ICOS configuration guide

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Chapter 1. LACP/LAG Configuration

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

1.1. Topology

Figure 1.1. LAG Topology
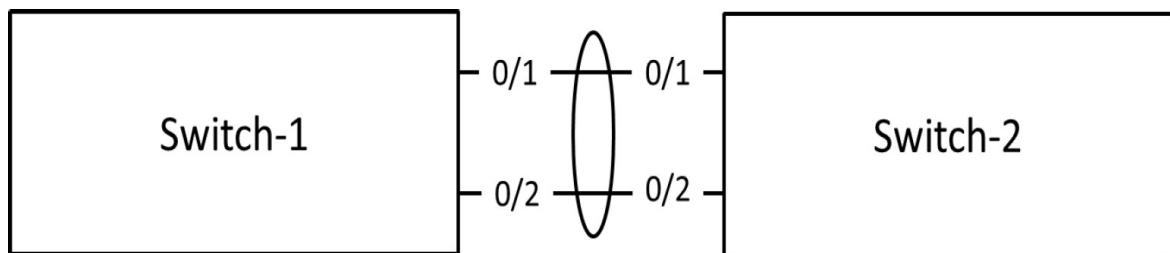
1.2. Configuration Procedure

The port channel interface number in the NOS is defined as 3/x.

1.2.1. Create Static Port channel

The default port channel is created as static one.

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#interface 0/1-0/2
(Switch-1) (Interface 0/1-0/2)#addport 3/1
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#interface 0/1-0/2
(Switch-2) (Interface 0/1-0/2)#addport 3/1
```

1.2.2. Create dynamic Port channel

Switch-1

```
(Switch-1) (Config)#interface 0/1-0/2
(Switch-1) (Interface 0/1-0/2)#addport 3/1
(Switch-1) (Interface 0/1-0/2)#exit
(Switch-1) (Config)#port-channel name lag 1 lag1
(Switch-1) (Config)#interface 3/1
(Switch-1) (Interface 3/1)#no port-channel static
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#interface 0/1-0/2
(Switch-2) (Interface 0/1-0/2)#addport 3/1
(Switch-2) (Interface 0/1-0/2)#exit
(Switch-2) (Config)#port-channel name lag 1 lag1
(Switch-2) (Config)#interface 3/1
(Switch-2) (Interface 3/1)#no port-channel static
```

1.2.3. Change the port system admin key

```
(Switch-1) (Interface lag 1)#lacp admin key ?

<0-65535>                    Enter LACP admin key. <0-65535>
```

1.2.4. Change the port channel system priority

```
(Switch-1) (Config)#port-channel system priority ?

<0-65535>              Enter port channel system priority (0-65535).
```

1.2.5. Change the port channel port priority

```
(Switch-1) (Interface 0/1-0/2)#lacp actor port priority ?

<0-65535>              Enter LACP actor port priority key.
```

1.2.6. Change the port channel load balance methodology

```
(Switch-1) (Config)#interface lag 1

(Switch-1) (Interface lag 1)#port-channel load-balance ?

1                      Src MAC, VLAN, EType, incoming port
2                      Dest MAC, VLAN, EType, incoming port
3                      Src/Dest MAC, VLAN, EType, incoming port
4                      Src IP and Src TCP/UDP Port fields
5                      Dest IP and Dest TCP/UDP Port fields
6                      Src/Dest IP and TCP/UDP Port fields
7                      Enhanced hashing mode
```

1.3. Check Port Channel Status

1.3.1. Command: show port-channel lag-intf-num/<slot/port>

The command displays an overview of the specified port-channel (LAG) on the switch.

```
(Switch-1) #show port-channel 1

Local Interface................................... 3/1
Channel Name...................................... lag1
Link State........................................ Up
Admin Mode........................................ Enabled
Type.............................................. Dynamic
Port-channel Min-links............................ 1
Admin Key......................................... 172
Load Balance Option............................... 6
(Src/Dest IP and TCP/UDP Port fields)
Local Preference Mode............................. Disabled
LACP Fallback Timeout············................. 5


Mbr      Device/          Port        Port      Fallback
Ports    Timeout          Speed       Active    State
------   --------------   ---------   -------   --------
0/1      actor/long       10G Full    True
         partner/long
0/2      actor/long       10G Full    True
         partner/long
```

1.3.2. Command: show port-channel brief/all

This command displays the static capability of all port-channel (LAG) interfaces on the device as well as a summary of individual port-channel interfaces.

```
(Switch-1) #show port-channel brief

Logical    Port-Channel      Min Link State Trap      Type    Mbr Ports Active Ports
Interface  Name                             Flag
---------  ----------------  --- ---------- --------  ------- ---------- -------------
3/1        lag1              1   Up         Enabled   Dynamic 0/1,       0/1,
                                                              0/2        0/2
3/2        ch2               1   Down       Enabled   Static
```

1.3.3. Command: show lacp actor/partner <slot/port>

This command displays LACP actor/partner attributes.

```
(Switch-1) #show lacp actor 0/1

          Sys      Admin Port     Admin
 Intf    Priority Key   Priority State
-------  -------- ----- -------- -----------
0/1       32768    0     128      ACT|AGG|LTO

(Switch-1) #show lacp partner 0/1

         Sys        System       Admin Prt   Prt    Admin
 Intf    Pri          ID         Key   Pri   Id     State
-------  -----  ----------------- ----- ----- ----- ---------------------
0/1      32768  00:E0:95:00:1C:87 172   128   1     ACT|AGG|LTO
```

1.3.4. Command: show port-channel system priority

Purpose: This command to display the port-channel system priority.

```
(Switch-1) #show port-channel system priority

System Priority............................... 32768
```

Chapter 2. MLAG (VPC) Configuration guide

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

2.1. Topology

Figure 2.1. mLAG Topology
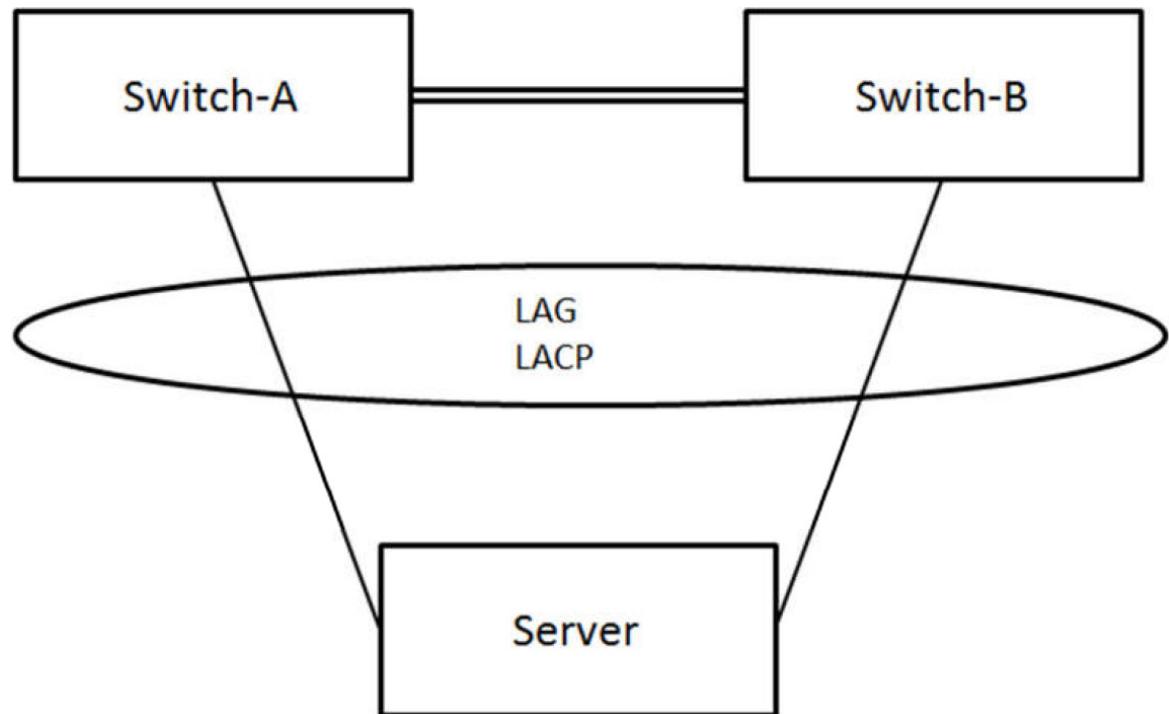
2.2. Physical Link

Table 2.1. mLAG Physical Link

Switch-A	Switch-B		Server	Switch-A	Switch-B
Port 47	Port 47		Eth0	Port 1	
Port 48	Port 48		Eth0		Port 1

2.3. Configuration

2.3.1. Create Peer Link

Switch-A:

```
(Switch-A) >en
(Switch-A) #configure
(Switch-A) (Config)#interface 0/47-0/48
(Switch-A) (Interface 0/47-0/48)#addport lag 60
(Switch-A) (Interface 0/47-0/48)#exit
(Switch-A) (Config)#interface lag 60
(Switch-A) (Interface lag 60)#vpc peer-link
(Switch-A) (Interface lag 60)#switchport mode trunk
```

Switch-B:

```
(Switch-B) >en
(Switch-B) #configure
(Switch-B) (Config)#interface 0/47-0/48
(Switch-B) (Interface 0/47-0/48)#addport lag 60
(Switch-B) (Interface 0/47-0/48)#exit
(Switch-B) (Config)#interface lag 60
(Switch-B) (Interface lag 60)#vpc peer-link
(Switch-B) (Interface lag 60)#switchport mode trunk
```

2.3.2. Create VPC domain

Switch-A :

```
(Switch-A) (Config)#vpc domain 1
(Switch-A) (Config-VPC 1)#peer detection enable
(Switch-A) (Config-VPC 1)#peer-keepalive enable
(Switch-A) (Config-VPC 1)# peer-keepalive destination 192.168.1.59 source
192.168.1.15
```

Switch-B :

```
(Switch-B) (Config)#vpc domain 1
(Switch-B) (Config-VPC 1)#peer detection enable
(Switch-B) (Config-VPC 1)#peer-keepalive enable
(Switch-B) (Config-VPC 1)# peer-keepalive destination 192.168.1.15 source
192.168.1.59
```

2.3.3. Enable VPC feature

Switch-A :

```
(Switch-A) (Config)#feature vpc
```

Switch-B :

```
(Switch-B) (Config)#feature vpc
```

2.3.4. Create VPC link

Switch-A :

```
(Switch-A) (Config)#interface 0/1
(Switch-A) (Interface 0/1)#addport lag 1
(Switch-A) (Interface 0/1)#exit
(Switch-A) (Config)#interface lag 1
(Switch-A) (Interface lag 1)#vpc 1
```

Switch-B :

```
(Switch-B) (Config)#interface 0/1
(Switch-B) (Interface 0/1)#addport lag 1
(Switch-B) (Interface 0/1)#exit
(Switch-B) (Config)#interface lag 1
(Switch-B) (Interface lag 1)#vpc 1
```

2.3.5. Check VPC State

Switch-A :

```
(Switch-A)# show vpc brief
```

```
(Aurora 220) >en

(Aurora 220) #show vpc brief

VPC Domian ID.................................. 1
VPC admin status.............................. Enabled
Keep-alive admin status........................ Enabled
VPC operational status......................... Disabled
Self role...................................... none
Peer role...................................... none
Peer detection admin status.................... Peer not detected, VPC down
Operational VPC MAC............................ 00:00:00:00:00:00
Operational VPC system priority................ 0
Delay Restore Time............................. 0 senonds

Peer-Link details
-----------------

Interface...................................... 3/1
Peer-link admin status......................... DOWN
Peer-link STP admin status..................... Enabled
Configured VLANs............................... 1
Egress tagged VLANs............................ none

VPC Details
-----------

Number of VPCs configured...................... 3
Number of VPCs operational..................... 0


VPC id# 1
-----------
Interface...................................... 3/2
Configured VLANs............................... 1,10
VPC interface state............................ Wait

Local Members       Status
----------------    ------
0/25                DOWN

Peer Members        Status
----------------    ------

VPC id# 2
-----------
Interface...................................... 3/3
Configured VLANs............................... 1,10
VPC interface state............................ Wait

Local Members       Status
----------------    ------
0/49                DOWN

Peer Members        Status
----------------    ------

VPC id# 3
-----------
Interface...................................... 3/4
Configured VLANs............................... 1,10
VPC interface state............................ Wait

Local Members       Status
----------------    ------
0/50                DOWN

Peer Members        Status
----------------    ------


(Aurora 220) #
```

```
(Switch-A)# show vpc 1
```

```
(Aurora 220) #show vpc 1

VPC id# 1
-----------------
Config mode..................................... Enabled
Operational mode................................ Disabled
Port channel.................................... 3/2

Local Members          Status
-----------------      ------
0/25                   DOWN

Peer Members           Status
-----------------      ------
```

2.4. Trouble shoot

Table 2.2. Troubleshoot Table about mLAG

Problem Title	Result	Troubleshoot
Domain IDs mismatch	2 peer devices cannot be identified by each other.	Use "show vpc brief" to check domain IDs on Switch A and Switch B, if domain ID is not same, use "vpc domain #id" to correct.
vPC peer keepalive link and connectivity issues over serviceport/mgmt 0	Use "show vpc peer-keepalive" command to check, 'peer is detected' status is 'false'	Use the "show serviceport" to check if the service-port is up and IP address is available, if no problem, use the "show run vpc" to check if the destination IP and source IP are set correctly.

Chapter 3. VLAN Configuration guide

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

3.1. Topology

Figure 3.1. VLAN Topology
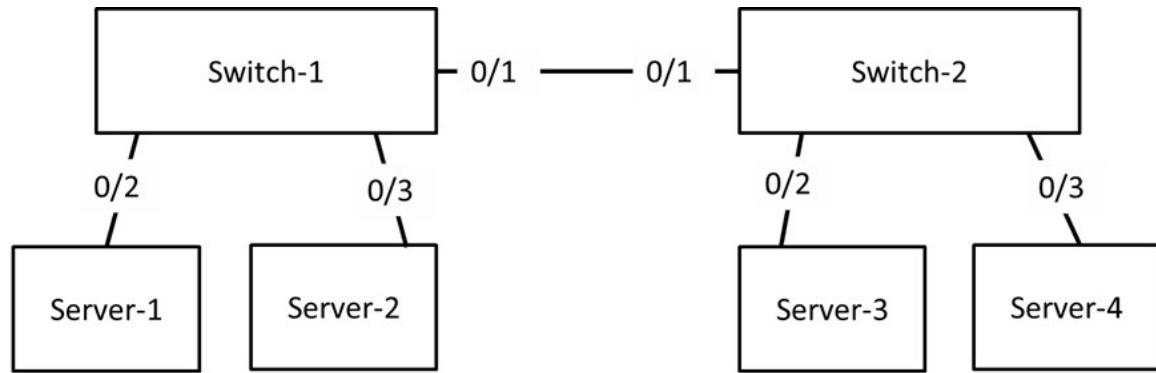
- The eth 0/1 of Switch-1 and Switch-2 is defined as VLAN 2 and VLAN 3 trunk port.
- The eth 0/2 of Switch-1 and Switch-2 is defined as VLAN 2 access port.
- The eth 0/3 of Switch-1 and Switch-3 is defined as VLAN 3 hybrid port.

3.2. Configuration

3.2.1. Create VLAN

Switch-1

```
(Switch-1) #vlan database
(Switch-1) (Vlan)#vlan 2-3,10
(Switch-1) (Vlan)#vlan name 2 Access
(Switch-1) (Vlan)#vlan name 3 hybrid
(Switch-1) (Vlan)#exit
```

Switch-2

```
(Switch-2) #vlan database
(Switch-2) (Vlan)#vlan 2-3,10
(Switch-2) (Vlan)#vlan name 2 Access
(Switch-2) (Vlan)#vlan name 3 hybrid
(Switch-2) (Vlan)#exit
```

3.2.2. Configure the trunk port

Switch-1

```
(Switch-1) (Interface 0/1)#switchport trunk allowed vlan add 2,3
(Switch-1) (Interface 0/1)#switchport mode trunk
```

Switch-2

```
(Switch-2) (Interface 0/1)#switchport trunk allowed vlan add 2,3
(Switch-2) (Interface 0/1)#switchport mode trunk
```

3.2.3. Configure the access port

Switch-1

```
(Switch-1) (Interface 0/2)#switchport mode access
(Switch-1) (Interface 0/2)#switchport access vlan 2
```

Switch-2

```
(Switch-1) (Interface 0/2)#switchport mode access
(Switch-1) (Interface 0/2)#switchport access vlan 2
```

3.2.4. Configure the hybrid port

Switch-1

```
(Switch-1) (Interface 0/3)#vlan participation include 3,10
(Switch-1) (Interface 0/3)#vlan participation exclude 1
(Switch-1) (Interface 0/3)#vlan pvid 3
```

```
(Switch-1) (Interface 0/3)#vlan tagging 10
```

Switch-2

```
(Switch-1) (Interface 0/3)#vlan participation include 3
(Switch-1) (Interface 0/3)#vlan participation exclude 1
(Switch-1) (Interface 0/3)#vlan pvid 3
```

3.3. Check VLAN Status

3.3.1. Command: show vlan brief

This command displays a list of all configured VLANs.

3.3.2. Command: show vlan port <slot/port>

This command displays VLAN port information.

