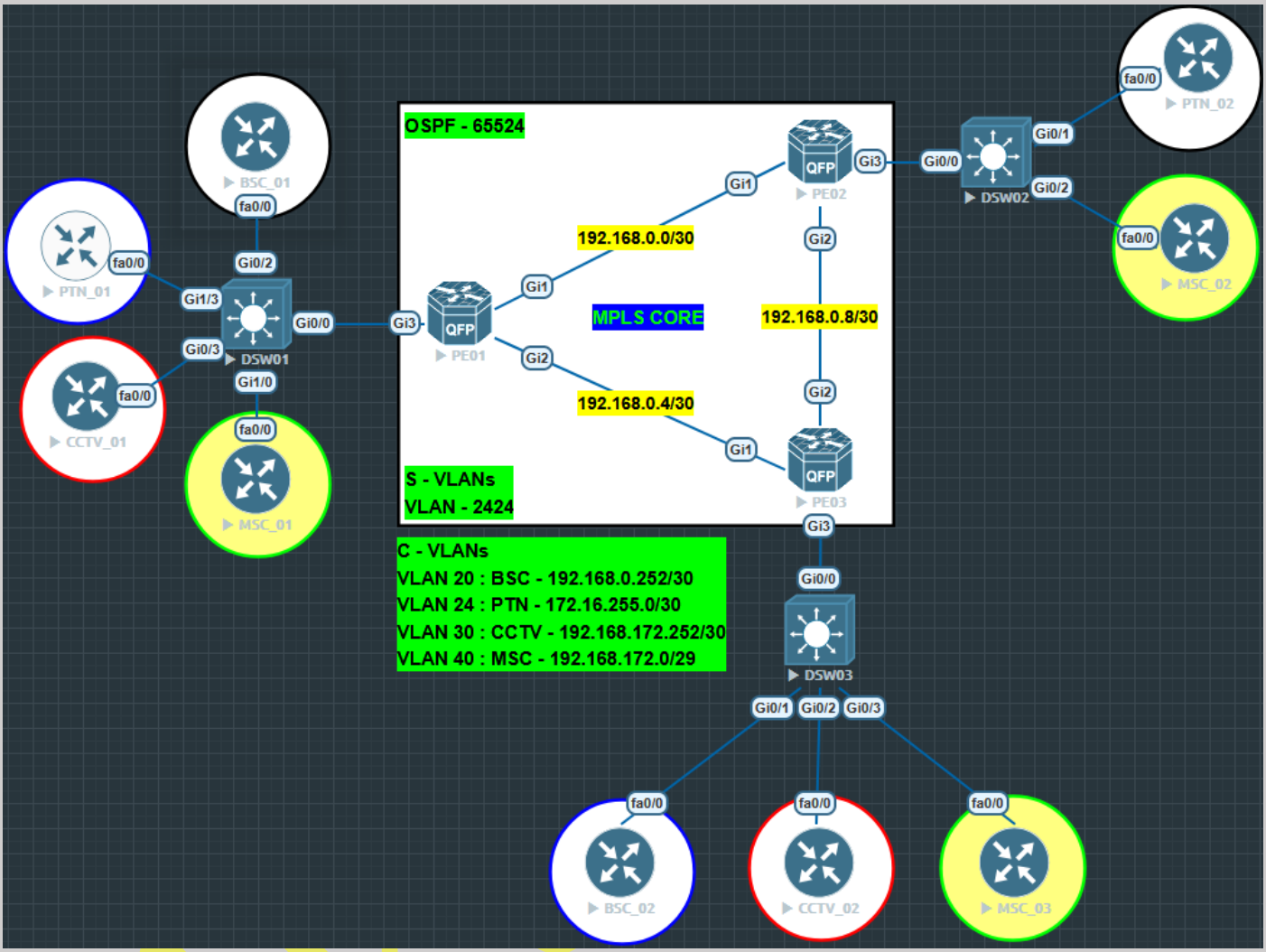
Multipoint Multi-VLAN Layer 2 Service over QinQ-Based VPLS



Lab Requirements

1. Provide Layer 2 reachability to transport multiple C-VLANs between customer sites using QinQ in one VPLS instance.
2. All customer VLAN traffic must be encapsulated with S-VLAN **2424**.

C-VLANs

VLAN – 20	BSC	192.168.0.252/30
VLAN – 24	PTN	172.16.255.0/30
VLAN – 30	CCTV	192.168.172.252/30
VLAN – 40	MSC	192.168.172.0/29

MPLS Core Network: IGP & MPLS

PE01

```
router ospf 65524
 router-id 192.168.255.1
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet1
 no passive-interface GigabitEthernet2
 network 192.168.0.1 0.0.0.0 area 0
 network 192.168.0.5 0.0.0.0 area 0
 network 192.168.255.1 0.0.0.0 area 0
!
interface range gigabitEthernet 1-2
mpls ip
!
```

PE02

```
router ospf 65524
 router-id 192.168.255.2
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet1
 no passive-interface GigabitEthernet2
 network 192.168.0.2 0.0.0.0 area 0
 network 192.168.0.9 0.0.0.0 area 0
```

```
 network 192.168.255.2 0.0.0.0 area 0
!
interface range gigabitEthernet 1–2
mpls ip
!
```

