

1 OpenFlow Commands

Command	Function
of connect-interval	Configure the interval at which an OpenFlow device reconnects to a controller.
of controller-ip	Enable the OpenFlow function on a device.
of echo-interval	Configure the echo request sending interval on an OpenFlow device.
of mode	Configure the single-controller or multi-controller mode for an OpenFlow device.
of packet table-lookup	Configure the table-lookup mode for OpenFlow packets.
of packet vlantag	Configure a VLAN tag for OpenFlow packets sent to the controller.
of source-ip	Configure the source IP address of an OpenFlow device to connect to a controller.
show of	Display the status of the connection between an OpenFlow device and a controller.
show of flowtable	Display the flow entries of an OpenFlow device.
show of port	Display the current port information of an OpenFlow device.
show of group	Display the group table information of an OpenFlow device.
show of meter	Display the meter table information of an OpenFlow device.
show of mergedflow	Display the merged entry information of an OpenFlow device.

1.1 of connect-interval

Function

Run the **of connect-interval** command to configure the interval at which an OpenFlow device reconnects to a controller.

The default interval at which an OpenFlow device reconnects to a controller is **6** seconds.

Syntax

of connect-interval *interval*

Parameter Description

interval: Controller reconnection interval, in seconds. The value range is from 5 to 120.

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

N/A

Examples

The following example sets the interval at which an OpenFlow device reconnects to a controller to 10 seconds.

```
Hostname> enable
Hostname# configure terminal
Hostname(config)# of connect-interval 10
```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.2 of controller-ip

Function

Run the **of controller-ip** command to enable the OpenFlow function on a device.

Run the **no** form of this command to disable this function.

The OpenFlow function of a device is disabled by default.

Syntax

```
of controller-ip ipv4-address [ port port-number ] [ aux ] interface interface-type interface-number  
no of controller-ip [ ipv4-address ]
```

Parameter Description

ipv4-address: IP address of a controller. If this parameter is removed from the **no** form of this command, all controllers are disabled.

port *port-number*: Configures the port number of a controller. The value range is from 0 to 65535. For OpenFlow 1.0, the default value is **6633**. For OpenFlow 1.3, the default value is **6653**.

aux: Specifies an auxiliary connection switch (available in OpenFlow 1.3).

interface-type interface-number: Interface type and interface number. The interface can be an out-of-band management interface or a common in-band Ethernet interface.

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

This command is used to configure the OpenFlow function on a device. In OpenFlow 1.0, only one controller can be connected. In OpenFlow 1.3, a maximum of three controllers can be connected once.

Examples

The following example enables the OpenFlow function on a device and sets the IP address of connecting to a controller to 192.168.21.57.

```
Hostname> enable  
Hostname# configure terminal  
Hostname(config)# of controller-ip 192.168.21.57 interface mgmt 0
```

Notifications

N/A

Common Errors

Multiple controllers are connected through different ports.

Platform Description

N/A

Related Commands

N/A

1.3 of echo-interval

Function

Run the **of echo-interval** command to configure the echo request sending interval on an OpenFlow device.

The default echo request sending interval of an OpenFlow device is **5** seconds.

Syntax

```
of echo-interval interval
```

Parameter Description

interval: Echo request sending interval of an OpenFlow device, in seconds. The value range is from 2 to 15.

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

N/A

Examples

The following example sets the echo request sending interval for an OpenFlow device to 10 seconds.

```
Hostname> enable
Hostname# configure terminal
Hostname(config)# of echo-interval 10
```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.4 of mode

Function

Run the **of mode** command to configure the single-controller or multi-controller mode for an OpenFlow device.

Run the **no** form of this command to remove this configuration.

An OpenFlow device works in multi-controller mode by default.

Syntax

of mode { multiple | single }
no of mode

Parameter Description

multiple: Multi-controller mode.
single: Single-controller mode.

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

This command is used to configure the single-controller or multi-controller mode. The configured mode takes effect when an OpenFlow controller is connected.

