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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.

**Syntax**

```
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.

**Examples**

```
# Activate OpenFlow instance 1.
<Sysname> system-view
<Sysname> openflow instance 1
<Sysname-of-inst-1> active instance
```

**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. If the loosen mode is used, a port belongs to the OpenFlow instance when VLANs associated with the OpenFlow instance overlap with the port’s allowed VLANs. Otherwise, a port belongs to an OpenFlow instance only when VLANs associated with the OpenFlow instance are within the port’s allowed VLAN list.

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.

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 ] [ ssl ssl-policy-name ] [ vrf vrf-name ]
undo controller controller-id address
```

Default

The main connection is not configured for an OpenFlow instance.

Views

OpenFlow instance view

Predefined user roles

network-admin

Parameters

**Controller-id:** Specifies a controller ID in the range of 0 to 63.

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

**ipv6 ipv6-address:** Specifies the IPv6 address of the controller.
**port** **port-number**: Sets the port number used to establish TCP connections to the controller. The value range of 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.
- 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 switch.

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

**Syntax**

```
cscontroller connect interval interval-value
undo controller connect interval
```

**Default**

The reconnection interval is 60 seconds.

**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 switch 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
```
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.

**Views**

OpenFlow instance view

**Predefined user roles**

network-admin

**Parameters**

- **interval-value**: Specifies the connection detection interval in seconds, in the range of 1 to 10.

**Examples**

```
# Set the detection connection interval to 10 seconds for OpenFlow instance 1.
<Sysname> system-view
<Sysname> openflow instance 1
<Sysname-of-inst-1] controller echo-request interval 10
```

caller 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** for the OpenFlow instance to establish connections to controllers.
- **single**: Configures the controller mode as **single** for the OpenFlow instance to establish connections to controllers.

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

```
# Set the controller mode to 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 set 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 0xFFFFFFFFFFFFFFF.

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
```
**description**

Use `description` to set 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 description for the OpenFlow instance, a case-insensitive string of 1 to 255 characters and must start with an English letter.

**Examples**

```
# Set a description for OpenFlow instance 1 to 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.
 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>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconnect interval</td>
<td>Reconnection interval (in seconds) for an OpenFlow instance to re-connect to all controllers.</td>
</tr>
<tr>
<td>Echo interval</td>
<td>Interval (in seconds) at which an OpenFlow instance sends an Echo Request message to all controller.</td>
</tr>
</tbody>
</table>

Controller role

- **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 policy is configured, this field displays two hyphens (--).

VRF name

Name of the MPLS L3VPN to which the controller belongs.
If no VRF is configured, this field displays two hyphens (--).

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 ID in the range of 1 to 4094.
table-id: Specifies a flow table ID in the range of 0 to 254.

Usage guidelines

If you do not specify the flow table ID, the 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: 0xffff
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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table type</td>
<td>Type of the flow table: MAC-IP or Extensibility.</td>
</tr>
<tr>
<td>flow entry count</td>
<td>Number of flow entries deployed by controllers.</td>
</tr>
<tr>
<td>total flow entry count</td>
<td>Total number of flow entries in the table.</td>
</tr>
<tr>
<td>cookie</td>
<td>Cookie ID of the flow entry.</td>
</tr>
<tr>
<td>priority</td>
<td>Priority of the flow entry. The larger the value, the higher the priority.</td>
</tr>
<tr>
<td>hard time</td>
<td>Hard timeout of the flow entry, in seconds. The flow entry is aged out immediately after the hard timeout expires.</td>
</tr>
<tr>
<td>idle time</td>
<td>Idle timeout of the flow entry, in seconds. The flow entry is aged out if no packet matches the entry within the idle timeout.</td>
</tr>
<tr>
<td>flags</td>
<td>Flags that the flow entry includes:</td>
</tr>
<tr>
<td></td>
<td>• flow_send_rem—Sends a flow removed message when the flow entry is removed or expires.</td>
</tr>
<tr>
<td></td>
<td>• check_overlap—Checks the flow table for overlapping flow entries.</td>
</tr>
<tr>
<td></td>
<td>• reset_counts—Resets flow table counters.</td>
</tr>
<tr>
<td></td>
<td>• no_pkt_counts—Does not count packets.</td>
</tr>
<tr>
<td></td>
<td>• no_byte_counts—Does not count bytes.</td>
</tr>
<tr>
<td></td>
<td>If the flow entry does not include any flags, this field displays none.</td>
</tr>
<tr>
<td>byte count</td>
<td>Number of bytes that have matched the flow entry.</td>
</tr>
</tbody>
</table>
### Field Description

