RP0/CPU0:router# show mpls ldp graceful-restart

   Forwarding State Hold timer : Not Running
   GR Neighbors              : 1

    Neighbor ID      Up  Connect Count  Liveness Timer     Recovery Timer
   ---------------   --  -------------  -----------------  ------------------
    10.0.0.2              Y       1           -                  -
```

This table describes the significant fields shown in the display.

Table 8: show mpls ldp graceful-restart Command Field Descriptions

Field	Description
Forwarding State Hold timer	State of the hold timer—running or not running.

Field	Description
GR Neighbors	Number of graceful restartable neighbors.
Neighbor ID	Router ID of each neighbor.
Up	Neighbor up or down.
Connect Count	Number of times the same neighbor has reconnected.
Liveness Timer	State of the liveness timer (running or not running) and its expiration time, if running.
Recovery Timer	State of the recovery timer (running or not running) and its expiration time, if running.

show mpls ldp igp sync

To display Label Distribution Protocol (LDP) Interior Gateway Protocol (IGP) synchronization information on interface(s), use the **show mpls ldp igp sync** command in XR EXEC mode mode.

show mpls ldp [**afi-all**] [{**ipv4** }] **igp sync** [**interface** *type* *interface-path-id*] **[brief]** [{**location** *node-id* }]

Syntax Description		
afi-all		(Optional) Displays all address families.
ipv4		(Optional) Specifies IP version 4 address family.
brief		(Optional) Displays brief information about a specified LDP-enabled interface.
interface		(Optional) Displays the interface type.
type		(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id		(Optional) 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 location information for the specified node ID.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History	Release	Modification
	Release 6.0	This command was introduced.

Usage Guidelines

LDP IGP synchronization addresses traffic loss issues as a result of synchronization between MPLS LDP and IP (IGP). For instance, upon a link up, IGP can advertise a link before MPLS converges on the link. Also, the IGP link is still used even when MPLS session goes down and MPLS LSP is broken on this link. The use of IGP link is determined based on MPLS LDP convergence synchronization status on the link.

Use the **show mpls ldp igp sync** command to display MPLS convergence status. The configuration for LDP IGP synchronization resides in IGPs (OSPF, ISIS); accordingly, LDP displays and advertises this information for all LDP-enabled interfaces (regardless if the interface is configured for LDP IGP).

Task ID

Task ID	Operations
mpls-ldp	read

Examples

The following shows a sample output from the **show mpls ldp igp sync** command:

```
RP/0/RP0/CPU0:router# show mpls ldp igp sync


 TenGigE0/0/0/0:
   VRF: 'default' (0x60000000)
   Sync delay: Disabled
   Sync status: Ready
     Peers:
     13.13.13.13:0
```

This table describes the significant fields shown in the display.

Table 9: show mpls ldp igp sync Command Field Descriptions

Field	Description
VRF	VRF of the interface.
Sync status	MPLS LDP convergence status on a given link. Ready indicates that the link is converged and is ready to be used by IGP. Not Ready with Deferred means that the link fulfills LDP IGP synchronization requirements but is deferred by LDP IGP synchronization delay timeout configuration setting. Not Ready means that the link is not ready to be used by IGP.

Field	Description
Peers	List of peers converged on the given link. If the peer session is GR[3]-enabled, output is tagged as GR. If GR-only reachability is indicated due to a GR neighbor record recovered from checkpoint after local start, then Chkpt-created flag is also set.

[3] Graceful Restart.

show mpls ldp interface

To display information about LDP-enabled interfaces, use the **show mpls ldp interfaces** command in XR EXEC mode mode.

show mpls ldp [**afi-all**] [{**ipv4** }] **interface** [{*type interface-path-id* | **summary**}] [**brief**] [{**location** *node-id* }]

Syntax Description		
afi-all	(Optional) Displays all address families.
ipv4	(Optional) Specifies IP version 4 address family.
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.
summary	(Optional) Displays summary information about a specified LDP-enabled interface.
brief	(Optional) Displays concise information about a specified LDP-enabled interface.
detail	(Optional) Displays detailed information about a specified LDP-enabled interface.
location *node-id*	(Optional) Displays location information for the specified node ID.

Command Default   No default behavior or values

Command Modes   XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read

Examples

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

```
RP/0/RP0/CPU0:router# show mpls ldp interface

Interface TenGigE0/0/0/1 (0x8000040)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/1.10 (0x80009b8)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/1.11 (0x80009c0)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/1.12 (0x80009c8)
VRF: 'default' (0x60000000)


RP/0/RP0/CPU0:router# show mpls ldp interface

Interface TenGigE0/0/0/0 (0x8000038)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/0.1 (0x80001c8)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/4 (0x8000058)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
```

This table describes the significant fields shown in the display.

Table 10: show mpls ldp interface Command Field Descriptions

Field	Description

Auto-config items	Lists IGPs that specify an interface for MPLS LDP auto-configuration:
	OSPF
	    ospf instance area
	ISIS
	    isis instance

The following shows a sample output from the **show mpls ldp interface detail** command for the mesh groups:

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


Interface TenGigE0/0/0/1 (0x8000040)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/1.10 (0x80009b8)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
Interface TenGigE0/0/0/1.11 (0x80009c0)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
```

```
Interface TenGigE0/0/0/1.12 (0x80009c8)
VRF: 'default' (0x60000000)
Enabled via config: LDP interface
```

show mpls ldp neighbor

To display the status of Label Distribution Protocol (LDP) sessions, use the **show mpls ldp neighbor** command in XR EXEC mode mode.

