



Open vSwitch Configuration Guide

PICA8 Inc.
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**Configuration Guide for the OVS PICA8 Switch
First Edition (2011/11)**

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Preface

Intended Audience

This guide is intended for use by data center administrators, system administrators and customer support personnel responsible for configure the Open vSwitch in PICA8 switch

Website of PICA8

The PICA8 switch documents is available at following website:

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

Open vSwitch software documents is available at following websit:

<http://openvswitch.org/>

Open flow document is available at following websit:

<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 example of configuration.

Chapter 1. Overview

This Chapter provide the overview of feature of Open vSwitch (OVS) in PICA8 switch. Open vSwitch is a production quality, multilayer virtual switch licensed under the open source Apache 2.0 license. PICA8 Inc. implement the OVS in PICA8 hardware Switch.

PICA8 OVS Feature List

PICA8 OVS Switch support following features:

Table 1-1 PICA8 OVS Feature List

Supporting for NetFlow, sFlow
Supporting for Standard 802.1Q VLAN model with trunking
Supporting for link monitoring
Supporting for IPv6
Supporting for MPLS

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 only support 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 no-cost L2/L3 protocol stacks and enables the community to innovate. This document focus in OVS, so you should choose the item “3” 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] OpenFlow
  [3] Open vSwitch
```

```
[4] System shell
[5] Boot menu editor
Enter your choice (1,2,3,4,5):3
```

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 database configure file, which contain the configuration which is needed by OVS initialization. Usually, if only need input following command to create it. 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 the static IP address and the default gateway by static or by DHCP.

```
root@XorPlus#udhcpc
udhcpc (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#

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 vswitch. You can specify the parameter of 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 server 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] OpenFlow
  [3] Open vSwitch
  [4] System shell
  [5] Boot menu editor
Enter your choice (1,2,3,4,5):3

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!

Waiting for eth0 up .....
Done!

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

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

Startup finished!
root@XorPlus#

```

Update the system with image file

Firstly, user should kill all the OVS process by manual. Then, you can download the image and tar 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, IPv6 and MPLS.

Create a bridge and add ports in bridge

User can create one or more bridge in which, ports can be also be added in the bridge

(1) Create the bridge and add port in this bridge

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

```
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-br br0 -- set bridge br0
datapath_type=pronto
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 -- set
Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/2 -- set
Interface te-1/1/2 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.215:6633 add-port br0 te-1/1/3 -- set
Interface te-1/1/3 type=pronto
root@XorPlus#
```

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

In following, user add the port te-1/1/3 in 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 tag=1000
-- set Interface te-1/1/3 type=pronto
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 brige 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 802.1Q and trunk port

- In PICA8 OVS, each port has it's default vlan-id. User can configure the port as 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 trunk=100,200,300
-- set Interface te-1/1/1 type=pronto
root@XorPlus#

```

Configure the sFlow

- PICA8 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 parameter is 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

- PICA8 OVS support 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 parameter is 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

- PICA8 OVS support 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 MPLS

- PICA8 OVS support 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 lable 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_mpls_label:10,output:2
root@XorPlus#
```

(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_mpls_label:10,set_mpls_label:20,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=0x0800,dl_src=22:11:11:11:11:11,dl_dst=22:00:00:00:00:00,dl_vlan=1,mpls_label=10,actions=set_mpls_label:20,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=0x0800,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:0x0800,output:2
```

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

In 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 be 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 label 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,mpls_label=10,actions=pop_mpls:0x8847,output: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,mpls_label=20,actions=pop_mpls:0x0800,output:2
```

Configure the IPv4 and IPv6 flows

- PICA8 OVS support IPv4 and IPv6 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) Create a IPv6 flow

```
root@XorPlus# ovs-ofctl add-flow br0 in_port=1,dl_type=0x86dd,ipv6_src=2000::/3,ipv6_dst=2000::/3,actions=mod_dl_dst:00:CC:EE:EE:FF:13,output:2,3,4
root@XorPlus#
root@XorPlus# ovs-ofctl dump-flows br0
NXST_FLOW reply (xid=0x4):
  cookie=0x0, duration=4.412s, table=0, n_packets=0, n_bytes=0,
  ipv6,in_port=1,ipv6_src=2000::/3,ipv6_dst=2000::/3
  actions=mod_dl_dst:00:cc:ee:ee:ff:13,output:2,output:3,output:4
root@XorPlus#
```

(4) Delete a IPv6 flow

