



PicOS XorPlus Configuration Guide

Version 1.4

PICA8 Inc.
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Configuration Guide for the XorPLus Switch, Version 1.4

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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 monitoring or configuring the XorPlus Ethernet Switch via the command line interface.

Website of XorPlus

The XorPlus switch documents is available at following website:
<http://www.pica8.com/documents>

Organization

The configuration guide is organized as following:

Chapter	Descriptions
Chap 1, "Overview".	Describes the overview of the XorPlus switch.
Chap 2. "System Management Configuration"	Describes the System Management configuration
Chap 3. "File Management Configuration".	Describes the Configuration File Management.
Chap 4. "Configure the Layer 2 switch".	Describes the configuration steps of Layer2 switch.
Chap 5. "Configure the Layer 3 switch".	Describes the configuration steps of Layer3 switch.
Chap 6. "Multicast Configuration"	Describes the configuration steps of multicast.
Chap 7. "Qos Configuration"	Describes the configuration steps of Qos.
Chap 8. "Open Flow Configuration"	Describes the configuration steps of open flow

Chapter 1. Overview

This Chapter provide the overview of feature of XorPlus, which including the Layer-2 switching and Layer-3 routing etc.

XorPlus Feature List

XorPlus Switch has Layer-2 switching(e.g. STP, RSTP, MSTP, MAC learning) and Layer-3 routing (Static routing, RIPv2, OSPF, IGMP, PIM-SM, IPv6)

Table 1-1 XorPlus Feature List

Category	Functional Requirement
Sys Mgmt & Admin	Support for clock/date setting and NTP.
	Support for inband IP access via any routed interface
	Support for DHCP client and DHCP relay
	Support for multiple local user accounts.
	Supports SSHv2 protocol
	Ability to enable debugging for specific module
	Support for Read Only access SNMP
	Support the IPFIX, monitor the data flow in specified server
Device Config, SW & File Mgmt	Device configuration to be saved to flash on the device.
	Support for configuration versioning and rollback, compare the two configuration for differences
	Ability to import/export configuration, device software and log from a file on a remote server (ftp/scp as possible options)
	Ping tool and Traceroute tool from CLI
	SSH and telnet tool from CLI
	Ability to view and configure MAC/ARP table information
Layer-2 Forwarding and protocol	Support for LLDP protocols for detecting devices on a link.
	Supports LACP protocol, hashing of traffic using src/dst MAC address and src/dst IP address and layer4 port information
	Support for 802.1q trunked interfaces, for both single and LAG interfaces
	Support for 802.1q tagged/untagged interfaces and native tag
	Support for Jumbo Frame
	Support for 802.1d spanning tree protocol (STP)
	Support for 802.1w rapid STP (RSTP)
	Support for 802.1s Multiple Spanning Tree protocol (MSTP)
	Support for BPDU Guard / Filter and etc. functionality
	Support for storm-control for unicast, multicast, broadcast
	Support for Mirror based the egress/ingress
	Support for 802.1p in Layer2 forwarding
	Support for Flow control per-interface
	Support for IGMP snooping enable per-vlan

	Support for IGMP snooping querier per-vlan
Layer-3 Forwarding and Routing protocol	Full support for dual stacked IPv4 and IPv6 addressing.
	Support for 6 members in a Layer3 LAG interface.
	Support for IPv4 and IPv6 static route configuration
	Support for OSPFv2 (IPv4)
	Support for Stub and Totally Stubby and NSSA OSPF area types
	Support for a maximum of 32 equal cost routes in OSPF
	Support for RIP routing protocol
	Support for 128 equal cost routes in the devices routing/forwarding table
	Support for ECMP routing with hashing of traffic using src/dst IP and Port
	Support the TOS and DSCP in Layer3 forwarding
	Support for IGMP v1/v2
	Support for PIM-SM multicast routing
	Support VRRP protocol

Chapter 2. System Management Configuration

This chapter describes the configuration steps of system management, including the image update, IPFIX, DHCP, user account etc.

Boot Process

Before user can get the boot information of the switch, user should make sure user 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
```

Usually, user need not disrupt the default boot process. The switch will read the image of CF card and enter the software choice menu as following.

```
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] System shell
 [4] Boot menu editor
```


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

The default choice is the XorPlus, if user have not type any choice, the system will boot-up with XorPlus. Open Flow is a new switching architecture which is developed by Stanford Univ. System shell is a debug mode in which no applications (XorPlus and Open Flow) will be run. Furthermore, user can edit the default choice in boot menu editor.

After that, user will enter the XorPlus CLI as following:

```
Pica8 XorPlus L2/L3 switch system is selected.
Switch Manager starting ... ..
PHY: 24520:01 - Link is Up - 1000/Full
PowerPC Book-E Watchdog Timer Enabled (wdt_period=29)
ip_tables: (C) 2000-2006 Netfilter Core Team
Waiting for synchronizing configuration.
Synchronize configuration OK.
Pica8 XorPlus Version 1.2
Welcome to XorPlus on XorPlus
XorPlus>
```

If user really need modify the baud rate of switch, user can enter the u-boot and configure the baud rate and other parameters as following

```
U-Boot 1.3.0 (Sep  8 2010 - 17:20:00)

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
       DDR: 512 MB
FLASH: 32 MB
L2 cache 256KB: enabled
Set ethaddr MAC address = c8:0a:a9:04:49:1a
Set ethladdr MAC address = c8:0a:a9:04:49:1b
In:    serial
Out:   serial
Err:   serial
Net:   TSEC0, TSEC1
IDE:   Bus 0: OK
       Device 0: Model: CF Card Firm: Ver2.35 Ser#: 7DF70707030700224009
              Type: Hard Disk
              Capacity: 1923.9 MB = 1.8 GB (3940272 x 512)
Hit any key to stop autoboot:  0
=>
=>
=> printenv
flash bootcmd=setenv bootargs root=/dev/ram console=ttyS0,$baudrate; bootm ffd00000
ff000000 ffee0000
cfcard bootcmd=setenv bootargs root=/dev/ram console=ttyS0,$baudrate; ext2load ide 0:1
0x1000000 /uImage;ext2load ide 0:1 0x2000000 /uInitrd2m;ext2load ide 0:1 0x400000
/LB9A.dtb;bootm 1000000 2000000 400000
bootdelay=5
baudrate=115200
loads_echo=1
rootpath=/nfsroot
netmask=255.255.255.0
hostname=LB9A X
loadaddr=4000000
ethact=TSEC0
ipaddr=10.10.50.60
gatewayip=10.10.50.1
serverip=10.10.50.16
bootfile=u-boot.bin
```

```

filesize=100000
fileaddr=2000000

=> set baudrate 115200
=> save
Saving Environment to Flash...
Un-Protected 1 sectors
Erasing Flash...
. done
Erased 1 sectors
Writing to Flash... done
Protected 1 sectors
=> reset

```

Commit failed and exit discard

(1) Exit the “configure” mode

Enter the execute mode from “configure” mode WITHOUT any un-committed configuration.

```

XorPlus# exit
XorPlus>

```

(2) Exit the “configure” mode with un-commit configuration

Exit discard to Enter the execute mode from “configure” mode WITH any un-committed or failed committed configuration Exit.

```

XorPlus# set interface gigabit-ethernet ge-1/1/1 disable true
[edit]
XorPlus# exit
ERROR: There are uncommitted changes.
Use "commit" to commit the changes, or "exit discard" to discard them.
XorPlus# exit discard
XorPlus

```

Configure the DHCP and Static IP address

(3) Enable DHCP

The DHCP is enabled defaultly on management interface eth0. User can enable the DHCP by manual with following CLI.

```

XorPlus# set interface management-ethernet eth0 dhcp enable true
[edit]
XorPlus# commit
Commit OK.
Save done.
[edit]
XorPlus#

```

(4) Configure static IP address and gateway

User can configure a static management IP address in interface eth0 by manual.

```

XorPlus# set interface management-ethernet eth0 address 192.168.1.5/24
[edit]
XorPlus# set interface management-ethernet eth0 gateway 192.168.1.1/24
[edit]
XorPlus# commit
Commit OK.
Save done.
[edit]
XorPlus#

```

Configure the DHCP relay

(1) Enable DHCP relay in a VLAN-interface

When user enables DHCP relay in a VLAN-interface, the switch will relay the received DHCP request to the specified DHCP server by routing.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 address 192.168.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 192.168.2.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 dhcp-relay disable false
[edit]
XorPlus# set vlan-interface interface vlan-2 dhcp-relay dhcp-servers-address 192.168.2.100
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Configure User Account

Only two kinds of user account are supported, including super-user and read-only.

(1) Create a user class and password

```
XorPlus# set system login user ychen authentication plain-text-password pica8
[edit]
XorPlus# set system login user ychen class super-user
[edit]
XorPlus# commit
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure the announcement when user telnet switch

```
XorPlus# set system login announcement "welcome the switch-1101"
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Configure AAA-Authentication/Authorization/Accounting

In XorPlus, AAA (Authentication/Authorization/Accounting) is supported. Currently, any user who has got the AAA server Authentication is able to configure the switch such as “admin”. The local switch and server should be configured as following.

(1) Configure the AAA in switch

```
XorPlus# set system aaa tacacs-plus disable false
[edit]
XorPlus# set system aaa tacacs-plus key pica8
[edit]
XorPlus# set system aaa tacacs-plus server-ip 10.10.53.53
[edit]
XorPlus# commit
Commit OK.
Save done.
[edit]
XorPlus# set system aaa tacacs-plus authorization true
[edit]
XorPlus# set system aaa tacacs-plus accounting true
XorPlus# commit
```

(2) Display AAA information

```
XorPlus# show system aaa tacacs-plus
Waiting for building configuration.
  authorization: true
  accounting: true
  server-ip 10.10.53.53
  key: "pica8"
```

(3) Configure the AAA server

The AAA server configuration file should be configured as following

```
key = pica8

# Accounting File
accounting file = /var/tmp/acctfile
default authentication = file /etc/passwd

user = admin {
  member = admins
}

group = admins {
  global = cleartext "password"
  service = exec {
    default attribute = permit
  }
}

user = operator {
  global = cleartext "operator"
  service = exec {
    default attribute = permit
  }
}

user = ychen {
  global = cleartext "ychen"
  member = admins
  service = exec {
    default attribute = permit
  }
}
```

In above configuration, the admin or operator can access the switch by telnet or ssh. Any configured CLI will be accounting to file which is specified. For example, all the configured CLI which is executed by user will be recorded in `/var/tmp/acctfile`.

(4) Configure the local login

```
XorPlus# set system aaa local disable true
[edit]
XorPlus# commit
Commit OK.
Save done.
[edit]
```

In above configuration, the user can't login the switch with local account.

Configure SSH and Telnet Parameter**(1) Configure SSH version and connection-limit**

```
XorPlus# set system services ssh protocol-version v2
[edit]
XorPlus# set system services ssh connection-limit 5
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Disable the Telnet service

```
XorPlus# set system services telnet disable true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Enable and Disable the inband service

In default configuration, the SSH and telnet with inband interface is enabled. User can disable the inband service by following.

```
XorPlus# set system inband enable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Configure NTP and Timezone Parameter**(1) Configure NTP server IP address**

In default configuration, the NTP server IP address is 192.43.244.18. User can change it as following. The XorPlus switch will synchronize with the NTP server only when the configuration CLI is committed.

```
XorPlus# set system ntp-server-ip 192.168.10.100
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure timezone

```
XorPlus# set system timezone Pacific/Kosrae
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Configure system clock

```
XorPlus> set date 2012.01.01-23:59
Sun Jan 1 23:59:00 UTC 2012
XorPlus>.
```

The clock will be set in the hardware.

Configure IPFIX

(1) Configure IPFIX parameter

In default configuration, the IPFIX is disabled. User can enable IPFIX and configure the parameter (e.g. max-entries, max-idle-time, max-time, min-time, sample-rate) as following. Make sure the switch can connect the IPFIX collector server correctly.

```
XorPlus# set protocols ipfix collector 192.168.2.10 udp-port 9999
[edit]
XorPlus# set protocols ipfix interfaces ingress ge-1/1/1 max-entries 5000
[edit]
XorPlus# set protocols ipfix interfaces ingress ge-1/1/1 sample-rate 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Configure SNMP

(1) Configure SNMP parameter

In default configuration, the SNMP is disabled. User can enable SNMP and configure the parameter (e.g. community, description, location, name) as following.

