

HP 5130 EI Switch Series

High Availability

Command Reference

Part number: 5998-5474a

Software version: Release 31xx

Document version: 6W100-20150731



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Ethernet OAM commands

display oam

Use **display oam** to display the information about an Ethernet OAM connection, including connection status, information contained in Ethernet OAM packet header, and Ethernet OAM packet statistics.

Syntax

```
display oam { local | remote } [ interface interface-type interface-number ]
```

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

local: Displays the Ethernet OAM connection information of the local end.

remote: Displays the Ethernet OAM connection information of the remote end.

interface *interface-type interface-number*: Specifies a port by its type and number.

Usage guidelines

If you do not specify the **interface** keyword, the command displays information about all the Ethernet OAM connections.

Examples

```
# Display information about the Ethernet OAM connection established on all local ports.
```

```
<Sysname> display oam local  
----- [GigabitEthernet1/0/1] -----  
Enable status      : Enable  
Loopback status   : No loopback  
Link status       : UP  
OAM mode          : Active  
PDU               : ANY  
Mux action        : FWD  
Par action        : FWD
```

```
# Display information about the Ethernet OAM connection established on the local port GigabitEthernet 1/0/1.
```

```
<Sysname> display oam local interface gigabitethernet 1/0/1  
Enable status      : Enable  
Loopback status   : No loopback  
Link status       : UP  
OAM mode          : Active  
PDU               : ANY
```

```

Mux action      : FWD
Par action      : FWD
Flags
  Link fault    : Not occurred
  Dying gasp    : Not occurred
  Critical event : Not occurred
  Local evaluating : COMPLETE
  Remote evaluating : COMPLETE
Packets statistics
  Packet type          Sent          Received
  -----
  OAMPDU              100            80
  OAMInformation       64             60
  OAMEventNotification 36             20
  OAMUniqueEventNotification 36            10
  OAMDuplicateEventNotification 0             10

```

Table 1 Command output

| Field | Description |
|----------------------|---|
| GigabitEthernet1/0/1 | Information on GigabitEthernet 1/0/1. |
| Enable status | Ethernet OAM state (enabled or disabled). |
| Loopback status | Ethernet OAM loopback state: <ul style="list-style-type: none"> No loopback. Remote loopback. Local loopback. |
| Link status | Link state (UP or DOWN). |
| OAM mode | Local Ethernet OAM mode: <ul style="list-style-type: none"> Active—The port operates in the active Ethernet OAM mode. Passive—The port operates in the passive Ethernet OAM mode. |
| PDU | The way in which the local end processes Ethernet OAMPDUs: <ul style="list-style-type: none"> RX_INFO—The port only receives Information OAMPDUs and does not send any Ethernet OAMPDUs. LF_INFO—The port only sends the Information OAMPDUs without Information TLV triplets and with their link error flag bits being set. INFO—The port sends and receives only Information OAMPDUs. ANY—The port sends and receives Ethernet OAMPDUs of any type. |
| Mux action | Operating mode of the local transmitter: <ul style="list-style-type: none"> FWD—The port can send any packets. DISCARD—The port only sends Ethernet OAMPDUs. |
| Par action | Operating mode of the local receiver: <ul style="list-style-type: none"> FWD—The port can receive any packets. DISCARD—The port only receives Ethernet OAMPDUs. LB—The local receiver is in loopback state. All the packets, other than Ethernet OAMPDUs, received on the local receiver are returned to their sources along their original routes. |

| Field | Description |
|-------------------------------|--|
| Flags | Local flags inserted in the local flag fields of the Ethernet OAMPDUs sent. |
| Link fault | Indicates whether an Ethernet OAM link error is present. |
| Dying gasp | Indicates whether a fatal error is present. |
| Critical event | Indicates whether a critical error is present. |
| Local evaluating | Indicates whether the local-to-remote configuration negotiation is complete: <ul style="list-style-type: none"> • COMPLETE—The negotiation is completed. • NOTCOMPLETE—The negotiation is uncompleted. |
| Remote evaluating | Indicates whether the remote-to-local configuration negotiation is complete: <ul style="list-style-type: none"> • COMPLETE—The negotiation is completed. • NOTCOMPLETE—The negotiation is uncompleted. • RESERVED—The field is reserved and the negotiation is uncompleted. • UNSATISFIED—The remote end is not satisfied with the local configuration and the negotiation is uncompleted. |
| Packets statistics | Statistics about Ethernet OAMPDUs sent and received. |
| OAMPDU | Total number of the Ethernet OAMPDUs sent and received. |
| OAMInformation | Number of the Information OAMPDUs sent and received. |
| OAMEventNotification | Number of the Event notification OAMPDUs sent and received. |
| OAMUniqueEventNotification | Number of the unduplicated Event notification OAMPDUs sent or received uniquely. |
| OAMDuplicateEventNotification | Number of the duplicate Event notification OAMPDUs sent or received. |

Display the Ethernet OAM information about all remote ports.

```
<Sysname> display oam remote
----- [GigabitEthernet1/0/1] -----
OAM mode           : Active
MAC address        : 3822-d6a2-a800
MTU size           : 1500
Mux action         : FWD
Par action         : FWD
```

Display the Ethernet OAM information about the peer port GigabitEthernet 1/0/1.

```
<Sysname> display oam remote interface gigabitethernet 1/0/1
OAM mode           : Active
MAC address        : 3822-d6a2-a800
MTU size           : 1500
Mux action         : FWD
Par action         : FWD
Configuration
  Unidirectional   : Not supported
  Remote loopback  : Supported
  Link events      : Supported
  MIB retrieval    : Not supported
Flags
  Link fault       : Not occurred
```



```

Dying gasp      : Not occurred
Critical event   : Not occurred
Local evaluating : COMPLETE
Remote evaluating : COMPLETE

```

Table 2 Command output

| Field | Description |
|----------------------|--|
| GigabitEthernet1/0/1 | Information on GigabitEthernet 1/0/1. |
| OAM mode | Local Ethernet OAM mode: <ul style="list-style-type: none"> • Active—The port operates in the active Ethernet OAM mode. • Passive—The port operates in the passive Ethernet OAM mode. |
| MAC address | MAC address of the remote end. |
| MTU size | MTU size, in bytes. |
| Mux action | Operating mode of the remote transmitter: <ul style="list-style-type: none"> • FWD—The port can send any packets. • DISCARD—The port only sends Ethernet OAMPDUs. |
| Par action | Operating mode of the remote receiver: <ul style="list-style-type: none"> • FWD—The port can receive any packets. • DISCARD—The port only receives Ethernet OAMPDUs. • LB—The local receiver is in loopback state. All the packets, other than Ethernet OAMPDUs, received on the local receiver are returned to their sources along their original routes. |
| Configuration | Configuration of the remote Ethernet OAM entity. |
| Unidirectional | Indicates whether unidirectional transmission is supported. |
| Remote loopback | Indicates whether Ethernet OAM remote loopback is supported. |
| Link events | Indicates whether Ethernet OAM link error events are supported. |
| MIB retrieval | Indicates whether MIB variable retrieval is supported. |
| Flags | Values of the peer Ethernet OAM flag fields in OAM packets. |
| Link fault | Indicates whether an Ethernet OAM link error is present. |
| Dying gasp | Indicates whether a fatal error is present. |
| Critical event | Indicates whether a critical error is present. |
| Local evaluating | Indicates whether the local-to-remote configuration negotiation is complete: <ul style="list-style-type: none"> • COMPLETE—The negotiation is completed. • NOTCOMPLETE—The negotiation is uncompleted. • RESERVED—The field is reserved and the negotiation is uncompleted. • UNSATISFIED—The remote end is not satisfied with the local configuration and the negotiation is uncompleted. |

| Field | Description |
|-------------------|--|
| Remote evaluating | <p>Indicates whether the remote-to-local configuration negotiation is complete:</p> <ul style="list-style-type: none"> • COMPLETE—The negotiation is completed. • NOTCOMPLETE—The negotiation is uncompleted. • UNSATISFIED—The remote end is not satisfied with the local configuration and the negotiation is uncompleted. |

Related commands

reset oam

display oam configuration

Use **display oam configuration** to display global Ethernet OAM configuration on the specified port, including the periods and thresholds for Ethernet OAM link error event detection.

Syntax

display oam configuration [**interface** *interface-type interface-number*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

interface *interface-type interface-number*: Specifies a port by its type and number.

Usage guidelines

If you do not specify the **interface** keyword, the command displays Ethernet OAM configuration globally and on ports that do not use the default configuration.

Examples

Display Ethernet OAM configuration globally and on ports that do not use the default configuration.

```
<Sysname> display oam configuration
----- [Global] -----
OAM timers
  Hello timer          : 1000 milliseconds
  Keepalive timer     : 5000 milliseconds
Link monitoring
  Errored symbol period
    Window             : 100 x 1000000 symbols
    Threshold          : 1 error symbols
  Errored frame
    Window             : 10 x 100 milliseconds
    Threshold          : 1 error frames
  Errored frame period
    Window             : 1000 x 10000 frames
```

```

Threshold          : 1 error frames
Errored frame seconds
Window            : 600 x 100 milliseconds
Threshold        : 1 error seconds

----- [GigabitEthernet1/0/1] -----
OAM timers
Hello timer       : 500 milliseconds
Keepalive timer   : 5000 milliseconds
Link monitoring
Errored symbol period
Window            : 100 x 1000000 symbols
Threshold        : 1 error symbols
Errored frame
Window            : 10 x 100 milliseconds
Threshold        : 1 error frames
Errored frame period
Window            : 1000 x 10000 frames
Threshold        : 1 error frames
Errored frame seconds
Window            : 600 x 100 milliseconds
Threshold        : 1 error seconds

```

Table 3 Command output

| Field | Description |
|-----------------------|--|
| Global | Global information. |
| GigabitEthernet1/0/1 | Information on GigabitEthernet 1/0/1. |
| OAM timers | Ethernet OAM connection detection timers. |
| Hello timer | Ethernet OAM handshake packet transmission interval. |
| Keepalive timer | Ethernet OAM connection timeout timer. |
| Link monitoring | Link event detection window and threshold. |
| Errored symbol period | Errored symbol event. |
| Errored frame | Errored frame event. |
| Errored frame period | Errored frame period event. |
| Errored frame seconds | Errored frame seconds event. |
| Window | Detection window configured for link events. |
| Threshold | Triggering threshold configured for link events. |

display oam critical-event

Use **display oam critical-event** to display the statistics of critical Ethernet OAM link events that occurred on a port.

Syntax

display oam critical-event [**interface** *interface-type interface-number*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

interface *interface-type interface-number*: Specifies a port by its type and number.

Usage guidelines

If you do not specify the **interface** keyword, the command displays the statistics of the critical Ethernet OAM link events that occurred on all the ports of the switch.

Examples

Display the statistics of critical Ethernet OAM link events that occurred on all the ports.

```
<Sysname> display oam critical-event
----- [GigabitEthernet1/0/1] -----
Local link status   : UP
Event statistics
  Link fault        : Not occurred
  Dying gasp        : Not occurred
  Critical event    : Not occurred
```

Table 4 Command output

| Field | Description |
|----------------------|--|
| GigabitEthernet1/0/1 | Information on GigabitEthernet 1/0/1. |
| Local link status | Local link status, up or down. |
| Event statistics | Statistics of critical Ethernet OAM link events. |
| Link fault | Indicates whether a link fault is present. |
| Dying Gasp | Indicates whether a fatal fault is present. |
| Critical Event | Indicates whether a critical fault is present. |

display oam link-event

Use **display oam link-event** to display the statistics of Ethernet OAM link error events that occurred on a local port or a peer port. Ethernet OAM link error events include errored symbol events, errored frame events, errored frame period events, and errored frame seconds events.

Syntax

display oam link-event { **local** | **remote** } [**interface** *interface-type interface-number*]

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

local: Displays the statistics on the local Ethernet OAM link error events.

remote: Displays the statistics on the peer Ethernet OAM link error events.

interface *interface-type interface-number*: Specifies a port by its type and number.

Usage guidelines

If you do not specify the **interface** keyword, the command displays the statistics of the Ethernet OAM link error events that occurred on all the local/peer ports.

Examples

Display the statistics of Ethernet OAM link error events that occurred on all the local ports.

```
<Sysname> display oam link-event local
----- [GigabitEthernet1/0/1] -----
Link status: UP
OAM local errored frame event
  Event time stamp      : 49582 x 100 milliseconds
  Errored frame window  : 10 x 100 milliseconds
  Errored frame threshold : 1 error frames
  Errored frame         : 1 error frames
  Error running total   : 6 error frames
  Event running total   : 6 events
OAM local errored frame period event
  Event time stamp      : 16382 x 100 milliseconds
  Errored frame period window : 10000000 frames
  Errored frame period threshold : 1 error frames
  Errored frame period   : 1 error frames
  Error running total   : 5 error frames
  Event running total   : 5 events
OAM local errored frame seconds summary event
  Event time stamp      : 50022 x 100 milliseconds
  Errored frame seconds window : 600 x 100 milliseconds
  Errored frame seconds threshold : 1 error seconds
  Errored frame seconds   : 1 error seconds
  Error running total   : 1 error seconds
  Event running total   : 1 events
```

Display Ethernet OAM link event statistics of the remote ends of all the ports.

```
<Sysname> display oam link-event remote
----- [GigabitEthernet1/0/1] -----
Link status: UP
OAM remote errored symbol event
  Event time stamp      : 35498 x 100 milliseconds
  Errored symbol window : 100000000 symbols
  Errored symbol threshold : 1 error symbols
  Errored symbol        : 1 error symbols
```

```

Error running total      : 4 error symbols
Event running total     : 4 events
OAM remote errored frame event
Event time stamp       : 49582 x 100 milliseconds
Errored frame window   : 10 x 100 milliseconds
Errored frame threshold : 1 error frames
Errored frame          : 1 error frames
Error running total    : 6 error frames
Event running total    : 6 events
OAM remote errored frame period event
Event time stamp       : 16382 x 100 milliseconds
Errored frame period window : 10000000 frames
Errored frame period threshold : 1 error frames
Errored frame period   : 1 error frames
Error running total    : 5 error frames
Event running total    : 5 events
OAM remote errored frame seconds summary event
Event time stamp       : 50022 x 100 milliseconds
Errored frame seconds window : 600 x 100 milliseconds
Errored frame seconds threshold : 1 error seconds
Errored frame seconds   : 1 error seconds
Error running total    : 1 error seconds
Event running total    : 1 events

```

Table 5 Command output

| Field | Description |
|---------------------------------|--|
| GigabitEthernet1/0/1 | Information on GigabitEthernet 1/0/1. |
| Link status | Link status, up or down. |
| OAM remote errored symbol event | <p>Information about remote errored symbol events (available only when remote errored symbol events occur):</p> <ul style="list-style-type: none"> • Event time stamp—Time when an errored symbol event occurred. • Errored symbol window—Errored symbol detection interval. • Errored symbol threshold—Errored threshold that triggers an errored symbol event. • Errored symbol—Number of detected errored symbols in the most recent errored symbol event. • Error running total—Total number of errored symbols. • Event running total—Total number of errored symbol events that have occurred. |

| Field | Description |
|--|--|
| OAM local/remote errored frame event | <p>Information about local/remote end errored frame events (available only when local/remote end errored frame events occur):</p> <ul style="list-style-type: none"> • Event time stamp—Time when an errored frame event occurred. • Errored frame window—Errored frame detection interval. • Errored frame threshold—Errored threshold that triggers an errored frame event. • Errored frame—Number of detected errored frames in the most recent errored frame event. • Error running total—Total number of errored frames. • Event running total—Total number of errored frame events that have occurred. |
| OAM local/remote errored frame period event | <p>Information about local/remote errored frame period events (available only when local/remote errored frame period events occur):</p> <ul style="list-style-type: none"> • Event time stamp—Time when an errored frame period event occurred. • Errored frame period window—Errored frame period detection interval. • Errored frame period threshold—Errored threshold that triggers an errored frame period event. • Errored frame period—Number of detected errored frames in the most recent errored frame period event. • Error running total—Total number of errored frames that have detected. • Event running total—Total number of errored frame period events. |
| OAM local/remote errored frame seconds summary event | <p>Information about local/remote end errored frame seconds events (available only when local/remote end errored frame seconds events occur):</p> <ul style="list-style-type: none"> • Event time stamp—Time when an errored frame seconds event occurred. • Errored frame second window—Errored frame second detection interval. • Errored Frame seconds threshold—Errored threshold that triggers an errored frame seconds event. • Errored frame seconds—Number of detected errored frame seconds in the most recent errored frame seconds event. • Error running total—Total number of errored frame seconds. • Event running total—Total number of errored frame seconds events that have occurred. |

Related commands

reset oam

oam enable

Use **oam enable** to enable Ethernet OAM.

Use **undo oam enable** to disable Ethernet OAM.

Syntax

oam enable

undo oam enable

Default

Ethernet OAM is disabled.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Examples

```
# Enable OAM on GigabitEthernet 1/0/1.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam enable
```

oam errored-frame threshold

Use **oam errored-frame threshold** to set the errored frame event triggering threshold for a port.

Use **undo oam errored-frame threshold** to restore the default.

Syntax

oam errored-frame threshold *threshold-value*

undo oam errored-frame threshold

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored frame event triggering threshold in number of errored frame seconds, in the range of 0 to 4294967295.

Usage guidelines

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored frame event triggering threshold to 100.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam errored-frame threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**

- **oam global errored-frame threshold**

oam errored-frame window

Use **oam errored-frame window** to set the errored frame event detection window.

Use **undo oam errored-frame window** to restore the default.

Syntax

oam errored-frame window *window-value*

undo oam errored-frame window

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored frame event detection window in the range of 10 to 600 and in steps of 10 (in 100 milliseconds).

Usage guidelines

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored frame event detection window on GigabitEthernet 1/0/1 to 2000 milliseconds.
```

```
<Sysname> system-view
```

```
[Sysname] interface gigabitethernet 1/0/1
```

```
[Sysname-GigabitEthernet1/0/1] oam errored-frame window 20
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam global errored-frame window**

oam errored-frame-period threshold

Use **oam errored-frame-period threshold** to set the errored frame period event triggering threshold on a port.

Use **undo oam errored-frame-period threshold** to restore the default.

Syntax

oam errored-frame-period threshold *threshold-value*

undo oam errored-frame-period threshold

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored frame period event triggering threshold in the range of 0 to 4294967295.

Usage guidelines

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored frame period event triggering threshold on GigabitEthernet 1/0/1 to 100.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam errored-frame-period threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam global errored-frame-period threshold**

oam errored-frame-period window

Use **oam errored-frame-period window** to set the errored frame period event detection window.

Use **undo oam errored-frame-period window** to restore the default.

Syntax

oam errored-frame-period window *window-value*

undo oam errored-frame-period window

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored frame period event detection window in the range of 1 to 65535. The value of this argument must be a multiple of 10000.

Usage guidelines

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored frame period event detection window to 20000000.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam errored-frame-period window 2000
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam global errored-frame-period window**

oam errored-frame-seconds threshold

Use **oam errored-frame-seconds threshold** to set the errored frame seconds event triggering threshold on a port.

Use **undo oam errored-frame-seconds threshold** to restore the default.

Syntax

oam errored-frame-seconds threshold *threshold-value*

undo oam errored-frame-seconds threshold

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored frame seconds event triggering threshold in the range of 0 to 900.

Usage guidelines

The value of the errored frame seconds event triggering threshold cannot be greater than the value of the errored frame seconds event detection window (in seconds). Otherwise, errored frame seconds events cannot be generated.

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored frame seconds event triggering threshold on GigabitEthernet 1/0/1 to 100.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam errored-frame-seconds threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame-seconds window**
- **oam global errored-frame-seconds threshold**

oam errored-frame-seconds window

Use **oam errored-frame-seconds window** to set the errored frame seconds event detection window.

Use **undo oam errored-frame-seconds window** to restore the default.

Syntax

oam errored-frame-seconds window *window-value*

undo oam errored-frame-seconds window

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored frame seconds event detection window in the range of 100 to 9000 and in steps of 10 (in 100 milliseconds).

Usage guidelines

The value of the errored frame seconds event triggering threshold cannot be greater than the value of the errored frame seconds event detection window (in seconds). Otherwise, errored frame seconds events cannot be generated.

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored frame seconds event detection window to 10000 milliseconds.  
<Sysname> system-view  
[Sysname] interface gigabitethernet 1/0/1  
[Sysname-GigabitEthernet1/0/1] oam errored-frame-seconds window 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame-seconds threshold**
- **oam errored-frame-seconds period**

oam errored-symbol-period threshold

Use **oam errored-symbol-period threshold** to set the errored symbol event triggering threshold.

Use **undo oam errored-symbol-period threshold** to restore the default.

Syntax

oam errored-symbol-period threshold *threshold-value*

undo oam errored-symbol-period threshold

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored symbol event triggering threshold in the range of 0 to 4294967295.

Usage guidelines

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored symbol event triggering threshold to 100.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam errored-symbol-period threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam global errored-symbol-period threshold**

oam errored-symbol-period window

Use **oam errored-symbol-period window** to set the errored symbol event detection window.

Use **undo oam errored-symbol-period window** to restore the default.

Syntax

oam errored-symbol-period window *window-value*

undo oam errored-symbol-period window

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored symbol event detection window in the range of 1 to 65535. The value of this argument must be a multiple of 1000000.

Usage guidelines

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the errored symbol event detection window on GigabitEthernet 1/0/1 to 200000000.  
<Sysname> system-view  
[Sysname] interface gigabitethernet 1/0/1  
[Sysname-GigabitEthernet1/0/1] oam errored-symbol-period window 200
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam global errored-symbol-period window**

oam global errored-frame threshold

Use **oam global errored-frame threshold** to set the global errored frame event triggering threshold.

Use **undo oam global errored-frame threshold** to restore the default.

Syntax

oam global errored-frame threshold *threshold-value*

undo oam global errored-frame threshold

Default

The errored frame event triggering threshold is 1.

Views

System view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored frame event triggering threshold in the range of 0 to 4294967295.

Usage guidelines

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored frame event triggering threshold to 100.
<Sysname> system-view
[Sysname] oam global errored-frame threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame threshold**

oam global errored-frame window

Use **oam global errored-frame window** to set the global errored frame event detection window.

Use **undo oam global errored-frame window** to restore the default.

Syntax

```
oam global errored-frame window window-value
```

```
undo oam global errored-frame window
```

Default

The global errored frame event detection window is 1000 milliseconds.

Views

System view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored frame event detection window in the range of 10 to 600 and in steps of 10 (in 100 milliseconds).

Usage guidelines

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored frame event detection window to 2000 milliseconds.
<Sysname> system-view
[Sysname] oam global errored-frame window 20
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame window**

oam global errored-frame-period threshold

Use **oam global errored-frame-period threshold** to set the global errored frame period event triggering threshold.

Use **undo oam global errored-frame-period threshold** to restore the default.

Syntax

oam global errored-frame-period threshold *threshold-value*

undo oam global errored-frame-period threshold

Default

The errored frame period event triggering threshold is 1.

Views

System view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored frame period event triggering threshold in the range of 0 to 4294967295.