Examples

The following example enables the multi-controller mode for an OpenFlow device.

```
Hostname> enable
Hostname# configure terminal
Hostname(config)# of mode multiple
```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.5 of packet table-lookup

Function

Run the **of packet table-lookup** command to configure the table-lookup mode for OpenFlow packets.

Run the **no** form of this command to remove this configuration.

The table-lookup mode is enabled for OpenFlow packets by default.

Syntax

of packet table-lookup { disable | enable }

no of packet table-lookup**Parameter Description**

disable: Disables the table-lookup mode for OpenFlow packets.

enable: Enables the table-lookup mode for OpenFlow packets.

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

N/A

Examples

The following example disables the table-lookup mode for OpenFlow packets.

```
Hostname> enable
Hostname# configure terminal
Hostname(config)# of packet table-lookup disable
```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.6 of packet vlantag

Function

Run the **of packet vlantag** command to configure a VLAN tag for OpenFlow packets sent to the controller.

Run the **no** form of this command to remove this configuration.

Packets sent to a controller by an OpenFlow device contain the VLAN tag by default.

Syntax

of packet vlantag

no of packet vlantag

Parameter Description

N/A

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

N/A

Examples

The following example removes the VLAN tag from packets sent to the controller.

```
Hostname> enable
Hostname# configure terminal
Hostname(config)# no of packet vlantag
```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.7 of source-ip

Function

Run the **of source-ip** command to configure the source IP address of an OpenFlow device to connect to a controller.

No source IP address is configured for the OpenFlow device, and the IP address of the connection port is the source IP address by default.

Syntax

of source-ip *ipv4-address*

Parameter Description

ipv4-address: Source IP address for connecting to a controller.

Command Modes

Global configuration mode

Default Level

14

Usage Guidelines

N/A

Examples

The following example sets the source IP address of a network device to connect to a controller to 192.168.197.25.

```
Hostname> enable
Hostname# configure terminal
Hostname(config)# of source-ip 192.168.197.25
```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.8 show of

Function

Run the **show of** command to display the status of the connection between an OpenFlow device and a controller.

Syntax

```
show of
```

Parameter Description

N/A

Command Modes

All modes except the user EXEC mode

Default Level

14

Usage Guidelines

N/A

Examples

The following example displays the status of the connection between an OpenFlow device and a controller.

```
Hostname> enable
```



```

Hostname# show of
version:openflow1.3, controller[0]:tcp:172.18.2.35 port6653 interface
GigabitEthernet1/0/7, main is connected, aux is disable, role is master.
Current controller mode : multiple.
Current packet process mode : Lookup all flow.
Datapath id = 897516188948
Source IP = 192.168.197.25

```

Table 1-1Output Fields of the show of Command

Field	Description
version	Version of the OpenFlow controller
controller	Connection between an OpenFlow device and a controller
Echo interval	Echo request sending interval
Current packet process mode	OpenFlow packet processing mode
Current controller mode	Controller mode: <ul style="list-style-type: none"> ● multiple: Multi-controller mode ● single: Single-controller mode
Datapath id	ID of a data path
Source IP	Source IP address for connecting to a controller

Notifications

If the SDN controller connection function is enabled and the OpenFlow 1.0 controller is connected, the following notification will be displayed:

```
Controller is 172,18.2.35 port 6633,connected.
```

If the SDN controller connection function is enabled and the OpenFlow 1.3 controller is connected, the following notification will be displayed:

```

Hostname# show of
version:openflow1.3, controller[0]:tcp:172.18.2.35 port6653 interface
GigabitEthernet1/0/7, main is connected, aux is disable, role is master.
Current controller mode : multiple.
Current packet process mode : Lookup all flow.
Datapath id = 897516188948
Source IP = 192.168.197.25

```

If the SDN controller connection function is enabled but the OpenFlow 1.0 controller is not connected, the following notification will be displayed:

```
Controller is 172.18.2.35 port 6633,disconnect.
```

If the SDN controller connection function is not enabled and the OpenFlow 1.3 controller is not connected, the following notification will be displayed:

```
version:openflow, controller[0]:tcp:172.18.2.35 port6653 interface
GigabitEthernet1/0/7, main is disconnected, aux is disable,
Current controller mode : multiple.
Current packet process mode : Lookup all flow.
Source IP = 192.168.197.25
```

If the SDN controller connection function is not enabled, the following notification will be displayed:

```
openflow is closed!
```

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.9 show of flowtable

Function

Run the **show of flowtable** command to display the flow entries of an OpenFlow device.

