

# H3C S6850 & S9850 Switch Series

## OpenFlow Command Reference

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Software version: Release 6555 and later  
Document version: 6W101-20200820

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# Preface

This command reference describes OpenFlow configuration commands.

This preface includes the following topics about the documentation:

- [Audience](#).
- [Conventions](#).
- [Documentation feedback](#).

## Audience

This documentation is intended for:

- Network planners.
- Field technical support and servicing engineers.
- Network administrators working with the S6850 & S9850 switch series.

## Conventions

The following information describes the conventions used in the documentation.





### Command conventions

Convention	Description
<b>Boldface</b>	<b>Bold</b> text represents commands and keywords that you enter literally as shown.
<i>Italic</i>	<i>Italic</i> text represents arguments that you replace with actual values.
[ ]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x   y   ... }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[ x   y   ... ]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x   y   ... }*	Asterisk marked braces enclose a set of required syntax choices separated by vertical bars, from which you select a minimum of 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
<b>Boldface</b>	Window names, button names, field names, and menu items are in Boldface. For example, the <b>New User</b> window opens; click <b>OK</b> .
>	Multi-level menus are separated by angle brackets. For example, <b>File &gt; Create &gt; Folder</b> .

## Symbols

Convention	Description
 <b>WARNING!</b>	An alert that calls attention to important information that if not understood or followed can result in personal injury.
 <b>CAUTION:</b>	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.
 <b>IMPORTANT:</b>	An alert that calls attention to essential information.
<b>NOTE:</b>	An alert that contains additional or supplementary information.
 <b>TIP:</b>	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 module, such as a firewall, load balancing, NetStream, SSL VPN, IPS, or ACG module.

## Examples provided in this document

Examples in this document might use devices that differ from your device in hardware model, configuration, or software version. It is normal that the port numbers, sample output, screenshots, and other information in the examples differ from what you have on your device.

# Documentation feedback

You can e-mail your comments about product documentation to [info@h3c.com](mailto:info@h3c.com).

We appreciate your comments.

# Contents

OpenFlow commands .....	1
active instance .....	1
classification .....	1
controller address .....	2
controller auxiliary .....	3
controller connect interval .....	4
controller echo-request interval .....	5
controller mode .....	6
datapath-id .....	6
default table-miss permit .....	7
description .....	7
display openflow .....	8
display openflow auxiliary .....	9
display openflow flow-table .....	11
display openflow group .....	15
display openflow instance .....	17
display openflow meter .....	19
display openflow summary .....	20
fail-open mode .....	22
flow-entry max-limit .....	22
flow-log disable .....	23
flow-table .....	23
forbidden packet-in arp controller .....	24
forbidden port .....	25
in-band management vlan .....	26
listening port .....	26
loop-protection enable .....	27
mac-ip dynamic-mac aware .....	28
mac-learning forbidden .....	28
openflow instance .....	29
openflow lossless enable .....	29
openflow shutdown .....	30
permit-port-type member-port .....	31
precedence dynamic arp .....	31
protocol-packet filter slow .....	32
qinq-network enable .....	32
refresh ip-flow .....	33
reset openflow instance statistics .....	33
tcp dscp .....	34
tcp-connection backup .....	34

# OpenFlow commands

## active instance

Use `active instance` to activate 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

After an OpenFlow instance is created or modified, use this command to activate or reactivate the instance to make the instance take effect. After an OpenFlow instance is reactivated, it disconnects from all controllers, clears the deployed flow tables, updates the capability set, and then reconnects to controllers.

### Examples

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

## classification

Use `classification` to configure the OpenFlow instance mode.

Use `undo classification` to restore the default.

### Syntax

```
classification { global | vlan vlan-id [ mask vlan-mask ] [ loosen ] }
undo classification
```

### Default

The OpenFlow instance mode is not configured.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

## Parameters

**global**: Specifies the global mode.

**vlan**: Specifies the VLAN mode.

*vlan-id*: Specifies a 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. 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. If you do not specify the loosen mode, 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 VLANs to be associated are calculated by a bitwise AND operation on the specified VLAN ID and mask. The VLAN mask supports non-contiguous 1s and ignores all 0 bits. 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

# Enable the VLAN mode for OpenFlow instance 1 and associate OpenFlow instance 1 with 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 delete the main connection to the specified controller.

## Syntax

```
controller controller-id address { ip ipv4-address | ipv6 ipv6-address }  
[ port port-number ] [ local address { ip local-ipv4-address | ipv6  
local-ipv6-address } [ port local-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** *ipv4-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 by the controller to establish TCP connections to the OpenFlow switch. The value range for the port number is 1 to 65535. The default value is 6633.

**local address**: Specifies the source IP address used to establish TCP connections to the controller. When multiple routes are available between a controller and a switch, you can use this keyword to configure a source IP address for the switch. When the switch restarts or an active/standby switchover occurs, the switch can use the original route to reconnect to the controller without selecting a new route.

**ip** *local-ipv4-address*: Specifies the source IPv4 address.

**ipv6** *local-ipv6-address*: Specifies the source IPv6 address.

**port** *local-port-number*: Specifies the source port number in the range of 1 to 65535. If you do not specify this option, the system automatically assigns a source port number for establishing the main connection to the controller.

**ssl** *ssl-policy-name*: Specifies the SSL client policy that the controller uses to authenticate the OpenFlow switch. The *ssl-policy-name* argument is a case-insensitive string of 1 to 31 characters. You must configure a separate SSL client policy for the main connection to each controller.

**vrf** *vrf-name*: Specifies an MPLS L3VPN instance by its name, a case-sensitive string of 1 to 31 characters. If you do not specify a VRF name, the controller is in the public network.

## 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 uses the main connection to a controller to exchange control messages with the controller to perform the following operations:

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

As a best practice, configure a unicast IP address for a controller. An OpenFlow switch might fail to establish a connection with the controller that does not use a unicast IP address.

The main connection must be a reliable TCP or SSL connection. The OpenFlow switch uses the main connection to a controller to exchange control messages with the controller to perform the following operations:

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

## Examples