show mpls ldp **neighbor** [{*ip-address ldp-id*}] [*type interface-path-id*] [**brief**] [**capabilities**] [**detail**] [**gr**] [**location** *node-id*] [**non-gr**] [**sp**]

Syntax Description		
ip-address		(Optional) Neighbor IP address.
ldp-id		(Optional) Neighbor LDP ID in A.B.C.D: format.
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.
brief		(Optional) Displays the existing LDP sessions in brief format.
capabilities		(Optional) Displays the neighbor capabilities information.
detail		(Optional) Displays detailed information (including, inbound label filtering, session KAs, and session protection state) for an LDP session.
gr		(Optional) Displays graceful restartable neighbors.
location *node-id*		(Optional) Displays location information for the specified node ID.

non-gr	(Optional) Displays non-graceful restartable neighbors.
sp	(Optional) Displays neighbors with session protection.

Command Default   No default behavior or values

Command Modes   XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   The **show mpls ldp neighbor** command provides information about all LDP neighbors in the entire routing domain—conversely, the show output is filtered to display:

- LDP neighbors with specific IP addresses
- LDP neighbors on a specific interface
- LDP neighbors that are graceful restartable
- LDP neighbors that are nongraceful restartable
- LDP neighbors enabled with session protection

Task ID

Task ID	Operations
mpls-ldp	read

Examples   The following shows a sample output from the **show mpls ldp neighbor** command using an IP address:

```
RP/0/RP0/CPU0:router# show mpls ldp neighbor

Peer LDP Identifier: 12.12.12.12:0
TCP connection: 12.12.12.12:33432 - 5.5.5.5:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 1464/1479; Downstream-Unsolicited
Up time: 14:08:40
LDP Discovery Sources:
IPv4: (16)
TenGigE0/0/0/1.15
TenGigE0/0/0/1.11
TenGigE0/0/0/1
TenGigE0/0/0/1.13
TenGigE0/0/0/1.3
TenGigE0/0/0/1.7
TenGigE0/0/0/1.14
TenGigE0/0/0/1.6
TenGigE0/0/0/1.2
TenGigE0/0/0/1.10
TenGigE0/0/0/1.4
TenGigE0/0/0/1.5
TenGigE0/0/0/1.16
```

```
TenGigE0/0/0/1.8
TenGigE0/0/0/1.9
TenGigE0/0/0/1.12
IPv6: (0)
Addresses bound to this peer:
IPv4: (73)
4.4.4.1 10.64.98.26 12.12.12.12 20.20.20.1
21.21.21.2 27.27.27.27 43.43.43.1 53.53.53.1
55.55.55.1 59.1.0.2 63.63.63.1 66.66.66.1
69.1.0.2 73.73.73.1 77.77.77.77 79.1.0.2
81.81.81.1 83.83.83.1 89.1.0.2 90.1.0.2
91.1.0.2 92.1.0.2 93.1.0.2 93.93.93.1
94.1.0.2 95.1.0.2 96.1.0.2 97.1.0.2
98.1.0.2 99.1.0.2 100.1.0.2 101.1.0.2
102.1.0.2 103.1.0.2 103.103.103.1 104.1.0.2
105.1.0.2 106.1.0.2 107.1.0.2 108.1.0.2
109.1.0.2 110.1.0.2 111.1.0.2 112.1.0.2
113.1.0.2 113.113.113.1 114.1.0.2 115.1.0.2
116.1.0.2 123.123.123.1 133.133.133.1 143.143.143.1
153.153.153.1 163.163.163.1 173.173.173.1 181.181.181.1
183.183.183.1 184.184.184.1 185.185.185.1 186.186.186.1
187.187.187.1 188.188.188.1 189.189.189.1 190.190.190.1
191.191.191.1 193.193.193.1 194.194.194.1 195.195.195.1
196.196.196.1 197.197.197.1 198.198.198.1 199.199.199.1
203.203.203.1
IPv6: (0)

RP/0/RP0/CPU0:router# show mpls ldp neighbor non-gr

Peer LDP Identifier: 12.12.12.12:0
TCP connection: 12.12.12.12:33432 - 5.5.5.5:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 1464/1479; Downstream-Unsolicited
Up time: 14:08:49
LDP Discovery Sources:
IPv4: (16)
TenGigE0/0/0/1.15
TenGigE0/0/0/1.11
TenGigE0/0/0/1
TenGigE0/0/0/1.13
TenGigE0/0/0/1.3
TenGigE0/0/0/1.7
TenGigE0/0/0/1.14
TenGigE0/0/0/1.6
TenGigE0/0/0/1.2
TenGigE0/0/0/1.10
TenGigE0/0/0/1.4
TenGigE0/0/0/1.5
TenGigE0/0/0/1.16
TenGigE0/0/0/1.8
TenGigE0/0/0/1.9
TenGigE0/0/0/1.12
IPv6: (0)
Addresses bound to this peer:
IPv4: (73)
4.4.4.1 10.64.98.26 12.12.12.12 20.20.20.1
21.21.21.2 27.27.27.27 43.43.43.1 53.53.53.1
55.55.55.1 59.1.0.2 63.63.63.1 66.66.66.1
69.1.0.2 73.73.73.1 77.77.77.77 79.1.0.2
81.81.81.1 83.83.83.1 89.1.0.2 90.1.0.2
91.1.0.2 92.1.0.2 93.1.0.2 93.93.93.1
94.1.0.2 95.1.0.2 96.1.0.2 97.1.0.2
98.1.0.2 99.1.0.2 100.1.0.2 101.1.0.2
```

```
102.1.0.2 103.1.0.2 103.103.103.1 104.1.0.2
105.1.0.2 106.1.0.2 107.1.0.2 108.1.0.2
109.1.0.2 110.1.0.2 111.1.0.2 112.1.0.2
113.1.0.2 113.113.113.1 114.1.0.2 115.1.0.2
116.1.0.2 123.123.123.1 133.133.133.1 143.143.143.1
153.153.153.1 163.163.163.1 173.173.173.1 181.181.181.1
183.183.183.1 184.184.184.1 185.185.185.1 186.186.186.1
187.187.187.1 188.188.188.1 189.189.189.1 190.190.190.1
191.191.191.1 193.193.193.1 194.194.194.1 195.195.195.1
196.196.196.1 197.197.197.1 198.198.198.1 199.199.199.1
203.203.203.1
IPv6: (0)

RP/0/RP0/CPU0:router# show mpls ldp neighbor 8.8.8.8

Peer LDP Identifier: 8.8.8.8:0
TCP connection: 8.8.8.8:42784 - 1.2.3.4:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 1276/1250; Downstream-Unsolicited
Up time: 15:37:39
LDP Discovery Sources:
IPv4: (1)
TenGigE0/0/0/4
IPv6: (0)
Addresses bound to this peer:
IPv4: (9)
5.0.0.2 8.8.8.8 10.1.0.1 10.64.98.28
12.1.1.2 41.41.41.41 77.77.77.77 167.167.167.167
202.202.202.202
IPv6: (0)
```

