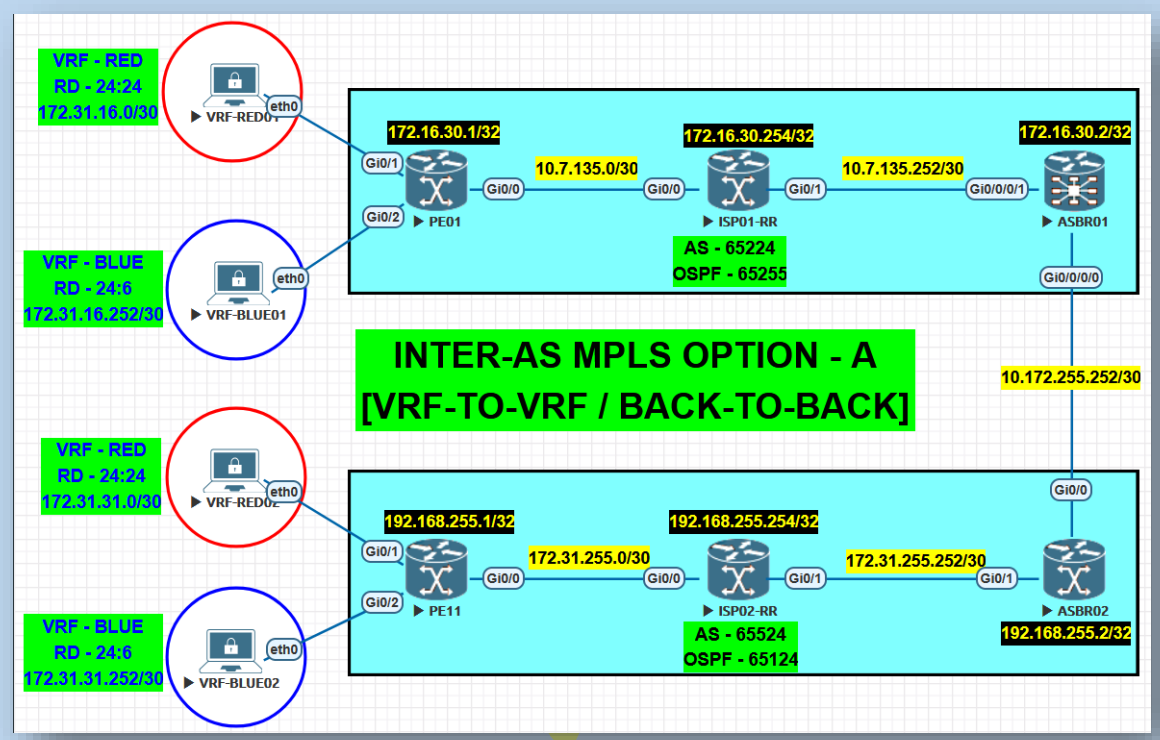
INTER–AS MPLS OPTION–A
[VRF–TO–VRF / BACK–TO–BACK]



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–A.**

IGP: OSPF Configuration

hello interval is 3s, dead interval is 6s 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 6
 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-A CONFIGURATION]

```
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
  !
  address-family vpnv4 unicast
  !
 vrf RED
```

rd 24:24

address-family ipv4 unicast

!

neighbor 10.172.255.254

remote-as 65524

password kolwin!!!!

address-family ipv4 unicast

route-policy PASS in

route-policy PASS out

!

vrf BLUE

rd 24:6

address-family ipv4 unicast

!

neighbor 10.172.255.254

remote-as 65524

password kolwin!!!!

address-family ipv4 unicast

route-policy PASS in

route-policy PASS out

!

route-policy **PASS**

```
  pass
end-policy
!
```

ASBR02 [INTER-AS MPLS OPTION-A CONFIGURATION]

```
router bgp 65524
 bgp router-id 192.168.255.2
 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
  neighbor 10.172.255.253 remote-as 65224
  neighbor 10.172.255.253 password kolwin!!!!
```

neighbor 10.172.255.253 activate

exit-address-family

!

address-family ipv4 vrf RED

neighbor 10.172.255.253 remote-as 65224

neighbor 10.172.255.253 password kolwin!!!!

neighbor 10.172.255.253 activate

exit-address-family

!

VRF Configuration

IOS XE

ip vrf **BLUE**

rd 24:6

route-target export 24:6

route-target import 24:6

!

ip vrf **RED**

rd 24:24

route-target export 24:24

route-target import 24:24

!

PE01

```
interface GigabitEthernet0/1
 ip vrf forwarding RED
 ip address 172.31.16.2 255.255.255.252
!
interface GigabitEthernet0/2
 ip vrf forwarding BLUE
 ip address 172.31.16.254 255.255.255.252
!
```

PE11

```
interface GigabitEthernet0/1
 ip vrf forwarding RED
 ip address 172.31.31.2 255.255.255.252
!
interface GigabitEthernet0/2
 ip vrf forwarding BLUE
 ip address 172.31.31.254 255.255.255.252
!
```

ASBR01

```
vrf RED
 address–family ipv4 unicast
  import route–target 24:24
```

```
  export route-target 24:24
!
vrf BLUE
 address-family ipv4 unicast
  import route-target 24:6
  !
  export route-target 24:6
!
interface GigabitEthernet0/0/0/0.24
 vrf RED
 ipv4 address 10.172.255.253 255.255.255.252
 encapsulation dot1q 24
!
interface GigabitEthernet0/0/0/0.6
 vrf BLUE
 ipv4 address 10.172.255.253 255.255.255.252
 encapsulation dot1q 6
!
```

ASBR02

```
interface GigabitEthernet0/0.24
 encapsulation dot1Q 24
 ip vrf forwarding RED
```

ip address 10.172.255.254 255.255.255.252

!

interface **GigabitEthernet0/0.6**

encapsulation dot1Q 6

ip vrf forwarding **BLUE**

ip address 10.172.255.254 255.255.255.252

!