```
(Switch-1) #show vlan port 0/1

           Port        Port                    Ingress    Ingress
           VLAN ID     VLAN ID  Acceptable    Filtering  Filtering  Default
Interface  Configured  Current  Frame Types   Configured Current    Priority
---------- ----------- -------- ------------ ----------- ---------- --------
0/1        1           1        Admit All     Enable      Enable        0

Protected Port ............................. False
Switchport mode: Trunk Mode
Operating parameters:
Port 0/1 is member in:

VLAN    Name                            Egress rule    Type
------- ----------------------------    -------------  -------------
1       default                         Untagged       Default
2       Access                          Tagged         Static
3       hybrid                          Tagged         Static
10      VLAN0010                        Tagged         Static

Static configuration:

Port 0/1 is statically configured to:

VLAN    Name                            Egress rule
------- ----------------------------    -------------
2       Access                          Tagged
3       hybrid                          Tagged
10      VLAN0010                        Tagged

Forbidden VLANS:

VLAN    Name
------- ------------------------
```

3.4. Trouble Shoot

Switch-A and Switch-B:

```
(Switch-A) #show vlan 10
```

```
VLAN ID: 10
VLAN Name: VLAN10
VLAN Type: Static

Interface    Current     Configured    Tagging
----------   --------    ------------  --------
0/1          Include     Include       Untagged
0/2          Exclude     Autodetect    Untagged
0/3          Include     Include       Tagged
```

```
(Switch-A) #show vlan 20
```

```
VLAN ID: 20
VLAN Name: VLAN20
VLAN Type: Static

Interface    Current     Configured    Tagging
----------   --------    ------------  --------
0/1          Exclude     Autodetect    Untagged
0/2          Include     Include       Untagged
0/3          Include     Include       Tagged
```

3.4.1. Troubleshoot table about VLAN

Table 3.1. Troubleshoot Table about VLAN

Problem Title	Problem Description	Result	Troubleshoot
IP Addressing issues with VLAN.	Two devices In the same VLANs have different subnet addresses. For example: Server-1 IP: 192.168.10.2 Server-2: 192.16.10.4	Server-1 and Server-2 cannot inter-communicate	A check of the IP configuration settings of Server-1 and Server-2. If they are not in the same subnet. Set the correct IP Address for Server-1 and Server-2
Missing VLANs	The port doesn't belongs to the expected VLAN For example: interface 0/1 doesn't belong vlan 10	Server-1 and Server-2 cannot inter-communicate	Use the "show vlanvlan-id" command to check, if interface 0/1 participation state is "Exclude", use the "switchport access vlanvlan-id" to correct the VLAN membership on a participation port

Problem Title	Problem Description	Result	Troubleshoot
Native VLAN mismatch	One port is defined as native VLAN 1 and the opposite trunk end is defined as native VLAN 10 For example Port 3 of Switch-A is defined as native VLAN 1 Port3 of Switch-B is defined as native VLAN 10	VLAN leaking occurs	Use the "show interfaces switchport trunk" command to check whether the local and peer native VLANs match. If the native VLAN does not match on both sides, use "switchport trunk native vlan-vlan-id" to correct
Trunk mode mismatch	One end of the trunk is configured as trunk mode "off" and the other as trunk mode "on"	Causes loss of network connectivity	Use the "show interfaces switchport trunk" command to check whether a trunk has been established between switches. If not, use "switchport mode trunk" to correct
Allowed VLANs on trunks	The list of allowed VLANs does not support current VLAN trunk requirements	Unexpected traffic or no traffic is sent over the trunk	Use the "show interfaces switchport trunk" command to check whether the required trunk vlan in the list of allowed VLANs. If not, use "switchport trunk allowed vlanvlan-id " to correct

Chapter 4. VRRP Configuration guide

4.1. Pre-requirement

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

4.2. Topology

Figure 4.1. VRRP Topology
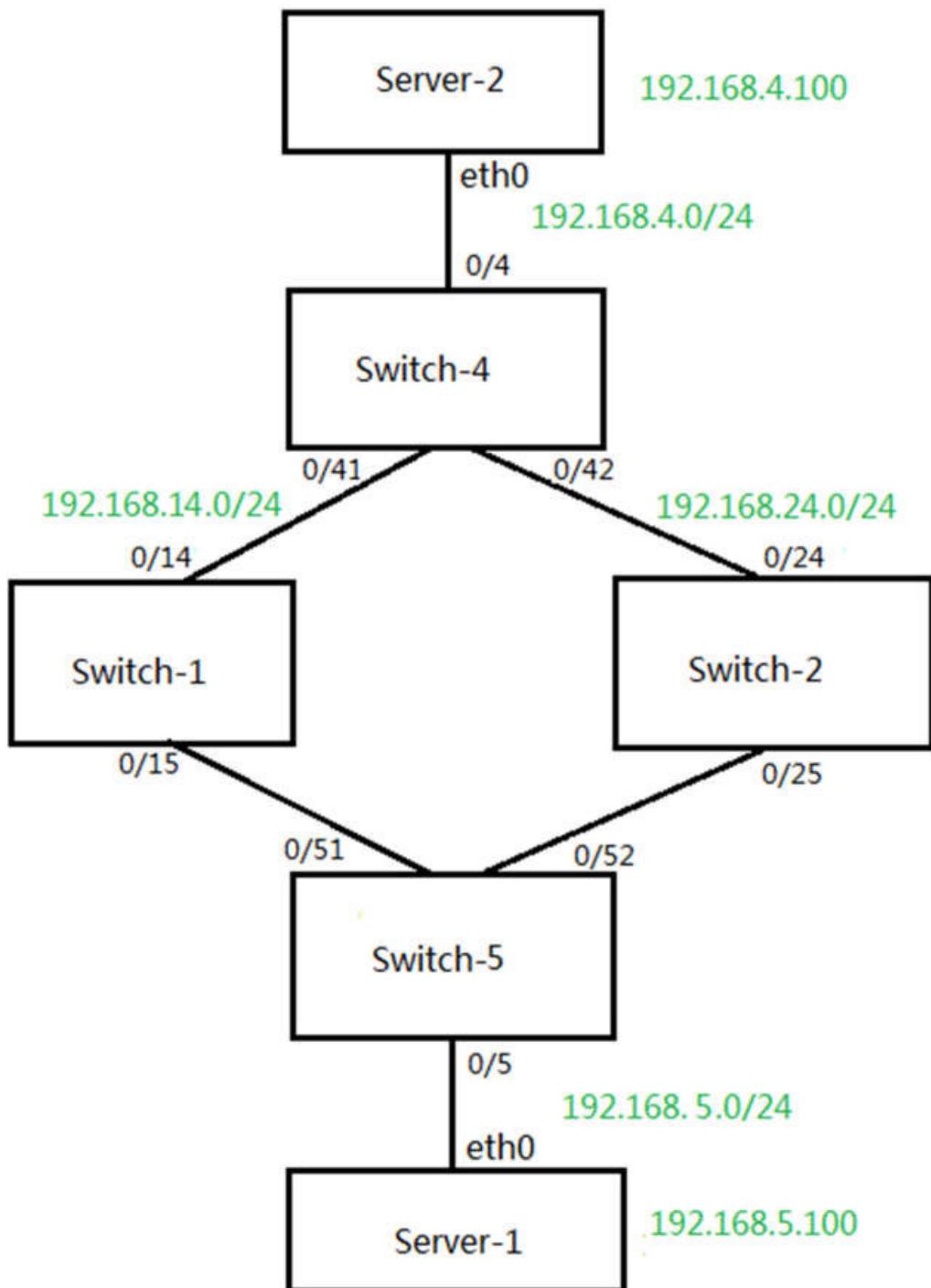
4.3. Physical Link

Figure 4.2. VRRP Physical Link

Switch-1	Switch-4	Switch-5
Port 14	Port 41	
Port 15		Port 51

Switch-2	Switch-4	Switch-5
Port 24	Port 42	
Port 25		Port 52

Server-1	Switch-4
eth0	Port 4

Server-2	Switch-5
eth0	Port 5

4.4. IPs set

Figure 4.3. VRRP IPs Set

Switch-1	Port 14	Port 15
	192.168.14.1	192.168.5.251

Switch-2	Port 24	Port 25
	192.168.24.2	192.168.5.252

Switch-4	Port 41	Port 42	Port 4
	192.168.14.4	192.168.24.4	192.168.4.4

Switch-3 acts as a Layer2 switch

4.5. Configuration

4.5.1. Create IPs

Switch-1 (Take Aurora 220 switch as example):

