

PICA8, INC.

OVS Configuration Guide

PicOS 1.6

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OVS Configuration Guide for PicOS 1.6

Table of Contents

TABLE OF CONTENTS	3
PREFACE	4
Intended Audience	4
Websites.....	4
Organization	4
CHAPTER 1. OVERVIEW	5
PicOS OVS Feature List.....	5
CHAPTER 2. SYSTEM UPDATE AND BOOT	6
Boot Process	6
Update the system with image file.....	8
CHAPTER 3. CONFIGURATION OPEN VSWITCH.....	10
Connect to OpenFlow controller.....	10
Create a bridge and add ports in bridge	10
Configure the link speed of port	11
Configure the 802.1Q and trunk port.....	11
Configure the sFlow	12
Configure the NetFlow	12
Configure the Mirroring.....	12
Configure the IPv4 flows.....	13
Configure GRE tunnel	13
Configure the MPLS.....	15
CHAPTER 4. CONFIGURATION EXAMPLE	17
Configure 802.1Q VLAN	17
Configure GRE tunnel	18
Configure one Label MPLS network	19
Configure multiple virtual bridge in system	21

Preface

Intended Audience

This guide is intended for data center administrators, system administrators and customer service staffs who are responsible for configuring the PicOS Open vSwitch (OVS).

Websites

The PicOS documents are available at the following website:

<http://www.pica8.com/documents>

Open vSwitch software documents are available at the following website:

<http://openvswitch.org/>

Open flow documents are available at the following website:

<http://www.openflow.org/>

Organization

The configuration guide is organized as following:

Chapter	Descriptions
Chap 1, "Overview".	Describes the overview of the PICA8 switch.
Chap 2. "System update and boot"	Describes the System update and boot
Chap 3. "Configuration Open vSwitch".	Describes the Configuration of OVS in PICA8.
Chap 4. "Configuration Example".	Describes the examples of configuration.

Chapter 1. Overview

This Chapter provides the overview and features of PicOS OVS. Open vSwitch is a production quality, multilayer virtual switch licensed under the open source Apache 2.0 license. PicOS OVS is the implementation of Open vSwitch on PICA8 hardware Switches.

PicOS OVS Feature List

PicOS OVS supports the following features:

Table 1-1 PICOS OVS Feature List

Supporting for NetFlow, sFlow
Supporting for Standard 802.1Q VLAN model with trunking
Supporting for link monitoring
Supporting for MPLS, GRE
Supporting for multiple virtual bridges

Chapter 2. System update and boot

This chapter describes the procedure how to update the system and boot the system.

Boot Process

Before you can get the boot information of the switch, you should make sure you have connected the console port with correct baud rate, data bits and stop bits.

- The baud rate is **115200**.
- The data bits value is **8**.
- The stop bits value is **1**.

The output message of boot-up is showed as following

```
U-Boot 1.3.0 (Mar  8 2011 - 16:39:03)

CPU:  8541, Version: 1.1, (0x80720011)
Core:  E500, Version: 2.0, (0x80200020)
Clock Configuration:
      CPU: 825 MHz, CCB: 330 MHz,
      DDR: 165 MHz, LBC:  41 MHz
L1:   D-cache 32 kB enabled
      I-cache 32 kB enabled
I2C:  ready
DRAM:  Initializing
initdram robin1
initdram robin2
robin before CFG_READ_SPD
robin after CFG_READ_SPD
initdram robin3
      DDR: 512 MB
FLASH: 32 MB
L2 cache 256KB: enabled
In:    serial
Out:   serial
Err:   serial
Net:   TSEC0, TSEC1
IDE:   Bus 0: OK
      Device 0: Model: CF 512MB Firm: 20060911 Ser#: TSS25016070309051750
              Type: Hard Disk
              Capacity: 495.1 MB = 0.4 GB (1014048 x 512)
Hit any key to stop autoboot:  5
```