Verification

ASBR01

For VRF RED,

```
Process       RcvTblVer   bRIB/RIB   LabelVer  ImportVer  SendTblVer  StandbyVer
Speaker              17         17         17         17          17           0

Neighbor        Spk    AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down  St/PfxRcd
10.172.255.254    0 65524      73      67       17    0    0 01:02:04           1
```

For VRF BLUE,

```
Process       RcvTblVer   bRIB/RIB   LabelVer  ImportVer  SendTblVer  StandbyVer
Speaker              17         17         17         17          17           0

Neighbor        Spk    AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down  St/PfxRcd
10.172.255.254    0 65524      74      67       17    0    0 01:01:52           1
```

```
Route Distinguisher: 24:6 (default for vrf BLUE)
*>i172.31.16.252/30   172.16.30.1              0    100      0 ?
*> 172.31.31.252/30   10.172.255.254                        0 65524 ?
Route Distinguisher: 24:24 (default for vrf RED)
*>i172.31.16.0/30     172.16.30.1              0    100      0 ?
*> 172.31.31.0/30     10.172.255.254                        0 65524 ?
```

ASBR02

For VRF RED,

```
Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
10.172.255.253  4        65224      71      78        8    0    0 01:06:21        1
```

For VRF BLUE,

```
Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
10.172.255.253  4        65224      71      79        8    0    0 01:06:06        1
```

```
Route Distinguisher: 24:6 (default for vrf BLUE)
 *>  172.31.16.252/30 10.172.255.253                      0 65224 ?
 *>i 172.31.31.252/30 192.168.255.1             0    100      0 ?
Route Distinguisher: 24:24 (default for vrf RED)
 *>  172.31.16.0/30   10.172.255.253                      0 65224 ?
 *>i 172.31.31.0/30   192.168.255.1             0    100      0 ?
```

PE01

```
Route Distinguisher: 24:6 (default for vrf BLUE)
 *>  172.31.16.252/30 0.0.0.0                  0         32768 ?
 *>i 172.31.31.252/30 172.16.30.2                    100      0 65524 ?
Route Distinguisher: 24:24 (default for vrf RED)
 *>  172.31.16.0/30   0.0.0.0                  0         32768 ?
 *>i 172.31.31.0/30   172.16.30.2                    100      0 65524 ?
```

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

      172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
B        172.31.31.0/30 [200/0] via 172.16.30.2, 01:05:57
PE01#sh ip route vrf BLUE bgp | be Gate
Gateway of last resort is not set

      172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
B        172.31.31.252/30 [200/0] via 172.16.30.2, 01:05:42
```

PE11

```
Route Distinguisher: 24:6 (default for vrf BLUE)
 *>i 172.31.16.252/30 192.168.255.2            0    100      0 65224 ?
 *>  172.31.31.252/30 0.0.0.0                  0         32768 ?
Route Distinguisher: 24:24 (default for vrf RED)
 *>i 172.31.16.0/30   192.168.255.2            0    100      0 65224 ?
 *>  172.31.31.0/30   0.0.0.0                  0         32768 ?
```

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

      172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
B        172.31.16.0/30 [200/0] via 192.168.255.2, 01:08:00
PE11#sh ip route vrf BLUE bgp | be Gate
Gateway of last resort is not set

      172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
B        172.31.16.252/30 [200/0] via 192.168.255.2, 01:07:45
```

RED01-PC01

```
RED01> ping 172.31.31.1

84 bytes from 172.31.31.1 icmp_seq=1 ttl=58 time=10.421 ms
84 bytes from 172.31.31.1 icmp_seq=2 ttl=58 time=6.172 ms
84 bytes from 172.31.31.1 icmp_seq=3 ttl=58 time=5.788 ms
84 bytes from 172.31.31.1 icmp_seq=4 ttl=58 time=6.320 ms
84 bytes from 172.31.31.1 icmp_seq=5 ttl=58 time=6.229 ms
```

BLUE01-PC01

```
BLUE01> ping 172.31.31.253

84 bytes from 172.31.31.253 icmp_seq=1 ttl=58 time=8.184 ms
84 bytes from 172.31.31.253 icmp_seq=2 ttl=58 time=6.559 ms
84 bytes from 172.31.31.253 icmp_seq=3 ttl=58 time=5.876 ms
84 bytes from 172.31.31.253 icmp_seq=4 ttl=58 time=6.571 ms
84 bytes from 172.31.31.253 icmp_seq=5 ttl=58 time=6.383 ms
```

Ko Lwin (Network)