```
# Specify controller 1 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 1 address ip 1.1.1.1 port 6666
```

## controller auxiliary

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

Use **undo controller auxiliary** to delete the specified auxiliary connection to the specified controller.

## Syntax

```
controller controller-id auxiliary auxiliary-id transport { tcp | udp | ssl ssl-policy-name } [ address { ip ipv4-address | ipv6 ipv6-address } ] [ port port-number ]
```

```
undo controller id auxiliary auxiliary-id
```

## Default

An OpenFlow instance does not have auxiliary connections 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.

**auxiliary** *auxiliary-id*: Specifies an auxiliary connection ID in the range of 1 to 255.

**transport**: Specifies the transport layer protocol.

**tcp**: Specifies TCP connections.

**udp**: Specifies UDP connections.

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

**ip** *ipv4-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 for the port number is 1 to 65535. The default value is 6633.

## Usage guidelines

Auxiliary connections are used to improve the communication performance between the controller and OpenFlow switches.

For an auxiliary connection to be successfully established, make sure the configuration of the auxiliary connection does not conflict with the configuration of the main connection.

An auxiliary connection can have a different destination IP address and port number than the main connection. If no destination IP address and port number are specified, the auxiliary connection uses the destination IP address and port number configured for the main connection.

## Examples

```
# Specify controller 1 for OpenFlow instance 1 and configure auxiliary connection 1 to the controller.
```

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

```
[Sysname] openflow instance 1
```

```
[Sysname-of-inst-1] controller 10 auxiliary 1 transport tcp
```

## controller connect interval

Use **controller connect interval** to set the reconnection interval.

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

## Syntax

```
controller connect interval interval  
undo controller connect interval
```

## Default

The reconnection interval is 60 seconds.

## Views

OpenFlow instance view

## Predefined user roles

network-admin

## Parameters

*interval*: Specifies the reconnection interval in the range of 10 to 120 seconds.

## 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.

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

## Syntax

```
controller echo-request interval interval  
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*: Specifies the connection detection interval in the range of 1 to 10 seconds.

## 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 connection mode for an OpenFlow instance.

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

### Syntax

```
controller mode { multiple | single }  
undo controller mode
```

### Default

The controller connection mode is **multiple**.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Parameters

**multiple**: Specifies the **multiple** mode. In **multiple** mode, the OpenFlow switch simultaneously connects to all controllers. If one or more controllers become invalid or disconnected, the OpenFlow switch continues to exchange messages with the rest of the controllers.

**single**: Specifies the **single** mode. In **single** mode, the OpenFlow switch connects to only one controller at a time. When communication with the current controller fails, the OpenFlow instance connects to the controller with the lowest ID among the rest controllers.

### Examples

```
# Set all controllers of OpenFlow instance 1 to operate in single mode.  
<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 id  
undo datapath-id
```

### Default

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

### Views

OpenFlow instance view

### Predefined user roles

network-admin

## Parameters

*id*: Specifies the datapath ID for the OpenFlow instance, in the range of 1 to ffffffff in hexadecimal format.

## Usage guidelines

The datapath ID uniquely identifies an OpenFlow instance.

## Examples

```
# Set the datapath ID to 123456 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 configure the default action of table-miss flow entries 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 a table-miss flow entry is to drop packets.

## Views

OpenFlow instance view

## Predefined user roles

network-admin

## Examples

```
# Configure the default action of table-miss flow entries 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, a case-sensitive string of 1 to 255 characters.

## Examples

```
# Configure the description as test-desc for OpenFlow instance 1.
```

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

# display openflow

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

## Syntax

```
display openflow instance instance-id { controller [ controller-id ] | listened }
```

## 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 you do not specify a controller ID, this command displays information about all controllers for an OpenFlow instance.

