

Contents

MPLS OAM commands	1
bfd ip-router-alert.....	1
ping mpls ipv4	1
ping mpls pw	4
ping mpls te	5
tracert mpls ipv4.....	6
tracert mpls te.....	8
vccv cc.....	9

MPLS OAM commands

bfd ip-router-alert

Use **bfd ip-router-alert** to add the Router Alert option in BFD packets for LSP connectivity verification.

Use **undo bfd ip-router-alert** to remove the Router Alert option from BFD packets for LSP connectivity verification.

Syntax

```
bfd ip-router-alert
undo bfd ip-router-alert
```

Default

The device adds the Router Alert option in BFD packets for LSP connectivity verification.

Views

System view

Predefined user roles

network-admin
mdc-admin

Usage guidelines

Execute the **undo bfd ip-router-alert** command on the local device if the peer device cannot identify the Router Alert option in BFD packets.

This command takes effect only on BFD sessions that come up after this command is executed.

Examples

```
# Remove the Router Alert option from BFD packets.
<Sysname> system-view
[Sysname] undo bfd ip-router-alert
```

ping mpls ipv4

Use **ping mpls ipv4** to verify MPLS LSP connectivity for an IPv4 prefix.

Syntax

```
ping mpls [ -a source-ip | -c count | -exp exp-value | -h ttl-value | -m
wait-time | -r reply-mode | -rtos tos-value | -s packet-size | -t time-out
| -v ] * ipv4 ipv4-address mask-length [ destination start-address
[ end-address [ address-increment ] ] ]
```

Views

Any view

Predefined user roles

network-admin
mdc-admin

Parameters

-a *source-ip*: Specifies the source address for MPLS echo request packets. If you do not specify this option, the device uses the primary IP address of the outgoing interface as the source address for MPLS echo requests.

-c *count*: Specifies the number of MPLS echo request packets to be sent with the same destination address in the IP header. The value range is 1 to 4294967295. The default is 5.

-exp *exp-value*: Specifies the EXP value for MPLS echo request packets, in the range of 0 to 7. The default is 0.

-h *ttl-value*: Specifies the TTL value for MPLS echo request packets, in the range of 1 to 255. The default is 255.

-m *wait-time*: Specifies the interval for sending MPLS echo request packets, in the range of 1 to 10000 milliseconds. The default is 200 milliseconds.

-r *reply-mode*: Specifies the reply mode of the receiver in response to MPLS echo request packets. The *reply-mode* argument can be 1, 2, 3, or 4. 1 means "Do not reply." 2 means "Reply by using a UDP packet." 3 means "Reply by using a UDP packet that carries the Router Alert option." 4 means "Reply by using a VCCV packet." The default is 2. The reply mode 4 is not available for MPLS LSP connectivity verification. If the reply mode 4 is specified, the remote end does not reply.

-rtos *tos-value*: Specifies the ToS value in the IP header of an MPLS echo reply packet. The value range is 0 to 7, and the default value is 6.

-s *packet-size*: Specifies the length (excluding the IP header and UDP header) of an MPLS echo request packet. The value for the *packet-size* argument is 65 to 8100 bytes, and the default is 100 bytes.

-t *time-out*: Specifies the timeout interval for the reply to an MPLS echo request. The value range is 0 to 65535 milliseconds, and the default is 2000 milliseconds.

-v: Displays detailed reply information. If you do not specify this keyword, the command displays brief reply information.

ipv4-address mask-length: Specifies an FEC by a destination IP address and mask length. The mask length is in the range of 0 to 32.

destination: Specifies the destination address in the IP header of MPLS echo requests. The default is 127.0.0.1.

start-address: Specifies the destination address or the start destination address. This address must be an address on subnet 127.0.0.0/8—a local loopback address. If you specify the *start-address* argument without the *end-address* argument, the *start-address* is the destination address in the IP header. The number of MPLS echo requests to be sent is determined by the **-c** *count* keyword. If you specify both *start-address* and *end-address*, you specify a range of destination addresses. The destination address increments by the value specified for the *address-increment* argument, starting from the *start-address* to the *end-address*. The number of MPLS echo requests to be sent with each of the destination addresses is determined by the **-c** *count* keyword.

end-address: Specifies the end destination address. This address must be an address on subnet 127.0.0.0/8—a local loopback address.

address-increment: Specifies the increment value by which the destination address in the IP header increases in turn. The value range is 1 to 16777215 and the default value is 1.

