

MPLS OAM Commands

This module describes Multiprotocol Label Switching (MPLS) label switched path (LSP) verification commands. These commands provide a means to detect and diagnose data plane failures and are the first set of commands in the MPLS Operations, Administration, and Maintenance (OAM) solution.

For detailed information about MPLS concepts, configuration tasks, and examples, see *Cisco ASR 9000 Series Aggregation Services Router MPLS Configuration Guide* .

- address-family ipv4, on page 2
- address-family ipv4 reply, on page 3
- address-family ipv6 reply, on page 5
- clear mpls oam counters, on page 7
- echo disable-vendor-extension, on page 9
- echo lsp-properties-timeout, on page 10
- echo revision, on page 11
- mpls oam, on page 13
- ping mpls ipv4, on page 14
- ping mpls traffic-eng, on page 19
- ping mpls traffic-eng tunnel-tp, on page 23
- ping pseudowire (AToM), on page 28
- ping mpls traffic-eng tunnel-te (P2P), on page 32
- ping mpls traffic-eng tunnel-mte (P2MP), on page 35
- ping pseudowire multisegment, on page 42
- show mpls oam, on page 46
- show mpls oam database, on page 48
- traceroute mpls ipv4, on page 49
- traceroute mpls multipath, on page 53
- traceroute mpls traffic-eng, on page 57
- traceroute pseudowire multisegment, on page 60
- traceroute mpls traffic-eng tunnel-te (P2P), on page 62
- traceroute mpls traffic-eng tunnel-mte (P2MP), on page 65
- traceroute mpls traffic-eng tunnel-tp, on page 69

address-family ipv4

To configure the IPv4 address family parameters for MPLS OAM, use the **address-family ipv4** command in MPLS OAM configuration mode.

address-family ipv4 { **apply-group** *group-name* | **exclude-group** *group-name* | **reply ip-header-source** *source-ip* }

Syntax Description

apply-group *group-name*	Applies configuration from the specified group.
exclude-group *group-name*	Excludes the specified group from applying configuration.
reply ip-header-source *source-ip*	Configures the reply parameters for the specified IPv4 source ip address.

Command Default

None

Command Modes

MPLS OAM configuration 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-te	read, write
mpls-ldp	read, write
mpls-static	read, write

Examples

This example displays the **address-family ipv4** command parameters.

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# address-family ipv4 ?

  apply-group        Apply configuration from a group
  exclude-group      Exclude apply-group configuration from a group
  reply              Configure reply parameters for MPLS OAM address family
  <cr>
```

address-family ipv4 reply

To configure the reply parameters for MPLS OAM IPv4 address family, use the **address-family ipv4 reply** command in MPLS OAM configuration mode.

address-family ipv4 reply **ip-header-source** *source-ip-address*

Syntax Description

ip-header-source *source-ip-address*	Configures the specified MPLS OAM IPv4 source IP address in the reply node.

Command Default

None

Command Modes

MPLS OAM configuration mode

Command History

Release	Modification
Release 24.3.1	This command was introduced.

Usage Guidelines

Use the **address-family ipv4 reply ip-header-source** *source-ip-address* command if an explicit source IP is required in the MPLS OAM reply packets when route policies block packets with non-routed source addresses. By default, the MPLS OAM packets use the local interface address as the source.

Task ID

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

Examples

This example configures the specified MPLS OAM IPv4 source IP address in the reply node.

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# address-family ipv4 reply ip-header-source
1.1.1.4
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# commit
```

This example verifies the above MPLS OAM source IPv4 address configuration in the reply node.

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# show running-config mpls oam

Thu Jun 20 13:43:28.855 IST
mpls oam
```

```
address-family ipv4
 reply ip-header-source 1.1.1.4
!
```

address-family ipv6 reply

To configure the reply parameters for MPLS OAM IPv6 address family, use the **address-family ipv6 reply** command in MPLS OAM configuration mode.

address-family ipv6 reply ip-header-source *source-ip-address*

Syntax Description

ip-header-source *source-ip-address*	Configures the specified MPLS OAM IPv6 source IP address in the reply node.

Command Default

None

Command Modes

MPLS OAM configuration mode

Command History

Release	Modification
Release 24.3.1	This command was introduced.

Usage Guidelines

Use the **address-family ipv6 reply ip-header-source** *source-ip-address* command if an explicit source ip is required in the MPLS OAM reply packets when route policies block packets with non-routed source addresses. By default, the MPLS OAM packets use the local interface address as the source.

Task ID

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

Examples

This example configures the specified MPLS OAM IPv6 source IP address in the reply node.

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# address-family ipv6 reply ip-header-source
192::4
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# commit
```

This example verifies the above MPLS OAM source IPv6 address configuration in the reply node.

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# show running-config mpls oam

Thu Jun 20 13:55:12.142 IST
mpls oam
```

```
address-family ipv6
 reply ip-header-source 192::4
!
```

clear mpls oam counters

To clear MPLS OAM counters, use the **clear mpls oam counters** command in EXEC modeXR EXEC mode.

clear mpls oam counters {**global** | **interface** [*type* *interface-path-id*] | **packet**}

Syntax Description

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

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

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

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-te	execute
mpls-ldp	execute

Task ID	Operations
mpls-static	execute

Examples

The following example shows how to clear all global MPLS OAM counters:

```
RP/0/RP0RSP0/CPU0:router:hostname# clear mpls oam counters global
```

echo disable-vendor-extension

To disable sending the vendor extension type length and value (TLV) in the echo request, use the **echo disable-vendor extension** command in MPLS OAM configuration mode. To return to the default behavior, use the **no** form of this command.

echo disable-vendor-extension

Syntax Description

This command has no arguments or keywords.

Command Default

The default value is 4.

Command Modes

MPLS OAM configuration mode

Command History

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

Task ID

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

Examples

The following example shows how to disable inclusion of the vendor extensions TLV in the echo requests:

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# echo disable-vendor-extension
```

echo lsp-properties-timeout

To configure the timeout for LSP properties request in the echo configuration, use the **echo lsp-properties-timeout** command in MPLS OAM configuration mode. To return to the default behavior, use the **no** form of this command.

echo lsp-properties-timeout *timeout*
no echo lsp-properties-timeout

Syntax Description

lsp-properties-timeout *timeout*	Specifies the timeout interval, in milliseconds. Range is 500 to 10000. Default is 2000 ms.

Command Default

The default timeout value is 2 seconds (2000 ms).

Command Modes

MPLS OAM configuration mode

Command History

Release	Modification
Release 26.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

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

Examples

The following example shows how to configure timeout for LSP properties request in the echo configuration:

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# echo lsp-properties-timeout 2000
```

echo revision

To set the echo packet revision, use the **echo revision** command in MPLS OAM configuration mode. To return to the default behavior, use the **no** form of this command.

echo revision {**1** | **2** | **3** | **4** }

Syntax Description

1 | **2** | **3** | **4**	Draft revision number: • 1: draft-ietf-mpls-lsp-ping-03 (initial) • 2: draft-ietf-mpls-lsp-ping-03 (rev 1) • 3: draft-ietf-mpls-lsp-ping-03 (rev 2) • 4: draft-ietf-mpls-lsp-ping-09 (initial)

Command Default

The default echo revision is 4 (in draft 9).

Command Modes

MPLS OAM configuration mode

Command History

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

Task ID

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

Examples

The following example shows how to set the echo packet default revision:

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)# echo revision 1
```

mpls oam

To enable MPLS OAM LSP verification, use the **mpls oam** command in Global Configuration modeXR Config mode. To return to the default behavior, use the **no** form of this command.

mpls oam

Syntax Description

This command has no arguments or keywords.

Command Default

By default, MPLS OAM functionality is disabled.

Command Modes

Global Configuration

Command History

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

Usage Guidelines

The **mpls oam** command and OAM functionality is described in the IETF LSP ping draft.