- **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**—Clears all actions in the action set of the matched packet.
- **Apply actions**—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

<table>
<thead>
<tr>
<th>Match field</th>
<th>Match field mask</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input interface</td>
<td>N/A</td>
<td>Ingress port (see Table 5).</td>
</tr>
<tr>
<td>Physical input interface</td>
<td>N/A</td>
<td>Ingress physical port.</td>
</tr>
<tr>
<td>Ethernet destination MAC address</td>
<td>Mask</td>
<td>Ethernet destination MAC address and mask.</td>
</tr>
<tr>
<td>Ethernet source MAC address</td>
<td>Mask</td>
<td>Ethernet source MAC address and mask.</td>
</tr>
<tr>
<td>Ethernet type</td>
<td>N/A</td>
<td>Ethernet type of the OpenFlow packet payload.</td>
</tr>
<tr>
<td>VLAN ID</td>
<td>Mask</td>
<td>VLAN ID and mask.</td>
</tr>
<tr>
<td>VLAN PCP</td>
<td>N/A</td>
<td>VLAN priority.</td>
</tr>
<tr>
<td>IP DSCP</td>
<td>N/A</td>
<td>DSCP value.</td>
</tr>
<tr>
<td>IP ECN</td>
<td>N/A</td>
<td>ECN value in the IP header.</td>
</tr>
<tr>
<td>IP protocol</td>
<td>N/A</td>
<td>IPv4 or IPv6 protocol number.</td>
</tr>
<tr>
<td>IPv4 source address</td>
<td>Mask</td>
<td>IPv4 source address and mask.</td>
</tr>
<tr>
<td>IPv4 destination address</td>
<td>Mask</td>
<td>IPv4 destination address and mask.</td>
</tr>
<tr>
<td>TCP source port</td>
<td>N/A</td>
<td>TCP source port.</td>
</tr>
<tr>
<td>TCP destination port</td>
<td>N/A</td>
<td>TCP destination port.</td>
</tr>
<tr>
<td>UDP source port</td>
<td>N/A</td>
<td>UDP source port.</td>
</tr>
<tr>
<td>UDP destination port</td>
<td>N/A</td>
<td>UDP destination port.</td>
</tr>
<tr>
<td>ICMPv4 type</td>
<td>N/A</td>
<td>ICMPv4 type.</td>
</tr>
<tr>
<td>ICMPv4 code</td>
<td>N/A</td>
<td>ICMPv4 code.</td>
</tr>
<tr>
<td>ARP source IPv4 address</td>
<td>Mask</td>
<td>Sender IPv4 address and mask in the ARP payload.</td>
</tr>
<tr>
<td>Match field</td>
<td>Match field mask</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>ARP source MAC address</td>
<td>ARP source MAC address mask</td>
<td>Sender MAC address and mask in the ARP payload.</td>
</tr>
<tr>
<td>IPv6 source address</td>
<td>IPv6 source address mask</td>
<td>Source IPv6 address and mask.</td>
</tr>
<tr>
<td>IPv6 destination address</td>
<td>IPv6 destination address mask</td>
<td>Destination IPv6 address and mask.</td>
</tr>
<tr>
<td>IPv6 flow label</td>
<td>Mask</td>
<td>IPv6 flow label and mask.</td>
</tr>
<tr>
<td>ICMPv6 type</td>
<td>N/A</td>
<td>ICMPv6 type.</td>
</tr>
<tr>
<td>ICMPv6 code</td>
<td>N/A</td>
<td>ICMPv6 code.</td>
</tr>
</tbody>
</table>

