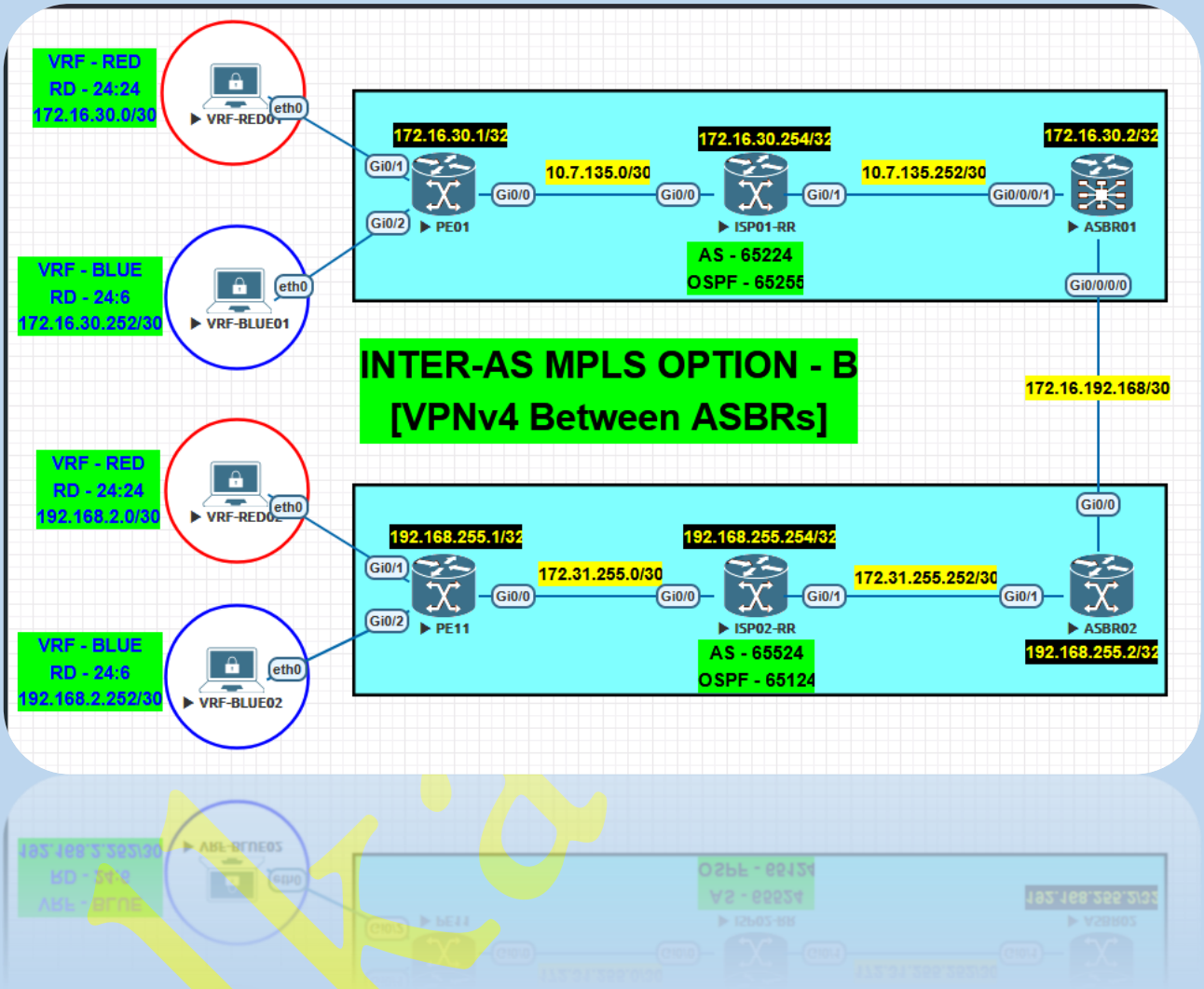
INTER–AS MPLS OPTION–B

[VPNv4 BETWEEN ASBRs]



Lab Requirements

1. Configure MPLS L3VPN from **PE01(AS–65224)** to **PE11(AS–65524)** for vrf **RED** and vrf **BLUE** using **INTER–AS MPLS OPTION–B**.