In PICA8 Switch, the default choice is PICA8 XorPlus which is a switching software providing L2/L3 protocol stack and enables the community to innovate. OVS is the focus of this document, so you should choose the item “2” to boot-up. Furthermore, you can edit the default choice in boot menu editor.

```
File system OK
net.netfilter.nf_conntrack_acct = 1
net.ipv6.conf.all.forwarding = 1
 7 Apr 07:08:58 ntpdate[900]: no servers can be used, exiting
System initiating...Please wait...
Please choose which to start: Pica8 XorPlus, OpenFlow, or System shell:
(Will choose default entry if no input in 10 seconds.)
[1] Pica8 XorPlus * default
[2] Open vSwitch
[3] System shell
[4] Boot menu editor
```

```
Enter your choice (1,2,3,4):2
```

After that, you will enter the OVS CLI as following:

```
Open vSwitch is selected
```

```
Note: Defaultly, the OVS server is runned with static local management IP and port 6633.  
The default way of vswitch connecting to server is PTCP.  
If you do not want default configuration, choose manual start!
```

```
Do you want start the OVS by manual? (yes/no)
```

(1) How to start the OVS by manual

You can choose to start the OVS software by manual or by system. If user type “yes”, the system will enter into the system shell as following:

```
Do you want start the OVS by manual? (yes/no) yes  
You need start the OVS by manual!  
root@XorPlus#  
root@XorPlus#
```

After then, user can start the OVS. Firstly, user should specify the configuration database file, which contains the configurations needed by OVS initialization. You only need to create it once and the created file is located in /ovs/ovs-vswitchd.conf.db.

```
root@XorPlus# ovsdb-tool create /ovs/ovs-vswitchd.conf.db /ovs/bin/vswitch.ovsschema  
Nov 13 06:55:55|00001|lockfile|INFO|ovs/.ovs-vswitchd.conf.db.~lock~: lock file does not exist,  
creating  
root@XorPlus#
```

Secondly, user should configure how to get the IP address of the management interface eth0 and its gateway. It could be either DHCP:

```
root@XorPlus# udhcpd  
udhcpd (v1.13.3) started  
Sending discover...  
Sending select for 10.10.50.215...  
Lease of 10.10.50.215 obtained, lease time 3600  
root@XorPlus#  
PHY: 24520:01 - Link is Up - 1000/Full  
root@XorPlus#
```

Or configure them manually:

```
root@XorPlus# ifconfig eth0 10.10.50.215 netmask 255.255.255.0 up  
root@XorPlus# route add default gw 10.10.50.1  
root@XorPlus#
```

Then, user should start the OVS database server. The parameters of the command are the configuration database file and the connecting way.

```
root@XorPlus# ovsdb-server /ovs/ovs-vswitchd.conf.db --remote=ptcp:6633:10.10.50.215 &  
root@XorPlus#
```

At last, user should start the OVS daemon.

```
root@XorPlus# ovs-vswitchd tcp:10.10.50.215:6633 --pidfile=pica8 --overwrite-pidfile >  
/var/log/ovs.log 2>/dev/null &
```

(2) How to start the OVS by system

You can choose to start the OVS software by system. If you type “No”, the system will enter into the system configure shell as following:

```
System initiating...Please wait...
Please choose which to start: Pica8 XorPlus, OpenFlow, or System shell:
(Will choose default entry if no input in 10 seconds.)
[1] Pica8 XorPlus * default
[2] Open vSwitch
[3] System shell
[4] Boot menu editor
Enter your choice (1,2,3,4,5):2

Open vSwitch is selected.

Note: Defaultly, the OVS server is runned with static local management IP and port 6633.
The default way of vswitch connecting to server is PTCP.
If you do not want default configuration, choose manual start!

Do you want start the OVS by manual? (yes/no) no

Please set a static IP and netmask for the switch (e.g. 128.0.0.10/24):

After then, you can input the parameter step by step.

Please set a static IP and netmask for the switch (e.g. 128.0.0.10/24) : 10.10.50.215/24

Please set the gateway IP (e.g 172.168.1.2):10.10.50.1

Specify the file name of database for server, if not exist, it will be created:
Choose the default database file /ovs/ovs-vswitchd.conf.db!
System have found the database file!

Waitting for eth0 up .....
Done!

Adding the gateway .....
route: SIOCADDRT: File exists
Run the ovsdb-server with 10.10.50.215 and port 6633 with ptcp .....
Waitting for ovsdb-server .....
Done!

Run the ovs-vswitchd with 10.10.50.215 and port 6633 with ptcp .....
Waitting for ovs-vswitchd .....
Done!

Startup finished!
root@XorPlus#
```