```
XorPlus# set protocols snmp community Pica8-data-center
[edit]
XorPlus# set protocols snmp contact support@pica8.com
[edit]
XorPlus# set protocols snmp description pica8_switc
[edit]
XorPlus# set protocols snmp location Beijing
[edit]
XorPlus# set protocols snmp name xorp_switc
[edit]
XorPlus# set protocols snmp trap-group targets 10.10.1.1
[edit]
XorPlus# set protocols snmp trap-group version v2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure SNMP-acl

In default, all hosts can “snmpwalk” the information of the switch. When user configures some specified host in snmp-acl, only these specified hosts can snmp-walk the switch.

```
XorPlus# set system snmp-acl network 1.1.1.0/24
[edit]
XorPlus# set system snmp-acl network 2.2.2.0/24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Configure Syslog Log Level**(1) Configure syslog level**

There are 5 system syslog levels, including error, fatal, warning, info and trace. In default the system syslog level is warning. If user wants to change it, he can configure the switch as following:

```
XorPlus# set system log-level info
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

After completing above configuration, user can make the log displayed in screen with following

```
XorPlus# exit
XorPlus> syslog monitor on
```

Specially, if user configures the switch syslog level as “trace”, the “traceoptions” of the modules should be turned on as following. For example, user wants to turn the ospf tracoptions to debug.

```
XorPlus# set protocols ospf4 traceoptions flag all disable false
[edit]
XorPlus# set system log-level trace
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# exit
XorPlus> syslog monitor on
```

(2) Configure log-facility

In the standard document, the log-facility can be configured as [0, 7]

```
XorPlus# set system log-facility 0
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
Oct 17 15:22:42 XorPlus local0.warn : admin logged the switch
```

```
Oct 17 15:22:50 XorPlus local0.warn pica_sh: Tacacs send acct body send failed: wrote -1 of
127: Connection refused

XorPlus# set system log-facility 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
Oct 17 15:22:42 XorPlus local2.warn : admin logged the switch
```

Update the Software and Platform

User can separate the system as XorPlus Platform and XorPlus Software and update them respectively. Usually, the “rootfs.tar.gz” will include the both XorPlus Platform and XorPlus Software, and “pica.tar.gz” will only include the XorPlus Software.

(1) Display the system version

```
XorPlus# run show version
Pica8 XorPlus 1.3
Copyright (C) 2009, 2010, 2011, 2012 Pica8, Inc.
Base ethernet MAC Address : C8:0A:A9:9E:14:A4
Hardware model : Pronto 3290
Revision ID : 7832
```

(2) Update the software of XorPlus

```
XorPlus> file tftp get remote-file pica.tar.gz local-file pica.tar.gz ip-address 1.1.5.6
XorPlus> configure
//save the current config to startup config if necessary
XorPlus# save running-to-startup
XorPlus# run request system reboot
```

The system will decompress the “pica.tar.gz” automatically, which will update the xorplus software in system.

(3) Update the Platform of XorPlus

```
XorPlus> file tftp get remote-file rootfs.tar.gz local-file pica.tar.gz ip-address 1.1.5.6
XorPlus> configure
//save the current config to startup config if necessary
XorPlus# save running-to-startup
XorPlus# run request system reboot
```

The system will decompress the “rootfs.tar.gz” automatically, which will update the xorplus software and xorplus platform in system.

Display the system information

User can display the system information including the fan, Power Supply Unit and serial-number

(1) Display the system fan

```
XorPlus> show system fan
Sensor Temperature:
  Sensor 1 Temperature : 42 Centigrade
  Sensor 2 Temperature : 39 Centigrade
```



```

Sensor 3 Temperature : 46 Centigrade
Sensor 4 Temperature : 33 Centigrade
Fan Status:
Fan 1 speed = 12529 RPM, PWM = 79
Fan 2 speed = 12413 RPM, PWM = 79
Fan 3 speed = 12300 RPM, PWM = 79

```

(2) Display the system Power Supply Unit

```

XorPlus> show system rpsu
RPSU 1:
TEMPERATURE_1 : 28.00 Centigrade
TEMPERATURE_2 : 30.00 Centigrade
FAN_SPEED      : 10752.0 RPM
FAN_PWM        : 60
RPSU 2:
RPSU 2: Is not ready
RPSU 2: Can't read TEMPERATURE_1

```

(3) Display the system serial-number

```

XorPlus> show system serial-number
MotherBoard Serial Number : QTFQXI10700003
RPSU 1 Serial Number      : 601G1010A0500DW
RPSU 2 is not ready.
SFP te-1/1/49             :
Vendor Name                : AVAGO
Serial Number              : AD0846A0079
SFP te-1/1/50             :
Vendor Name                : DELTA
Serial Number              : 084109000011
SFP te-1/1/51             :
Vendor Name                : DELTA
Serial Number              : 083209000007
SFP te-1/1/52 is not ready.

```

(4) Other system information display

```

XorPlus# run show system temperature
Temperature: 41.00 Centigrade
XorPlus#
XorPlus# run show system uptime
01:21:33 up 50 min, load average: 0.04, 0.06, 0.07
XorPlus#
XorPlus# run show system cpu-usage
Cpu usage: 15%
XorPlus#

```

Diagnosis and Get Technical Support

User can execute the diagnosis CLI and get the technical support by sending the diagnosis result report to PICA

(1) Execute the Diagnosis CLI

```

XorPlus> show tech_support
Start.....

Item 1: Dispaly system version finished!
Item 2: Dispaly system interface finished!
Item 3: Dispaly system configuration finished!
Item 4: Dispaly system config files finished!
Item 5: Dispaly system process finished!
Item 6: Dispaly system fdb table finished!
Item 7: Dispaly system fdb entries finished!
Item 8: Dispaly system ospf neighbors finished!
Item 9: Dispaly system ospf interfaces finished!
Item 10: Dispaly system route table finished!

```

```
Item 11: Display system RIB finished!  
Item 12: Display system hard-route table finished!  
Item 13: Display system hard-route for host finished!  
Item 14: Display system rstp interfaces finished!  
Item 15: Display system rstp bridge finished!  
Item 16: Display system vlans table finished!  
Item 17: Display system vlan-interfaces finished!  
Item 18: Display system core-dump finished!  
Item 19: Display system uptime finished!  
Item 20: Display system arp table finished!
```

```
The information has been stored in XorPlus-201105310305-techSupport.log, please forward to  
support@pica8.com  
XorPlus>
```

Chapter 3. File Management Configuration

This chapter describes the configuration files of save, rollback and management functions
We will provide some configure scripts, by which, user can configure multiple switches centralized

Display current configuration

In XorPlus, user can display the non-default configuration with CLI “show” and all-configuration with CLI “show all”

```
XorPlus# show
Waiting for building configuration.
  interface {
    gigabit-ethernet "ge-1/1/1" {
      ether-options {
      }
    }
    gigabit-ethernet "ge-1/1/2" {
      ether-options {
      }
    }
    gigabit-ethernet "ge-1/1/3" {
      ether-options {
      }
      family {
        ethernet-switching {
          native-vlan-id: 2
        }
      }
    }
    gigabit-ethernet "ge-1/1/4" {
      ether-options {
      }
      family {
        ethernet-switching {
          native-vlan-id: 3
        }
      }
    }
    gigabit-ethernet "ge-1/1/5" {
      ether-options {
      }
    }
    .....
XorPlus#
XorPlus# show all
Waiting for building configuration.
  interface {
    ecmp_path_max: 4
    gigabit-ethernet "ge-1/1/1" {
      mtu: 1514
      disable: false
      ether-options {
        flow-control: true
      }
    }
    gigabit-ethernet "ge-1/1/2" {
      mtu: 1514
      disable: false
      ether-options {
        flow-control: true
      }
    }
  }
```

```

gigabit-ethernet "ge-1/1/3" {
  mtu: 1514
  disable: false
  ether-options {
    flow-control: true
  }
  family {
    ethernet-switching {
      native-vlan-id: 2
      port-mode: "access"
    }
  }
}

```

Save current configuration as default configuration

User can save current configuration as the startup configuration. System always loads the startup configuration file after it finishes the boot-up process.

```

XorPlus# save running-to-startup
Save done.
[edit]
XorPlus#

```

Rollback the Configuration

- In XorPlus, each time user commit a configuration, a roll-back configuration file is created. For example, if user commit the configuration 10 times, pica.conf.01~ pica.conf.10 will be created. User can rollback the any of these configurations if necessary.
- The maximum rollback file is limited to 50. The pica.conf is the current configuration.

```

XorPlus# rollback 1
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

Management the configuration files

- User can display, copy, delete, rename and compare the configuration files as following.
- "pica_startup.boot" is the startup and default configuration file.
- "pica.conf" is current configuration file.

```

XorPlus> file list pica/config
-rw-r--r--  1 root   root      344 Apr  1 02:27 boot.lst
-rw-rw-r--  1 root   xorp    10750 Apr  9 09:20 pica.conf
-rw-rw-r--  1 root   xorp    10749 Apr  9 09:17 pica.conf.01
-rw-rw-r--  1 root   xorp    10619 Apr  9 09:15 pica.conf.02
-rw-rw-r--  1 root   xorp    10023 Apr  9 08:56 pica.conf.03
-rw-rw-r--  1 root   xorp     9902 Apr  9 08:56 pica.conf.04
-rw-rw-r--  1 root   xorp    10238 Apr  9 08:43 pica.conf.05
-rw-rw-r--  1 root   xorp    10057 Apr  9 08:43 pica.conf.06
-rw-rw-r--  1 root   xorp    11796 Apr  9 08:37 pica.conf.07
-rw-rw-r--  1 root   xorp    11796 Apr  9 07:05 pica.conf.08
-rw-rw-r--  1 root   xorp    11364 Apr  9 07:02 pica.conf.09
-rw-rw-r--  1 root   xorp    10057 Apr  9 07:02 pica.conf.10
-rw-rw-r--  1 root   xorp     9625 Apr  9 07:02 pica.conf.11
-rw-rw-r--  1 root   xorp     9322 Apr  9 07:02 pica.conf.12
-rw-rw-r--  1 root   xorp    10599 Apr  9 06:34 pica.conf.13

```

```

-rw-rw-r-- 1 root xorp 9947 Apr 9 06:34 pica.conf.14
-rw-rw-r-- 1 root xorp 9947 Apr 9 06:34 pica.conf.15
-rw-rw-r-- 1 root xorp 9848 Apr 9 06:34 pica.conf.16
-rw-rw-r-- 1 root xorp 9947 Apr 9 06:34 pica.conf.17
-rw-rw-r-- 1 root xorp 10599 Apr 9 06:33 pica.conf.18
-rw-rw-r-- 1 root xorp 9912 Apr 9 06:33 pica.conf.19
-rw-rw-r-- 1 root xorp 9702 Apr 9 06:33 pica.conf.20
-rw-rw-r-- 1 root xorp 10604 Apr 8 07:47 pica.conf.21
-rw-rw-r-- 1 root xorp 10402 Apr 8 07:47 pica.conf.22
-rw-rw-r-- 1 root xorp 10402 Apr 8 07:27 pica.conf.23
-rw-rw-r-- 1 root xorp 10390 Apr 8 06:47 pica.conf.24
-rw-rw-r-- 1 root xorp 10392 Apr 8 06:32 pica.conf.25
-rw-rw-r-- 1 root xorp 10023 Apr 8 06:25 pica.conf.26
-rw-rw-r-- 1 root xorp 10024 Apr 8 06:08 pica.conf.27
-rw-rw-r-- 1 root xorp 10305 Apr 8 03:27 pica.conf.28
-rw-rw-r-- 1 root xorp 9774 Apr 8 03:21 pica.conf.29
-rw-rw-r-- 1 root xorp 9958 Apr 8 03:20 pica.conf.30
-rw-rw-r-- 1 root xorp 9854 Apr 8 03:16 pica.conf.31
-rw-rw-r-- 1 root xorp 9567 Apr 8 03:08 pica.conf.32
-rw-rw-r-- 1 root xorp 9498 Apr 8 02:57 pica.conf.33
-rw-rw-r-- 1 root xorp 9257 Apr 7 10:52 pica.conf.34
-rw-rw-r-- 1 root xorp 9073 Apr 7 10:52 pica.conf.35
-rw-rw-r-- 1 root xorp 9311 Apr 7 10:46 pica.conf.36
-rw-rw-r-- 1 root xorp 9149 Apr 7 10:45 pica.conf.37
-rw-rw-r-- 1 root xorp 10750 Apr 9 09:32 pica_startup.boot
drwxrwxrwx 2 root root 4096 Apr 1 02:28 root
XorPlus>
XorPlus> file compare pica/config/pica.conf pica/config/pica.conf.01
--- pica/config/pica.conf Sat Apr 9 09:20:39 2011
+++ pica/config/pica.conf.01 Sat Apr 9 09:17:44 2011
@@ -410,8 +410,8 @@
     interface "ge-1/1/3"
     }
     querier {
-         enable: true
-         address: 10.10.1.1
+         enable: false
+         address: 0.0.0.0
         other-querier-timer: 1
         version: 2
     }
XorPlus>

```

Save and Load configuration files

- User can save current configuration in a file and load it to switch at other times.