Syntax

show of flowtable

Parameter Description

N/A

Command Modes

All modes except the user EXEC mode

Default Level

14

Usage Guidelines

Before this command is run, run the **of controller-ip** command to enable the SDN controller connection function so that port information can be normally displayed.

Examples

The following example displays the flow entries of an OpenFlow 1.0 device.

```
Hostname> enable
Hostname# show of flowtable
openflow flow count = 1
*****FLOW START*****
KEY:
          SMAC          DMAC          SIP          DIP
```

```

00:d0:f8:56:d3:22    00:d0:f8:a3:62:13    NA    NA
      INPORT      VLANID      ETYPE      VLAN_PRIORITY
      26          NA          NANA
      TCP/UDP_SPORT  TCP/UDP_DPORT  DSCP      IP_PROTOCOL
      NA          NANANA
WILDCARDSIP_MASKDIP_MASK
      3ffff2          NA          NA
PRIORITYIDLE_TIMEOUTHARD_TIMEOUTSEND_FLOW_REM
      120          0          0          0
-----
ACTION:
ACTION_SIZE = 8
OUTPUT_PORT = 7
*****FLOW END*****
    
```

Table 1-1Output Fields of the show of flowtable Command

Field	Description
KEY	Keyword field of a flow table
SMAC	Source MAC address
DMAC	Destination MAC address
SIP	Source IP address
DIP	Destination IP address
INPORT	Input port
VLANID	VLAN ID
ETYPE	Ethernet packet type domain
VLAN PRIORITY	Priority domain in the VLAN field
TCP/UDP_SPORT	Source port ID on the transport layer
TCP/UDP_DPORT	Destination port ID on the transport layer
DSCP	Differentiated Services Code Point (DSCP) domain on the IP layer
IP_PROTOCOL	Protocol domain on the IP layer
WILDCARD	Mask bit in the OpenFlow protocol, specifying valid domains
SIP_MASK	Mask in the source IP address
DIP_MASK	Mask in the destination IP address
PRIORITY	Priority of an entry
IDLE_TIMEOUT	Idle aging time of an entry

Field	Description
HARD_TIMEOUT	Absolute aging time of an entry
SEND_FLOW_REM	Whether to notify the controller of entry aging. 1 : Notify; 0 : Not notify.
ACTION	Action field of a flow table
ACTION_SIZE	Size of the action field of a flow table size
OUTPUT_PORT	Output port of a flow table
SET_VLAN_ID	VLAN ID to be configured
SET_VLAN_PCP	Priority of the VLAN to be configured
STRIP_VLAN	VLAN to be stripped
SET_SMAC	Source MAC address to be configured
SET_DMAC	Destination MAC address to be configured
SET_SIP	Source IP address to be configured
SET_DIP	Destination IP address to be configured
SET_IP_TOS	IP Type of Service (TOS) (DSCP) to be configured
SET_TCP_SRCPORT	TCP source port to be configured
SET_TCP_DSTPORT	TCP destination port to be configured

The following example displays the flow entries of an OpenFlow 1.3 device.

```

Hostname> enable
Hostname# show of flowItable
/*****openflow flow table[0]-flow number[5] *****/
{table="0", duration_sec="7", priority="500", flags = "0x1", idle_timeout="0",
hard_timeout="0", cookie="0x0", packet_count="0", byte_count="0".
match=oxm{in_port="6", vlan_vid="5"} instructions=[apply{acts=[output{port="1"} ]
} ] }
xid=486, sync_flag=0x0, ss_index=0x7c4
{table="0", duration_sec="7", priority="500", flags = "0x1", idle_timeout="0",
hard_timeout="0", cookie="0x0", packet_count="0", byte_count="0".
match=oxm{eth_src="00:00:00:00:00:22", eth_type="0x800"}
instructions=[apply{acts=[output{port="controller", max_len="1111"} ] } ] }
xid=327, sync_flag=0x0, ss_index=0x725
{table="0", duration_sec="7", priority="500", flags = "0x1", idle_timeout="0",
hard_timeout="0", cookie="0x0", packet_count="0", byte_count="0".
match=oxm{in_port="12", vlan_vid="1"}
instructions=[apply{acts=[output{port="1"} ] } ] }
xid=92, sync_flag=0x0, ss_index=0x63a