Usage guidelines

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored frame period event triggering threshold to 100.  
<Sysname> system-view  
[Sysname] oam global errored-frame-period threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame-period threshold**

oam global errored-frame-period window

Use **oam global errored-frame-period window** to set the global errored frame period event detection window.

Use **undo oam global errored-frame-period window** to restore the default.

Syntax

oam global errored-frame-period window *window-value*

undo oam global errored-frame-period window

Default

The global errored frame period event detection window is 10000000.

Views

System view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored frame period event detection window in the range of 1 to 65535. The value of this argument must be a multiple of 10000.

Usage guidelines

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored frame period event detection window to 20000000.
<Sysname> system-view
[Sysname] oam global errored-frame-period window 2000
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame-period window**

oam global errored-frame-seconds threshold

Use **oam global errored-frame-seconds threshold** to set the global errored frame seconds event triggering threshold.

Use **undo oam global errored-frame-seconds threshold** to restore the default.

Syntax

oam global errored-frame-seconds threshold *threshold-value*

undo oam global errored-frame-seconds threshold

Default

The global errored frame seconds event detection interval is 1.

Views

System view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored frame seconds event triggering threshold in the range of 0 to 900.

Usage guidelines

The value of the errored frame seconds event triggering threshold cannot be greater than the value of the errored frame seconds event detection window (in seconds). Otherwise, errored frame seconds events cannot be generated.

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored frame seconds event triggering threshold to 100.
<Sysname> system-view
[Sysname] oam global errored-frame-seconds threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame-seconds threshold**
- **oam global errored-frame-seconds window**

oam global errored-frame-seconds window

Use **oam global errored-frame-seconds window** to set the global errored frame seconds event detection window.

Use **undo oam global errored-frame-seconds window** to restore the default.

Syntax

```
oam global errored-frame-seconds window window-value
undo oam global errored-frame-seconds window
```

Default

The global errored frame seconds event detection window is 60000 milliseconds.

Views

System view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored frame seconds event detection window in the range of 100 to 9000 and in steps of 10 (in 100 milliseconds).

Usage guidelines

The value of the errored frame seconds event triggering threshold cannot be greater than the value of the errored frame seconds event detection window (in seconds). Otherwise, errored frame seconds events cannot be generated.

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored frame seconds event detection window to 10000 milliseconds.
<Sysname> system-view
[Sysname] oam global errored-frame-seconds window 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-frame-seconds period**
- **oam global errored-frame-seconds threshold**

oam global errored-symbol-period threshold

Use **oam global errored-symbol-period threshold** to set the global errored symbol event triggering threshold.

Use **undo oam global errored-symbol-period threshold** to restore the default.

Syntax

oam global errored-symbol-period threshold *threshold-value*

undo oam global errored-symbol-period threshold

Default

The global errored symbol event triggering threshold is 1.

Views

System view

Predefined user roles

network-admin

Parameters

threshold-value: Specifies the errored symbol event triggering threshold in the range of 0 to 4294967295.

Usage guidelines

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored symbol event triggering threshold to 100.
<Sysname> system-view
[Sysname] oam global errored-symbol-period threshold 100
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam errored-symbol-period threshold**

oam global errored-symbol-period window

Use **oam global errored-symbol-period window** to set the global errored symbol event detection window.

Use **undo oam global errored-symbol-period window** to restore the default.

Syntax

```
oam global errored-symbol-period window window-value  
undo oam global errored-symbol-period window
```

Default

The global errored symbol event detection window is 100000000.

Views

System view

Predefined user roles

network-admin

Parameters

window-value: Specifies the errored symbol event detection window in the range of 1 to 65535. The value of this argument must be a multiple of 1000000.

Usage guidelines

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the errored symbol event detection window to 200000000.  
<Sysname> system-view  
[Sysname] oam global errored-symbol-period window 200
```

Related commands

- **display oam configuration**
- **display oam link-event**
- **oam global errored-symbol-period window**

oam global timer hello

Use **oam global timer hello** to configure the global Ethernet OAM handshake packet transmission interval.

Use **undo oam global timer hello** to restore the default.

Syntax

```
oam global timer hello interval  
undo oam global timer hello
```

Default

The global Ethernet OAM handshake packet transmission interval is 1000 milliseconds.

Views

System view

Predefined user roles

network-admin

Parameters

interval: Specifies the Ethernet OAM handshake packet transmission interval, in steps of 100 (in milliseconds). The value range for this argument is 500 to 5000.

Usage guidelines

After the timeout timer of an Ethernet OAM connection expires, the local OAM entity ages out its connection with the peer OAM entity, causing the OAM connection to disconnect. To keep the Ethernet OAM connections stable, HP recommends that you set the connection timeout timer to be at least five times the handshake packet transmission interval.

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the Ethernet OAM handshake packet transmission interval to 600 milliseconds.
<Sysname> system-view
[Sysname] oam global timer hello 600
```

Related commands

- **display oam configuration**
- **oam timer hello**

oam global timer keepalive

Use **oam global timer keepalive** to configure the global Ethernet OAM connection timeout timer.

Use **undo oam global timer keepalive** to restore the default.

Syntax

```
oam global timer keepalive interval
undo oam global timer keepalive
```

Default

The global Ethernet OAM connection timeout timer is 5000 milliseconds.

Views

System view

Predefined user roles

network-admin

Parameters

interval: Specifies the Ethernet OAM connection timeout timer, in steps of 100 (in milliseconds). The value range for this argument is 1000 to 25000.

Usage guidelines

After the timeout timer of an Ethernet OAM connection expires, the local OAM entity ages out its connection with the peer OAM entity, causing the OAM connection to disconnect. To keep the Ethernet OAM connections stable, HP recommends that you set the connection timeout timer to be at least five times the handshake packet transmission interval.

The configuration in system view takes effect on all ports, but has a lower precedence than the configuration in port view.

Examples

```
# Set the Ethernet OAM connection timeout timer to 6000 milliseconds.
<Sysname> system-view
[Sysname] oam global timer keepalive 6000
```

Related commands

- **display oam configuration**
- **oam timer keepalive**

oam mode

Use **oam mode** to set the Ethernet OAM mode.

Use **undo oam mode** to restore the default.

Syntax

```
oam mode { active | passive }
undo oam mode
```

Default

An Ethernet OAM-enabled Ethernet port operates in the active Ethernet OAM mode.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

active: Specifies the active Ethernet OAM mode.

passive: Specifies the passive Ethernet OAM mode.

Usage guidelines

To change the Ethernet OAM mode of an Ethernet OAM-enabled Ethernet port, first disable Ethernet OAM on the port.

Examples

```
# Disable Ethernet OAM on GigabitEthernet 1/0/1, and then configure GigabitEthernet 1/0/1 to
operate in passive Ethernet OAM mode.
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] undo oam enable
[Sysname-GigabitEthernet1/0/1] oam mode passive
```

Related commands

oam enable

oam remote-failure action

Use **oam remote-failure action** to configure the action the port takes after it receives an Ethernet OAM event from the remote end.

Use **undo oam remote-failure action** to restore the default.

Syntax

```
oam remote-failure { connection-expired | critical-event | dying-gasp | link-fault } action error-link-down
```

```
undo oam remote-failure { connection-expired | critical-event | dying-gasp | link-fault } action error-link-down
```

Default

The port only logs the Ethernet OAM event it receives from the remote end.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

connection-expired: Specifies a connection timeout fault.

critical-event: Specifies a critical fault.

dying-gasp: Specifies a fatal fault.

link-fault: Specifies a link fault.

error-link-down: Terminates the OAM connection, and sets the link state of the port to down.

Examples

```
# Configure GigabitEthernet 1/0/1 to terminate the OAM connection after it receives a fatal fault from the remote end, and set the link state of the port to down.
```

```
<Sysname> system-view
```

```
[Sysname] interface gigabitethernet 1/0/1
```

```
[Sysname-GigabitEthernet1/0/1] oam remote-failure dying-gasp action error-link-down
```

oam remote-loopback

Use **oam remote-loopback start** to enable Ethernet OAM remote loopback on the specified Ethernet port.

Use **oam remote-loopback stop** to disable Ethernet OAM remote loopback on the Ethernet port.

Syntax

```
oam remote-loopback start
```

```
oam remote-loopback stop
```

Default

Ethernet OAM remote loopback is disabled on the Ethernet port.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Usage guidelines

Ethernet OAM remote loopback is available only after the Ethernet OAM connection is established and can be performed only by the Ethernet OAM entities operating in active Ethernet OAM mode.

You can enable Ethernet OAM remote loopback on a specified port in user view or system view, or enable it on the current port in port view. The configurations have the same effect.

Examples

Configure the active Ethernet OAM mode and enable Ethernet OAM on GigabitEthernet 1/0/1, and then enable Ethernet OAM remote loopback on GigabitEthernet 1/0/1 in Layer 2 Ethernet port view.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam mode active
[Sysname-GigabitEthernet1/0/1] oam enable
[Sysname-GigabitEthernet1/0/1] oam remote-loopback start
```

Related commands

- **oam enable**
- **oam mode**
- **oam remote-loopback interface**

oam remote-loopback interface

Use **oam remote-loopback start interface** to enable Ethernet OAM remote loopback on an Ethernet port.

Use **oam remote-loopback stop interface** to disable Ethernet OAM remote loopback on an Ethernet port.

Syntax

oam remote-loopback start interface *interface-type interface-number*

oam remote-loopback stop interface *interface-type interface-number*

Default

Ethernet OAM remote loopback is disabled on an Ethernet port.

Views

User view, system view

Predefined user roles

network-admin

Parameters

interface-type interface-number: Specifies a port by its type and number.

Usage guidelines

Ethernet OAM remote loopback is available only after the Ethernet OAM connection is established and can be performed only by the Ethernet OAM entities operating in active Ethernet OAM mode.

You can enable Ethernet OAM remote loopback on a specified port in user view or system view, or enable it on the current port in port view. The configurations have the same effect.

Examples

Configure the active Ethernet OAM mode and enable Ethernet OAM on GigabitEthernet 1/0/1, and then enable Ethernet OAM remote loopback on GigabitEthernet 1/0/1 in system view.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam mode active
[Sysname-GigabitEthernet1/0/1] oam enable
[Sysname-GigabitEthernet1/0/1] quit
[Sysname] oam remote-loopback start interface gigabitethernet 1/0/1
```

Related commands

- **oam enable**
- **oam mode**
- **oam remote-loopback**

oam remote-loopback reject-request

Use **oam remote-loopback reject-request** to configure a port to reject the Ethernet OAM remote loopback request from a remote port.

Use **undo oam remote-loopback reject-request** to restore the default.

Syntax

oam remote-loopback reject-request

undo oam remote-loopback reject-request

Default

A port does not reject the Ethernet OAM remote loopback request from a remote port.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Usage guidelines

If a port is in loopback state when you execute the **oam remote-loopback reject-request** command, the configuration takes effect when the next loopback starts.

Examples

Configure GigabitEthernet 1/0/1 to reject the Ethernet OAM remote loopback request from a remote port.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam remote-loopback reject-request
```

oam timer hello

Use **oam timer hello** to configure the Ethernet OAM handshake packet transmission interval.

Use **undo oam timer hello** to restore the default.

Syntax

oam timer hello *interval*

undo oam timer hello

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

interval: Specifies the Ethernet OAM handshake packet transmission interval, in steps of 100 (in milliseconds). The value range for this argument is 500 to 5000.

Usage guidelines

After the timeout timer of an Ethernet OAM connection expires, the local OAM entity ages out its connection with the peer OAM entity, causing the OAM connection to disconnect. To keep the Ethernet OAM connections stable, HP recommends that you set the connection timeout timer to be at least five times the handshake packet transmission interval.

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

```
# Set the Ethernet OAM handshake packet transmission interval to 600 milliseconds.  
<Sysname> system-view  
[Sysname] interface gigabitethernet 1/0/1  
[Sysname-GigabitEthernet1/0/1] oam timer hello 600
```

Related commands

- **display oam configuration**
- **oam global timer hello**

oam timer keepalive

Use **oam timer keepalive** to configure the Ethernet OAM connection timeout timer.

Use **undo oam timer keepalive** to restore the default.

Syntax

oam timer keepalive *interval*

undo oam timer keepalive

Default

The port uses the global setting.

Views

Layer 2 Ethernet port view

Predefined user roles

network-admin

Parameters

interval: Specifies the Ethernet OAM connection timeout timer, in steps of 100 (in milliseconds). The value range for this argument is 1000 to 25000.

Usage guidelines

After the timeout timer of an Ethernet OAM connection expires, the local OAM entity ages out its connection with the peer OAM entity, causing the OAM connection to disconnect. To keep the Ethernet OAM connections stable, HP recommends that you set the connection timeout timer to be at least five times the handshake packet transmission interval.

The configuration in port view takes effect on the specified port. For a port, the configuration in port view takes precedence.

Examples

Set the Ethernet OAM connection timeout timer to 6000 milliseconds.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] oam timer keepalive 6000
```

Related commands

- **display oam configuration**
- **oam global timer keepalive**

reset oam

Use **reset oam** to clear the statistics of Ethernet OAM packets and Ethernet OAM link error events for an Ethernet port.

Syntax

```
reset oam [ interface interface-type interface-number ]
```

Views

User view

Predefined user roles

network-admin

Parameters

interface *interface-type interface-number*: Specifies a port by its type and number.

Usage guidelines

If you do not specify the **interface** keyword, the command clears the statistics of Ethernet OAM packets and Ethernet OAM link error events for all the ports.

Examples

Clear the statistics of Ethernet OAM packets and Ethernet OAM link error events for all the ports.
<Sysname> reset oam

Related commands

- **display oam**
- **display oam link-event**

CFD commands

cfid ais enable

Use **cfid ais enable** to enable AIS.

Use **undo cfid ais enable** to disable AIS.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

cfid ais enable

undo cfid ais enable

Default

AIS is disabled.

Views

System view

Predefined user roles

network-admin

Examples

```
# Enable AIS.  
<Sysname> system-view  
[Sysname] cfid ais enable
```

Related commands

- **cfid ais level**
- **cfid ais period**

cfid ais level

Use **cfid ais level** to set the AIS frame transmission level.

Use **undo cfid ais level** to restore the default.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

cfid ais level *level-value* **service-instance** *instance-id*

undo cfid ais level *level-value* **service-instance** *instance-id*

Default

The AIS frame transmission level is not set.

Views

System view

Predefined user roles

network-admin

Parameters

level *level-value*: Specifies the AIS frame transmission level in the range of 1 to 7.

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

Usage guidelines

If no AIS frame transmission level is configured for a service instance, the MEPs in the service instance cannot send AIS frames.

Examples

```
# Set the AIS frame transmission level to 3 in service instance 1.
<Sysname> system-view
[Sysname] cfd ais level 3 service-instance 1
```

Related commands

- **cfd ais enable**
- **cfd ais period**

cfd ais period

Use **cfd ais period** to set the AIS frame transmission period.

Use **undo cfd ais period** to restore the default.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

cfd ais period *period-value* **service-instance** *instance-id*

undo cfd ais period *period-value* **service-instance** *instance-id*

Default

The AIS frame transmission period is 1 second.

Views

System view

Predefined user roles

network-admin

Parameters

period *period-value*: Specifies the AIS frame transmission period in the range of 1 to 60 seconds.

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

Examples

```
# Set the AIS frame transmission period to 60 seconds in service instance 1.
<Sysname> system-view
[Sysname] cfd ais period 60 service-instance 1
```

Related commands

- **cfd ais enable**
- **cfd ais level**

cfd ais-track link-status global

Use **cfd ais-track link-status global** to enable port status-AIS collaboration.

Use **undo cfd ais-track link-status global** to disable port status-AIS collaboration.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

cfd ais-track link-status global

undo cfd ais-track link-status global

Default

Port status-AIS collaboration is disabled.

Views

System view

Predefined user roles

network-admin

Examples

```
# Enable port status-AIS collaboration.
<Sysname> system-view
[Sysname] cfd ais-track link-status global
```

Related commands

- **cfd ais-track link-status level**
- **cfd ais-track link-status period**
- **cfd ais-track link-status vlan**

cfd ais-track link-status level

Use **cfd ais-track link-status level** to set the E AIS frame transmission level.

Use **undo cfd ais-track link-status level** to restore the default.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

cfd ais-track link-status level *level-value*

undo cfd ais-track link-status level

Default

The EAIS frame transmission level is not set.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

level *level-value*: Specifies the EAIS frame transmission level in the range of 0 to 7.

Usage guidelines

If no EAIS frame transmission level is configured on a port, the port cannot send EAIS frames.

Follow these guidelines when you use the command:

- Configurations in Ethernet interface view take effect only on the current interface.
- Configurations in aggregate interface view take effect on the aggregate interface and all its member ports.
- Configurations on a member port take effect only when the member port leaves the aggregation group.

Examples

```
# Set the EAIS frame transmission level to 3 on GigabitEthernet 1/0/1.
```

```
<Sysname> system-view
```

```
[Sysname] interface gigabitethernet 1/0/1
```

```
[Sysname-GigabitEthernet1/0/1] cfd ais-track link-status level 3
```

Related commands

- **cfd ais-track link-status global**
- **cfd ais-track link-status period**
- **cfd ais-track link-status vlan**

cfd ais-track link-status period

Use **cfd ais-track link-status period** to set the EAIS frame transmission period.

Use **undo cfd ais-track link-status period** to restore the default.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
cfd ais-track link-status period period-value
```

```
undo cfd ais-track link-status period
```

Default

The EAIS frame transmission period is not set.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

period *period-value*: Specifies the EAIS frame transmission period in the range of 1 to 60 seconds.

Usage guidelines

If no EAIS frame transmission period is configured on a port, the port cannot send EAIS frames.

Follow these guidelines when you use the command:

- Configurations in Ethernet interface view take effect only on the current interface.
- Configurations in aggregate interface view take effect on the aggregate interface and all its member ports.
- Configurations on a member port take effect only when the member port leaves the aggregation group.

Examples

```
# Set the EAIS frame transmission period to 60 seconds on GigabitEthernet 1/0/1.
```

```
<Sysname> system-view
```

```
[Sysname] interface gigabitethernet 1/0/1
```

```
[Sysname-GigabitEthernet1/0/1] cfd ais-track link-status period 60
```

Related commands

- **cfd ais-track link-status global**
- **cfd ais-track link-status level**
- **cfd ais-track link-status vlan**

cfd ais-track link-status vlan

Use **cfd ais-track link-status vlan** to specify the VLANs where the EAIS frames can be transmitted.

Use **undo cfd ais-track link-status vlan** to remove the specified VLANs.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
cfd ais-track link-status vlan vlan-list
```

```
undo cfd ais-track link-status vlan vlan-list
```

Default

The E AIS frames can be transmitted only within the default VLAN of the port.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

vlan *vlan-list*: Specifies the VLANs where the E AIS frames can be transmitted. The *vlan-list* argument specifies a space-separated list of up to 10 VLAN items. Each item specifies a VLAN ID or a range of VLAN IDs in the form of *vlan-id* [**to** *vlan-id*]. The value range for VLAN IDs is 1 to 4094.

Usage guidelines

The E AIS frames are transmitted within the intersection of the VLANs specified with this command and the existing VLANs on the device.

If the command is executed multiple times, the combination of the VLANs specified in each command takes effect.

Follow these guidelines when you use the command:

- Configurations in Ethernet interface view take effect only on the current interface.
- Configurations in aggregate interface view take effect on the aggregate interface and all its member ports.
- Configurations on a member port take effect only when the member port leaves the aggregation group.

Examples

On port GigabitEthernet 1/0/1, specify VLANs 100 through 200 as the VLANs where the E AIS frames can be transmitted.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] cfd ais-track link-status vlan 100 to 200
```

Related commands

- **cfd ais-track link-status global**
- **cfd ais-track link-status level**
- **cfd ais-track link-status period**

cfd cc enable

Use **cfd cc enable** to enable CCM sending on a specified MEP.

Use **undo cfd cc enable** to disable CCM sending on a specified MEP.

Syntax

cfd cc service-instance *instance-id* **mep** *mep-id* **enable**

undo cfd cc service-instance *instance-id* **mep** *mep-id* **enable**

Default

The CCM sending feature is disabled.

Views

Layer 2 Ethernet interface view

Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

mep *mep-id*: Specifies the ID of a MEP in the range of 1 to 8191.

Usage guidelines

Follow these guidelines when you use the command:

- Configurations in Ethernet interface view take effect only on the current interface.
- Configurations in aggregate interface view take effect on the aggregate interface and all its member ports.
- Configurations on a member port take effect only when the member port leaves the aggregation group.

Examples

On port GigabitEthernet 1/0/1, enable CCM sending on MEP 3 in service instance 5.

```
<Sysname> system-view
```

```
[Sysname] interface gigabitethernet 1/0/1
```

```
[Sysname-GigabitEthernet1/0/1] cfd cc service-instance 5 mep 3 enable
```

Related commands

cfd cc interval

cfd cc interval

Use **cfd cc interval** to set the value of the interval field in the CCM messages.

Use **undo cfd cc interval** to restore default.

Syntax

cfd cc interval *interval-value* **service-instance** *instance-id*

undo cfd cc interval [*interval-value*] **service-instance** *instance-id*

Default

The value of this field is 4 for all CCMs sent.

Views

System view

Predefined user roles

network-admin

Parameters

interval *interval-value*: Specifies the value of the interval field in CCM messages, in the range of 1 to 7. The switch does not support a CCM interval field value in the range of 1 to 3. If you configure a CCM interval field value of 1, 2, or 3, the value of 4 takes effect.

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

Usage guidelines

When setting the CCM interval, use the settings described in [Table 6](#).

Table 6 CCM interval field encoding

| CCM interval field | Transmission interval | Maximum CCM lifetime |
|--------------------|-----------------------|----------------------|
| 1 | 10/3 milliseconds | 35/3 milliseconds |
| 2 | 10 milliseconds | 35 milliseconds |
| 3 | 100 milliseconds | 350 milliseconds |
| 4 | 1 second | 3.5 seconds |
| 5 | 10 seconds | 35 seconds |
| 6 | 60 seconds | 210 seconds |
| 7 | 600 seconds | 2100 seconds |

Examples

```
# Set the value of the interval field in CCMs sent by MEPs in service instance 2 to 7.  
<Sysname> system-view  
[Sysname] cfd cc interval 7 service-instance 2
```

Related commands

cfd cc enable

cfd dm one-way

Use **cfd dm one-way** to enable one-way delay measurement (DM). The one-way DM function measures the one-way frame delay between the source and target MEPs by using 1 DM frames.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
cfd dm one-way service-instance instance-id mep mep-id { target-mac mac-address | target-mep target-mep-id } [ number number ]
```

Views

Any view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

mep *mep-id*: Specifies the source MEP by its ID in the range of 1 to 8191.

target-mac *mac-address*: Specifies the target MEP by its MAC address in the format of H-H-H.

target-mep *target-mep-id*: Specifies the target MEP by its ID in the range of 1 to 8191.

number *number*: Specifies the number of 1DM frames sent. The value range for the *number* argument is 2 to 10, and the default is 5.

Usage guidelines

To view the one-way delay test result, use the **display cfd dm one-way history** command on the target MEP.