VRF Configuration

IOS XE

ip vrf **BLUE**

rd 24:6

```
 route-target both 24:6
 !
ip vrf RED
 rd 24:24
 route-target both 24:24
!
```

PE01

```
interface GigabitEthernet0/1
 ip vrf forwarding RED
 ip address 172.16.30.2 255.255.255.252
!
interface GigabitEthernet0/2
 ip vrf forwarding BLUE
 ip address 172.16.30.254 255.255.255.252
!
```

PE11

```
interface GigabitEthernet0/1
 ip vrf forwarding RED
 ip address 192.168.2.2 255.255.255.252
!
interface GigabitEthernet0/2
 ip vrf forwarding BLUE
```

```
 ip address 192.168.2.254 255.255.255.252
!
```

IGP: OSPF Configuration

hello interval is 3s, dead interval is 10s and network type is point-to-point

PE01

```
router ospf 65255
 router-id 172.16.30.1
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet0/0
 network 10.7.135.1 0.0.0.0 area 0
 network 172.16.30.1 0.0.0.0 area 0
!
```

ISP01-RR

```
router ospf 65255
 router-id 172.16.30.254
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet0/0
 no passive-interface GigabitEthernet0/1
 network 10.7.135.2 0.0.0.0 area 0
 network 10.7.135.253 0.0.0.0 area 0
```

```
 network 172.16.30.254 0.0.0.0 area 0
!
```

ASBR01

```
router ospf 65255
 router-id 172.16.30.2
 network point-to-point
 passive enable
 dead-interval 10
 hello-interval 3
 auto-cost reference-bandwidth 10000
 area 0
  interface Loopback2028
  !
  interface GigabitEthernet0/0/0/1
   passive disable
  !
```

PE11

```
router ospf 65124
 router-id 192.168.255.1
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet0/0
```

```
 network 172.31.255.1 0.0.0.0 area 0
 network 192.168.255.1 0.0.0.0 area 0
!
```

ISP02-RR

```
router ospf 65124
 router-id 192.168.255.254
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet0/0
 no passive-interface GigabitEthernet0/1
 network 172.31.255.2 0.0.0.0 area 0
 network 172.31.255.253 0.0.0.0 area 0
 network 192.168.255.254 0.0.0.0 area 0
!
```

ASBR02

```
router ospf 65124
 router-id 192.168.255.2
 auto-cost reference-bandwidth 10000
 passive-interface default
 no passive-interface GigabitEthernet0/1
 network 172.31.255.254 0.0.0.0 area 0
 network 192.168.255.2 0.0.0.0 area 0
```

Configure MPLS in Respective Interfaces

!

BGP Configuration

PE01

```
router bgp 65224
 bgp router-id 172.16.30.1
 neighbor 172.16.30.254 remote-as 65224
 neighbor 172.16.30.254 password kolwin!!!!
 neighbor 172.16.30.254 update-source Loopback2028
 !
 address-family ipv4
  neighbor 172.16.30.254 activate
 exit-address-family
 !
 address-family vpnv4
  neighbor 172.16.30.254 activate
  neighbor 172.16.30.254 send-community extended
 exit-address-family
 !
 address-family ipv4 vrf BLUE
  redistribute connected
 exit-address-family
```

```
!
 address-family ipv4 vrf RED
  redistribute connected
 exit-address-family
!
```

ISP01-RR

```
router bgp 65224
 bgp router-id 172.16.30.254
 neighbor 172.16.30.1 remote-as 65224
 neighbor 172.16.30.1 password kolwin!!!!
 neighbor 172.16.30.1 update-source Loopback2028
 neighbor 172.16.30.2 remote-as 65224
 neighbor 172.16.30.2 password kolwin!!!!
 neighbor 172.16.30.2 update-source Loopback2028
 !
 address-family ipv4
  neighbor 172.16.30.1 activate
  neighbor 172.16.30.1 route-reflector-client
  neighbor 172.16.30.2 activate
  neighbor 172.16.30.2 route-reflector-client
 exit-address-family
 !
```

```
 address-family vpnv4
  neighbor 172.16.30.1 activate
  neighbor 172.16.30.1 send-community extended
  neighbor 172.16.30.1 route-reflector-client
  neighbor 172.16.30.2 activate
  neighbor 172.16.30.2 send-community extended
  neighbor 172.16.30.2 route-reflector-client
 exit-address-family
```