```

```

{table="0", duration_sec="7", priority="500", flags = "0x1", idle_timeout="0",
hard_timeout="0", cookie="0x0", packet_count="1699", byte_count="108736".
match=oxm{in_port="3", eth_src="00:00:00:00:00:44"}
instructions=[apply{acts=[output{port="controller", max_len="10000"} ] } ] }
xid=472, sync_flag=0x0, ss_index=0x7b6
{table="0", duration_sec="7", priority="500", flags = "0x1", idle_timeout="0",
hard_timeout="0", cookie="0x0", packet_count="0", byte_count="0".
match=oxm{in_port="6", vlan_vid="2"}
instructions=[apply{acts=[output{port="11"} ] } ] }
xid=475, sync_flag=0x0, ss_index=0x7b4
/*****openflow flow table end
*****/
flow total number = 5

```

Table 1-2Output Fields of the show of flowtable Command

Field	Description
Table	ID of a flow table
duration_sec	Duration of a flow table
priority	Priority of a flow table
flags	Flag bit
idle_timeout	Idle aging time of an entry
hard_timeout	Absolute aging time of an entry
cookie	NA
packet_count	Total number of packets that match entries
byte_count	Total number of packet bytes that match entries
match	Keyword that is matched by a flow
in_port	Input port
In_phy_port	Physical input port
vlan_vid	Vlan ID
vlan_pcp	VLAN priority
Eth_type	Ethernet type
Tcp_src	TCP source port
Tcp_dst	TCP destination port
Udp_src	UDP source port
Udp_dst	UDP destination port

Field	Description
eth_src	Source MAC address
eth_src_mask	Mask in the source MAC address
eth_dst	Destination MAC address
eth_dst_mask	Mask in the destination MAC address
ipv4_dst	Destination IP address
ipv4_dst_mask	Mask in the destination IP address
ipv4_src	Source IP address
ipv4_src_mask	Mask in the source IP address
ip_proto	IP protocol
ip_dscp	DSCP
instructions	Instruction keyword
Table	Keyword of next table
meta	Metadata keyword
acts	Action keyword
meter	Keyword of a meter table
port	Outbound interface for forwarding
xid	Interaction transaction ID used when the controller delivers the current flow table
sync_flag	Indicating that the current flow table is being verified. The value 0 indicates verification completed.
ss_index	ID value delivered to ss

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.10 show of port**Function**

Run the **show of port** command to display the current port information of an OpenFlow device.

Syntax**show of port****Parameter Description**

N/A

Command Modes

All modes except the user EXEC mode

Default Level

14

Usage Guidelines

Before this command is run, run the **of controller-ip** command to enable the SDN controller connection function so that port information can be normally displayed.

Examples

The following example displays the port information of an OpenFlow 1.0 device.

```

Hostname> enable
Hostname# show of port
ID      IFX      INTERFACE                               CONFIG      SPEED      LINK
DUPLICATE
1       1       GigabitEthernet 0/1                    0x0000      Unknown    DOWN
Unknown
2       2       GigabitEthernet 0/2                    0x0000      Unknown    DOWN
Unknown
3       3       GigabitEthernet 0/3                    0x0000      Unknown    DOWN
Unknown

```

The following example displays the port information of an OpenFlow 1.3 device.

```

Hostname> enable
Hostname# show of port
ID      IFX      INTERFACE                               SPEED      LINK      DUPLEX      TX_PKT
RX_PKT  CONFIG
1       1       GigabitEthernet 0/1                    Unknown    DOWN      Unknown     0         0
NA
2       2       GigabitEthernet 0/2                    Unknown    DOWN      Unknown     0         0
NA