Examples

```
# Enable the one-way DM function to test the one-way frame delay from source MEP 1101 to target MEP 1003 in service instance 1.
```

```
<Sysname> cfd dm one-way service-instance 1 mep 1101 target-mep 1003
5 1DMs have been sent. Please check the result on the remote device.
```

Related commands

- **display cfd dm one-way history**
- **reset cfd dm one-way history**

cfd dm two-way

Use **cfd dm two-way** to enable two-way DM. The two-way DM function measures the two-way frame delay between the source and target MEPs by using DMM frames and DMR frames.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
cfd dm two-way service-instance instance-id mep mep-id { target-mac mac-address | target-mep target-mep-id } [ number number ]
```

Views

Any view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

mep *mep-id*: Specifies the source MEP by its ID in the range of 1 to 8191.

target-mac *mac-address*: Specifies the target MEP by its MAC address, which is in the format of H-H-H.

target-mep *target-mep-id*: Specifies the target MEP by its ID in the range of 1 to 8191.

number *number*: Specifies the number of DMM frames sent. The value range for the *number* argument is 2 to 10, and the default is 5.

Examples

```
# Enable the two-way DM function to test the two-way frame delay between source MEP 1101 and target MEP 2001 in service instance 1.
```

```
<Sysname> cfd dm two-way service-instance 1 mep 1101 target-mep 2001
```

```
Frame delay:
```

```
Reply from 0010-fc00-6512: 10ms
```

```
Reply from 0010-fc00-6512: 9ms
```

```
Reply from 0010-fc00-6512: 11ms
```

```
Reply from 0010-fc00-6512: 5ms
```

```
Reply from 0010-fc00-6512: 5ms
```

```
Average: 8ms
```

```
Sent DMMs: 5          Received: 5          Lost: 0
```

```
Frame delay variation: 5ms 4ms 6ms 0ms 0ms
```

```
Average: 3ms
```

Table 7 Command output

| Field | Description |
|---------------------------|--|
| Reply from 0010-fc00-6512 | Delay of the DMR frames returned from the MEP with MAC address 0010-FC00-6512. |
| Average | Average frame delay or average frame delay variation. |
| Sent DMMs | Number of sent DMM frames . |
| Received | Number of received DMR frames. |
| Lost | Number of lost DMM frames. |

cfd enable

Use **cfd enable** to enable CFD.

Use **undo cfd enable** to disable CFD.

Syntax

```
cfd enable
```

```
undo cfd enable
```

Default

CFD is disabled.

Views

System view

Predefined user roles

network-admin

Examples

```
# Enable CFD.
```

```
<Sysname> system-view
```

```
[Sysname] cfd enable
```

cfld linktrace

Use **cfld linktrace** to find the path between the source MEP and target MP, which is achieved through the transmission of LTMs between the two and detection of the responding LTRs.

Syntax

```
cfld linktrace service-instance instance-id mep mep-id { target-mac mac-address | target-mep target-mep-id } [ tll tll-value ] [ hw-only ]
```

Views

Any view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

mep *mep-id*: Specifies the ID of the source MEP, in the range of 1 to 8191.

target-mac *mac-address*: Specifies the destination MAC address, in the format of H-H-H.

target-map *target-mep-id*: Specifies the ID of the destination MEP, in the range of 1 to 8191.

tll *tll-value*: Specifies the time to live value in the range of 1 to 255 and defaulting to 64.

hw-only: Sets the hw-only bits of the LTMs sent. If this keyword is specified, the MIP does not flood LTM messages that have an unknown destination MAC address.

Examples

```
# Identify the path between source MEP 1101 and target MEP 2001 in service instance 1.
```

```
<Sysname> cfd linktrace service-instance 1 mep 1101 target-mep 2001
```

```
Linktrace to MEP 2001 with the sequence number 1101-43361:
```

| MAC Address | TTL | Last Mac | Relay Action |
|----------------|-----|----------------|--------------|
| 0010-fc00-6512 | 63 | 0010-fc00-6500 | Hit |

Table 8 Command output

| Field | Description |
|---|--|
| Linktrace to MEP 2001 with the sequence number 1101-43361 | Linktrace to target MEP 2001 with the sequence number 1101-43361. |
| MAC Address | Source MAC address in the LTR messages. |
| TTL | TTL value when the LTM passes the device. |
| Last Mac | MAC address of the last-hop device the LTM passes. |
| Relay Action | Indicates whether the forwarding device found the destination MAC address in its MAC address table. When the standard version (IEEE 802.1ag) of CFD is used: <ul style="list-style-type: none">• Hit—The current device is the destination device.• FDB—The forwarding device found the destination MAC address.• MPDB—The destination MAC address is not found, or the destination MAC address is found in the MEP or MIP database. |

Related commands

- **cf** linktrace auto-detection
- **display cfd** linktrace-reply

cf linktrace auto-detection

Use **cf linktrace auto-detection** to enable the auto sending of linktrace messages.

Use **undo cfd linktrace auto-detection** to disable this feature.

Syntax

```
cf linktrace auto-detection [ size size-value ]
```

```
undo cfd linktrace auto-detection
```

Default

This feature is disabled.

Views

System view

Predefined user roles

network-admin

Parameters

size *size-value*: Specifies the size of the buffer used to store the auto-detection result, in the range of 1 to 100 (in terms of sending times).

This value defaults to 5, which means the buffer stores the results of the recent five auto-detections.

Usage guidelines

After LT messages automatic sending is enabled, if the source MEP fails to receive the CCMs from the target MEP within 3.5 times the sending interval, the link between the two is regarded as faulty and LTMs will be sent out. (The destination of the LTMs is the target MEP, and the TTL field value is 255.) Based on the LTRs that echo back, the fault source can be located.

Once you disable LT message automatic sending, the content stored in the buffer will be removed.

Examples

```
# Enable automatic LT messages sending, and set the size of the buffer used to store the auto-detection result to 100 (in terms of sending times).
```

```
<Sysname> system-view
```

```
[Sysname] cfd linktrace auto-detection size 100
```

Related commands

- **cf** linktrace
- **display cfd** linktrace-reply auto-detection

cf loopback

Use **cf loopback** to enable LB function so that LBMs can be sent from the source MEP to the target MP, and LBR messages can be received.

Syntax

```
bfd loopback service-instance instance-id mep mep-id { target-mac mac-address | target-mep target-mep-id } [ number number ]
```

Default

LB is not enabled.

Views

Any view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

mep *mep-id*: Specifies the ID of the source MEP, in the range of 1 to 8191.

target-mac *mac-address*: Specifies the destination MAC address of the MP, in the format of H-H-H.

target-mep *target-mep-id*: Specifies the ID of the target MEP, in the range of 1 to 8191.

number *number*: Specifies the number of the LBMs packets sent, in the range of 1 to 10. The default is 5.

Examples

```
# Enable LB to check the status of the link between MEP 1101 and MEP 2001 in service instance 1
(assume that the link status is normal).
```

```
<Sysname> bfd loopback service-instance 1 mep 1101 target-mep 2001
Loopback to 0010-fc00-6512 with the sequence number start from 1101-43404:
Reply from 0010-fc00-6512: sequence number=1101-43404 Time=5ms
Reply from 0010-fc00-6512: sequence number=1101-43405 Time=5ms
Reply from 0010-fc00-6512: sequence number=1101-43406 Time=5ms
Reply from 0010-fc00-6512: sequence number=1101-43407 Time=5ms
Reply from 0010-fc00-6512: sequence number=1101-43408 Time=5ms
Sent: 5          Received: 5          Lost: 0
```

```
# Enable LB to check the status of the link between MEP 1101 and MEP 2001 in service instance 1
(assume that the link status is abnormal).
```

```
<Sysname> bfd loopback service-instance 1 mep 1101 target-mep 2001
Loopback to 0010-fc00-6512 with the sequence number start from 1101-43404:
Sent: 5          Received: 0          Lost: 5
```

Table 9 Command output

| Field | Description |
|---|---|
| Loopback to 0010-fc00-6512 with the sequence number start from 1101-43404 | Sends LBMs to 0010-FC00-6512 with the sequence number starting with 1101-43404. |
| Reply from 0010-fc00-6512 | Reply from the MP with the MAC address 0010-FC00-6512. |
| sequence number | Sequence number in the LBR messages. |
| Time=5ms | The interval between the sending of LBMs and receiving of LBRs is 5 milliseconds. |
| Sent | Number of LBMs sent. |

| Field | Description |
|----------|----------------------------------|
| Received | Number of LBR messages received. |
| Lost | Number of lost LBRs. |

cfld md

Use **cfld md** to create an MD.

Use **undo cfld md** to delete an MD.

Syntax

cfld md *md-name* [**index** *index-value*] **level** *level-value* [**md-id** { **dns** *dns-name* | **mac** *mac-address* *subnumber* | **none** }]

undo cfld md *md-name*

Default

No MD is created.

Views

System view

Predefined user roles

network-admin

Parameters

md *md-name*: Specifies the name of an MD, which is a string of 1 to 43 characters that can contain letters, numbers, and special characters such as *grave accent* (`), *tilde* (~), *exclamation mark* (!), *at sign* (@), *number sign* (#), *dollar sign* (\$), *percent* (%), *caret* (^), *ampersand* (&), *asterisk* (*), *brackets* ({ }, (), [], < >), *hyphen* (-), *underscore* (_), *plus* (+), *equal sign* (=), *vertical bar* (|), *colon* (:), *semicolon* (;), *quotation mark* ('), *comma* (,), *period* (.), and *slash* (/).

index *index-value*: Specifies an MD index in the range of 1 to 4294967295. If this option is not specified, the system automatically assigns the smallest index number that is not in use. HP recommends that you use the index automatically assigned by the system.

level *level-value*: Specifies an MD level in the range of 0 to 7.

md-id: Specifies the MD name carried by packets sent by the MEP. If you do not provide the keyword, the MD name is represented by *md-name*.

dns *dns-name*: Specifies an MD name in the format of DNS name, where *dns-name* represents the DNS name.

mac *mac-address subnumber*: Specifies an MD name comprising the MAC address and an integer, where *mac-address* represents the MAC address of the MD, and *subnumber* is in the range of 0 to 65535.

none: Specifies that no MD name is carried in the packets sent by the MEP.

Usage guidelines

An MD name must be in compliant with the specifications in table 21-19 in IEEE802.1ag-2007.

You can create only one MD with a specific level. MD cannot be created if you enter an invalid MD name or an existing MD name or the MD index is in use.

When deleting an MD, you will also delete the configurations related to that MD.

Examples

Create an MD named **test_md1**, with its level being 3.

```
<Sysname> system-view  
[Sysname] cfd md test_md1 level 3
```

Create an MD named **test_md2**, and the MD name carried in the packet sent by the MEP comprises the MAC address 1-1-1 and integer 1.

```
<Sysname> system-view  
[Sysname] cfd md test_md2 level 5 md-id mac 1-1-1 1
```

cfd mep

Use **cfd mep** to create a MEP.

Use **undo cfd mep** to delete the specified MEP.

Syntax

```
cfd mep mep-id service-instance instance-id { inbound | outbound }
```

```
undo cfd mep mep-id service-instance instance-id
```

Default

No MEP exists on a port.

Views

Layer 2 Ethernet interface view

Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

mep *mep-id*: Specifies the ID of a MEP, in the range of 1 to 8191.

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

inbound: Creates an inward-facing MEP.

outbound: Creates an outward-facing MEP.

Usage guidelines

In creating a MEP, the service instance you specified defines the MD and MA to which the MEP belongs.

You cannot create a MEP if the MEP ID is not included in the MEP list of the relevant service instance.

Follow these guidelines when you use the command:

- Configurations in Ethernet interface view take effect only on the current interface.
- Configurations in aggregate interface view take effect on the aggregate interface and all its member ports.
- Configurations on a member port take effect only when the member port leaves the aggregation group.

Examples

```
# Configure a MEP list in service instance 5, and create and enable inward-facing MEP 3 in service instance 5 on GigabitEthernet 1/0/1.
```

```
<Sysname> system-view
[Sysname] cfd md test_md level 3
[Sysname] cfd service-instance 5 ma-id vlan-based md test_md vlan 100
[Sysname] cfd meplist 3 service-instance 5
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] cfd mep 3 service-instance 5 outbound
```

Related commands

cfd meplist

cfd meplist

Use **cfd meplist** to create a MEP list, a collection of local MEPs allowed to be configured and the remote MEPs to be monitored in the same MA.

Use **undo cfd meplist** to delete existing MEP lists.

Syntax

cfd meplist *mep-list* **service-instance** *instance-id*

undo cfd meplist *mep-list* **service-instance** *instance-id*

Default

No MEP list is created.

Views

System view

Predefined user roles

network-admin

Parameters

meplist *mep-list*: Specifies a list of MEP IDs, indicating multiple MEPs, in the format of *mep-list* = { *mep-id* [**to** *mep-id*] }&<1-10>, in which *mep-id* represents the MEP ID and is in the range of 1 to 8191. &<1-10> indicates you can specify up to 10 MEP ID ranges.

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

Usage guidelines

Before creating a MEP list, create the relevant MD, MA, and service instance.

After you delete a MEP list, all local MEP configurations based on this list are deleted.

Examples

```
# Create a MEP list that includes MEP 9 through MEP 15 in service instance 5.
```

```
<Sysname> system-view
[Sysname] cfd md test_md level 3
[Sysname] cfd service-instance 5 ma-id vlan-based md test_md vlan 100
[Sysname] cfd meplist 9 to 15 service-instance 5
```

Related commands

- `cfm md`
- `cfm service-instance`

cfm mip-rule

Use `cfm mip-rule` to configure the rules for generating MIPs. The system automatically generates MIPs on each port according to the rules configured.

Use `undo cfm mip-rule` to restore the default.

Syntax

```
cfm mip-rule { default | explicit } service-instance instance-id
```

```
undo cfm mip-rule [ default | explicit ] service-instance instance-id
```

Default

No rules for generating MIPs are configured and the system does not automatically generate any MIPs.

Views

System view

Predefined user roles

network-admin

Parameters

default: Specifies the default rule. If no lower-level MIP exists on an interface, a MIP is created on the current level. A MIP can be created even if no MEP is configured on the interface.

explicit: Specifies the explicit rule. If no lower-level MIP exists and a lower-level MEP exists on an interface, a MIP is created at the current level. A MIP can be created only when a lower-level MEP is created on the interface.

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767.

Examples

```
# Configure the MIP generation rule as default in service instance 5.
```

```
<Sysname> system-view
```

```
[Sysname] cfm mip-rule default service-instance 5
```

cfm service-instance

Use `cfm service-instance` to create a service instance with the MD name.

Use `undo cfm service-instance` to remove the service instance.

Syntax

```
cfm service-instance instance-id ma-id { icc-based icc-name | integer ma-num | string ma-name | vlan-based [ vlan-id ] } [ ma-index index-value ] md md-name vlan vlan-id
```

```
undo cfm service-instance instance-id
```

Default

No service instance exists.

Views

System view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

ma-id: Creates an MA.

icc-based *icc-name*: Specifies that an MA is identified by an ICC. The *icc-name* argument is a string of 1 to 13 characters.

integer *ma-num*: Specifies that an MA is identified by an integer, where *ma-num* is in the range of 0 to 65535.

string *ma-name*: Specifies that an MA is identified by a string, where *ma-name* is string of 1 to 45 characters that can contain letters, numbers, and special characters such as *grave accent* (`), tilde (~), exclamation mark (!), at sign (@), number sign (#), dollar sign (\$), percent (%), caret (^), ampersand (&), asterisk(*), brackets ({ }, (), [], < >), hyphen (-), underscore (_), plus (+), equal sign (=), vertical bar (|), colon (:), semicolon (;), quotation mark ('), comma (,), period (.), and slash (/).

vlan-based [*vlan-id*]: Specifies that an MA is identified by a VLAN ID, where *vlan-id* is in the range of 1 to 4094. If you do not provide the *vlan-id* argument, the VLAN ID specified by **vlan** *vlan-id* is used. If the **vlan** *vlan-id* option is not provided, you must specify the *vlan-id* argument for the **vlan-based** [*vlan-id*] option.

ma-index *index-value*: Specifies an MA index in the range of 1 to 4294967295. If this option is not specified, the system automatically assigns the smallest index number that is not in use. HP recommends that you use the index automatically assigned by the system.

md *md-name*: Specifies the name of an MD. The *md-name* argument is a string of 1 to 43 characters that can contain letters, numbers, and special characters such as *grave accent* (`), tilde (~), exclamation mark (!), at sign (@), number sign (#), dollar sign (\$), percent (%), caret (^), ampersand (&), asterisk(*), brackets ({ }, (), [], < >), hyphen (-), underscore (_), plus (+), equal sign (=), vertical bar (|), colon (:), semicolon (;), quotation mark ('), comma (,), period (.), and slash (/).

vlan *vlan-id*: Specifies the VLAN that the MA serves, in the range of 1 to 4094.

Usage guidelines

A service instance is indicated by an integer to represent an MA in an MD. The MD and MA define the level attribute and VLAN attribute of the messages handled by the MPs in a service instance. An MA index uniquely identifies a specific MA in an MD. An MA index can be used in different MDs.

An MD name must be in compliant with the specifications in table 21-19 in IEEE802.1ag-2007.

With the **vlan-based** [*vlan-id*] or **vlan** *vlan-id* option, the command creates an MA carrying the VLAN attribute. If you do not specify the option, the command creates an MA carrying no VLAN attribute.

You must create the relevant MD and MA prior to creating a service instance with the MD name.

When you delete a service instance, you are deleting the configurations related to that service instance as well.

Deleting a service instance not only breaks up the connection between the service instance and the relevant MA, but also deletes the MA itself.

Examples

```
# Create a level-3 MD named test_md and create service instance 5, in which the MA is identified by a VLAN and serves VLAN 100.
```

```
<Sysname> system-view
[Sysname] cfd md test_md level 3
[Sysname] cfd service-instance 5 ma-id vlan-based md test_md vlan 100
```

Related commands

cfd md

cfd slm

Use **cfd slm** to enable loss measurement (LM). The LM function measures the frame loss between the source and target MEPs by using LMM frames and LMR frames.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
cfd slm service-instance instance-id mep mep-id { target-mac mac-address | target-mep target-mep-id }
[ number number ]
```

Views

Any view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

mep *mep-id*: Specifies the source MEP by its ID in the range of 1 to 8191.

target-mac *mac-address*: Specifies the target MEP by its MAC address, which is in the format of H-H-H.

target-mep *target-mep-id*: Specifies the target MEP by its ID in the range of 1 to 8191.

number *number*: Specifies the number of LMM frames sent. The value range for the *number* argument is 2 to 10, and the default is 5.

Examples

```
# Enable the LM function to measure the frame loss between source MEP 1101 and target MEP 2001 in service instance 1.
```

```
<Sysname> cfd slm service-instance 1 mep 1101 target-mep 2001
Reply from 0010-fc00-6512
Far-end frame loss: 10    Near-end frame loss: 20
Reply from 0010-fc00-6512
Far-end frame loss: 40    Near-end frame loss: 40
Reply from 0010-fc00-6512
Far-end frame loss: 0     Near-end frame loss: 10
Reply from 0010-fc00-6512
Far-end frame loss: 30    Near-end frame loss: 30
```

```

Average
Far-end frame loss: 20    Near-end frame loss: 25
Far-end frame loss rate: 25.00%    Near-end frame loss rate: 32.00%
Sent LMMs: 5    Received: 5    Lost: 0

```

Table 10 Command output

| Field | Description |
|---------------------------|--|
| Reply from 0010-fc00-6512 | LMR frames returned from the target MEP with MAC address 0010-FC00-6512. |
| Far-end frame loss | Number of lost frames on the target MEP. |
| Near-end frame loss | Number of lost frames on the source MEP. |
| Far-end frame loss rate | Frame loss ratio on the target MEP. |
| Near-end frame loss rate | Frame loss ratio on the source MEP. |
| Average | Average number of lost frames. |
| Sent LMMs | Number of sent LMM frames. |
| Received | Number of received LMR frames. |
| Lost | Number of lost LMR frames. |

cfdd tst

Use **cfdd tst** to enable test (TST). The TST function detects bit errors between the source and target MEPs by using TST frames.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```

cfdd tst service-instance instance-id mep mep-id { target-mac mac-address | target-mep target-mep-id }
[ number number ] [ length-of-test length ] [ pattern-of-test { all-zero | prbs } [ with-crc ] ]

```

Views

Any view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

mep *mep-id*: Specifies the source MEP by its ID in the range of 1 to 8191.

target-mac *mac-address*: Specifies the target MEP by its MAC address, which is in the format of H-H-H.

target-mep *target-mep-id*: Specifies the target MEP by its ID in the range of 1 to 8191.

number *number*: Specifies the number of sent TST frames. The value range for the *number* argument is 1 to 10, and the default is 5.

length-of-test *length*: Specifies the length of the Test TLV (Type/Length/Value) in the TST frame. The value range for the *length* argument is 4 to 1400, and the default is 64.

pattern-of-test { **all-zero** | **prbs** } [**with-crc**]: Specifies the pattern of the Test TLV in the TST frame:

- **all-zero** (all-zero value without CRC-32), which is the default pattern.
- **prbs** (pseudo random bit sequence without CRC-32).
- **all-zero with-crc** (all-zero value with CRC-32).
- **prbs with-crc** (pseudo random bit sequence with CRC-32).

Usage guidelines

To view the TST test result, use the **display cfd tst** command on the target MEP.

Examples

```
# Enable the TST function to test the bit errors between source MEP 1101 and target MEP 1003 in service instance 1.
```

```
<Sysname> cfd tst service-instance 1 mep 1101 target-mep 1003
5 TSTs have been sent. Please check the result on the remote device.
```

Related commands

- **display cfd tst**
- **reset cfd tst**

display cfd ais

Use **display cfd ais** to display the AIS configuration and information on the specified MEP.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
display cfd ais [ service-instance instance-id [ mep mep-id ] ]
```

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767. If you do not specify this option, the command displays the AIS configuration and information for all service instances.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191. If you do not specify this option, the command displays the AIS configuration and information for all MEPs.

Examples

```
# Display the AIS configuration and information for all the MEPs in all service instances.
<Sysname> display cfd ais
```

```

Service instance: 5
AIS level: 4    AIS period: 1s
MEP ID: 1
AIS condition: yes    Time to enter the condition: 2013/01/22 10:43:57
AIS state machine: Previous state: NO_RECEIVE
                  Current state: RECEIVE

MEP ID: 2
AIS condition: yes    Time to enter the condition: 2013/01/22 10:43:57
AIS state machine: Previous state: NO_RECEIVE
                  Current state: RECEIVE

Service instance: 20
AIS level: 3    AIS period: 60s
MEP ID: 10
AIS condition: yes    Time to enter the condition: 2013/01/22 10:43:57
AIS state machine: Previous state: NO_RECEIVE
                  Current state: RECEIVE

Service instance: 100
AIS level: 6    AIS period: 1s
MEP ID: 20
AIS condition: no    Time to enter the condition: 2013/01/22 11:40:01
AIS state machine: Previous state: IDLE
                  Current state: NO_RECEIVE

MEP ID: 50
AIS condition: no    Time to enter the condition: -
AIS state machine: Previous state: IDLE
                  Current state: NO_RECEIVE

```

Table 11 Command output

| Field | Description |
|-----------------------------|---|
| Service instance | Service instance of the MEP. |
| AIS level | AIS frame transmission level. |
| AIS period | AIS frame transmission period. |
| AIS condition | AIS status: <ul style="list-style-type: none"> • yes—AIS is running. • no—AIS is not running. |
| Time to enter the condition | Time when the AIS status began. (- means AIS is enabled but the MEP does not receive any AIS frame.) |
| AIS state machine | AIS frame receiving state machine. |
| Previous state | Previous state: <ul style="list-style-type: none"> • IDLE—Not activated. • NO_RECEIVE—Activated. • RECEIVE—AIS frames are received. |

| Field | Description |
|---------------|--|
| Current state | Current state: <ul style="list-style-type: none"> • IDLE—Not activated. • NO_RECEIVE—Activated. • RECEIVE—AIS frames are received. |

display cfd ais-track link-status

Use **display cfd ais-track link-status** to display the configuration and information of the AIS associated with the port status.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

display cfd ais-track link-status [**interface** *interface-type interface-number*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

interface *interface-type interface-number*: Specifies a port by its type and number. If you do not specify this option, the command displays the configuration and information of the AIS associated with the status of all ports.

