IEG3821 N2:LAN Switching
Laboratory Report

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Task 0: Configuration of hostname

Run `hostname` on each router and switch.

Task 1: Configuration of VLAN on SW1

- **SW1**

```
vlan database
 vlan 12 name VLAN_12
 vlan 23 name VLAN_23
 vlan 34 name VLAN_34
 vlan 45 name VLAN_45
 vlan 56 name VLAN_56
!
```

Task 2: Configuration of Etherchannel

- **SW1**

```
interface FastEthernet1/11
 channel-group 1 mode on
!
interface FastEthernet1/12
 channel-group 1 mode on
!
interface FastEthernet1/13
 channel-group 2 mode on
!
interface FastEthernet1/14
 channel-group 2 mode on
!
```

- **SW2**

```
interface FastEthernet1/11
 channel-group 1 mode on
!
interface FastEthernet1/12
 channel-group 1 mode on
!
interface FastEthernet1/13
 channel-group 2 mode on
!
interface FastEthernet1/14
 channel-group 2 mode on
!
```

Task 3: VLAN Trunk

- **SW1 & SW2**

```
interface FastEthernet1/11
 switchport mode trunk
!
interface FastEthernet1/12
 switchport mode trunk
!
interface FastEthernet1/13
 switchport mode trunk
!
interface FastEthernet1/14
 switchport mode trunk
!
```

- **Capture**

```
SW1#sh interfaces trunk

Port      Mode         Encapsulation  Status        Native vlan
Po1       on           802.1q         trunking      1
Po2       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Po1       1-1005
Po2       1-1005

Port      Vlans allowed and active in management domain
Po1       1,12,23,34,45,56
Po2       1,12,23,34,45,56

Port      Vlans in spanning tree forwarding state and not pruned
Po1       1,12,23,34,45,56
Po2       1,12,23,34,45,56

SW2#sh interfaces trunk
```

```
Port      Mode         Encapsulation  Status        Native vlan
Po1       on           802.1q         trunking      1
Po2       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Po1       1-1005
Po2       1-1005

Port      Vlans allowed and active in management domain
Po1       1
Po2       1

Port      Vlans in spanning tree forwarding state and not pruned
Po1       none
Po2       none
```

- The trunk interfaces on SW1 are active in management domain and in spanning tree forwarding state while the trunk interfaces on SW2 are not.

Task 4: VLAN Trunking Protocol(VTP)

a)

- **SW1**

```
vlan database
 vtp server
 vtp domain Hello
 vtp password World
!
```

- **SW2**

```
vlan database
 vtp client
 vtp domain Hello
 vtp password World
!
```

- **Capture**

```
W2#sh vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 256
Number of existing VLANs        : 10
VTP Operating Mode              : Client
VTP Domain Name                 : Hello
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x10 0xBB 0x02 0x06 0xE6 0x70 0x70 0xB4
```

```
Configuration last modified by 0.0.0.0 at 3-1-02 00:07:04
SW2#sh vlan-switch brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa1/0, Fa1/1, Fa1/2, Fa1/3
                                                Fa1/4, Fa1/5, Fa1/6, Fa1/7
                                                Fa1/8, Fa1/9, Fa1/10, Fa1/15
12   VLAN_12                          active
23   VLAN_23                          active
34   VLAN_34                          active
45   VLAN_45                          active
56   VLAN_56                          active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW2#sh int trunk

Port      Mode         Encapsulation  Status        Native vlan
Po1       on           802.1q         trunking      1
Po2       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Po1       1-1005
Po2       1-1005

Port      Vlans allowed and active in management domain
Po1       1,12,23,34,45,56
Po2       1,12,23,34,45,56

Port      Vlans in spanning tree forwarding state and not pruned
Po1       1,12,23,34,45,56
Po2       none
```

b)

- The route will complain that SW2 is on client mode and the vlan setting can not be saved. To and VLAN_67 to the domain, we have to run the command on SW1 since it is the vtp server.

```
SW2(vlan)#vlan 67 name VLAN_67
VLAN 67 added:
Name: VLAN_67
SW2(vlan)#exit
In CLIENT state, no apply attempted.
Exiting....
```