```
(Switch-1) >en
(Switch-1) #configure
(Switch-1) (Config)#ip routing
(Switch-1) (Config)#interface 0/14
(Switch-1) (Interface 0/14)#routing
(Switch-1) (Interface 0/14)#ip address 192.168.14.1 255.255.255.0
(Switch-1) (Interface 0/14)#exit
(Switch-1) (Config)#interface 0/15
(Switch-1) (Interface 0/15)#routing
(Switch-1) (Interface 0/15)#ip address 192.168.5.251 255.255.255.0
(Switch-1) (Interface 0/15)#exit
(Switch-1)(Config)#show ip interface brief
```

```
(switch-1)  (Config)#show ip interface brief

Interface      State   IP Address        IP Mask            Method
----------     -----   ----------------  ----------------   --------
0/14           Up      192.168.14.1      255.255.255.0      Manual
0/15           Up      192.168.5.251     255.255.255.0      Manual
```

Switch-2 (Take Aurora 220 switch as example):

```
(Switch-2) >en
(Switch-2) #configure
(Switch-2) (Config)#ip routing
(Switch-2) (Config)#interface 0/24
(Switch-2) (Interface 0/24)#routing
(Switch-2) (Interface 0/24)#ip address 192.168.24.2 255.255.255.0
(Switch-2) (Interface 0/24)#exit
(Switch-2) (Config)#interface 0/25
(Switch-2) (Interface 0/25)#routing
(Switch-2) (Interface 0/25)#ip address 192.168.5.252 255.255.255.0
(Switch-2) (Interface 0/25)#exit
(Switch-2) (Config)#show ip interface brief
```

```
(switch-2)  (Config)#show ip interface brief

Interface      State   IP Address        IP Mask            Method
----------     -----   ----------------  ----------------   --------
0/24           Up      192.168.24.2      255.255.255.0      Manual
0/25           Up      192.168.5.252     255.255.255.0      Manual
```

Switch-4 (Take Aurora 220 switch as example):

```
(Switch-4) >en
(Switch-4) #configure
(Switch-4) (Config)#ip routing
(Switch-4) (Config)#interface 0/41
(Switch-4) (Interface 0/41)#routing
(Switch-4) (Interface 0/41)#ip address 192.168.14.4 255.255.255.0
(Switch-4) (Interface 0/41)#exit
(Switch-4) (Config)#interface 0/42
(Switch-4) (Interface 0/42)#routing
(Switch-4) (Interface 0/42)#ip address 192.168.24.4 255.255.255.0
(Switch-4) (Interface 0/42)#exit
(Switch-4) (Config)#interface 0/4
(Switch-4) (Interface 0/4)#routing
(Switch-4) (Interface 0/4)#ip address 192.168.4.4 255.255.255.0
(Switch-4) (Interface 0/4)#exit
```

```
(switch-4) (Config)#show ip interface brief

Interface     State  IP Address       IP Mask          Method
----------    -----  ---------------- ---------------- -------
0/4           Up     192.168.4.4      255.255.255.0    Manual
0/41          Up     192.168.14.4     255.255.255.0    Manual
0/42          Up     192.168.24.4     255.255.255.0    Manual
```

4.5.2. Configure OSPF

Switch-1:

```
(Switch-1) (Config)#router ospf
(Switch-1) (Config-router)#network 192.168.0.0 0.0.255.255 area 1
(Switch-1) (Config-route)#exit
```

Switch-2:

```
(Switch-2) (Config)#router ospf
(Switch-2) (Config-router)#network 192.168.0.0 0.0.255.255 area 1
(Switch-2) (Config-route)#exit
```

Switch-4:

```
(Switch-4) (Config)#router ospf
(Switch-4) (Config-router)#network 192.168.0.0 0.0.255.255 area 1
(Switch-4) (Config-route)#exit
```

4.5.3. Test Switch connection

Switch-1:

```
(Switch-1) #ping 192.168.4.100
```

```
(switch-1) #ping 192.168.4.100
 Pinging 192.168.4.100 with 0 bytes of data:

Reply From 192.168.4.100: icmp_seq = 0. time= 2 msec.
Reply From 192.168.4.100: icmp_seq = 1. time <1 msec.
Reply From 192.168.4.100: icmp_seq = 2. time= 1 msec.

----192.168.4.100 PING statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (msec) min/avg/max = <1/1/2
```

Switch-2:

```
(Switch-2)#ping 192.168.4.100
```

```
(switch-2) #ping 192.168.4.100
 Pinging 192.168.4.100 with 0 bytes of data:

Reply From 192.168.4.100: icmp_seq = 0. time= 1 msec.
Reply From 192.168.4.100: icmp_seq = 1. time <1 msec.
Reply From 192.168.4.100: icmp_seq = 2. time= 1 msec.

----192.168.4.100 PING statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (msec) min/avg/max = <1/1/1
```

4.5.4. Configure VRRP

Switch-1:

```
(Switch-1) (Config)#ip vrrp
(Switch-1) (Config)#interface 0/15
(Switch-1) (Interface 0/15)#ip vrrp 1
(Switch-1) (Interface 0/15)#ip vrrp 1 mode
(Switch-1) (Interface 0/15)#ip vrrp 1 ip 192.168.5.254
(Switch-1) (Interface 0/15)# ip vrrp 1 priority 120
(Switch-1) (Interface 0/15)# ip vrrp 1 track interface 0/14 decrement 25
(Switch-1) (Interface 0/15)#exit
```

Switch-2:

```
(Switch-2) (Config)#ip vrrp
(Switch-2) (Config)#interface 0/25
(Switch-2) (Interface 0/25)#ip vrrp 1
(Switch-2) (Interface 0/25)#ip vrrp 1 mode
(Switch-2) (Interface 0/25)#ip vrrp 1 ip 192.168.5.254
(Switch-2) (Interface 0/25)# ip vrrp 1 priority 100
(Switch-2) (Interface 0/25)#exit
```

Server-1 (Configure IP as 192.168.5.100 and Gateway IP 192.168.5.254)

4.5.5. Check VRRP State

Switch-1:

```
(Switch-1) (Config)#show ip vrrp interface brief
```

```
(switch-1) (Config)#show ip vrrp interface brief

Interface      VRID      IP Address        Mode        State
---------      ----      --------------    -------     -------------
0/15           1         192.168.5.254     Enable      Master
```

Switch-2:

```
(Switch-1) (Config)#show ip vrrp interface brief
```

```
(switch-2) (Config)#show ip vrrp interface brief

Interface      VRID      IP Address        Mode        State
---------      ----      --------------    -------     -------------
0/25           1         192.168.5.254     Enable      Backup
```

4.5.6. VRRP IP Test

Server-1 PING Server-2:
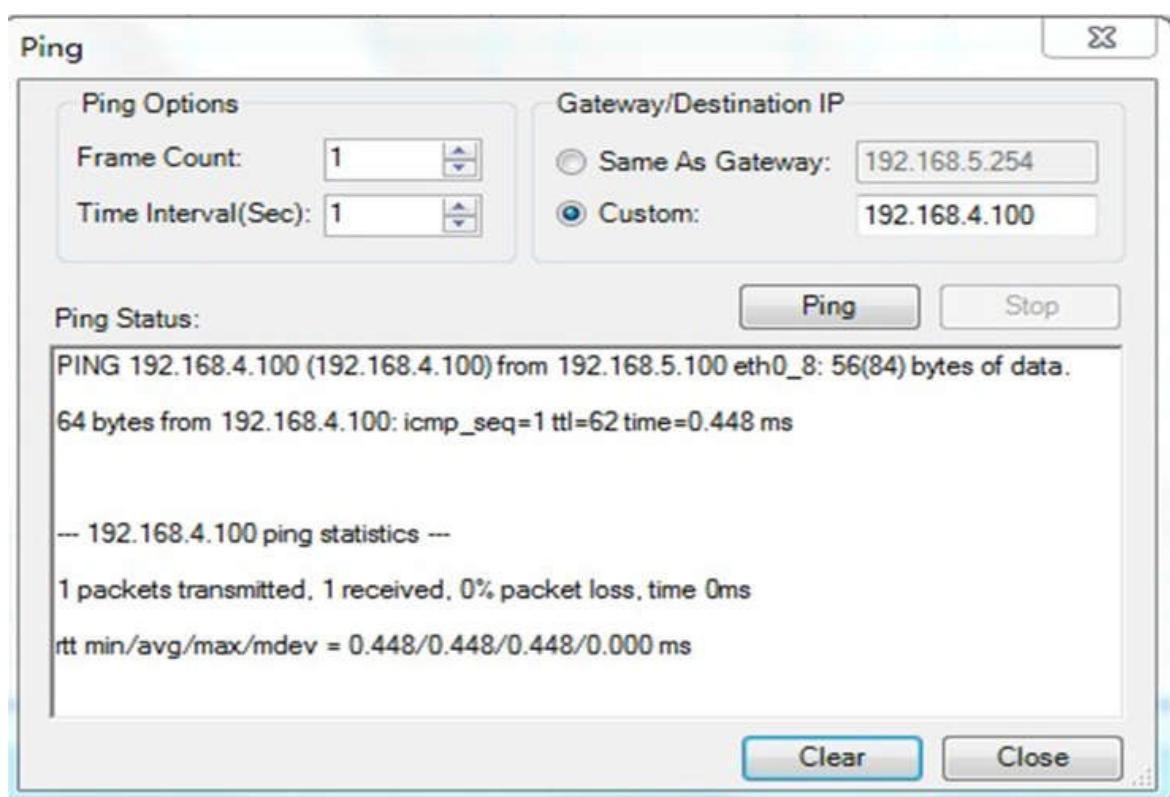
4.5.7. VRRP Fault-Tolerance Test

Switch-1:

```
(Switch-1) (Config)#interface 0/15
(Switch-1) (Interface 0/15)#shutdown
(Switch-1) (Interface 0/15)#show ip vrrp interface brief
```

```
(switch-1) (Interface 0/15)#show ip vrrp interface brief

Interface      VRID      IP Address      Mode      State
---------      ----      --------------- ------    -------------
0/15           1         192.168.5.254   Enable    Initialize
```

Switch-2:

```
(Switch-2) (Config)#ishow ip vrrp interface brief
```

```
(switch-2) (Config)#show ip vrrp interface brief

Interface      VRID      IP Address      Mode      State
---------      ----      --------------- ------    -------------
0/25           1         192.168.5.254   Enable    Master
```

Server-1 PING Server-2:
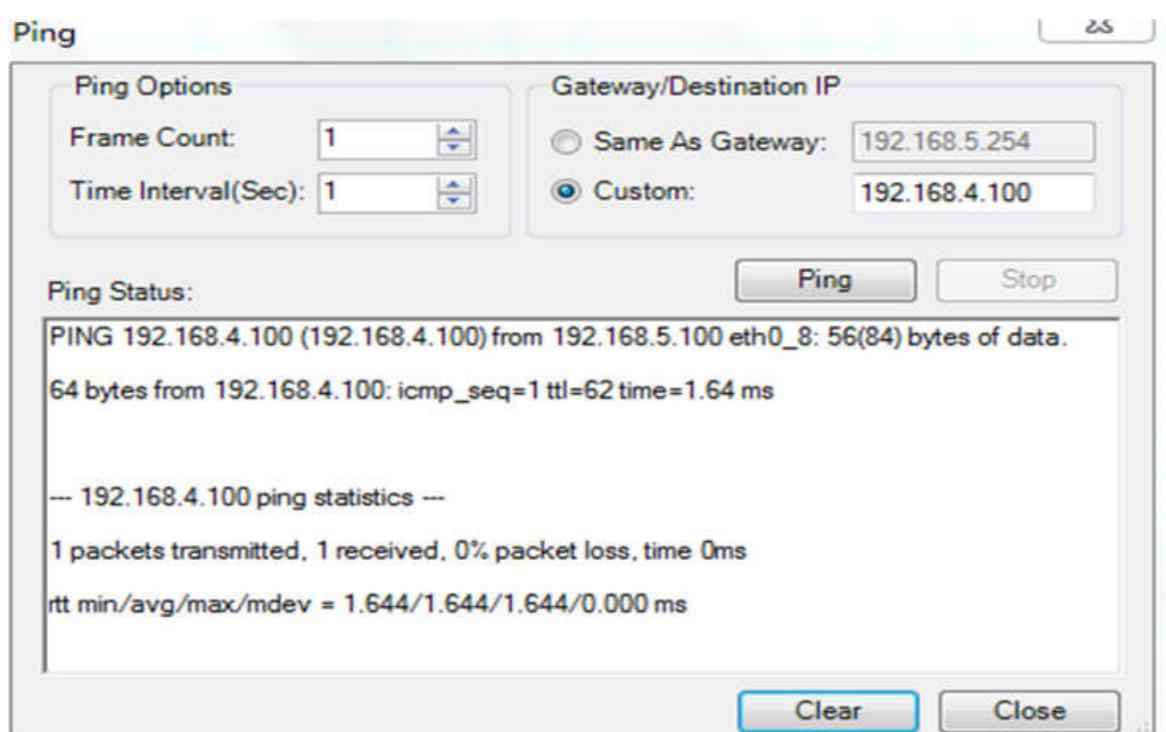
Switch-1:

```
(Switch-1) (Interface 0/15)#no shutdown
(Switch-1) (Interface 0/15)#show ip vrrp interface brief
```

```
(switch-1) (Config)#show ip vrrp interface brief

Interface      VRID      IP Address        Mode       State
---------      ----      ---------------   ------     -------------
0/15           1         192.168.5.254     Enable     Master
```

Switch-2:

```
(Switch-2) (Config)# show ip vrrp interface brief
```

```
(switch-2) (Config)#show ip vrrp interface brief

Interface      VRID      IP Address        Mode       State
---------      ----      ---------------   ------     -------------
0/25           1         192.168.5.254     Enable     Backup
```

4.5.8. VRRP Interface Track Test

Switch-1:

```
(Switch-1) (Config)#interface 0/14
(Switch-1) (Interface 0/14)#shutdown
(Switch-1) (Interface 0/14)#show ip vrrp interface brief
```

```
(switch-1) (Interface 0/14)#show ip vrrp interface brief

Interface      VRID      IP Address        Mode       State
---------      ----      ---------------   ------     -------------
0/15           1         192.168.5.254     Enable     Backup
```

Switch-2:

```
(Switch-2) (Config)# show ip vrrp interface brief
```

```
(switch-2) (Config)#show ip vrrp interface brief

Interface      VRID      IP Address        Mode       State
---------      ----      ---------------   ------     -------------
0/25           1         192.168.5.254     Enable     Master
```

Server-1 PING Server-2:
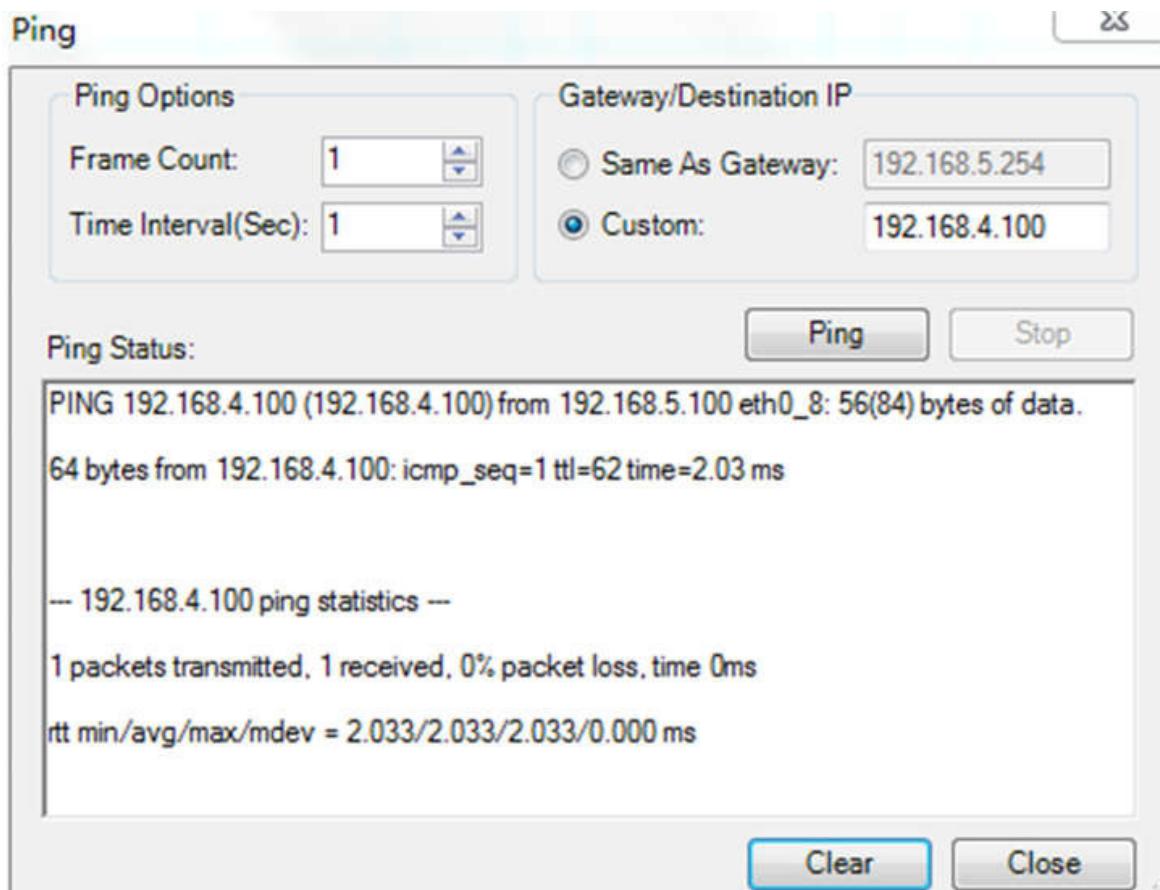
Chapter 5. IP Interface

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

5.1. IP address for the management port

5.1.1. DHCP mode