Task ID

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

Examples

The following example shows how to enable MPLS OAM:

```
RP/0/RP0RSP0/CPU0:router:hostname# configure
RP/0/RP0RSP0/CPU0:router:hostname(config)# mpls oam
RP/0/RP0RSP0/CPU0:router:hostname(config-oam)#
```

ping mpls ipv4

To check MPLS host reachability and network connectivity by specifying the destination type as a Label Distribution Protocol (LDP) IPv4 address, use the **ping mpls ipv4** command in EXEC modeXR EXEC mode.

ping mpls ipv4 *address/mask* [**destination** *start-address end-address increment*] [**dsmap**] [**exp** *exp-bits*] [**force-explicit-null**] [**interval** *min-send-delay*] [**output** { **interface** *type interface-path-id* [**nexthop** *nexthop-iaddress*] | [**nexthop** *nexthop-address*] }] [**pad** *pattern*] [**repeat** *count*] [**reply** { **dscp** *dscp-value* | **reply mode** { **ipv4** | **no-reply** | **router-alert** } | **reply pad-tlv** }] [**revision** *version*] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min value max value increment*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**] [**fec-type** { **bgp** | **generic** | **ldp** }]

Syntax Description

address/mask	Address prefix of the target and number of bits in the target address network mask.
destination *start address end address address increment*	(Optional) Specifies a network 127/8 address to be used as the destination address in the echo request packet. ***start address*** Start of the network address. ***end address*** Start of the ending network address. ***address increment*** Incremental value of the network address, which is expressed as a decimal number value or IP address.
dsmap	(Optional) Indicates that a downstream mapping (DSMAP) type length and value should be included in the LSP echo request.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.
output interface	(Optional) Specifies the output interface where echo request packets are sent.

type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information, use the question mark (**?**) online help function.
nexthop	(Optional) Specifies the nextop as an IP address.
nexthop-iaddress	(Optional) IP address for the next hop.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.
repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.
reply dscp *dscp-value*	Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode [**ipv4** | **router-alert** | **no-reply**]	Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (this is the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set
reply pad-tlv	Indicates that a pad TLV should be included.
revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
size *packet size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.

source *source-address*	(Optional) Specifies the source address used in the echo request packet.
sweep *min value max value interval*	(Optional) Specifies a range of sizes for the echo packets sent. ***min value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max value*** Maximum or end size for an echo packet(range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.
fec-type	(Optional) Specifies FEC type to be used. **bgp** Use FEC type as BGP **generic** Use FEC type as generic **ldp** Use FEC type as LDP

Command Default

exp *exp bits*: 0

interval *min-send-delay*: 0

repeat *count* : 5

reply-mode: IPv4

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	No modification.
Release 4.3.1	The **fec-type** keyword was added. The **nexthop** keyword was added for **interface** sub-option.

Usage Guidelines

The **output interface** keyword specifies the output interface on which the MPLS echo request packets are sent. If the specified output interface is not part of the LSP, the packets are not transmitted.

In cases where the sweep keyword is used, values larger than the outgoing interface's MTU are not transmitted.

The **ping** command sends an echo request packet to an address, and then awaits a reply. Ping output can help you evaluate path-to-host reliability, delays over the path, and whether the host can be reached or is functioning.

Note The **ping mpls** command is not supported on optical LSPs. If an optical LSP is encountered along the LSP's path, it is treated as a physical interface.

For detailed configuration information about the MPLS **ping** command, see *Cisco ASR 9000 Series Router System Monitoring Configuration Guide* .

Task ID

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

Examples

The following example shows the destination type as a label distribution protocol (LDP) prefix and specifies a range of sizes for the echo packets sent:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls ipv4 140.140.140/32 verbose sweep 100 200 15
repeat 1

  Sending 1, [100..200]-byte MPLS Echos to 140.140.140.140/32,
        timeout is 2 seconds, send interval is 0 msec:

  Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
```

```
    'L' - labeled output interface, 'B' - unlabeled output interface,
    'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
    'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
    'P' - no rx intf label prot, 'p' - premature termination of LSP,
    'R' - transit router, 'I' - unknown upstream index,
    'X' - unknown return code, 'x' - return code 0

  Type escape sequence to abort.
  !    size 100, reply addr 196.100.1.26, return code 3
  !    size 115, reply addr 196.100.1.26, return code 3
  !    size 130, reply addr 196.100.1.26, return code 3
  !    size 145, reply addr 196.100.1.26, return code 3
  !    size 160, reply addr 196.100.1.26, return code 3
  !    size 175, reply addr 196.100.1.26, return code 3
  !    size 190, reply addr 196.100.1.26, return code 3

  Success rate is 100 percent (7/7), round-trip min/avg/max = 5/6/8 ms
```

The following example shows the destination type as a label distribution protocol (LDP) prefix and specifies FEC type as generic and verbose option:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls ipv4 11.11.11.11/32 fec-type generic output
interface gigabitEthernet 0/0/0/3
nexthop 172.40.103.2 verbose

Sending 5, 100-byte MPLS Echos to 11.11.11.11/32,
      timeout is 2 seconds, send interval is 0 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

!      size 100, reply addr 11.101.11.11, return code 3
!      size 100, reply addr 11.101.11.11, return code 3
!      size 100, reply addr 11.101.11.11, return code 3
!      size 100, reply addr 11.101.11.11, return code 3
!      size 100, reply addr 11.101.11.11, return code 3

Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/6 ms
```

ping mpls traffic-eng

To specify the destination type as an MPLS-TE tunnel and tunnel interface, use the **ping mpls traffic-eng** command in EXEC modeXR EXEC mode.

ping mpls traffic-eng tunnel *tunnel-ID* [**dsmap**] [**exp** *exp-bits*] [**force-explicit-null**] [**interval** *min-send-delay*] [**pad** *pattern*] [**repeat** *count*] [**reply** {**dscp** *dscp-value* | **reply mode** {**ipv4** | **no-reply** | **router-alert**} | **reply pad-tlv**}] [**revision** *version*] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min-value max-value increment*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel *tunnel-ID*	Specifies the destination type as an MPLS traffic engineering (TE) tunnel and the tunnel interface number. The range for the tunnel interface number is from 0 to 65535.
dsmap	(Optional) Indicates that a downstream mapping (DSMAP) type length and value should be included in the LSP echo request.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.
repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode [**ipv4** | **router-alert** | **no-reply**]	(Optional) Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (this is the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set
reply pad-tlv	(Optional) Indicates that a pad TLV should be included.

revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
size *packet-size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
sweep *min-value max-value interval*	(Optional) Specifies a range of sizes for the echo packets sent. ***min-value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max-value*** Maximum or end size for an echo packet(range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits*: 0

interval *min-send-delay*: 0

repeat *count*: 5

reply-mode: IPv4

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

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

Release	Modification
Release 3.8.0	No modification.
Release 3.9.0	No modification.
Release 4.0.0	This command was introduced. This command was replaced by the **ping mpls traffic-eng tunnel-te (P2P)** command.

Usage Guidelines

The **output interface** keyword specifies the output interface on which the MPLS echo request packets are sent. If the specified output interface is not part of the LSP, the packets are not transmitted.

In cases where the **sweep** keyword is used, values larger than the outgoing interface's MTU are not transmitted.

The **ping** command sends an echo request packet to an address, and then awaits a reply. Ping output can help you evaluate path-to-host reliability, delays over the path, and whether the host can be reached or is functioning.



Note The **ping mpls traffic-eng** command is not supported on optical LSPs. If an optical LSP is encountered along the LSP's path, it is treated as a physical interface.

Task ID

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

Examples

The following example shows how to check connectivity by using the **ping mpls traffic-eng** command when a TE tunnel 10 is present. Return code, reply address, and packet size are displayed due to the **verbose** keyword.

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel 10 repeat 1 verbose

  Sending 1, 100-byte MPLS Echos to tunnel-te10,
        timeout is 2 seconds, send interval is 0 msec:

  Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
    'L' - labeled output interface, 'B' - unlabeled output interface,
    'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
    'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
    'P' - no rx intf label prot, 'p' - premature termination of LSP,
    'R' - transit router, 'X' - unknown return code, 'x' - return code 0

  Type escape sequence to abort.
  !    size 100, reply addr 196.100.1.18, return code 3

