Hewlett Packard Enterprise

HPE FlexFabric 5700 Switch Series

OpenFlow Command Reference

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Acknowledgments

Contents

OpenFlow commands

In this chapter, an OpenFlow switch is the same as an OpenFlow instance, unless otherwise specified.

active instance

Use **active instance** to activate or reactivate an OpenFlow instance.

Use **undo active instance** to deactivate an OpenFlow instance.

Syntax

active instance

undo active instance

Default

An OpenFlow instance is not activated.

Views

OpenFlow instance view

Predefined user roles

network-admin

Usage guidelines

An OpenFlow instance takes effect only after it is activated.

Reactivating an OpenFlow instance refreshes the configuration data and interrupts communication with the controllers.

You can reactivate an OpenFlow instance by using the **active instance** command after you deactivate the OpenFlow instance by using the **undo active instance** command.

Examples

Activate OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] active instance
```

classification global

Use **classification global** to enable the global mode for an OpenFlow instance.

Use **undo classification** to remove the configuration.

Syntax

classification global

undo classification

Default

An OpenFlow instance is in the VLAN mode.

Views

OpenFlow instance view

Predefined user roles

network-admin

Usage guidelines

If you execute the **classification global** and **classification vlan** commands multiple times, the most recent configuration takes effect.

By default, an OpenFlow instance is in the VLAN mode. When an OpenFlow instance is associated with VLANs, the flow entries take effect only on packets within those VLANs.

When the global mode is enabled for an OpenFlow instance, the flow entries take effect on packets within the network. All interfaces on the device belong to the OpenFlow instance, including VLAN interfaces and Layer 2 or Layer 3 Ethernet interfaces.

Examples

Enable the global mode for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] classification global
```

Related commands

classification vlan

classification vlan

Use **classification vlan** to associate VLANs with an OpenFlow instance.

Use **undo classification** to cancel the association.

Syntax

classification vlan *vlan-id* [**mask** *vlan-mask*] [**loosen**]

undo classification

Default

An OpenFlow instance is not associated with any VLAN.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

vlan-id: Specifies the VLAN ID in the range of 1 to 4094.

vlan-mask: Specifies a VLAN mask in the range of 0 to 4095. The default value is 4095.

loosen: Specifies the loosen mode for the OpenFlow instance-VLAN association.

Usage guidelines

The system calculates the VLANs to be associated according to the specified VLAN ID and mask. To view the associated VLANs, use the **display openflow instance** command.

If you execute this command multiple times, the most recent configuration takes effect.

When the **loosen** keyword is specified, a port belongs to an OpenFlow instance only when the VLANs associated with the OpenFlow instance overlap with the VLANs permitted on the port.

When the **loosen** keyword is not specified, a port belongs to an OpenFlow instance only when the VLANs associated with the OpenFlow instance are a subset of the VLANs permitted on the port.

Examples

Associate an OpenFlow instance with a list of VLANs determined by VLAN ID 255 and VLAN mask 7.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] classification vlan 255 mask 7
```

Related commands

display openflow instance

controller address

Use **controller address** to specify a controller for an OpenFlow switch and configure the main connection to the controller.

Use **undo controller address** to remove the configuration.

Syntax

controller *controller-id* **address** { **ip** *ip-address* | **ipv6** *ipv6-address* } [**port** *port-number*] [**local address** { **ip** *ip-address* | **ipv6** *ipv6-address* } [**port** *port-number*]] [**ssl** *ssl-policy-name*] [**vrf** *vrf-name*]

undo controller *controller-id* **address**

Default

An OpenFlow instance does not have a main connection to a controller.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

controller-id: Specifies a controller by its ID in the range of 0 to 63.

ip *ip-address*: Specifies the IPv4 address of the controller or the device.

ipv6 *ipv6-address*: Specifies the IPv6 address of the controller or the device.

local address: Specifies the IPv4 or IPv6 address that the device uses to establish connections with the controller.

port *port-number*: Sets the port number that the device or the controller uses to establish TCP connections between them. The value range for the port number is 1 to 65535. The default value is 6633.

ssl *ssl-policy-name*: Specifies the SSL client policy that the controller uses to authenticate the OpenFlow switch. The policy name is a case-insensitive string of 1 to 31 characters.

vrf *vrf-name*: Specifies the VPN to which the controller belongs. The VRF name is the VRF instance name of MPLS L3VPN and is a case-insensitive string of 1 to 31 characters.

Usage guidelines

You can specify multiple controllers for an OpenFlow switch. The OpenFlow channel between the OpenFlow switch and each controller can have only one main connection.

The OpenFlow switch exchanges control messages with a controller through the main connection to perform the following tasks:

- Receive flow table entries or data from the controller.
- Report information to the controller.

Examples

Specify controller 10 for OpenFlow instance 1. The controller's IP address is 1.1.1.1 and the port number is 6666.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] controller 10 address ip 1.1.1.1 port 6666
```

controller connect interval

Use **controller connect interval** to set a reconnection interval for an OpenFlow instance.