```
(Switch-1) #serviceport protocol dhcp
```

5.1.2. Static mode

```
(Switch-1) #serviceport protocol none
Changing protocol mode will reset ip configuration.
Are you sure you want to continue? (y/n) y
(Switch-1) #serviceport ip 192.168.1.1 255.255.255.0 192.168.1.254
```

5.2. IP address for the management from the front port

5.2.1. DHCP mode

```
(Switch-1) #network protocol dhcp
```

5.2.2. Static mode

```
(Switch-1) #network protocol none
Changing protocol mode will reset ip configuration.
Are you sure you want to continue? (y/n) y
(Switch-1) #network parms 172.20.1.1 255.255.255.0 172.20.1.254
(Switch-1) #network mgmt_vlan 1
```

5.3. IP address for Interface

```
(Switch-1) #configure
(Switch-1) (Config)#interface 0/1
(Switch-1) (Interface 0/1)#routing
(Switch-1) (Interface 0/1)#ip address 10.10.10.1 /24
```

5.4. IP address for VLAN

```
(Switch-1) #vlan database
(Switch-1) (Vlan)#vlan 2
(Switch-1) (Vlan)#vlan routing 2
(Switch-1) #exit
(Switch-1) #configure
(Switch-1) (Config)#interface vlan2
(Switch-1) (Interface vlan2)#ip address 20.20.20.1 /24
```

5.5. Check IP Interface Status

5.5.1. Command: show ip interface <slot/port>

This command displays all pertinent information about the IP interface.

```
(Switch-1) #show ip interface 0/1

Routing interface status......................... Up
Primary IP address............................... 10.10.10.1/255.255.255.0:
Method........................................... Manual
Routing Mode..................................... Enable
Administrative Mode.............................. Enable
Forward Net Directed Broadcasts.................. Disable
Active State..................................... Active
Link Speed Data Rate............................. 10000 Full
MAC address...................................... 00:E0:95:00:1C:8A
Encapsulation Type............................... Ethernet
IP MTU........................................... 1500
Bandwidth........................................ 100000 kbps
Destination Unreachables......................... Enabled
ICMP Redirects................................... Enabled
Interface Suppress Status........................ Unsuppressed
```

5.5.2. Command: show ip interface brief

This command displays summary information about IP configuration settings for all ports.

```
(Switch-1) #show ip interface brief

Interface      State   IP Address        IP Mask           Method
---------      -----   ---------------   ---------------   -------
4/1            Up      20.20.20.1        255.255.255.0     Manual
```

5.5.3. Command: show ip interface vlan vlan-id

This command displays all pertinent information about the IP interface.

```
(Switch-1) #show ip interface vlan 2

Routing interface status........................ Up
Primary IP address.............................. 20.20.20.1/255.255.255.0
Method.......................................... Manual
Routing Mode.................................... Enable
Administrative Mode............................. Enable
Forward Net Directed Broadcasts................. Disable
Active State.................................... Active
Link Speed Data Rate............................ 10000 Full
MAC address..................................... 00:E0:95:00:1C:8A
Encapsulation Type.............................. Ethernet
IP MTU.......................................... 1500
Bandwidth....................................... 1000000 kbps
Destination Unreachables........................ Enabled
ICMP Redirects.................................. Enabled
Interface Suppress Status....................... Unsuppressed
```

Chapter 6. OSPF

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

6.1. Scenario
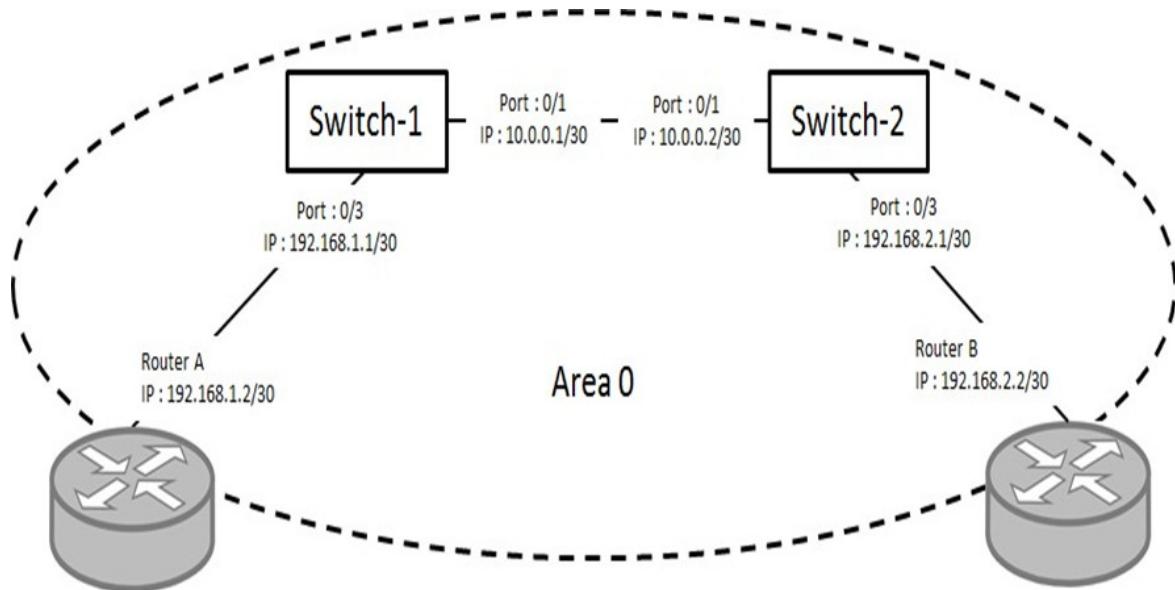
6.2. Configuration Procedure

6.2.1. Create Switches IP

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#ip routing
(Switch-1) (Config)#interface 0/1
(Switch-1) (Interface 0/1)#routing
(Switch-1) (Interface 0/1)#ip address 10.0.0.1 255.255.255.252
(Switch-1) (Interface 0/1)#exit
(Switch-1) (Config)#interface 0/3
(Switch-1) (Interface 0/3)#routing
(Switch-1) (Interface 0/3)#ip address 192.168.1.1 255.255.255.252
(Switch-1) (Interface 0/3)#exit
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#ip routing
(Switch-2) (Config)#interface 0/1
(Switch-2) (Interface 0/1)#routing
(Switch-2) (Interface 0/1)#ip address 10.0.0.2 255.255.255.252
(Switch-2) (Config)#interface 0/3
(Switch-2) (Interface 0/3)#routing
(Switch-2) (Interface 0/3)#ip address 192.168.2.1 255.255.255.252
(Switch-1) (Interface 0/3)#exit
```

6.2.2. Create OSPF

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#ip routing
(Switch-1) (Config)#router ospf
(Switch-1) (Config-router)#network 192.168.1.00.0.0.3 area 0
(Switch-1) (Config-router)#network 10.0.0.00.0.0.3 area 0
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#ip routing
(Switch-2) (Config)#router ospf
(Switch-2) (Config-router)#network 192.168.2.00.0.0.3 area 0
(Switch-2) (Config-router)#network 10.0.0.0 0.0.0.3 area 0
```

6.3. Check OSPF Status

6.3.1. Command: show ip ospf

This command displays OSPF global configuration information for the specified virtual router.

```
(Switch-1) (Config-router)#show ip ospf

Router ID....................................... 10.0.0.1
OSPF Admin Mode................................. Enable
RFC 1583 Compatibility.......................... Enable
External LSDB Limit............................. No Limit
Exit Overflow Interval.......................... 0
Spf Delay Time.................................. 5 sec
Spf Hold Time................................... 10 sec
Flood Pacing Interval........................... 33 ms
LSA Refresh Group Pacing Time................... 60 Sec
Opaque capability............................... Enable
AutoCost Ref BW................................. 100 Mbps
Default Passive Setting......................... Disabled
Prefix Suppression ............................. Disabled
Maximum Paths .................................. 48
Default Metric.................................. Not configured
Stub Router Configuration ...................... None
Summary LSA Metric Override..................... Disabled

Default Route Advertise......................... Disabled
Alway........................................... False
Metric.......................................... Not configured
Metric Type .................................... External Type 2

Number of Active Areas ......................... 1 (1 normal, 0 stub, 0 nssa)
ABR Status ..................................... Disable
ASBR Status..................................... Disable
Stub Router Status.............................. Inactive
External LSDB Overflow ......................... False
External LSA Count.............................. 0
External LSA Checksum .......................... 0
AS_OPAQUE LSA Count............................. 0
AS_OPAQUE LSA Checksum ......................... 0
New LSAS Originated ............................ 14
LSAs Received................................... 6
LSA Count ...................................... 4
Maximum Number of LSAS ......................... 148456
LSA High Water Mark ............................ 4
AS Scope LSA Flood List Length.................. 0
Retransmit List Entries ........................ 0
Maximum Number of Retransmit Entries ........... 593824
Retransmit Entries High Water Mark ............. 2
NFS Helper Support.............................. Always
NFS Helper Stric LSA Checking................... Enable
```

6.3.2. Command: show ip ospf neighbor

This command displays the state of the neighbors where receive the hello packets.