Examples

```
# Verify the connectivity of LSPs to destination 3.3.3.9/32.
```

```
<Sysname> ping mpls ipv4 3.3.3.9 32
```

```
MPLS ping FEC 3.3.3.9/32 with 100 bytes of data:
```

```

100 bytes from 100.1.2.1: Sequence=1 time=49 ms
100 bytes from 100.1.2.1: Sequence=2 time=44 ms
100 bytes from 100.1.2.1: Sequence=3 time=60 ms
100 bytes from 100.1.2.1: Sequence=4 time=60 ms
100 bytes from 100.1.2.1: Sequence=5 time=76 ms

```

```

--- Ping statistics for FEC 3.3.3.9/32 ---

```

```

5 packets transmitted, 5 packets received, 0.0% packet loss

```

```

Round-trip min/avg/max = 44/57/76 ms

```

Verify the connectivity of LSPs to destination 3.3.3.9/32, and specify the following parameters:

- Set the number of MPLS echo requests to be sent with the same destination address to 3.
- Display detailed reply information.
- Specify the range of destination addresses in IP headers as 127.0.0.1 to 127.0.0.3, and set the destination address increment value to 2. With these settings, the destination addresses are 127.0.0.1 and 127.0.0.3.

```

<Sysname> ping mpls -c 3 -v ipv4 3.3.3.9 32 destination 127.0.0.1 127.0.0.3 2

```

```

MPLS ping FEC 3.3.3.9/32 with 100 bytes of data:

```

```

Destination address 127.0.0.1

```

```

100 bytes from 100.1.2.1: Sequence=1 time=49 ms Return Code=3(1)

```

```

Destination address 127.0.0.3

```

```

100 bytes from 100.1.2.1: Sequence=2 time=44 ms Return Code=3(1)

```

```

Destination address 127.0.0.1

```

```

100 bytes from 100.1.2.1: Sequence=3 time=60 ms Return Code=3(1)

```

```

Destination address 127.0.0.3

```

```

100 bytes from 100.1.2.1: Sequence=4 time=60 ms Return Code=3(1)

```

```

Destination address 127.0.0.1

```

```

100 bytes from 100.1.2.1: Sequence=5 time=76 ms Return Code=3(1)

```

```

Destination address 127.0.0.3

```

```

100 bytes from 100.1.2.1: Sequence=6 time=57 ms Return Code=3(1)

```

```

--- Ping statistics for FEC 3.3.3.9/32 ---

```

```

6 packets transmitted, 6 packets received, 0.0% packet loss

```

```

Round-trip min/avg/max = 44/57/76 ms

```

Table 1 Command output

Field	Description
MPLS Ping FEC: 3.3.3.9/32 : 100 data bytes	Verify LSP connectivity for FEC 3.3.3.9/32 by sending 100-byte MPLS echo requests.
Destination address	Destination IP address in the IP header.
100 bytes from 100.1.2.1	Received a 100-byte reply from 100.1.2.1.
Sequence	Sequence number of the reply, for determination of packet loss, disorder, or duplicate.

Field	Description
time	Packet round-trip delay.
Return Code	Return code. The number in parentheses represents a return subcode.
Ping statistics for FEC 3.3.3.9/32	LSP verification statistics.
packets transmitted	Number of MPLS echo requests sent.
packets received	Number of MPLS echo replies received.
packet loss	Percentage of unreplied packets to total request packets.
Round-trip min/avg/max	Minimum, average, and maximum round-trip delay.

ping mpls pw

Use `ping mpls pw` to verify LDP PW or static PW connectivity.

Syntax

```
ping mpls [ -a source-ip | -c count | -exp exp-value | -h ttl-value | -m
wait-time | -r reply-mode | -rtos tos-value | -s packet-size | -t time-out
| -v ] *pw ip-address pw-id pw-id
```

Views

Any view

Predefined user roles

network-admin

mdc-admin

Parameters

-a *source-ip*: Specifies the source address for MPLS echo request packets. If you do not specify this option, the device uses its MPLS LSR ID as the source address for MPLS echo requests.

-c *count*: Specifies the number of MPLS echo request packets to be sent. The value range is 1 to 4294967295. The default is 5.

-exp *exp-value*: Specifies the EXP value for MPLS echo request packets, in the range of 0 to 7. The default is 0.

-h *ttl-value*: Specifies the TTL value for MPLS echo request packets, in the range of 1 to 255. The default is 255.

-m *wait-time*: Specifies the interval for sending MPLS echo request packets, in the range of 1 to 10000 milliseconds. The default is 200 milliseconds.

-r *reply-mode*: Specifies the reply mode of the receiver in response to MPLS echo request packets. The *reply-mode* argument can be 1, 2, 3, or 4. 1 means "Do not reply." 2 means "Reply by using a UDP packet." 3 means "Reply by using a UDP packet that carries the Router Alert option." 4 means "Reply by using a VCCV packet." The default is 2.