Update the system with image file

Firstly, user should kill all the OVS processes by manual. Then, you can download the image and untar the image as following:

```
root@XorPlus#tftp -g -l rootfs.tar.gz -r build/baidu/3780/release/20111123_pront
o3780_revision7273/rootfs.tar.gz 10.10.50.16
root@XorPlus#
root@XorPlus#tar xzvpf rootfs.tar.gz
./bin/
./bin/mt
./bin/ash
./bin/gzip
./bin/cat
./bin/linux64
```



```
./bin/login
./bin/run-parts
./bin/egrep
./bin/umount
./bin/watch
./bin/delgroup
./bin/nice
./bin/cpio
./bin/pipe_progress
./bin/lsattr
./bin/chmod
./bin/su
./bin/catv
.....
./var/empty/
./var/run/
./var/run/utmp
root@XorPlus#
root@XorPlus#sync
root@XorPlus#
root@XorPlus#version
Pica8 Open Flow
=====
Hardware model      : Pronto 3780
Software Revision   : 7273

root@XorPlus# reboot
```

Chapter 3. Configuration Open vSwitch

This chapter describes the configuration steps of Open vSwitch, including NetFlow, sFlow, 802.1Q VLAN, monitoring.

Connect to OpenFlow controller

In the following ovs-vsctl command, the switch connects to an OF controller whose IP address is 10.10.53.50 and port number is 6636..

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 set-controller br0 tcp:10.10.53.50:6636
root@XorPlus#
```

Create a bridge and add ports in bridge

User can create one or more bridges in a PICA8 switch. Each physical port can be added to one and only one bridge.

(1) Create the bridge and add ports to this bridge

In the following example, user create a bridge br0 and add port te-1/1/1, te-1/1/2 and te-1/1/3 to br0. The default vlan-id for each port is 1.

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-br br0 -- set bridge br0
datapath_type=pica8
device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1 --
set Interface te-1/1/1 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/2 vlan_mode=access tag=1 --
set Interface te-1/1/2 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/3 vlan_mode=access tag=1 --
set Interface te-1/1/3 type=pica8
root@XorPlus#
```

(2) Configure the default vlan-id for a port

In the following example, user add the port te-1/1/3 to bridge br0 and the default VLAN-ID is 1000.

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/3 vlan_mode=trunk tag=1
trunks=1000 -- set Interface te-1/1/3 type=pica8
root@XorPlus#
```

(3) Display the bridge information

```
root@XorPlus#ovs-ofctl show br0
OFPT_FEATURES_REPLY (xid=0x1): ver:0x1, dpid:0000e89a8f503d30
n_tables:1, n_buffers:256
features: capabilities:0x87, actions:0x3f
1(ge-1/1/1): addr:e8:9a:8f:50:3d:30
config: 0
state: LINK_DOWN
current: 10MB-FD COPPER AUTO_NEG AUTO_PAUSE AUTO_PAUSE_ASYM
advertised: 10MB-FD AUTO_PAUSE
supported: 10MB-HD 10MB-FD 100MB-HD 100MB-FD 1GB-FD AUTO_NEG AUTO_PAUSE AUTO_PAUSE_ASYM
```

```

peer:      10MB-FD AUTO_PAUSE
2 (ge-1/1/2): addr:e8:9a:8f:50:3d:30
config:    0
state:     LINK_DOWN
current:   10MB-FD COPPER AUTO_NEG AUTO_PAUSE AUTO_PAUSE_ASYM
advertised: 10MB-FD AUTO_PAUSE
supported: 10MB-HD 10MB-FD 100MB-HD 100MB-FD 1GB-FD AUTO_NEG AUTO_PAUSE AUTO_PAUSE_ASYM
peer:      10MB-FD AUTO_PAUSE
3 (ge-1/1/3): addr:e8:9a:8f:50:3d:30
config:    0
state:     LINK_DOWN
current:   10MB-FD COPPER AUTO_NEG AUTO_PAUSE AUTO_PAUSE_ASYM
advertised: 10MB-FD AUTO_PAUSE
supported: 10MB-HD 10MB-FD 100MB-HD 100MB-FD 1GB-FD AUTO_NEG AUTO_PAUSE AUTO_PAUSE_ASYM
peer:      10MB-FD AUTO_PAUSE
LOCAL(br0): addr:e8:9a:8f:50:3d:30
config:    PORT_DOWN
state:     LINK_DOWN
current:   10MB-FD COPPER
OFPT_GET_CONFIG_REPLY (xid=0x3): frags=normal miss_send_len=0
root@XorPlus#
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 list-ports br0
ge-1/1/1
ge-1/1/2
ge-1/1/3
root@XorPlus#
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 list-ifaces br0
ge-1/1/1
ge-1/1/2
ge-1/1/3
root@XorPlus#
root@XorPlus#

```

(4) Delete the port from bridge and delete the bridge