**Table 4 Actions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop</td>
<td>Drops the matched packet.</td>
</tr>
<tr>
<td>Output interface</td>
<td>Sends the packet through a specified port. For more information about ports, see Table 5.</td>
</tr>
<tr>
<td>Group</td>
<td>Specifies a group to process the packet.</td>
</tr>
<tr>
<td>Set queue</td>
<td>Maps the flow entry to a queue specified by ID.</td>
</tr>
<tr>
<td>Set field</td>
<td>Modifies a specific field of the packet.</td>
</tr>
</tbody>
</table>

**Table 5 Ports**

<table>
<thead>
<tr>
<th>Port name</th>
<th>Ingress port</th>
<th>Output port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Not supported.</td>
<td>Supported.</td>
<td>Normal forwarding workflow of the switch.</td>
</tr>
<tr>
<td>In Port</td>
<td>Not supported.</td>
<td>Supported.</td>
<td>Packet ingress port. This port is available only in Release 2311P05 and later versions.</td>
</tr>
<tr>
<td>Flood</td>
<td>Not supported.</td>
<td>Supported.</td>
<td>Flooding workflow.</td>
</tr>
<tr>
<td>All</td>
<td>Not supported.</td>
<td>Supported.</td>
<td>All ports.</td>
</tr>
<tr>
<td>Controller</td>
<td>Supported.</td>
<td>Supported.</td>
<td>Channel connected to the controller.</td>
</tr>
<tr>
<td>Local</td>
<td>Supported.</td>
<td>Supported.</td>
<td>Local CPU.</td>
</tr>
<tr>
<td>XGE1/0/3 (port name)</td>
<td>Supported.</td>
<td>Supported.</td>
<td>Name of a physical or logical port (for example, an aggregate interface).</td>
</tr>
</tbody>
</table>

**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 entry by its ID in the range of 0 to 4294967040. If this argument is not specified, the 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group count</td>
<td>Number of group entries contained in the OpenFlow instance.</td>
</tr>
<tr>
<td>Type</td>
<td>Group table type:</td>
</tr>
<tr>
<td></td>
<td>- <strong>All</strong>—Execute all buckets in the group. This group is used for multicast or broadcast forwarding.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Indirect</strong>—Execute the one defined bucket in this group. This group type is available only in Release 2311P05 and later versions.</td>
</tr>
<tr>
<td>Action count</td>
<td>Number of actions in the action bucket.</td>
</tr>
</tbody>
</table>
### display openflow instance

Use `display openflow instance` to display the detailed information for 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 the detailed information of OpenFlow instances.

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

Configuration information:
Description    : test-desc
Active status  : active
Inactive configuration:
Classification VLAN, total VLANs(1)
3
Flow table:
  Table ID(type): 0(MAC-IP)
  Table ID(type): 1(Extensibility)
Active configuration:
Classification VLAN, loosen mode, total VLANs(1)
```
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
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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the OpenFlow instance.</td>
</tr>
<tr>
<td>Active status</td>
<td>Activation status of the OpenFlow instance.</td>
</tr>
<tr>
<td>Inactive configuration</td>
<td>Inactive OpenFlow instance configuration.</td>
</tr>
<tr>
<td>Active configuration</td>
<td>Active OpenFlow instance configuration.</td>
</tr>
<tr>
<td>Classification VLAN, loosen mode, total VLANs</td>
<td>VLANs associated with the OpenFlow instance, the total number of VLANs, and the loosen mode.</td>
</tr>
<tr>
<td>In-band management VLAN, total VLANs</td>
<td>Inband management VLANs and the total number of inband management VLANs. empty VLAN is displayed when no inband management VLAN is configured.</td>
</tr>
<tr>
<td>Connect mode</td>
<td>Controller mode of the OpenFlow instance:</td>
</tr>
<tr>
<td></td>
<td>• Multiple.</td>
</tr>
<tr>
<td></td>
<td>• Single.</td>
</tr>
<tr>
<td>Mac-address learning</td>
<td>Whether MAC address learning is enabled in the VLANs associated with the OpenFlow instance:</td>
</tr>
<tr>
<td></td>
<td>• Enabled—MAC address learning is enabled in the VLANs associated with the OpenFlow instance.</td>
</tr>
<tr>
<td></td>
<td>• Disabled—MAC address learning is disabled in the VLANs associated with the OpenFlow instance.</td>
</tr>
<tr>
<td>Flow-entry max-limit</td>
<td>Maximum number of flow entries allowed in the extensibility flow table.</td>
</tr>
<tr>
<td>Datapath ID</td>
<td>Datapath ID of the OpenFlow instance.</td>
</tr>
<tr>
<td>Port information</td>
<td>Ports added to the OpenFlow instance.</td>
</tr>
<tr>
<td>Flow table</td>
<td>Flow table information of the OpenFlow instance.</td>
</tr>
<tr>
<td>Table ID(type)</td>
<td>Flow table ID (flow table type). The flow table type can be MAC-IP or Extensibility.</td>
</tr>
<tr>
<td>count</td>
<td>Total number of flow entries in the flow table.</td>
</tr>
<tr>
<td>Active channel information</td>
<td>Information about active control channels.</td>
</tr>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>Controller id IP address: port:</th>
<th>Brief information of controllers which have established connections to the OpenFlow instance. This field is displayed only when the OpenFlow instance has established connections to controllers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failopen mode</td>
<td>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):</td>
</tr>
<tr>
<td></td>
<td>• secure — The OpenFlow switch uses flow tables for traffic forwarding after it is disconnected from all controllers.</td>
</tr>
<tr>
<td></td>
<td>• standalone — The OpenFlow switch uses the normal forwarding process after it is disconnected from all controllers.</td>
</tr>
</tbody>
</table>

---

**display openflow meter**

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

**Syntax**