- **Capture**

```
SW2#sh vlan-switch br

VLAN Name                             Status    Ports
```

```
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa1/0, Fa1/1, Fa1/2, Fa1/3
                                                Fa1/4, Fa1/5, Fa1/6, Fa1/7
                                                Fa1/8, Fa1/9, Fa1/10, Fa1/15
12   VLAN_12                          active
23   VLAN_23                          active
34   VLAN_34                          active
45   VLAN_45                          active
56   VLAN_56                          active
67   VLAN_67                          active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
```

Task 5: Configuration of VLAN on switch port

- **SW1**

```
interface FastEthernet1/1
 switchport access vlan 12
!
interface FastEthernet1/2
 switchport access vlan 23
!
interface FastEthernet1/3
 switchport access vlan 34
!
interface FastEthernet1/4
 switchport access vlan 45
!
interface FastEthernet1/5
 switchport access vlan 56
!
interface FastEthernet1/6
 switchport access vlan 67
!
```

- **SW2**

```
nterface FastEthernet1/2
 switchport access vlan 12
!
interface FastEthernet1/3
 switchport access vlan 23
!
interface FastEthernet1/4
 switchport access vlan 34
!
interface FastEthernet1/5
 switchport access vlan 45
```

```
!
interface FastEthernet1/6
 switchport access vlan 56
!
interface FastEthernet1/7
 switchport access vlan 67
!
```

- **Capture**

```
SW1#sh interfaces status

Port      Name               Status       Vlan       Duplex Speed Type
Fa1/0                        notconnect   1            auto    auto 10/100BaseTX
Fa1/1                        connected    12         a-full   a-100 10/100BaseTX
Fa1/2                        connected    23         a-full   a-100 10/100BaseTX
Fa1/3                        connected    34         a-full   a-100 10/100BaseTX
Fa1/4                        connected    45         a-full   a-100 10/100BaseTX
Fa1/5                        connected    56         a-full   a-100 10/100BaseTX
Fa1/6                        connected    67         a-full   a-100 10/100BaseTX
Fa1/7                        notconnect   1            auto    auto 10/100BaseTX
Fa1/8                        connected    1          a-full   a-100 10/100BaseTX
Fa1/9                        notconnect   1            auto    auto 10/100BaseTX
Fa1/10                       notconnect   1            auto    auto 10/100BaseTX
Fa1/11                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/12                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/13                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/14                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/15                       notconnect   1            auto    auto 10/100BaseTX
Po1                          connected    trunk      a-full   a-100 10/100BaseTX
Po2                          connected    trunk      a-full   a-100 10/100BaseTX


SW2#sh interfaces status

Port      Name               Status       Vlan       Duplex Speed Type
Fa1/0                        notconnect   1            auto    auto 10/100BaseTX
Fa1/1                        notconnect   1            auto    auto 10/100BaseTX
Fa1/2                        connected    12         a-full   a-100 10/100BaseTX
Fa1/3                        connected    23         a-full   a-100 10/100BaseTX
Fa1/4                        connected    34         a-full   a-100 10/100BaseTX
Fa1/5                        connected    45         a-full   a-100 10/100BaseTX
Fa1/6                        connected    56         a-full   a-100 10/100BaseTX
Fa1/7                        connected    67         a-full   a-100 10/100BaseTX
Fa1/8                        notconnect   1            auto    auto 10/100BaseTX
Fa1/9                        notconnect   1            auto    auto 10/100BaseTX
Fa1/10                       notconnect   1            auto    auto 10/100BaseTX
Fa1/11                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/12                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/13                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/14                       connected    trunk      a-full   a-100 10/100BaseTX
Fa1/15                       notconnect   1            auto    auto 10/100BaseTX
Po1                          connected    trunk      a-full   a-100 10/100BaseTX
```

```
Po2                         connected    trunk      a-full   a-100 10/100BaseTX
```

Task 6: Configuration of IP address on Routers

- **R1**

```
int f0/0
 ip addr 200.51.12.1 255.255.255.0
!
```

- **R2**

```
int f0/0
 ip addr 200.51.23.2 255.255.255.0
!
int f1/0
 ip addr 200.51.12.2 255.255.255.0
!
```

- **R3**

```
int f0/0
 ip addr 200.51.34.3 255.255.255.0
!
int f1/0
 ip addr 200.51.23.3 255.255.255.0
!
```