Examples

Display the configuration and information of the AIS associated with the status of all ports.

```
<Sysname> display cfd ais-track link-status
```

```
AIS tracking link-status is enabled.
```

```
Interface GigabitEthernet1/0/1:
```

```
AIS level: 5           AIS period: 1s
```

```
Configured VLANs: 1, 10-100, 103
```

```
Send VLANs: 1, 10-100, 103
```

```
AIS condition: yes     Time to enter the condition: 2013/02/26 10:43:57
```

```
Interface GigabitEthernet1/0/2:
```

```
AIS level: 5           AIS period: 1s
```

```
Configured VLANs: 1-4094
```

```
Send VLANs: 1-2000
```

```
AIS condition: yes     Time to enter the condition: 2013/02/26 10:44:57
```

Table 12 Command output

| Field | Description |
|--------------------------------------|--|
| AIS tracking link-status is enabled | Port status-AIS collaboration is enabled. |
| AIS tracking link-status is disabled | Port status-AIS collaboration is disabled. |
| Interface | Port that collaborates with AIS. |
| AIS level | EAIS frame transmission level on the port. |
| AIS period | EAIS frame transmission period on the port. |
| Configured VLANs | VLANs where the EAIS frames can be transmitted. |
| Send VLANs | Actual VLANs where the EAIS frames can be transmitted. |
| AIS condition | EAIS frame sending status: <ul style="list-style-type: none">• yes—EAIS frames are being sent.• no—No EAIS frame is being sent. |
| Time to enter the condition | Time when the EAIS frame sending started. |

display cfd dm one-way history

Use **display cfd dm one-way history** to display the one-way DM result.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
display cfd dm one-way history [ service-instance instance-id [ mep mep-id ] ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767. If you do not specify this option, the command displays the one-way DM results for all service instances.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191. If you do not specify this option, the command displays the one-way DM results for all MEPs.

Usage guidelines

The one-way DM results for all inward-facing MEPs in a service instance are the same.

Examples

```
# Display the one-way DM results for all the MEPs in all service instances.
<Sysname> display cfd dm one-way history
Service instance: 1
MEP ID: 1003
```

```

Sent 1DM total number: 0
Received 1DM total number: 5
Frame delay: 10ms 9ms 11ms 5ms 5ms
Delay average: 8ms
Frame delay variation: 5ms 4ms 6ms 0ms 0ms
Variation average: 3ms
MEP ID: 1004
Sent 1DM total number: 0
Received 1DM total number: 5
Frame delay: 10ms 9ms 11ms 5ms 5ms
Delay average: 8ms
Delay variation: 5ms 4ms 6ms 0ms 0ms
Variation average: 3ms

```

```

Service instance: 2
No MEP exists in the service instance.

```

```

Service instance: 3
MEP ID: 1023
Sent 1DM total number: 5
Received 1DM total number: 10
Frame delay: 20ms 9ms 8ms 7ms 1ms 5ms 13ms 17ms 9ms 10ms
Delay average: 9ms
Delay variation: 19ms 8ms 7ms 6ms 0ms 4ms 12ms 16ms 8ms 9ms
Variation average: 8ms

```

```

Service instance: 4
MEP ID: 1023
Sent 1DM total number: 77
Received 1DM total number: 0

```

Table 13 Command output

| Field | Description |
|---------------------------|--------------------------------|
| Service instance | Service instance of the MEP. |
| Sent 1DM total number | Number of sent 1DM frames. |
| Received 1DM total number | Number of received 1DM frames. |
| Delay average | Average frame delay. |
| Delay variation | Frame delay variation. |
| Variation average | Average frame delay variation. |

Related commands

- **cfm dm one-way**
- **reset cfm dm one-way history**

display cfd linktrace-reply

Use **display cfd linktrace-reply** to display the LTR information received by a MEP.

Syntax

```
display cfd linktrace-reply [ service-instance instance-id [ mep mep-id ] ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

service-instance *instance-id*: Specifies the service instance ID in the range of 1 to 32767. If you do not specify this option, the LTR information saved on all the MEPs in all service instances is displayed.

mep *mep-id*: Specifies the ID of a MEP, in the range of 1 to 8191. If you do not specify this option, the LTR information saved on all the MEPs is displayed.

Usage guidelines

This command displays only information about LTRs received by execution of the **cfd linktrace** command.

Examples

Display the LTR information saved on all the MEPs in every service instance.

```
<Sysname> display cfd linktrace-reply
Service instance: 1      MEP ID: 1003
MAC address             TTL      Last MAC              Relay action
0000-fc00-6505         63      0000-fc00-6504       MPDB
000f-e269-a852         62      0000-fc00-6505       FDB
0000-fc00-6508         61      000f-e269-a852       Hit
Service instance: 2      MEP ID: 1023
MAC address             TTL      Last MAC              Relay action
0000-fc00-6508         61      000f-e269-a852       Hit
```

Table 14 Command output

| Field | Description |
|------------------|---|
| Service instance | Service instance to which the MEPs that send LTRs belong. |
| MEP ID | ID of the MEP that sends LTRs. |
| MAC address | Source MAC address in the LTR message. |
| TTL | TTL value when LTR passes the device. |
| Last MAC | MAC address of the last-hop device the LTR passes. |

| Field | Description |
|--------------|--|
| | Indicates whether the forwarding device found the destination MAC address in its MAC address table. |
| Relay action | <p>When the standard version (IEEE 802.1ag) of CFD is used:</p> <ul style="list-style-type: none"> • Hit—The current device is the destination device. • FDB—The forwarding device found the destination MAC address. • MPDB—The destination MAC address is not found, or the destination MAC address is found in the MEP or MIP database. |

Related commands

`cfld linktrace`

display cfd linktrace-reply auto-detection

Use **display cfd linktrace-reply auto-detection** to display information about the LTR messages received as responses to the automatically sent LTMs.

Syntax

display cfd linktrace-reply auto-detection [**size** *size-value*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

size *size-value*: Specifies the times of recent auto-detections, in the range of 1 to 100. If you do not specify this option, all information in the buffer is displayed.

Usage guidelines

This command displays only information about LTRs received by execution of the **cfld linktrace auto-detection** command.

Examples

Display the contents of the LTRs received as responses to the LTMs automatically sent.

```
<Sysname> display cfd linktrace-reply auto-detection
Service instance: 1      MEP ID: 1003      Time: 2014/05/22 10:43:57
Target MEP ID: 2005    TTL: 255
MAC address            TTL      Last MAC          Relay action
0000-fc00-6505        254     0000-fc00-6504    MPDB
000f-e269-a852        62      0000-fc00-6505    FDB
0000-fc00-6508        61      000f-e269-a852    Hit
Service instance: 2      MEP ID: 1023      Time: 2014/05/22 10:44:06
Target MEP ID: 2025    TTL: 255
MAC address            TTL      Last MAC          Relay action
0000-fc00-6508        61      000f-e269-a852    Hit
```

Table 15 Command output

| Field | Description |
|------------------|---|
| Service instance | Service instance to which the MEPs that sent LTM messages belong. |
| MEP ID | ID of the MEP that sends LTMs. |
| Time | Time of the LTMs automatically sent. |
| Target MEP ID | ID of the target MEP. |
| TTL | Initial TTL value of the automatically sent LTMs. |
| MAC address | Source MAC address in the LTR messages. |
| TTL | TTL value when LTM passes the device. |
| Last MAC | MAC address of the last-hop device the LTM passes. |
| Relay action | <p>Indicates whether the forwarding device found the destination MAC address in its MAC address table.</p> <p>When the standard version (IEEE 802.1ag) of CFD is used:</p> <ul style="list-style-type: none"> • Hit—The current device is the destination device. • FDB—The forwarding device found the destination MAC address. • MPDB—The destination MAC address is not found, or the destination MAC address is found in the MEP or MIP database. |

Related commands

cfld linktrace auto-detection

display cfd md

Use **display cfd md** to display the MD configuration information.

Syntax

display cfd md

Views

Any view

Predefined user roles

network-admin

network-operator

Examples

Display the MD configuration information.

```
<Sysname> display cfd md
```

```
CFD is enabled.
```

```
Maintenance domains configured: 4 in total
```

| Level | Index | Maintenance domain | MD format | MD ID |
|-------|-------|--------------------|------------|------------------|
| 0 | 1 | md_0 | CHARSTRING | md_0 |
| 1 | 2 | md_1 | DNS | dns1 |
| 2 | 3 | md_2 | MAC | 0001-0001-0001-1 |
| 3 | 4 | md_3 | NONE | Without ID |

Table 16 Command output

| Field | Description |
|--------------------------------|--|
| Maintenance domains configured | Number of MDs configured. |
| Level | Level of MD. |
| Index | MD index. |
| Maintenance domain | Name of MD. |
| MD format | MD name format: <ul style="list-style-type: none">• CHARSTRING—Character string.• DNS—DNS name.• MAC—MAC address and an integer.• NONE—No MD name is carried. |
| MD ID | MD ID value: <ul style="list-style-type: none">• A character string if the MD format is CHARSTRING.• A DNS name if the MD format is DNS.• A MAC address-subnumber if the MD format is MAC.• No ID if the MD format is NONE. |

display cfd mep

Use **display cfd mep** to display the attribute and operating information of a MEP.

Syntax

display cfd mep *mep-id* **service-instance** *instance-id*

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191.

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

Examples

Display the attribute and operating information of MEP 50 in service instance 1.

```
<Sysname> display cfd mep 50 service-instance 1
Interface: GigabitEthernet1/0/2
Maintenance domain: md_0
Maintenance domain index: 1
Maintenance association: ma_0
Maintenance association index: 1
Level: 0          VLAN: 1          Direction: Outbound
```

Current state: Active CCM send: Enable
FNG state: FNG_DEFECT_REPORTED

CCM:
Current state: CCI_WAITING
Interval: 1s SendCCM: 12018

Loopback:
NextSeqNumber: 8877
SendLBR: 0 ReceiveInOrderLBR: 0 ReceiveOutOrderLBR: 0

Linktrace:
NextSeqNumber: 8877
SendLTR: 0 ReceiveLTM: 0

No CCM received from some remote MEPs.

One or more streams of error CCMs is received. The last received CCM:
Maintenance domain: (Without ID)
Maintenance association: matest1
MEP ID: 5 Sequence Number: 0x50A
MAC Address: 0011-2233-4402
Received Time: 2014/03/06 13:01:34

One or more streams of cross-connect CCMs is received. The last received CCM:
Maintenance domain: mdtest1
Maintenance association: matest1
MEP ID: 6 Sequence Number: 0x63A
MAC Address: 0011-2233-4401
Received Time: 2014/03/06 13:01:34

Some other MEPs are transmitting the RDI bit.

Table 17 Command output

| Field | Description |
|-------------------------------|---|
| Interface | Interface to which an MD belongs. |
| Maintenance domain | MD to which a MEP belongs. (If the MD does not have a name, this field is displayed as Without ID.) |
| Maintenance domain index | Index of the MD where the MEP resides. |
| Maintenance association | MA to which a MEP belongs. |
| Maintenance association index | Index of the MA where the MEP resides. |
| Level | Level of the MD. |
| VLAN | VLAN to which the MA belongs. |
| Direction | Direction of the MEPs. |
| Current state | State of MEP, either Active or Inactive. |

| Field | Description |
|---|---|
| CCM send | Whether the MEP sends CCM. |
| FNG state | <p>State of FNG (Fault Notification Generator):</p> <ul style="list-style-type: none"> • FNG_RESET—A fault has been cleared. • FNG_DEFECT—A fault has been detected. • FNG_REPORT_DEFECT—Report a fault. • FNG_DEFECT_REPORTED—A fault has been reported. • FNG_DEFECT_CLEARING—A fault is being cleared. <p>If this field is not supported, a hyphen (-) is displayed.</p> |
| CCM | Information related to CCM. |
| Current state | <p>State of CCMs sent:</p> <ul style="list-style-type: none"> • CCI_IDLE—Initial state. • CCI_WAITING—Sending state. <p>If this field is not supported, a hyphen (-) is displayed.</p> |
| Interval | Interval to send CCM. |
| SendCCM | <p>Number of CCMs that have been sent by the MEPs.</p> <p>If this field is not supported, a hyphen (-) is displayed.</p> |
| Loopback | Information related to Loopback. |
| NextSeqNumber | Sequence number of the next LBM to be sent. |
| SendLBR | Number of LBRs that have been sent. If the MEP is inward-facing, the number of LBRs will not be counted. |
| ReceiveInOrderLBR | Number of LBR messages received in correct sequence. |
| ReceiveOutOrderLBR | Number of LBR messages received out of order. |
| Linktrace | Information related to linktrace. |
| NextSeqNumber | Sequence number of the next LTM to be sent. |
| SendLTR | Number of LTRs sent. If the MEP is inward-facing, the number of LTRs will not be counted. |
| ReceiveLTM | Number of LTMs received. |
| No CCM received from some remote MEPs. | Failure to receive CCMs from some remote MEPs. (This information is displayed only when some CCMs are lost.) |
| One or more streams of error CCMs is received. The last received CCM: | Display the content of the last error CCM when one or more error CCMs are received. (This information is displayed only when error CCMs are received.) |
| Maintenance domain | <p>MD of the last error CCM message.</p> <p>If this field is not supported, a hyphen (-) is displayed.</p> |
| Maintenance association | <p>MA of the last error CCM message.</p> <p>If this field is not supported, a hyphen (-) is displayed.</p> |
| MEP | <p>ID of the MEP that sent the last error CCM message.</p> <p>If this field is not supported, a hyphen (-) is displayed.</p> |
| Sequence Number | <p>Sequence number of the last error CCM.</p> <p>If this field is not supported, a hyphen (-) is displayed.</p> |

| Field | Description |
|---|---|
| Received Time | Time when the last error CCM is received. |
| One or more streams of cross-connect CCMs is received. The last received CCM: | Cross-connect CCMs are received, and the content of the last cross-connect CCM is displayed. (This information is displayed only when cross-connect CCMs are received.) |
| Some other MEPs are transmitting the RDI bit. | CCMs with the RDI flag bits set are received from other MEPs. (This information is displayed only when this type of CCMs are received.) |

display cfd meplist

Use **display cfd meplist** to display the MEP list in a service instance.

Syntax

```
display cfd meplist [ service-instance instance-id ]
```

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767. If you do not specify this option, MEP lists in all service instances are displayed.

Examples

```
# Display the MEP list in service instance 5.
<Sysname> display cfd meplist service-instance 5
Service instance: 5
MEP list: 1 to 20, 30, 50.
```

display cfd mp

Use **display cfd mp** to display the MP information.

Syntax

```
display cfd mp [ interface interface-type interface-number ]
```

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

interface *interface-type interface-number*: Displays the MP information on a port specified by its port type and port number. If you do not specify this option, MP information on all ports is displayed.

Usage guidelines

The output is arranged by port name. On a port, the output shows MPs that serve VLANs, and then shows MPs that do not serve any VLANs. The MPs that serve VLANs are displayed in the ascending VLAN ID order. Within the same VLAN, the output is in the order of MIPs and MEPs (from high to low level). The MEPs that do not serve any VLANs are displayed by level (from high to low).

Examples

Display the MP information on all ports.

```
<Sysname> display cfd mp
Interface GigabitEthernet1/0/1  VLAN 100
MIP          Level: 2    Service instance: 102
Maintenance domain: md_2
Maintenance domain index: 3
Maintenance association: ma_2
Maintenance association index: 3

MEP ID: 101    Level: 1    Service instance: 101    Direction: Inbound
Maintenance domain: md_1
Maintenance domain index: 2
Maintenance association: ma_1
Maintenance association index: 2

MEP ID: 100    Level: 0    Service instance: 100    Direction: Outbound
Maintenance domain: md_0
Maintenance domain index: 1
Maintenance association: ma_0
Maintenance association index: 1
```

Table 18 Command output

| Field | Description |
|--|--|
| Interface GigabitEthernet1/0/1 VLAN 100 | MP configuration of VLAN 100 on the GigabitEthernet 1/0/1. |
| MIP | A MIP in the MP. |
| Level | MD level to which an MP belongs. |
| Service instance | Service instance to which the MP belongs. |
| Maintenance domain | MD to which an MP belongs. |
| Maintenance domain index | Index of the MD to which an MP belongs. |
| Maintenance association | MA to which an MP belongs. |
| Maintenance association index | Index of the MA to which an MP belongs. |
| Direction | Direction of the MEP, inbound or outbound. |

display cfd remote-mep

Use **display cfd remote-mep** to display information about a remote MEP.

Syntax

display cfd remote-mep service-instance *instance-id* **mep** *mep-id*

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191.

Examples

Display remote MEP information for MEP 10 in service instance 4.

```
<Sysname> display cfd remote-mep service-instance 4 mep 10
```

| MEP ID | MAC address | State | Time | MAC status |
|--------|----------------|--------|---------------------|------------|
| 20 | 00e0-fc00-6565 | OK | 2014/03/06 02:36:38 | UP |
| 30 | 00e0-fc27-6502 | OK | 2014/03/06 02:36:38 | DOWN |
| 40 | 00e0-fc00-6510 | FAILED | 2014/03/06 02:36:39 | DOWN |
| 50 | 00e0-fc52-baa0 | OK | 2014/03/06 02:36:44 | DOWN |
| 60 | 0010-fc00-6502 | OK | 2014/03/06 02:36:42 | DOWN |

Table 19 Command output

| Field | Description |
|-------------|---|
| MEP ID | ID of the remote MED. |
| MAC address | MAC address of the remote MEP device. If this field is not supported, a hyphen (-) is displayed. |
| State | Running state of the remote MEP, OK or FAILED. |
| Time | Time when the remote MEP entered the FAILED or OK state for the last time. |
| MAC status | State of the interface indicated by the last CCM received from the remote MEP: <ul style="list-style-type: none">• UP—The interface is ready to pass packets.• DOWN—The interface cannot pass packets.• TESTING—The interface is in some test mode.• UNKNOWN—The interface status cannot be determined.• DORMANT—The interface is not in a state to pass packets. Instead, it is in a pending state, waiting for some external event.• NOT-PRESENT—Some component of the interface is missing.• LLD—The interface is down due to state of the lower layer interfaces. If this field is not supported, a hyphen (-) is displayed. |

display cfd service-instance

Use **display cfd service-instance** to display the configuration information of service instance.

Syntax

```
display cfd service-instance [ instance-id ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies a service instance ID in the range of 1 to 32767. If you do not specify this argument, the configuration information of all service instances is displayed.

Examples

```
# Display the configuration information of all service instances.
```

```
<Sysname> display cfd service-instance
Service instances configured (2 in total):
Service instance 5:
Maintenance domain: md_5
Maintenance domain index: 5
Maintenance association: ma_5
Maintenance association index: 5
Level: 5 VLAN: 5 MIP rule: NONE CCM interval: 1s Direction: Inbound
MEP ID: 730 Interface: GigabitEthernet1/0/1

Service instance 6:
Maintenance domain: (Without ID)
Maintenance domain index: 6
Maintenance association: ma_6
Maintenance association index: 6
Level: 6 VLAN: 6 MIP rule: NONE CCM interval: 1s Direction: Outbound
MEP ID: 731 Interface: GigabitEthernet1/0/2
```

Table 20 Command output

| Field | Description |
|-----------------------------------|--|
| Service instances are configured. | Number of service instances configured. |
| Service instance | Service instance ID. |
| Maintenance domain | MD of the service instances. (If the MD does not have a name, this field displays Without ID .) |
| Maintenance domain index | Index of the MD to which the service instances belong. |
| Maintenance association: | MA of the service instances. |
| Maintenance association index | Index of the MA to which the service instances belong. |

| Field | Description |
|--------------|---|
| Level | MD level. |
| VLAN | VLAN to which the MA belongs. |
| MIP rule | MIP generation rules configured on service instance. |
| CCM interval | Interval to send CCMs. |
| Direction | Direction of the MEPs configured on the service instance. |
| MEP ID | ID of MEPs configured on the service instance. |
| Interface | Interface of the MEP configured on the service instance. |

display cfd status

Use **display cfd status** to display the CFD and AIS status.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

display cfd status

Views

Any view

Predefined user roles

network-admin

network-operator

Examples

```
# Display the CFD status.
<Sysname> display cfd status
CFD is enabled.
AIS is disabled.
```

display cfd tst

Use **display cfd tst** to display the TST result.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

display cfd tst [**service-instance** *instance-id* [**mep** *mep-id*]]

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767. If you do not specify this option, the command displays the TST results for all service instances.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191. If you do not specify this option, the command displays the TST results for all MEPs.

Usage guidelines

The TST DM results for all inward-facing MEPs in a service instance are the same.

Examples

```
# Display the TST results for all the MEPs in all service instances.
<Sysname> display cfd tst
Service instance: 1
MEP ID: 1003
Sent TST total number: 0
Received TST total number: 5
Received from 0010-fc00-6510, Bit True, sequence number 0
Received from 0010-fc00-6510, Bit True, sequence number 1
Received from 0010-fc00-6510, Bit True, sequence number 2
Received from 0010-fc00-6510, Bit True, sequence number 3
Received from 0010-fc00-6510, Bit True, sequence number 4
MEP ID: 1004
Sent TST total number: 5
Received TST total number: 0

Service instance: 2
No MEP exists in the service instance.

Service instance: 3
MEP ID: 1023
Sent TST total number: 5
Received TST total number: 0
```

Table 21 Command output

| Field | Description |
|---|--|
| Service instance | Service instance of the MEP. |
| Sent TST total number | Number of sent TST frames. |
| Received TST total number | Number of received TST frames. |
| Received from 0010-fc00-6510, Bit True, sequence number 0 | A TST frame with sequence number 0 was received from the MEP with MAC address 0010-FC00-6510. <ul style="list-style-type: none">• Bit True—No bit error occurred.• Bit False—Bit errors occurred. |

Related commands

- **cfp tst**
- **reset cfp tst**

reset cfd dm one-way history

Use **reset cfd dm one-way history** to clear the one-way DM result.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

reset cfd dm one-way history [**service-instance** *instance-id* [**mep** *mep-id*]]

Views

User view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767. If you do not specify this option, the command clears the one-way DM results for all service instances.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191. If you do not specify this option, the command clears the one-way DM results for all MEPs.