  Success rate is 100 percent (1/1), round-trip min/avg/max = 15/15/15 ms
```

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.
ping mpls traffic-eng tunnel-te (P2P)	Verifies the connectivity of the LSP path for the MPLS-TE tunnel.

ping mpls traffic-eng tunnel-tp

To specify the destination type as an MPLS-TP tunnel and tunnel interface, use the **ping mpls traffic-eng tunnel-tp**command in EXEC modeXR EXEC mode.

ping mpls traffic-eng tunnel-tp *tunnel-id* [**ddmap**] [**destination** *start-address end-address increment*] [**dsmap**] [**encap** {**cv-ip** | **cv-non-ip** | **ip**}] [**exp** *exp-bits*] [**flags** {**fec** | **reverse-verification** }] [**interval** *min-send-delay*][**lsp** {**active** | **protect** | **working**}][**pad** *pattern*][**repeat** *count*] [**reply** {**dscp** *dscp-value* | **mode** {**control-channel** | **no-reply** } | **pad-tlv**}] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min value max value increment*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel-tp *tunnel-ID*	Specifies the destination type as an MPLS Transport Profile (MPLS-TP) tunnel and the tunnel interface number. The range for the tunnel interface number is 0 to 65535.
ddmap	(Optional) Indicates that a downstream detailed mapping (DDMAP) TLV should be included in the LSP echo request.
destination *start-address end-address increment*	Specifies a network 127/8 address to be used as the destination address in the echo request packet. ***start address*** Start of the network address. ***end address*** Start of the ending network address. ***address increment*** Incremental value of the network address, which is expressed as a decimal number value or IP address.
dsmap	(Optional) Indicates that a downstream mapping (DSMAP) type length and value should be included in the LSP echo request.
encap { **cv-ip** | **cv-non-ip** | **ip** }	(Optional) Specifies the MPLS-TP encapsulation type to use. **cv-ip** Use IP encapsulation with GACH channel 0x0021. **cv-non-ip** Use non-IP encapsulation with GACH channel 0x0025. **ip** Use IP encapsulation.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.

flags { **fec** | **reverse-verification** }	(Optional) Specifies the flag options to use. **fec** Request forwarding equivalent class (FEC) stack checking is to be performed at transit routers. **reverse-verification** Request reverse path connectivity verification.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.
lsp { **active** | **protect** | **working** }	(Optional) Specifies the LSP to use. **active** Active MPLS-TP tunnel. **protect** Protect MPLS-TP tunnel. **working** Working MPLS-TP tunnel. **Note** Use this option to identify error in the LSP path if the MPLS-TP tunnel is not up.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.
repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
mode [**control-channel** | **no-reply**]	(Optional) Specifies the reply mode for the echo request packet. **control-channel** Send reply through a control channel. **no-reply** Do not reply.
pad-tlv	(Optional) Indicates that a pad TLV should be included.
size *packet-size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.

sweep *min-value max-value interval*	(Optional) Specifies a range of sizes for the echo packets sent. ***min-value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max-value*** Maximum or end size for an echo packet(range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits*: 0

interval *min-send-delay*: 0

repeat *count*: 5

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Usage Guidelines

In cases where the **sweep** keyword is used, values larger than the outgoing interface's MTU are not transmitted.

The **ping** command sends an echo request packet to an address, and then waits for a reply. Ping output helps you evaluate path-to-host reliability, delays over the path. It also helps you determine whether the host is reachable or is functioning.

Task ID

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

Examples

The following sample output is from the **ping mpls traffic-eng tunnel-tp** command using the non-IP-ACH encapsulation:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel-tp 1 encap cv-non-ip

Sending 5, 100-byte MPLS Echos to tunnel-tp1,
      timeout is 2 seconds, send interval is 0 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/11/45 ms
```

The following sample output is from the **ping mpls traffic-eng tunnel-tp** command using the non-IP-ACH encapsulation and verbose option:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel-tp 1 encap cv-non-ip

Sending 5, 100-byte MPLS Echos to tunnel-tp1,
      timeout is 2 seconds, send interval is 0 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

!      size 100, reply node id 12.12.12.3, global id 0, return code 3
!      size 100, reply node id 12.12.12.3, global id 0, return code 3
!      size 100, reply node id 12.12.12.3, global id 0, return code 3
!      size 100, reply node id 12.12.12.3, global id 0, return code 3
!      size 100, reply node id 12.12.12.3, global id 0, return code 3

Success rate is 100 percent (5/5), round-trip min/avg/max = 3/3/4 ms
```

The following sample output is from the **ping mpls traffic-eng tunnel-tp** command using the non-IP-ACH encapsulation and DSMAP/DDMAP option:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel-tp 1 encap cv-non-ip

Sending 1, 100-byte MPLS Echos to tunnel-tp1,
      timeout is 2 seconds, send interval is 0 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
```

```
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

L      size 100, reply node id 12.12.12.3, global id 0, return code 8
 Echo Reply received from Node ID 12.12.12.3, Global ID 0
  DSMAP 0, Ingress Link ID 3, Egress Link ID 4
    Depth Limit 0, MRU 1500 [Labels: 1100 Exp: 0]


Success rate is 0 percent (0/1)
```

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.
ping mpls traffic-eng tunnel-me (P2P)	Verifies the connectivity of the LSP path for the MPLS-TE P2P tunnels.

ping pseudowire (AToM)

To verify connectivity between provider edge (PE) LSRs in an Any Transport over MPLS (AToM) setup, use the **ping pseudowire** command in EXEC modeXR EXEC mode.

ping [**mpls**] **pseudowire** { *remote-PE -address pw-id* | **fec-129** { **aii-type1** | **aii-type2** } **vpls-id** { *ipv4-address:nn as-number:nn* } **target** *router-id* } [**exp** *exp-bits*] [**interval** *min-send-delay*] [**pad** *pattern*] [**repeat** *count*] [**reply** { **dscp** *dscp-value* | **reply mode** { **ipv4** | **no-reply** | **router-alert** | **control-channel** } | **reply pad-tlv** }] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min-value max-value increment*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

mpls	(Optional) Verifies the Labeled Switch Path (LSP).
remote-PE address	IP address of the remote PE LSR.
pw-id	Pseudowire ID that identifies the pseudowire in which MPLS connectivity is being verified. The pseudowire is used to send the echo request packets. The range is from 1 to 4294967295.
fec-129	Specifies FEC 129 pseudowire.
aii-type1	Specifies the type 1 attachment individual identifier.
aii-type2	Specifies the type 2 attachment individual identifier.
vpls-id	Specifies that the VPLS identifier should be included.
ipv4-address:nn	Specifies the VPLS identifier as an IPv4 address followed by the index value. The index value range is 0 to 4294967295.
as-number:nn	Specifies the VPLS identifier as an autonomous system (AS) identifier followed by the index value. The index value range is 0 to 4294967295. The AS identifier value range is 1 to 65535.
target	Specifies that the target end address of the pseudowire should be included.
router-id	Specifies the IPv4 address that is the L2VPN router identifier of the target.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.
repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.

reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode {**ipv4** | **router-alert** | **no-reply** | **control-channel**}	(Optional) Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set **control-channel** Force the use of a VCCV control channel. Reply using an application for a defined control channel. This applies only to pseudowires in which VCCV is used in the reply path. This is the default choice for pseudowire ping.
reply pad-tlv	(Optional) Indicates that a reply pad TLV should be included.
size *packet-size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
sweep *min-value max-value interval*	Specifies a range of sizes for the echo packets sent. ***min-value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max-value*** Maximum or end size for an echo packet(range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)
timeout *timeout*	(Optional) Specifies the timeout interval in seconds. Range is 0 to 3600. Default is 2 seconds.
ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255).

verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp bits*: 0

interval *min-send-delay*: 0

repeat *count*: 5

reply-mode: IPv4

timeout *timeout* : 2

Command Modes

EXEC

Command History

Release	Modification
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	The following keywords and arguments were added: • **force-control-channel**, **control-word**, **ra-label** and **ttl-expiry** keywords were added.
Release 5.3.2	The pseudowire FEC129 AII-type 1 is supported.
Release 6.3.2	Supports segment routing and SR-TE policy preferred path as transport to reach remote PE. **Note** Label distribution protocol (LDP) is required to signal PW up, but is not required as transport.

Usage Guidelines

In cases in which the **sweep** keyword is used, values larger than the outgoing interface's MTU are not transmitted.

The **ping** command sends an echo request packet to an address, and then awaits a reply. Ping output can help you evaluate path-to-host reliability, delays over the path, and whether the host can be reached or is functioning.



Note The **ping mpls** command is not supported on optical LSPs. If an optical LSP is encountered along the LSP's path, it is treated as a physical interface.

AToM VCCV allows the sending of control packets inband of an AToM pseudowire (PW) from the originating provider edge (PE) router. The transmission is intercepted at the destination PE router, instead of being forwarded to the customer edge (CE) router. This lets you use MPLS LSP ping to test the pseudowire section of AToM virtual circuits (VCs).

The no interactive version of the **ping pseudowire (AToM)** command is supported.

The control word setting is either enabled along the entire path between the Terminating-Provider Edge (T-PE) or it is completely disabled. If the control word configuration is enabled on one segment and disabled on another segment, the multisegment pseudowire does not come up.

Task ID

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

Examples

The following example shows how the **ping mpls pseudowire** command is used to verify PE to PE connectivity in which the remote PE address is 150.150.150.150. Only one echo request packet is sent and the remote PE is to answer using IPv4 instead of the control channel.