Use **undo controller connect interval** to restore the default.

Syntax

controller connect interval *interval-value*

undo controller connect interval

Default

The reconnection interval is 60 seconds for an OpenFlow instance.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

interval-value: Sets a reconnection interval in seconds, in the range of 10 to 120.

Usage guidelines

The OpenFlow instance waits a reconnection interval before it attempts to reconnect to a controller.

Examples

Set the reconnection interval to 10 seconds for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] controller connect interval 10
```

controller echo-request interval

Use **controller echo-request interval** to set the connection detection interval for an OpenFlow switch. The connection detection interval specifies the interval at which the OpenFlow switch sends an Echo Request message to a controller.

Use **undo controller echo-request interval** to restore the default.

Syntax

controller echo-request interval *interval-value*

undo controller echo-request interval

Default

The connection detection interval is 5 seconds for an OpenFlow switch.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

interval-value: Specifies the connection detection interval in seconds. The value range is 1 to 10.

Usage guidelines

As a best practice to reduce the CPU load, set the connection detection interval to a large value.

Examples

Set the connection detection interval to 10 seconds for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] controller echo-request interval 10
```

controller mode

Use **controller mode** to set the controller mode for an OpenFlow instance.

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

Syntax

controller mode { **multiple** | **single** }

undo controller mode

Default

The controller mode is **multiple**.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

multiple: Configures the controller mode as **multiple**.

single: Configures the controller mode as **single**.

Usage guidelines

An OpenFlow instance can connect to one or more controllers, depending on the controller mode the OpenFlow instance uses:

- **Single**—The OpenFlow instance connects to only one controller at a time. When communication with the current controller fails, the OpenFlow instance uses another controller.
- **Multiple**—The OpenFlow instance can simultaneously connect to multiple controllers. When communication with any controller fails, the OpenFlow instance attempts to reconnect to the controller after a reconnection interval.

Examples

Configure the controller mode as **single** for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] controller mode single
```

datapath-id

Use **datapath-id** to configure the datapath ID for an OpenFlow instance.

Use **undo datapath-id** to restore the default.

Syntax

datapath-id *datapath-id*

undo datapath-id

Default

The datapath ID of an OpenFlow instance contains the instance ID and the bridge MAC address. The upper 16 bits are the instance ID and the lower 48 bits are the bridge MAC address.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

datapath-id: Specifies the datapath ID for an OpenFlow instance. The argument is a hexadecimal number and the value range is 1 to 0xFFFFFFFFFFFFFFFF.

Examples

Set the datapath ID to 0x123456 for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] datapath-id 123456
```

default table-miss permit

Use **default table-miss permit** to change the default action of the table-miss flow entry to forward packets to the normal pipeline.

Use **undo default table-miss permit** to restore the default.

Syntax

default table-miss permit

undo default table-miss permit

Default

The default action of the table-miss flow entry is to drop packets after the OpenFlow instance is activated and before the controller deploys flow entries.

Views

OpenFlow instance view

Predefined user roles

network-admin

Examples

Change the default action of the table-miss flow entry to forward packets to the normal pipeline.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] default table-miss permit
```

description

Use **description** to configure a description for an OpenFlow instance.

Use **undo description** to restore the default.

Syntax

description *text*

undo description

Default

An OpenFlow instance does not have a description.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

text: Specifies a description for the OpenFlow instance, a case-insensitive string of 1 to 255 characters.

Examples

Configure a description for OpenFlow instance 1 as **test-desc**.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] description test-desc
```

display openflow controller

Use **display openflow controller** to display controller information for an OpenFlow instance.

Syntax

display openflow instance *instance-id* **controller** [*controller-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

controller-id: Specifies a controller by its ID in the range of 0 to 63. If no controller ID is specified, this command displays information about all controllers for an OpenFlow instance.

Usage guidelines

The controller information includes connection information and packet statistics.

Examples

Display controller information for OpenFlow instance 10.

```
<Sysname> display openflow instance 10 controller
Instance 10 controller information:
 Reconnect interval: 60 (s)
 Echo interval     : 5  (s)

 Controller ID           : 1
 Controller IP address   : 192.168.49.49
 Controller port         : 6633
 Controller role         : --
 Connect type            : TCP
 Connect state           : Idle
 Packets sent            : 0
 Packets received        : 0
 SSL policy              : --
 VRF name                : --
```