```plaintext
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 100.
<Sysname> display openflow instance 100 meter
Meter flags: KBPS -- Rate value in kb/s, PKTPS -- Rate value in packet/sec
                 BURST -- Do burst size, STATS -- Collect statistics

Instance 100 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: --
Referenced information:
  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: 0
Referenced information:
Count: 0

Table 8 Command output

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

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.

```bash
<Sysname> display openflow summary
```

Fail Open mode: Se -- secure mode, Sa -- standalone mode

Reactive flags: Y -- Need active instance,

N -- Needn't active instance

<table>
<thead>
<tr>
<th>ID</th>
<th>Status</th>
<th>Datapath-ID</th>
<th>Channel</th>
<th>Table num</th>
<th>Port num</th>
<th>Reactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>active</td>
<td>0x0000000100001221</td>
<td>Connected</td>
<td>2</td>
<td>8</td>
<td>Y</td>
</tr>
<tr>
<td>10</td>
<td>deactive</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4094</td>
<td>active</td>
<td>0x00000ffe00001221</td>
<td>Fail(Sa)</td>
<td>2</td>
<td>0</td>
<td>N</td>
</tr>
</tbody>
</table>

**Table 9 Command output**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>OpenFlow instance ID.</td>
</tr>
</tbody>
</table>
| 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.
|               | • Fail(Se)—The secure channel between the OpenFlow instance and the controller has been disconnected, and the OpenFlow instance is operating in secure mode.
|               | • Fail(Sa)—The channel between the OpenFlow instance and the controller has been disconnected, and the OpenFlow instance is operating in standalone mode.
|               | A hyphen (−) is displayed when the OpenFlow instance is inactive.            |
| Table         | Number of flow tables in the OpenFlow instance. A hyphen (−) is displayed when the OpenFlow instance is inactive. |
| Port          | Number of ports belonging to the OpenFlow instance. A hyphen (−) is displayed when the OpenFlow instance is inactive. |
| Reactive      | 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**

```plaintext
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**

```
# Set 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 set the maximum number of entries that an extensibility flow table can include.

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

**Syntax**

```plaintext
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 { extensibility extensibility-table-id | mac-ip mac-ip-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

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

Usage guidelines

You can specify only one MAC-IP flow table and one extensibility flow table for an OpenFlow instance. For the same OpenFlow instance, 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.

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

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.

**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.

**Examples**

```bash
# 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 an OpenFlow instance 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**

This command configures an OpenFlow instance to support querying and deleting dynamic MAC addresses in only MAC-IP flow tables.
When this command is configured, the OpenFlow switch does not send change events for the dynamic MAC addresses to controllers.

**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 disable MAC address learning for the VLANs associated with an OpenFlow instance.