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls pseudowire 150.150.150.150 21 repeat 1 reply
mode ipv4

  Sending 1, 100-byte MPLS Echos to 150.150.150.150 VC: 21,
        timeout is 2 seconds, send interval is 0 msec:

  Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
    'L' - labeled output interface, 'B' - unlabeled output interface,
    'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
    'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
    'P' - no rx intf label prot, 'p' - premature termination of LSP,
    'R' - transit router, 'I' - unknown upstream index,
    'X' - unknown return code, 'x' - return code 0

  Type escape sequence to abort.
  !
  Success rate is 100 percent (1/1), round-trip min/avg/max = 23/23/23 ms
```

ping mpls traffic-eng tunnel-te (P2P)

To specify the destination type as an MPLS-TE tunnel and tunnel interface, use the **ping mpls traffic-eng tunnel-te** command in EXEC modeXR EXEC mode.

ping mpls traffic-eng tunnel-te *tunnel-ID* {**destination** *start-address end-address increment*}[**dsmap**] [**exp** *exp-bits*] [**force-explicit-null**] [**interval** *min-send-delay*] [**lsp** {**active** | **path-protect** | **reopt**}][**pad** *pattern*] [**repeat** *count*] [**reply** {**dscp** *dscp-value* | **mode** {**ipv4** | **no-reply** | **router-alert**} | **pad-tlv**}] [**revision** *version*] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min-value max-value increment*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel-te *tunnel-ID*	Specifies the destination type as an MPLS traffic engineering (TE) tunnel and the tunnel interface number. The range for the tunnel interface number is 0 to 65535.
destination *start-address end-address increment*	Specifies a network 127/8 address to be used as the destination address in the echo request packet. ***start address*** Start of the network address. ***end address*** Start of the ending network address. ***address increment*** Incremental value of the network address, which is expressed as a decimal number value or IP address.
dsmap	(Optional) Indicates that a downstream mapping (DSMAP) type length and value should be included in the LSP echo request.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.
{ **active** | | **path-protect**}	(Optional) Specifies the LSP to use. **active** **path-protect** Path-Protect LSP.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.

repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
mode [**ipv4** | **router-alert** | **no-reply**]	(Optional) Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (this is the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set
reply pad-tlv	(Optional) Indicates that a pad TLV should be included.
revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
size *packet-size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
sweep *min-value max-value interval*	(Optional) Specifies a range of sizes for the echo packets sent. ***min-value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max-value*** Maximum or end size for an echo packet(range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.

ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits*: 0

interval *min-send-delay*: 0

repeat *count*: 5

reply-mode: IPv4

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced. This command replaces the **ping mpls traffic-eng** command.

Usage Guidelines

The **output interface** keyword specifies the output interface on which the MPLS echo request packets are sent. If the specified output interface is not part of the LSP, the packets are not transmitted.

In cases where the **sweep** keyword is used, values larger than the outgoing interface's MTU are not transmitted.

The **ping** command sends an echo request packet to an address, and then waits for a reply. Ping output helps you evaluate path-to-host reliability, delays over the path. It also helps you determine whether the host is reachable or is functioning.

Task ID

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

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.

ping mpls traffic-eng tunnel-mte (P2MP)

To specify the destination type as a Point-to-Multipoint (P2MP) for MPLS-TE tunnel and tunnel interface, use the **ping mpls traffic-eng tunnel-mte** command in EXEC modeXR EXEC mode.

ping mpls traffic-eng tunnel-mte *tunnel-ID* [**ddmap** { **destination** *start-address end-address increment* }] [**responder-id** *ipv4-address*] [**exp** *exp-bits*] [**interval** *min-send-delay*] [**jitter** *jitter-value*] [**lsp** { **active** | **reopt** }] [**pad** *pattern*] [**repeat** *count*] [**reply** { **dscp** *dscp-value* | **mode** { **ipv4** | **no-reply** | **router-alert** } | **pad-tlv** }] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min-value max-value increment*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel-mte *tunnel-ID*	Specifies the destination type as an MPLS traffic engineering (TE) P2MP tunnel and the tunnel interface number. The range for the tunnel interface number is 0 to 65535.
ddmap	(Optional) Indicates that a downstream detailed mapping TLV should be included in the LSP echo request.
destination *start-address end-address increment*	Specifies a network 127/8 address to be used as the destination address in the echo request packet. ***start-address*** Start of the network address. ***end-address*** End of the network address. ***address increment*** Incremental value of the network address, which is expressed as a decimal number value or IP address.
responder-id *ipv4-address*	(Optional) Specifies the responder IPv4 address.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.

jitter *jitter-value*	(Optional) Specifies a jitter value, in milliseconds. Range is 0 to 2147483647. Default is 200.
lsp { **active** | **reopt**}	(Optional) Specifies the Label Switch Path (LSP) to use. **active** Active LSP. **reopt** Reoptimize LSP.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.
repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
mode [**ipv4** | **router-alert** | **no-reply**]	(Optional) Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (this is the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set
reply pad-tlv	(Optional) Indicates that a pad TLV should be included.
size *packet-size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.

sweep *min-value max-value interval*	(Optional) Specifies a range of sizes for the echo packets sent. ***min-value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max-value*** Maximum or end size for an echo packet(range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255). Default is 255.
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits*: 0

interval *min-send-delay*: 0

repeat *count*: 5

reply-mode: IPv4

timeout *timeout* : 2

lsp: active

Command Modes

EXECXR EXEC

Command History

Usage Guidelines

To ping for LSP reoptimization, ensure that the reoptimization timer for the tunnel is running by using the **show mpls traffic-eng tunnels reoptimized within-last** command.

Task ID

Task ID	Operation
basic-services	execute
mpls-te or mpls-ldp	read

Example

The following example shows how to check connectivity by using the **ping mpls traffic-eng tunnel-mte** command with the **jitter** keyword:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel-mte 10 jitter 300

Mon Apr 12 12:13:00.630 EST

Sending 1, 100-byte MPLS Echos to tunnel-mte10,
      timeout is 2.3 seconds, send interval is 0 msec, jitter value is 300 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

Request #1
! reply addr 192.168.222.2
! reply addr 192.168.140.2
! reply addr 192.168.170.1

Success rate is 100 percent (3 received replies/3 expected replies),
     round-trip min/avg/max = 148/191/256 ms
```

The following example shows how to check connectivity by using the **ping mpls traffic-eng tunnel-mte** command with the **ddmap** keyword:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping traffic-eng tunnel-mte 10 ddmap

Mon Apr 12 12:13:34.365 EST

Sending 1, 100-byte MPLS Echos to tunnel-mte10,
      timeout is 2.2 seconds, send interval is 0 msec, jitter value is 200 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

Request #1
! reply addr 192.168.222.2
! reply addr 192.168.140.2
! reply addr 192.168.170.1

Success rate is 100 percent (3 received replies/3 expected replies),
     round-trip min/avg/max = 105/178/237 ms
```

The following example shows how to identify the LSP ID tunnel information by using the **show mpls traffic-eng tunnels p2mp** command, and then using the **lsp id** keyword with the **ping mpls traffic-eng tunnel-mte** command.

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls traffic-eng tunnels p2mp 10

Mon Apr 12 12:13:55.075 EST
Signalling Summary:
              LSP Tunnels Process:  running
                     RSVP Process:  running
                       Forwarding:  enabled
           Periodic reoptimization:  every 3600 seconds, next in 654 seconds
            Periodic FRR Promotion:  every 300 seconds, next in 70 seconds
           Auto-bw enabled tunnels:  0 (disabled)

Name: tunnel-mte10
   Status:
     Admin: up  Oper: up (Up for 12w4d)

     Config Parameters:
      Bandwidth: 0 kbps (CT0) Priority: 7 7 Affinity: 0x0/0xffff
      Metric Type: TE (default)
      Fast Reroute: Not Enabled, Protection Desired: None
      Record Route: Not Enabled

      Destination summary: (3 up, 0 down, 0 disabled) Affinity: 0x0/0xffff
      Auto-bw: disabled
      Destination: 11.0.0.1
        State: Up for 12w4d
        Path options:
          path-option 1 dynamic     [active]
      Destination: 12.0.0.1
        State: Up for 12w4d
        Path options:
          path-option 1 dynamic     [active]
      Destination: 13.0.0.1
        State: Up for 12w4d
        Path options:
          path-option 1 dynamic     [active]

     History:
       Reopt. LSP:
         Last Failure:
           LSP not signalled, identical to the [CURRENT] LSP
           Date/Time: Thu Jan 14 02:49:22 EST 2010 [12w4d ago]

    Current LSP:
      lsp-id: 10002 p2mp-id: 10 tun-id: 10 src: 10.0.0.1 extid: 10.0.0.1
      LSP up for: 12w4d
      Reroute Pending: No
      Inuse Bandwidth: 0 kbps (CT0)
      Number of S2Ls: 3 connected, 0 signaling proceeding, 0 down

      S2L Sub LSP: Destination 11.0.0.1 Signaling Status: connected
        S2L up for: 12w4d
        Sub Group ID: 1 Sub Group Originator ID: 10.0.0.1
        Path option path-option 1 dynamic    (path weight 1)
        Path info (OSPF 1 area 0)
          192.168.222.2
          11.0.0.1

      S2L Sub LSP: Destination 12.0.0.1 Signaling Status: connected
        S2L up for: 12w4d
        Sub Group ID: 2 Sub Group Originator ID: 10.0.0.1
```

```
        Path option path-option 1 dynamic    (path weight 2)
        Path info (OSPF 1 area 0)
          192.168.222.2
          192.168.140.3
          192.168.140.2
          12.0.0.1

      S2L Sub LSP: Destination 13.0.0.1 Signaling Status: connected
        S2L up for: 12w4d
        Sub Group ID: 3 Sub Group Originator ID: 10.0.0.1
        Path option path-option 1 dynamic    (path weight 2)
        Path info (OSPF 1 area 0)
          192.168.222.2
          192.168.170.3
          192.168.170.1
          13.0.0.1

    Reoptimized LSP (Install Timer Remaining 0 Seconds):
      None
    Cleaned LSP (Cleanup Timer Remaining 0 Seconds):
      None
Displayed 1 (of 16) heads, 0 (of 0) midpoints, 0 (of 0) tails
Displayed 1 up, 0 down, 0 recovering, 0 recovered heads


RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel-mte 10 lsp id 10002

Mon Apr 12 12:14:04.532 EST

Sending 1, 100-byte MPLS Echos to tunnel-mte10,
      timeout is 2.2 seconds, send interval is 0 msec, jitter value is 200 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

Request #1
! reply addr 192.168.222.2
! reply addr 192.168.170.1
! reply addr 192.168.140.2

Success rate is 100 percent (3 received replies/3 expected replies),
     round-trip min/avg/max = 128/153/167 ms
```