The following shows a sample output from the **show mpls ldp neighbor** command using the **non-gr** keyword:

```
RP/0/RP0/CPU0:router# show mpls ldp neighbor non-gr

Peer LDP Identifier: 13.13.13.13:0
TCP connection: 13.13.13.13:63262 - 1.2.3.4:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 1322/1361; Downstream-Unsolicited
Up time: 15:38:02
LDP Discovery Sources:
IPv4: (1)
TenGigE0/0/0/0
IPv6: (0)
Addresses bound to this peer:
IPv4: (24)
10.0.0.1 4.4.4.4 10.1.0.2 10.1.1.2
10.1.2.2 10.1.3.2 10.1.4.2 10.1.5.2
10.1.6.2 10.1.7.2 10.64.98.27 11.10.9.8
13.13.13.13 18.0.0.1 33.33.33.33 79.0.0.2
79.1.0.2 79.2.0.2 79.3.0.2 79.4.0.2
79.5.0.2 100.100.100.100 178.0.0.2 201.201.201.201
IPv6: (0)
```

This table describes the significant fields shown in the display.

Table 11: show mpls ldp neighbor Command Field Descriptions

Field	Description
Peer LDP Identifier	LDP identifier of the neighbor (peer) for this session.

TCP connection	TCP connection used to support the LDP session, shown in the following format:
	
	neighbor IP address
	
	    peer port
	
	local IP address
	
	    local port

Graceful Restart	Graceful-restart status (Y or N).
State	State of the LDP session. Generally this is Oper (operational), but transient is another possible state.
Msgs sent/rcvd	Number of LDP messages sent to and received from the session peer. The count includes the transmission and receipt of periodic keepalive messages, which are required for maintenance of the LDP session.
Up time	The length of time that this session has been up for (in *hh:mm:ss* format).
LDP Discovery Sources	The source(s) of LDP discovery activity leading to the establishment of the LDP session.
Addresses bound to this peer	The known interface addresses of the LDP session peer. These are addresses that might appear as "next hop" addresses in the local routing table. They are used to maintain the LFIB[4].

[4] LFIB = Label Forwarding Information Base.

The following shows a sample output from the **show mpls ldp neighbor** command using the **brief** keyword:

```
RP/0/RP0/CPU0:router# show mpls ldp neighbor brief

Peer              GR  NSR  Up Time     Discovery   Addresses    Labels
                                       ipv4  ipv6  ipv4  ipv6  ipv4   ipv6
-----------------  --  ---  ----------  ----------  ----------  ------------
4.4.4.4:0          Y   N    1d00h       1     0     3     0     5      0
46.46.46.2:0       N   N    1d00h       1     1     3     3     5      5
46.46.46.46:0      Y   N    1d00h       2     2     4     4     5      5
6.6.6.1:0          Y   N    23:25:50    0     1     0     2     0      5
```

This table describes the significant fields shown in the display.