```

XorPlus# save ychen.conf
Save done.
[edit]
XorPlus# load ychen.config
Possible completions:
<text> Local file name
ychen.conf Size: 10750, Last changed: Sat Apr 9 09:52:11 2011
XorPlus# load ychen.conf
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

Chapter 4. Layer-2 Switching Configuration

This chapter describes the configuration steps of Layer-2 switching, e.g. MAC address learning, LLDP, LACP, 802.1Q VLAN, Flow control, Mirroring, Storm control, Spanning Tree Protocol (STP/RSTP/MSTP)

Link Layer Discovery Protocol (LLDP) Configuration

- LLDP is a standard link-layer discovery protocol which can broadcast its capability, IP address, ID, interface name as TLVs (Type/length/Value) in LLDPDU (Link Layer Discovery Protocol Data Unit).
- LLDPDU include 4 Basic TLVs and several optional TLVs. Basic TLVs include Chassis ID TLV, Port ID, TLV, TTL TLV and End TLV.
- In XorPlus, following optional TLVs can be selected

Table 3-1 Supported TLVs of XorPlus

TLV Name	Description
mac-phy-cfg	MAC address of the system
management-address	Management IP address of the system
port-description	The port description of system
port-vlan	The VLAN ID of the port
system-capabilities	System capability e.g. switch, router
system-description	System description
system-name	System name

(1) Configure the Mode of LLDP

LLDP support 4 mode including, TxRx, Tx_only, Rx_only, Disabled. In TxRx mode, the system will transmit and receive the LLDPDU. In Tx_only mode, the system will transmit the LLDPDU only. In Rx_only mode, the system will receive the LLDPDU only. In Disabled mode, the system will not transmit and receive any LLDPDU. User can configure the system as following.

```
XorPlus# set protocols lldp enable true
[edit]
XorPlus# set protocols lldp interface ge-1/1/1 status tx_rx
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Select the optional TLVs

```
XorPlus# set protocols lldp tlv-select mac-phy-cfg true
[edit]
```

```
XorPlus# set protocols lldp tlv-select management-address true
[edit]
XorPlus# set protocols lldp tlv-select port-description true
[edit]
XorPlus# set protocols lldp tlv-select system-capabilities true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Display the information LLDP

```
XorPlus# show protocols lldp
Waiting for building configuration.
  enable: true
  tlv-select {
}
```

(4) Configure other parameter

Other parameter (e.g. advertisement-interval, hold-time-multiplier, reinit-delay, transmit-delay) is able to be configured similarly.

Static Link Aggregation Configuration

- In XorPlus, user can maximum configure 24 LAGs, in which includes maximum 8 member ports.
- The LAGs include static and LACP can support for hashing of traffic using src/dst MAC address, Src/dst IP address and Layer-4 port information
- If all the member port are link-down, the LAGs will be link-down. The LAG will link-up when at least one member port is link-up
- The logical function and configuration of LAG is same as physical port.

(1) Configure static LAGs?

```
XorPlus# set interface aggregate-ethernet ae1
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 ether-options 802.3ad ae1
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 ether-options 802.3ad ae1
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 ether-options 802.3ad ae1
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 ether-options 802.3ad ae1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Display the information static LAGs

```
XorPlus# run show interface aggregate-ethernet ae1
Physical interface: ae1, Enabled, Physical link is Up
Interface index: 53
Link-level type: Ethernet, MTU: 1514, Speed: Auto, Duplex: Auto
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled
```

```

Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
Current address: c8:0a:a9:9e:14:9f, Hardware address: c8:0a:a9:9e:14:9f
Traffic statistics:
  Input Packets.....176
  Output Packets.....16
  Input Octets.....12888
  Output Octets.....1594
Aggregated link protocol: STATIC
Members      Status      Port Speed
-----
ge-1/1/1     Down       Auto
ge-1/1/2     Down       Auto
ge-1/1/3     Up         Auto
ge-1/1/4     Up         Auto

```

Link Aggregation Control Protocol (LACP) Configuration

- LACP is 802.3ad standard protocol which provide the dynamic link aggregation function.
- The LACPDU include system LACP priority, system MAC, port priority, port ID etc. The port which is included in LACP LAG will transmit the LACPDU to neighbors.
- The configuration of LACP LAG is similar to the static LAG.

(1) Configure LACP LAGs

```

XorPlus# set interface aggregate-ethernet ael aggregated-ether-options lacp enable true
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 ether-options 802.3ad ael
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 ether-options 802.3ad ael
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 ether-options 802.3ad ael
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 ether-options 802.3ad ael
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

(2) Display the information LACP LAGs

```

XorPlus# run show interface aggregate-ethernet ael
Physical interface: ael, Enabled, Physical link is Up
Interface index: 53
Link-level type: Ethernet, MTU: 1514, Speed: Auto, Duplex: Auto
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled
Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
Current address: c8:0a:a9:9e:14:9f, Hardware address: c8:0a:a9:9e:14:9f
Traffic statistics:
  Input Packets.....176
  Output Packets.....16
  Input Octets.....12888
  Output Octets.....1594
Aggregated link protocol: LACP
Members      Status      Port Speed
-----
ge-1/1/1     Down       Auto
ge-1/1/2     Down       Auto
ge-1/1/3     Up         Auto
ge-1/1/4     Up         Auto

```


Ethernet Port Configuration

- User can disable/enable the Ethernet port or configure the MTU, rate-limiting, flow control.

(1) Shutdown the Ethernet port

```
XorPlus# set interface gigabit-ethernet ge-1/1/1 disable true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure the MTU and rate-limiting

```
XorPlus# set interface gigabit-ethernet ge-1/1/1 rate-limiting egress kilobits 10000
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 mtu 1200
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Enable the flow control in port

```
XorPlus# set interface gigabit-ethernet ge-1/1/1 ether-options flow-control true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(4) Configure the speed of port

```
XorPlus# set interface gigabit-ethernet ge-1/1/1 speed 100
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(5) Display the port detail information

```
XorPlus# run show interface gigabit-ethernet ge-1/1/1 detail
Physical interface: ge-1/1/1, Enabled, Physical link is Up
Interface index: 1
Link-level type: Ethernet, MTU: 1514, Speed: 1Gb/s, Duplex: Full
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled
Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
Interface rate limit ingress:0, egress:0
Current address: c8:0a:a9:04:49:19, Hardware address: c8:0a:a9:04:49:19
Traffic statistics:
  Input Packets.....35748
  Output Packets.....35143881241
  Input Octets.....3923150
  Output Octets.....2266956387852
MAC statistics:
```

```

Multicast packets RX and TX.....199565932
Broadcast packets RX and TX.....4968094
Undersize packets RX and TX.....0
Fragments packets RX and TX.....0
Packets RX and TX 64 Octets.....35088774487
Packets RX and TX 65-127 Octets.....27771
Packets RX and TX 128-255 Octets.....2574126
Packets RX and TX 256-511 Octets.....52540605
Packets RX and TX 512-1023 Octets.....0
Packets RX and TX 1024-1518 Octets.....0
XorPlus# run clear interface statistics all

```

Storm Control in Ethernet Port Configuration

- User can configure the storm control for the unicast, multicast and broadcast in packets per second.

(1) Configure the storm control

```

XorPlus# set interface gigabit-ethernet ge-1/1/1 storm-control broadcast pps 10000
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 storm-control multicast pps 10000
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 storm-control unicast pps 80000
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

Static MAC entry and Dynamic MAC address Learning

- User can configure the static MAC entry in the FDB. User can also manage the dynamic MAC address learning, e.g. configuring the aging time, delete the dynamic MAC address entry.

(1) Configure a static MAC entry and manage FDB

```

XorPlus# set interface gigabit-ethernet ge-1/1/1 static-ethernet-switching mac-address
22:22:22:22:22:22 vlan 1
[edit]
XorPlus# set interface ethernet-switching-options mac-table-aging-time 60
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show ethernet-switching table
Total entries in switching table: 2
Static entries in switching table: 0
Dynamic entries in switching table: 2
VLAN    MAC address          Type      Age    Interfaces
----    -
1       00:22:be:96:f2:83   Dynamic   60    ge-1/1/1
1       00:22:be:96:f2:84   Dynamic   60    ge-1/1/2

XorPlus# run clear ethernet-switching table all
XorPlus# run show ethernet-switching table
Total entries in switching table: 0
Static entries in switching table: 0
Dynamic entries in switching table: 0
VLAN    MAC address          Type      Age    Interfaces
----    -
XorPlus#

```

Cut-through mode configuration

- In default, the switch forward the packet with store-and-forward mode. User can configure the cut-through mode by following, which will reduce the latency of the forwarding packet:

(1) Configure switch in cut-through mode

```
XorPlus# set interface cut_through_mode true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Configure Mirroring

- User can configure only 1 mirror to analyze the traffic. User need configure the source/destination port which also called input/output port. The output port is not belong to any VLAN and will not participate in the Layer-2 and Layer-3 forwarding.

(1) Configure a mirror to analyze the traffic

```
XorPlus# set interface ethernet-switching-options analyzer 111 input egress ge-1/1/1
[edit]
XorPlus# set interface ethernet-switching-options analyzer 111 input ingress ge-1/1/1
[edit]
XorPlus# set interface ethernet-switching-options analyzer 111 input egress ge-1/1/2
[edit]
XorPlus# set interface ethernet-switching-options analyzer 111 input ingress ge-1/1/2
[edit]
XorPlus# set interface ethernet-switching-options analyzer 111 output ge-1/1/3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show analyzer 111
Analyzer name: 111
Output interface: <ge-1/1/3>
Ingress monitored interfaces: <ge-1/1/1> <ge-1/1/2>
Egress monitored interfaces: <ge-1/1/1> <ge-1/1/2>
XorPlus#
```

802.1Q Basic Port Configuration

- IEEE 802.1Q, or VLAN tagging, is a networking standard which defines the meaning of VLAN. User can configure the port as Trunk/Access mode port and native vlan-id. Furthermore, user can add the port in more than 1 VLANs if the port is in Trunk mode.
- Access port belongs to native VLAN, while the trunk ports can belong to more than 1 VLANs including the native VLAN.

(1) Configure the port in ACCESS/TRUNK mode

```
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching port-mode trunk
[edit]
XorPlus# commit
Waiting for merging configuration.
```

```
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure the native VLAN-ID

Native VLAN-ID is the default VLAN which the port belongs to. Actually, every port should be included in at least one VLAN.

```
XorPlus# set vlans vlan-id 5
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 5
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show vlans vlan-id 5
VLAN ID: 5
VLAN Name: default
Description:
vlan-interface:
Number of member ports: 1
Tagged port: None
Untagged port: ge-1/1/1,
XorPlus#
```

(3) Add a port in a VLAN

```
XorPlus# set vlans vlan-id 5
[edit]
XorPlus# set vlans vlan-id 6
[edit]
XorPlus# set vlans vlan-id 7
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching port-mode trunk
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching vlan members 5
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching vlan members 6
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching vlan members 7
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show vlans
VlanID  Tag      Interfaces
-----  -
1      tagged
untagged  ge-1/1/2, ge-1/1/3, ge-1/1/4, ge-1/1/5, ge-1/1/6,
ge-1/1/7, ge-1/1/8, ge-1/1/9, ge-1/1/10, ge-1/1/11,
ge-1/1/12, ge-1/1/13, ge-1/1/14, ge-1/1/15, ge-1/1/16,
ge-1/1/17, ge-1/1/18, ge-1/1/19, ge-1/1/20, ge-1/1/21,
ge-1/1/22, ge-1/1/23, ge-1/1/24, ge-1/1/25, ge-1/1/26,
ge-1/1/27, ge-1/1/28, ge-1/1/29, ge-1/1/30, ge-1/1/31,
ge-1/1/32, ge-1/1/33, ge-1/1/34, ge-1/1/35, ge-1/1/36,
ge-1/1/37, ge-1/1/38, ge-1/1/39, ge-1/1/40, ge-1/1/41,
ge-1/1/42, ge-1/1/43, ge-1/1/44, ge-1/1/45, ge-1/1/46,
ge-1/1/47, ge-1/1/48, ge-1/1/49, ge-1/1/50, ge-1/1/51,
te-1/1/52,
5      tagged  ge-1/1/2,
untagged
6      tagged  ge-1/1/2,
untagged
7      tagged  ge-1/1/2,
```

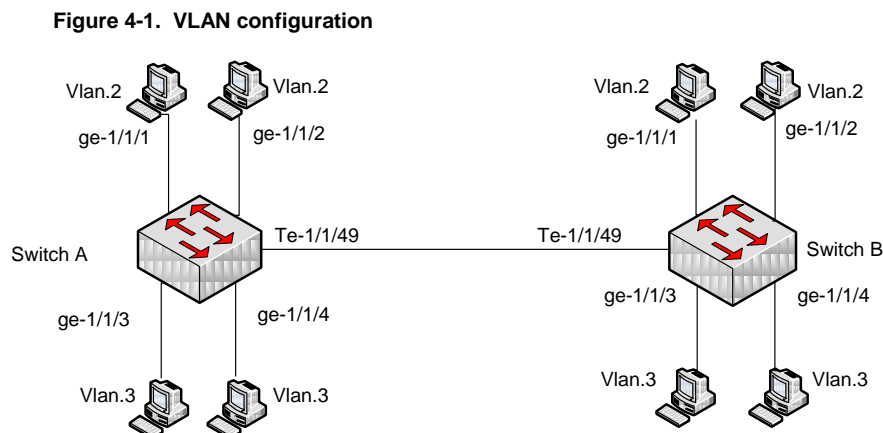
```

untagged
XorPlus#

```

VLAN Configuration Example

- In following topology, we give the configuration of VLAN



(1) Configure the Switch A

In switch-A, user 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

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet te-1/1/49 family ethernet-switching port-mode trunk
[edit]
XorPlus# set interface gigabit-ethernet te-1/1/49 family ethernet-switching vlan members 2
[edit]
XorPlus# set interface gigabit-ethernet te-1/1/49 family ethernet-switching vlan members 3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# run show vlans
VlanID  Tag      Interfaces
-----  ---      -
1       tagged