```

root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 del-port br0 te-1/1/3
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 del-br br0

```

Configure the link speed of port

- In PICOS OVS, user can configure the link speed of each port as following:

(1) Configure the link speed of port

```

root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1
type=pica8 options:link_speed=1G
root@XorPlus#

```

Configure the 802.1Q and trunk port

- In PicOS OVS, each port has its default vlan-id. User can configure the port to trunk mode if user want the port belong to more than one VLAN.

(1) Configure port as a TRUNK port for multiple VLAN

```

root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/1 vlan_mode=trunk
trunk=100,200,300 -- set Interface te-1/1/1 type=pica8
root@XorPlus#

```

Configure the sFlow

- PICOS OVS support sFlow v5. User can configure the sFlow by following:

(1) Configure sFlow

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.215:6633 -- --id=@s create sFlow agent=eth0
target="\10.10.50.207:9901\" header=128 sampling=64 polling=10 -- set Bridge br0 sflow=@s
root@XorPlus#
```

In above CLI, the parameters are shown as following:

```
COLLECTOR_IP=10.10.50.207
COLLECTOR_PORT=9901
AGENT_IP=eth0
HEADER_BYTES=128
SAMPLING_N=64
POLLING_SECS=10
```

(2) Delete the sFlow

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.215:6633 -- clear Bridge br0 sflow
root@XorPlus#
```

Configure the NetFlow

- PICOS OVS supports NetFlow. User can configure the NetFlow by following:

(1) Configure NetFlow

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.215:6633 -- set Bridge br0 netflow=@nf -- --id=@nf create
NetFlow targets="\10.10.50.207:5566\" active-timeout=30
root@XorPlus#
```

In above CLI, the parameters are shown as following:

```
COLLECTOR_IP=10.10.50.207
COLLECTOR_PORT=5566
ACTIVE_TIMEOUT=30
```

(2) Delete the NetFlow

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.215:6633 -- clear Bridge br0 netflow
```

Configure the Mirroring

- PICOS OVS supports Mirroring. User can configure the Mirroring by following:

(1) Configure Mirroring

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.215:6633 -- set bridge br0 mirrors=@m -- --id=@te-1/1/1
get Port te-1/1/1 -- --id=@te-1/1/2 get Port te-1/1/2 -- --id=@te-1/1/3 get Port te-1/1/3 -- --
```

```
id=@m create Mirror name=mymirror select-dst-port=@te-1/1/1,@te-1/1/2 select-src-port=@te-1/1/1,@te-1/1/2 output-port=@te-1/1/3
root@XorPlus#
```

In above configuration, user configure the te-1/1/1, te-1/1/2 and te-1/1/3 in the mirroring, in which the source port are te-1/1/1 and te-1/1/2 (including the ingress and egress), the output port (monitor port) is te-1/1/3. The “select-dst-port” means some packet (in switch chip) will go-out from the specified port (egress). The “select-src-port” means some packet enter the specified port (ingress).