-rtos *tos-value*: Specifies the ToS value in the IP header of an MPLS echo reply packet. The value range is 0 to 7, and the default value is 6.

-s *packet-size*: Specifies the length (excluding the IP header and UDP header) of an MPLS echo request packet. The value for the *packet-size* argument is 65 to 8100 bytes, and the default is 100 bytes.

-t *time-out*: Specifies the timeout interval for the reply to an MPLS echo request. The value range is 0 to 65535 milliseconds, and the default is 2000 milliseconds.

-v: Displays detailed reply information. If you do not specify this keyword, the command displays brief reply information.

ip-address: Specifies the IP address of the peer PE.

pw-id *pw-id*: Specifies the ID of the PW to the peer PE, in the range of 1 to 4294967295.

Examples

Verify the connectivity of PW 301 to peer PE 3.3.3.9.

```
<Sysname> ping mpls pw 3.3.3.9 pw-id 301
MPLS ping PW 3.3.3.9 301 with 100 bytes of data:
100 bytes from 100.1.2.1: Sequence=1 time=49 ms
100 bytes from 100.1.2.1: Sequence=2 time=44 ms
100 bytes from 100.1.2.1: Sequence=3 time=60 ms
100 bytes from 100.1.2.1: Sequence=4 time=60 ms
100 bytes from 100.1.2.1: Sequence=5 time=76 ms

--- Ping statistics for PW 3.3.3.9 301 ---
5 packets transmitted, 5 packets received, 0.0% packet loss
Round-trip min/avg/max = 44/57/76 ms
```

For the command output, see [Table 1](#).

ping mpls te

Use `ping mpls te` to verify MPLS TE tunnel connectivity.

Syntax

```
ping mpls [ -a source-ip | -c count | -exp exp-value | -h ttl-value | -m wait-time | -r reply-mode | -rtos tos-value | -s packet-size | -t time-out | -v ] * te tunnel interface-number
```

Views

Any view

Predefined user roles

network-admin

mdc-admin

Parameter

-a *source-ip*: Specifies the source address for MPLS echo request packets. If you do not specify this option, the device uses the primary IP address of the outgoing interface as the source address for MPLS echo requests.

-c *count*: Specifies the number of MPLS echo request packets to be sent, in the range of 1 to 4294967295. The default is 5.

-exp *exp-value*: Specifies the EXP value for MPLS echo request packets, in the range of 0 to 7. The default is 0.

-h *ttl-value*: Specifies the TTL value for MPLS echo request packets, in the range of 1 to 255. The default is 255.

-m *wait-time*: Specifies the interval for sending MPLS echo request packets, in the range of 1 to 10000 milliseconds. The default is 200 milliseconds.

-r *reply-mode*: Specifies the reply mode of the receiver in response to MPLS echo request packets. The *reply-mode* argument can be 1, 2, 3, or 4. 1 means "Do not reply." 2 means "Reply by using a UDP packet." 3 means "Reply by using a UDP packet that carries the Router Alert option." 4 means "Reply by using a VCCV packet." The default is 2. The reply mode 4 is not available for MPLS TE tunnel connectivity verification. If the mode is specified, the remote end does not reply.

-rtos *tos-value*: Specifies the ToS value in the IP header of an MPLS echo reply packet. The value range is 0 to 7, and the default is 6.

-s *packet-size*: Specifies the length (excluding the IP header and UDP header) of an MPLS echo request packet. The value range for the *packet-size* argument is 65 to 8100 bytes, and the default is 100 bytes.

-t *time-out*: Specifies the timeout interval for the reply to an MPLS echo request. The value range is 0 to 65535 milliseconds, and the default is 2000 milliseconds.

-v: Displays detailed reply information. If you do not specify this keyword, the command displays brief reply information.

tunnel *interface-number*: Specifies an MPLS TE tunnel interface by the interface number. The specified MPLS TE tunnel interface must have already been created.

Examples

Verify the connectivity of the MPLS TE tunnel for Tunnel 1.

```
<Sysname> ping mpls te tunnel 1
MPLS ping TE tunnel Tunnell with 100 bytes of data:
100 bytes from 100.1.2.1: Sequence=1 time=49 ms
100 bytes from 100.1.2.1: Sequence=2 time=44 ms
100 bytes from 100.1.2.1: Sequence=3 time=60 ms
100 bytes from 100.1.2.1: Sequence=4 time=60 ms
100 bytes from 100.1.2.1: Sequence=5 time=76 ms

--- Ping statistics for TE tunnel Tunnell ---
5 packets transmitted, 5 packets received, 0.0% packet loss
Round-trip min/avg/max = 44/57/76 ms
```

For the command output, see [Table 1](#).

tracert mpls ipv4

Use **tracert mpls ipv4** to trace MPLS LSPs from the ingress node to the egress node for an IPv4 prefix. You can locate the error node according to the reply information.