```

```

untagged ge-1/1/5, ge-1/1/6, ge-1/1/7, ge-1/1/8, ge-1/1/9,
ge-1/1/10, ge-1/1/11, ge-1/1/12, ge-1/1/13, ge-1/1/14,
ge-1/1/15, ge-1/1/16, ge-1/1/17, ge-1/1/18, ge-1/1/19,
ge-1/1/20, ge-1/1/21, ge-1/1/22, ge-1/1/23, ge-1/1/24,
ge-1/1/25, ge-1/1/26, ge-1/1/27, ge-1/1/28, ge-1/1/29,
ge-1/1/30, ge-1/1/31, ge-1/1/32, ge-1/1/33, ge-1/1/34,
ge-1/1/35, ge-1/1/36, ge-1/1/37, ge-1/1/38, ge-1/1/39,
ge-1/1/40, ge-1/1/41, ge-1/1/42, ge-1/1/43, ge-1/1/44,
ge-1/1/45, ge-1/1/46, ge-1/1/47, ge-1/1/48, te-1/1/49,
te-1/1/50, te-1/1/51, te-1/1/52,
2 tagged te-1/1/49,
untagged ge-1/1/1, ge-1/1/2,
3 tagged te-1/1/49,
untagged ge-1/1/3, ge-1/1/4,
XorPlus#

```

(2) Configure the Switch B

In switch-B, user 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

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 family ethernet-switching port-mode access
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet te-1/1/49 family ethernet-switching port-mode trunk
[edit]
XorPlus# set interface gigabit-ethernet te-1/1/49 family ethernet-switching vlan members 2
[edit]
XorPlus# set interface gigabit-ethernet te-1/1/49 family ethernet-switching vlan members 3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# run show vlans
VlanID  Tag      Interfaces
-----  -
1      tagged
untagged ge-1/1/5, ge-1/1/6, ge-1/1/7, ge-1/1/8, ge-1/1/9,
ge-1/1/10, ge-1/1/11, ge-1/1/12, ge-1/1/13, ge-1/1/14,
ge-1/1/15, ge-1/1/16, ge-1/1/17, ge-1/1/18, ge-1/1/19,
ge-1/1/20, ge-1/1/21, ge-1/1/22, ge-1/1/23, ge-1/1/24,
ge-1/1/25, ge-1/1/26, ge-1/1/27, ge-1/1/28, ge-1/1/29,
ge-1/1/30, ge-1/1/31, ge-1/1/32, ge-1/1/33, ge-1/1/34,
ge-1/1/35, ge-1/1/36, ge-1/1/37, ge-1/1/38, ge-1/1/39,
ge-1/1/40, ge-1/1/41, ge-1/1/42, ge-1/1/43, ge-1/1/44,
ge-1/1/45, ge-1/1/46, ge-1/1/47, ge-1/1/48, te-1/1/49,
te-1/1/50, te-1/1/51, te-1/1/52,
2      tagged te-1/1/49,
untagged ge-1/1/1, ge-1/1/2,
3      tagged te-1/1/49,
untagged ge-1/1/3, ge-1/1/4,

```

```
XorPlus#
```

Spanning Tree Protocol Configure

- 802.1D, 802.1w and 802.1s are spanning tree protocol which can avoid the loop in Layer-2. XorPlus supports STP/RSTP before software version-1.2, MSTP will be support after version-1.2.1. User can configure the parameters of STP/RSTP such as bridge-priority, forward-delay, max-age and hello-time interval.

(1) Configure basic global parameter of RSTP

In the global parameter configuring, forward Delay should be more than $\text{MaxAge}/2 + 1$, otherwise, the commit will be failed.

```
XorPlus# set protocols rstp bridge-priority 4096
[edit]
XorPlus# set protocols rstp force-version 1
[edit]
XorPlus# set protocols rstp forward-delay 10
[edit]
XorPlus# set protocols rstp hello-time 1
[edit]
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show spanning-tree bridge
STP Bridge Parameters
  Enabled Protocol: RSTP
  Root ID: 4096.c8:0a:a9:9e:14:9f
  Hello Time: 1 seconds
  Maximum Age: 20 seconds
  Forward Delay: 30 seconds
  Number of topology changes: 1
  Time since last topology change: 1507 seconds
Local Parameters
  Bridge ID: 4096.c8:0a:a9:9e:14:9f
XorPlus#
```

(2) Configure interface parameter of RSTP

```
XorPlus# set protocols rstp interface ge-1/1/1 cost 300000
[edit]
XorPlus# set protocols rstp interface ge-1/1/1 edge true
[edit]
XorPlus# set protocols rstp interface ge-1/1/1 mode point-to-point
[edit]
XorPlus# set protocols rstp interface ge-1/1/1 port-priority 120
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show spanning-tree interface ge-1/1/1
Interface  Port ID    Designated  Designated Bridge      Port  State  Role
-----  -
port ID    ID
-----  -
ge-1/1/1  112.1      112.1      32768.00:00:00:00:00:00  300000  FORWARDING  EDGE PORT
XorPlus#
```

(3) Disable RSTP in specied interface

User can disable the spanning tree protocol in interfaces. If user disable the RSTP, the port will be always in "Forwarding" status and will not send BPDU anymore

```
XorPlus# set protocols rstp interface ge-1/1/1 manual-forwarding true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show spanning-tree interface
Interface  Port ID  Designated  Designated Bridge  Port  State  Role
          port ID  ID          ID                  Cost
-----  -
ge-1/1/1  128.1   128.1       32768.60:eb:69:44:44  20000  FORWARDING  MANUAL
ge-1/1/14 128.14  128.14      32768.60:eb:69:44:44  20000  FORWARDING  DESIGNATED PORT
XorPlus#
```

(4) Configure BPDU Filter and Guard

- **BPDU Guard:** If a switch port that has EgPort enabled receives a BPDU on that port, it will place the port into the error disabled state
- **BPDU Filter:** BPDU filter will simply prevent the bridge from using BPDU's for STP calculations. If switch receive BPDUs, it will ignore these BPDUs

```
XorPlus# set protocols rstp interface ge-1/1/1 bpdu-filter true
[edit]
XorPlus# set protocols rstp interface ge-1/1/1 bpdu-guard true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show spanning-tree interface ge-1/1/1 detail
Interface Name: ge-1/1/1
Port Identifier: 28673
Designated Port ID: 28673
Port Cost: 300000
Port State: DISABLED
Designated Bridge ID: 32768.00:00:00:00:00:00
Port Role: EDGE PORT
Port Type: P2P (Non-Edge)
Port Guard Status: Bpdu(enable), Loop(disable), Root(disable), Tcn(disable)

XorPlus#
```

(5) Configure BPDU root guard

- **Root Guard:** If a switch port receives a higher bridge-priority BPDUs, it will ignore it and keep current root-bridge as root-bridge.

```
XorPlus# set protocols rstp interface ge-1/1/1 root-guard true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show spanning-tree interface ge-1/1/1 detail
Interface Name: ge-1/1/1
Port Identifier: 28673
Designated Port ID: 28673
Port Cost: 300000
Port State: DISABLED
Designated Bridge ID: 32768.00:00:00:00:00:00
Port Role: EDGE PORT
Port Type: P2P (Non-Edge)
Port Guard Status: Bpdu(enable), Loop(disable), Root(enable), Tcn(disable)

XorPlus#
```


(6) Configure BPDU loop guard

- Loop Guard: When the switch can't not receive the BPDU, the port will enter into loop-inconsis

```
XorPlus# set protocols rstp interface ge-1/1/2 loop-guard true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show spanning-tree interface ge-1/1/2 detail
Interface Name: ge-1/1/2
Port Identifier: 28673
Designated Port ID: 28673
Port Cost: 200000
Port State: DISABLED
Designated Bridge ID: 32768.00:00:00:00:00:00
Port Role: EDGE PORT
Port Type: P2P (Non-Edge)
Port Guard Status: Bpdu(enable), Loop(enable), Root(disable), Tcn(disable)

XorPlus#
```

Buffer Management Configure

- The switch provide the buffer for the burst traffic to avoid the packet dropped. User can configure the “Cell” and “Packet” to control the buffer management
- Usually, user need not configure the parameter of “cell” and “packet”, the switch has its default parameter.
- User can configure the switch as burst-mode for burst traffic, which will dynamic allocate the “cell” and “packet” for each port and queues

(1) Configure burst-mode for specified port

```
XorPlus# set interface ethernet-switching-options buffer burst-mode enable true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure “cell” and “packet” for specified port

```
XorPlus# set interface ethernet-switching-options buffer cell queue 1 guaranteed-ratio 10
[edit]
XorPlus# set interface ethernet-switching-options buffer cell queue 1 shared-ratio 30
[edit]
XorPlus# set interface ethernet-switching-options buffer cell shared-ratio 50
[edit]
XorPlus# set interface ethernet-switching-options buffer cell total-shared-ratio 80
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# set interface ethernet-switching-options buffer packet queue 1 guaranteed-ratio 10
[edit]
XorPlus# set interface ethernet-switching-options buffer packet queue 1 shared-ratio 40
[edit]
```

```
XorPlus# set interface ethernet-switching-options buffer packet shared-ratio 60
[edit]
XorPlus# set interface ethernet-switching-options buffer packet total-shared-ratio 80
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Chapter 5. Layer-3 Routing Configuration

This chapter describes the configuration steps of Layer-3 routing, e.g. static routing, RIPV2, OSPFv2, VRRP and ECMP

Layer-3 VLAN Interface Configuration

- In XorPlus, all Layer-3 interface is VLAN-Interface, user should create a VLAN and VLAN-Interface before user can configure it.
- User can configure the IP address and prefix length for the VLAN-interface
- When all the member ports in the VLAN are link-down, the VLAN-interface will be link-down. The VLAN-interface will link-up when one member port link-up at least.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 address 192.168.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 192.168.2.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show vlan-interface
vlan-2      Hwaddr C8:0A:A9:9E:14:9F, Vlan:2, State:DOWN
           Inet addr: 192.168.1.1/24
           fe80::ca0a:a9ff:fe9e:149f/64
           Traffic statistics:
           IPv4 Input Packets.....0
           IPv4 Forwarding Packets.....0
           IPv6 Input Packets.....0
           IPv6 Forwarding Packets.....0

vlan-3      Hwaddr C8:0A:A9:9E:14:9F, Vlan:3, State:UP
           Inet addr: 192.168.2.1/24
           fe80::ca0a:a9ff:fe9e:149f/64
           Traffic statistics:
           IPv4 Input Packets.....0
           IPv4 Forwarding Packets.....0
           IPv6 Input Packets.....0
           IPv6 Forwarding Packets.....0

XorPlus#
```