(2) Delete the Mirroring

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.215:6633 -- remove bridge br0 mirrors mymirror
```

Configure the IPv4 flows

- PICOS OVS supports IPv4 flow in open flow.

(1) Create a IPv4 flow

```
root@XorPlus# ovs-ofctl add-flow br0
dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,in_port=1,dl_type=0x0800,nw_src=128.1.1.1,nw_dst=128.1.1.2,nw_proto=6,actions=output:2,3,4
root@XorPlus#
root@XorPlus# ovs-ofctl dump-flows br0
NXST_FLOW reply (xid=0x4):
cookie=0x0, duration=12.758s, table=0, n_packets=0, n_bytes=0,
tcp,in_port=1,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,nw_src=128.1.1.1,nw_dst=128.1.1.2
actions=output:2,output:3,output:4
cookie=0x0, duration=2180.111s, table=0, n_packets=0, n_bytes=0, priority=0 actions=NORMAL
root@XorPlus#
```

(2) Delete a IPv4 flow

```
root@XorPlus# ovs-ofctl del-flows br0 dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,in_port=1,dl_type=0x0800,nw_src=128.1.1.1,nw_dst=128.1.1.2,nw_proto=6
root@XorPlus#
```

(3) Remove all flows

```
root@XorPlus# ovs-ofctl del-flows br0
root@XorPlus#
```

Configure GRE tunnel

- PICOS OVS supports IP GRE tunnel.

(1) Create a GRE tunnel

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.243:6633 add-port br0 gre1 -- set Interface gre1
type=pica8_gre options:remote_ip=10.10.60.10 options:local_ip=10.10.61.10 options:vlan=1
options:src_mac=00:11:11:11:11:11 options:dst_mac=00:22:22:22:22:22 options:egress_port=ge-1/1/5
```

If user want to create a GRE tunnel, he need configure a GRE tunnel and two flows which are used for sending traffic to GRE and sending output from GRE.

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,actions=output:91
root@XorPlus# ovs-ofctl add-flow br0 in_port=5,actions=mod_dl_src:00:11:11:11:11:11,
mod_dl_dst:00:33:33:33:33:33,output:1
```

The GRE port is count from 91, which is the port number of GRE1. The first flow in above means all traffic from port ge-1/1/1 will send to GRE tunnel whose port number is 91. The second flow of above means all the traffic come out from GRE tunnel will be forwarded to port ge-1/1/1. User must configure the MAC address of the sent out traffic.

Configure the MPLS

- PICOS OVS supports MPLS, which is specified in openflow-1.2. The basic action of the MPLS is Push, Swap and Pop.
- User can add flow to modify and copy the MPLS TTL and IP TTL
- In current version, user can push at most 2 MPLS label for a flow
- User should note that, every un-tagged packet will be tagged with the default VLAN-ID before Push, Pop and Swap

(1) Push a MPLS header for flows

In following configuration, user specify a flow, which should match { in_port=1,dl_type=0x0800, dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1}, the action is push a MPLS header whose label is 10 and forward to port te-1/1/2

Mark: The MPLS TTL will copy from the IP header and decrease

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x0800,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,actions=push_mpls:0x8847,set_field:10->mpls_label,output:2
```

(2) Push two MPLS headers for flows

In following configuration, user specify a flow, which should match { in_port=1,dl_type=0x0800, dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1}, the action is push two MPLS header whose label is 10 and 20 and forward to port te-1/1/2

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x0800,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,actions= push_mpls:0x8847,set_field:10->mpls_label,set_field:20->mpls_label,output:2
root@XorPlus#
```

(3) Swap the MPLS packet

In following configuration, user specify a flow, which should match { in_port=1,dl_type=0x0800, dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,mpls_label=10}, the action is swap and set the Label as 20, then forward to port te-1/1/2

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x8847,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,dl_type=0x8847,mpls_label=10,actions= set_field:20->mpls_label,output:2
root@XorPlus#
```

(4) Pop a MPLS header for flows

In following configuration, user specify a flow, which should match { in_port=1,dl_type=0x0800, dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,mpls_label=10}, the action is pop the MPLS header and forward to port te-1/1/2

Mark: The MPLS TTL will be copied to IP header TTL and decrease.

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x8847,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,mpls_label=10,actions=pop_mpls:0x8847,output:2
```

(5) Pop a MPLS header for flows which have two MPLS header

In the following configuration, user specify a flow which has two MPLS headers (10 and 20). The pop action is always popping the outer MPLS header.

Mark: User should remember, two label flow is popped only one label, the output packet is also a MPLS packet. Thus, the “pop_mpls:0x8847” must be configured.

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x8847,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,mpls_label=10,actions=pop_mpls:0x8847,output:2
```

(6) Pop two MPLS headers for flows which have two MPLS header

In following configuration, user specify a flow which has two labels to pop. The output flow is IP packet. User should configure two pop entries to pop the flow.