The following example shows how to use the **ping mpls traffic-eng tunnel-mte** command to check connectivity with a router's host address 13.0.0.1:

```
RP/0/RP0RSP0/CPU0:router:hostname# ping mpls traffic-eng tunnel-mte 10 egress 13.0.0.1


Mon Apr 12 12:15:34.205 EST

Sending 1, 100-byte MPLS Echos to tunnel-mte10,
      timeout is 2.2 seconds, send interval is 0 msec, jitter value is 200 msec:

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
```

```
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

Request #1
! reply addr 192.168.170.1

Success rate is 100 percent (1 received reply/1 expected reply),
     round-trip min/avg/max = 179/179/179 ms
```

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.

ping pseudowire multisegment

To verify the ping over the multisegment pseudowire, use the **ping pseudowire multisegment** command in EXEC modeXR EXEC mode.

ping [**mpls**] **pseudowire multisegment** *end-address pw-id* [**destinationfec** *sender-address remote-address pw-id-address*] [**exp** *exp-bits*] [**interval** *min-send-delay*] [**pad** *pattern*] [**repeat** *count*] [**segment-count** *segment-number*] [**reply** {**dscp** *dscp-value* | **mode** {**ipv4** | **no-reply** | **router-alert** | **control-channel**} | **pad-tlv**}] [**size** *packet-size*] [**source** *source-address*] [**sweep** *min value max value increment*] [**timeout** *timeout*] [**verbose**]

Syntax Description

mpls	(Optional) Verifies the Label Switched Path (LSP).
end-address	Target end address.
pw-id	Virtual circuit of the pseudowire ID that identifies the pseudowire in which MPLS connectivity is being verified. The pseudowire sends the echo request packets. Range is from 1 to 4294967295.
destinationfec *sender-address remote-address pw-id-address*	(Optional) Specifies the destination for the Forwarding Equivalence Class (FEC) . ***sender-address*** Sender-PE (S-PE) address for the destination FEC. The S-PE address is placed in the S-PE address field of the FEC 128 Pseudowire (RFC 4379). ***remote-address*** Remote address (S-PE address for the partial ping) for the destination FEC. The address is placed in the remote PE address of the FEC 128 Pseudowire (RFC 4379). **pw-id-address** Pseudowire ID of the pseudowire segment to the remote T-PE address (S-PE address for the partial ping).
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
interval *min-send-delay*	(Optional) Specifies a send interval between requests (in milliseconds). Range is 0 to 3600000. Default is 0.
pad *pattern*	(Optional) Specifies the pad pattern for an echo request.
repeat *count*	(Optional) Specifies the number of times to resend a packet. Range is 1 to 2147483647. Default is 5.

reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode {**ipv4** | **router-alert** | **no-reply** | **control-channel**}	(Optional) Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set **control-channel** Force the use of a VCCV control channel. Reply using an application for a defined control channel. This applies only to pseudowires in which VCCV is used in the reply path. This is the default choice for pseudowire ping.
segment-count	(Optional) Specifies the segment count for the FEC destination of the multisegment pseudowire . The segment count is used for the pseudowire label for the TTL value.
segment-number	(Optional) Value of the segment count. Range is 1 to 255.
pad-tlv	(Optional) Indicates that a pad TLV should be included.
size *packet-size*	(Optional) Specifies the packet size or number of bytes in each MPLS echo request packet. Range is 100 to 17986. Default is 100.
sweep *min value max value interval*	Specifies a range of sizes for the echo packets sent. ***min value*** Minimum or start size for an echo packet (range is 100 to 17986) ***max value*** Maximum or end size for an echo packet (range is 100 to 17986) ***interval*** Number used to increment an echo packet size(range is 1 to 8993)

source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval in seconds. Range is 0 to 3600. Default is 2 seconds.
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits* : 0

interval *min-send-delay* : 0

repeat *count*: 5

reply-mode: ipv4

size *packet-size* : 100

timeout *timeout* : 2 seconds

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	No modification.

Usage Guidelines

The partial ping works only if the **destinationfec** keyword is used.

The control word setting is either enabled along the entire path between the Terminating-Provider Edge (T-PE) or it is completely disabled. If the control word configuration is enabled on one segment and disabled on another segment, the multisegment pseudowire does not come up.

Task ID

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

The following example shows the local pseudowire segment from T-PE1 is set to S-PE1 80.80.80.80 and the pseudowire ID is set to 100. The last pseudowire segment of the multisegment pseudowire is from S-PE1 80.80.80.80 to T-PE2 90.90.90.90 and the pseudowire ID is set to 300.

```
RP/0/RP0RSP0/CPU0:router:hostname#  ping pseudowire multisegment 80.80.80.80 100
destinationfec 80.80.80.80 90.90.90.90 300 segment-count 2

Sending 5, 100-byte MPLS Echos to 80.80.80.80 VC: 100, 90.90.90.90 VC: 300
      timeout is 2 seconds, send interval is 0 msec, PW Label TTL is 2:
```

```
Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/10/18 ms
```

show mpls oam

To display MPLS OAM information, use the **show mpls oam** command in EXEC modeXR EXEC mode.

show mpls oam {**client** | **counters** {**global** | **packet**} | **interface** *type* *interface-path-id*}

Syntax Description

client	Displays clients registered with LSPV server.
counters global	Displays LSP verification global counters.
counters packet	Displays LSP verification packet counters.
counters interface	Displays LSP verification information for a specific interface.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all 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

EXECXR EXEC

Command History

Release	Modification
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	No modification.

Task ID

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

Examples

The following example shows how to display MPLS OAM client information:

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

  Client Process: l2vpn_mgr Node: 0/0/SP Pid: 418014
  Client Process: te_control Node: 0/0/SP Pid: 639227
```

This table describes the significant fields shown in the display.

Table 1: show mpls oam client Command Field Descriptions

Field	Description
Client Process	Process of client.

show mpls oam database

To display MPLS OAM database information, use the **show mpls oam database** command in EXEC modeXR EXEC mode.

show mpls oam database {**replies** | **requests** | **tt-requests**} [**detail**] [**handle** *handle-value*]

Syntax Description

replies	Displays replies database.
requests	Displays request database
tt-requests	Displays tree trace request database
detail	(Optional) Displays displayed information.
handle	(Optional) Displays handle information.
handle-value	Generic handle value. Range is from 0 to 4294967295.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	The *handle-value* argument was added.

Task ID

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

Examples

The following example shows how to display detailed MPLS OAM database information:

```
RP/0/RP0RSP0/CPU0:router:hostname# show mpls oam database request detail
```

traceroute mpls ipv4

To learn the routes that packets follow when traveling to their Label Distribution Protocol (LDP) IPv4 destination, use the **traceroute mpls** command in EXEC modeXR EXEC mode.

traceroute mpls ipv4 *address/mask* [**destination** *start-address end-address address-increment*] [**exp** *exp-bits*] [**flags fec**] [**force-explicit-null**] [**output** { **interface** *type interface-path-id* [**nexthop** *nexthop-address*] | [**nexthop** *nexthop-address*] }] [**reply** { **dscp** *dscp-value* | **reply mode** { **ipv4** | **router-alert** } }] [**revision** *version*] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**] [**fec-type** { **bgp** | **generic** | **ldp** }]

Syntax Description

address/mask	Specifies the destination type as a label distribution protocol (LDP) prefix. Address prefix of the target and number of bits in the target address network mask.
destination *start-address end-address address-increment*	Specifies a network 127 address to be used as the destination address in the echo request packet. ***start address*** Start of the network address. ***end address*** End of the network address. ***address increment*** Incremental value of the network address.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
flags fec	(Optional) Specifies that forwarding equivalent class (FEC) stack checking is to be performed at transit routers.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
output interface	(Optional) Specifies the output interface in which echo request packets are sent.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information, use the question mark (**?**) online help function.

nexthop	(Optional) Specifies the IP address for the next hop.
nexthop-address	(Optional) IP address for the next hop.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode { **ipv4** | **router-alert**}	(Optional) Specifies the reply mode for the echo request packet. **ipv4** Reply with IPv4 UDP packet (this is the default) **router-alert** Reply with IPv4 UDP packet with router alert
revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeoutt*	(Optional) Specifies the timeout interval, in seconds. Range is from 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the maximum number of hops (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.
fec-type	(Optional) Specifies FEC type to be used. **bgp** Use FEC type as BGP **generic** Use FEC type as generic **ldp** Use FEC type as LDP

Command Default

exp *exp-bits*: 0

reply mode: IPv4

timeout *timeout*: 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 3.9.0	No modification.
Release 4.3.1	The **fec-type** keyword was added. The **nexthop** keyword was added for **interface** sub-option.

Usage Guidelines

Note The **traceroute mpls** command is not supported on optical LSPs. If an optical LSP is encountered along the LSPs path, it is treated as a physical interface.

For detailed configuration information about MPLS LSP trace operations, see *Cisco ASR 9000 Series Aggregation Services Router System Monitoring Configuration Guide*.

Task ID

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

Examples

The following example shows how to trace a destination:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls ipv4 140.140.140.140/32
destination 127.0.0.10 127.0.0.15.1


Tracing MPLS Label Switched Path to 140.140.140.140/32, timeout is 2
seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.
```

```
Destination address 127.0.0.10

  0 196.100.1.41 MRU 4470 [Labels: 19 Exp: 0]
L 1 196.100.1.42 MRU 4470 [Labels: 86 Exp: 0] 360 ms
  2 196.100.1.50 MRU 4470 [Labels: implicit-null Exp: 0] 8 ms
! 3 196.100.1.18 9 ms
```

The following example shows how to trace a destination with FEC type specified as generic and verbose option:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls ipv4 11.11.11.11/32 fec-type generic
output interface gigabitEthernet 0/0/0/3
nexthop 172.40.103.2 verbose


Tracing MPLS Label Switched Path to 11.11.11.11/32, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

  0 172.40.103.1 172.40.103.2 MRU 1500 [Labels: 16038 Exp: 0]
L 1 172.40.103.2 173.101.103.1 MRU 1500 [Labels: 16037 Exp: 0] 6 ms, ret code 8
L 2 173.101.103.1 11.101.11.11 MRU 1500 [Labels: implicit-null Exp: 0] 4 ms, ret code 8
! 3 11.101.11.11 6 ms, ret code 3
```

traceroute mpls multipath

To discover all possible paths of an LSP between the ingress and egress routers, use the **traceroute mpls multipath** command in EXEC modeXR EXEC mode.

traceroute mpls multipath ipv4 *address/mask* [**destination** *start-address end-address address-increment*] [**exp** *exp-bits*] [**flags fec**] [**force-explicit-null**] [**hashkey ipv4 bitmap** *bit-size*] [**interval** *min-send-delay*] [**output interface** *type interface-path-id* [**nexthop** *nexthop-address*]] [**reply** {**dscp** *dscp-value* | **reply mode** {**ipv4** | **router-alert**}}] [**retry-count** *count*] [**revision** *version*] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**] [**fec-type** {**bgp** | **generic** | **ldp**}]

traceroute mpls multipath ipv4 *address/mask* [**destination** *start-address end-address address-increment*] [**exp** *exp-bits*] [**flags fec**] [**force-explicit-null**] [**hashkey ipv4 bitmap** *bit-size*] [**interval** *min-send-delay*] [**output** { **interface** *type interface-path-id* [**nexthop** *nexthop-address*] | [**nexthop** *nexthop-address*] }] [**reply** { **dscp** *dscp-value* | **reply mode** { **ipv4** | **router-alert** } }] [**retry-count** *count*] [**revision** *version*] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**] [**fec-type** { **bgp** | **generic** | **ldp** }]

Syntax Description

ipv4	Specifies the destination type as a Label Distribution Protocol (LDP) IPv4 address.
address/mask	Address prefix of the target and number of bits in the target address network mask.
destination *start-address end-address address -increment*	(Optional) Specifies a network 127 address to be used as the destination address in the echo request packet. ***start-address*** Start of the network address. ***end-address*** End of the network address. ***address-increment*** Incremental value of the network address.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
flags fec	(Optional) Specifies that forwarding equivalent class (FEC) stack checking is to be performed at transit routers.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
hashkey ipv4 bitmap *bit-size*	(Optional) Allows user control of the hash key/multipath settings. Range is 0 to 256. The default is 32.
interval *min-send-delay*	(Optional) Specifies a send interval, in milliseconds, between requests. Range is 0 to 3600000. Default is 0.

output interface	(Optional) Specifies the output interface where echo request packets are sent.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information, use the question mark (**?**) online help function.
nexthop	(Optional) Specifies the IP address for the next hop.
nexthop-address	(Optional) IP address for the next hop.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode [**ipv4** | **router-alert**]	(Optional) Specifies the reply mode for the echo request packet. **ipv4** Reply with IPv4 UDP packet (this is the default) **router-alert** Reply with IPv4 UDP packet with router alert
retry-count *count*	(Optional) Specifies the number of retry attempts during multipath LSP traceroute. A retry is attempted if an outstanding echo request • times out waiting for the corresponding echo reply. • fails to find a valid destination address set to exercise a specific outgoing path. Range is 0 to 10. Default is 3.
revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is from 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the maximum number of hops (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits* : 0

hashkey ipv4 bitmap *bit-size*: 4

interval *min-send-delay*: 0

reply mode: IPv4

retry-count: 3

timeout *timeout* : 2

Command Modes

EXEC

Command History

Release	Modification
Release 3.4.0	No modification.
Release 3.5.0	No modification.
Release 3.6.0	No modification.
Release 3.7.0	No modification.
Release 3.7.2	This command was introduced.
Release 3.8.0	No modification.
Release 4.3.1	The **fec-type** keyword was added. The **nexthop** keyword was added for **interface** sub-option.

Usage Guidelines

The **hashkey ipv4 bitmap** keyword and *bit-size* value control how many addresses are encoded in the DSMAP multipath field. Larger values allow more coverage of equal cost multiple paths throughout the network, but with more processing at the head, mid, and tail routers.

Task ID

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

Examples

The following example shows how to specify the destination type as an LDP IPv4 prefix:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls multi ipv4 140.140.140.140/32 verbose
force-explicit-null

  Starting LSP Path Discovery for 140.140.140.140/32

  Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0
```

```
  Type escape sequence to abort.

  LL!
  Path 0 found,
  output interface POS0/2/0/3 source 196.100.1.61 destination 127.0.0.1
  0 196.100.1.61 196.100.1.62 MRU 4470 [Labels: 18/explicit-null Exp: 0/0] multipaths 0
  L 1 196.100.1.62 196.100.1.10 MRU 4470 [Labels: 17/explicit-null Exp: 0/0] ret code 8
multipaths 1
  L 2 196.100.1.10 196.100.1.18 MRU 4470 [Labels: implicit-null/explicit-null Exp: 0/0] ret
 code 8 multipaths 1
  ! 3 196.100.1.1018, ret code 3 multipaths 0
  LL!
  Path 1 found,
  output interface GigabitEthernet0/3/0/0 source 196.100.1.5 destination 127.0.0.1
  0 196.100.1.5 196.100.1.37 6 MRU 1500 [Labels: 18/explicit-null Exp: 0/0] multipaths 0
  L 1 196.100.1.6 196.100.1.10 MRU 4470 [Labels: 17/explicit-null Exp: 0/0] ret code 8
multipaths 1
  L 2 10196.0100.21.5 1010 196.0100.21.10 18 MRU 4470 [Labels: implicit-null/explicit-null
 Exp: 0/0] ret code 8 multipaths 1
  ! 3 10196.0100.21.1018, ret code 3 multipaths 0

  Paths (found/broken/unexplored) (2/0/0)
  Echo Request (sent/fail) (6/0)
  Echo Reply (received/timeout) (6/0)
  Total Time Elapsed 80 ms
```

The following example shows how to specify the FEC type as LDP with verbose option:

```
RP/0/RP0RSP0/CPU0:router:hostname#  traceroute mpls multipath ipv4 11.11.11.11/32 fec-type
 ldp output interface gigabitEthernet 0/0/0/3
nexthop 172.40.103.2 verbose

Starting LSP Path Discovery for 11.11.11.11/32

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

LL!
Path 0 found,
 output interface GigabitEthernet0/0/0/3 nexthop 172.40.103.2
 source 172.40.103.1 destination 127.0.0.0
  0 172.40.103.1 172.40.103.2 MRU 1500 [Labels: 16038 Exp: 0] multipaths 0
L 1 172.40.103.2 173.101.103.1 MRU 1500 [Labels: 16037 Exp: 0] ret code 8 multipaths 1
L 2 173.101.103.1 11.101.11.11 MRU 1500 [Labels: implicit-null Exp: 0] ret code 8 multipaths
 1
! 3 11.101.11.11, ret code 3 multipaths 0

Paths (found/broken/unexplored) (1/0/0)
 Echo Request (sent/fail) (3/0)
 Echo Reply (received/timeout) (3/0)
 Total Time Elapsed 21 ms
```

traceroute mpls traffic-eng

To specify the destination type as an MPLS traffic engineering (TE) tunnel, use the **traceroute mpls traffic-eng** command in EXEC modeXR EXEC mode.