Table 12: show mpls ldp neighbor brief Command Field Descriptions

Field	Description
Peer	LDP identifier of the neighbor (peer) for this session.
GR	Graceful-restart status (Y or N).
Up Time	Time the session has been up (in hh:mm:ss format).
Discovery	Number of LDP discovery sources corresponding to the neighbor.
Address	Number of addresses bound to this peer.

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

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

eer LDP Identifier: 12.12.12.12:0
TCP connection: 12.12.12.12:33432 - 5.5.5.5:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 1465/1481; Downstream-Unsolicited
Up time: 14:10:17
LDP Discovery Sources:
IPv4: (16)
TenGigE0/0/0/1.15
TenGigE0/0/0/1.11
TenGigE0/0/0/1
TenGigE0/0/0/1.13
TenGigE0/0/0/1.3
TenGigE0/0/0/1.7
TenGigE0/0/0/1.14
TenGigE0/0/0/1.6
TenGigE0/0/0/1.2
TenGigE0/0/0/1.10
TenGigE0/0/0/1.4
TenGigE0/0/0/1.5
TenGigE0/0/0/1.16
TenGigE0/0/0/1.8
TenGigE0/0/0/1.9
TenGigE0/0/0/1.12
IPv6: (0)
Addresses bound to this peer:
IPv4: (73)
4.4.4.1 10.64.98.26 12.12.12.12 20.20.20.1
21.21.21.2 27.27.27.27 43.43.43.1 53.53.53.1
55.55.55.1 59.1.0.2 63.63.63.1 66.66.66.1
69.1.0.2 73.73.73.1 77.77.77.77 79.1.0.2
81.81.81.1 83.83.83.1 89.1.0.2 90.1.0.2
91.1.0.2 92.1.0.2 93.1.0.2 93.93.93.1
94.1.0.2 95.1.0.2 96.1.0.2 97.1.0.2
98.1.0.2 99.1.0.2 100.1.0.2 101.1.0.2
102.1.0.2 103.1.0.2 103.103.103.1 104.1.0.2
105.1.0.2 106.1.0.2 107.1.0.2 108.1.0.2
109.1.0.2 110.1.0.2 111.1.0.2 112.1.0.2
113.1.0.2 113.113.113.1 114.1.0.2 115.1.0.2
116.1.0.2 123.123.123.1 133.133.133.1 143.143.143.1
```

```
153.153.153.1 163.163.163.1 173.173.173.1 181.181.181.1
183.183.183.1 184.184.184.1 185.185.185.1 186.186.186.1
187.187.187.1 188.188.188.1 189.189.189.1 190.190.190.1
191.191.191.1 193.193.193.1 194.194.194.1 195.195.195.1
196.196.196.1 197.197.197.1 198.198.198.1 199.199.199.1
203.203.203.1
IPv6: (0)
Peer holdtime: 180 sec; KA interval: 60 sec; Peer state: Estab
NSR: Disabled
Capabilities:
Sent:
0x508 (MP: Point-to-Multipoint (P2MP))
0x509 (MP: Multipoint-to-Multipoint (MP2MP))
0x50b (Typed Wildcard FEC)
Received:
0x508 (MP: Point-to-Multipoint (P2MP))
0x509 (MP: Multipoint-to-Multipoint (MP2MP))
0x50b (Typed Wildcard FEC)