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x8847,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,actions=pop_mpls:0x0800,output:2
```

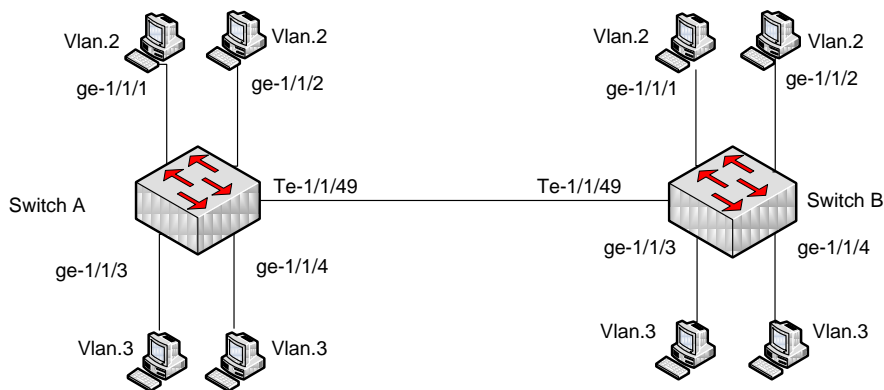

Chapter 4. Configuration example

This chapter gives some configuration example for 802.1Q.

Configure 802.1Q VLAN

- In following topology, we need configure 2 VLANs in switch A and B.

Figure 4-1. 802.1Q network configuration



(1) Configure Switch-A

In switch-A, you need configure ge-1/1/1~ ge-1/1/4 as access port while te-1/1/49 as trunk port, because the 10Gbit link will trunk the traffic of VLAN-2 and VLAN-3

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/1 vlan_mode=access tag=2 --
set Interface te-1/1/1 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/2 vlan_mode=access tag=2 --
set Interface te-1/1/2 type=pica8
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/3 vlan_mode=access tag=3 --
set Interface te-1/1/3 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/4 vlan_mode=access tag=3 --
set Interface te-1/1/4 type=pica8
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/49 vlan_mode=trunk
trunk=2,3 -- set Interface te-1/1/49 type=pica8
root@XorPlus#
```

(2) Configure Switch-B

In switch-B, you need configure ge-1/1/1~ ge-1/1/4 as access port while te-1/1/49 as trunk port, because the 10Gbit link will trunk the traffic of VLAN-2 and VLAN-3

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/1 vlan_mode=access tag=2 --
set Interface te-1/1/1 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/2 vlan_mode=access tag=2 --
set Interface te-1/1/2 type=pica8
root@XorPlus#
```

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/3 vlan_mode=access tag=3 --
set Interface te-1/1/3 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/4 vlan_mode=access tag=3 --
set Interface te-1/1/4 type=pica8
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/49 vlan_mode=trunk
trunk=2,3 -- set Interface te-1/1/49 type=pica8
root@XorPlus#
```

Configure GRE tunnel

- In following topology, we need configure a GRE tunnel between switch A and B. The IP address of the GRE tunnel is 10.10.61.10/24 and 10.10.60.10/24.

Figure 4-2. GRE tunnel configuration



(1) Configure Switch-A

In switch-A, you need configure a GRE tunnel and two flows as following:

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.243:6633 add-br br0 -- set bridge br0 datapath_type=pica8
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.243:6633 add-port br0 ge-1/1/1 vlan_mode=trunk tag=1 -- set
Interface ge-1/1/1 type=pica8
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.243:6633 add-port br0 ge-1/1/5 vlan_mode=trunk tag=1 -- set
Interface ge-1/1/5 type=pica8
root@XorPlus#
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.243:6633 add-port br0 gre1 -- set Interface gre1
type=pica8_gre options:remote_ip=10.10.60.10 options:local_ip=10.10.61.10 options:vlan=1
options:src_mac=00:11:11:11:11:11 options:dst_mac=00:22:22:22:22:22 options:egress_port=ge-1/1/5
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,actions=output:91
root@XorPlus# ovs-ofctl add-flow br0
in_port=5,actions=mod_dl_src:00:11:11:11:11:11,mod_dl_dst:00:33:33:33:33:33,output:1
```

(2) Configure Switch-B

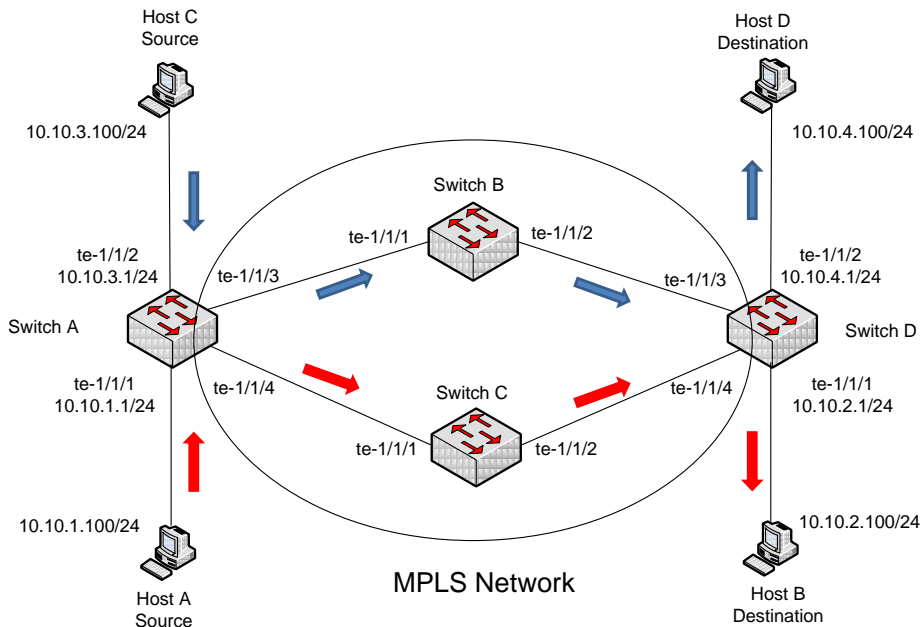
In switch-A, you also need configure a GRE tunnel and two flows as following:

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.200:6633 add-br br0 -- set bridge br0 datapath_type=pica8
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 ge-1/1/1 vlan_mode=trunk tag=1 -- set
Interface ge-1/1/1 type=pica8
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 ge-1/1/5 vlan_mode=trunk tag=1 -- set
Interface ge-1/1/5 type=pica8
root@XorPlus#
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 gre1 -- set Interface gre1
type=pica8_gre options:remote_ip=10.10.61.10 options:local_ip=10.10.60.10 options:vlan=1
options:src_mac=00:22:22:22:22:22 options:dst_mac=00:11:11:11:11:11 options:egress_port=ge-1/1/5
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,actions=output:91
root@XorPlus# ovs-ofctl add-flow br0
in_port=5,actions=mod_dl_src:00:22:22:22:22:22,mod_dl_dst:00:66:66:66:66:66,output:1
```

Configure one Label MPLS network

- In following topology, we configure a simple MPLS network. Traffic (Red) from host-A to host-B will forward by MPLS network with Label 10. The traffic (Blue) from host-C to host-D will forward by MPLS network with Label 20.
- All the flow will only push ONE MPLS header.

Figure 4-2. MPLS network configuration



(3) Configure Switch-A

In switch-A, you need configure two flow which will push the MPLS Label 10 and 20 for traffic RED and BLUE respectively.

```

root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-br br0 -- set bridge br0
datapath_type=pica8
device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1
-- set Interface te-1/1/1 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/2 vlan_mode=access tag=1
-- set Interface te-1/1/2 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/3 vlan_mode=access tag=1
-- set Interface te-1/1/3 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/4 vlan_mode=access tag=1
-- set Interface te-1/1/4 type=pica8
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x0800,nw_src=10.10.1.100,
nw_dst=10.10.2.100,dl_vlan=1,actions= push_mpls:0x8847,set_field:10->mpls_label
,output:4
root@XorPlus#