Usage guidelines

Clearing the one-way DM result for an inward-facing MEP clears all one-way DM results for the service instance where the inward-facing MEP resides.

Examples

```
# Clear the one-way DM results for all MEPs in all service instances.  
<Sysname> reset cfd dm one-way history
```

Related commands

- **cfp dm one-way**
- **display cfd dm one-way history**

reset cfd tst

Use **reset cfd tst** to clear the TST result.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

reset cfd tst [**service-instance** *instance-id* [**mep** *mep-id*]]

Views

User view

Predefined user roles

network-admin

Parameters

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767. If you do not specify this option, the command clears the TST results for all service instances.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191. If you do not specify this option, the command clears the TST results for all MEPs.

Usage guidelines

Clearing the TST result for an inward-facing MEP clears all TST results for the service instance where the inward-facing MEP resides.

Examples

Clear the TST results for all MEPs in all service instances.

```
<Sysname> reset cfd tst
```

Related commands

- **cfm tst**
- **display cfd tst**

DLDP commands

display dldp

Use **display dldp** to display DLDP configuration.

Syntax

```
display dldp [ interface interface-type interface-number ]
```

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

interface *interface-type interface-number*: Specifies an interface by its type and number.

Usage guidelines

If no port is specified, this command displays global and port-specific DLDP configuration. If a port is specified, this command displays only the DLDP configuration on the port.

Examples

Display global and port-specific DLDP configuration.

```
<Sysname> display dldp
DLDP global status: Enabled
DLDP advertisement interval: 5s
DLDP authentication-mode: Simple
DLDP authentication-password: *****
DLDP unidirectional-shutdown mode: Auto
DLDP delaydown-timer value: 1s
Number of enabled ports: 2

Interface GigabitEthernet1/0/1
DLDP port state: Bidirectional
Number of the port's neighbors: 1
Neighbor MAC address: 0023-8956-3600
Neighbor port index: 79
Neighbor state: Confirmed
Neighbor aged time: 13s

Interface GigabitEthernet1/0/2
DLDP port state: Inactive
Number of the port's neighbors: 0 (Maximum number ever detected: 1)
```

Display the DLDP configuration of GigabitEthernet 1/0/1.

```

<Sysname> display dldp interface gigabitethernet 1/0/1
Interface GigabitEthernet1/0/1
  DLDAP port state: Bidirectional
  Number of the port's neighbors: 1
    Neighbor MAC address: 0023-8956-3600
    Neighbor port index: 79
    Neighbor state: Confirmed
    Neighbor aged time: 13s

```

Table 22 Command output

| Field | Description |
|-----------------------------------|---|
| DLDP global status | Global DLDP state (Enabled or Disabled). |
| DLDP advertisement interval | Interval for sending Advertisement packets (in seconds) to maintain neighbor relations. |
| DLDP authentication-mode | DLDP authentication mode (None, Simple, or md5). |
| DLDP authentication-password | Password for DLDP authentication: <ul style="list-style-type: none"> • *****—The password has been configured. • Not configured—The authentication mode has been configured but no password is configured. |
| DLDP unidirectional-shutdown mode | Port shutdown mode (Auto or Manual) after unidirectional links are detected. |
| DLDP delaydown-timer value | Setting of the DelayDown timer, in seconds. |
| Number of enabled ports | Number of the DLDP-enabled ports. |
| Interface | Index of a DLDP-enabled port. |
| DLDP port state | DLDP state on a port: <ul style="list-style-type: none"> • Bidirectional. • Inactive. • Initial. • Unidirectional. |
| Number of the port's neighbors | Current number of neighbors. |
| Maximum number ever detected | Maximum number of neighbors once detected on the port. This field appears only when the current number of neighbors is different from the maximum number of neighbors once detected. |
| Neighbor MAC address | MAC address of the neighbor. |
| Neighbor port index | Neighbor port index. |
| Neighbor state | Neighbor state (Confirmed or Unconfirmed). |
| Neighbor aged time | Neighbor aging time. |

display dldp statistics

Use **display dldp statistics** to display the statistics on the DLDP packets passing through a port.

Syntax

```
display dldp statistics [ interface interface-type interface-number ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

interface *interface-type interface-number*: Specifies a port by its type and number.

Usage guidelines

If no port is specified, this command displays the statistics on the DLDAP packets passing through all the DLDAP-enabled ports.

Examples

Display the statistics on the DLDAP packets passing through all the DLDAP-enabled ports.

```
<Sysname> display dldap statistics
Interface GigabitEthernet1/0/1
  Packets sent: 6
  Packets received: 5
  Invalid packets received: 2
  Loopback packets received: 0
  Authentication-failed packets received: 0
  Valid packets received: 3
```

```
Interface GigabitEthernet1/0/2
  Packets sent: 7
  Packets received: 7
  Invalid packets received: 3
  Loopback packets received: 0
  Authentication-failed packets received: 0
  Valid packets received: 4
```

Table 23 Command output

| Field | Description |
|--|--|
| Interface | Port index. |
| Packets sent | Total number of DLDAP packets sent. |
| Packets received | Total number of DLDAP packets received. |
| Invalid packets received | Number of the invalid packets received. |
| Loop packets received | Number of the loopback packets received. |
| Authentication failed packets received | Number of the received packets that failed to pass the authentication. |
| Valid packets received | Number of the valid packets received. |

Related commands

reset dldap statistics

lldp authentication-mode

Use **lldp authentication-mode** to configure DLDP authentication.

Use **undo lldp authentication-mode** to restore the default.

Syntax

```
lldp authentication-mode { md5 | none | simple }  
undo lldp authentication-mode
```

Default

DLDP authentication is not configured.

Views

System view

Predefined user roles

network-admin

Parameters

md5: Specifies the MD5 authentication mode.

none: Specifies not to perform authentication.

simple: Specifies the plain text authentication mode.

Usage guidelines

To enable DLDP to operate correctly, make sure the DLDP authentication modes and the passwords configured on the two ends of a link are the same.

If you do not configure the authentication password after you configure the authentication mode, the authentication mode is **none** no matter which authentication mode you configure.

Examples

Configure to perform plain text authentication and set the password to **abc** (assuming that Device A and Device B are connected by a DLDP link).

- Configure Device A:

```
<DeviceA> system-view  
[DeviceA] lldp authentication-mode simple  
[DeviceA] lldp authentication-password simple abc
```
- Configure Device B:

```
<DeviceB> system-view  
[DeviceB] lldp authentication-mode simple  
[DeviceB] lldp authentication-password simple abc
```

Related commands

- **display lldp**
- **lldp authentication-password**

lldp authentication-password

Use **lldp authentication-password** to configure the password for DLDP authentication.

Use **undo dldp authentication-password** to restore the default.

Syntax

```
dldp authentication-password { cipher cipher | simple simple }  
undo dldp authentication-password
```

Default

No DLDAP authentication password is configured.

Views

System view

Predefined user roles

network-admin

Parameters

cipher *cipher*: Sets a ciphertext password. The *cipher* argument is a case-sensitive string of 1 to 53 characters.

simple *simple*: Sets a plaintext password. The *simple* argument is a case-sensitive string of 1 to 16 characters.

Usage guidelines

For security purposes, all DLDAP authentication passwords, including passwords configured in plain text, are saved in cipher text.

To enable DLDAP to operate correctly, make sure the DLDAP authentication modes and the passwords configured on the two ends of a link are the same.

If you do not configure the authentication password after you configure the authentication mode, the authentication mode is **none** no matter which authentication mode you configure.

Examples

Configure to perform plain text authentication and set the password to **abc** (assuming that Device A and Device B are connected by a DLDAP link).

- Configure Device A:

```
<DeviceA> system-view  
[DeviceA] dldp authentication-mode simple  
[DeviceA] dldp authentication-password simple abc
```
- Configure Device B:

```
<DeviceB> system-view  
[DeviceB] dldp authentication-mode simple  
[DeviceB] dldp authentication-password simple abc
```

Related commands

- **display dldp**
- **dldp authentication-mode**

dldp delaydown-timer

Use **dldp delaydown-timer** to set the DelayDown timer.

Use **undo dldp delaydown-timer** to restore the default.

Syntax

```
dldp delaydown-timer time  
undo dldp delaydown-timer
```

Default

The setting of the DelayDown timer is 1 second.

Views

System view

Predefined user roles

network-admin

Parameters

time: Specifies the DelayDown timer in the range of 1 to 5 seconds.

Usage guidelines

The DelayDown timer configured by using this command applies to all DLDP-enabled ports.

Examples

```
# Set the DelayDown timer to 2 seconds.  
<Sysname> system-view  
[Sysname] dldp delaydown-timer 2
```

Related commands

```
display dldp
```

dldp enable

Use **dldp enable** to enable DLDP on a port.

Use **undo dldp enable** to disable DLDP on a port.

Syntax

```
dldp enable  
undo dldp enable
```

Default

DLDP is disabled on a port.

Views

Layer 2 Ethernet interface view

Predefined user roles

network-admin

Usage guidelines

DLDP can take effect only after you enable it globally and on a port.

Examples

```
# Enable DLDP globally, and then enable DLDP on GigabitEthernet 1/0/1.  
<Sysname> system-view
```

```
[Sysname] dldp global enable
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] dldp enable
```

Related commands

- **display dldp**
- **dldp global enable**

dldp global enable

Use **dldp global enable** to enable DLDP globally.

Use **undo dldp global enable** to disable DLDP globally.

Syntax

dldp global enable

undo dldp global enable

Default

DLDP is disabled globally.

Views

System view

Predefined user roles

network-admin

Usage guidelines

DLDP can take effect only after you enable it globally and on a port.

Examples

```
# Enable DLDP globally.
<Sysname> system-view
[Sysname] dldp global enable
```

Related commands

- **display dldp**
- **dldp enable**

dldp interval

Use **dldp interval** to set the interval for sending Advertisement packets.

Use **undo dldp interval** to restore the default.

Syntax

dldp interval *time*

undo dldp interval

Default

The interval for sending Advertisement packets is 5 seconds.

Views

System view

Predefined user roles

network-admin

Parameters

time: Specifies Advertisement packets sending interval in the range of 1 to 100 seconds.

Usage guidelines

This command applies to all DLDAP-enabled ports.

To enable DLDAP to operate correctly, make sure the intervals for sending Advertisement packets configured on the two ends of a link are the same.

Examples

```
# Set the interval for sending Advertisement packets to 20 seconds.
<Sysname> system-view
[Sysname] dldp interval 20
```

Related commands

display dldp

dldp unidirectional-shutdown

Use **dldp unidirectional-shutdown** to set the port shutdown mode.

Use **undo dldp unidirectional-shutdown** to restore the default.

Syntax

```
dldp unidirectional-shutdown { auto | manual }
undo dldp unidirectional-shutdown
```

Default

The port shutdown mode is auto mode.

Views

System view

Predefined user roles

network-admin

Parameters

auto: Configures the port shutdown mode as auto mode. In this mode, when DLDAP detects a unidirectional link, it shuts down the Unidirectional port.

manual: Configures the port shutdown mode as manual mode. In this mode, when DLDAP detects a unidirectional link, DLDAP does not shut down the involved port but you need to manually shut it down. When the link state is restored to Bidirectional, you must manually bring up the port.

Examples

```
# Set the port shutdown mode to manual mode.
<Sysname> system-view
```

```
[Sysname] dldp unidirectional-shutdown manual
```

Related commands

display dldp

reset dldp statistics

Use **reset dldp statistics** to clear the statistics on DLDP packets passing through a port.

Syntax

```
reset dldp statistics [ interface interface-type interface-number ]
```

Views

User view

Predefined user roles

network-admin

Parameters

interface *interface-type interface-number*: Clears the statistics on DLDP packets passing through a port. *interface-type interface-number* represents a port by its type and number.

Usage guidelines

If no port is specified, this command clears the statistics on the DLDP packets passing through all the DLDP-enabled ports.

Examples

Clear the statistics on the DLDP packets passing through all the DLDP-enabled ports.

```
<Sysname> reset dldp statistics
```

Related commands

display dldp statistics

RRPP commands

RRPP is available in Release 3108P01 and later versions.

control-vlan

Use **control-vlan** to configure the primary control VLAN for the RRPP domain.

Use **undo control-vlan** to remove the primary control VLAN from the RRPP domain.

Syntax

control-vlan *vlan-id*

undo control-vlan

Default

No control VLAN exists in the RRPP domain.

Views

RRPP domain view

Predefined user roles

network-admin

Parameters

vlan-id: Specifies the ID of the primary control VLAN, in the range of 2 to 4093. The VLAN must have not been created yet.

Usage guidelines

When you configure control VLANs for an RRPP domain, you only need to configure the primary control VLAN. The system automatically configures the secondary control VLAN. It uses the primary control VLAN ID plus 1 as the secondary control VLAN ID. For the control VLAN configuration to succeed, make sure the IDs of the two control VLANs are consecutive and have not been assigned yet.

To ensure correct forwarding of RRPPDUs, follow these guidelines:

- Do not configure the default VLAN of a port accessing an RRPP ring as the control VLAN.
- Do not enable QinQ or VLAN mapping on the control VLANs.

After you configure RRPP rings for an RRPP domain, you cannot delete or modify the primary control VLAN of the domain. To do so, use the **undo control-vlan** command.

Examples

Configure VLAN 100 as the primary control VLAN of RRPP domain 1 (assume that VLAN 100 and VLAN 101 have not been created yet).

```
<Sysname> system-view
[Sysname] rrpp domain 1
[Sysname-rrpp-domain1] control-vlan 100
```

display rrpp brief

Use **display rrpp brief** to display brief RRPP information.

Syntax

display rrpp brief

Views

Any view

Predefined user roles

network-admin

network-operator

Examples

Display brief RRPP information.

```
<Sysname> display rrpp brief
```

```
Flags for node mode: M -- Master, T -- Transit, E -- Edge, A -- Assistant-edge
```

```
RRPP protocol status: Enabled
```

```
Domain ID      : 1
```

```
Control VLAN   : Primary 5, Secondary 6
```

```
Protected VLAN: Reference instance 0 to 2, 4
```

```
Hello timer    : 1 seconds, Fail timer: 3 seconds
```

```
Fast detection status: Disabled
```

```
Fast-Hello timer: 20 ms, Fast-Fail timer: 60 ms
```

```
Fast-Edge-Hello timer: 10 ms, Fast-Edge-Fail timer: 30 ms
```

| Ring ID | Ring level | Node mode | Primary/Common port | Secondary/Edge port | Enable status |
|---------|------------|-----------|---------------------|---------------------|---------------|
|---------|------------|-----------|---------------------|---------------------|---------------|

| | | | | | |
|---|---|---|---------|---------|-----|
| 1 | 1 | M | GE1/0/1 | GE1/0/2 | Yes |
|---|---|---|---------|---------|-----|

```
Domain ID      : 2
```

```
Control VLAN   : Primary 10, Secondary 11
```

```
Protected VLAN: Reference instance 0 to 2, 4
```

```
Hello timer    : 1 seconds, Fail timer: 3 seconds
```

```
Fast detection status: Disabled
```

```
Fast-Hello timer: 10 ms, Fast-Fail timer: 30 ms
```

| Ring ID | Ring level | Node mode | Primary/Common port | Secondary/Edge port | Enable status |
|---------|------------|-----------|---------------------|---------------------|---------------|
|---------|------------|-----------|---------------------|---------------------|---------------|

| | | | | | |
|---|---|---|---------|---------|-----|
| 1 | 0 | T | GE1/0/3 | GE1/0/4 | Yes |
| 2 | 1 | E | GE1/0/3 | GE1/0/5 | Yes |
| | | | GE1/0/4 | | |

Table 24 Command output

| Field | Description |
|-----------------------|--|
| Flags for node mode | RRPP node mode: <ul style="list-style-type: none"> • M—Master node. • T—Transit node. • E—Edge node. • A—Assistant edge node. |
| RRPP protocol status | RRPP status: <ul style="list-style-type: none"> • Enabled—Globally enabled. • Disabled—Globally disabled. |
| Domain ID | RRPP domain ID. |
| Control VLAN | Primary and secondary control VLANs of the RRPP domain. |
| Protected VLAN | MSTIs corresponding to the VLANs protected by the RRPP domain. To view the VLAN-to-instance mappings, use the display stp region-configuration command (see <i>Layer 2—LAN Switching Command Reference</i>). |
| Hello timer | Hello timer value in seconds. |
| Fail timer | Fail timer value in seconds. |
| Fast detection status | Fast detection status: Enabled or Disabled . |
| Fast-Hello timer | Fast-Hello timer value in milliseconds. |
| Fast-Fail timer | Fast-Fail timer value in milliseconds. |
| Fast-Edge-Hello timer | Fast-Edge-Hello timer value in milliseconds. |
| Fast-Edge-Fail timer | Fast-Edge-Fail timer value in milliseconds. |
| Ring ID | RRPP ring ID. |
| Ring level | RRPP ring level: <ul style="list-style-type: none"> • 0—Primary ring. • 1—Subring. |
| Primary/Common port | <p>This field displays primary ports when the node mode is master node or transit node.</p> <p>This field displays common ports when the node mode is edge node or assistant edge node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Secondary/Edge port | <p>This field displays secondary ports when the node mode is master node or transit node.</p> <p>This field displays edge ports when the node mode is edge node or assistant edge node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |

| Field | Description |
|---------------|--|
| Enable status | RRPP ring status: <ul style="list-style-type: none"> • Yes—Enabled. • No—Disabled. |

display rrpp ring-group

Use **display rrpp ring-group** to display the RRPP ring group configuration.

Syntax

display rrpp ring-group [*ring-group-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

ring-group-id: Specifies an RRPP ring group by its ID in the range of 1 to 64. If you do not specify this argument, the command displays the configuration of all ring groups.

Usage guidelines

For an edge node RRPP ring group, this command also displays the subring sending Edge-Hello packets.

Examples

Display the configuration of all RRPP ring groups.

```
<Sysname> display rrpp ring-group
Ring group 1:
  Domain 1 ring 1 to 3, 5
  Domain 2 ring 1 to 3, 5
  Domain 1 ring 1 is the sending ring

Ring group 2:
  Domain 1 ring 4, 6 to 7
  Domain 2 ring 4, 6 to 7
```

Table 25 Command output

| Field | Description |
|-------------------------------------|--|
| Ring group 1 | RRPP ring group 1. |
| Domain 1 ring 1 to 3, 5 | Subrings in the ring group, including rings 1, 2, 3, and 5 in RRPP domain 1. |
| Domain 1 ring 1 is the sending ring | The sending ring of the ring group is ring 1 in RRPP domain 1. |

display rrpp statistics

Use **display rrpp statistics** to display RRPPDU statistics.

Syntax

```
display rrpp statistics domain domain-id [ ring ring-id ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

domain *domain-id*: Specifies an RRPP domain by its ID in the range of 1 to 128.

ring *ring-id*: Specifies an RRPP ring by its ID in the range of 1 to 128. If you do not specify this option, the command displays the RRPPDU statistics for all rings in the specified RRPP domain.

Usage guidelines

If a port belongs to more than one ring, this command collects and displays RRPPDU statistics of the port by ring.

When a ring transits from inactive status to active status, packet counting for the ring restarts.

Examples

```
# Display RRPPDU statistics for all rings in RRPP domain 2.
```

```
<Sysname> display rrpp statistics domain 2
Ring ID      : 1
Ring level   : 0
Node mode    : Master
Active status : Yes
Primary port  : GE1/0/3
Fast-Hello packets: 0 Sent, 0 Received
Fast-Edge-Hello packets: 0 Sent, 0 Received
Direct Hello   Link      Common      Complete   Edge      Major      Total
                down      flush FDB   flush FDB  hello     fault
-----
Out   16924    0         0          1          0         0         16925
In    0         0         0          0          0         0         0
Secondary port: GE1/0/4
Fast-Hello packets: 0 Sent, 0 Received
Fast-Edge-Hello packets: 0 Sent, 0 Received
Direct Hello   Link      Common      Complete   Edge      Major      Total
                down      flush FDB   flush FDB  hello     fault
-----
Out    0         0         0          0          0         0         0
In   16878    0         0          1          0         0         16879

Ring ID      : 2
```

```

Ring level      : 1
Node mode      : Edge
Active status  : No
Common port    : GE1/0/3
Fast-Hello packets: 0 Sent, 0 Received
Fast-Edge-Hello packets: 0 Sent, 0 Received
  Direct Hello   Link      Common      Complete   Edge      Major      Total
                  down      flush FDB  flush FDB  hello     fault
-----
  Out    0        0        0          0          0          0          0
  In     0        0        0          0          0          0          0
Common port    : GE1/0/4
Fast-Hello packets: 0 Sent, 0 Received
Fast-Edge-Hello packets: 0 Sent, 0 Received
  Direct Hello   Link      Common      Complete   Edge      Major      Total
                  down      flush FDB  flush FDB  hello     fault
-----
  Out    0        0        0          0          0          0          0
  In     0        0        0          0          0          0          0
Edge port      : GE1/0/5
  Direct Hello   Link      Common      Complete   Edge      Major      Total
                  down      flush FDB  flush FDB  hello     fault
-----
  Out    0        0        0          0          0          0          0
  In     0        0        0          0          0          0          0

```

Table 26 Command output

| Field | Description |
|---------------|--|
| Ring ID | RRPP ring ID. |
| Ring level | RRPP ring level: <ul style="list-style-type: none"> • 0—Primary ring. • 1—Subring. |
| Node mode | Node mode: <ul style="list-style-type: none"> • Master node. • Transit node. • Edge node. • Assistant edge node. |
| Active status | RRPP ring status: <ul style="list-style-type: none"> • Yes—Active. • No—Inactive. |
| Primary port | The primary port field means the node mode is master node or transit node. A hyphen (-) appears when one of the following cases occurs: <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |

| Field | Description |
|-------------------------|--|
| Secondary port | <p>The secondary port field means the node mode is master node or transit node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Common port | <p>The common port field means the node mode is edge node or assistant edge node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Edge port | <p>The edge port field means the node mode is edge node or assistant edge node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Fast-Hello packets | <p>Fast-Hello packet statistics on the port:</p> <ul style="list-style-type: none"> • Sent—Number of Fast-Hello packets sent out of the port. • Received—Number of Fast-Hello packets received on the port. |
| Fast-Edge-Hello packets | <p>Fast-Edge-Hello packet statistics on the port:</p> <ul style="list-style-type: none"> • Sent—Number of Fast-Edge-Hello packets sent out of the port. • Received—Number of Fast-Edge-Hello packets received on the port. |
| Packet direct | <p>Packet transmission direction on the port:</p> <ul style="list-style-type: none"> • Out—Packet sending direction. • In—Packet receiving direction. |
| Hello | Statistics of Hello packets received/sent on the port. |
| Link down | Statistics of Link-Down packets received/sent on the port. |
| Common flush FDB | Statistics of Common-Flush-FDB packets received/sent on the port. |
| Complete flush FDB | Statistics of Complete-Flush-FDB packets received/sent on the port. |
| Edge hello | Statistics of Edge-Hello packets received/sent on the port. |
| Major fault | Statistics of Major-Fault packets received/sent on the port. |
| Total | Total number of packets received/sent on the port. Only Hello, Link-Down, Common-Flush-FDB, Complete-Flush-FDB, Edge-Hello, and Major-Fault packets of RRPP are counted. |

Related commands

reset rrpp statistics

display rrpp verbose

Use **display rrpp verbose** to display detailed RRPP information.