PE11

```
router bgp 65524
 bgp router-id 192.168.255.1
 neighbor 192.168.255.254 remote-as 65524
 neighbor 192.168.255.254 password kolwin!!!!
 neighbor 192.168.255.254 update-source Loopback2028
 !
 address-family ipv4
  neighbor 192.168.255.254 activate
 exit-address-family
 !
 address-family vpnv4
  neighbor 192.168.255.254 activate
  neighbor 192.168.255.254 send-community extended
```

```
 exit-address-family
 !
 address-family ipv4 vrf BLUE
  redistribute connected
 exit-address-family
 !
 address-family ipv4 vrf RED
  redistribute connected
 exit-address-family
!
```

ISP02-RR

```
router bgp 65524
 bgp router-id 192.168.255.254
 neighbor 192.168.255.1 remote-as 65524
 neighbor 192.168.255.1 password kolwin!!!!
 neighbor 192.168.255.1 update-source Loopback2028
 neighbor 192.168.255.2 remote-as 65524
 neighbor 192.168.255.2 password kolwin!!!!
 neighbor 192.168.255.2 update-source Loopback2028
 !
 address-family ipv4
  neighbor 192.168.255.1 activate
```

```
 neighbor 192.168.255.1 route-reflector-client
 neighbor 192.168.255.2 activate
 neighbor 192.168.255.2 route-reflector-client
exit-address-family
!
address-family vpnv4
 neighbor 192.168.255.1 activate
 neighbor 192.168.255.1 send-community extended
 neighbor 192.168.255.1 route-reflector-client
 neighbor 192.168.255.2 activate
 neighbor 192.168.255.2 send-community extended
 neighbor 192.168.255.2 route-reflector-client
exit-address-family
!
```

ASBR01 [INTER-AS MPLS OPTION-B CONFIGURATION]

```
router static
 address-family ipv4 unicast
  172.16.192.170/32 GigabitEthernet0/0/0/0
!
```

{"BGP can form without a /32 route, but MPLS forwarding cannot — because BGP allocates labels only to /32 peer routes, and without an explicit /32 in the RIB, labeled traffic will fail."}

```
!
```

```
RP/0/0/CPU0:ASBR01#sh mpls forwarding | in 172.16.192.170/32
Wed Dec 24 22:02:27.740 UTC
24008  Pop         172.16.192.170/32  Gi0/0/0/0    172.16.192.170  6501924
```

```
!
route-policy SSAP
  pass
end-policy
!
router bgp 65224
 bgp router-id 172.16.30.2
 address-family ipv4 unicast
 !
 address-family vpnv4 unicast
 !
 neighbor 172.16.30.254
  remote-as 65224
  password kolwin!!!!
  update-source Loopback2028
  address-family ipv4 unicast
   next-hop-self
  !
  address-family vpnv4 unicast
   next-hop-self
!
```

neighbor 172.16.192.170

remote-as 65524

password kolwin!!!!

address-family vpnv4 unicast

route-policy SSAP in

route-policy SSAP out

!

ASBR02 [INTER-AS MPLS OPTION-B CONFIGURATION]

interface GigabitEthernet0/0

mpls bgp forwarding

!

router bgp 65524

bgp router-id 192.168.255.2

neighbor 172.16.192.169 remote-as 65224

neighbor 172.16.192.169 password kolwin!!!!

neighbor 192.168.255.254 remote-as 65524

neighbor 192.168.255.254 password kolwin!!!!

neighbor 192.168.255.254 update-source Loopback2028

!

address-family ipv4

neighbor 192.168.255.254 activate

neighbor 192.168.255.254 next-hop-self all

exit-address-family

!

address-family vpnv4

neighbor 172.16.192.169 activate

neighbor 172.16.192.169 send-community extended

neighbor 192.168.255.254 activate

neighbor 192.168.255.254 send-community extended

neighbor 192.168.255.254 next-hop-self all

exit-address-family

!