traceroute mpls traffic-eng tunnel *tunnel-ID* [**destination** *start-address end-address address-increment increment-mask*] [**exp** *exp-bits*] [**flags fec**] [**force-explicit-null**] [**reply** {**dscp** *dscp-value* | **reply mode** {**ipv4** | **router-alert**}}] [**revision** *version*] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel	Specifies the MPLS-TE tunnel type.
tunnel-ID	Tunnel interface.
destination *start-address end-address address -increment increment-mask*	(Optional) Specifies a network 127 address to be used as the destination address in the echo request packet. ***start-address*** Start of the network address. ***end-address*** End of the network address. ***address-increment*** Incremental value of the network address. ***increment-mask*** Incremental mask of the network address.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
flags fec	(Optional) Specifies that forwarding equivalent class (FEC) stack checking is to be performed at transit routers.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply mode [**ipv4** | **router-alert**]	(Optional) Specifies the reply mode for the echo request packet. **ipv4** Reply with IPv4 UDP packet (this is the default) **router-alert** Reply with IPv4 UDP packet with router alert

revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is from 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the maximum number of hops (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits* : 0

reply mode: IPv4

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 4.0.0	This command was replaced by the **traceroute mpls traffic-eng tunnel-te (P2P)** command.

Task ID

Task ID	Operation
mpls-te	read
mpls-ldp	read

The following example shows how to specify the destination as a MPLS-TE tunnel:

```
RP/0/RP0RSP0/CPU0:router:hostname#  traceroute mpls traffic-eng tunnel 13

Tracing MPLS TE Label Switched Path on tunnel-te13, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.
```

```
0 0.0.0.0 11.0.0.1 MRU 1500 [Labels: 16003 Exp: 0]
L 1 192.168.200.2 192.168.170.1 MRU 1500 [Labels: implicit-null Exp: 0] 110 ms
! 2 192.168.170.1 0.0.0.0 MRU 0 [No Label] 169 ms
```

Related Commands

Command	Description
ping mpls traffic-eng tunnel-te (P2P)	Displays information about MPLS-TE tunnel for a point-to-point connection.

traceroute pseudowire multisegment

To verify the Labeled Switch Path (LSP) for the multisegment pseudowire, use the **traceroute pseudowire multisegment** command in EXEC modeXR EXEC mode.

traceroute pseudowire multisegment *address pw-id* [**exp** *exp-bits*] [**flags fec**] [**reply** {**dscp** *dscp-value* | **mode** {**ipv4** | **no-reply** | **router-alert** | **control-channel**} | **pad-tlv**}] [**source** *source-address*] [**timeout** *timeout*] [**verbose**]

Syntax Description

address	Address of the next S-PE.
pw-id	Pseudowire ID of the pseudowire segment to the next S-PE.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
flags fec	(Optional) Specifies that forwarding equivalent class (FEC) stack checking is to be performed at transit routers.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
mode {**ipv4** | **router-alert** | **no-reply** | **control-channel**}	(Optional) Specifies the reply mode for the echo request packet. **no-reply** Do not reply **ipv4** Reply with an IPv4 UDP packet (the default) **router-alert** Reply with an IPv4 UDP packet with the IP router alert set **control-channel** Force the use of a VCCV control channel. Reply using an application for a defined control channel. This applies only to pseudowires in which VCCV is used in the reply path. This is the default choice for pseudowire ping.
pad-tlv	(Optional) Indicates that a pad TLV should be included.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval in seconds. Range is 0 to 3600. Default is 2 seconds.
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits* : 0

reply-mode: ipv4

timeout *timeout* : 2 seconds

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	No modification.

Task ID

Task ID	Operation
mpls-te	read
mpls-ldp	read

The following example shows that the next pseudowire segment and traceroute go through each hop in which each hop is a S-PE or remote T-PE. The local segment from T-PE1 is set to S-PE1 80.80.80.80 and the pseudowire ID is set to 100. The last pseudowire segment of the multisegment pseudowire is from S-PE1 80.80.80.80 to T-PE2 90.90.90.90 and the pseudowire ID is set to 300.

```
RP/0/RP0RSP0/CPU0:router:hostname#  traceroute pseudowire multisegment 80.80.80.80 100

Tracing MS-PW to 80.80.80.80 VC: 100, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

  0 1.2.1.2 MRU 1500 [Outgoing Labels: 20495 Exp: 0]
L 1 1.2.1.1 MRU 1500 [Outgoing Labels: 24587 Exp: 0] 13 ms
    local 70.70.70.70 remote 80.80.80.80 pw-id 100
! 2 1.4.1.1 9 ms
    local 80.80.80.80 remote 90.90.90.90 pw-id 300
```

traceroute mpls traffic-eng tunnel-te (P2P)

To specify the destination type as an MPLS traffic engineering (TE) tunnel for a point-to-point connection, use the **traceroute mpls traffic-eng tunnel-te (P2P)** command in EXEC modeXR EXEC mode.

traceroute mpls traffic-eng tunnel-te *tunnel-ID* [**destination** *start-address end-address address-increment increment-mask*] [**exp** *exp-bits*] [**flags fec**] [**force-explicit-null**] [**reply** {**dscp** *dscp-value* | **mode** {**ipv4** | **router-alert**}}] [**revision** *version*] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel-te	Specifies the MPLS-TE tunnel type.
tunnel-ID	Tunnel interface.
destination *start-address end-address address -increment increment-mask*	(Optional) Specifies a network 127 address to be used as the destination address in the echo request packet. ***start-address*** Start of the network address. ***end-address*** End of the network address. ***address-increment*** Incremental value of the network address. ***increment-mask*** Incremental mask of the network address.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
flags fec	(Optional) Specifies that forwarding equivalent class (FEC) stack checking is to be performed at transit routers.
force-explicit-null	(Optional) Forces an unsolicited explicit null label to be added to the MPLS label stack and allows LSP ping to be used to detect LSP breakages at the penultimate hop.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
reply-mode [**ipv4** | **router-alert**]	(Optional) Specifies the reply mode for the echo request packet. **ipv4** Reply with IPv4 UDP packet (this is the default) **router-alert** Reply with IPv4 UDP packet with router alert

revision *version*	(Optional) Specifies the Cisco extension TLV versioning field: • 1 draft-ietf-mpls-lsp-ping-03 (initial) • 2 draft-ietf-mpls-lsp-ping-03 (rev 1) • 3 draft-ietf-mpls-lsp-ping-03 (rev 2) • 4 draft-ietf-mpls-lsp-ping-09 (initial)
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is from 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the maximum number of hops (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits* : 0

reply-mode: IPv4

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced. This command replaces the **traceroute mpls traffic-eng** command.

Task ID

Task ID	Operation
mpls-te	read
mpls-ldp	read

The following example shows how to specify the destination as a MPLS-TE tunnel:

```
RP/0/RP0RSP0/CPU0:router:hostname#  traceroute mpls traffic-eng tunnel-te 13

Tracing MPLS TE Label Switched Path on tunnel-te13, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

 0 0.0.0.0 11.0.0.1 MRU 1500 [Labels: 16003 Exp: 0]
 L 1 192.168.200.2 192.168.170.1 MRU 1500 [Labels: implicit-null Exp: 0] 110 ms
```

```
! 2 192.168.170.1 0.0.0.0 MRU 0 [No Label] 169 ms
```

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.

traceroute mpls traffic-eng tunnel-mte (P2MP)

To specify the destination type as an MPLS traffic engineering (TE) tunnel for point-to-multipoint connection, use the **traceroute mpls traffic-eng tunnel-mte** command in EXEC modeXR EXEC mode.

traceroute mpls traffic-eng tunnel-mte *tunnel-ID* [**destination** *start-address end-address address-increment increment-mask*] [**responder-id** *ipv4-address*][**exp** *exp-bits*] [**flags fec**] [**jitter** *jitter-value*] [**reply** {**dscp** *dscp-value* | **mode** {**ipv4** | **router-alert**}}] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel-mte	Specifies the MPLS-TE P2MP tunnel type.
tunnel-ID	Tunnel interface.
destination *start-address end-address address -increment increment-mask*	(Optional) Specifies a network 127 address to be used as the destination address in the echo request packet. ***start-address*** Start of the network address. ***end-address*** End of the network address. ***address-increment*** Incremental value of the network address. ***increment-mask*** Incremental mask of the network address.
responder-id *ipv4-address*	(Optional) Specifies the responder-id IPv4 address.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.
flags fec	(Optional) Specifies that forwarding equivalent class (FEC) stack checking is to be performed at transit routers.
jitter *jitter-value*	(Optional) Specifies the jitter value. Range is 0 to 2147483647.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.