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

**Syntax**

```
mac-learning forbidden
undo mac-learning forbidden
```

**Default**

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

**Views**

OpenFlow instance view

**Predefined user roles**

network-admin

**Examples**

```
# Disable 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]
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
## Conventions

This section describes the conventions used in this documentation set.

### Command conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boldface</strong></td>
<td><strong>Bold</strong> text represents commands and keywords that you enter literally as shown.</td>
</tr>
<tr>
<td><em>Italic</em></td>
<td><em>Italic</em> text represents arguments that you replace with actual values.</td>
</tr>
<tr>
<td>[]</td>
<td>Square brackets enclose syntax choices (keywords or arguments) that are optional.</td>
</tr>
<tr>
<td>{ x</td>
<td>y</td>
</tr>
<tr>
<td>[ x</td>
<td>y</td>
</tr>
<tr>
<td>{ x</td>
<td>y</td>
</tr>
<tr>
<td>[ x</td>
<td>y</td>
</tr>
<tr>
<td>&amp;&lt;1-n&gt;</td>
<td>The argument or keyword and argument combination before the ampersand (&amp;) sign can be entered 1 to n times.</td>
</tr>
<tr>
<td>#</td>
<td>A line that starts with a pound (#) sign is comments.</td>
</tr>
</tbody>
</table>

### GUI conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boldface</strong></td>
<td>Window names, button names, field names, and menu items are in bold text. For example, the <strong>New User</strong> window appears; click <strong>OK</strong>.</td>
</tr>
<tr>
<td>&gt;</td>
<td>Multi-level menus are separated by angle brackets. For example, <strong>File &gt; Create &gt; Folder</strong>.</td>
</tr>
</tbody>
</table>

### Symbols

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶️ <strong>WARNING</strong></td>
<td>An alert that calls attention to important information that if not understood or followed can result in personal injury.</td>
</tr>
<tr>
<td>▶️ <strong>CAUTION</strong></td>
<td>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.</td>
</tr>
<tr>
<td>⚪ <strong>IMPORTANT</strong></td>
<td>An alert that calls attention to essential information.</td>
</tr>
<tr>
<td><strong>NOTE</strong></td>
<td>An alert that contains additional or supplementary information.</td>
</tr>
<tr>
<td>🔥 <strong>TIP</strong></td>
<td>An alert that provides helpful information.</td>
</tr>
</tbody>
</table>
### Network topology icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="icon1.png" alt="Generic Network Device" /></td>
<td>Represents a generic network device, such as a router, switch, or firewall.</td>
</tr>
<tr>
<td><img src="icon2.png" alt="Routing-Capable Device" /></td>
<td>Represents a routing-capable device, such as a router or Layer 3 switch.</td>
</tr>
<tr>
<td><img src="icon3.png" alt="Generic Switch" /></td>
<td>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.</td>
</tr>
<tr>
<td><img src="icon4.png" alt="Access Controller" /></td>
<td>Represents an access controller, a unified wired-WLAN module, or the switching engine on a unified wired-WLAN switch.</td>
</tr>
<tr>
<td><img src="icon5.png" alt="Access Point" /></td>
<td>Represents an access point.</td>
</tr>
<tr>
<td><img src="icon6.png" alt="Mesh Access Point" /></td>
<td>Represents a mesh access point.</td>
</tr>
<tr>
<td><img src="icon7.png" alt="Omnidirectional Signals" /></td>
<td>Represents omnidirectional signals.</td>
</tr>
<tr>
<td><img src="icon8.png" alt="Directional Signals" /></td>
<td>Represents directional signals.</td>
</tr>
<tr>
<td><img src="icon9.png" alt="Security Product" /></td>
<td>Represents a security product, such as a firewall, UTM, multiservice security gateway, or load-balancing device.</td>
</tr>
<tr>
<td><img src="icon10.png" alt="Security Card" /></td>
<td>Represents a security card, such as a firewall, load-balancing, NetStream, SSL VPN, IPS, or ACG card.</td>
</tr>
</tbody>
</table>

### 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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<th>D</th>
<th>F</th>
<th>I</th>
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<th>O</th>
<th>S</th>
<th>W</th>
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<td></td>
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<td>display openflow summary, 16</td>
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<td></td>
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<td>Documents, 1</td>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>