Table 1 Command output

Field	Description
Reconnect interval	Reconnection interval (in seconds) for an OpenFlow instance to reconnect to all controllers.
Echo interval	Interval (in seconds) at which an OpenFlow instance sends an Echo Request message to all controller.
Controller IP address	IP address of the controller.
Controller port	TCP port number of the controller.
Controller role	Role of the controller: • **Equal**—The controller has the same mode as other controllers that are specified for the OpenFlow instance. • **Master**—The controller is the master controller for the OpenFlow instance. • **Slave**—The controller is a subordinate controller for the OpenFlow instance. If the controller is not configured with any role, this field displays two hyphens (**--**).
Connect type	Type of the connection between the OpenFlow instance and the controller: **TCP** or **SSL**.
Connect state	State of the connection between the OpenFlow instance and the controller: **Idle** or **Established**.
Packets sent	Number of packets that have been sent to the controller.
Packets received	Number of packets that have been received from the controller.
SSL policy	Name of the SSL client policy used for SSL connections. If no SSL client policy controller is configured, this field displays two hyphens

Field	Description
	(**--**).
VRF name	Name of the MPLS L3VPN to which the controller belongs.

display openflow flow-table

Use **display openflow flow-table** to display flow table information for an OpenFlow instance.

Syntax

display openflow instance *instance-id* **flow-table** [*table-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

table-id: Specifies a flow table by its ID in the range of 0 to 254.

Usage guidelines

If you do not specify the flow table ID, this command displays information about all flow tables for the specified OpenFlow instance.

Examples

Display information about all flow tables for OpenFlow instance 10.

```
<Sysname> display openflow instance 10 flow-table
Instance 10 flow table information:

Table 0 information:
 Table type: MAC-IP, flow entry count: 1, total flow entry count: 2

MissRule (default) flow entry information:
 cookie: 0x0, priority: 0, hard time: 0, idle time: 0, flags: reset_counts
 |no_pkt_counts|no_byte_counts, byte count: --, packet count: --
Match information: any
Instruction information:
 Write actions:
  Drop

Flow entry 1 information:
 cookie: 0x0, priority: 1, hard time: 0, idle time: 0, flags: none,
 byte count: --, packet count: --
Match information:
 Ethernet destination MAC address: 0000-0000-0001
 Ethernet destination MAC address mask: ffff-ffff-ffff
 VLAN ID: 100, mask: 0xfff
Instruction information:
```

```
 Write actions:
  Output interface: XGE1/0/4
 Write metadata/mask: 0x0000000000000001/0xffffffffffffffff
 Goto table: 1

Table 1 information:
 Table type: Extensibility, flow entry count: 2, total flow entry count: 2

MissRule Flow entry information:
 cookie: 0x0, priority: 0, hard time: 0, idle time: 0, flags: none,
 byte count: --, packet count: 60
Match information: any
Instruction information:
 Write actions:
  Drop

Flow entry 1 information:
 cookie: 0x0, priority: 0, hard time: 0, idle time: 0, flags: flow_send_rem
 |check_overlap, byte count: --, packet count: 1
Match information:
 Input interface: XGE1/0/3
 Ethernet source MAC address: 0000-0000-0001
 Ethernet source MAC address mask: ffff-ffff-ffff
Instruction information:
 Set meter: 100
 Apply actions:
  Output interface: XGE1/0/4
 Write actions:
  Output interface: Controller, send length: 128 bytes
```

Table 2 Command output

Field	Description
Table type	Type of the flow table: **MAC-IP** or **Extensibility**.
flow entry count	Number of flow entries deployed by controllers.
total flow entry count	Total number of flow entries in the table.
cookie	Cookie ID of the flow entry.
priority	Priority of the flow entry. The larger the value, the higher the priority.
hard time	Hard timeout of the flow entry, in seconds. The flow entry is aged out immediately after the hard timeout expires. If the flow entry has no hard timeout, the field displays **0**.
idle time	Idle timeout of the flow entry, in seconds. The flow entry is aged out if no packet matches the entry within the idle timeout. If the flow entry has no idle timeout, the field displays **0**.
flags	Flags that the flow entry includes: • **flow_send_rem**—Sends a flow removed message when the flow entry is removed or expires. • **check_overlap**—Checks for overlapping flow entries.

Field	Description
	• **reset_counts**—Resets flow table counters. • **no_pkt_counts**—Does not count packets. • **no_byte_counts**—Does not count bytes. If the flow entry does not include any flags, this field displays **none**.
byte count	Number of bytes that have matched the flow entry.
packet count	Number of packets that have matched the flow entry.
Match information	Contents in the Match field of the flow entry (see Table 3).
Instruction information	Contents in the Instruction field of the flow entry: • **Set meter**—Sends the matched packet to a specified meter. • **Write metadata/mask**—Writes the masked metadata value into the metadata fields of the matched packet. Metadata is used for passing messages between flow tables. • **Goto table**—Sends the matched packet to the next flow table for processing. • **Clear actions**—Immediately clears all actions in the action set of the matched packet. • **Apply actions**—Immediately applies specified actions in the action set of the matched packet. • **Write actions**—Writes specified actions into the action set of the matched packet. For more information about actions, see Table 4.