Syntax

```
display rrpp verbose domain domain-id [ ring ring-id ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

domain *domain-id*: Specifies an RRPP domain by its ID in the range of 1 to 128.

ring *ring-id*: Specifies an RRPP ring by its ID in the range of 1 to 128. If you do not specify this option, the command displays detailed information for all rings in the specified RRPP domain.

Examples

```
# Display detailed information for all rings in RRPP domain 2.
```

```
<Sysname> display rrpp verbose domain 2
Domain ID      : 2
Control VLAN   : Primary 10, Secondary 11
Protected VLAN: Reference instance 3, 5 to 7
Hello timer    : 1 seconds, Fail timer: 3 seconds
Fast detection status: Disabled
Fast-Hello timer: 20 ms, Fast-Fail timer: 60 ms
Fast-Edge-Hello timer: 10 ms, Fast-Edge-Fail timer: 30 ms

Ring ID       : 1
Ring level    : 0
Node mode     : Master
Ring state    : Completed
Enable status : Yes, Active status: Yes
Primary port  : GE1/0/4           Port status: UP
Secondary port: GE1/0/5           Port status: BLOCKED

Ring ID       : 2
Ring level    : 1
Node mode     : Edge
Ring state    : -
Enable status : No, Active status: No
Common port   : GE1/0/4           Port status: -
               GE1/0/5           Port status: -
Edge port     : GE1/0/3           Port status: -
```

Table 27 Command output

| Field | Description |
|-----------------------|---|
| Domain ID | RRPP domain ID. |
| Control VLAN | Control VLANs of the RRPP domain: <ul style="list-style-type: none"> • Primary—Primary control VLAN. • Secondary—Secondary control VLAN. |
| Protected VLAN | MSTIs corresponding to the VLANs protected by the RRPP domain. To view the VLAN-to-instance mappings, use the display stp region-configuration command (see <i>Layer 2—LAN Switching Command Reference</i>). |
| Hello timer | Hello timer value in seconds. |
| Fail timer | Fail timer value in seconds. |
| Fast detection status | Fast detection mechanism status: Enabled or Disabled . |
| Fast-Hello timer | Fast-Hello timer value in milliseconds. |
| Fast-Fail timer | Fast-Fail timer value in milliseconds. |
| Fast-Edge-Hello timer | Fast-Edge-Hello timer value in milliseconds. |
| Fast-Edge-Fail timer | Fast-Edge-Fail timer value in milliseconds. |
| Ring ID | RRPP ring ID. |
| Ring level | RRPP ring level: <ul style="list-style-type: none"> • 0—Primary ring. • 1—Subring. |
| Node mode | Node mode: <ul style="list-style-type: none"> • Master node. • Transit node. • Edge node. • Assistant edge node. |
| Ring state | RRPP ring state: <ul style="list-style-type: none"> • Completed—The ring is healthy. • Failed—The ring is not closed. <p>If the ring is not enabled on the device operating as the master node or the device is not the master node of the ring, a hyphen (-) is displayed.</p> |
| Enable status | RRPP ring status: <ul style="list-style-type: none"> • Yes—Enabled. • No—Disabled. |
| Active status | RRPP ring status. <ul style="list-style-type: none"> • Yes—Active. • No—Inactive. <p>An RRPP ring can be active only when RRPP and the RRPP ring are both enabled. This field also helps you identify whether RRPP is enabled.</p> |

| Field | Description |
|----------------|--|
| Primary port | <p>The primary port field means the node mode is master node or transit node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Secondary port | <p>The secondary port field means the node mode is master node or transit node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Common port | <p>The common port field means the node mode is edge node or assistant edge node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Edge port | <p>The edge port field means the node mode is edge node or assistant edge node.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |
| Port status | <p>Port status: Down, up, or blocked.</p> <p>A hyphen (-) appears when one of the following cases occurs:</p> <ul style="list-style-type: none"> • The ring is inactive. • The port is not configured on the ring. • The card to which the port belongs has not started up. • The port is a member of a link aggregation group. |

domain ring

Use **domain ring** to configure subrings for an RRPP ring group.

Use **undo domain ring** to remove subrings from the RRPP ring group.

Syntax

domain *domain-id* **ring** *ring-id-list*

undo domain *domain-id* [**ring** *ring-id-list*]

Default

No subring exists in the RRPP ring group.

Views

RRPP ring group view

Predefined user roles

network-admin

Parameters

domain-id: Specifies an RRPP domain by its ID in the range of 1 to 128.

ring *ring-id-list*: Specifies a space-separated list of up to 10 RRPP subring ID items. Each item specifies an RRPP subring ID or a range of RRPP subring IDs. The value range for RRPP subring IDs is 1 to 128. If you do not specify this option, the command removes all subrings from the ring group in the specified domain.

Usage guidelines

Follow these guidelines when you configure an RRPP ring group on the edge node and the assistant edge node:

- When you assign an active ring to a ring group, assign it on the assistant edge node first and then on the edge node.
- To remove an active ring from a ring group, remove it on the edge node first and then on the assistant edge node.
- To remove the whole ring group, remove it on the edge node first and then on the assistant edge node.
- When you activate rings in a ring group, activate them on the edge node first and then on the assistant edge node.
- When you deactivate rings in a ring group, deactivate them on the assistant edge node first and then on the edge node.

If you do not follow these guidelines, the assistant edge node might fail to receive Edge-Hello packets and consider the primary ring failed even if it did not.

Examples

```
# Create RRPP ring group 1, and add subrings 1, 2, 3, and 5 to domain 1 and domain 2.
```

```
<Sysname> system-view
[Sysname] rrpp ring-group 1
[Sysname-ring-group1] domain 1 ring 1 to 3 5
[Sysname-ring-group1] domain 2 ring 1 to 3 5
```

Related commands

- **display rrpp ring-group**
- **rrpp ring-group**

protected-vlan

Use **protected-vlan** to configure the protected VLANs for the RRPP domain.

Use **undo protected-vlan** to remove the protected VLANs from the RRPP domain.

Syntax

```
protected-vlan reference-instance instance-id-list
```

```
undo protected-vlan [ reference-instance instance-id-list ]
```

Default

No protected VLAN is configured for an RRPP domain.

Views

RRPP domain view

Predefined user roles

network-admin

Parameters

reference-instance *instance-id-list*: Specifies the Multiple Spanning Tree Instances (MSTIs) you want to reference in the form of *instance-id-list* = { *instance-id* [**to** *instance-id*] }&<1-10>. The *instance-id* argument is an MSTI ID in the range of 0 to 4094. You can specify up to 10 MSTI IDs or ID ranges. You can use the **display stp region-configuration** command to display the VLAN-to-instance mappings. If you do not specify this option, the command removes all MSTIs referenced by the RRPP domain.

Usage guidelines

You can delete or modify the protected VLANs configured for an RRPP domain before and after you configure rings for it. However, you cannot delete configurations of all the protected VLANs configured for the domain.

When the VLAN-to-instance mappings change, the protected VLANs of an RRPP domain also change.

Examples

Map VLANs 1 through 30 to MSTI 1, and activate the MST region configuration. Configure VLAN 100 as the control VLAN of RRPP domain 1. Configure VLANs mapped to MSTI 1 as the primary control VLANs of RRPP domain 1.

```
<Sysname> system-view
[Sysname] stp region-configuration
[Sysname-mst-region] instance 1 vlan 1 to 30
[Sysname-mst-region] active region-configuration
[Sysname-mst-region] quit
[Sysname] rrpp domain 1
[Sysname-rrpp-domain1] control-vlan 100
[Sysname-rrpp-domain1] protected-vlan reference-instance 1
```

Related commands

- **display stp region-configuration** (*Layer 2—LAN Switching Command Reference*)
- **rrpp domain**

reset rrpp statistics

Use **reset rrpp statistics** to clear RRPPDU statistics.

Syntax

```
reset rrpp statistics domain domain-id [ ring ring-id ]
```

Views

User view

Predefined user roles

network-admin

Parameters

domain *domain-id*: Specifies an RRPP domain by its ID in the range of 1 to 128.

ring *ring-id*: Specifies an RRPP ring by its ID in the range of 1 to 128. If you do not specify this option, the command clears RRPPDU statistics of all RRPP rings in the specified RRPP domain.

Examples

```
# Clear the RRPPDU statistics of ring 10 in RRPP domain 1.
<Sysname> reset rrpp statistics domain 1 ring 10
```

Related commands

display rrpp statistics

ring

Use **ring** to configure the node mode of the device, the role of the specified RRPP port, and the level of the RRPP ring.

Use **undo ring** to delete the RRPP ring.

Syntax

```
ring ring-id node-mode { { master | transit } [ primary-port interface-type interface-number ]  
[ secondary-port interface-type interface-number ] level level-value | { assistant-edge | edge }  
[ edge-port interface-type interface-number ] }
```

```
undo ring ring-id
```

Default

The device is not a node of the RRPP ring.

Views

RRPP domain view

Predefined user roles

network-admin

Parameters

ring-id: Specifies an RRPP ring by its ID in the range of 1 to 128.

master: Specifies the device as the master node of the RRPP ring.

transit: Specifies the device as the transit node of the RRPP ring.

primary-port: Specifies the port as a primary port.

interface-type interface-number: Specifies a port by its type and number.

secondary-port: Specifies the port as a secondary port.

level level-value: Specifies an RRPP ring level, 0 for the primary ring and 1 for the subring.

assistant-edge: Specifies the device as the assistant edge node of the RRPP ring.

edge: Specifies the device as the edge node of the RRPP ring.

edge-port: Specifies the edge port for the node.

Usage guidelines

The ID of an RRPP ring in a domain must be unique.

When an RRPP ring is activated, you cannot configure its RRPP ports.

When you configure the edge node and the assistant edge node, first configure the primary ring, and then the subrings.

The node mode, RRPP port role, and ring level settings of an RRPP ring cannot be modified after they are configured. To modify the settings, first remove the current settings.

Remove all subring configurations before you delete the primary ring configuration of the edge node or the assistant edge node. However, an active RRPP ring cannot be deleted.

When RRPP is enabled on a device, you must disable the RRPP ring before you can delete it. When RRPP is disabled on the device, you can directly delete the RRPP ring, as well as the setting of the **ring enable** command.

Examples

Specify the device as the master node of primary ring 10 in RRPP domain 1. Specify GigabitEthernet 1/0/1 as the primary port and GigabitEthernet 1/0/2 as the secondary port.

```
<Sysname> system-view
[Sysname] rrpp domain 1
[Sysname-rrpp-domain1] control-vlan 100
[Sysname-rrpp-domain1] protected-vlan reference-instance 0 1 2
[Sysname-rrpp-domain1] ring 10 node-mode master primary-port gigabitethernet 1/0/1
secondary-port gigabitethernet 1/0/2 level 0
```

Specify the device as the transit node of primary ring 10 in RRPP domain 1. Specify GigabitEthernet 1/0/1 as the primary port and GigabitEthernet 1/0/2 as the secondary port. Specify the device as the edge node of subring 20 in RRPP domain 1, and specify GigabitEthernet 1/0/3 as the edge port.

```
<Sysname> system-view
[Sysname] rrpp domain 1
[Sysname-rrpp-domain1] control-vlan 100
[Sysname-rrpp-domain1] protected-vlan reference-instance 0 1 2
[Sysname-rrpp-domain1] ring 10 node-mode transit primary-port gigabitethernet 1/0/1
secondary-port gigabitethernet 1/0/2 level 0
[Sysname-rrpp-domain1] ring 20 node-mode edge edge-port gigabitethernet 1/0/3
```

Related commands

ring enable

ring enable

Use **ring enable** to enable an RRPP ring.

Use **undo ring enable** to disable the RRPP ring.

Syntax

ring *ring-id* **enable**

undo ring *ring-id* **enable**

Default

The RRPP ring is disabled.

Views

RRPP domain view

Predefined user roles

network-admin

Parameters

ring-id: Specifies an RRPP ring by its ID in the range of 1 to 128.

Usage guidelines

To activate an RRPP ring, you must enable RRPP and the RRPP ring.

Before you enable subrings on a device, you must enable the primary ring. Before you disable the primary ring on the device, you must disable all subrings. Otherwise, the system displays error prompts.

Examples

```
# Enable RRPP ring 10 in RRPP domain 1.
<Sysname> system-view
[Sysname] rrpp domain 1
[Sysname-rrpp-domain1] control-vlan 100
[Sysname-rrpp-domain1] protected-vlan reference-instance 0 1 2
[Sysname-rrpp-domain1] ring 10 node-mode master primary-port gigabitethernet 1/0/1
secondary-port gigabitethernet 1/0/2 level 0
[Sysname-rrpp-domain1] ring 10 enable
```

Related commands

rrpp enable

rrpp domain

Use **rrpp domain** to create an RRPP domain and enter its view.

Use **undo rrpp domain** to remove an RRPP domain.

Syntax

```
rrpp domain domain-id
undo rrpp domain domain-id
```

Default

No RRPP domain is created.

Views

System view

Predefined user roles

network-admin

Parameters

domain-id: Specifies an RRPP domain by its ID in the range of 1 to 128.

Usage guidelines

When you delete an RRPP domain, configurations of the control VLANs and protected VLANs are deleted at the same time.

To delete an RRPP domain successfully, make sure it has no RRPP rings.

Examples

```
# Create RRPP domain 1, and enter RRPP domain 1 view.
<Sysname> system-view
```

```
[Sysname] rrpp domain 1
[Sysname-rrpp-domain1]
```

Related commands

- **control-vlan**
- **protected-vlan**

rrpp enable

Use **rrpp enable** to enable RRPP.

Use **undo rrpp enable** to disable RRPP.

Syntax

```
rrpp enable
undo rrpp enable
```

Default

RRPP is disabled.

Views

System view

Predefined user roles

network-admin

Usage guidelines

To activate the RRPP domain, enable RRPP and the RRPP rings for the RRPP domain.

Examples

```
# Enable RRPP.
<Sysname> system-view
[Sysname] rrpp enable
```

Related commands

```
ring enable
```

rrpp ring-group

Use **rrpp ring-group** to create an RRPP ring group and enter its view.

Use **undo rrpp ring-group** to remove an RRPP ring group.

Syntax

```
rrpp ring-group ring-group-id
undo rrpp ring-group ring-group-id
```

Default

No RRPP ring group is created.

Views

System view

Predefined user roles

network-admin

Parameters

ring-group-id: Specifies an RRPP ring group ID in the range of 1 to 64.

Usage guidelines

When you remove a ring group, remove it on the edge node first and then on the assistant edge node. Otherwise, the assistant edge node might fail to receive Edge-Hello packets and consider the primary ring failed even if it is not.

After a ring group is removed, all subrings in the ring group do not belong to any ring group.

Examples

```
# Create RRPP ring group 1 and enter its view.  
<Sysname> system-view  
[Sysname] rrpp ring-group 1  
[Sysname-ring-group1]
```

Related commands

- **display rrpp ring-group**
- **domain ring**

timer

Use **timer** to configure the Hello timer and the Fail timer.

Use **undo timer** to restore the default.

Syntax

timer hello-timer *hello-value* **fail-timer** *fail-value*

undo timer

Default

The Hello timer is 1 second and the Fail timer is 3 seconds.

Views

RRPP domain view

Predefined user roles

network-admin

Parameters

hello-timer *hello-value*: Specifies the Hello timer in the range of 1 to 10 seconds.

fail-timer *fail-value*: Specifies the Fail timer in the range of 3 to 30 seconds.

Usage guidelines

The Fail timer must be greater than or equal to three times the Hello timer.

Examples

```
# Set the Hello timer to 2 seconds and the Fail timer to 7 seconds for RRPP domain 1.  
<Sysname> system-view
```

```
[Sysname] rrpp domain 1
```

```
[Sysname-rrpp-domain1] timer hello-timer 2 fail-timer 7
```

Smart Link commands

display smart-link flush

Use **display smart-link flush** to display information about the received flush messages.

Syntax

```
display smart-link flush
```

Views

Any view

Predefined user roles

network-admin

network-operator

Examples

Display information about the received flush messages.

```
<Sysname> display smart-link flush
Received flush packets                : 10
Receiving interface of the last flush packet : GigabitEthernet1/0/1
Receiving time of the last flush packet   : 19:19:03 2014/04/21
Device ID of the last flush packet       : 000f-e200-8500
Control VLAN of the last flush packet    : 1
```

Table 28 Command output

| Field | Description |
|--|--|
| Received flush packets | Total number of received flush messages. |
| Receiving interface of the last flush packet | Port that received the last flush message. |
| Receiving time of the last flush packet | Time when the last flush message was received. |
| Device ID of the last flush packet | Device ID carried in the last flush message. |
| Control VLAN of the last flush packet | Control VLAN ID carried in the last flush message. |

Related commands

reset smart-link statistics

display smart-link group

Use **display smart-link group** to display information about the specified or all smart link groups.

Syntax

```
display smart-link group { group-id | all }
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

group-id: Specifies a smart link group ID in the range of 1 to 48.

all: Displays information about all smart link groups.

Usage guidelines

If you configure a port as both an aggregation group member and a smart link group member, only the aggregation group configuration takes effect. The port is not shown in the output from the **display smart-link group** command. The smart link group configuration takes effect after the port leaves the aggregation group.

Examples

```
# Display information about smart link group 1.
```

```
<Sysname> display smart-link group 1
```

```
Smart link group 1 information:
```

```
Device ID       : 0011-2200-0001
```

```
Preemption mode : NONE
```

```
Preemption delay: 1(s)
```

```
Control VLAN    : 1
```

```
Protected VLAN  : Reference Instance 2, 4
```

| Member | Role | State | Flush-count | Last-flush-time |
|---------|-----------|---------|-------------|---------------------|
| GE1/0/1 | PRIMARY | ACTIVE | 1 | 16:45:20 2014/04/21 |
| GE1/0/2 | SECONDARY | STANDBY | 2 | 16:37:20 2014/04/21 |

Table 29 Command output

| Field | Description |
|--------------------------------|--|
| Smart link group 1 information | Information about smart link group 1. |
| Preemption mode | Preemption mode, which can be ROLE for preemption enabled or NONE for preemption disabled. |
| Preemption delay | Preemption delay time, in seconds. |
| Control-VLAN | Control VLAN ID. |
| Protected VLAN | Protected VLANs of the smart link group. Referenced Multiple Spanning Tree Instances (MSTIs) are displayed. To view the VLANs mapped to the referenced MSTIs, use the display stp region-configuration command. |
| Member | Member port of the smart link group. |
| Role | Port role: primary or secondary. |
| State | Port state: active, down, or standby. |

| Field | Description |
|-----------------|---|
| Flush-count | Number of transmitted flush messages. |
| Last-flush-time | Time when the last flush message was transmitted (NA indicates that no flush message has been transmitted). |

flush enable

Use **flush enable** to enable flush update.

Use **undo flush enable** to disable flush update.

Syntax

flush enable [**control-vlan** *vlan-id*]

undo flush enable

Default

Flush update is enabled for smart link groups, and VLAN 1 is used for flush message transmission.

Views

Smart link group view

Predefined user roles

network-admin

Parameters

control-vlan *vlan-id*: Specifies the control VLAN used for transmitting flush messages. The *vlan-id* argument represents the control VLAN ID in the range of 1 to 4094.

Usage guidelines

You must configure different control VLANs for different smart link groups.

- Make sure the configured control VLAN already exists, and assign the smart link group member ports to the control VLAN.
- The control VLAN of a smart link group must also be one of its protected VLANs. Do not remove the control VLAN. Otherwise, flush messages cannot be sent correctly.

Examples

```
# Disable flush update for smart link group 1.
<Sysname> system-view
[Sysname] smart-link group 1
[Sysname-smlk-group1] undo flush enable
```

Related commands

smart-link flush enable

port

Use **port** to assign the specified port as the primary or secondary port of the current smart link group.

Use **undo port** to remove the specified port from the smart link group.

Syntax

```
port interface-type interface-number { primary | secondary }
```

```
undo port interface-type interface-number
```

Default

A smart link group has no member ports.

Views

Smart link group view

Predefined user roles

network-admin

Parameters

interface-type interface-number: Specifies a port by its type and number, which can be a Layer 2 Ethernet interface or Layer 2 aggregate interface.

primary: Specifies a port as the primary port.

secondary: Specifies a port as the secondary port.

Usage guidelines

Disable the spanning tree feature on the ports you want to add to the smart link group. You cannot enable the spanning tree feature on a smart link group member port.

If you configure a port as both an aggregation group member and a smart link group member, only the aggregation group configuration takes effect. The port is not shown in the output from the **display smart-link group** command. The smart link group configuration takes effect after the port leaves the aggregation group.

You can also assign a port to a smart link group by using the **port smart-link group** command in interface view.

Examples

```
# Configure GigabitEthernet 1/0/1 as the secondary port of smart link group 1.
```

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] undo stp enable
[Sysname-GigabitEthernet1/0/1] quit
[Sysname] smart-link group 1
[Sysname-smlk-group1] protected-vlan reference-instance 0
[Sysname-smlk-group1] port gigabitethernet 1/0/1 secondary
```

Related commands

port smart-link group

port smart-link group

Use **port smart-link group** to configure the current port as a member of the specified smart link group.

Use **undo port smart-link group** to remove the port from the specified smart link group.

Syntax

```
port smart-link group group-id { primary | secondary }
```

undo port smart-link group *group-id*

Default

A port is not a smart link group member.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

group-id: Specifies a smart link group ID in the range of 1 to 48.

primary: Specifies the port as the primary port.

secondary: Specifies the port as the secondary port.

Usage guidelines

Disable the spanning tree feature on the ports you want to add to the smart link group. You cannot enable the spanning tree feature on a smart link group member port.

If you configure a port as both an aggregation group member and a smart link group member, only the aggregation group configuration takes effect. The port is not shown in the output from the **display smart-link group** command. The smart link group configuration takes effect after the port leaves the aggregation group.

You can assign a port to a smart link group by using the **port** command in smart link group view.

Examples

Configure GigabitEthernet 1/0/1 as the primary port of smart link group 1.

```
<Sysname> system-view
[Sysname] smart-link group 1
[Sysname-smlk-group1] protected-vlan reference-instance 0
[Sysname-smlk-group1] quit
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] undo stp enable
[Sysname-GigabitEthernet1/0/1] port smart-link group 1 primary
```

Configure Layer 2 aggregate interface 1 as the primary port of smart link group 1.