Verification

ASBR01

show bgp vpnv4 unicast summary

```
Neighbor        Spk    AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down  St/PfxRcd
172.16.30.254     0 65224     138     124        9    0    0 01:53:29          2
172.16.192.170    0 65524     114     103        9    0    0 01:33:19          2
```

show bgp vpnv4 unicast

```
Route Distinguisher: 24:6
*>i172.16.30.252/30   172.16.30.1              0    100      0 ?
*> 192.168.2.252/30   172.16.192.170                        0 65524 ?
Route Distinguisher: 24:24
*>i172.16.30.0/30     172.16.30.1              0    100      0 ?
*> 192.168.2.0/30     172.16.192.170                        0 65524 ?
```

ASBR02

show ip bgp vpnv4 all summary

```
Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
172.16.192.169  4        65224     102     114       11    0    0 01:36:42        2
192.168.255.254 4        65524     143     134       11    0    0 01:52:31        2
```

show ip bgp vpnv4 all

```
Route Distinguisher: 24:6 (default for vrf BLUE)
 *>  172.16.30.252/30 172.16.192.169                      0 65224 ?
 *>i 192.168.2.252/30 192.168.255.1           0    100      0 ?
Route Distinguisher: 24:24 (default for vrf RED)
 *>  172.16.30.0/30   172.16.192.169                      0 65224 ?
 *>i 192.168.2.0/30   192.168.255.1           0    100      0 ?
```

PE01

show ip bgp vpnv4 all

```
Route Distinguisher: 24:6 (default for vrf BLUE)
 *>  172.16.30.252/30 0.0.0.0                  0         32768 ?
 *>i 192.168.2.252/30 172.16.30.2                    100      0 65524 ?
Route Distinguisher: 24:24 (default for vrf RED)
 *>  172.16.30.0/30   0.0.0.0                  0         32768 ?
 *>i 192.168.2.0/30   172.16.30.2                    100      0 65524 ?
```

show ip route vrf RED bgp

```
PE01#sh ip route vrf RED bgp | be Gate
Gateway of last resort is not set

      192.168.2.0/30 is subnetted, 1 subnets
B        192.168.2.0 [200/0] via 172.16.30.2, 01:37:11
```

show ip route vrf BLUE bgp

```
PE01#sh ip route vrf BLUE bgp | be Gate
Gateway of last resort is not set

      192.168.2.0/30 is subnetted, 1 subnets
B        192.168.2.252 [200/0] via 172.16.30.2, 01:38:07
```

PE11

show ip bgp vpnv4 all

```
Route Distinguisher: 24:6 (default for vrf BLUE)
 *>i 172.16.30.252/30 192.168.255.2           0    100      0 65224 ?
 *>  192.168.2.252/30 0.0.0.0                 0         32768 ?
Route Distinguisher: 24:24 (default for vrf RED)
 *>i 172.16.30.0/30   192.168.255.2           0    100      0 65224 ?
 *>  192.168.2.0/30   0.0.0.0                 0         32768 ?
```

show ip route vrf RED bgp

```
PE11#sh ip route vrf RED bgp | be Gate
Gateway of last resort is not set

      172.16.0.0/30 is subnetted, 1 subnets
B        172.16.30.0 [200/0] via 192.168.255.2, 01:39:43
```

sh ip route vrf BLUE bgp

```
PE11#sh ip route vrf BLUE bgp | be Gate
Gateway of last resort is not set

      172.16.0.0/30 is subnetted, 1 subnets
B        172.16.30.252 [200/0] via 192.168.255.2, 01:40:20
```

REDPC01

```
REDPC01> ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=58 time=8.898 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=58 time=5.448 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=58 time=5.689 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=58 time=5.342 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=58 time=5.713 ms
```

BLUEPC01

```
BLUEPC01> ping 192.168.2.253

84 bytes from 192.168.2.253 icmp_seq=1 ttl=58 time=5.781 ms
84 bytes from 192.168.2.253 icmp_seq=2 ttl=58 time=5.639 ms
84 bytes from 192.168.2.253 icmp_seq=3 ttl=58 time=5.979 ms
84 bytes from 192.168.2.253 icmp_seq=4 ttl=58 time=5.279 ms
84 bytes from 192.168.2.253 icmp_seq=5 ttl=58 time=6.362 ms
```

Ko Lwin (Network)