- **R4**

```
int f0/0
 ip addr 200.51.45.4 255.255.255.0
!
int f1/0
 ip addr 200.51.34.4 255.255.255.0
!
```

- **R5**

```
int f0/0
 ip addr 200.51.56.5 255.255.255.0
!
int f1/0
 ip addr 200.51.45.5 255.255.255.0
!
```

- **R6**

```
int f0/0
 ip addr 200.51.67.6 255.255.255.0
!
int f1/0
 ip addr 200.51.56.6 255.255.255.0
!
```

- **R7**

```
int f1/0
 ip addr 200.51.67.7 255.255.255.0
!
```

- Verify & Capture

```
R1#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            200.51.12.1     YES manual up
up

R2#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            200.51.23.2     YES manual up
up
FastEthernet1/0            200.51.12.2     YES manual up
up

R3#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            200.51.34.3     YES manual up
up
FastEthernet1/0            200.51.23.3     YES manual up
up

R4#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            200.51.45.4     YES manual up
up
FastEthernet1/0            200.51.34.4     YES manual up
up

R5#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            200.51.56.5     YES manual up
up
FastEthernet1/0            200.51.45.5     YES manual up
up

R6#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            200.51.67.6     YES manual up
up
FastEthernet1/0            200.51.56.6     YES manual up
up
```

```
R7#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet1/0            200.51.67.7     YES manual up
up


R1#ping 200.51.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/42/84 ms

R2#ping 200.51.23.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/34/68 ms


R3#ping 200.51.34.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/39/60 ms

R4#ping 200.51.45.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.5, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/42/80 ms

R5#ping 200.51.56.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/36/64 ms

R6#ping 200.51.67.7

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.7, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/20/44 ms
```

Task 7: Configuration of trunk between switch and router

a)

- **SW1**

```
interface FastEthernet1/8
 switchport trunk allowed vlan 1,2,12,23,34,45,56,67,1002-1005
 switchport mode trunk
!
```

- **Capture**

```
SW1#sh interfaces trunk

Port      Mode         Encapsulation  Status        Native vlan
Fa1/8     on           802.1q         trunking      1
Po1       on           802.1q         trunking      1
Po2       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Fa1/8     1-2,12,23,34,45,56,67,1002-1005
Po1       1-1005
Po2       1-1005

Port      Vlans allowed and active in management domain
Fa1/8     1,12,23,34,45,56,67
Po1       1,12,23,34,45,56,67
Po2       1,12,23,34,45,56,67

Port      Vlans in spanning tree forwarding state and not pruned
Fa1/8     1
Po1       1,12,23,34,45,56,67
Po2       1,12,23,34,45,56,67
```

b)

- **R8**

```
interface FastEthernet0/0
 no ip address
!
interface FastEthernet0/0.12
 encapsulation dot1Q 12
 ip address 200.51.12.8 255.255.255.0
!
interface FastEthernet0/0.23
 encapsulation dot1Q 23
 ip address 200.51.23.8 255.255.255.0
!
interface FastEthernet0/0.34
 encapsulation dot1Q 34
 ip address 200.51.34.8 255.255.255.0
```

```
!
interface FastEthernet0/0.45
 encapsulation dot1Q 45
 ip address 200.51.45.8 255.255.255.0
!
interface FastEthernet0/0.56
 encapsulation dot1Q 56
 ip address 200.51.56.8 255.255.255.0
!
interface FastEthernet0/0.67
 encapsulation dot1Q 67
 ip address 200.51.67.8 255.255.255.0
!
```

- **Capture**

```
R8#sh ip int br
Interface                  IP-Address      OK? Method Status
Protocol
FastEthernet0/0            unassigned      YES NVRAM  up
up
FastEthernet0/0.12         200.51.12.8     YES NVRAM  up
up
FastEthernet0/0.23         200.51.23.8     YES NVRAM  up
up
FastEthernet0/0.34         200.51.34.8     YES NVRAM  up
up
FastEthernet0/0.45         200.51.45.8     YES NVRAM  up
up
FastEthernet0/0.56         200.51.56.8     YES NVRAM  up
up
FastEthernet0/0.67         200.51.67.8     YES NVRAM  up
up
```