**listened**: Specifies the controllers acting as SSL clients to which the OpenFlow instance connects as an SSL server.

## Examples

```
# Display controller information for OpenFlow instance 100.
```

```
<Sysname> display openflow instance 100 controller
Instance 1 controller information:
Reconnect interval : 60 (s)
Echo interval      : 5 (s)

Controller ID           : 1
Controller IP address   : 192.168.49.49
Controller port         : 6633
Local IP address        : 192.0.0.1
Local port              : 5566
Controller role         : Equal
Connect type            : TCP
Connect state           : Established
Packets sent            : 9
Packets received       : 9
```

```

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	Connection detection interval (in seconds) at which an OpenFlow instance sends an echo request message to all controllers.
Controller IP address	IP address of the controller.
Controller port	TCP port number of the controller.
Local IP address	Source IP address of the controller that is connected to the OpenFlow instance.
Local port	Source TCP port number of the current controller.
Controller role	<p>Role of the controller:</p> <ul style="list-style-type: none"> <li>• <b>Equal</b>—The controller has the same mode as other controllers that are specified for the OpenFlow instance.</li> <li>• <b>Master</b>—The controller is the master controller for the OpenFlow instance.</li> <li>• <b>Slave</b>—The controller is a subordinate controller for the OpenFlow instance.</li> </ul> <p>If the controller is not configured with any role, this field displays two hyphens (--).</p>
Connect type	Type of the connection between the OpenFlow instance and the controller: <b>TCP</b> or <b>SSL</b> .
Connect state	State of the connection between the OpenFlow instance and the controller: <b>Idle</b> or <b>Established</b> .
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 is configured, this field displays two hyphens (--).
VRF name	Name of the MPLS L3VPN to which the controller belongs. If no MPLS L3VPN instance is configured, this field displays two hyphens (--).

## display openflow auxiliary

Use **display openflow auxiliary** to display auxiliary connection information for an OpenFlow instance.

### Syntax

```

display openflow instance instance-id auxiliary [ controller-id
[ auxiliary auxiliary-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.

**auxiliary** *auxiliary-id*: Specifies an auxiliary connection by its ID in the range of 1 to 255.

## Examples

# Display auxiliary connection information for OpenFlow instance 100.

```
<Sysname> display openflow instance 100 auxiliary
```

```
Controller ID: 1      Auxiliary connection number: 2
```

```
Auxiliary connection ID : 1
```

```
Controller IP address   : 192.168.49.48
```

```
Controller port        : 6633
```

```
Connect type           : TCP
```

```
Connect state          : Established
```

```
Packets sent           : 9
```

```
Packets received       : 9
```

```
SSL policy              : --
```

```
Auxiliary connection ID : 2
```

```
Controller IP address   : 192.168.49.49
```

```
Controller port        : 6633
```

```
Connect type           : TCP
```

```
Connect state          : Established
```

```
Packets sent           : 9
```

```
Packets received       : 9
```

```
SSL policy              : --
```

**Table 2 Command output**

Field	Description
Auxiliary connection number	Total number of auxiliary connections.
Auxiliary connection ID	ID of an auxiliary connection.
Controller IP address	IP address of the controller.
Controller port	TCP port number of the controller.
Connect type	Type of the connection between the OpenFlow instance and the controller: <b>TCP</b> , <b>UDP</b> , or <b>SSL</b> .
Connect state	State of the connection between the OpenFlow instance and the controller: <b>Idle</b> or <b>Established</b> .
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 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 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. If you do not specify a 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 100.

```
<Sysname> display openflow instance 100 flow-table
```

```
Instance 100 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: --
```

```
Create time: 09:39:42 10/24/2017, Last modified time: 09:39:42 10/24/2017
```

```
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: --
```

```
Create time: 09:39:42 10/24/2017, Last modified time: 09:39:42 10/24/2017
```

```
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: WGE1/0/4
```

```
Write metadata/mask: 0x0000000000000001/0xffffffffffffffff
```

```
Goto table: 1
```

Table 1 information:

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

MissRule (default) flow entry information:

cookie: 0x0, priority: 0, hard time: 0, idle time: 0, flags: none,

byte count: 300, packet count: 60

Create time: 09:39:42 10/24/2017, Last modified time: 09:39:42 10/24/2017

Match information: any

Instruction information:

Write actions:

Drop

Flow entry 1 information: (Not effective)

cookie: 0x0, priority: 0, hard time: 0, idle time: 0, flags: flow\_send\_rem

|check\_overlap, byte count: 8, packet count: 1

Create time: 09:39:42 10/24/2017, Last modified time: 09:39:42 10/24/2017

Match information:

Input interface: WGE1/0/3

Ethernet source MAC address: 0000-0000-0001

Ethernet source MAC address mask: ffff-ffff-ffff

Instruction information:

Set meter: 100

Apply actions:

Output interface: WGE1/0/4

Write actions:

Output interface: Controller, send length: 128 bytes

### Table 3 Command output

Field	Description
Table information	Information about the flow table.
Table type	Type of the flow table: <ul style="list-style-type: none"><li>• MAC-IP.</li><li>• Extensibility.</li></ul>
flow entry count	Number of flow entries deployed by the controller.
total flow entry count	Total number of flow entries in the table.
Flow entry information	Information about the flow entry. If the flow entry does not take effect, this field displays <b>Not effective</b> .
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 removed when the timer times out, whether or not the flow entry matches any data stream. If the flow entry has no hard timeout, the field displays <b>0</b> .
idle time	Idle timeout of the flow entry, in seconds. The flow entry is removed if the flow entry does not match any data stream during the idle time. If the flow entry has no idle timeout, the field displays <b>0</b> .