Syntax

```
tracert mpls [ -a source-ip | -exp exp-value | -h ttl-value | -r reply-mode
| -rtos tos-value | -t time-out | -v | fec-check ] * ipv4 ipv4-address
mask-length [ destination start-address [ end-address
[ address-increment ] ] ]
```

Views

Any view

Predefined user roles

network-admin

mdc-admin

Parameters

-a *source-ip*: Specifies the source address for MPLS echo request packets. If you do not specify this option, the command uses the primary IP address of the outgoing interface as the source address for MPLS echo requests.

-exp *exp-value*: Specifies the EXP value for MPLS echo request packets, in the range of 0 to 7. The default is 0.

-h *ttl-value*: Specifies the maximum TTL value for MPLS echo request packets (the maximum number of hops to be inspected). The value range for the *ttl-value* argument is 1 to 255, and the default is 30.

-r *reply-mode*: Specifies the reply mode of the receiver in response to MPLS echo request packets. The *reply-mode* argument can be 1, 2, or 3. 1 means "Do not reply," 2 means "Reply by using a UDP packet," and 3 means "reply by using a UDP packet that carries the Router Alert option." The default is 2.

-rtos *tos-value*: Specifies the ToS value in the IP header of an MPLS echo reply packet. The value range is 0 to 7, and the default value is 6.

-t *time-out*: Specifies the timeout interval for the reply to an MPLS echo request. The value range is 0 to 65535 milliseconds, and the default is 2000 milliseconds.

-v: Displays detailed reply information. If you do not specify this keyword, the command displays brief reply information.

fec-check: Checks the FEC stack at transit nodes.

ipv4-address mask-length: Specifies an FEC by an IPv4 destination address and a mask length. The value range for the *mask-length* argument is 0 to 32.

destination: Specifies the destination address in the IP header of MPLS echo requests. The default is 127.0.0.1.

start-address: Specifies the destination address or the start destination address. This address must be an address on subnet 127.0.0.0/8—a local loopback address. If you specify the *start-address* argument without the *end-address* argument, the *start-address* is the destination address in the IP header. If you specify both *start-address* and *end-address*, you specify a range of destination addresses. The destination address increments by the value specified for the *address-increment* argument, starting from the *start-address* to the *end-address*. The command performs a tracer for each of the destination addresses.

end-address: Specifies the end destination address. This address must be an address on subnet 127.0.0.0/8—a local loopback address.

address-increment: Specifies the increment value by which the destination address in the IP header increases in turn. The value range is 1 to 16777215 and the default value is 1.

Examples

Trace the path that the LSP (for FEC 5.5.5.9/32) traverses from the ingress node to the egress node. Specify the IP header destination address range as 127.1.1.1 to 127.1.1.2 and set the address increment value to 1. With these settings, the device performs a tracer for 127.1.1.1 and 127.1.1.2.

```
<Sysname> tracert mpls ipv4 5.5.5.9 32 destination 127.1.1.1 127.1.1.2 1
```

```
MPLS trace route FEC 5.5.5.9/32
```

```
Destination address 127.1.1.1
```

TTL	Replier	Time	Type	Downstream
0			Ingress	100.1.2.1/[1025]
1	100.1.2.1	1 ms	Transit	100.2.4.1/[1024]
2	100.2.4.1	63 ms	Transit	100.4.5.1/[3]

```
3      100.4.5.1          129 ms  Egress
```

```
Destination address 127.1.1.2
```

```
TTL  Replier           Time    Type    Downstream
0                               Ingress 100.1.3.1/[1030]
1    100.1.3.1         1 ms   Transit 100.3.4.1/[1024]
2    100.3.4.1        51 ms  Transit 100.4.5.1/[3]
3    100.4.5.1        80 ms  Egress
```