- **Verify & Capture**

```
R8#ping 200.51.12.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/24/52 ms
R8#ping 200.51.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/53/72 ms
R8#ping 200.51.23.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.2, timeout is 2 seconds:
.!!!!
```

```
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/26/36 ms
R8#ping 200.51.23.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 28/42/56 ms
R8#ping 200.51.34.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/29/40 ms
R8#ping 200.51.34.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/40/64 ms
R8#ping 200.51.45.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/30/44 ms
R8#ping 200.51.45.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.5, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 12/32/44 ms
R8#ping 200.51.56.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.5, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/39/84 ms
R8#ping 200.51.56.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/39/92 ms
R8#ping 200.51.67.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/27/40 ms
R8#ping 200.51.67.7

Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 200.51.67.7, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/33/52 ms
```

Task 8: Spanning Tree

a) Bridge priority

- **Capture**

```
SW1#sh spanning-tree vlan 12

VLAN12 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 8192, address cc08.08ac.0001
Configured hello time 2, max age 20, forward delay 15
We are the root of the spanning tree
Topology change flag not set, detected flag not set
Number of topology changes 6 last change occurred 01:08:41 ago
from FastEthernet1/8
Times:  hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 42 (FastEthernet1/1) of VLAN12 is forwarding
Port path cost 19, Port priority 128, Port Identifier 128.42.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 128.42, designated path cost 0
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3339, received 0

Port 49 (FastEthernet1/8) of VLAN12 is forwarding
Port path cost 19, Port priority 128, Port Identifier 128.49.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 128.49, designated path cost 0
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 2075, received 0

Port 321 (Port-channel1) of VLAN12 is forwarding
Port path cost 12, Port priority 128, Port Identifier 129.65.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 129.65, designated path cost 0
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3952, received 1

Port 322 (Port-channel2) of VLAN12 is forwarding
Port path cost 12, Port priority 128, Port Identifier 129.66.
```

```
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 129.66, designated path cost 0
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3941, received 1


SW2#sh spanning-tree vlan 12

VLAN12 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc09.08ac.0001
Configured hello time 2, max age 20, forward delay 15
Current root has priority 8192, address cc08.08ac.0001
Root port is 321 (Port-channel1), cost of root path is 12
Topology change flag not set, detected flag not set
Number of topology changes 1 last change occurred 01:48:50 ago
from FastEthernet1/2
Times:  hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 43 (FastEthernet1/2) of VLAN12 is forwarding
Port path cost 19, Port priority 128, Port Identifier 128.43.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 32768, address cc09.08ac.0001
Designated port id is 128.43, designated path cost 12
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3271, received 0

Port 321 (Port-channel1) of VLAN12 is forwarding
Port path cost 12, Port priority 128, Port Identifier 129.65.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 129.65, designated path cost 0
Timers: message age 2, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 1, received 3671

Port 322 (Port-channel2) of VLAN12 is blocking
Port path cost 12, Port priority 128, Port Identifier 129.66.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 129.66, designated path cost 0
Timers: message age 1, forward delay 0, hold 0
Number of transitions to forwarding state: 0
BPDU: sent 1, received 3652
```

- The root bridge of VLAN 12 is SW1.

b) Port priority

- **SW1**

```
interface Port-channel1
 spanning-tree vlan 12 port-priority 64
!
```

- **Capture**

```
SW2#sh spanning-tree vlan 12

VLAN12 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc09.08ac.0001
Configured hello time 2, max age 20, forward delay 15
Current root has priority 8192, address cc08.08ac.0001
Root port is 322 (Port-channel2), cost of root path is 12
Topology change flag set, detected flag not set
Number of topology changes 3 last change occurred 00:00:11 ago
from Port-channel2
Times:  hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 43 (FastEthernet1/2) of VLAN12 is forwarding
Port path cost 19, Port priority 128, Port Identifier 128.43.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 32768, address cc09.08ac.0001
Designated port id is 128.43, designated path cost 12
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3610, received 0

Port 321 (Port-channel1) of VLAN12 is blocking
Port path cost 12, Port priority 128, Port Identifier 129.65.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 133.65, designated path cost 0
Timers: message age 2, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 1, received 4008

Port 322 (Port-channel2) of VLAN12 is forwarding
Port path cost 12, Port priority 128, Port Identifier 129.66.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 129.66, designated path cost 0
Timers: message age 2, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3, received 3990
```