reply-mode [**ipv4** | **router-alert**]	(Optional) Specifies the reply mode for the echo request packet. **ipv4** Reply with IPv4 UDP packet. (This is the default.) **router-alert** Reply with IPv4 UDP packet with router alert
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the maximum number of hops. Range is 1 to 255. Default is 30.
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits* : 0

reply-mode: IPv4

timeout *timeout* : 2

ttl: 30

Command Modes

EXECXR EXEC

Command History

Task ID

Task ID	Operation
mpls-te	read
mpls-ldp	read

Example

The following example shows how to specify the maximum number of hops for the trace route to traverse by using the **ttl** keyword:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls traffic-eng tunnel-mte 10 ttl 4

Mon Apr 12 12:16:50.095 EST

Tracing MPLS MTE Label Switched Path on tunnel-mte10, timeout is 2.2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
```

```
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

! 1 192.168.222.2 186 ms [Estimated Role: Bud]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]

! 2 192.168.222.2 115 ms [Estimated Role: Bud]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 2 192.168.140.2 213 ms [Estimated Role: Egress]
! 2 192.168.170.1 254 ms [Estimated Role: Egress]

! 3 192.168.222.2 108 ms [Estimated Role: Bud]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 3 192.168.170.1 164 ms [Estimated Role: Egress]
! 3 192.168.140.2 199 ms [Estimated Role: Egress]

! 4 192.168.170.1 198 ms [Estimated Role: Egress]
! 4 192.168.222.2 206 ms [Estimated Role: Bud]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 4 192.168.140.2 266 ms [Estimated Role: Egress]
```

The following example shows how to specify the egress host address by using the **egress** keyword:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls traffic-eng tunnel-mte 10 egress 13.0.0.1

Mon Apr 12 12:18:01.994 EST

Tracing MPLS MTE Label Switched Path on tunnel-mte10, timeout is 2.2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

d 1 192.168.222.2 113 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]

d 2 192.168.222.2 118 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 2 192.168.170.1 244 ms [Estimated Role: Egress]

d 3 192.168.222.2 141 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 3 192.168.170.1 204 ms [Estimated Role: Egress]

d 4 192.168.222.2 110 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 4 192.168.170.1 174 ms [Estimated Role: Egress]
```

The following example shows how to specify the egress host address, the maximum number of hops, and jitter in the tunnel:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls traffic-eng tunnel-mte 10 egress 13.0.0.1
 ttl 4 jitter 500

Mon Apr 12 12:19:00.292 EST

Tracing MPLS MTE Label Switched Path on tunnel-mte10, timeout is 2.5 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0, 'd' - DDMAP

Type escape sequence to abort.

d 1 192.168.222.2 238 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]

d 2 192.168.222.2 188 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 2 192.168.170.1 290 ms [Estimated Role: Egress]

d 3 192.168.222.2 115 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 3 192.168.170.1 428 ms [Estimated Role: Egress]

d 4 192.168.222.2 127 ms [Estimated Role: Branch]
    [L] DDMAP 0: 192.168.140.2 192.168.140.2 MRU 1500 [Labels: 16001 Exp: 0]
    [L] DDMAP 1: 192.168.170.1 192.168.170.1 MRU 1500 [Labels: 16000 Exp: 0]
! 4 192.168.170.1 327 ms [Estimated Role: Egress]
```

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.
ping mpls traffic-eng tunnel-te (P2P)	Displays information about MPLS-TE tunnel for a point-to-point connection.

traceroute mpls traffic-eng tunnel-tp

To learn the routes that packets follow when traveling to their destination, use the **traceroute mpls traffic-eng tunnel-tp**command in EXEC modeXR EXEC mode.

traceroute mpls traffic-eng tunnel-tp *tunnel-id* [**ddmap**] [**destination** *start-address end-address increment*] [**encap** {**cv-ip** | **cv-non-ip** | **ip**}] [**exp** *exp-bits*] [**flags** {**fec** | **reverse-verification** }] [**lsp** {**active** | **protect** | **working**}][**reply** {**dscp** *dscp-value* | **mode** {**control-channel** | **no-reply** } | **pad-tlv**}] [**source** *source-address*] [**timeout** *timeout*] [**ttl** *value*] [**verbose**]

Syntax Description

tunnel-tp *tunnel-ID*	Specifies the destination type as an MPLS Transport Profile (MPLS-TP) tunnel and the tunnel interface number. The range for the tunnel interface number is 0 to 65535.
ddmap	(Optional) Indicates that a downstream detailed mapping (DDMAP) TLV should be included in the LSP echo request.
destination *start-address end-address increment*	Specifies a network 127/8 address to be used as the destination address in the echo request packet. ***start address*** Start of the network address. ***end address*** Start of the ending network address. ***address increment*** Incremental value of the network address, which is expressed as a decimal number value or IP address.
encap { **cv-ip** | **cv-non-ip** | **ip** }	(Optional) Specifies the MPLS-TP encapsulation type to use. **cv-ip** Use IP encapsulation with GACH channel 0x0021. **cv-non-ip** Use non-IP encapsulation with GACH channel 0x0025. **ip** Use IP encapsulation.
exp *exp-bits*	(Optional) Specifies the MPLS experimental field value in the MPLS header for echo replies. Range is 0 to 7. Default is 0.

flags { **fec** | **reverse-verification** }	(Optional) Specifies the flag options to use. **fec** Request forwarding equivalent class (FEC) stack checking is to be performed at transit routers. **reverse-verification** Request reverse path connectivity verification.
lsp { **active** | **protect** | **working** }	(Optional) Specifies the LSP to use. **active** Active MPLS-TP tunnel. **protect** Protect MPLS-TP tunnel. **working** Working MPLS-TP tunnel. **Note** Use this option to identify error in the LSP path if the MPLS-TP tunnel is not up.
reply dscp *dscp-value*	(Optional) Specifies the differentiated service codepoint value for an MPLS echo reply.
mode [**control-channel**]	(Optional) Specifies the reply mode for the echo request packet. **control-channel** Send reply via a control channel.
source *source-address*	(Optional) Specifies the source address used in the echo request packet.
timeout *timeout*	(Optional) Specifies the timeout interval, in seconds. Range is 0 to 3600. Default is 2.
ttl *value*	(Optional) Specifies the TTL value to be used in the MPLS labels (range is 1 to 255).
verbose	(Optional) Enables verbose output information, including MPLS echo reply, sender address of the packet, and return codes.

Command Default

exp *exp-bits*: 0

timeout *timeout* : 2

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.3.1	This command was introduced.

Task ID

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

Examples

The following sample output is from the **traceroute mpls traffic-eng tunnel-tp** command using the non-IP-ACH encapsulation:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls traffic-eng tunnel-tp 1 encap cv-non-ip

Tracing MPLS TP Label Switched Path on tunnel-tp1, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

  0 Node ID 10.10.10.1, Global ID 0 MRU 1500 [Labels: 1000 Exp: 0]
L 1 Node ID 10.10.10.2, Global ID 0 MRU 1500 [Labels: 1100 Exp: 0] 3 ms
! 2 Node ID 12.12.12.3, Global ID 0 4 ms
```

The following sample output is from the **traceroute mpls traffic-eng tunnel-tp** command using the non-IP-ACH encapsulation and verbose option:

```
RP/0/RP0RSP0/CPU0:router:hostname# traceroute mpls traffic-eng tunnel-tp 1 encap cv-non-ip

Tracing MPLS TP Label Switched Path on tunnel-tp1, timeout is 2 seconds

Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L' - labeled output interface, 'B' - unlabeled output interface,
  'D' - DS Map mismatch, 'F' - no FEC mapping, 'f' - FEC mismatch,
  'M' - malformed request, 'm' - unsupported tlvs, 'N' - no rx label,
  'P' - no rx intf label prot, 'p' - premature termination of LSP,
  'R' - transit router, 'I' - unknown upstream index,
  'X' - unknown return code, 'x' - return code 0

Type escape sequence to abort.

  0 Node ID 10.10.10.1, Global ID 0 MRU 1500 [Labels: 1000 Exp: 0]
    Ingress Link ID 0, Egress Link ID 1
L 1 Node ID 10.10.10.2, Global ID 0 MRU 1500 [Labels: 1100 Exp: 0] 3 ms
    Ingress Link ID 2, Egress Link ID 3
```

```
! 2 Node ID 12.12.12.3, Global ID 0 4 ms
```

Related Commands

Command	Description
show mpls traffic-eng tunnels	Displays information about MPLS-TE tunnels.
ping mpls traffic-eng tunnel-te (P2P)	Verifies the connectivity of the LSP path for the MPLS-TE P2P tunnels.