Field	Description
flags	<p>Flags that the flow entry includes:</p> <ul style="list-style-type: none"> <li>• <b>flow_send_rem</b>—Sends a flow removed message when the flow entry is removed or expires.</li> <li>• <b>check_overlap</b>—Checks for overlapping flow entries.</li> <li>• <b>reset_counts</b>—Resets flow table counters.</li> <li>• <b>no_pkt_counts</b>—Does not count packets.</li> <li>• <b>no_byte_counts</b>—Does not count bytes.</li> </ul> <p>If the flow entry does not include any flags, this field displays <b>none</b>.</p>
byte count	Number of bytes that have matched the flow entry.
packet count	Number of packets that have matched the flow entry.
Create time	Time when the flow entry was created.
Last modified time	Time when the flow entry was modified for the last time.
Match information	Contents of the match field of the flow entry (see <a href="#">Table 4</a> ).
Instruction information	<p>Contents of the instruction set of the flow entry:</p> <ul style="list-style-type: none"> <li>• <b>Set meter</b>—Sends the matched packet to a specific meter.</li> <li>• <b>Write metadata</b>—Writes the value into the metadata fields of the matched packet. Metadata is used for passing messages between flow tables.</li> <li>• <b>Write metadata mask</b>—Specifies which bits of the metadata should be modified.</li> <li>• <b>Goto table</b>—Sends the matched packet to the next flow table for processing.</li> <li>• <b>Clear actions</b>—Immediately clears all actions in the action set.</li> <li>• <b>Apply actions</b>—Immediately applies specified actions in the action set.</li> <li>• <b>Write actions</b>—Writes specified actions into the current action set.</li> </ul> <p>For more information about actions, see <a href="#">Table 5</a>.</p>

**Table 4 Match field types (supported fields vary by device model)**

Field	Mask field	Description
Input interface	N/A	Ingress port (see <a href="#">Table 6</a> ).
Physical input interface	N/A	Ingress physical port.
Metadata	Metadata mask	Metadata and mask.
Ethernet destination MAC address	Ethernet destination MAC address mask	Ethernet destination MAC address and mask.
Ethernet source MAC address	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.

Field	Mask field	Description
IPv4 source address	Mask	IPv4 source address and mask.
IPv4 destination address	Mask	IPv4 destination address and mask.
TCP source port	Mask	TCP source port and mask.
TCP destination port	Mask	TCP destination port and mask.
UDP source port	Mask	UDP source port and mask.
UDP destination port	Mask	UDP destination port and mask.
SCTP source port	Mask	Stream Control Transmission Protocol (SCTP) source port and mask.
SCTP destination port	Mask	SCTP destination port and mask.
ICMPv4 type	N/A	ICMPv4 type.
ICMPv4 code	N/A	ICMPv4 code.
ARP opcode	N/A	ARP opcode.
ARP source IPv4 address	Mask	Sender IPv4 address and mask in the ARP payload.
ARP target IPv4 address	Mask	Target IPv4 address and mask in the ARP payload.
ARP source MAC address	ARP source MAC address mask	Sender MAC address and mask in the ARP payload.
ARP target MAC address	ARP target MAC address mask	Target MAC address and mask in the ARP payload.
IPv6 source address	IPv6 source address mask	Source IPv6 address and mask.
IPv6 destination address	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.
IPv6 ND target address	N/A	Target IP address in an IPv6 Neighbor Discovery message.
IPv6 ND source MAC address	N/A	Source link-layer address in an IPv6 Neighbor Discovery message.
IPv6 ND target MAC address	N/A	Target link-layer address in an IPv6 Neighbor Discovery message.
MPLS label	N/A	Label in the first MPLS header.
MPLS tc	N/A	Traffic Class (TC) in the first MPLS header.
MPLS bos	N/A	Bottom of stack flag in the MPLS label.
Tunnel ID	Mask	Metadata and mask that are associated with a logical port.
IPv6 extension header	Mask	IPv6 extension header and mask.
Output interface	N/A	Output port.
VRF index	N/A	VPN index.
Fragment	N/A	Fragment.

Field	Mask field	Description
Physical output interface	N/A	Output physical port.
CVLAN ID	Mask	CVLAN ID and mask.
Experimenter	N/A	Extension matching fields. <b>Address ID</b> represents the unique identifier of an address.

**Table 5 Actions**

Field	Description
Drop	Drops the matched packet. This action is not defined in the OpenFlow specifications.
Output interface	Sends the packet through a specific port. For more information about ports, see <a href="#">Table 6</a> .
Group	Specifies a group table to process the packet.
Set queue	Maps the flow entry to a queue specified by its ID.
Set field	Modifies a field of the packet.

**Table 6 Ports**

Port name	Ingress port	Output port	Description
Normal	Not supported.	Supported.	Processing the packet by using the normal forwarding process.
Flood	Not supported.	Supported.	Flooding the packet.
All	Not supported.	Supported.	Forwarding the packet out of all ports.
Controller	Supported.	Supported.	Sending the packet to the controller.
Local	Supported.	Supported.	Sending the packet to the local CPU.
<i>port name</i>	Supported.	Supported.	Valid physical or logical port on the switch.

## display openflow group

Use `display openflow group` to display group 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 you do not specify a group ID, this command displays information about all group entries for an OpenFlow instance.