c) Port path cost

- **SW2**

```
interface Port-channel1
 spanning-tree vlan 12 cost 10
!
```

- **Capture**

```
SW2#sh spanning-tree vlan 12

VLAN12 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc09.08ac.0001
Configured hello time 2, max age 20, forward delay 15
Current root has priority 8192, address cc08.08ac.0001
Root port is 321 (Port-channel1), cost of root path is 10
Topology change flag set, detected flag not set
Number of topology changes 5 last change occurred 00:00:28 ago
from Port-channel1
Times:  hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 43 (FastEthernet1/2) of VLAN12 is forwarding
Port path cost 19, Port priority 128, Port Identifier 128.43.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 32768, address cc09.08ac.0001
Designated port id is 128.43, designated path cost 10
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3713, received 0

Port 321 (Port-channel1) of VLAN12 is forwarding
Port path cost 10, Port priority 128, Port Identifier 129.65.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 133.65, designated path cost 0
Timers: message age 2, forward delay 0, hold 0
Number of transitions to forwarding state: 2
BPDU: sent 3, received 4111

Port 322 (Port-channel2) of VLAN12 is blocking
Port path cost 12, Port priority 128, Port Identifier 129.66.
Designated root has priority 8192, address cc08.08ac.0001
Designated bridge has priority 8192, address cc08.08ac.0001
Designated port id is 129.66, designated path cost 0
Timers: message age 1, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 3, received 4092
```

Task 9: Traffic Load balancing on Trunk Port by Spanning Tree

- **SW1**

```
interface Port-channel1
 spanning-tree vlan 23 port-priority 192
 spanning-tree vlan 34 port-priority 64
 spanning-tree vlan 45 port-priority 192
 spanning-tree vlan 56 port-priority 64
 spanning-tree vlan 67 port-priority 192
!
```

- **Capture**

```
SW1#sh spanning-tree interface p1 br

Vlan                                        Designated
Name                 Port ID Prio Cost  Sts Cost  Bridge ID
Port ID
-------------------- ------- ---- ----- --- ----- -------------------- -------
VLAN1                129.65   128    12 FWD     0  8192 cc08.08ac.0000
129.65
VLAN12                65.65    64    12 FWD     0  8192 cc08.08ac.0001
65.65
VLAN23               193.65   192    12 FWD     0  8192 cc08.08ac.0002
193.65
VLAN34                65.65    64    12 FWD     0  8192 cc08.08ac.0003
65.65
VLAN45               193.65   192    12 FWD     0   256 cc08.08ac.0004
193.65
VLAN56                65.65    64    12 FWD     0   256 cc08.08ac.0005
65.65
VLAN67               193.65   192    12 FWD     0   256 cc08.08ac.0006
193.65
SW1#sh spanning-tree interface p2 br

Vlan                                        Designated
Name                 Port ID Prio Cost  Sts Cost  Bridge ID
Port ID
-------------------- ------- ---- ----- --- ----- -------------------- -------
VLAN1                129.66   128    12 FWD     0  8192 cc08.08ac.0000
129.66
VLAN12               129.66   128    12 FWD     0  8192 cc08.08ac.0001
129.66
VLAN23               129.66   128    12 FWD     0  8192 cc08.08ac.0002
129.66
VLAN34               129.66   128    12 FWD     0  8192 cc08.08ac.0003
129.66
VLAN45               129.66   128    12 FWD     0   256 cc08.08ac.0004
129.66
VLAN56               129.66   128    12 FWD     0   256 cc08.08ac.0005
129.66
VLAN67               129.66   128    12 FWD     0   256 cc08.08ac.0006
129.66


SW2#sh spanning-tree int p1 br
```

```
Vlan                                    Designated
Name                 Port ID Prio Cost  Sts Cost  Bridge ID
Port ID
-------------------- ------- ---- ----- --- ----- -------------------- -------
VLAN1                129.65   128    12 FWD     0  8192 cc08.08ac.0000
129.65
VLAN12               129.65   128    10 FWD     0  8192 cc08.08ac.0001
65.65
VLAN23               129.65   128    12 BLK     0  8192 cc08.08ac.0002
193.65
VLAN34               129.65   128    12 FWD     0  8192 cc08.08ac.0003
65.65
VLAN45               129.65   128    12 BLK     0   256 cc08.08ac.0004
193.65
VLAN56               129.65   128    12 FWD     0   256 cc08.08ac.0005
65.65
VLAN67               129.65   128    12 BLK     0   256 cc08.08ac.0006
193.65
SW2#sh spanning-tree int p2 br

Vlan                                    Designated
Name                 Port ID Prio Cost  Sts Cost  Bridge ID
Port ID
-------------------- ------- ---- ----- --- ----- -------------------- -------
VLAN1                129.66   128    12 BLK     0  8192 cc08.08ac.0000
129.66
VLAN12               129.66   128    12 BLK     0  8192 cc08.08ac.0001
129.66
VLAN23               129.66   128    12 FWD     0  8192 cc08.08ac.0002
129.66
VLAN34               129.66   128    12 BLK     0  8192 cc08.08ac.0003
129.66
VLAN45               129.66   128    12 FWD     0   256 cc08.08ac.0004
129.66
VLAN56               129.66   128    12 BLK     0   256 cc08.08ac.0005
129.66
VLAN67               129.66   128    12 FWD     0   256 cc08.08ac.0006
129.66
```