RP/0/RP0/CPU0:router# show mpls ldp neighbor detail

Peer LDP Identifier: 8.8.8.8:0
TCP connection: 8.8.8.8:42784 - 1.2.3.4:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 1280/1254; Downstream-Unsolicited
Up time: 15:41:06
LDP Discovery Sources:
IPv4: (1)
TenGigE0/0/0/4
IPv6: (0)
Addresses bound to this peer:
IPv4: (9)
5.0.0.2 8.8.8.8 10.1.0.1 10.64.98.28
12.1.1.2 41.41.41.41 77.77.77.77 167.167.167.167
202.202.202.202
IPv6: (0)
Peer holdtime: 180 sec; KA interval: 60 sec; Peer state: Estab
NSR: Disabled
Capabilities:
Sent:
0x508 (MP: Point-to-Multipoint (P2MP))
0x509 (MP: Multipoint-to-Multipoint (MP2MP))
0x50b (Typed Wildcard FEC)
Received:
0x508 (MP: Point-to-Multipoint (P2MP))
0x509 (MP: Multipoint-to-Multipoint (MP2MP))
0x50b (Typed Wildcard FEC)
```

This table describes the significant fields shown in the display.

Table 13: show mpls ldp neighbor detail Command Field Descriptions

Field	Description
Peer LDP Identifier	LDP identifier of the neighbor (peer) for this session.

Field	Description

TCP connection	TCP connection used to support the LDP session, shown in the following format:
	
	neighbor IP address
	
	    peer port
	
	local IP address
	
	    local port

Graceful Restart	Graceful-restart status (Y or N).
Session Holdtime	Session hold time, in seconds.
State	State of the LDP session (operational or transient).
Msgs sent/rcvd	Number of LDP messages sent to and received from the session peer. The count includes the transmission and receipt of periodic keepalive messages, which are required for maintenance of the LDP session.
Up time	Time the session has been up for (in *hh:mm:ss* format).
Peer holdtime	Time to keep LDP peer session up without receipt of LDP protocol message from a peer.
Peer state	Peer session state.
Peer holdtime	Time to keep LDP peer session up without receipt of LDP protocol message from a peer.
Clients	LDP (internal) clients requesting session with a neighbor.
Inbound label filtering	LDP neighbor inbound filtering policy.

Session Protection	State of the session protection:
	
	Incomplete
	
	    Targeted discovery requested but not yet up.
	
	Ready
	
	    Targeted discovery and at least one link hello adjacency to the peer are up.
	
	Protecting
	
	    Targeted discovery is up and there is no link hello adjacency to the peer. Targeted discovery is protecting and backing up link discoveries.

Duration	Maximum time to maintain session through targeted discovery upon loss of primary link discovery.
Holdtimer	When in "protecting" state, time to keep LDP peer session up without receipt of LDP protocol message from a peer.

show mpls ldp parameters

To display current LDP parameters, use the **show mpls ldp parameters** command in XR EXEC mode mode.

show mpls ldp   parameters [{**location** *node-id* }]

Syntax Description	**location** *node-id*	(Optional) Displays location information for the specified node ID.

Command Default   No default behavior or values

Command Modes   XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines   The **show mpls ldp parameters** command displays all LDP operational and configuration parameters.

Task ID

Task ID	Operations
mpls-ldp	read
network	read

Examples   The following shows a sample output from the **show mpls ldp parameters** command:

```
RP/0/RP0/CPU0:router# show mpls ldp parameters

  LDP Parameters:
    Protocol Version: 1
    Router ID: 10.11.11.11
    Null Label: Implicit
    Session:
      Hold time: 180 sec
      Keepalive interval: 60 sec
      Backoff: Initial:15 sec, Maximum:120 sec
    Discovery:
      Link Hellos:     Holdtime:15 sec, Interval:5 sec
      Targeted Hellos: Holdtime:90 sec, Interval:10 sec
                       (Accepting peer ACL 'peer_acl_10')
    Graceful Restart:
      Enabled (Configured)
      Reconnect Timeout:120 sec, Forwarding State Holdtime:180 sec
    Timeouts:
      Binding with no-route: 300 sec
      LDP application recovery (with LSD): 360 sec
    OOR state
      Memory: Normal
```

This table describes the significant fields shown in the display.

Table 14: show mpls ldp parameters Command Field Descriptions

Field	Description
Protocol Version	Version of LDP running on the platform.
Router ID	Currently used router ID.
Null Label	LDP use of implicit-null or explicit-null as label for prefixes where it has to use a null label.
Session Hold time	Time LDP session is to be maintained with an LDP peer without receiving LDP traffic or an LDP keepalive message from the peer.
Session Keepalive interval	Time interval between consecutive transmissions of LDP keepalive messages to an LDP peer.
Session Backoff	Initial maximum backoff time for sessions.
Discovery Link Hellos	Time to remember that a neighbor platform wants an LDP session without receiving an LDP hello message from the neighbor (hold time), and the time interval between the transmission of consecutive LDP hello messages to neighbors (interval).
Discovery Targeted Hellos	Indicates the time: • To remember that a neighbor platform wants an LDP session when the neighbor platform is not directly connected to the router or the neighbor platform has not sent an LDP hello message. This intervening interval is known as *hold time*. • Interval between the transmission of consecutive hello messages to a neighbor not directly connected to the router and if targeted hellos are being accepted, displaying peer-acl (if any).
Graceful Restart	Status of graceful-restart status (Y or N).
Timeouts	Various timeouts (of interest) that the LDP is using. One timeout is *binding no route*, which indicates how long the LDP waits for an invalid route before deleting it. It also shows restart recovery time for LSD and LDP.
OOR state	Out of resource memory state: Normal, Major, or Critical.

show mpls ldp statistics fwd-setup

To display the statistics of the forwarding setup counters related to RIB/LSD, use the **show mpls ldp statistics fwd-setup** command in XR EXEC mode.

show mpls ldp   statistics fwd-setup [{**location** *node-id* }]

Syntax Description	**location** *node-id*	(Optional) Displays location information for the specified node ID.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	**Modification**
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	**Operation**
mpls-ldp	read

Example

The following shows a sample output from the **show mpls ldp statistics fwd-setup** command:

```
RP/0/RP0/CPU0:router# show mpls ldp statistics fwd-setup

RIB
===

Thread counters:
  Events In          : 10
  Events Out         : 39
  RIB fetch throttled : 0 (0 during last throttle)

TC Thread counters:
  Events In          : 39 (3 skipped)
  Events Out         : 12 (0 failed, 2 skipped)

Address Family: IPv4
  RIB server connects: 1
  RIB converged: Yes
  Op counters:
    Fetch         : 4 (2 buffers per fetch)
                    no-data: 0
                    callbacks: 33 routes, 3 convg, 0 rcmd
    Route Up      : 33 (0 protected; Paths: 29/0/0 total/backup/protected)
```