## Examples

```
# Display group information for OpenFlow instance 100.
<Sysname> display openflow instance 100 group
Instance 100 group table information:
  Group count: 2

Group entry 103:
  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: BAGG100
  Bucket 2 information:
    Action count 1, watch port: any, watch group: any
    Byte count 0, packet count 0
    Output interface: Controller, send length: 128 bytes
  Referenced information:
    Count: 3
    Flow table 0
    Flow entry: 1, 2, 3

Group entry 104:
  Some buckets are invalid.
  Type: All, byte count: 0, packet count: 0
  Bucket 1 information:
    Action count 2, watch port: any, watch group: any
    Byte count 0, packet count 0
    Output interface: Controller, send length: 128 bytes
  Referenced information:
    Count: 0
```

**Table 7 Command output**

Field	Description
Group count	Total number of group entries included in the OpenFlow instance.
Some buckets are invalid.	Some buckets of the group entry are invalid because the hardware resources are insufficient or the device fails.
Type	Type of the group entry. The value of <b>All</b> indicates that the device executes all buckets in the group. This group is used for multicast or broadcast forwarding.
Bucket	Buckets included in the group table.
Action count	Number of actions included in the bucket.
Byte count	Number of bytes processed by a group or by a bucket. If the statistics cannot be collected, this field displays two hyphens (--).
packet count	Number of packets processed by a group or by a bucket. If the statistics cannot be collected, this field displays two hyphens (--).
watch port	Port whose state affects whether this bucket is live.
watch group	Group whose state affects whether this bucket is live.

Field	Description
Output interface	OpenFlow port to which packets are forwarded.
Referenced information	Information about the group entry used by flow entries.
Count	Total number of flow entries that use the group entry.
Flow table	Flow table to which the flow entries that use the group entry belong.
Flow entry	Flow entries that use 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. If you do not specify an instance ID, this command displays detailed information about all OpenFlow instances.

### Examples

# Display detailed information about all OpenFlow instances.

```
<Sysname> display openflow instance
Instance 100 information:

Configuration information:
  Description      : test-desc
  Active status   : Active
  Inactive configuration:
    None
  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: Disabled
  TCP DSCP value: 10
  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
Qinq Network: Disabled
TCP connection backup: Enabled
Port information:
  Twenty-FiveGigE1/0/3
Active channel information:
  Controller 1 IP address: 192.168.49.49  port: 6633
  Controller 2 IP address: 192.168.43.49  port: 6633
...

```

**Table 8 Command output**

Field	Description
Configuration information	Information about the configuration.
Description	Description of the OpenFlow instance.
Active status	OpenFlow instance status: <b>Active</b> or <b>Inactive</b> .
Inactive configuration	Inactive configuration for the OpenFlow instance.
Active configuration	Active configuration for the OpenFlow instance.
Classification: VLAN, total VLANs	VLANs that are associated with the OpenFlow instance and the total number of these VLANs.
loose mode	The loose mode is used.
In-band management VLAN, total VLANs	Inband management VLANs and the total number of them.
Connect mode	Connection mode of the controller: <ul style="list-style-type: none"> <li>• <b>Single</b>—The OpenFlow instance connects to only one controller at a time.</li> <li>• <b>Multiple</b>—The OpenFlow instance can simultaneously connect to multiple controllers.</li> </ul>
MAC address learning	Whether MAC address learning is disabled: <b>Enabled</b> or <b>Disabled</b> .
TCP DSCP value	DSCP value for OpenFlow packets.
Flow table	Flow table information for the OpenFlow instance.
Table ID(type)	Type of the flow table: <ul style="list-style-type: none"> <li>• MAC-IP.</li> <li>• Extensibility.</li> </ul>
count	Total number of flow entries included in the current flow table.
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: <b>Permit</b> or <b>Drop</b> .
Forbidden port	Type of interfaces that are forbidden to be reported to the controller: <ul style="list-style-type: none"> <li>• <b>L3 Physical Interface</b>—Layer 3 Ethernet interfaces and Layer 3 aggregate interfaces.</li> <li>• <b>VLAN interface</b>.</li> </ul>



Field	Description
Qinq Network	Whether the OpenFlow instance is enabled to perform Qinq tagging for double-tagged packets passing an extensibility flow table: <ul style="list-style-type: none"> <li>• <b>Disabled.</b></li> <li>• <b>Enabled.</b></li> </ul>
TCP connection backup	Whether OpenFlow connection backup is enabled: <ul style="list-style-type: none"> <li>• <b>Disabled.</b></li> <li>• <b>Enabled.</b></li> </ul>
Port information	Ports that have been added to the OpenFlow instance.
Active channel information	Information about active channels.
IP address	IP address of the controller configured for the OpenFlow instance.
Port	TCP port number that is used to connect to the controller.
Failopen mode	Connection interruption mode for the OpenFlow instance: <ul style="list-style-type: none"> <li>• <b>Standalone.</b></li> <li>• <b>Smart.</b></li> <li>• <b>Secure.</b></li> </ul>

## display openflow meter

Use `display openflow meter` to display meter 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 1 to 4294901760. If you do not specify a meter ID, this command displays information about all meter entries for an OpenFlow instance.