Task 10: Configuration of Switch Virtual Interface(SVI)

- **SW1**

```
interface Vlan12
 ip address 200.51.12.11 255.255.255.0
!
interface Vlan23
 ip address 200.51.23.11 255.255.255.0
!
interface Vlan34
 ip address 200.51.34.11 255.255.255.0
```

```
!
interface Vlan45
 ip address 200.51.45.11 255.255.255.0
!
interface Vlan56
 ip address 200.51.56.11 255.255.255.0
!
interface Vlan67
 ip address 200.51.67.11 255.255.255.0
!
```

- **SW2**

```
interface Vlan12
 ip address 200.51.12.12 255.255.255.0
!
interface Vlan23
 ip address 200.51.23.12 255.255.255.0
!
interface Vlan34
 ip address 200.51.34.12 255.255.255.0
!
interface Vlan45
 ip address 200.51.45.12 255.255.255.0
!
interface Vlan56
 ip address 200.51.56.12 255.255.255.0
!
interface Vlan67
 ip address 200.51.67.12 255.255.255.0
!
```

- **Capture**

```
SW1#sh ip rout
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

C    200.51.23.0/24 is directly connected, Vlan23
C    200.51.67.0/24 is directly connected, Vlan67
C    200.51.34.0/24 is directly connected, Vlan34
C    200.51.12.0/24 is directly connected, Vlan12
C    200.51.45.0/24 is directly connected, Vlan45
C    200.51.56.0/24 is directly connected, Vlan56

SW2#sh ip rout
```

```
*Mar  1 03:02:25.927: %SYS-5-CONFIG_I: Configured from console by console
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

C    200.51.23.0/24 is directly connected, Vlan23
C    200.51.67.0/24 is directly connected, Vlan67
C    200.51.34.0/24 is directly connected, Vlan34
C    200.51.12.0/24 is directly connected, Vlan12
C    200.51.45.0/24 is directly connected, Vlan45
C    200.51.56.0/24 is directly connected, Vlan56


SW1#ping 200.51.12.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/27/44 ms
SW1#ping 200.51.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/24/52 ms
SW1#ping 200.51.23.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/33/72 ms
SW1#ping 200.51.23.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/45/68 ms
SW1#ping 200.51.34.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/33/44 ms
SW1#ping 200.51.34.4

Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 200.51.34.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 32/44/60 ms
SW1#ping 200.51.45.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/44/92 ms
SW1#ping 200.51.45.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.5, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/21/36 ms
SW1#ping 200.51.56.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.5, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/20/28 ms
SW1#ping 200.51.56.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/40/68 ms
SW1#ping 200.51.67.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/27/52 ms
SW1#ping 200.51.67.7

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.7, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/20/32 ms

SW2#ping 200.51.12.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 24/41/64 ms
SW2#ping 200.51.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/46/72 ms
```

```
SW2#ping 200.51.23.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/24/64 ms
SW2#ping 200.51.23.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 32/44/60 ms
SW2#ping 200.51.34.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/33/68 ms
SW2#ping 200.51.34.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/37/68 ms
SW2#ping 200.51.45.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/32/76 ms
SW2#ping 200.51.45.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.5, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/20/28 ms
SW2#ping 200.51.56.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.5, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/22/48 ms
SW2#ping 200.51.56.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/43/72 ms
SW2#ping 200.51.67.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.6, timeout is 2 seconds:
```

```
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 36/39/44 ms
SW2#ping 200.51.67.7

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.7, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/42/68 ms
```