Trace the path that the LSP (for FEC 5.5.5.9/32) traverses from the ingress node to the egress node. Display detailed reply information, specify the IP header destination address range as 127.1.1.1 to 127.1.1.2, and set the address increment value to 1. With these settings, the device performs a `tracert` for 127.1.1.1 and 127.1.1.2.

```
<Sysname> tracert mpls -v ipv4 5.5.5.9 32 destination 127.1.1.1 127.1.1.2 1
```

```
MPLS trace route FEC 5.5.5.9/32
```

```
Destination address 127.1.1.1
```

```
TTL  Replier           Time    Type    Downstream
0                               Ingress 100.1.2.1/[1025]
1    100.1.2.1         1 ms   Transit 100.2.4.1/[1024] ReturnCode 8(1)
2    100.2.4.1        63 ms  Transit 100.4.5.1/[3] ReturnCode 8(1)
3    100.4.5.1        129 ms Egress  ReturnCode 3(1)
```

```
Destination address 127.1.1.2
```

```
TTL  Replier           Time    Type    Downstream
0                               Ingress 100.1.3.1/[1030]
1    100.1.3.1         1 ms   Transit 100.3.4.1/[1024] ReturnCode 8(1)
2    100.3.4.1        51 ms  Transit 100.4.5.1/[3] ReturnCode 8(1)
3    100.4.5.1        80 ms  Egress  ReturnCode 3(1)
```

Table 2 Command output

Field	Description
MPLS trace route FEC	Trace the LSPs for the specified FEC.
Destination address	Destination IP address in the IP header.
TTL	Number of hops.
Replier	Address of the LSR that replied the request.
Time	Time used to receive the reply, in milliseconds.
Type	LSR type: Ingress , Transit , or Egress .
Downstream	Address of the downstream LSR and the label assigned by the downstream LSR.
ReturnCode	Return code. The number in parentheses represents a return subcode.

tracert mpls te

Use `tracert mpls te` to trace an MPLS TE tunnel from the ingress node to the egress node. You can locate the error node according to the reply information.

Syntax

```
tracert mpls [ -a source-ip | -exp exp-value | -h ttl-value | -r reply-mode |  
-rtos tos-value | -t time-out | -v | fec-check ] * te tunnel interface-number
```

Views

Any view

Predefined user roles

network-admin

mdc-admin

Parameters

-a *source-ip*: Specifies the source address for MPLS echo request packets. If you do not specify this option, the command uses the primary IP address of the outgoing interface as the source address for MPLS echo requests.

-exp *exp-value*: Specifies the EXP value for MPLS echo request packets, in the range of 0 to 7. The default is 0.

-h *ttl-value*: Specifies the maximum TTL value for MPLS echo request packets (the maximum number of hops to be inspected). The value range for the *ttl-value* argument is 1 to 255, and the default is 30.

-r *reply-mode*: Specifies the reply mode of the receiver in response to MPLS echo request packets. The *reply-mode* argument can be 2 or 3. 2 means "Reply by using a UDP packet," and 3 means "reply by using a UDP packet that carries the Router Alert option." The default is 2.

-rtos *tos-value*: Specifies the ToS value in the IP header of an MPLS echo reply packet. The value range is 0 to 7, and the default value is 6.

-t *time-out*: Specifies the timeout interval for the reply to an MPLS echo request. The value range is 0 to 65535 milliseconds, and the default is 2000 milliseconds.

-v: Displays detailed reply information. If you do not specify this keyword, the command displays brief reply information.

fec-check: Checks the FEC stack at transit nodes.

tunnel *interface-number*: Specifies an existing MPLS TE tunnel interface by the interface number.

Examples

Trace the path that MPLS TE tunnel 1 traverses from the ingress node to the egress node.

```
<Sysname> tracert mpls te tunnel 1  
MPLS trace route TE tunnel Tunnell  
  TTL   Replier           Time    Type      Downstream  
  0                0 ms    Ingress   10.4.5.1/[1025]  
  1    10.4.5.1           1 ms    Transit   100.3.4.1/[1024]  
  2    100.3.4.1          63 ms   Transit   100.1.2.1/[3]  
  3    100.1.2.1          129 ms   Egress
```

For the command output, see [Table 2](#).

VCCV CC

Use **vccv cc** to specify the VCCV control channel (CC) type.

Use **undo vccv cc** to restore the default.

Syntax

```
vccv cc router-alert  
undo vccv cc
```

Default

No VCCV CC type is specified.

Views

PW class view

Predefined user roles

```
network-admin  
mdc-admin
```

Parameters

router-alert: Specifies the VCCV CC type as MPLS router alert label.

Usage guidelines

The packets used to verify PW connectivity are collectively referred to as VCCV packets. A PE transfers VCCV packets through a CC.

After you execute this command and specify the PW class for a PW, the specified CC is used if both PEs have specified the same VCCV CC type. Otherwise, the PEs do not use any CC and they cannot establish a BFD session for the PW.

Examples

Specify the VCCV CC type as MPLS router alert label.

```
<Sysname> system-view  
[Sysname] pw-class test  
[Sysname-pw-test] vccv cc router-alert
```