```
(Switch-1) #show ip ospf neighbor

Router ID    Priority    IP Address    Neighbor      State      Dead
                                       Interface                Time
----------   ---------   -----------   ----------    --------   -------
10.0.0.2     1           10.0.0.2      0/1           Full/DR    39
```

6.3.3. Command: show ip ospf interface port_ID

This command displays the detail state of the interface where the OSPF configured.

```
(Switch-1) #show ip ospf interface 0/1

IP Address...................................... 10.0.0.1
Subnet Mask..................................... 255.255.255.252
Secondary IP Address(es).......................
OSPF Admin Mode................................. Enable
OSPF Area ID ................................... 0
OSPF Network Type............................... Broadcast
Router Priority................................. 1
Retransmit Interval ............................ 5
Hello Interval.................................. 10
Dead Interval .................................. 40
LSA Ack Interval................................ 1
Transmit Delay ................................. 1
Authentication Type ............................ None
Metric Cost..................................... 1 (computed)
Prefix Suppression.............................. Not configured
Passive Status.................................. Non-passive interface
OSPF Mtu-ignore................................. Disabled
Flood Blocking ................................. Disabled
State........................................... backup-designated-router
Designated Router............................... 10.0.0.2
Backup Designated Router ....................... 10.0.0.1
Number of Link Events........................... 3
Local Link LSAs ................................ 0
Local Link LSA Checksum......................... 0
```

6.3.4. Command: show ip route ospf

This command displays the routing entries learned from OSPF.

```
(Switch-1) # show ip route ospf

Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
             B - BGP Derived, IA - OSPF Inter Area
             E1 - OSPF External Type 1, E2 - OSPF External Type 2
             N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
             SU - Unnumbered Peer, L - Leaked Route

O      192.168.2.0/32 [110/2] via 10.0.0.2, 00h:32m:03s, 0/1
```

Chapter 7. BGP

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

7.1. Scenario
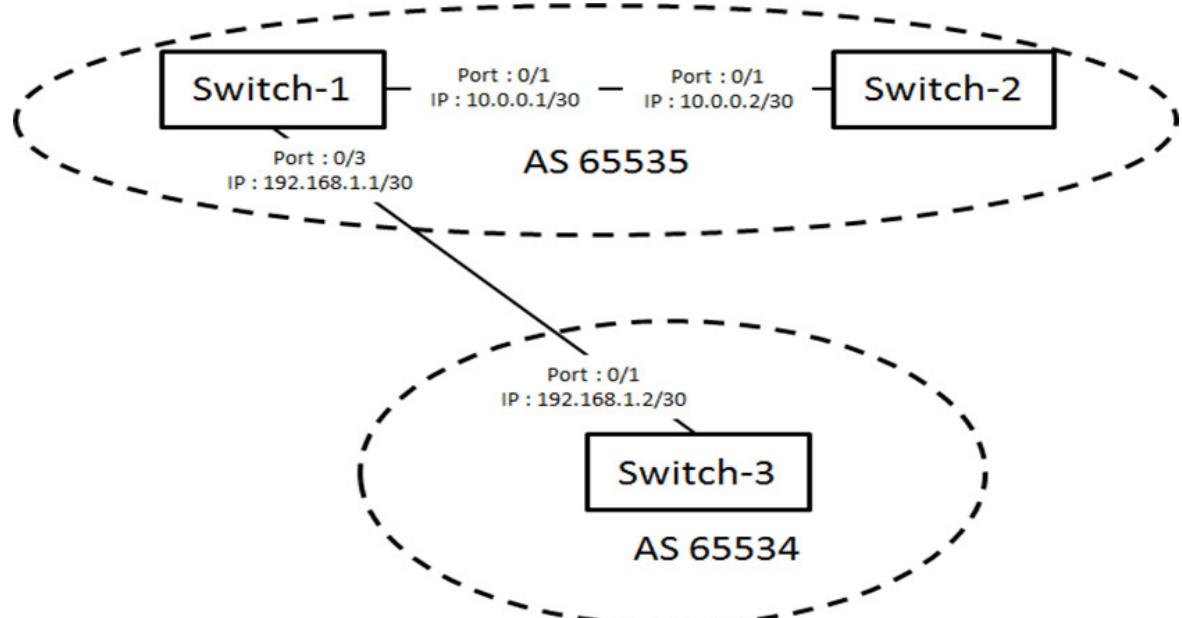
7.2. Configuration Procedure

7.2.1. Create Switches IP

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#ip routing
(Switch-1) (Config)#interface 0/1
(Switch-1) (Interface 0/1)#routing
(Switch-1) (Interface 0/1)#ip address 10.0.0.1 255.255.255.252
(Switch-1) (Interface 0/1)#exit
(Switch-1) (Config)#interface 0/3
(Switch-1) (Interface 0/3)#routing
(Switch-1) (Interface 0/3)#ip address 192.168.1.1 255.255.255.252
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#ip routing
(Switch-2) (Config)#interface 0/1
(Switch-2) (Interface 0/1)#routing
(Switch-2) (Interface 0/1)#ip address 10.0.0.2 255.255.255.252
```

Switch-3

```
(Switch-3) #configure
(Switch-3) (Config)#ip routing
(Switch-3) (Config)#interface 0/1
(Switch-3) (Interface 0/1)#routing
(Switch-3) (Interface 0/1)#ip address 192.168.1.2 255.255.255.252
```

7.2.2. Create BGP

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#ip routing
(Switch-1) (Config)#router bgp 65535
(Switch-1) (Config-router)#bgp router-id 10.0.0.1
(Switch-1) (Config-router)#neighbor 10.0.0.2 remote-as 65535
(Switch-1) (Config-router)#neighbor 192.168.1.2 remote-as 65534
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#ip routing
(Switch-2) (Config)#router bgp 65535
(Switch-2) (Config-router)#bgp router-id 10.0.0.2
(Switch-2) (Config-router)#neighbor 10.0.0.1 remote-as 65535
```

Switch-3

```
(Switch-3) #configure
(Switch-3) (Config)#ip routing
(Switch-3) (Config)#router bgp 65534
(Switch-3) (Config-router)#bgp router-id 192.168.1.2
(Switch-3) (Config-router)#neighbor 192.168.1.1 remote-as 65535
```

7.3. Check BGP Status

7.3.1. Command: show ip bgp summary

This command displays a summary of BGP configuration and status on the switch.

```
(Switch-1) #show ip bgp summary

IPv4 Routing .................................... Enabled
BGP Admin Mode .................................. Enabled
BGP Router ID ................................... 10.0.0.1
Local AS Number ................................. 65535
Number of Network Entries ....................... 0
Number of AS Paths .............................. 0


Neighbor        ASN     MsgRcvd    MsgSent   State         Up/Down Time       Pfx Rcvd
------------    ------  --------   --------  ------------  ----------------   --------
192.168.1.2     65534   177966     178118    ESTABLISHED   53:19:43:57        0
10.0.0.2        65535   178127     178098    ESTABLISHED   11:19:46:52        0
```

7.3.2. Command: show ip bgp neighbors neighbor_IP

This command displays the detail parameter of BGP with specific neighbor.