```

```

3      3      GigabitEthernet 0/3  Unknown  DOWN  Unknown  0      0
NA

```

Table 1-1 Output Fields of the show of port Command

Field	Description
ID	Port ID
IFX	Interface index of a port
CONFIG	Port configuration by the current SDN controller
LINK	Link status of the current port
SPEED	Working rate of the current port. This field is valid to up ports only.
DUPLEX	Duplex mode status of the current port. This field is valid to up ports only.
INTERFACE	Name of the interface index of a port
TX_PKT	Number of sent packets
RX_PKT	Number of received packets

Notifications

N/A

Platform Description

N/A

Common Errors

N/A

Related Commands

N/A

1.11 show of group

Function

Run the **show of group** command to display the group table information of an OpenFlow device.

Syntax

```
show of group
```

Parameter Description

N/A

Command Modes

All modes except the user EXEC mode

Default Level

14

Usage Guidelines

This command is only valid in OpenFlow 1.3 mode.

Examples

The following example displays the current group table information.

```
Hostname> enable
Hostname# show of group
/***** openflow group table-group num[0] *****/
total group number = 0
/***** group print end *****/
*****/
```

Notifications

N/A

Platform Description

N/A

Related Commands

N/A

1.12 show of meter

Function

Run the **show of meter** command to display the meter table information of an OpenFlow device.

Syntax

```
show of meter
```

Parameter Description

N/A

Command Modes

All modes except the user EXEC mode

Default Level

14

Usage Guidelines

This command is only valid in OpenFlow 1.3 mode.

Examples

The following example displays the current meter table information.

```

Hostname> enable
Hostname# show of meter
/*****openflow meter table-meter num[0]*****/
total meter number = 0
/***** meter print end
*****/

```

Notifications

N/A

Common Errors

N/A

Platform Description

N/A

Related Commands

N/A

1.13 show of mergedflow

Function

Run the **show of mergedflow** command to display the merged entry information of an OpenFlow device.

Syntax

```
show of mergedflow
```

Parameter Description

N/A

Command Modes

All modes except the user EXEC mode

Default Level

14

Usage Guidelines

This command is only valid in OpenFlow 1.3 mode.

Examples

The following example displays the current merged entry information.

```

Hostname> enable
Hostname# show of mergedflow
/*****merged flow print begin
*****/

```

```
{index=0x2 , priority=6, idle_timeout=0, byte_count=456, pkt_count=123.
match=oxm{in_port="19", eth_type="0x800", src_fcid=0x006677,
src_fcid_mask=0x0008cf, dst_fcid=0x008899}, act=[output{port="13"} ] }
total merged flow number = 1
/***** merged flow print end
*****/
```

Table 1-1 Output Fields of the show of mergedflow Command

Field	Description
index	ID of a flow table sent to ss
priority	Priority of a flow table
idle_timeout	Idle aging time of an entry
packet_count	Total number of packets that match entries
byte_count	Total number of packet bytes that match entries
match	Keyword that is matched by a flow
in_port	Input Port
In_phy_port	Physical input port
vlan_vid	VLAN ID
vlan_pcp	VLAN priority
Eth_type	Ethernet type
Tcp_src	TCP source port
Tcp_dst	TCP destination port
Udp_src	UDP source port
Udp_dst	UDP destination port
eth_src	Source MAC address
eth_src_mask	Mask in the source MAC address
eth_dst	Destination MAC address
eth_dst_mask	Mask in the destination MAC address
ipv4_dst	Destination IP address
ipv4_dst_mask	Mask in the destination IP address
ipv4_src	Source IP address
ipv4_src_mask	Mask in the source IP address

Field	Description
ip_proto	IP protocol
ip_dscp	DSCP
act	Action keyword
meter	Keyword of a meter table
port	Outbound interface for forwarding

Notifications

N/A

Platform Description

N/A

Related Commands

N/A