```
<Sysname> system-view
[Sysname] smart-link group 1
[Sysname-smlk-group1] protected-vlan reference-instance 0
[Sysname-smlk-group1] quit
[Sysname] interface bridge-aggregation 1
[Sysname-Bridge-Aggregation1] undo stp enable
[Sysname-Bridge-Aggregation1] port smart-link group 1 primary
```

Related commands

port

port smart-link group track

Use **port smart-link group track** to configure the collaboration between a smart link group member port and a track entry.

Use **undo port smart-link group track** to remove the collaboration.

Syntax

```
port smart-link group group-id track track-entry-number
```

```
undo port smart-link group group-id track track-entry-number
```

Default

Smart link group member ports do not collaborate with any track entry.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

group-id: Specifies a smart link group ID in the range of 1 to 48.

track-entry-number: Specifies the ID of a track entry that has been associated with the CC function of CFD.

Usage guidelines

Smart Link collaborates with link detection protocols through track entries. It supports only the CC function of CFD to implement link detection. To associate the CC function of CFD with a track entry, use the **track cfd** command.

Before configuring the collaboration between Smart Link and Track on a port, make sure the port has been added to the specified smart link group.

Examples

```
# Configure the collaboration between GigabitEthernet 1/0/1, the primary port of smart link group 1, and the CC function of CFD through track entry 1 to detect the link status.
```

```
<Sysname> system-view
[Sysname] track 1 cfd cc service-instance 100 mep 2
[Sysname] smart-link group 1
[Sysname-smlk-group1] protected-vlan reference-instance 0
[Sysname-smlk-group1] quit
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] undo stp enable
[Sysname-GigabitEthernet1/0/1] port smart-link group 1 primary
[Sysname-GigabitEthernet1/0/1] port smart-link group 1 track 1
```

```
# Configure the collaboration between bridge-aggregation 1, the primary port of smart link group 1, and the CC function of CFD through track entry 1 to detect the link status.
```

```
<Sysname> system-view
[Sysname] track 1 cfd cc service-instance 100 mep 2
[Sysname] smart-link group 1
[Sysname-smlk-group1] protected-vlan reference-instance 0
```

```
[Sysname-smlk-group1] quit
[Sysname] interface bridge-aggregation 1
[Sysname-Bridge-Aggregation1] undo stp enable
[Sysname-Bridge-Aggregation1] port smart-link group 1 primary
[Sysname-Bridge-Aggregation1] port smart-link group 1 track 1
```

Related commands

track cfd

preemption delay

Use **preemption delay** to set the preemption delay.

Use **undo preemption delay** to restore the default.

Syntax

preemption delay *delay*

undo preemption delay

Default

The preemption delay is 1 second.

Views

Smart link group view

Predefined user roles

network-admin

Parameters

delay: Specifies the preemption delay in the range of 0 to 300 seconds.

Usage guidelines

The preemption delay configuration takes effect only after role preemption is enabled.

When role preemption is enabled, and after the preemption delay is set, the primary port waits for a specific period before taking over in order to collaborate with the switchover of upstream devices.

Examples

```
# Enable role preemption and set the preemption delay to 10 seconds.
<Sysname> system-view
[Sysname] smart-link group 1
[Sysname-smlk-group1] preemption mode role
[Sysname-smlk-group1] preemption delay 10
```

Related commands

preemption mode

preemption mode

Use **preemption mode** to enable role preemption.

Use **undo preemption mode** to disable role preemption.

Syntax

preemption mode role
undo preemption mode

Default

Role preemption is disabled.

Views

Smart link group view

Predefined user roles

network-admin

Parameters

role: Configures the role preemption mode, which enables the primary port to preempt the secondary port in active state.

Examples

```
# Enable the role preemption mode.
<Sysname> system-view
[Sysname] smart-link group 1
[Sysname-smlk-group1] preemption mode role
```

protected-vlan

Use **protected-vlan** to configure protected VLANs for a smart link group.

Use **undo protected-vlan** to remove the protected VLAN configuration of the smart link group.

Syntax

protected-vlan reference-instance *instance-id-list*
undo protected-vlan [**reference-instance** *instance-id-list*]

Default

No protected VLAN is configured for a smart link group.

Views

Smart link group view

Predefined user roles

network-admin

Parameters

reference-instance *instance-id-list*: Specifies the MSTIs to be referenced in the form of *instance-id-list* = { *instance-id* [**to** *instance-id*] }&<1-10>, where *instance-id* is an MSTI ID in the range of 0 to 4094. An MSTI ID of 0 represents the common internal spanning tree (CIST). &<1-10> means that you can specify up to 10 MSTI IDs or ID ranges. You can use the **display stp region-configuration** command to display the instance-to-VLAN mappings.

Usage guidelines

If the **reference-instance** *instance-id-list* option is specified, the **undo protected-vlan** command removes configuration of VLANs mapped to the specified MSTIs. Otherwise, the command removes configuration of all protected VLANs.

Before assigning ports to a smart link group, configure protected VLANs for the smart link group.

You can remove the protected VLAN configuration of a smart link group when the group is empty but not after a member port is assigned to it.

Removing a smart link group also removes its protected VLAN configuration.

If the VLANs mapped to a referenced MSTI change, the protected VLANs also change.

The VLANs to which the member ports of a smart link group belong must be configured as the protected VLANs of the smart link group.

Examples

```
# Map VLANs 1 through 30 to MSTI 1, activate the MST region configuration, and configure the VLANs mapped to MSTI 1 as the protected VLANs of smart link group 1.
```

```
<Sysname> system-view
[Sysname] stp region-configuration
[Sysname-mst-region] instance 1 vlan 1 to 30
[Sysname-mst-region] active region-configuration
[Sysname-mst-region] quit
[Sysname] smart-link group 1
[Sysname-smlk-group1] protected-vlan reference-instance 1
```

Related commands

- **display stp region-configuration** (*Layer 2—LAN Switching Command Reference*)
- **smart-link group**

reset smart-link statistics

Use **reset smart-link statistics** to clear the statistics about flush messages.

Syntax

```
reset smart-link statistics
```

Views

User view

Predefined user roles

network-admin

Examples

```
# Clear the statistics about flush messages.
<Sysname> reset smart-link statistics
```

Related commands

```
display smart-link flush
```

smart-link flush enable

Use **smart-link flush enable** to enable the flush message receiving function.

Use **undo smart-link flush enable** to remove the configuration.

Syntax

smart-link flush enable [**control-vlan** *vlan-id-list*]

undo smart-link flush enable [**control-vlan** *vlan-id-list*]

Default

Flush messages are not processed.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

Parameters

control-vlan *vlan-id-list*: Specifies the control VLANs used for receiving flush messages. The default is 1. The *vlan-id-list* is expressed in the form of *vlan-id-list* = { *vlan-id* [**to** *vlan-id*] }&<1-10>, where the *vlan-id* argument represents the ID of a control VLAN in the range of 1 to 4094. &<1-10> indicates that you can provide up to 10 VLAN IDs or VLAN ID lists.

Examples

Enable GigabitEthernet 1/0/1 to process the flush messages received in VLAN 1.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] smart-link flush enable
```

Enable Layer 2 aggregate interface 1 to process the flush messages received in VLAN 1.

```
<Sysname> system-view
[Sysname] interface bridge-aggregation 1
[Sysname-Bridge-Aggregation1] smart-link flush enable
```

Related commands

flush enable

smart-link group

Use **smart-link group** to create a smart link group and enter smart link group view.

Use **undo smart-link group** to remove a smart link group.

Syntax

smart-link group *group-id*

undo smart-link group *group-id*

Views

System view

Predefined user roles

network-admin

Parameters

group-id: Specifies a smart link group ID in the range of 1 to 48.

Usage guidelines

You cannot remove a smart link group with member ports.

Examples

Create smart link group 1 and enter smart link group view.

```
<Sysname> system-view  
[Sysname] smart-link group 1  
[Sysname-smlk-group1]
```

Monitor Link commands

display monitor-link group

Use **display monitor-link group** to display monitor link group information.

Syntax

```
display monitor-link group { group-id | all }
```

Views

Any view

Predefined user roles

network-admin
network-operator

Parameters

group-id: Specifies a monitor link group by its ID. The value range for the *group-id* argument is 1 to 16.

all: Specifies all monitor link groups.

Usage guidelines

This command does not display information about ports that belong to a link aggregation group.

Examples

```
# Display information about monitor link group 1.
```

```
<Sysname> display monitor-link group all
```

```
Monitor link protocol status: Disabled
```

```
Monitor link group 1 information:
```

```
Group status      : N/A  
Downlink up-delay: 0(s)  
Last-up-time     : -  
Last-down-time   : -
```

| Member | Role | Status |
|---------|----------|--------|
| GE1/0/1 | UPLINK | UP |
| GE1/0/2 | DOWNLINK | UP |

Table 30 Command output

| Field | Description |
|------------------------------|---|
| Monitor link protocol status | Whether Monitor Link is enabled: <ul style="list-style-type: none">• Enabled.• Disabled. |

| Field | Description |
|-------------------|---|
| Group status | Monitor link group status: <ul style="list-style-type: none"> • DOWN. • UP. • N/A—Monitor Link is disabled globally. The monitor link group does not operate. |
| Downlink up-delay | Switchover delay of the downlink interfaces in the monitor link group, in seconds. |
| Last-up-time | Last time when the monitor link group was up. |
| Last-down-time | Last time when the monitor link group was down. |
| Member | Member interfaces of the monitor link group. |
| Role | Interface role, which can be uplink interface or downlink interface. |
| Status | Member link state, which can be up or down. |

downlink up-delay

Use **downlink up-delay** to configure the switchover delay for the downlink interfaces in a monitor link group.

Use **undo downlink up-delay** to restore the default.

Syntax

downlink up-delay *delay*

undo downlink up-delay

Default

The switchover delay is 0 seconds, which means the downlink interfaces come up as soon as the uplink interfaces come up.

Views

Monitor link group view

Predefined user roles

network-admin

Parameters

delay: Specifies the switchover delay in the range of 1 to 300 seconds.

Usage guidelines

To avoid frequent state changes of downlink interfaces in the event that uplink interfaces flap, you can configure a switchover delay. The switchover delay is the time that the downlink interfaces wait before they come up following an uplink interface.

Examples

```
# Configure the switchover delay for the downlink interfaces in monitor link group 1 as 50 seconds.
<Sysname> system-view
[Sysname] monitor-link group 1
```

```
[Sysname-mtlk-group1] downlink up-delay 50
```

monitor-link disable

Use **monitor-link disable** to disable Monitor Link globally.

Use **undo monitor-link disable** to enable Monitor Link globally.

Syntax

```
monitor-link disable
```

```
undo monitor-link disable
```

Default

Monitor Link is enabled globally.

Views

System view

Predefined user roles

network-admin

Usage guidelines

All monitor link groups can operate only after you enable Monitor Link globally. When you disable Monitor Link globally, all monitor link groups cannot operate and the downlink interfaces brought down by the monitor link groups resume their original states.

Examples

```
# Disable Monitor Link globally.  
<Sysname> system-view  
[Sysname] monitor-link disable
```

monitor-link group

Use **monitor-link group** to create a monitor link group and enter monitor link group view.

Use **undo monitor-link group** to remove a monitor link group.

Syntax

```
monitor-link group group-id
```

```
undo monitor-link group group-id
```

Default

No monitor link group is created.

Views

System view

Predefined user roles

network-admin

Parameters

group-id: Specifies a monitor link group ID in the range of 1 to 16.

Examples

```
# Create monitor link group 1 and enter the view of monitor link group 1.
<Sysname> system-view
[Sysname] monitor-link group 1
[Sysname-mtlk-group1]
```

port

Use **port** to assign an interface to the monitor link group.

Use **undo port** to remove an interface from the monitor link group.

Syntax

```
port interface-type interface-number { downlink | uplink }
undo port interface-type interface-number
```

Default

A monitor link group has no member interfaces.

Views

Monitor link group view

Predefined user roles

network-admin

Parameters

interface-type: Specifies an interface type, which can be Layer 2 Ethernet interface, Layer 2 aggregate interface, member port of a Layer 2 aggregation group.

interface-number: Specifies an interface by its number.

downlink: Specifies a downlink interface.

uplink: Specifies an uplink interface.

Usage guidelines

To avoid interrupting Monitor Link operation, do not assign the aggregate interface and member ports of an aggregate group to the same monitor link group.

You can assign an interface only to one monitor link group.

You can also assign an interface to a monitor link group by using the **port monitor-link group** command in interface view.

Examples

```
# Configure GigabitEthernet 1/0/1 as an uplink interface and GigabitEthernet 1/0/2 as a downlink
interface for monitor link group 1.
<Sysname> system-view
[Sysname] monitor-link group 1
[Sysname-mtlk-group1] port gigabitethernet 1/0/1 uplink
[Sysname-mtlk-group1] port gigabitethernet 1/0/2 downlink
```

Related commands

port monitor-link group

port monitor-link group

Use **port monitor-link group** to assign the current interface to a monitor link group as a member interface.

Use **undo port monitor-link group** to remove the current interface from a monitor link group.

Syntax

```
port monitor-link group group-id { downlink | uplink }
```

```
undo port monitor-link group group-id
```

Default

The interface is not a monitor link group member.

Views

Layer 2 Ethernet interface view

Layer 2 aggregate interface view

Layer 2 aggregation group member port view

Predefined user roles

network-admin

Parameters

group-id: Specifies a monitor link group ID in the range of 1 to 16.

downlink: Specifies a downlink interface.

uplink: Specifies an uplink interface.

Usage guidelines

To avoid interrupting Monitor Link operation, do not assign the aggregate interface and member ports of an aggregate group to the same monitor link group.

You can assign an interface only to one monitor link group.

You can also assign an interface to a monitor link group with the **port** command in monitor link group view.

Examples

```
# Configure GigabitEthernet 1/0/1 as an uplink interface and GigabitEthernet 1/0/2 as a downlink interface for monitor link group 1.
```

```
<Sysname> system-view
[Sysname] monitor-link group 1
[Sysname-mtlk-group1] quit
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] port monitor-link group 1 uplink
[Sysname-GigabitEthernet1/0/1] quit
[Sysname] interface gigabitethernet 1/0/2
[Sysname-GigabitEthernet1/0/2] port monitor-link group 1 downlink
```

Related commands

port

BFD commands

The term "interface" in this chapter collectively refers to VLAN interfaces.

bfd authentication-mode

Use **bfd authentication-mode** to configure the BFD authentication mode for single-hop BFD control packets.

Use **undo bfd authentication-mode** to restore the default.

Syntax

Release 3106:

```
bfd authentication-mode simple key-id { cipher cipher-string | plain plain-string }
```

```
undo bfd authentication-mode
```

Release 3108P01 and later versions:

```
bfd authentication-mode { m-md5 | m-sha1 | md5 | sha1 | simple } key-id { cipher cipher-string | plain plain-string }
```

```
undo bfd authentication-mode
```

Default

Single-hop BFD control packets are not authenticated.

Views

Interface view

Predefined user roles

network-admin

Parameters

m-md5: Specifies the Meticulous MD5 algorithm.

m-sha1: Specifies the Meticulous SHA1 algorithm.

md5: Specifies the MD5 algorithm.

sha1: Specifies the SHA1 algorithm.

simple: Specifies the simple authentication mode.

key-id: Sets the authentication key ID in the range of 1 to 255.

cipher: Sets a ciphertext password.

cipher-string: Ciphertext password, which is a case-sensitive string of 33 to 53 characters.

plain: Sets a ciphertext password.

plain-string: Plaintext password, which is a case-sensitive string of 1 to 16 characters.

Usage guidelines

Use this command to enhance BFD session security.

For security purposes, all authentication passwords, including passwords configured in plain text, are saved in cipher text.

Examples

```
# Configure VLAN-interface 11 to perform simple authentication for single-hop BFD control packets,
setting the authentication key ID to 1 and password to 123456.
```

```
<Sysname> system-view
[Sysname] interface vlan-interface 11
[Sysname-Vlan-interface11] bfd authentication-mode simple 1 plain 123456
```

bfd demand enable

Use **bfd demand enable** to enable the Demand BFD session mode.

Use **undo bfd demand enable** to restore the default.

Syntax

bfd demand enable

undo bfd demand enable

Default

The BFD session is in Asynchronous mode.

Views

Interface view

Predefined user roles

network-admin

Usage guidelines

In Demand mode, the device periodically sends BFD control packets. If the peer end is operating in Asynchronous mode (default), the peer end stops sending BFD control packets. If the peer end is operating in Demand mode, both ends stop sending BFD control packets. When the connectivity to another system needs to be verified explicitly, a system sends several BFD control packets that have the Poll (P) bit set at the negotiated transmit interval. If no response is received within the detection interval, the session is considered down. If the connectivity is found to be up, no more BFD control packets are sent until the next command is issued.

In Asynchronous mode, the device periodically sends BFD control packets. The device considers that the session is down if it does not receive any BFD control packets within a specific interval.

Examples

```
# Enable the Demand BFD session mode on VLAN-interface 11.
```

```
<Sysname> system-view
[Sysname] interface vlan-interface 11
[Sysname-Vlan-interface11] bfd demand enable
```

bfd detect-multiplier

Use **bfd detect-multiplier** to configure the single-hop detection time multiplier.

Use **undo bfd detect-multiplier** to restore the default.

Syntax

bfd detect-multiplier *value*

undo bfd detect-multiplier

Default

The single-hop detection time multiplier is 5.

Views

Interface view

Predefined user roles

network-admin

Parameters

value: Specifies a single-hop detection time multiplier in the range of 3 to 50.

Usage guidelines

The detection time multiplier determines the maximum number of concurrent BFD packets (including control packets and echo packets) that can be discarded.

Table 31 Detection interval calculation method

| Mode | Detection interval |
|--|--|
| Echo packet mode | Detection time multiplier of the sender × actual packet sending interval of the sender |
| Control packet mode BFD session in asynchronous mode | Detection time multiplier of the receiver × actual packet sending interval of the receiver |
| Control packet mode BFD session in demand mode | Detection time multiplier of the sender × actual packet sending interval of the sender |

Examples

```
# Configure the single-hop detection time multiplier as 6 on VLAN-interface 11.  
<Sysname> system-view  
[Sysname] interface vlan-interface 11  
[Sysname-Vlan-interfacell] bfd detect-multiplier 6
```

bfd echo enable

Use **bfd echo enable** to enable the echo packet mode.

Use **undo bfd echo enable** to restore the default.

Syntax

bfd echo enable

undo bfd echo enable

Default

The echo packet mode is disabled.

Views

Interface view

Predefined user roles

network-admin

Usage guidelines

If you enable the echo packet mode for a BFD session in which control packets are sent and the session comes up, BFD does the following:

- Periodically sends echo packets to detect link connectivity.
- Decreases the control packet receiving rate at the same time.

Examples

```
# Enable the echo packet mode on VLAN-interface 11.
<Sysname> system-view
[Sysname] interface vlan-interface 11
[Sysname-Vlan-interface11] bfd echo enable
```

bfd echo-source-ip

Use **bfd echo-source-ip** to configure the source IP address of BFD echo packets.

Use **undo bfd echo-source-ip** to remove the configured source IP address of BFD echo packets.

Syntax

bfd echo-source-ip *ip-address*

undo bfd echo-source-ip

Default

No source IP address is configured for BFD echo packets.

Views

System view

Predefined user roles

network-admin

Parameters

ip-address: Specifies the source IP address of BFD echo packets.

Usage guidelines

The source IP address cannot be on the same network segment as any local interface's IP address. Otherwise, a large number of ICMP redirect packets might be sent from the peer, resulting in link congestion.

Examples

```
# Configure the source IP address of BFD echo packets as 8.8.8.8.
<Sysname> system-view
[Sysname] bfd echo-source-ip 8.8.8.8
```

bfd echo-source-ipv6

Use **bfd echo-source-ipv6** to configure the source IPv6 address of BFD echo packets.

Use **undo bfd echo-source-ipv6** to remove the configured source IPv6 address of BFD echo packets.

Syntax

```
bfd echo-source-ipv6 ipv6-address  
undo bfd echo-source-ipv6
```

Default

No source IPv6 address is configured for BFD echo packets.

Views

System view

Predefined user roles

network-admin

Parameters

ipv6-address: Specifies the source IPv6 address for BFD echo packets.

Usage guidelines

The source IPv6 address of echo packets can only be a global unicast address.

The source IPv6 address cannot be on the same network segment as any local interface's IP address. Otherwise, a large number of ICMP redirect packets might be sent from the peer, resulting in link congestion.

Examples

```
# Configure the source IPv6 address of BFD echo packets as 80::2.  
<Sysname> system-view  
[Sysname] bfd echo-source-ipv6 80::2
```

bfd min-echo-receive-interval

Use **bfd min-echo-receive-interval** to configure the minimum interval for receiving BFD echo packets.

Use **undo bfd min-echo-receive-interval** to restore the default.

Syntax

```
bfd min-echo-receive-interval value  
undo bfd min-echo-receive-interval
```

Default

The minimum interval for receiving BFD echo packets is 400 milliseconds.

Views

Interface view

Predefined user roles

network-admin

Parameters

value: Specifies a minimum interval for receiving BFD echo packets, in milliseconds. The value takes 0 or is in the range of 100 to 1000.

Usage guidelines

This command sets the BFD echo packet receiving interval, which is the actual BFD echo packet sending interval.

Examples

Configure the minimum interval for receiving BFD echo packets on VLAN-interface 11 as 500 milliseconds.

```
<Sysname> system-view
[Sysname] interface vlan-interface 11
[Sysname-Vlan-interface11] bfd min-echo-receive-interval 500
```

bfd min-receive-interval

Use **bfd min-receive-interval** to configure the minimum interval for receiving single-hop BFD control packets.

Use **undo bfd min-receive-interval** to restore the default.

Syntax

bfd min-receive-interval *value*

undo bfd min-receive-interval

Default

The minimum interval for receiving single-hop BFD control packets is 400 milliseconds.

Views

Interface view

Predefined user roles

network-admin

Parameters

value: Specifies the minimum interval for receiving single-hop BFD control packets, in the range of 100 to 1000 milliseconds.

Usage guidelines

Configure this command to prevent the control packet sending rate of the peer end from exceeding the control packet receiving rate of the local end.

The actual control packet sending interval of the peer end takes the greater value between the minimum interval for transmitting BFD control packets on the peer end and the minimum interval for receiving BFD control packets on the local end.

Examples

Configure the minimum interval for receiving single-hop BFD control packets on VLAN-interface 11 as 500 milliseconds.

```
<Sysname> system-view
[Sysname] interface vlan-interface 11
[Sysname-Vlan-interface11] bfd min-receive-interval 500
```

bfd min-transmit-interval

Use **bfd min-transmit-interval** to configure the minimum interval for transmitting single-hop BFD control packets.

Use **undo bfd min-transmit-interval** to restore the default.

Syntax

bfd min-transmit-interval *value*

undo bfd min-transmit-interval

Default

The minimum interval for transmitting single-hop BFD control packets is 400 milliseconds.

Views

Interface view

Predefined user roles

network-admin

Parameters

value: Specifies the minimum interval for transmitting single-hop BFD control packets, in the range of 100 to 1000 milliseconds.

Usage guidelines

Use this command to make sure that the BFD packet sending rate does not exceed the device capability. The actual BFD control packet transmitting interval on the local end is the greater value between the minimum interval for transmitting BFD control packets on the local end and the minimum interval for receiving BFD control packets on the peer end.

Examples

```
# Configure the minimum interval for transmitting single-hop BFD control packets on VLAN-interface 11 as 500 milliseconds.
```

```
<Sysname> system-view
[Sysname] interface vlan-interface 11
[Sysname-Vlan-interface11] bfd min-transmit-interval 500
```

bfd multi-hop authentication-mode

Use **bfd multi-hop authentication-mode** to configure the authentication mode for multihop BFD control packets.

Use **undo bfd multi-hop authentication-mode** to restore the default.