```
(Switch-1) #show ip bgp neighbors 10.0.0.2

Remote Address.................................. 10.0.0.2
Remote AS...................................... 65535
Peer ID........................................ 10.0.0.2
Peer Admin Status ............................. START
Peer State..................................... ESTABLISHED
Local Interface Address........................ 10.0.0.1
Local Port..................................... 46578
Remote Port.................................... 179
Connection Retry Interval...................... 2 sec
Neighbor Capabilities.......................... MP RF
IPv4 Unicate Support........................... Both
IPv6 Unicast Support........................... None
Template Name ................................. None
Update Source ................................. None
Configured Hold Time........................... 90 sec
Configured Keep Alive Time..................... 30 sec
Negotiated Hold Time........................... 90 sec
Negotiated Keep Alive Time..................... 30 sec
MD5 Password................................... None
Last Error ()................................. None
Last SubError ................................. None
Time Since Last Error ......................... Nerver
Established Transitions ....................... 1
Established Time .............................. 11 days 22 hrs 49 mins 57 secs
Time Since Last Update ........................ No UPDATE received
IPv4 Outbound Update Group..................... 0
IPv6 Outbound Update Group..................... None
BFD Enabled to Detect Fast Fallove:........... No


            Open     Update    Keepalive    Notification    Received    Total

Msgs Sent    2         0        39556          1              0         39559

Msgs Rcvd    1         0        39543          0              0         39544


Received UPDATA Queue Size: 0 bytes. High: 0 Limit: 393216 Drops: 0

IPv4 Prefix Statistics:
                            Inbound              Outbound
Prefixes Advertised           0                    0
Prefixes Withdrawn            0                    0
Prefixes Current              0                    0
Prefixes Accepted             0                    N/A
Prefixes Rejected             0                    N/A
Max NLRI per Update           0                    0
Min NLRI per Update           0                    0
```

Chapter 8. ECMP

- Support hardware: Aurora 220, Aurora 420, Aurora 620, Aurora 630, Aurora 720

- Support software: 1.1.6 or above

8.1. OSPF ECMP Scenario

ECMP will work based on the OSPF or BGP routing protocol. Here is work with OSPF.
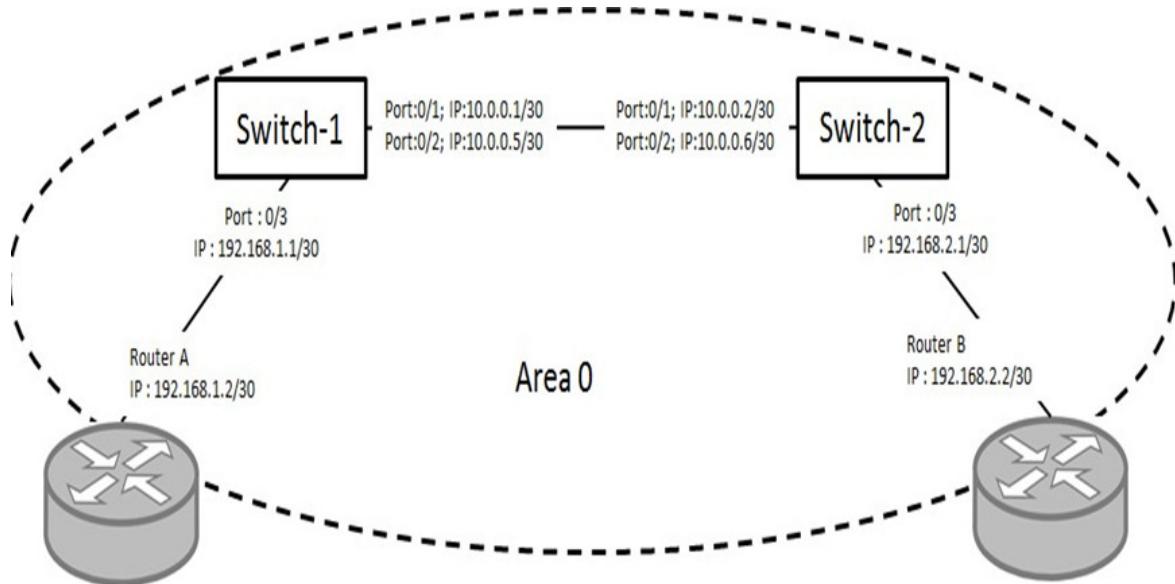
8.2. OSPF ECMP Configuration Procedure

8.2.1. Basic OSPF Configuration

Please refer to the Chapter 6, *OSPF* section.

8.2.2. Extra OSPF Configuration

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#interface 0/2
(Switch-1) (Interface 0/2)#routing
(Switch-1) (Interface 0/2)#ip address 10.0.0.5 255.255.255.252
(Switch-1) (Interface 0/2)#exit
(Switch-1)  (Config)#router ospf
(Switch-1) (Config-router)#maximum-paths 48
(Switch-1) (Config-router)#exit
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#interface 0/2
(Switch-2) (Interface 0/2)#routing
(Switch-2) (Interface 0/2)#ip address 10.0.0.6 255.255.255.252
(Switch-2) (Interface 0/2)#exit
(Switch-2)  (Config)#router ospf
(Switch-2) (Config-router)#maximum-paths 48
(Switch-2) (Config-router)#exit
```

# 8.3. Check OSPF ECMP Status

8.3.1. Command: show ip route ospf

This command displays the OSPF ECMP state on the switch.

```
(Switch-1) #show ip route ospf

Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
             B - BGP Derived, IA - OSPF Inter Area
             E1 - OSPF External Type 1, E2 - OSPF External Type 2
             N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
             SU - Unnumbered Peer, L - Leaked Route

O        192.168.2.0/30 [110/2] via 10.0.0.2, 00h:43m:03s, 0/1
                                via 10.0.0.6, 00h:14m:17s, 0/2
```

8.4. BGP ECMP Scenario

ECMP will work based on the OSPF or BGP routing protocol. Here is work with BGP.
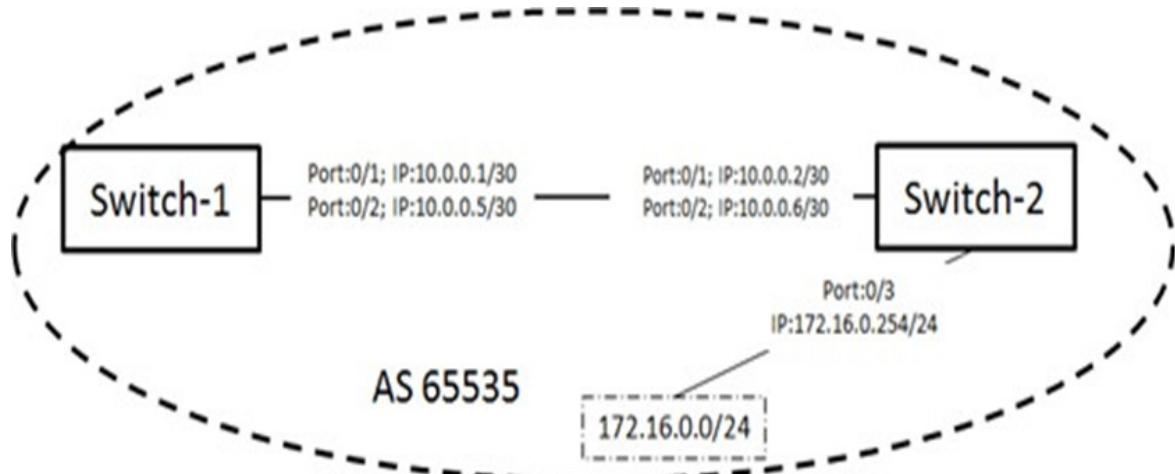
8.5. BGP ECMP Configuration Procedure

8.5.1. Basic BGP Configuration

Please refer to Chapter 7, *BGP* section

8.5.2. Extra BGP Configuration

Switch-1

```
(Switch-1) #configure
(Switch-1) (Config)#interface 0/2
(Switch-1) (Interface 0/2)#routing
(Switch-1) (Interface 0/2)#ip address 10.0.0.5 255.255.255.252
(Switch-1) (Interface 0/2)#exit
(Switch-1) (Config)#router bgp 65535
(Switch-1) (Config-router)# maximum-paths ibgp 32
(Switch-1) (Config-router)#exit
```

Switch-2

```
(Switch-2) #configure
(Switch-2) (Config)#interface 0/2
(Switch-2) (Interface 0/2)#routing
(Switch-2) (Interface 0/2)#ip address 10.0.0.6 255.255.255.252
(Switch-2) (Interface 0/2)#exit
(Switch-2) (Config)#interface 0/3
(Switch-2) (Interface 0/3)#routing
(Switch-2) (Interface 0/3)#ip address 172.16.0.254 255.255.255.0
(Switch-2) (Interface 0/3)#exit
(Switch-2) (Config)#router bgp 65535
(Switch-2) (Config-router)# maximum-paths ibgp 32
(Switch-2) (Config-router)# network 172.16.0.0 mask 255.255.255.0
(Switch-2) (Config-router)#exit
```

8.6. Check BGP ECMP Status

8.6.1. Command: show ip route bgp

This command displays the BGP ECMP state on the switch.

```
(Switch-1) # show ip route bgp

Route Codes: R - RIP Derived, O - OSPF Derived, C - Connected, S - Static
             B - BGP Derived, IA - OSPF Inter Area
             E1 - OSPF External Type 1, E2 - OSPF External Type 2
             N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type 2
             SU - Unnumbered Peer, L - Leaked Route

 B        172.16.0.0/24 [20/1]    via 10.0.0.2, 00h:00m:12s, 0/1
                                  via 10.0.0.6, 00h:00m:12s, 0/2
```