Table 3 Match information

Match field	Match field mask	Description
Input interface	N/A	Ingress port (see Table 5).
Physical input interface	N/A	Ingress physical port.
Metadata	Mask	Metadata and mask that are transmitted between flow tables.
Ethernet destination MAC address	Mask	Ethernet destination MAC address and mask.
Ethernet source MAC address	Mask	Ethernet source MAC address and mask.
Ethernet type	N/A	Ethernet type of the OpenFlow packet payload.
VLAN ID	Mask	VLAN ID and mask.
VLAN PCP	N/A	VLAN priority.
IP DSCP	N/A	Differentiated Services Code Point (DSCP) value.
IP ECN	N/A	Explicit Congestion Notification (ECN) value in the IP header.
IP protocol	N/A	IPv4 or IPv6 protocol number.
IPv4 source address	Mask	IPv4 source address and mask.
IPv4 destination address	Mask	IPv4 destination address and mask.
TCP source port	N/A	TCP source port.
TCP destination port	N/A	TCP destination port.

Match field	Match field mask	Description
UDP source port	N/A	UDP source port.
UDP destination port	N/A	UDP destination port.
ICMPv4 type	N/A	ICMPv4 type.
ICMPv4 code	N/A	ICMPv4 code.
ARP source IPv4 address	Mask	Sender IPv4 address and mask in the ARP payload.
ARP source MAC address	Mask	Sender MAC address and mask in the ARP payload.
IPv6 source address	Mask	Source IPv6 address and mask.
IPv6 destination address	Mask	Destination IPv6 address and mask.
IPv6 flow label	Mask	IPv6 flow label and mask.
ICMPv6 type	N/A	ICMPv6 type.
ICMPv6 code	N/A	ICMPv6 code.
Output interface	N/A	Output port.

Table 4 Actions

Field	Description
Drop	Drops the matched packet.
Output interface	Sends the packet through a specified port. For more information about ports, see Table 5.
Group	Specifies a group to process the packet.
Set queue	Maps the flow entry to a queue specified by ID.
Set field	Modifies a field of the packet.

Table 5 Ports

Port name	Ingress port	Output port	Description
Normal	Not supported.	Supported.	Normal forwarding workflow of the switch.
Flood	Not supported.	Supported.	Flooding workflow.
All	Not supported.	Supported.	All ports.
Controller	Supported.	Supported.	Channel connected to the controller.
Local	Supported.	Supported.	Local CPU.
XGE1/0/3 (port name)	Supported.	Supported.	Name of a physical or logical port, such as a link aggregation port.

display openflow group

Use **display openflow group** to display the group table information for an OpenFlow instance.

Syntax

display openflow instance *instance-id* **group** [*group-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

group-id: Specifies a group by its ID in the range of 0 to 4294967040. If this argument is not specified, this command displays information about all group entries of the OpenFlow instance.

Usage guidelines

The group entries are referenced by flow entries to make the OpenFlow device support more packet forwarding functions, for example, multicast and broadcast. Each group table contains multiple action buckets. The actions in the buckets of a group entry are performed for packets matching the group entry.

You cannot configure group entries on the OpenFlow devices. Instead, you can configure group entries on the controller and issue the group entries to the OpenFlow device.

Examples

Display the group table information for OpenFlow instance 10.

```
<Sysname> display openflow instance 10 group
Instance 10 group table information:
 Group count: 1

Group entry 1:
 Type: All, byte count: 55116, packet count: 401
 Bucket 1 information:
Action count 1, watch port: any, watch group: any
Byte count 55116, packet count 401
  Output interface: XGE1/0/11
 Bucket 2 information:
Action count 1, watch port: any, watch group: any
Byte count --, packet count --
  Output interface: XGE1/0/12
 Referenced information:
  Count: 3
  Flow table 0
  Flow entry: 1, 2, 3
```

Table 6 Output description

Field	Description
Group count	Number of group entries contained in the OpenFlow instance.
Type	Group table type: **All**—Execute all buckets in the group. This group is used for multicast or broadcast forwarding.
Action count	Number of actions in the action bucket.
Byte count	Number of bytes processed by the action bucket. Two hyphens (**--**) are

Field	Description
	displayed when the field is not supported.
packet count	Number of packets processed by the action bucket. Two hyphens (**--**) are displayed when the field is not supported.
watch port	Ports that affect the action bucket status.
watch group	Group table IDs of the ports that affect the action bucket status.
Output interface	Output interface in the group table.
Referenced information	Information about the group entry referenced by flow entries.
Count	Total number of flow entries that reference the group entry.
Flow table	Flow table to which the flow entries that reference the group entry belong.
Flow entry	Flow entries that reference the group entry.

display openflow instance

Use **display openflow instance** to display detailed information about an OpenFlow instance.