```
             Route Down     : 0
             Route Filtered : 5 (0 intern, 5 misc, 0 alloc, 0 admin,
                                0 unsupp-intf 0, unsupp-protection,
                                0 bgp, 0 bgp-unlabelled, 0 ibgp-no-lbl-ucast)

     MFI
     ===

     Thread counters:
       Events In         : 9
       Events Out        : 8
       LSD Rsrc-Complete  : 1
       LSD server connects : 1

     Op counters:
                                   Successful      Failed
                                   ----------      ------
             Control           :        3            0
             RCMD Markers      :        0            0
             State cleanup     :        0            0
             Interface Enable  :        5            0
             Interface Disable :        0            0
             Label alloc       :        4            0
             Label alloc - mldp :       0            0
             Label free        :        0            0
             Label free - mldp :        0            0
             Rewrite create    :        6            0
             Rewrite delete    :        0            0
             Label/Rewrite create :     0            0
             Label/Rewrite delete :     0            0
             Label OOR cleared :        3            0

             Total LSD Reqs/Msgs :      7            0

     LSD flow control status:
       Flow control        : 0
       Flow control cnt    : 0
       Evt queue item cnt  : 0
       Last flow control   : N/A
```

show mpls ldp statistics msg-counters

To display statistics of the messages exchanged between neighbors, use the **show mpls ldp statistics msg-counters** command in XR EXEC mode mode.

show mpls ldp   **statistics msg-counters**   [{*lsr-id ldp-id*}]   [{**location** *node-id* }]

Syntax Description	*lsr-id*	(Optional) LSR ID of neighbor in A.B.C.D format.
	ldp-id	(Optional) LDP ID of neighbor in A.B.C.D: format.
	location *node-id*	(Optional) Displays location information for the specified node ID.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show mpls ldp statistics msg-counters** command can provide counter information about different types of messages sent and received between neighbors.

Task ID

Task ID	Operations
mpls-ldp	read

Examples

The following shows a sample output from the **show mpls ldp statistics msg-counters** command:

```
RP/0/RP0/CPU0:router# show mpls ldp statistics msg-counters


Peer LDP Identifier: 13.13.13.13:0

Sent Rcvd
------ ------
Initialization 1 1
Address 15 46
Address-Withdraw 14 25
Label-Mapping 28 498
Label-Withdraw 14 439
Label-Release 439 14
Label-Request 0 0
Label-Abort-Request 0 0
Notification 0 0
```

```
KeepAlive 4862 4874

Total 5373 5897
```

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

Table 15: show mpls ldp statistics msg-counters Command Field Descriptions

Field	Description
Peer LDP Identifier	LDP identifier of the neighbor (peer).
Msg Sent	Summary of messages sent to the LDP peer.
Msg Rcvd	Summary of messages received from the LDP peer.

show mpls ldp summary

To display a summary of LDP information, use the **show mpls ldp summary** command in System Admin EXEC mode mode.

show mpls ldp **summary** [{**location** *node-id* }] **[all]**

Syntax Description	

location *node-id*	(Optional) Displays location information for the specified node ID.
all	(Optional) Displays the aggregate summary across LDP processes and all VRFs.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The **show mpls ldp summary** command can provide information about the number of LDP neighbors, interfaces, forwarding state (rewrites), servers connection/registration, and graceful-restart information.

Task ID

Task ID	Operations
mpls-ldp	read

Examples The following example shows a sample output from the **show mpls ldp summary** command:

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

   AFIs      : IPv4
   Routes    : 4
   Neighbors : 1 (1 GR)
   Hello Adj : 1
   Addresses : 3
   Interfaces: 4 LDP configured
```

The following example shows a sample output from the **show mpls ldp summary all** command:

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

   VRFs         : 1 (1 oper)
   AFIs         : IPv4
   Routes       : 4
   Neighbors    : 1 (1 GR)
```

```
Hello Adj    : 1
Addresses    : 3
Interfaces   : 4 (1 forward reference, 2 LDP configured)
Collaborators:

                   Connected   Registered
                   ---------   ----------
      SysDB            Y           Y
      IM               Y           Y
      RSI              Y           -
      IP-ARM           Y           -
      IPv4-RIB         Y           Y (1/1 tables)
      LSD              Y           Y
      LDP-NSR-Partner  Y           -
      L2VPN-AToM       Y           -
      mLDP             -           N
```

This table describes the significant fields shown in the display.

Table 16: show mpls ldp summary Command Field Descriptions

Field	Description
Routes	Number of known IP routes (prefixes).
Neighbors	Number of LDP neighbors, including targeted and graceful restartable neighbors.
Hello Adj	Number of discovered LDP discovery sources.
Interfaces	Number of known IP interfaces and number of LDP configured interfaces. LDP is configured on a forward-referenced interface which may not exist or for which no IP address is configured.
Addresses	Number of known local IP addresses.

show mpls ldp trace

To display the Label Distribution Protocol (LDP) VRF event traces, use the **show mpls ldp trace** command in XR EXEC mode.

show mpls ldp trace
[binding] [capabilities] [config] [dev] [discovery] [error] [**file** *file-name*]
[forwarding] [gr] [hexdump] [iccp] [igp-sync] [interface] [last]
[**location** {*node-id name all mgmt-nodes*}] **[misc] [mldp] [nsr] [peer] [process]**
[reverse] [route] [since] [stats] [tailf] [unique] [usec]
[verbose] [wide] [wrapping]

Syntax Description		
binding		(Optional) Displays the binding event traces.
capabilities		(Optional) Displays the capabilities event traces.
config		(Optional) Displays the configuration event traces.
dev		(Optional) Displays the development private traces.
discovery		(Optional) Displays Hello or discovery and adj event traces.
error		(Optional) Displays error traces.
file *file-name*		(Optional) Displays trace of a specific file.
forwarding		(Optional) Displays forwarding event traces.
gr		(Optional) Displays graceful-restart event traces.
hexdump		(Optional) Displays traces in hexadecimal.
iccp		(Optional) Displays ICCP signaling event traces.
igp-sync		(Optional) Displays IGP sync event traces.
interface		(Optional) Displays interface event traces.
last		(Optional) Displays last number of entries.

location	(Optional) Identifies the location of the card whose CPU controller trace information you want to display.
node-id	The node-id argument is expressed in the **rack/slot/module** notation.
name	Specifies the name of the card.
all	Specifies all locations.
mgmt-nodes	Specifies all managements nodes.
misc	(Optional) Displays miscellaneous event traces.
mldp	(Optional) Displays MLDP event traces.
nsr	(Optional) Displays non-stop routing event traces.
peer	(Optional) Displays peer session event traces.
process	(Optional) Displays process-level event traces.
pw	(Optional) Displays L2VPN pseudo-wire event traces.
reverse	(Optional) Displays latest traces first.
route	(Optional) Displays route event traces.
since last-start	(Optional) Displays traces since the last start time.
stats	(Optional) Displays statistics.
tailf	(Optional) Displays new traces as they are added.
unique	(Optional) Displays unique entries with count.
usec	(Optional) Displays timestamp w/usec detail.
verbose	(Optional) Displays internal debugging information.

wide	(Optional) Do not display buffer name, node name and tid.
wrapping	(Optional) Displays wrapping entries.

Command Default
No default behavior or values

Command Modes
XR EXEC mode

Command History

Release	**Modification**
Release 6.0	This command was introduced.

Usage Guidelines
No specific guidelines impact the use of this command.

Task ID

Task ID	**Operation**
mpls-ldp	read

Example

The following example shows how to display the LDP event traces:

```
RP/0/RP0/CPU0:router# show mpls ldp trace

Dec 12 17:14:58.193 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:117: **** PROCESS MPLS-LDP STARTED
 ****
Dec 12 17:14:58.193 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:1061: Thread 'ldp_main' started
Dec 12 17:14:58.194 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'OS'
Dec 12 17:14:58.206 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'Dbg'
Dec 12 17:14:58.212 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'Global'
Dec 12 17:14:58.212 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'TDP'
Dec 12 17:14:58.213 mpls/ldp/misc 0/RP0/CPU0 t7049 [MISC]:293: s_ldp_chkpt_lib_inited=0
Dec 12 17:14:58.213 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'Hello-Tx'
Dec 12 17:14:58.213 mpls/ldp/proc 0/RP0/CPU0 t7263 [PROC]:46: Thread 'ldp_hello_tx' started
Dec 12 17:14:58.244 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'Chkpt'
Dec 12 17:14:58.245 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'GS'
Dec 12 17:14:58.245 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'IO
EVM'
Dec 12 17:14:58.248 mpls/ldp/cfg 0/RP0/CPU0 t7049 [CFG]:151: sr_cfg_pre_init DONE
Dec 12 17:14:58.248 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'Cfg
Pre-Init'
Dec 12 17:14:58.253 mpls/ldp/intf 0/RP0/CPU0 t7049 [INTF]:685: im_attr_owner_init: DONE
Dec 12 17:14:58.253 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'IM
Attr Pre-Init'
Dec 12 17:14:58.253 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'UDP-xport
 Pre-Init'
Dec 12 17:14:58.253 mpls/ldp/proc 0/RP0/CPU0 t7271 [PROC]:227: Thread 'ldp_im_attr_nfy'
started
Dec 12 17:14:58.254 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'TCP-xport
 Pre-Init'
Dec 12 17:14:58.256 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:3792: TAGCON started
Dec 12 17:14:58.256 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'TC
Init'
```