### Examples

```
# Display meter 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: 0, packet count: 0
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: 0, packet count: 0
Referenced information:
  Count: 0

```

**Table 9 Command output**

Field	Description
Group entry count	Total number of meter entries that the OpenFlow instance has.
Meter flags	Flags configured for the meter: <ul style="list-style-type: none"> <li>• <b>KBPS</b>—The rate value is in kbps.</li> <li>• <b>PKTPS</b>—The rate value is in pps.</li> <li>• <b>BURST</b>—The burst size field in the band is used and the length of the packet or byte burst is determined by the burst size.</li> <li>• <b>STATS</b>—Meter statistics are collected.</li> </ul>
Band	Bands contained in the meter.
Type	Type of the band: <ul style="list-style-type: none"> <li>• <b>drop</b>—Discard the packet.</li> <li>• <b>dscp_remark</b>—Modify the drop precedence of the DSCP field in the IP header of the packet.</li> </ul>
Rate	Rate value above which the corresponding band applies 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 the statistics cannot be collected, this field displays two hyphens (--).
packet count	Number of packets processed by a band. If the statistics cannot be collected, this field displays two hyphens (--).
Referenced information	Information about the meter entry used by flow entries.
Count	Total number of flow entries that use the meter entry.
Flow table	Flow table to which the flow entries that use the meter entry belong.
Flow entry	Flow entries that use the meter entry.

## display openflow summary

Use `display openflow summary` to display brief OpenFlow instance information.

## Syntax

```
display openflow instance summary
```

## Views

Any view

## Predefined user roles

network-admin

network-operator

## Examples

# Display brief OpenFlow instance information.

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

Fail-open mode: Se - Secure mode, Sa - Standalone mode, Sm - Smart mode

ID	Status	Datapath-ID	Channel	Table-num	Port-num	Reactivate
1	Active	0x0000000100001221	Connected	2	8	N
10	Inactive	-	-	-	-	-
4094	Active	0x00000ffe00001221	Failed(Sa)	2	0	N

**Table 10 Command output**

Field	Description
ID	OpenFlow instance ID.
Status	Activation status of the OpenFlow instance: <ul style="list-style-type: none"><li>• <b>Active</b>—The OpenFlow instance has been activated.</li><li>• <b>Inactive</b>—The OpenFlow instance has not been activated.</li></ul>
Datapath-ID	Datapath ID of the OpenFlow instance. If the OpenFlow instance is not activated, this field displays a hyphen (-).
Channel	Status of the OpenFlow channel to the controller: <ul style="list-style-type: none"><li>• <b>Connected</b>—An OpenFlow channel has been established.</li><li>• <b>Failed(Se)</b>—The OpenFlow channel is disconnected from the controller, and the OpenFlow instance uses the <b>secure</b> connection interruption mode.</li><li>• <b>Failed(Sm)</b>—The OpenFlow channel is disconnected from the controller, and the OpenFlow instance uses the <b>smart</b> connection interruption mode.</li><li>• <b>Failed(Sa)</b>—The OpenFlow channel is disconnected from the controller, and the OpenFlow instance uses the <b>standalone</b> connection interruption mode.</li></ul> If the OpenFlow instance is not activated, this field displays a hyphen (-).
Table num	Number of flow tables that the OpenFlow instance has. If the OpenFlow instance is not activated, this field displays a hyphen (-).
Port num	Number of ports that belong to the OpenFlow instance. If the OpenFlow instance is not activated, this field displays a hyphen (-).
Reactivate	Whether the OpenFlow instance is required to be reactivated. <b>N</b> indicates the configuration is unchanged and the OpenFlow instance is not required to be reactivated. If the OpenFlow instance is not activated, this field displays a hyphen (-).

## 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 | smart | standalone }  
undo fail-open mode
```

### Default

The connection interruption mode is **secure**.

### 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. The OpenFlow switch does not remove unexpired flow entries.

**smart**: Configures the OpenFlow switch to use flow tables for traffic forwarding after it is disconnected from all controllers. If the output action in a matching flow entry is to forward traffic to a controller, the traffic is forwarded in normal process.

**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 for an extensibility flow table on an OpenFlow switch.

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 have a maximum of 65535 flow entries.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

## Parameters

*limit-value*: Specifies the maximum number of flow entries for an extensibility flow table. The value range for this argument is 1 to 65535.

## Usage guidelines

If the number of extensibility flow table entries deployed from a controller to an OpenFlow switch exceeds the maximum, the switch returns a failure message to the controller.

## Examples

```
# Configure OpenFlow instance 1 to have a maximum of 256 entries in each extensibility flow table.
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] flow-entry max-limit 256
```

## flow-log disable

Use **flow-log disable** to disable logging for successful flow table modifications.

Use **undo flow-log disable** to restore the default.

### Syntax

```
flow-log disable
undo flow-log disable
```

### Default

Logging for successful flow table modifications is enabled.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

## Examples

```
# Disable logging for successful flow table modifications for OpenFlow instance 1.
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] flow-log disable
```

## flow-table

Use **flow-table** to configure the flow table type and the flow table ID for an OpenFlow instance.

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

### Syntax

```
flow-table { ingress-vlan ingress-table-id | mac-ip mac-ip-table-id |
extensibility extensibility-table-id | egress-vlan egress-table-id }*
undo flow-table
```

### Default

An OpenFlow instance has an extensibility flow table with ID 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.

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

**extensibility** *extensibility-table-id*: Specifies an extensibility 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

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

The ID you enter for an extensibility flow table must be greater than the ID for an MAC-IP flow table.

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 OpenFlow instance uses the **standalone** connection interruption mode.

## Examples

```
# Create 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
```

## Related commands

```
qinq-network enable
```

# forbidden packet-in arp controller

Use **forbidden packet-in arp controller** to configure controllers to which ARP packets are forbidden to be reported.

Use **undo forbidden packet-in arp controller** to restore the default.

## Syntax