Syntax

display openflow instance [*instance-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

Examples

Display detailed information about OpenFlow instances.

```
<Sysname> display openflow instance
Instance 10 information:

Configuration information:
 Description   : test-desc
 Active status : Active
 Inactive configuration:
 Active configuration:
  Classification :VLAN, loosen mode, total VLANs(1)
   2
  In-band management VLAN, total VLANs(0)
   Empty VLAN
  Connect mode: Multiple
  MAC address learning: Enabled
  Flow table:
   Table ID(type): 0(MAC-IP), count: 0
```

```
  Flow-entry max-limit: 65535
  Datapath ID: 0x0000001234567891
  Default table-miss: Drop
  Forbidden port: None
Port information:
 Ten-GigabitEthernet1/0/3
Active channel information:
 Controller 1 IP address: 192.168.49.49  port: 6633
 Controller 2 IP address: 192.168.43.49  port: 6633
```

Table 7 Command output

Field	Description
Description	Description of the OpenFlow instance.
Active status	Activation status of the OpenFlow instance.
Inactive configuration	Inactive OpenFlow instance configuration.
Active configuration	Active OpenFlow instance configuration.
Classification: VLAN, loosen mode, total VLANs	OpenFlow instance scope, VLANs associated with the OpenFlow instance, the total number of these VLANs.
In-band management VLAN, total VLANs	Inband management VLANs and the total number of inband management VLANs. **empty VLAN** is displayed when no inband management VLAN is configured.
Connect mode	Controller mode of the OpenFlow instance: • **Multiple**. • **Single**.
MAC address learning	MAC address learning status in the VLANs associated with the OpenFlow instance: • **Enabled**—MAC address learning is enabled in the VLANs associated with the OpenFlow instance. • **Disabled**—MAC address learning is disabled in the VLANs associated with the OpenFlow instance.
Flow-entry max-limit	Maximum number of flow entries allowed in the extensibility flow table.
Datapath ID	Datapath ID of the OpenFlow instance.
Default table-miss	Default action of the table-miss flow entry: • **Permit**—Forward packets to the normal pipeline. • **Drop**—Drop packets.
Forbidden port	Port types forbidden to be reported to controllers: • **VLAN interface**. • **Virtual Switch Interface**.
Port information	Ports added to the OpenFlow instance.
Flow table	Flow table information of the OpenFlow instance.
Table ID(type)	Flow table ID (flow table type). The flow table type can be **MAC-IP** or **Extensibility**.
count	Total number of flow entries in the flow table.
Active channel information	Information about active control channels.
Controller id IP address: port:	Brief information of controllers which have established connections to the

Field	Description
	OpenFlow instance. This field is displayed only when the OpenFlow instance has established connections to controllers.
Failopen mode	Connection interruption mode when the OpenFlow instance is disconnected from all controllers (this field is displayed only when the OpenFlow instance is disconnected from all controllers): • **secure**—The OpenFlow switch uses flow tables for traffic forwarding after it is disconnected from all controllers. • **standalone**—The OpenFlow switch uses the normal forwarding process after it is disconnected from all controllers.

display openflow meter

Use **display openflow meter** to display meter entry information for an OpenFlow instance.

Syntax

display openflow instance *instance-id* **meter** [*meter-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

meter-id: Specifies a meter by its ID in the range of 0 to 4294901760. If no meter ID is specified, this command displays information about all meter entries for an OpenFlow instance.

Examples

Display meter entry information for OpenFlow instance 10.

```
<Sysname> display openflow instance 10 meter
Meter flags: KBPS  -- Rate value in kb/s, PKTPS -- Rate value in packet/sec
             BURST -- Do burst size,      STATS -- Collect statistics

Instance 10 meter table information:
 meter entry count: 2

Meter entry 100 information:
 Meter flags: KBPS
 Band 1 information
 Type: drop, rate: 1024, burst size: 65536
 Byte count: --, packet count: 0
 Referencedinformation:
  Count: 3
  Flow table: 0
  Flow entry: 1, 2, 3

Meter entry 200 information:
 Meter flags: KBPS
```

```
Band 1 information
Type: drop, rate: 10240, burst size: 655360
Byte count: --, packet count: --
Referenced information:
 Count: 0
```

Table 8 Command output

Field	Description
Group entry count	Total number of meter entries included in the OpenFlow instance.
Meter flags	Flags configured for the meter: • **KBPS**—The rate value is in kbps. • **PKTPS**—The rate value is in pps. • **BURST**—The burst size field in the band is used and the length of the packet or byte burst is determined by the burst size. • **STATS**—Meter statistics are collected.
Band	Bands included in the meter.
Type	Type of the band: • **drop**—Discard the packet. • **dscp remark**—Modify the drop precedence of the DSCP field in the IP header of the packet.
Rate	Rate value above which the corresponding band may apply to packets.
Burst size	Length of the packet or byte burst to consider for applying the meter.
Byte count	Number of bytes processed by a band. If this field is not supported, the field displays two hyphens (**--**).
packet count	Number of packets processed by a band. If this field is not supported, the field displays two hyphens (**--**).
Referenced information	Information about the meter entry referenced by flow entries.
Count	Total number of flow entries that reference the meter entry.
Flow table	Flow table to which the flow entries that reference the meter entry belong.
Flow entry	Flow entries that reference the meter entry.

display openflow summary

Use **display openflow summary** to display summary OpenFlow instance information, including OpenFlow instance ID, activation status, and datapath ID.