```
Dec 12 17:14:58.277 mpls/ldp/proc 0/RP0/CPU0 t7049 [PROC]:368: Init done for module 'LDP
mLDP Pre-Init'
```

show lcc

To display label consistency checker (LCC) information, use the **show lcc** command in XR EXEC mode mode.

show lcc {**ipv4**} **unicast** {**all** | **label** | **tunnel-interface** | **statistics** | [{**summary** | **scan-id** *scan-id*}]}

Syntax Description		
	ipv4	Specifies IP version 4 address prefixes.
	unicast	Specifies unicast address prefixes.
	all	Scans all routes.
	label	Scans all labels.
	tunnel-interface	Specifies the interface of a tunnel.
	statistics	Displays route consistency check statistics information.
	scan-id	Specifies the value of scan-id. Range is from 0 to 100000.
	summary	Displays background route consistency check statistics summary information.

Command Default

None

Command Modes

IPv4 address family configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
IPv4	read

Examples

The following example shows an outcome of the label consistency checker information:

```
RP/0/RP0/CPU0:router# show lcc ipv4 unicast all

Sending scan initiation request to IPv4 LSD ... done
Waiting for scan to complete (max time 600 seconds).....................
Scan Completed
Collecting scan results from FIBs (max time 30 seconds)... done
Number of nodes involved in the scan: 1
Number of nodes replying to the scan: 1
```

```
Legend:
? - Currently Inactive Node, ! - Non-standard SVD Role
* - Node did not reply

Node Checks Performed Errors
```

signalling dscp (LDP)

To assign label distribution protocol (LDP) signaling packets a differentiated service code point (DSCP) to assign higher priority to the control packets while traversing the network, use the **signalling dscp** command in MPLS LDP configuration mode. To return to the default behavior, use the **no** form of this command.

signalling dscp *dscp*
no **signalling dscp**

Syntax Description	*dscp* DSCP priority value. Range is 0 to 63.
Command Default	LDP control packets are sent with precedence 6 (*dscp* : 48)
Command Modes	MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

DSCP marking improves signaling setup and teardown times.

Ordinarily, when LDP sends hello discovery or protocol control messages, these are marked using the default control packet precedence value (6, or *dscp* 48). You can use the **signalling dscp** command to override that DSCP value to ensure that all control messages sent are marked with a specified DSCP.

Note   While the **signalling dscp** command controls LDP signaling packets (Discovery hellos and protocol messages), it has no effect on ordinary IP or MPLS data packets.

Task ID

Task ID	Operations
mpls-ldp	read, write

Examples

The following example shows how to assign LDP packets a DSCP value of 56:

```
RP/0/RP0/CPU0:router(config-ldp)# signalling dscp 56
```

snmp-server traps mpls ldp

To inform a network management system of session and threshold cross changes, use the **snmp-server traps mpls ldp** command in global configuration mode.

snmp-server traps mpls ldp {**up** | **down** | **threshold**}

Syntax Description		
	up	Displays the session-up notification.
	down	Displays the session-down notification.
	threshold	Displays the session-backoff-threshold crossed notification.

Command Default	LDP does not send SNMP traps.

Command Modes	XR Config mode

Command History	**Release**	**Modification**
	Release 6.0	This command was introduced.

Usage Guidelines
The **snmp-server traps mpls ldp** command sends notifications to the SNMP server. There are three types of traps sent by LDP:

Session up

Generated when sessions go up.

Session down

Generated when sessions go down.

Threshold

Generated when attempts to establish a session fails. The predefined value is 8.

Task ID	**Task ID**	**Operations**
	mpls-ldp	read, write
	snmp	read, write

Examples
The following example shows how to enable LDP SNMP trap notifications for Session up:

```
RP/0/RP0/CPU0:router(config)# snmp-server traps mpls ldp up
```

address-family ipv4 label

To configure label control and policies on a specific IPv4 destination, use the address-family ipv4 label command in the MPLS LDP configuration mode.

address-family {**ipv4** }
label [**remote accept from** *ldp-id* **for** *prefix-acl*]
local [**default-route**] [**allocate for** {*prefix-acl* | **host-routes**}]
[advertise [**to** *ldp-id* **for** *prefix-acl*]
[**interface** *type interface-path-id*]]

Syntax Description		
	address-family	Configure address-family and its parameters.
	ipv4	Specifies IP version 4 address family.
	label	(Optional) Configure label control and policies.
	remote	(Optional) Configure remote/peer label control and policies.
	accept	(Optional) Configure inbound label acceptance control.
	from *ldp-id*	Specifies which LDP neighbors will receive label advertisements. LDP ID is written in A.B.C.D: format.
	for *prefix-acl*	Specifies prefix destinations for which labels will be advertised.
	local	(Optional) Configure local label control and policies.
	default-route	(Optional) Enable MPLS forwarding for default route.
	allocate	(Optional) Configure label allocation control.
	for *prefix-acl*	Specifies prefix destinations for which labels will be allocated.
	host-routes	Allocates labels for host routes only.
	advertise	(Optional) Configure outbound label advertisement control.

to *ldp-id*	(Optional) Specifies which LDP neighbors will receive label advertisements. LDP ID is written in A.B.C.D: format.
for *prefix-acl*	(Optional) Specifies prefix destinations for which labels will be advertised.
interface	(Optional) Advertise interface host address.
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.

Command Default No default behavior or values

Command Modes MPLS LDP configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
mpls-ldp	read, write

Example

The following example shows how to configure label control and policies on a specific IPv4 destination:

```
RP/0/RP0/CPU0:router(config-ldp)# address-family ipv4 label
```