ARP Configuration

(1) Configure ARP aging time

In default, the ARP aging time is 1200 seconds.

```
XorPlus# set protocols arp aging-time 600
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure Static ARP entry

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlan-interface interface vlan-2 address 192.168.1.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols arp interface vlan-2 address 192.168.1.1 mac-address 22:22:22:22:22:22
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Static Routing Configuration

- In XorPlus, all routing entry will be configured to chip if the outgoing VLAN-interface is link-up and the outgoing physical port is learning.
- Actually, traffic is able to be routed should meet following: route entry in RIB, ARP of next hop, link-up of outgoing interface. In this case, the traffic will be routed by CPU of switch, which is called soft-routed?
- When the switch learn the MAC address of next-hop, the switch will forward the traffic with ASIC Chip

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
```

```

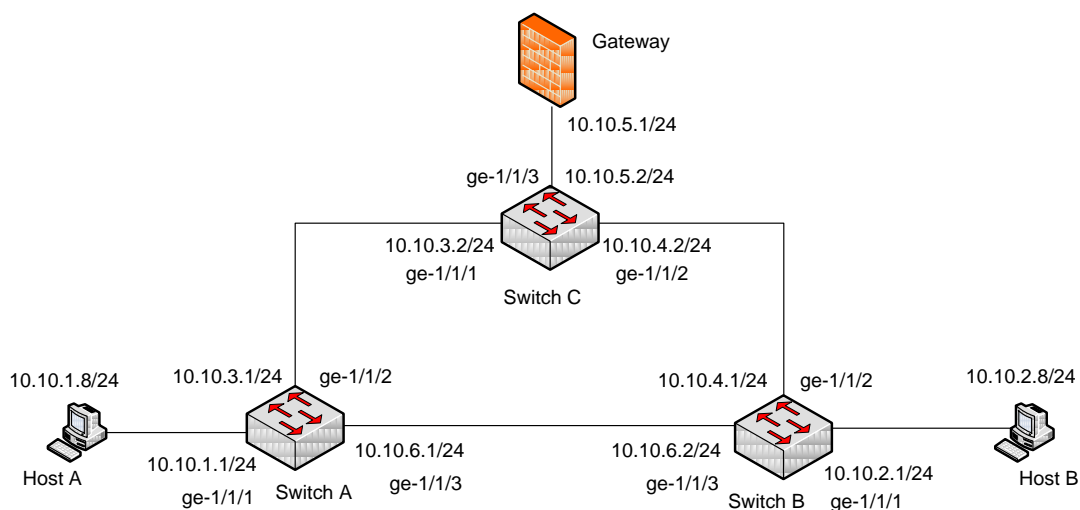
XorPlus# set vlan-interface interface vlan-2 address 192.168.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 192.168.2.1 prefix-length 24
[edit]
XorPlus# set protocols static route 10.10.1.0/24 next-hop 192.168.2.5
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show route table ipv4 unicast final
10.10.1.0/24      [static(1)/1]
                  > to 192.168.2.5 via vlan-3/vlan-3
192.168.1.0/24  [connected(0)/0]
                  > via vlan-2/vlan-2
192.168.2.0/24  [connected(0)/0]
                  > via vlan-3/vlan-3
XorPlus#
XorPlus# run show route forward-route ipv4 all
Destination      NetMask          NextHopMac       Port
-----
10.10.1.0        255.255.255.0   00:1E:68:37:EF:7D ge-1/1/2
192.168.1.0     255.255.255.0   C8:0A:A9:04:49:28 connected
192.168.2.0     255.255.255.0   C8:0A:A9:04:49:28 connected
    
```

In the CLI of “show route forward-route ipv4 all”, all the route entry in ASIC Chip will be displayed. In the CLI of “show route table ipv4 unicast final”, all routes in RIB of kernel will be displayed.

Static Routing Configuration Example

- In following topology, we give the example of configuration with static routing
- The host A and host B should be able to communicate with each other.
- The host A and host B should be able to communicate with the gateway (e.g. access Internet)

Figure 5-1. Static routing configuration



(1) Configure the Switch A

In switch-A, user need configure 3 VLAN-interface for network 10.10.1.1/24, 10.10.3.1/24 and 10.10.6.1/24. Furthermore, user need configure a static route to 10.10.2.0/24 and a default route.

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set vlans vlan-id 4
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 4
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlans vlan-id 4 l3-interface vlan-4
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.3.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-4 address 10.10.6.1 prefix-length 24
[edit]
XorPlus# set protocols static route 10.10.2.0/24 next-hop 10.10.6.2
[edit]
XorPlus# set protocols static route 0.0.0.0/0 next-hop 10.10.3.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

User can verify the route entry in RIB as following:

```

XorPlus# run show route table ipv4 unicast final
0.0.0.0/0          [static(1)/1]
> to 10.10.3.2 via vlan-3/vlan-3
10.10.2.0/24     [static(1)/1]
> to 10.10.6.2 via vlan-4/vlan-4
10.10.1.0/24     [connected(0)/0]
> via vlan-2/vlan-2
10.10.3.0/24     [connected(0)/0]
> via vlan-3/vlan-3
10.10.6.0/24     [connected(0)/0]
> via vlan-4/vlan-4
XorPlus#

```

(2) Configure the Switch B

In switch-B, user need configure 3 VLAN-interface for network 10.10.2.1/24, 10.10.4.1/24 and 10.10.6.2/24. Furthermore, user need configure a static route to 10.10.1.0/24 and a default route.

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set vlans vlan-id 4
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]

```

```

XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 4
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlans vlan-id 4 l3-interface vlan-4
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.2.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.4.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-4 address 10.10.6.1 prefix-length 24
[edit]
XorPlus# set protocols static route 10.10.1.0/24 next-hop 10.10.6.1
[edit]
XorPlus# set protocols static route 0.0.0.0/0 next-hop 10.10.4.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

User can verify the route entry in RIB as following:

```

XorPlus# run show route table ipv4 unicast final
0.0.0.0/0          [static(1)/1]
                  > to 10.10.4.2 via vlan-3/vlan-3
10.10.1.0/24     [static(1)/1]
                  > to 10.10.6.1 via vlan-4/vlan-4
10.10.2.0/24     [connected(0)/0]
                  > via vlan-2/vlan-2
10.10.4.0/24     [connected(0)/0]
                  > via vlan-3/vlan-3
10.10.6.0/24     [connected(0)/0]
                  > via vlan-4/vlan-4
XorPlus#

```

(3) Configure the Switch C

In switch-C, user need configure 3 VLAN-interface for network 10.10.3.2/24, 10.10.4.2/24 and 10.10.5.2/24. Furthermore, user need configure a static route to 10.10.1.0/24 and a default route.

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set vlans vlan-id 4
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 4
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlans vlan-id 4 l3-interface vlan-4
[edit]

```

```

XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.3.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.4.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-4 address 10.10.5.2 prefix-length 24
[edit]
XorPlus# set protocols static route 10.10.1.0/24 next-hop 10.10.3.1
[edit]
XorPlus# set protocols static route 10.10.2.0/24 next-hop 10.10.4.1
[edit]
XorPlus# set protocols static route 10.10.6.0/24 next-hop 10.10.3.1
[edit]
XorPlus# set protocols static route 0.0.0.0/0 next-hop 10.10.5.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

User can verify the route entry in RIB as following:

```

XorPlus# run show route table ipv4 unicast final
0.0.0.0/0          [static(1)/1]
                  > to 10.10.5.1 via vlan-4/vlan-4
10.10.1.0/24      [static(1)/1]
                  > to 10.10.3.1 via vlan-2/vlan-2
10.10.2.0/24      [static(1)/1]
                  > to 10.10.4.1 via vlan-3/vlan-3
10.10.6.0/24      [static(1)/1]
                  > to 10.10.3.1 via vlan-2/vlan-2
10.10.3.0/24      [connected(0)/0]
                  > via vlan-2/vlan-2
10.10.4.0/24      [connected(0)/0]
                  > via vlan-3/vlan-3
10.10.5.0/24      [connected(0)/0]
                  > via vlan-4/vlan-4
XorPlus#

```

RIPv2 Routing Protocol Configuration

- In XorPlus, RIPv2 is supported.
- The Policy statement is used to specified which route entry will be distributed. For example, user can distribute the static route or the connected route to the neighbor. User can also specify the distributed route metric.
- User can configure the RIPv2 interface parameter e.g. accept-default-route, advertise-default-route, deletion-delay, request-interval, update-interval etc.

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlan-interface interface vlan-2 address 192.168.1.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.

```



```

Save done.
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlan-interface interface vlan-3 address 192.168.2.1 prefix-length 24
[edit]
XorPlus# set protocols static route 9.9.9.0/24 next-hop 192.168.2.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set policy policy-statement connected-to-rip term export from protocol connected
[edit]
XorPlus# set policy policy-statement connected-to-rip term export then metric 0
[edit]
XorPlus# set policy policy-statement static-to-rip term export from protocol static
[edit]
XorPlus# set policy policy-statement static-to-rip term export then metric 1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols rip interface vlan-2 address 192.168.1.1
[edit]
XorPlus# set protocols rip export "connected-to-rip,static-to-rip"
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

User can verify the RIP configuration with following:

```

XorPlus# run show rip status all

* RIP on vlan-2 vlan-2 192.168.1.1
  Status: enabled
XorPlus#
XorPlus# run show rip statistics all

* RIP on vlan-2 vlan-2 192.168.1.1
  Status: enabled

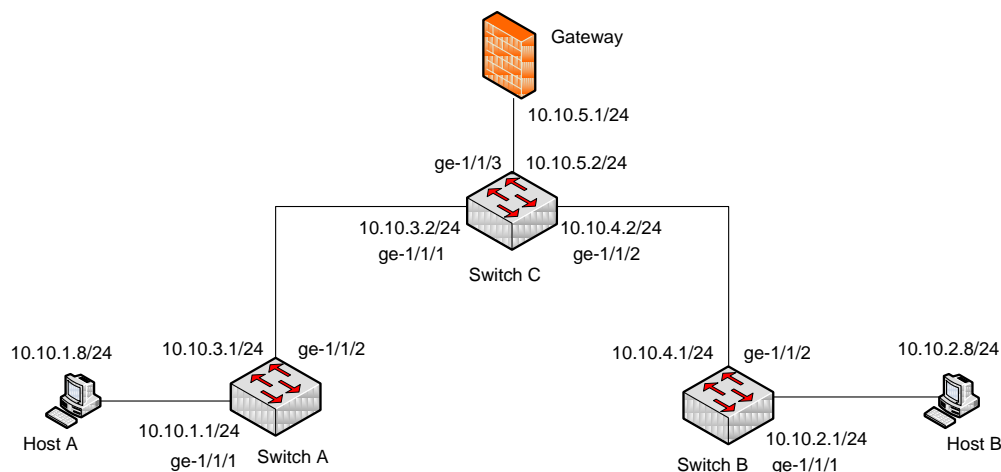
```

Counter	Value
Requests Sent	7
Updates Sent	6
Triggered Updates Sent	1
Non-RIP Updates Sent	0
Total Packets Received	0
Request Packets Received	0
Update Packets Received	0
Bad Packets Received	0
Authentication Failures	0
Bad Routes Received	0
Non-RIP Requests Received	0

RIPv2 Routing Configuration Example

- In following topology, we give the example of configuration with RIPv2 routing
- The host A and host B should be able to communicate with each other with RIP route.
- The host A and host B should be able to communicate with the gateway (e.g. access Internet) with RIP.