Syntax

display openflow instance summary

Views

Any view

Predefined user roles

network-admin

network-operator

Examples

Display summary information about OpenFlow instances.

```
<Sysname> display openflow summary
Fail Open mode: Se -- secure mode, Sa -- standalone mode

ID    Status    Datapath-ID         Channel    Table-num  Port-num  Reactivate
1     active    0x0000000100001221  Connected       2         8       Y
10    deactive          -              -            -         -       -
4094  active    0x00000ffe00001221  Failed(Sa)        2         0       N
```

Table 9 Command output

Field	Description
ID	OpenFlow instance ID.
Status	Activation status of the OpenFlow instance: • **active**—The OpenFlow instance is active. • **deactive**—The OpenFlow instance is inactive.
Datapath-ID	Datapath ID of the OpenFlow instance. A hyphen (**-**) is displayed when the OpenFlow instance is inactive.
Channel	Status of the secure channel between the OpenFlow instance and the controller: • **connected**—The secure channel between the OpenFlow instance and the controller has been established. • **Failed(Se)**—The secure channel between the OpenFlow instance and the controller has been disconnected, and the connection interruption mode is secure mode. • **Failed(Sa)**—The channel between the OpenFlow instance and the controller has been disconnected, and the connection interruption mode is standalone mode. A hyphen (**-**) is displayed when the OpenFlow instance is inactive.
Table-num	Number of flow tables in the OpenFlow instance. A hyphen (**-**) is displayed when the OpenFlow instance is inactive.
Port-num	Number of ports belonging to the OpenFlow instance. A hyphen (**-**) is displayed when the OpenFlow instance is inactive.
Reactivate	Indicates whether the OpenFlow instance needs to be reactivated: • **Y**—The OpenFlow instance needs to be reactivated. • **N**—The OpenFlow instance does not need to be reactivated. A hyphen (**-**) is displayed when the OpenFlow instance is inactive.

fail-open mode

Use **fail-open mode** to set the connection interruption mode for an OpenFlow switch.

Use **undo fail-open mode** to restore the default.

Syntax

fail-open mode { **secure** | **standalone** }

undo fail-open mode

Default

The connection interruption mode is **secure**, and the controller deploys the table-miss flow entry (the action is **Drop**) to the OpenFlow instance.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

secure: Configures the OpenFlow switch to use flow tables for traffic forwarding after it is disconnected from all controllers.

standalone: Configures the OpenFlow switch to use the normal forwarding process after it is disconnected from all controllers.

Examples

Configure the connection interruption mode to **standalone** for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] fail-open mode standalone
```

flow-entry max-limit

Use **flow-entry max-limit** to configure the maximum number of entries that every extensibility flow table can include.

Use **undo flow-entry max-limit** to restore the default.

Syntax

flow-entry max-limit *limit-value*

undo flow-entry max-limit

Default

An extensibility flow table can include up to 65535 flow entries.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

limit-value: Specifies the maximum number of flow entries, in the range of 1 to 65535.

Examples

Configure OpenFlow instance 1 to include up to 256 entries in each extensibility flow table.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] flow-entry max-limit 256
```

flow-table

Use **flow-table** to configure a flow table for an OpenFlow instance.

Use **undo flow-table** to restore the default.

Syntax

flow-table { [**ingress-vlan** *ingress-table-id*] [**extensibility** *extensibility-table-id* | **mac-ip** *mac-ip-table-id*] * [**egress-vlan** *egress-table-id*] }

undo flow-table

Default

An OpenFlow instance has an extensibility flow table whose ID is 0.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

ingress-vlan *ingress-table-id*: Specifies a VLAN tagging flow table by its ID in the range of 0 to 254. If you specify this option, the device tags all incoming packets matching the table.

extensibility *extensibility-table-id*: Specifies an extensibility flow table by its ID in the range of 0 to 254.

mac-ip *mac-ip-table-id*: Specifies a MAC-IP flow table by its ID in the range of 0 to 254.

egress-vlan *egress-table-id*: Specifies a VLAN untagging flow table by its ID in the range of 0 to 254. If you specify this option, the device untags all outgoing packets matching the table.