Syntax

Release 3106:

bfd multi-hop authentication-mode simple *key-id* { **cipher** *cipher-string* | **plain** *plain-string* }

undo bfd multi-hop authentication-mode

Release 3108P01 and later versions:

bfd multi-hop authentication-mode { **m-md5** | **m-sha1** | **md5** | **sha1** | **simple** } *key-id* { **cipher** *cipher-string* | **plain** *plain-string* }

undo bfd multi-hop authentication-mode

Default

No authentication is performed.

Views

System view

Predefined user roles

network-admin

Parameters

m-md5: Specifies the Meticulous MD5 algorithm.

m-sha1: Specifies the Meticulous SHA1 algorithm.

md5: Specifies the MD5 algorithm.

sha1: Specifies the SHA1 algorithm.

simple: Specifies the simple authentication mode.

key-id: Sets the authentication key ID in the range of 1 to 255.

cipher: Sets a ciphertext password.

cipher-string: Sets the ciphertext password, which is a case-sensitive string of 33 to 53 characters.

plain: Sets a plaintext password.

plain-string: Sets the plaintext password, which is a case-sensitive string of 1 to 16 characters.

Usage guidelines

Use this command to enhance BFD session security.

For security purposes, all authentication passwords, including passwords configured in plain text, are saved in cipher text.

Examples

Configure the simple authentication mode for multihop BFD control packets, setting the authentication key ID to 1 and password to **123456**.

```
<Sysname> system-view
```

```
[Sysname] bfd multi-hop authentication-mode simple 1 plain 123456
```

bfd multi-hop destination-port

Use **bfd multi-hop destination-port** to configure the destination port number for multihop BFD control packets.

Use **undo bfd multi-hop destination-port** to restore the default.

Syntax

bfd multi-hop destination-port *port-number*

undo bfd multi-hop destination-port

Default

The destination port number for multihop BFD control packets is 4784.

Views

System view

Predefined user roles

network-admin

Parameters

port-number: Specifies the destination port number of multihop BFD control packets, 3784 or 4784.

Examples

```
# Configure the destination port number for multihop BFD control packets as 3784.
<Sysname> system-view
[Sysname] bfd multi-hop destination-port 3784
```

bfd multi-hop detect-multiplier

Use **bfd multi-hop detect-multiplier** to configure the multihop detection time multiplier.

Use **undo bfd multi-hop detect-multiplier** to restore the default.

Syntax

bfd multi-hop detect-multiplier *value*

undo bfd multi-hop detect-multiplier

Default

The multihop detection time multiplier is 5.

Views

System view

Predefined user roles

network-admin

Parameters

value: Specifies the multihop detection time multiplier in the range of 3 to 50.

Usage guidelines

The detection time multiplier determines the maximum number of concurrent BFD control packets that can be discarded.

Table 32 Detection interval calculation method

| Mode | Detection interval |
|--|--|
| Control packet mode BFD session in asynchronous mode | Detection time multiplier of the receiver × actual packet sending interval of the receiver |
| Control packet mode BFD session in demand mode | Detection time multiplier of the sender × actual packet sending interval of the sender |

Examples

```
# Configure the multihop detection time multiplier as 6.
<Sysname> system-view
[Sysname] bfd multi-hop detect-multiplier 6
```

bfd multi-hop min-receive-interval

Use **bfd multi-hop min-receive-interval** to configure the minimum interval for receiving multihop BFD control packets.

Use **undo bfd multi-hop min-receive-interval** to restore the default.

Syntax

```
bfd multi-hop min-receive-interval value
undo bfd multi-hop min-receive-interval
```

Default

The minimum interval for receiving multihop BFD control packets is 400 milliseconds.

Views

System view

Predefined user roles

network-admin

Parameters

value: Specifies the minimum interval for receiving multihop BFD control packets, in the range of 100 to 1000 milliseconds.

Usage guidelines

When the packet sending rate of the peer end exceeds the packet receiving capability (minimum control packet receiving interval) of the local end, the peer end dynamically adjusts the BFD control packet sending interval to the minimum control packet receiving interval of the local end.

Examples

```
# Configure the minimum interval for receiving multihop BFD control packets as 500 milliseconds.
<Sysname> system-view
[Sysname] bfd multi-hop min-receive-interval 500
```

bfd multi-hop min-transmit-interval

Use **bfd multi-hop min-transmit-interval** to configure the minimum interval for transmitting multihop BFD control packets.

Use **undo bfd multi-hop min-transmit-interval** to restore the default.

Syntax

```
bfd multi-hop min-transmit-interval value
undo bfd multi-hop min-transmit-interval
```


Default

The minimum interval for transmitting multihop BFD control packets is 400 milliseconds.

Views

System view

Predefined user roles

network-admin

Parameters

value: Specifies the minimum interval for transmitting multihop BFD control packets, in the range of 100 to 1000 milliseconds.

Usage guidelines

Use this command to make sure that the BFD packet sending rate does not exceed the device capability. The actual BFD control packet transmitting interval on the local end is the greater value between the minimum interval for transmitting BFD control packets on the local end and the minimum interval for receiving BFD control packets on the peer end.

Examples

```
# Configure the minimum interval for transmitting multihop BFD control packets as 500 milliseconds.
<Sysname> system-view
[Sysname] bfd multi-hop min-transmit-interval 500
```

bfd session init-mode

Use **bfd session init-mode** to configure the mode for establishing a BFD session.

Use **undo bfd session init-mode** to restore the default.

Syntax

```
bfd session init-mode { active | passive }
```

```
undo bfd session init-mode
```

Default

BFD uses the **active** mode.

Views

System view

Predefined user roles

network-admin

Parameters

active: Uses the active mode. In active mode, BFD actively transmits BFD control packets to the remote device, regardless of whether it receives a BFD control packet from the remote device.

passive: Uses the passive mode. In passive mode, BFD does not actively transmit a BFD control packet to the remote end; it transmits a BFD control packet only after receiving a BFD control packet from the remote end.

Usage guidelines

At least one end must operate in active mode for a BFD session to be established.

Examples

```
# Configure the session establishment mode as passive.
<Sysname> system-view
[Sysname] bfd session init-mode passive
```

bfd template

Use **bfd template** to create a BFD template and enter BFD template view.

Use **undo bfd template** to delete the BFD template.

NOTE:

This command is available in Release 3108P01 and later versions.

Syntax

```
bfd template template-name
undo bfd template template-name
```

Default

No BFD template is created.

Views

System view

Predefined user roles

network-admin

Parameters

template-name: Specifies the template name, a case-sensitive string of 1 to 63 characters.

Examples

```
# Create the BFD template bfd1 and enter BFD template view.
<Sysname> system-view
[Sysname] bfd template bfd1
[Sysname-bfd-template-bfd1]
```

display bfd session

Use **display bfd session** to display BFD session information.

Syntax

```
display bfd session [ discriminator value | verbose ]
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

discriminator value: Specifies a local ID in the range of 1 to 4294967295. If this option is not specified, the command displays brief information about all BFD sessions.

verbose: Displays detailed BFD session information. If this keyword is not specified, the command displays brief BFD session information.

Examples

Display all IPv4 BFD session information.

```
<Sysname> display bfd session
```

```
Total Session Num: 1      Up Session Num: 1      Init Mode: Active
```

```
IPv4 Session Working Under Ctrl Mode:
```

| LD/RD | SourceAddr | DestAddr | State | Holdtime | Interface |
|---------|------------|----------|-------|----------|-----------|
| 513/513 | 1.1.1.1 | 1.1.1.2 | Up | 2297ms | GE1/0/1 |

Display all IPv6 BFD session information.

```
<Sysname> display bfd session
```

```
Total Session Num: 1      Up Session Num: 1      Init Mode: Active
```

```
IPv6 Session Working Under Ctrl Mode:
```

```
Local Discr: 513          Remote Discr: 513
Source IP: FE80::20C:29FF:FED4:7171
Destination IP: FE80::20C:29FF:FE72:AC4D
Session State: Up        Interface: GE1/0/2
```

Display detailed IPv4 BFD session information.

```
<Sysname> display bfd session verbose
```

```
Total Session Num: 1      Up Session Num: 1      Init Mode: Active
```

```
IPv4 Session Working Under Ctrl Mode:
```

```
Local Discr: 513          Remote Discr: 513
Source IP: 1.1.1.1        Destination IP: 1.1.1.2
Session State: Up        Interface: GigabitEthernet 1/0/1
Min Tx Inter: 500ms      Act Tx Inter: 500ms
Min Rx Inter: 500ms      Detect Inter: 2500ms
Rx Count: 42             Tx Count: 43
Connect Type: Direct     Running Up for: 00:00:20
Hold Time: 2078ms        Auth mode: None
Detect Mode: Async       Slot: 1
Protocol: RIP
Diag Info: No Diagnostic
```

Display detailed IPv6 BFD session information.

```
<Sysname> display bfd session verbose
```


| Field | Description |
|-------------|---|
| Detect Mode | Detection mode: <ul style="list-style-type: none"> • Async—Asynchronous mode. • Demand—Demand mode. |
| Slot | IRF member ID. |
| Diag Info | Diagnostic information about the session. |

reset bfd session statistics

Use **reset bfd session statistics** to clear the BFD session statistics.

Syntax

reset bfd session statistics

Views

User view

Predefined user roles

network-admin

Examples

Clear the BFD session statistics.

```
<Sysname> reset bfd session statistics
```

Track commands

display track

Use **display track** to display track entry information.

Syntax

```
display track { track-entry-number | all }
```

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

all: Specifies all track entries.

Examples

Display information about all track entries.

```
<Sysname> display track all
Track ID: 1
  State: Positive
  Duration: 0 days 0 hours 0 minutes 7 seconds
  Notification delay: Positive 20, Negative 30 (in seconds)
  Tracked object:
    NQA entry: admin test
    Reaction: 10
Track ID: 2
  State: NotReady
  Duration: 0 days 0 hours 0 minutes 32 seconds
  Notification delay: Positive 20, Negative 30 (in seconds)
  Tracked object:
    BFD session mode: Echo
    Outgoing interface: Vlan-interface2
    VPN instance name: -
    Remote IP: 192.168.40.1
    Local IP: 192.168.40.2
Track ID: 3
  State: Negative
  Duration: 0 days 0 hours 0 minutes 32 seconds
  Notification delay: Positive 20, Negative 30 (in seconds)
  Tracked object:
    Interface: Vlan-interface3
```

```

Protocol: IPv4
Track ID: 4
State: Negative
Duration: 0 days 0 hours 0 minutes 32 seconds
Notification delay: Positive 20, Negative 30 (in seconds)
Tracked object:
  CFD service instance: 1, MEP ID: 2

```

Table 34 Command output

| Field | Description |
|---|--|
| Track ID | ID of a track entry. |
| State | States of a track entry: <ul style="list-style-type: none"> • Positive—The tracked object operates correctly. • NotReady—The tracked object is invalid. • Negative—The tracked object is abnormal. |
| Duration | Time period during which the track entry stays in the state. |
| Notification delay: Positive 20, Negative 30 (in seconds) | <ul style="list-style-type: none"> • The Track module notifies the application modules that the status of the track entry changes to Positive after a delay time of 20 seconds. • The Track module notifies the application modules that the status of the track entry changes to Negative after a delay time of 30 seconds. |
| Tracked object | Tracked object associated with the track entry. |
| NQA entry | NQA operation associated with the track entry. |
| Reaction | Reaction entry associated with the track entry. |
| BFD session mode | BFD session mode. Only echo mode is supported. |
| Outgoing interface | Output interface of BFD echo packets. |
| VPN instance name | Name of VPN instance to which BFD session packets belong. Only a hyphen (-) can be displayed, which means that BFD session packets belongs to the public network. |
| Remote IP | Remote IP address of the BFD echo packets. |
| Local IP | Local IP address of the BFD echo packets. |
| Interface | Interface to be monitored. |
| Protocol | Link states or Layer 3 protocol states of the monitored interface: <ul style="list-style-type: none"> • None—Link status of the monitored interface. • IPv4—IPv4 protocol status of the monitored Layer 3 interface. • IPv6—IPv6 protocol status of the monitored Layer 3 interface. |

Related commands

- **track bfd**
- **track cfd**
- **track interface**
- **track interface protocol**

- **track nqa**

track bfd

Use **track bfd** to create a track entry and associate it with a BFD session.

Use **undo track** to remove the track entry.

Syntax

track *track-entry-number* **bfd echo interface** *interface-type interface-number* **remote ip** *remote-ip* **local ip** *local-ip* [**delay** { **negative** *negative-time* | **positive** *positive-time* } *]

undo track *track-entry-number*

Default

No track entry exists.

Views

System view

Predefined user roles

network-admin

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

interface *interface-type interface-number*: Specifies the output interface by its type and number of the BFD echo packets.

remote ip *remote-ip*: Specifies the destination IP address of the BFD echo packets.

local ip *local-ip*: Specifies the source IP address of the BFD echo packets.

delay: Specifies the delay before the Track module notifies the application modules of the track entry state change. If you do not specify this keyword, the Track module notifies the application modules immediately when the track entry state changes.

negative *negative-time*: Specifies the delay before the Track module notifies the application modules that the status of the track entry has changed to Negative. The *negative-time* argument represents the delay time in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay before the Track module notifies the application modules that the status of the track entry has changed to Positive. The *positive-time* argument represents the delay time in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you can only use the **track bfd delay** command to modify its notification delay settings. To modify other settings, you must delete the entry and create a new one.

Examples

```
# Create track entry 1, which uses BFD to monitor the link between local IP address 1.1.1.2 and remote IP address 1.1.1.1 by sending BFD echo packets out from the VLAN-interface 2.
```

```
<Sysname> system-view
```

```
[Sysname] track 1 bfd echo interface vlan-interface 2 remote ip 1.1.1.1 local ip 1.1.1.2
```


Related commands

display track

track cfd

Use **track cfd** to create a track entry and associate it with CFD.

Use **undo track** to remove the track entry.

Syntax

track *track-entry-number* **cfd cc service-instance** *instance-id* **mep** *mep-id* [**delay** { **negative** *negative-time* | **positive** *positive-time* } *]

undo track *track-entry-number*

Default

No track entry exists.

Views

System view

Predefined user roles

network-admin

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

service-instance *instance-id*: Specifies a service instance by its ID in the range of 1 to 32767.

mep *mep-id*: Specifies a MEP by its ID in the range of 1 to 8191.

delay: Specifies the delay before the Track module notifies the application modules of the track entry state change. If you do not specify this keyword, the Track module notifies the application modules immediately when the track entry state changes.

negative *negative-time*: Specifies the delay before the Track module notifies the application modules that the status of the track entry has changed to Negative. The *negative-time* argument represents the delay time in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay before the Track module notifies the application modules that the status of the track entry has changed to Positive. The *positive-time* argument represents the delay time in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you can only use the **track cfd delay** command to modify its notification delay settings. To modify other settings, you must delete the entry and create a new one.

Examples

```
# Create track entry 1, and specify the CFD service instance ID as 2 and MEP ID as 3.
<Sysname> system-view
[Sysname] track 1 cfd cc service-instance 2 mep 3
```

Related commands

- **display track**
- **cfd mep**

- **cf** **service-instance**

track interface

Use **track interface** to create a track entry and associate it with the link state of the specified interface.

Use **undo track** to remove the track entry.

Syntax

```
track track-entry-number interface interface-type interface-number [ delay { negative negative-time | positive positive-time } * ]
```

```
undo track track-entry-number
```

Default

No track entry exists.

Views

System view

Predefined user roles

network-admin

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

interface-type interface-number: Specifies an interface by its type and number.

delay: Specifies the delay before the Track module notifies the application modules of the track entry state change. If you do specify this keyword, the Track module notifies the application modules immediately when the track entry state changes.

negative *negative-time*: Specifies the delay before the Track module notifies the application modules that the state of the track entry has changed to Negative. The *negative-time* argument represents the delay time in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay before the Track module notifies the application modules that the state of the track entry has changed to Positive. The *positive-time* argument represents the delay time in the range of 1 to 300 seconds.

Usage guidelines

When you create a track entry that is associated with the link state of a specific interface, the state of the track entry is Positive if the link state of the interface is up. The state of the track entry is Negative if the link state of the interface is down. To display the link state of an interface, use the **display ip interface brief** command.

After you create a track entry, you can only use the **track interface delay** command to modify its notification delay settings. To modify other settings, you must delete the entry and create a new one.

Examples

```
# Create track entry 1, and associate it with the link state of VLAN-interface 10.
```

```
<Sysname> system-view
```

```
[Sysname] track 1 interface vlan-interface 10
```

Related commands

- **display track**

- **display ip interface brief** (*Layer 3—IP Services Command Reference*)

track interface protocol

Use **track interface protocol** to create a track entry and associate it with the protocol state of the specified interface.

Use **undo track** to remove the track entry.

Syntax

```
track track-entry-number interface interface-type interface-number protocol { ipv4 | ipv6 } [ delay  
{ negative negative-time | positive positive-time } * ]
```

```
undo track track-entry-number
```

Default

No track entry exists.

Views

System view

Predefined user roles

network-admin

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

interface-type interface-number: Specifies an interface by its type and number.

ipv4: Monitors the IPv4 protocol state. When the IPv4 protocol state of an interface is up, the state of the track object is Positive. When the IPv4 protocol state of an interface is down, the state of the track object is Negative. To display the IPv4 protocol state of an interface, use the **display ip interface brief** command.

ipv6: Monitors the IPv6 protocol state. When the IPv6 protocol state of an interface is up, the state of the track object is Positive. When the IPv6 protocol state of an interface is down, the state of the track object is Negative. To display the IPv6 protocol state of an interface, use the **display ipv6 interface brief** command.

delay: Specifies the delay before the Track module notifies the application modules of the track entry state change. If you do specify this keyword, the Track module notifies the application modules immediately when the track entry state changes.

negative *negative-time*: Specifies the delay before the Track module notifies the application modules that the state of the track entry has changed to Negative. The *negative-time* argument represents the delay time in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay before the Track module notifies the application modules that the state of the track entry has changed to Positive. The *positive-time* argument represents the delay time in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you can only use the **track interface protocol delay** command to modify its notification delay settings. To modify other settings, you must delete the entry and create a new one.

Examples

```
# Create track entry 1, and associate it with the IPv4 protocol state of VLAN-interface 2.
<Sysname> system-view
[Sysname] track 1 interface vlan-interface 2 protocol ipv4
```

Related commands

- **display track**
- **display ip interface brief** (*Layer 3—IP Services Command Reference*)
- **display ipv6 interface brief** (*Layer 3—IP Services Command Reference*)

track nqa

Use **track nqa** to create a track entry and associate it with the specified reaction entry of the NQA operation.

Use **undo track** to remove the track entry.

Syntax

```
track track-entry-number nqa entry admin-name operation-tag reaction item-number [ delay { negative negative-time | positive positive-time } * ]
```

```
undo track track-entry-number
```

Default

No track entry exists.

Views

System view

Predefined user roles

network-admin

Parameters

track-entry-number: Specifies the track entry ID in the range of 1 to 1024.

entry *admin-name operation-tag*: Specifies the NQA operation to be associated with the track entry. The *admin-name* argument is the name of the NQA operation administrator who creates the NQA operation, and is a case-insensitive string of 1 to 32 characters. The *operation-tag* argument is the NQA operation tag, a case-insensitive string of 1 to 32 characters.

reaction *item-number*: Specifies the reaction entry to be associated with the track entry. The *item-number* argument is the reaction entry ID in the range of 1 to 10.

delay: Specifies the delay before the Track module notifies the application modules of the track entry state change. If you do specify this keyword, the Track module notifies the application modules immediately when the track entry state changes.

negative *negative-time*: Specifies the delay before the Track module notifies the application modules that the state of the track entry has changed to Negative. The *negative-time* argument represents the delay time in the range of 1 to 300 seconds.

positive *positive-time*: Specifies the delay before the Track module notifies the application modules that the state of the track entry has changed to Positive. The *positive-time* argument represents the delay time in the range of 1 to 300 seconds.

Usage guidelines

After a track entry is created, you can only use the **track nqa delay** command to modify its notification delay settings. To modify other settings, you must delete the entry and create a new one.

Examples

Create track entry 1, and associate it with reaction entry 3 of the NQA operation **admin-test**.

```
<Sysname> system-view
```

```
[Sysname] track 1 nqa entry admin test reaction 3
```

Related commands

display track

Support and other resources

Contacting HP

For worldwide technical support information, see the HP support website:

<http://www.hp.com/support>

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

<http://www.hp.com/go/wwalerts>

After registering, you will receive email notification of product enhancements, new driver versions, firmware updates, and other product resources.

Related information

Documents

To find related documents, browse to the Manuals page of the HP Business Support Center website:

<http://www.hp.com/support/manuals>

- For related documentation, navigate to the Networking section, and select a networking category.
- For a complete list of acronyms and their definitions, see *HP FlexNetwork Technology Acronyms*.

Websites

- HP.com <http://www.hp.com>
- HP Networking <http://www.hp.com/go/networking>
- HP manuals <http://www.hp.com/support/manuals>
- HP download drivers and software <http://www.hp.com/support/downloads>
- HP software depot <http://www.software.hp.com>
- HP Education <http://www.hp.com/learn>

Conventions

This section describes the conventions used in this documentation set.





Command conventions

| Convention | Description |
|-------------------|--|
| Boldface | Bold text represents commands and keywords that you enter literally as shown. |
| <i>Italic</i> | <i>Italic</i> text represents arguments that you replace with actual values. |
| [] | Square brackets enclose syntax choices (keywords or arguments) that are optional. |
| { x y ... } | Braces enclose a set of required syntax choices separated by vertical bars, from which you select one. |
| [x y ...] | Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none. |
| { x y ... } * | Asterisk-marked braces enclose a set of required syntax choices separated by vertical bars, from which you select at least one. |
| [x y ...] * | Asterisk-marked square brackets enclose optional syntax choices separated by vertical bars, from which you select one choice, multiple choices, or none. |
| &<1-n> | The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times. |
| # | A line that starts with a pound (#) sign is comments. |











GUI conventions

| Convention | Description |
|-----------------|--|
| Boldface | Window names, button names, field names, and menu items are in bold text. For example, the New User window appears; click OK . |
| > | Multi-level menus are separated by angle brackets. For example, File > Create > Folder . |

Symbols

| Convention | Description |
|--|--|
|  WARNING | An alert that calls attention to important information that if not understood or followed can result in personal injury. |
|  CAUTION | An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software. |
|  IMPORTANT | An alert that calls attention to essential information. |
| NOTE | An alert that contains additional or supplementary information. |
|  TIP | An alert that provides helpful information. |

Network topology icons

| | |
|---|--|
|  | Represents a generic network device, such as a router, switch, or firewall. |
|  | Represents a routing-capable device, such as a router or Layer 3 switch. |
|  | Represents a generic switch, such as a Layer 2 or Layer 3 switch, or a router that supports Layer 2 forwarding and other Layer 2 features. |
|  | Represents an access controller, a unified wired-WLAN module, or the switching engine on a unified wired-WLAN switch. |
|  | Represents an access point. |
|  | Represents a mesh access point. |
|  | Represents omnidirectional signals. |
|  | Represents directional signals. |
|  | Represents a security product, such as a firewall, UTM, multiservice security gateway, or load-balancing device. |
|  | Represents a security card, such as a firewall, load-balancing, NetStream, SSL VPN, IPS, or ACG card. |

Port numbering in examples

The port numbers in this document are for illustration only and might be unavailable on your device.

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