Task 11: Hot Standby Routing Protocal(HSRP)

- **SW1**

```
interface Vlan12
 standby 12 ip 200.51.12.254
 standby 12 priority 64
 standby 12 preempt
!
interface Vlan23
 standby 23 ip 200.51.23.254
 standby 23 priority 128
 standby 23 preempt
!
interface Vlan34
 standby 34 ip 200.51.34.254
!
interface Vlan45
 standby 45 ip 200.51.45.254
 standby 45 priority 64
 standby 45 preempt
!
interface Vlan56
 standby 56 ip 200.51.56.254
 standby 56 preempt
!
interface Vlan67
 standby 67 ip 200.51.67.254
!
```

- **SW2**

```
interface Vlan12
 standby 12 ip 200.51.12.254
!
interface Vlan23
 standby preempt
 standby 23 ip 200.51.23.254
 standby 23 priority 64
!
interface Vlan34
 standby preempt
 standby 34 ip 200.51.34.254
```

```
 standby 34 priority 128
!
interface Vlan45
 standby 45 ip 200.51.45.254
!
interface Vlan56
 standby preempt
 standby 56 ip 200.51.56.254
 standby 56 priority 64
!
interface Vlan67
 standby preempt
 standby 67 ip 200.51.67.254
 standby 67 priority 128
!
```

- **R8**

```
interface FastEthernet0/0.12
 standby 12 ip 200.51.12.254
 standby 12 priority 128
 standby 12 preempt
!
interface FastEthernet0/0.23
 standby 23 ip 200.51.23.254
!
interface FastEthernet0/0.34
 standby 34 ip 200.51.34.254
 standby 34 priority 64
 standby 34 preempt
!
interface FastEthernet0/0.45
 standby 45 ip 200.51.45.254
 standby 45 priority 128
 standby 45 preempt
!
interface FastEthernet0/0.56
 standby 56 ip 200.51.56.254
!
interface FastEthernet0/0.67
 standby 67 ip 200.51.67.254
 standby 67 priority 64
 standby 67 preempt
!
```

- **Capture**

```
R1#ping 200.51.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.12.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/28/64 ms
```

```
R1#ping 200.51.23.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/30/40 ms
R1#ping 200.51.23.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.23.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 12/31/72 ms
R1#ping 200.51.34.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/60/128
ms
R1#ping 200.51.34.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.34.4, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/45/72 ms
R1#ping 200.51.45.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/53/76 ms
R1#ping 200.51.45.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.45.5, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 32/44/56 ms
R1#ping 200.51.56.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.5, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/40/84 ms
R1#ping 200.51.56.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.56.6, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 24/40/72 ms
R1#ping 200.51.67.6

Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 200.51.67.6, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/40 ms
R1#ping 200.51.67.7

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.51.67.7, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 24/71/124 ms
```

- When R2 PING to R7:f1/0(200.51.67.7), the ICMP ECHO frame travels through R2:f0/1 ⇒ R8:f0/0.12 ⇒ R8:f0/0.67 ⇒ R7:f1/0. The return path of the ICMP ECHO REPLY frame is R7:f1/0 ⇒ SW2:vlan67 ⇒ SW2:vlan12 ⇒ R2:f1/0.

Task 12: Traffic Monitoring

- **SW1**

```
monitor session 1 source interface Fa1/5
monitor session 1 destination interface Fa1/15
```

- **Capture**

```
SW1#show monitor session 1
Session 1
---------
Source Ports:
RX Only:       None
TX Only:       None
Both:          Fa1/5
Source VLANs:
RX Only:       None
TX Only:       None
Both:          None
Destination Ports: Fa1/15
Filter VLANs:      None
```

A Declaration

I declare that the assignment here submitted is original except for source material explicitly acknowledged, and that the same or related material has not been previously submitted for another course. I also acknowledge that I am aware of University policy and regulations on honesty in academic work, and of the disciplinary guidelines and procedures applicable to breaches of such policy and regulations, as contained in the website `http://www.cuhk.edu.hk/policy/academichonesty/`