Usage guidelines

You can specify only one MAC-IP flow table and one extensibility flow table for an OpenFlow instance, and the MAC-IP flow table ID must be smaller than the extensibility flow table ID.

Configure flow tables before you activate an OpenFlow instance.

If you execute this command multiple times, the most recent configuration takes effect.

If you specify the **ingress-vlan** *ingress-table-id* option, make sure the VLAN tagging flow table has the smallest ID among all flow tables. If you specify the **egress-vlan** *egress-table-id* option, make sure the VLAN untagging flow table has the largest ID among all flow tables. The VLAN tagging flow table and untagging flow table take effect only when the following conditions are met:

- The OpenFlow instance is configured to perform QinQ tagging for double-tagged packets passing an extensibility flow table.
- The device operates in standalone mode.

Examples

Configure a MAC-IP flow table with ID 0 and an extensibility flow table with ID 1 for OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] flow-table mac-ip 0 extensibility 1
```

forbidden port

Use **forbidden port** to forbid an OpenFlow instance to report ports of the specified types to controllers.

Use **undo forbidden port** to restore the default.

Syntax

forbidden port vlan-interface

undo forbidden port

Default

All ports that belong to an OpenFlow instance are reported to the controllers.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

vlan-interface: Specifies VLAN interfaces that belong to an OpenFlow instance.

Examples

Forbid OpenFlow instance 1 to report VLAN interfaces that belong to the OpenFlow instance to controllers.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] forbidden port vlan-interface
```

in-band management vlan

Use **in-band management vlan** to configure inband management VLANs.

Use **undo in-band management vlan** to restore the default.

Syntax

in-band management vlan *vlan-list*

undo in-band management vlan

Default

No inband management VLAN is configured for an OpenFlow instance.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

vlan-list: Specifies a list of VLANs in the format of *vlan-list* = { *vlan-id1* [**to** *vlan-id2*] }&<1-10>, where *vlan-id1* and *vlan-id2* are both in the range of 1 to 4094, *vlan-id2* cannot be smaller than *vlan-id1*, and &<1-10> indicates that you can specify up to 10 *vlan-id1* [**to** *vlan-id2*] parameters.

Usage guidelines

The inband management VLANs must be a subset of the VLANs associated with the OpenFlow instance.

This command is applicable only to OpenFlow instances that are in the VLAN mode.

Examples

Configure VLAN 10 as an inband management VLAN in OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] in-band management vlan 10
```

mac-ip dynamic-mac aware

Use **mac-ip dynamic-mac aware** to configure OpenFlow to support dynamic MAC addresses.

Use **undo mac-ip dynamic-mac aware** to restore the default.

Syntax

mac-ip dynamic-mac aware

undo mac-ip dynamic-mac aware

Default

An OpenFlow instance ignores dynamic MAC address messages sent from controllers.

Views

OpenFlow instance view

Predefined user roles

network-admin

Usage guidelines

When a MAC-IP flow table is configured for an OpenFlow switch, you can configure OpenFlow to support querying and deleting dynamic MAC addresses in the table.

When this command is configured, the OpenFlow switch does not send change events for the dynamic MAC addresses to controllers.

This command is applicable only to OpenFlow instances that are in the VLAN mode.

Examples

Configure OpenFlow instance 1 to support dynamic MAC addresses.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] mac-ip dynamic-mac aware
```

mac-learning forbidden

Use **mac-learning forbidden** to configure OpenFlow to forbid MAC address learning for the VLANs associated with the OpenFlow instance.

Use **undo mac-learning forbidden** to restore the default.

Syntax

mac-learning forbidden

undo mac-learning forbidden

Default

MAC address learning is allowed in the VLANs associated with an OpenFlow instance.

Views

OpenFlow instance view

Predefined user roles

network-admin

Usage guidelines

This command is applicable only to OpenFlow instances that are in the VLAN mode.

Examples

Forbid MAC address learning in the VLANs associated with OpenFlow instance 1.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] mac-learning forbidden
```

openflow instance

Use **openflow instance** to create an OpenFlow instance and enter OpenFlow instance view.

Use **undo openflow instance** to remove an OpenFlow instance.

Syntax

openflow instance *instance-id*

undo openflow instance *instance-id*

Default

No OpenFlow instance exists.

Views

System view

Predefined user roles

network-admin

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

Examples

Create OpenFlow instance 1, and enter the OpenFlow instance view.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1]
```

openflow lossless enable

Use **openflow lossless enable** to enable packet loss prevention for OpenFlow forwarding.

Use **undo openflow lossless enable** to disable packet loss prevention for OpenFlow forwarding.

Syntax

openflow lossless enable

undo openflow lossless enable

Default

Packet loss prevention for OpenFlow forwarding is disabled.

Views

System view

Predefined user roles

network-admin

Usage guidelines

When this feature is enabled, ACLs cannot match packets by IPv6 address.