```
forbidden packet-in arp controller controller-id-list
undo forbidden packet-in arp controller [controller-id-list ]
```

## Default

No controllers to which ARP packets are forbidden to be reported are configured.

## Views

OpenFlow instance view

## Predefined user roles

network-admin

## Parameters

*controller-id-list*: Specifies a space-separated list of a maximum of 10 controller items. Each item specifies a controller ID or a range of controller IDs in the form of *controller-id1* to *controller-id2*. The value range for controller IDs is 0 to 63. The value for the *controller-id2* argument must be equal to or greater than the value for the *controller-id1* argument. If you do not specify the *controller-id-list* argument, the **undo** form of this command restores all configuration of this feature to the default.

## Examples

```
# Forbid the device not to report ARP packets to controller 0.
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] forbidden packet-in arp controller 0
```

# forbidden port

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

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

## Syntax

```
forbidden port { l3-physical-interface | vlan-interface | vsi-interface }
*
undo forbidden port
```

## Default

No port types are prevented from being reported to the controllers. All ports that belong to an OpenFlow instance are reported to the controllers.

## Views

OpenFlow instance view

## Predefined user roles

network-admin

## Parameters

**l3-physical-interface**: Specifies Layer 3 Ethernet interfaces and Layer 3 aggregate interfaces that belong to an OpenFlow instance.

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

**vsi-interface**: Specifies virtual switch instance (VSI) interfaces that belong to an OpenFlow instance. This field is not supported in the current software version.

## Examples

```
# Forbid OpenFlow instance 1 from reporting 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 for an OpenFlow instance.

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

### Syntax

```
in-band management vlan { vlan-id [ to vlan-id ] } &<1-10>
undo in-band management vlan
```

### Default

No inband management VLANs are configured for an OpenFlow instance.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Parameters

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

### Usage guidelines

Traffic in inband management VLANs is forwarded in the normal forwarding process for an OpenFlow instance to establish secure connections to controllers.

### Examples

```
# Configure VLAN 10 as the inband management VLAN for OpenFlow instance 1.
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] in-band management vlan 10
```

## listening port

Use **listening port** to configure an OpenFlow instance to act as an SSL server to listen to controllers.

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

### Syntax

```
listening port port-number ssl ssl-policy-name
undo listening port
```

### Default

An OpenFlow instance is not configured to acts as an SSL server to listen to controllers.

### Views

OpenFlow instance view

### Predefined user roles

network-admin



## Parameters

*port-number*: Specifies the SSL server port number in the range of 1 to 65535.

**ssl** *ssl-policy-name*: Specifies the SSL server policy name, a case-insensitive string of 1 to 31 characters.

## Usage guidelines

Typically, an OpenFlow instance actively connects to the controller and acts as a TCP/SSL client. After the SSL server is enabled for an OpenFlow instance, the controller acts as the SSL client and actively connects to the OpenFlow instance. For more information about SSL, see *Security Configuration Guide*.

To re-configure the SSL server, first execute the **undo** form of the command to delete the existing SSL server configuration.

## Examples

```
# Configure OpenFlow instance 1 to act as an SSL server with port number 20000 and SSL server policy name ssl_name.
```

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

```
[Sysname] openflow instance 1
```

```
[Sysname-of-inst-1] listening port 20000 ssl ssl_name
```

# loop-protection enable

Use **loop-protection enable** to enable loop guard for an OpenFlow instance.

Use **undo loop-protection enable** to restore the default.

## Syntax

```
loop-protection enable
```

```
undo loop-protection enable
```

## Default

Loop guard is disabled for an OpenFlow instance.

## Views

OpenFlow instance view

## Predefined user roles

network-admin

## Usage guidelines

After an OpenFlow instance is deactivated, loops might occur in VLANs associated with the OpenFlow instance. To avoid loops, you can enable loop guard for the OpenFlow instance. This feature enables the deactivated OpenFlow instance to create a flow entry for dropping all traffic in these VLANs.

## Examples

```
# Enable loop guard for OpenFlow instance 1.
```

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

```
[Sysname] openflow instance 1
```

```
[Sysname-of-inst-1] loop-protection enable
```

## mac-ip dynamic-mac aware

Use **mac-ip dynamic-mac aware** to configure an OpenFlow instance to support matching the dynamic MAC addresses in the query and deletion flow entry instructions sent from controllers.

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 the dynamic MAC addresses in the query and deletion flow entry instructions sent from controllers.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Usage guidelines

This command takes effect only on MAC-IP flow tables.

### Examples

```
# Configure OpenFlow instance 1 to support matching the dynamic MAC addresses in the query and
deletion flow entry instructions sent from controllers.
<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 in 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 allowed for VLANs associated with an OpenFlow instance.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Examples

```
# Forbid MAC address learning in 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 its view, or enter the view of an existing OpenFlow instance.

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

### Syntax

```
openflow instance instance-id  
undo openflow instance instance-id
```

### Default

No OpenFlow instances exist.

### 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 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

Packet loss prevention ensures successful OpenFlow forwarding without packet loss. In an OpenFlow network, packet loss might occur on the switch during the flow entry deployment process.

Packet loss then causes OpenFlow forwarding errors. For example, traffic is mistakenly sent to controllers and the controllers deploy faulty flow entries.

When this feature is enabled, the OpenFlow matching ability is decreased. For example, packets cannot be matched by IPv6 address.