Figure 5-2. RIPv2 routing configuration



(1) Configure the Switch A

In switch-A, user need configure 2 VLAN-interface for network 10.10.1.1/24 and 10.10.3.1/24. Furthermore, user need configure a RIP interface in network 10.10.3.1/24. The switch-A should accept default route which is advertised from switch-C.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.3.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set policy policy-statement connected-to-rip term export from protocol connected
[edit]
XorPlus# set policy policy-statement connected-to-rip term export then metric 0
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols rip interface vlan-3 address 10.10.3.1
[edit]
```

```
XorPlus# set protocols rip export "connected-to-rip"
[edit]
XorPlus# set protocols rip interface vlan-3 address 10.10.3.1 accept-default-route true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure the Switch B

In switch-B, user need configure 2 VLAN-interface for network 10.10.1.1/24 and 10.10.3.1/24. Furthermore, user need configure a RIP interface in network 10.10.3.1/24. The switch-A should accept default route which is advertised from switch-C.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.2.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.4.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set policy policy-statement connected-to-rip term export from protocol connected
[edit]
XorPlus# set policy policy-statement connected-to-rip term export then metric 0
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols rip interface vlan-3 address 10.10.4.1
[edit]
XorPlus# set protocols rip export "connected-to-rip"
[edit]
XorPlus# set protocols rip interface vlan-3 address 10.10.4.1 accept-default-route true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Configure the Switch C

In switch-C, user need configure 3 VLAN-interface for network 10.10.3.2/24, 10.10.4.2/24 and 10.10.5.2/24. Furthermore, user need configure a default route and 2 RIP interfaces.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
```

```

XorPlus# set vlans vlan-id 4
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 4
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlans vlan-id 4 l3-interface vlan-4
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.3.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.4.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-4 address 10.10.5.2 prefix-length 24
[edit]
XorPlus# set protocols static route 0.0.0.0/0 next-hop 10.10.5.1
[edit]
XorPlus# set protocols rip interface vlan-2 address 10.10.3.2
[edit]
XorPlus# set protocols rip interface vlan-2 address 10.10.3.2 advertise-default-route true
[edit]
XorPlus# set protocols rip interface vlan-3 address 10.10.4.2
[edit]
XorPlus# set protocols rip interface vlan-3 address 10.10.4.2 advertise-default-route true
[edit]
XorPlus# set protocols rip export "connected-to-rip"
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

(4) Verify the RIP Configuration

User can verify the RIP configuration of them as following:

For example, in Switch-A, user can verify the RIP peer and the RIP route table.

```

XorPlus# run show rip peer
Address          Interface        State  Hello Rx  Hello Tx  Last Hello
-----
10.10.3.2        vlan-3/vlan-3    Up     0          0          00:41:44
XorPlus#
XorPlus# run show route table ipv4 unicast rip
0.0.0.0/0        [rip(120)/1]
> to 10.10.3.2 via vlan-3/vlan-3
10.10.2.0/24     [rip(120)/1]
> to 10.10.3.2 via vlan-3/vlan-3
10.10.4.0/24     [rip(120)/1]
> to 10.10.3.2 via vlan-3/vlan-3

```

OSPF Routing Protocol Configuration

- In XorPlus, OSPFv2 is supported.
- XorPlus supports the Normal, Stub and NSSA area type in OSPF

(1) Configure the router-id

The router-id should be configured firstly when user configure the OSPF. The route-id is a string which is similar to IP address. It should be unique in the OSPF domain. User'd better not change it after user finished the configuration

```
XorPlus# set protocols ospf4 router-id 1.1.1.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
```

(2) Configure the OSPF area and type

The area 0.0.0.0 is the back-bone area of OSPF. Each OSPF domain should have the area 0.0.0.0. The area type includes Normal, Stub and NSSA.

```
XorPlus# set protocols ospf4 area 0.0.0.0 area-type normal
[edit]
XorPlus# set protocols ospf4 area 1.1.1.1 area-type stub
[edit]
XorPlus# set protocols ospf4 area 2.2.2.2 area-type nssa
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Configure the OSPF interface

After user configured the OSPF area, user need configure some OSPF interface in these areas, which will transmit and receive the LSAs to calculate the route

```
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.60.10 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.61.10 prefix-length 24
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.60.10
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-3 address 10.10.61.10
[edit]
XorPlus# set protocols ospf4 router-id 1.1.1.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# run show ospf4 interface
```

Interface	State	Area	DR ID	BDR ID	Nbrs
vlan-2	DR	0.0.0.0	1.1.1.1	0.0.0.0	0
vlan-3	DR	0.0.0.0	1.1.1.1	0.0.0.0	0

(4) Configure the OSPF interface parameter

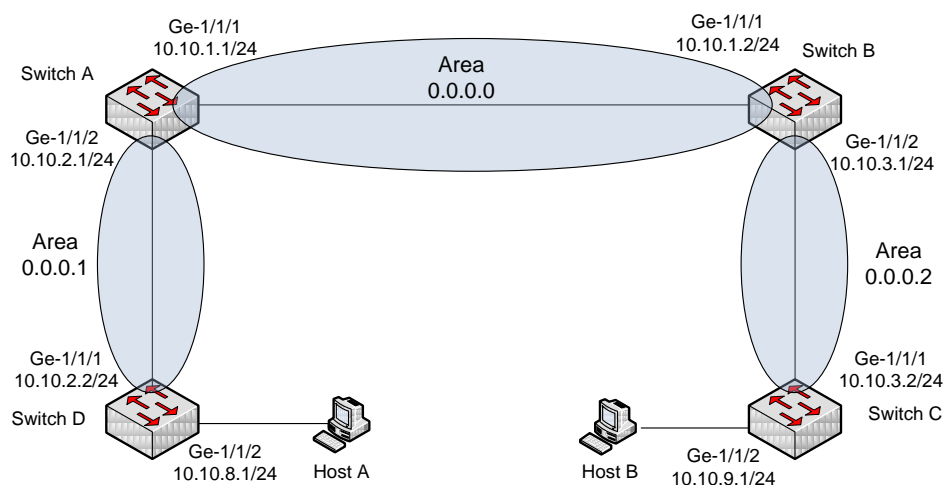
User can also configure other parameter of the OSPF interface, for example, hello-interval, interface-cost, static neighbor, priority, retransmit-interval, router-dead-interval and transmit-delay.

```
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.60.10 hello-interval 5
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.60.10 interface-cost 8
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.60.10 transmit-delay 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# run show ospf4 interface detail
Interface vlan-2/vlan-2, State DR, Area 0.0.0.0
DR ID 1.1.1.1, BDR ID 0.0.0.0, Nbrs 0
Network Type BROADCAST, Address 10.10.60.10, Mask 255.255.255.0, Cost 8
DR addr 10.10.60.10, BDR addr 0.0.0.0, Priority 128
Hello 10, Dead 40, ReXmit 5, NORMAL
```

OSPF Routing Basic Configuration Example

- In following topology, we give the example of configuration with OSPF routing. The switch-A and switch B is located in back-bone area 0.0.0.0. There are two no-back-bone areas 1.1.1.1 and 2.2.2.2.
- The switch D will get the route of network 10.10.1.0/24 10.10.3.0/24 and 10.10.9.0/24 according the received LSAs from neighbor. The switch C will get the route of network 10.10.1.0/24 10.10.2.0/24 and 10.10.8.0/24 according the received LSAs from neighbor.

Figure 5-3. OSPF basic routing configuration



(1) Configure the Switch A

In switch-A, user need configure 2 VLAN-interface for network 10.10.1.1/24 and 10.10.2.1/24. Furthermore, user need configure area 0.0.0.0 including network 10.10.1.1/24 and area 0.0.0.1 including network 10.10.2.1/24

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.2.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 1.1.1.1
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.1.1
[edit]
XorPlus# set protocols ospf4 area 0.0.0.1 interface vlan-3 address 10.10.2.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure the Switch B

In switch-B, user need configure 2 VLAN-interface for network 10.10.1.2/24 and 10.10.3.1/24. Furthermore, user need configure area 0.0.0.0 including network 10.10.1.2/24 and area 0.0.0.3 including network 10.10.3.1/24.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.3.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 2.2.2.2
[edit]
```

```
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.1.2
[edit]
XorPlus# set protocols ospf4 area 0.0.0.2 interface vlan-3 address 10.10.3.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(3) Configure the Switch C

In switch-C, user need only configure a OSPF interface which in area 0.0.0.2

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.3.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.9.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 3.3.3.3
[edit]
XorPlus# set protocols ospf4 area 0.0.0.2 interface vlan-2 address 10.10.3.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(4) Configure the Switch D

In switch-D, user need only configure a OSPF interface which in area 0.0.0.1

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.2.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.8.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
```



```
[edit]
XorPlus# set protocols ospf4 router-id 4.4.4.4
[edit]
XorPlus# set protocols ospf4 area 0.0.0.1 interface vlan-2 address 10.10.2.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(5) Verify the OSPF Configuration

User can verify the OSPF configuration of them. Usually, user can check the OSPF neighbor of switch. For example, the switch-A has two OSPF neighbor interface which are 10.10.1.2 and 10.10.2.2

```
XorPlus# run show ospf4 neighbor
```

Address	Interface	State	Router ID	Pri	Dead
10.10.1.2	vlan-2/vlan-2	Full	2.2.2.2	1	32
10.10.2.2	vlan-3/vlan-3	Full	4.4.4.4	1	32

Then user can check the OSPF database with following:

```
XorPlus# run show ospf4 database
```

OSPF link state database, Area 0.0.0.0							
Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Router	*1.1.1.1	1.1.1.1	0x8000025a	394	0x2	0xf2bb	48
Network	*10.10.1.1	1.1.1.1	0x80000180	394	0x2	0xc0b9	32
Network	*10.10.2.1	1.1.1.1	0x80000180	394	0x2	0xc0b9	32
Router	2.2.2.2	2.2.2.2	0x8000023e	339	0x2	0x3024	36
Network	10.10.3.1	2.2.2.2	0x80000180	394	0x2	0xc0b9	32
Router	3.3.3.3	3.3.3.3	0x8000023e	339	0x2	0x3024	36
Router	4.4.4.4	4.4.4.4	0x8000023e	339	0x2	0x3024	36

OSPF link state database, Area 0.0.0.2							
Type	ID	Adv Rtr	Seq	Age	Opt	Cksum	Len
Router	*1.1.1.1	1.1.1.1	0x8000025a	394	0x2	0xf2bb	48
Network	*10.10.1.1	1.1.1.1	0x80000180	394	0x2	0xc0b9	32
Network	*10.10.2.1	1.1.1.1	0x80000180	394	0x2	0xc0b9	32
Router	2.2.2.2	2.2.2.2	0x8000023e	339	0x2	0x3024	36
Network	10.10.3.1	2.2.2.2	0x80000180	394	0x2	0xc0b9	32
Router	3.3.3.3	3.3.3.3	0x8000023e	339	0x2	0x3024	36
Router	4.4.4.4	4.4.4.4	0x8000023e	339	0x2	0x3024	36

Finally, user can check the OSPF route in RIB in switch-A

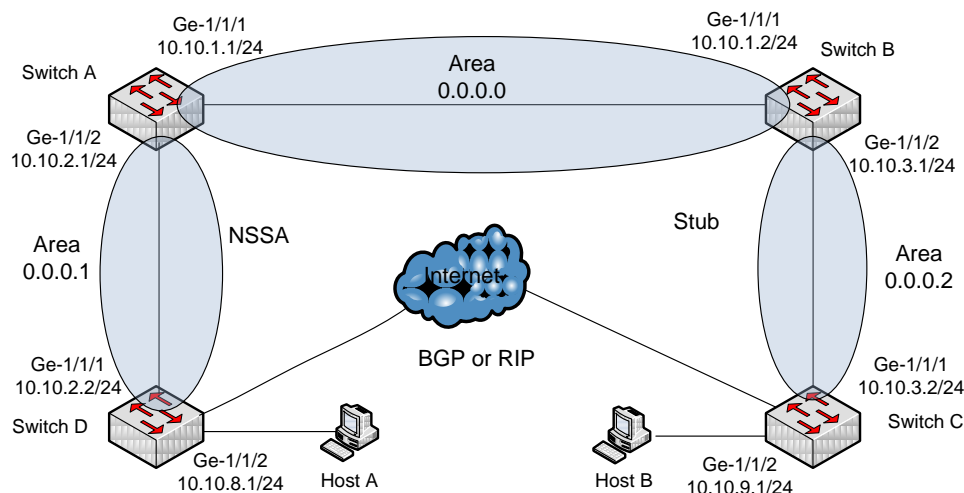
```
XorPlus#
XorPlus# run show route table ipv4 unicast ospf
```

10.10.3.0/24	[ospf (110) /2]
	> to 10.10.1.2 via vlan-2/vlan-2

OSPF Configuration NSSA/Stub/Normal Example

- In following topology, we give the example of configuration with OSPF area of NSSA and Stub.
- The switch D will get the route of network 10.10.1.0/24 10.10.3.0/24 and 10.10.9.0/24 according the received LSAs from neighbor. The switch C will get the route of network 10.10.1.0/24 10.10.2.0/24 and 10.10.8.0/24 according the received LSAs from neighbor.

Figure 5-4. OSPF NSSA/Stub area configuration



(1) Configure the Switch A

In switch-A, user need configure 2 VLAN-interface for network 10.10.1.1/24 and 10.10.2.1/24. Furthermore, user need configure area 0.0.0.0 including network 10.10.1.1/24 and area 0.0.0.1 including network 10.10.2.1/24

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.2.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 1.1.1.1
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.1.1
[edit]
XorPlus# set protocols ospf4 area 0.0.0.1 interface vlan-3 address 10.10.2.1
[edit]
XorPlus# set protocols ospf4 area 0.0.0.1 area-type nssa
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure the Switch B

In switch-B, user need configure 2 VLAN-interface for network 10.10.1.2/24 and 10.10.3.1/24. Furthermore, user need configure area 0.0.0.0 including network 10.10.1.2/24 and area 0.0.0.2 including network 10.10.3.1/24 with Stub.

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.3.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 2.2.2.2
[edit]
XorPlus# set protocols ospf4 area 0.0.0.0 interface vlan-2 address 10.10.1.2
[edit]
XorPlus# set protocols ospf4 area 0.0.0.2 interface vlan-3 address 10.10.3.1
[edit]
XorPlus# set protocols ospf4 area 0.0.0.2 area-type stub
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

(3) Configure the Switch C

In switch-C, user need only configure a OSPF interface which in area 0.0.0.2

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.3.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.9.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 3.3.3.3
[edit]
XorPlus# set protocols ospf4 area 0.0.0.2 interface vlan-2 address 10.10.3.2
[edit]
XorPlus# set protocols ospf4 area 0.0.0.2 area-type stub
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.