PE03

```
router ospf 65524
 router–id 192.168.255.3
 auto–cost reference–bandwidth 10000
 passive–interface default
 no passive–interface GigabitEthernet1
 no passive–interface GigabitEthernet2
 network 192.168.0.6 0.0.0.0 area 0
 network 192.168.0.10 0.0.0.0 area 0
 network 192.168.255.3 0.0.0.0 area 0
!
interface range gigabitEthernet 1–2
mpls ip
!
```

VPLS Configurations

PE01

```
l2vpn vfi context QINQ_01
 vpn id 1
 member 192.168.255.2 12 encapsulation mpls
```

```
 member 192.168.255.3 13 encapsulation mpls
!
interface GigabitEthernet3
 no ip address
 service instance 2424 ethernet
  encapsulation default
  rewrite ingress tag push dot1q 2424 symmetric
 !
bridge-domain 11
 member GigabitEthernet3 service-instance 2424
 member vfi QINQ_01
!
```

PE02

```
l2vpn vfi context QINQ_01
 vpn id 1
 member 192.168.255.1 12 encapsulation mpls
 member 192.168.255.3 23 encapsulation mpls
!
interface GigabitEthernet3
 no ip address
 service instance 2424 ethernet
  encapsulation default
  rewrite ingress tag push dot1q 2424 symmetric
 !
```

```
bridge-domain 11
 member GigabitEthernet3 service-instance 2424
 member vfi QINQ_01
!
```

PE03

```
l2vpn vfi context QINQ_01
 vpn id 1
 member 192.168.255.1 13 encapsulation mpls
 member 192.168.255.2 23 encapsulation mpls
!
interface GigabitEthernet3
 no ip address
 service instance 2424 ethernet
  encapsulation default
  rewrite ingress tag push dot1q 2424 symmetric
 !
bridge-domain 11
 member GigabitEthernet3 service-instance 2424
 member vfi QINQ_01
!
```

VLAN Assignments at Distribution Switches

Assign the required VLANs and configure trunk ports on the corresponding Distribution Switches.

Verifications

PE01

```
PE01#sh mpls l2transport vc

Local intf     Local circuit              Dest address    VC ID      Status
-------------  -------------------------- --------------- ---------- ------
VFI QINQ_01    vfi                        192.168.255.2   12         UP
VFI QINQ_01    vfi                        192.168.255.3   13         UP
```

```
PE01#sh l2vpn vfi
Legend: RT=Route-target, S=Split-horizon, Y=Yes, N=No

VFI name: QINQ_01, state: up, type: multipoint, signaling: LDP
  VPN ID: 1
  Bridge-Domain 11 attachment circuits:
  Pseudo-port interface: pseudowire100001
  Interface           Peer Address     VC ID         S
  pseudowire100003    192.168.255.2    12            Y
  pseudowire100002    192.168.255.3    13            Y
```

PE02

```
PE02#sh mpls l2transport vc

Local intf     Local circuit              Dest address    VC ID      Status
-------------  -------------------------- --------------- ---------- ------
VFI QINQ_01    vfi                        192.168.255.1   12         UP
VFI QINQ_01    vfi                        192.168.255.3   23         UP
```

```
PE02#sh l2vpn vfi
Legend: RT=Route-target, S=Split-horizon, Y=Yes, N=No

VFI name: QINQ_01, state: up, type: multipoint, signaling: LDP
  VPN ID: 1
  Bridge-Domain 11 attachment circuits:
  Pseudo-port interface: pseudowire100001
  Interface           Peer Address     VC ID         S
  pseudowire100003    192.168.255.1    12            Y
  pseudowire100002    192.168.255.3    23            Y
```

PE03

```
PE03#sh mpls l2transport vc

Local intf     Local circuit              Dest address    VC ID      Status
-------------  -------------------------- --------------- ---------- ------
VFI QINQ_01    vfi                        192.168.255.1   13         UP
VFI QINQ_01    vfi                        192.168.255.2   23         UP
```

```
PE03#sh l2vpn vfi
Legend: RT=Route-target, S=Split-horizon, Y=Yes, N=No

VFI name: QINQ_01, state: up, type: multipoint, signaling: LDP
  VPN ID: 1
  Bridge-Domain 11 attachment circuits:
  Pseudo-port interface: pseudowire100001
  Interface          Peer Address     VC ID         S
  pseudowire100003   192.168.255.1    13            Y
  pseudowire100002   192.168.255.2    23            Y
```

BSC01

```
BSC-01#ping 192.168.0.254 repeat 100
Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 192.168.0.254, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 48/59/660 ms
```

PTN01

```
PTN_01#ping 172.16.255.2 repeat  100
Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 172.16.255.2, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 32/53/132 ms
```

CCTV01

```
CCTV-01#ping 192.168.172.254 repeat 100
Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 192.168.172.254, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 8/32/80 ms
```

MSC01

```
MSC-01#ping 192.168.172.2 repeat 100
Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 192.168.172.2, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 48/56/84 ms
MSC-01#ping 192.168.172.3 repeat 100
Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 192.168.172.3, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 16/34/76 ms
```

13:11, Tue, Jun 16, 2026, GMT+3 Ko Lwin (Network)