After you enable or disable this feature, save the configuration and reboot the switch to make the configuration take effect.

Examples

Enable packet loss prevention for OpenFlow forwarding.

```
<Sysname> system-view
[Sysname] openflow lossless enable
Do you want to change the lossless traffic mode? [Y/N]:y
For the setting to take effect, save the configuration, and then reboot the device.
```

protocol-packet filter slow

Use **protocol-packet filter slow** to create a highest-priority flow entry for dropping slow protocol packets.

Use **undo protocol-packet filter** to restore the default.

Syntax

protocol-packet filter slow

undo protocol-packet filter

Default

An OpenFlow instance does not have a highest-priority flow entry for dropping slow protocol packets.

Views

OpenFlow instance view

Predefined user roles

network-admin

Usage guidelines

The flow entry created by using this command has a higher priority than the flow entries deployed by the controller.

The slow protocols include LACP, LAMP, and OAM.

Examples

Create a highest-priority flow entry for OpenFlow instance 1 to drop slow protocol packets.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] protocol-packet filter slow
```

qinq-network enable

Use **qinq-network enable** to enable an OpenFlow instance to perform QinQ tagging for double-tagged packets passing an extensibility flow table.

Use **undo qinq-network enable** to restore the default.

Syntax

qinq-network enable

undo qinq-network enable

Default

A double-tagged packet becomes single-tagged after it passes an extensibility flow table.

Views

OpenFlow instance view

Predefined user roles

network-admin

Usage guidelines

Execute this command to make double-tagged packets keep double-tagged after the packets pass an extensibility flow table.

Examples

Enable OpenFlow instance 1 to perform QinQ tagging for double-tagged packets passing an extensibility flow table.

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] qinq-network enable
```

reset openflow instance controller statistics

Use **reset openflow instance controller statistics** to clear statistics on packets that a controller sends and receives for an OpenFlow instance.

Syntax

reset openflow instance *instance-id* **controller** [*controller-id*] **statistics**

Views

User view

Predefined user roles

network-admin

network-operator

Parameters

instance-id: Specifies an OpenFlow instance by its ID in the range of 1 to 4094.

controller-id: Specifies a controller by its ID in the range of 0 to 63. If no controller ID is specified, this command clears statistics on packets that all controllers send and receive for an OpenFlow instance.

Examples

Clear statistics on packets that all controllers send and receive for OpenFlow instance 1.

```
<Sysname> reset openflow instance 1 controller statistics
```

Document conventions and icons

Conventions

This section describes the conventions used in the documentation.

Port numbering in examples

The port numbers in this document are for illustration only and might be unavailable on your device.

Command conventions

Convention	Description
Boldface	**Bold** text represents commands and keywords that you enter literally as shown.
Italic	*Italic* 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 Boldface. 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

Convention	Description
	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 access controller engine on a unified wired-WLAN switch.
	Represents an access point.
	Represents a wireless terminator unit.
	Represents a wireless terminator.
	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.

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:

  www.hpe.com/assistance
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:

  www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates, go to either of the following:
  - Hewlett Packard Enterprise Support Center **Get connected with updates** page:

    www.hpe.com/support/e-updates
  - Software Depot website:

    www.hpe.com/support/softwaredepot
- To view and update your entitlements, and to link your contracts, Care Packs, and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

  www.hpe.com/support/AccessToSupportMaterials

IMPORTANT:

Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.

Websites

Website	Link
Networking websites	
Hewlett Packard Enterprise Information Library for Networking	www.hpe.com/networking/resourcefinder
Hewlett Packard Enterprise Networking website	www.hpe.com/info/networking
Hewlett Packard Enterprise My Networking website	www.hpe.com/networking/support
Hewlett Packard Enterprise My Networking Portal	www.hpe.com/networking/mynetworking
Hewlett Packard Enterprise Networking Warranty	www.hpe.com/networking/warranty
General websites	
Hewlett Packard Enterprise Information Library	www.hpe.com/info/enterprise/docs
Hewlett Packard Enterprise Support Center	www.hpe.com/support/hpesc
Hewlett Packard Enterprise Support Services Central	ssc.hpe.com/portal/site/ssc/
Contact Hewlett Packard Enterprise Worldwide	www.hpe.com/assistance
Subscription Service/Support Alerts	www.hpe.com/support/e-updates
Software Depot	www.hpe.com/support/softwaredepot
Customer Self Repair (not applicable to all devices)	www.hpe.com/support/selfrepair
Insight Remote Support (not applicable to all devices)	www.hpe.com/info/insightremotesupport/docs

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

www.hpe.com/support/selfrepair

Remote support

Remote support is available with supported devices as part of your warranty, Care Pack Service, or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

For more information and device support details, go to the following website:

www.hpe.com/info/insightremotesupport/docs

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hpe.com). When submitting your feedback, include the document title,

part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.

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