```

```
[edit]
XorPlus#
```

(4) Configure the Switch D

In switch-D, user need only configure a OSPF interface which in area 0.0.0.1. This switch should import the RIP or BGP route from RIB and distribute to other areas.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.2.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.8.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set policy policy-statement rip-ospf term rip from protocol rip
[edit]
XorPlus# set policy policy-statement rip-ospf term rip then external-type 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols ospf4 router-id 4.4.4.4
[edit]
XorPlus# set protocols ospf4 area 0.0.0.1 interface vlan-2 address 10.10.2.2
[edit]
XorPlus# set protocols ospf4 area 0.0.0.1 area-type nssa
[edit]
XorPlus# set protocols ospf4 export rip-ospf
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Equal-Cost Multipath Routing (ECMP) Configuration

- In XorPlus, ECMP is supported. The maximum ECMP route is 4*128. For example, if user configure each ECMP route maximum has 4 equal-cost path, the maximum ECMP support is 128. If user configure each ECMP route maximum has 16 equal-cost path, the maximum ECMP support is 32.
- After user configure the ECMP maximum equal-cost path, user need save the configure file and reboot the switch to make it available.

(1) Configure the maximum equal-cost path

```
XorPlus# set interface ecmp_path_max 8
[edit]
XorPlus# commit
```

```

Waiting for merging configuration.
Commit OK.
Save done.
ECMP max path changes, please save running-config to startup and reset the box!
[edit]
XorPlus#
XorPlus# save running-to-startup
Save done.
[edit]
XorPlus#
XorPlus# run request system reboot
The system is going down NOW!
Sending SIGTERM to all processes
Sending SIGKILL to all processes
Requesting system reboot
Restarting system.
rstcr compatible register does not exist!
uses the mpc8541's gpio to do a reset.
U-Boot 1.3.0 (Sep  8 2010 - 17:20:00)
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

```

(2) Configure the static ECMP routing

```

XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set vlans vlan-id 4
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/5 family ethernet-switching native-vlan-id 4
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlans vlan-id 4 l3-interface vlan-4
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.60.10 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.61.10 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-4 address 10.10.62.10 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols static route 10.10.51.0/24 next-hop 10.10.61.20
[edit]
XorPlus# set protocols static route 10.10.51.0/24 qualified-next-hop 10.10.62.20 metric 1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]

```

```
XorPlus#
```

Then, user can check the static ECMP route for 10.10.51.0/24 in RIB

```
XorPlus# run show route table ipv4 unicast final
10.10.51.0/24      [static(1)/1]
                  > to 10.10.61.20 via vlan-3/vlan-3
10.10.51.0/24      [static(1)/1]
                  > to 10.10.62.20 via vlan-4/vlan-4
10.10.60.0/24      [connected(0)/0]
                  > via vlan-2/vlan-2
10.10.61.0/24      [connected(0)/0]
                  > via vlan-3/vlan-3
10.10.62.0/24      [connected(0)/0]
                  > via vlan-4/vlan-4
```

Virtual Router Redundancy Protocol (VRRP) Configuration

- In XorPlus, VRRP is supported including preempt and non-preempt.

(1) Configure the VRRP

In following configuration, a virtual router with IP 192.168.1.5/24 has been created User can configure the preempt and priority of this virtual router

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 192.168.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 192.168.2.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols vrrp interface vlan-2 vrid 1
[edit]
XorPlus# set protocols vrrp interface vlan-2 vrid 1 ip 192.168.1.5 prefix-length 24
[edit]
XorPlus# set protocols vrrp interface vlan-2 vrid 1 preempt true
[edit]
XorPlus# set protocols vrrp interface vlan-2 vrid 1 priority 100
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Then, user can check the VRRP configuration

```
XorPlus# run show vrrp vlan-2
Interface      vlan-2
Vif            vlan-2
VRID           1
State          master
```

```
Master IP      192.168.1.1
XorPlus#
```

IPv6 Neighbor Configuration

(1) Configure aging time of IPv6 neighbor

User can configure the aging time of IPv6 neighbor. The neighbor will be removed after timer expired.

```
XorPlus# set protocols neighbour aging-time 480
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure static IPv6 neighbor

User can configure static IPv6 neighbor in specified interface.

```
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set protocols neighbour interface vlan-2 address 2001::01 mac-address
22:22:22:22:22:22
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show ipv6-neighbors static
aging-time(seconds): 480
Address                                     HW Address                                Interface
-----
2001::1                                     22:22:22:22:22:22                         vlan-2
XorPlus#
```

IPv6 Static Routing Configuration

- In XorPlus, IPv6 static routing is supported. The IPv6 for OSPFv3 and RIPng will be support soon.
- In Pronto 3290 and Pronto 3780, user must configure the link-local IPv6 address, otherwise, all the IPv6 interface will share the same link-local address. We will fix this problem in later released version.

(1) Configure static route for IPv6

User can configure the link-local address and global address for a VLAN interface.

```
XorPlus# set vlans vlan-id 2
[edit]
XorPlus# set vlans vlan-id 3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/3 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/4 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 2001:db8:3c4d:5:60:ff:73:87 prefix-length
64
[edit]
```

```

XorPlus# set vlan-interface interface vlan-2 address fe80::ca0a:a9ff:fe04:4931 prefix-length 64
[edit]
XorPlus# set vlan-interface interface vlan-3 address 2001:db8:3c4d:6:0:ff:73:87 prefix-length
64
[edit]
XorPlus# set vlan-interface interface vlan-3 address fe80::ca0a:a9ff:4:4932 prefix-length 64
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols static route 2001:db8:3c4d:7::/64 next-hop 2001:db8:3c4d:5:60:d6ff:73:89
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

Then user can verify the IPv6 static route in RIB

```

XorPlus# run show route table ipv6 unicast final
2001:db8:3c4d:5::/64[connected(0)/0]
> via vlan-2/vlan-2
2001:db8:3c4d:6::/64[connected(0)/0]
> via vlan-3/vlan-3
fe80::/64 [connected(0)/0]
> via vlan-3/vlan-3
fe80::/64 [connected(0)/0]
> via vlan-2/vlan-2

```

OSPFv3 Routing Protocol Configuration

- In XorPlus, OSPFv3 is supported.

(1) Configure the router-id

```

XorPlus# set protocols ospf6 instance-id 1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]

```

(2) Configure the OSPF area and type

The area 0.0.0.0 is the back-bone area of OSPF. Each OSPF domain should have the area 0.0.0.0. The area type includes Normal, Stub and NSSA.

```

XorPlus# set protocols ospf6 area 0.0.0.0 area-type normal
[edit]
XorPlus# set protocols ospf6 area 1.1.1.1 area-type stub
[edit]
XorPlus# set protocols ospf6 area 2.2.2.2 area-type nssa
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```


(3) Configure the OSPF interface

```
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 2001::15 prefix-length 64
[edit]
XorPlus# set vlan-interface interface vlan-3 address 2002::15 prefix-length 64
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set protocols ospf6 area 0.0.0.0 interface vlan-2 address 2001::15
[edit]
XorPlus# set protocols ospf6 area 0.0.0.0 interface vlan-3 address 2002::15
[edit]
XorPlus# set protocols ospf6 instance-id 1
[edit]
XorPlus# set protocols ospf6 router-id 1.1.1.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# run show ospf6 interface
```

Interface	State	Area	DR ID	BDR ID	Nbrs
vlan-2	Down	0.0.0.0	0.0.0.0	0.0.0.0	0
vlan-3	Down	0.0.0.0	0.0.0.0	0.0.0.0	0

(4) Configure the OSPF interface parameter

User can also configure other parameter of the OSPF interface, for example, hello-interval, interface-cost, static neighbor, priority, retransmit-interval, router-dead-interval and transmit-delay.

```
XorPlus# set protocols ospf6 area 0.0.0.0 interface vlan-2 hello-interval 10
[edit]
XorPlus# set protocols ospf6 area 0.0.0.0 interface vlan-2 interface-cost 8
[edit]
XorPlus# set protocols ospf6 area 0.0.0.0 interface vlan-2 transmit-delay 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

ACL and Filter Configuration

In XorPlus, the ACL includes destination-address-ipv4, destination-address-ipv6, destination-mac-address, destination-port, ether-type, protocol, source-address-ipv4, source-address-ipv6, source-mac-address, source-port, vlan-id are supported. These ACL can be applied in the physical port and VLAN interface. If user wants to apply these ACL in LAG port, please apply it in the members respectively.

(1) Configure ACL

```
XorPlus# set firewall filter bad-net term bad-1 from source-address-ipv4 1.1.1.0/24
[edit]
```

```

XorPlus# set firewall filter bad-net term bad-1 then action discard
[edit]
XorPlus# set firewall filter bad-net term bad-2 from source-address-ipv4 1.1.2.0/24
[edit]
XorPlus# set firewall filter bad-net term bad-2 then action discard
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# set firewall filter bad-net input gigabit-ethernet ge-1/1/1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

Actually, when switch receives a packet in ingress and egress, it will try to match ACLs one by one. If the matched ACL's action is "forward", just try to match next. If the matched ACL's action is "drop", drop the packet and will not try to match remained ACLs.

(2) Configure ACL in VLANs

```

XorPlus# set firewall filter bad-net term bad-1 from source-address-ipv4 1.1.1.0/24
[edit]
XorPlus# set firewall filter bad-net term bad-1 then action discard
[edit]
XorPlus# set firewall filter bad-net term bad-2 from source-address-ipv4 1.1.2.0/24
[edit]
XorPlus# set firewall filter bad-net term bad-2 then action discard
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# set firewall filter bad-net input vlan-interface vlan-2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#

```

Every member ports in the vlan-interface will be applied the ACLs which are configured in the vlan-interface.

Chapter 6. Multicast Configuration

This chapter describes the configuration for IGMP, PIM-SM and IGMP Snooping.

IGMP Snooping Configuration

- In XorPlus, IGMPv2 Snooping is supported. Furthermore, the querier is also supported

(1) IGMP snooping basic configuration

In default, the switch disable the IGMP snooping. User need enable the IGMP snooping global and per-VLAN.

```
XorPlus# set protocols igmp-snooping enable true
[edit]
XorPlus# set protocols igmp-snooping vlan-id 1 enable true
[edit]
XorPlus# set protocols igmp-snooping vlan-id 1 mrouter interface ge-1/1/3
[edit]
XorPlus# set protocols igmp-snooping vlan-id 1 querier other-querier-timer 1
[edit]
XorPlus# set protocols igmp-snooping vlan-id 1 static group 238.255.0.1 interface ge-1/1/2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show igmp-snooping vlan 1
Vlan 1:
-----
IGMP snooping           : Enabled
IGMPv2 fast leave      : Disabled
IGMP querier state     : Disabled
IGMP querier source ip address : 0.0.0.0
IGMP other querier timer : 1
IGMP querier version   : 2
-----
XorPlus#
```

(2) IGMP snooping querier

If user want multicast traffic in Layer-2, the querier in vlan is necessary.

```
XorPlus# set protocols igmp-snooping vlan-id 1 querier enable true
[edit]
XorPlus# set protocols igmp-snooping vlan-id 1 querier address 10.10.1.1
[edit]
XorPlus# set protocols igmp-snooping vlan-id 1 querier version 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show igmp-snooping querier
Vlan   IP Address      IGMP Version
-----
1      10.10.1.1      v2
-----
XorPlus#
```

PIM-SM Configuration

- In XorPlus, PIM-SM is supported.

(1) PIM-SM basic configuration

Before user configures a PIM-SM interface, user need enable a multicast interface in it. After that, user can configure a candidate-RP and candidate-BSR. In configuring the candidate-BSR, the scope-zone means the zone of multicast group which is included in the multicast domain.