To avoid the forwarding efficiency and matching ability decrease, do not enable this feature in non-OpenFlow networks.

After you enable or disable packet loss prevention on a switch, save the configuration and restart the switch to make the configuration take effect.

## Examples

```
# Enable packet loss prevention for OpenFlow forwarding.
<Sysname> system-view
[Sysname] openflow lossless enable
  Enable lossless traffic function? [Y/N]:y
  For the setting to take effect, save the configuration, and then reboot the device.
```

## openflow shutdown

Use **openflow shutdown** to shut down an interface by OpenFlow.

Use **undo openflow shutdown** to restore the default.

### Syntax

```
openflow shutdown
undo openflow shutdown
```

### Default

An interface is not shut down by OpenFlow.

### Views

Interface view

### Predefined user roles

network-admin

### Usage guidelines

After an interface is shut down by OpenFlow, the **Current state** field displays **OFF DOWN** in the **display interface** command output.

To bring up an interface shut down by OpenFlow, use either of the following methods:

- Use the **undo openflow shutdown** command on the interface.
- Use the controller to send port modification messages to the interface.

## Examples

```
# Shut down Twenty-FiveGigE 1/0/1 by OpenFlow.
<Sysname> system-view
[Sysname] interface twenty-fivegige 1/0/1
[Sysname-Twenty-FiveGigE1/0/1] openflow shutdown
```

## permit-port-type member-port

Use `permit-port-type member-port` to allow link aggregation member ports to be in the deployed flow tables.

Use `undo permit-port-type` to restore the default.

### Syntax

```
permit-port-type member-port
undo permit-port-type
```

### Default

Link aggregation member ports cannot be in the deployed flow tables.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Examples

```
# Configure OpenFlow instance 1 to allow link aggregation member ports to be in the deployed flow tables.
```

```
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] permit-port-type member-port
```

## precedence dynamic arp

Use `precedence dynamic arp` to allow dynamic ARP entries to overwrite OpenFlow ARP entries.

Use `undo precedence dynamic` to restore the default.

### Syntax

```
precedence dynamic arp
undo precedence dynamic arp
```

### Default

An OpenFlow instance does not allow dynamic ARP entries to overwrite OpenFlow ARP entries.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Usage guidelines

This command takes effect only on the MAC-IP flow table of an OpenFlow instance.

### Examples

```
# Configure OpenFlow instance 1 to allow dynamic ARP entries to overwrite OpenFlow ARP entries.
```

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

[Sysname-of-inst-1] precedence dynamic arp

## protocol-packet filter slow

Use **protocol-packet filter slow** to configure an OpenFlow instance to drop 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 is not configured to drop slow protocol packets.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Usage guidelines

The slow protocols include LACP and OAM.

### Examples

```
# Configure 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. Then, double-tagged packets keep double-tagged after 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

### 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
```

## Related commands

**flow-table**

# refresh ip-flow

Use **refresh ip-flow** to refresh all Layer 3 flow entries in the MAC-IP flow tables for an OpenFlow instance.

## Syntax

```
refresh ip-flow
```

## Views

OpenFlow instance view

## Predefined user roles

network-admin

## Usage guidelines

Layer 3 flow entries in the MAC-IP flow tables might be overwritten. In such cases, you can use this command to obtain all Layer 3 flow entries in the MAC-IP flow tables from the controller again.

## Examples

# Refresh all Layer 3 flow entries in the MAC-IP flow tables for OpenFlow instance 1.

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

# reset openflow instance statistics

Use **reset openflow instance 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 ] | listened } statistics
```

## Views

User view

## Predefined user roles

network-admin

## 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 you do not specify a controller ID, this command clears statistics on packets that all controllers send and receive for an OpenFlow instance.

**listened**: Specifies the client that connects to the server enabled for the OpenFlow instance.

## Examples

```
# Clear statistics on packets that all controllers send and receive for OpenFlow instance 1.
<Sysname> reset openflow instance 1 controller statistics
```

## tcp dscp

Use `tcp dscp` to set a DSCP value for OpenFlow packets.

Use `undo tcp dscp` to restore the default.

### Syntax

```
tcp dscp dscp-value
undo tcp dscp
```

### Default

The DSCP value for OpenFlow packets is not set.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Parameters

*dscp-value*: Specifies a DSCP value for OpenFlow packets, in the range of 0 to 63.

## Examples

```
# Set the DSCP value to 63 for OpenFlow packets.
<Sysname> system-view
[Sysname] openflow instance 1
[Sysname-of-inst-1] tcp dscp 63
```

## tcp-connection backup

Use `tcp-connection backup` to enable OpenFlow connection backup.

Use `undo tcp-connection backup` to disable OpenFlow connection backup.

### Syntax

```
tcp-connection backup
undo tcp-connection backup
```

### Default

OpenFlow connection backup is enabled.

### Views

OpenFlow instance view

### Predefined user roles

network-admin

### Usage guidelines

This command enables an OpenFlow instance to back up OpenFlow connections established over TCP. This prevents connection interruption when an active/standby switchover occurs.



This feature is available only on an IRF fabric with two member devices.

## Examples

# Disable OpenFlow connection backup for OpenFlow instance 1.

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

```
[Sysname] openflow instance 1
```

```
[Sysname-of-inst-1] undo tcp-connection backup
```