```

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=2,dl_type=0x0800,nw_src=10.10.3.100,nw_dst=10.10.4.100,dl_vlan=1,actions=push_mpls:0x8847, set_field:20->mpls_label,output:3
root@XorPlus#
```

The received packet format in port te-1/1/1 and te-1/1/2 is shown as following (ingress):

Ethernet	IP Header
----------	-----------

The transmitted packet format to port te-1/1/3 and te-1/1/4 is shown as following (egress):

Ethernet	MPLS label 10	IP Header
----------	---------------	-----------

Ethernet	MPLS label 20	IP Header
----------	---------------	-----------

(4) Configure Switch-B

In switch-B, you need configure one flow which will SWAP the MPLS Label 20 to 200 for traffic BLUE.

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.20:6633 add-br br0 -- set bridge br0 datapath_type=pica8
device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.20:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1 -- set Interface te-1/1/1 type=pica8
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.20:6633 add-port br0 te-1/1/2 vlan_mode=access tag=1 -- set Interface te-1/1/2 type=pica8
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x08847,nw_src=10.10.3.100,nw_dst=10.10.4.100,dl_vlan=1,mpls_label=20,actions= set_field:200->mpls_label,output:2
root@XorPlus#
```

The transmitted packet format to port te-1/1/2 is shown as following (egress):

Ethernet	MPLS label 200	IP Header
----------	----------------	-----------

(5) Configure Switch-C

In switch-C, you need configure one flow which will SWAP the MPLS Label 10 to 100 for traffic RED.

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.30:6633 add-br br0 -- set bridge br0 datapath_type=pica8
device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1 -- set Interface te-1/1/1 type=pica8
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br0 te-1/1/2 vlan_mode=access tag=1 -- set Interface te-1/1/2 type=pica8
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x08847,nw_src=10.10.1.100,nw_dst=10.10.2.100,dl_vlan=1,mpls_label=10,actions= set_field:100->mpls_label,output:2
root@XorPlus#
```

The transmitted packet format to port te-1/1/2 is shown as following (egress):

Ethernet	MPLS label 100	IP Header
----------	----------------	-----------

(6) Configure Switch-D

In switch-D, you need configure two flow which will POP the MPLS Label 100 and 200 for traffic RED and BLUE respectively.

```
root@XorPlus# ovs-vsctl --db=tcp:10.10.50.40:6633 add-br br0 -- set bridge br0 datapath_type=pica8
```

```

device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1
-- set Interface te-1/1/1 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/2 vlan_mode=access tag=1
-- set Interface te-1/1/2 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/3 vlan_mode=access tag=1
-- set Interface te-1/1/3 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/4 vlan_mode=access tag=1
-- set Interface te-1/1/4 type=pica8
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=4,dl_type=0x08847,nw_src=10.10.1.100,nw
_dst=10.10.2.100,dl_vlan=1,actions=pop_mpls:0x8847,output:1
root@XorPlus#
root@XorPlus# ovs-ofctl add-flow br0 in_port=3,dl_type=0x08847,nw_src=10.10.3.100,nw
_dst=10.10.4.100,dl_vlan=1,actions=pop_mpls:0x8847,output:2
root@XorPlus#

```

The transmitted packet format to port te-1/1/1 and te-1/1/2 is shown as following (egress):

Ethernet	IP Header
----------	-----------

Configure multiple virtual bridge in system

- In PicOS OVS, user can create multiple virtual bridges which are independent to each other. One physical port is able to add into only one virtual bridge. Each virtual bridge can be configured a controller respectively.

```

root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-br br0 -- set bridge br0
datapath_type=pica8 other-config=datapath-id=0000d80aa99aaaaa
device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br0 te-1/1/1 vlan_mode=access tag=1
-- set Interface te-1/1/1 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br0 te-1/1/2 vlan_mode=access tag=1
-- set Interface te-1/1/2 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 set-controller br0 tcp:10.10.50.1:6633
root@XorPlus#
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-br br1 -- set bridge br1
datapath_type=pica8 other-config=datapath-id=0000d80bb99bbbbb
device br0 entered promiscuous mode
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br1 te-1/1/3 vlan_mode=access tag=1
-- set Interface te-1/1/3 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br1 te-1/1/4 vlan_mode=access tag=1
-- set Interface te-1/1/4 type=pica8
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 set-controller br1 tcp:10.10.50.2:6633
root@XorPlus#

```