```
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.60.10 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.61.10 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set multicast-interface interface vlan-2 disable false
[edit]
XorPlus# set multicast-interface interface vlan-3 disable false
[edit]
XorPlus# set multicast-interface interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols igmp interface vlan-3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols pimsm4 interface vlan-2 disable false
[edit]
XorPlus# set protocols pimsm4 interface vlan-3 disable false
[edit]
XorPlus# set protocols pimsm4 interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols pimsm4 bootstrap cand-bsr scope-zone 224.0.0.0/4 cand-bsr-by-vif-name
vlan-3
[edit]
XorPlus# set protocols pimsm4 bootstrap cand-rp group-prefix 237.0.0.0/8 cand-rp-by-vif-name
vlan-2
[edit]
XorPlus# set protocols pimsm4 bootstrap cand-rp group-prefix 231.0.0.0/8 cand-rp-by-vif-name
vlan-3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
```

```
XorPlus#
```

(2) Static RP configuration

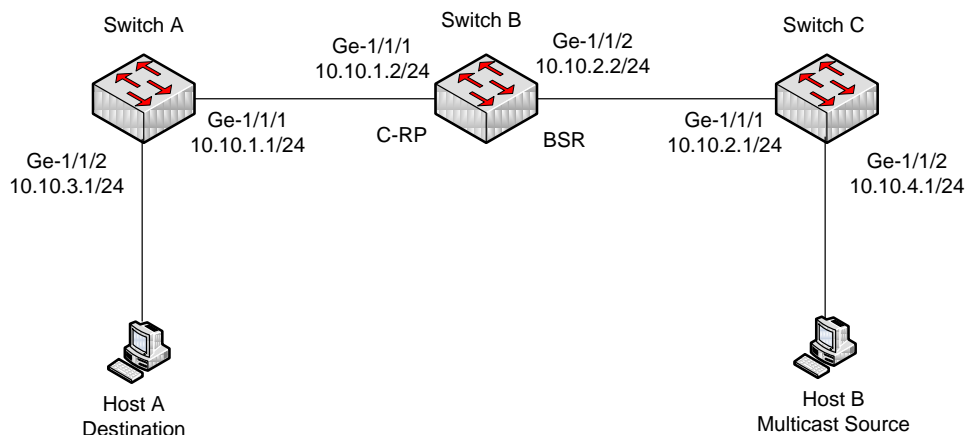
User can also configure the static RP instead of the BSR and dynamic RP.

```
XorPlus# set protocols pimsm4 static-rps rp 10.10.60.10 group-prefix 238.0.0.0/8 rp-priority 10
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

PIM-SM Configuration Example

- In following topology, the switch-B is the C-BSR and C-RP. Host-A is a receiver which wants to receive multicast traffic. Host-B is a multicast source which will send the multicast traffic.
- User need configure a IGMP interface in switch-A ge-1/1/2 for Host-A
- In this example, we use the static route in RIB as unicast routing protocol of PIM-SM

Figure 6-1. PIM-SM multicast routing configuration



(1) Configure Switch-A

In switch-A, user need configure a IGMP interface in ge-1/1/2 and PIM-SM interface in ge-1/1/1

```
XorPlus# set vlans vlan-id 2 l3-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 l3-interface vlan-3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.1 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.3.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
```

```

[edit]
XorPlus# set multicast-interface interface vlan-2 disable false
[edit]
XorPlus# set multicast-interface interface vlan-3 disable false
[edit]
XorPlus# set multicast-interface interface register_vif disable false
[edit]
XorPlus# set protocols igmp interface vlan-3
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols pimsm4 interface vlan-2 disable false
[edit]
XorPlus# set protocols pimsm4 interface vlan-3 disable false
[edit]
XorPlus# set protocols pimsm4 interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#set protocols static route 10.10.2.0/24 next-hop 10.10.1.2
[edit]
XorPlus#set protocols static route 10.10.4.0/24 next-hop 10.10.1.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show pim interface

```

Interface	State	Mode	V	PIMstate	Priority	DRaddr	Neighbors
vlan-2	UP	Sparse	2	DR	1	10.10.1.1	0
vlan-3	UP	Sparse	2	DR	1	10.10.3.1	0
register_vif	UP	Sparse	2	DR	1	10.10.1.1	0

```

XorPlus#
XorPlus# run show igmp interface

```

Interface	State	Querier	Timeout	Version	Groups
vlan-2	DISABLED	10.10.1.1	None	2	0
vlan-3	UP	10.10.3.1	None	2	3

(2) Configure Switch-B

In switch-B, user need configure 2 PIM-SM interfaces in ge-1/1/1 and ge-1/1/2. Furthermore, user need configure a candidate BSR and a candidate RP.

```

XorPlus# set vlans vlan-id 2 13-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 13-interface vlan-3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.1.2 prefix-length 24
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.2.2 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]

```

```

XorPlus# set multicast-interface interface vlan-2 disable false
[edit]
XorPlus# set multicast-interface interface vlan-3 disable false
[edit]
XorPlus# set multicast-interface interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols pimsm4 interface vlan-2 disable false
[edit]
XorPlus# set protocols pimsm4 interface vlan-3 disable false
[edit]
XorPlus# set protocols pimsm4 interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols pimsm4 bootstrap cand-bsr scope-zone 224.0.0.0/4 cand-bsr-by-vif-name
vlan-3
[edit]
XorPlus# set protocols pimsm4 bootstrap cand-rp group-prefix 238.0.0.0/8 cand-rp-by-vif-name
vlan-2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#set protocols static route 10.10.3.0/24 next-hop 10.10.1.1
[edit]
XorPlus#set protocols static route 10.10.4.0/24 next-hop 10.10.2.1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# run show pim bootstrap
Active zones:
BSR          Pri LocalAddress      Pri State              Timeout SZTimeout
10.10.2.2    1 10.10.2.2            1 Elected              19      -1
Expiring zones:
BSR          Pri LocalAddress      Pri State              Timeout SZTimeout
XorPlus#
XorPlus# run show pim rps
RP           Type      Pri  Holdtime  Timeout  ActiveGroups  GroupPrefix
-----
10.10.1.2    bootstrap 192  150      -1       0             238.0.0.0/8
XorPlus#

```

(3) Configure Switch-C

In switch-B, user need configure 2 PIM-SM interfaces in ge-1/1/1 and ge-1/1/2. Furthermore, user need configure a candidate BSR and a candidate RP.

```

XorPlus# set vlans vlan-id 2 13-interface vlan-2
[edit]
XorPlus# set vlans vlan-id 3 13-interface vlan-3
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/1 family ethernet-switching native-vlan-id 2
[edit]
XorPlus# set interface gigabit-ethernet ge-1/1/2 family ethernet-switching native-vlan-id 3
[edit]
XorPlus# set vlan-interface interface vlan-2 address 10.10.2.1 prefix-length 24

```

```
[edit]
XorPlus# set vlan-interface interface vlan-3 address 10.10.4.1 prefix-length 24
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set multicast-interface interface vlan-2 disable false
[edit]
XorPlus# set multicast-interface interface vlan-3 disable false
[edit]
XorPlus# set multicast-interface interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols pimsm4 interface vlan-2 disable false
[edit]
XorPlus# set protocols pimsm4 interface vlan-3 disable false
[edit]
XorPlus# set protocols pimsm4 interface register_vif disable false
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus# set protocols static route 10.10.1.0/24 next-hop 10.10.2.2
[edit]
XorPlus# set protocols static route 10.10.3.0/24 next-hop 10.10.2.2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
XorPlus# run show pim interface
```

Interface	State	Mode	V	PIMstate	Priority	DRaddr	Neighbors
vlan-2	UP	Sparse	2	DR	1	10.10.2.1	0
vlan-3	UP	Sparse	2	DR	1	10.10.4.1	0
register_vif	UP	Sparse	2	DR	1	10.10.2.1	0

```
XorPlus#
```


Chapter 7. QoS Configuration

This chapter describes the configuration for Layer-2 and Layer-3 QoS.

QoS Configuration

- In XorPlus, 802.1p, DSCP and COS QoS is supported
- Firstly, user should create the "forwarding-class", which will determine the queue number of specified traffic type.
- Secondly, user must create a "classifier" which includes the "trust-mode". Then user need map the code-point in "forwarding-class".
- Finally, user need apply the "classifier" on the specified port.

(1) Configure traffic in queue

```
XorPlus# set class-of-service forwarding-class best-effort queue-num 3
[edit]
XorPlus# set class-of-service forwarding-class rt-traffic queue-num 0
[edit]
XorPlus# set class-of-service forwarding-class normal-traffic queue-num 2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure classifier with ieee-802.1/DSCP/COS QoS

```
XorPlus# set class-of-service classifier c1 trust-mode ieee-802.1
[edit]
XorPlus# set class-of-service classifier c1 forwarding-class best-effort code-point 3
[edit]
XorPlus# set class-of-service classifier c2 trust-mode dscp
[edit]
XorPlus# set class-of-service classifier c2 forwarding-class rt-traffic code-point 10
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
```

(3) Apply the classifier in specified ports

```
XorPlus# set class-of-service interface ge-1/1/1 classifier c1
[edit]
XorPlus# set class-of-service interface ge-1/1/2 classifier c2
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

Chapter 8. Open Flow Configuration

This chapter describes the configuration of Open Flow.

Open Flow introduction

- In XorPlus, Open flow is supported.
- User can configure specified VLAN in Open Flow mode.
- The Open Flow forwarding Plane is separated with traditionally switch forwarding plane by VLAN. For example, in vlan 100, the forwarding plane is controlled by Open Flow and VLAN 200's forwarding Plane is controlled by traditionally XorPlus protocol.

Open Flow basic Configuration

- Usually, after user configure a VLAN in Open Flow mode, it will work as a simple switch in this VLAN, including flood unknow traffic, MAC learning.

(1) Configure VLAN in Open Flow mode

```
XorPlus# set vlans vlan-id 100 openflow-enable true
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure static flow in Open Flow

```
XorPlus# set open-flow flow host-flow-1 match-field ethernet-source-address 22:22:22:22:22:22
[edit]
XorPlus# set open-flow flow host-flow-1 match-field ip-source-address 192.168.1.0/24
[edit]
XorPlus# set open-flow flow host-flow-1 match-field ingress-port ge-1/1/1
[edit]
XorPlus# set open-flow flow host-flow-1 action modify ethernet-source-address 22:22:22:44:44:44
[edit]
XorPlus# set open-flow flow host-flow-1 action output interface ge-1/1/1
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

The match field of a flow include arp-source-address,arp-target-address,destination-port,ethernet-destination-address,ethernet-destination-mask,ethernet-source-address,ethernet-type,icmp-code,icmp-type,ingress-port,ip-destination-address,ip-protocol,ip-source-address,ip-tos,ipv6-destination-address,ipv6-source-address,mpls-label,nd-source-address,nd-target-address,nd-target-ip,source-port,vlan-id,vlan-priority.

The “action” of a flow include “modify” and “ouput”. In current version, use can only modify the L2 fields including MAC address and VLANs. The “output” port include physical port and virtual-port. The virtual-port is defined in Open Flow standard.

(3) Configure static flow with other parameter

```
XorPlus# set open-flow flow host-flow-1 hard-timeout 100
[edit]
XorPlus# set open-flow flow host-flow-1 idle-timeout 10
[edit]
XorPlus# set open-flow flow host-flow-1 priority 256
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

The “hard-timeout” means expiring time regardless of activity in seconds

The “idle-timeout” means expiring time due to inactivity in seconds

(4) Configure netflow for Open Flow

```
XorPlus# set open-flow netflow netflow-1 address 192.168.1.100
[edit]
XorPlus# set open-flow netflow netflow-1 active-timeout 10
[edit]
XorPlus# set open-flow netflow netflow-1 port 9999
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

The system support Netflow of version5 .

(5) Configure sflow for Open Flow

```
XorPlus# set open-flow sflow sflow-1 address 192.168.1.100
[edit]
XorPlus# set open-flow sflow sflow-1 port 9998
[edit]
XorPlus# set open-flow sflow sflow-1 polling-interval 5
[edit]
XorPlus# set open-flow sflow sflow-1 sampling-rate 2
[edit]
XorPlus# set open-flow sflow sflow-1 interface ge-1/1/1
[edit]
XorPlus#
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

In sFlow, user can monitor specified port's flow with polling-interval and sampling-rate.

Open Flow Controller Configuration

- In Open Flow, user can configure a controller to set the flow in switch. User can visit the Open Flow <http://www.openflow.org/>

- When the switch connects the controller successfully, it will clear all the flow in Open Flow and begin to receive the message from the controller

(1) Configure Open Flow Controller

```
XorPlus# set open-flow controller contr-serv address 192.168.1.100
[edit]
XorPlus# set open-flow controller contr-serv port 6633
[edit]
XorPlus# set open-flow controller contr-serv protocol tcp
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

(2) Configure Controller failed mode

```
XorPlus# set open-flow fail-mode secure
[edit]
XorPlus# commit
Waiting for merging configuration.
Commit OK.
Save done.
[edit]
XorPlus#
```

User can configure the fail mode as secure mode or standalone mode. In secure mode, the switch will not forward any traffic when it can't connect to open flow controller. In standalone mode, the switch will forward traffic as open flow switch when it can't connect to open flow controller.