```
root@XorPlus# ovs-ofctl del-flows br0 in_port=1,dl_type=0x86dd,ipv6_src=2000::/3,ipv6_dst=2000::/3
root@XorPlus#
```

(5) Remove all flows

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

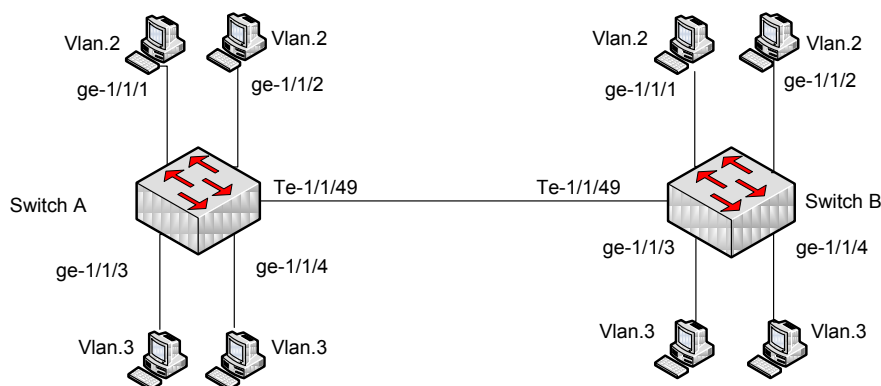
Chapter 4. Configuration example

This chapter gives some configuration example for 802.1Q and MPLS.

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 tag=2
-- set Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/2 tag=2
-- set Interface te-1/1/2 type=pronto
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/3 tag=3
-- set Interface te-1/1/3 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/4 tag=3
-- set Interface te-1/1/4 type=pronto
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.100:6633 add-port br0 te-1/1/49 trunk=2,3
-- set Interface te-1/1/49 type=pronto
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 tag=2
-- set Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/2 tag=2
-- set Interface te-1/1/2 type=pronto
root@XorPlus#
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.200:6633 add-port br0 te-1/1/3 tag=3
```



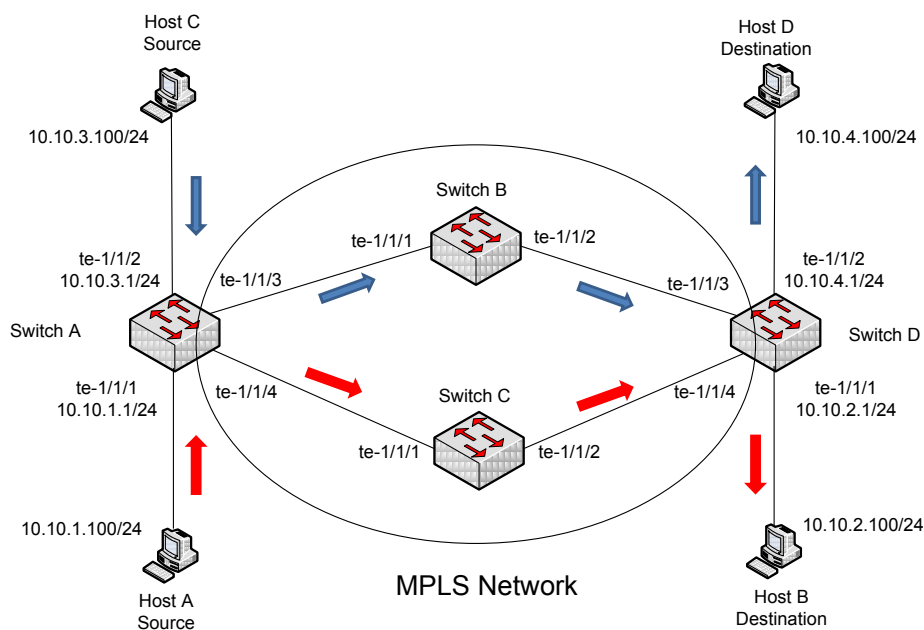
```

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

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=pronto
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 -- set
Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/2 -- set
Interface te-1/1/2 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/3 -- set
Interface te-1/1/3 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.10:6633 add-port br0 te-1/1/4 -- set
Interface te-1/1/3 type=pronto
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_mpls_label:10,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_mpls_label:20,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=pronto
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 -- set
Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.20:6633 add-port br0 te-1/1/2 -- set
Interface te-1/1/2 type=pronto
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_mpls_label:200,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=pronto
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 -- set
Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.30:6633 add-port br0 te-1/1/2 -- set
Interface te-1/1/2 type=pronto
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_mpls_label:100,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=pronto

```

```
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 -- set
Interface te-1/1/1 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/2 -- set
Interface te-1/1/2 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/3 -- set
Interface te-1/1/3 type=pronto
root@XorPlus#ovs-vsctl --db=tcp:10.10.50.40:6633 add-port br0 te-1/1/4 -- set
Interface te-1/1/3 type=pronto
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:0x0800,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:0x0800,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
----------	-----------