Cisco MPLS L3VPN configuration

Cisco IOSv (revision 1.0)

Step: 01 -- IP setup on all router
Step: 02 -- IGP Configuration(OSPF or ISIS)
Step: 03 -- MPLS configuration
Step: 04 -- VRF Configuration IN both PE router
Step: 05 -- CE Interface bonding to VRF and IP setup
Step: 06 -- iBGP configure between PE1 and PE2 --optional
Step: 07 -- VPNv4 IBGP (MP-iBGP) Configuration between PE1 and PE2
Step: 08 -- EBGP configure between PE(on VRF) and CE router
Step: 09 -- Client side configure on CE router

// Step: 01 -- IP Setup
[PE1]
conf t
!
hostname IOSv_PE1
no ip domain lookup
!
interface loopback 0
 ip address 1.1.1.1 255.255.255.255
!
interface GigabitEthernet0/0
 no shut
 ip address 10.10.10.1 255.255.255.252
!

[P]
conf t
!
hostname IOSv_P
no ip domain lookup
!
interface loopback 0
 ip address 2.2.2.2 255.255.255.255
!

interface GigabitEthernet0/0
 no shut

```
 ip address 10.10.10.2 255.255.255.252
!
interface GigabitEthernet0/1
 no shut
 ip address 10.10.10.5 255.255.255.252
!


[PE2]
conf t
!
hostname IOSv_PE2
no ip domain lookup
!
interface loopback 0
 ip address 3.3.3.3 255.255.255.255
!
interface GigabitEthernet0/0
 no shut
 ip address 10.10.10.6 255.255.255.252
!



// Step: 2 --IGP Configuration

[PE1]
conf t
!
router ospf 1
 router-id 1.1.1.1
 network 1.1.1.1 0.0.0.0 area 0
 passive-interface loopback 0
 mpls ldp autoconfig
!
interface GigabitEthernet0/0
 ip ospf network point-to-point
 ip ospf 1 area 0
!
end
copy r s



[P]
```

```
conf t
!
router ospf 1
 router-id 2.2.2.2
 network 2.2.2.2 0.0.0.0 area 0
 passive-interface loopback 0
 mpls ldp autoconfig
!
interface GigabitEthernet0/0
 ip ospf network point-to-point
 ip ospf 1 area 0
!
interface GigabitEthernet0/1
 ip ospf network point-to-point
 ip ospf 1 area 0
!
end
copy r s

[PE2]
conf t
!
router ospf 1
 router-id 3.3.3.3
 network 3.3.3.3 0.0.0.0 area 0
 passive-interface loopback 0
 mpls ldp autoconfig
!
interface GigabitEthernet0/0
 ip ospf network point-to-point
 ip ospf 1 area 0
!
end
copy r s


verification:
show ip ospf neighbor
show ip ospf interface
show ip route ospf
show ip ospf neighbor summary
```

//Step: 03 -- MPLS enable

[PE1]
ip cef
mpls ip
mpls ldp router-id loopback 0 force
mpls label range 100 199
mpls label protocol ldp

[P]
ip cef
mpls ip
mpls ldp router-id loopback 0 force
mpls label range 200 299
mpls label protocol ldp

[PE2]
ip cef
mpls ip
mpls ldp router-id loopback 0 force
mpls label range 300 399
mpls label protocol ldp

Verifaction:
show mpls ldp bindings local
show mpls ldp neighbor
show mpls ldp neighbor detail
show mpls ldp discovery
show mpls ldp parameters
show mpls ldp binding
show mpls ldp discovery details
show mpls forwarding-table
show mpls ip bind
show mpls forwarding-table 50.50.50.0 30
show tcp brief
show mpls interface
show mpls label range
show ip cef 50.50.50.0 255.255.255.0 detail

```
//Step:03 --VRF Configuration IN both PE router
//PE1
ip vrf CE-A1
 rd 1.1.1.1:1
 route-target export 1.1.1.1:1
 route-target import 3.3.3.3:1
!
ip vrf CE-B1
 rd 1.1.1.1:2
 route-target export 1.1.1.1:2
 route-target import 3.3.3.3:2
!

//PE2
ip vrf CE-A2
 rd 4.4.4.4:1
 route-target export 3.3.3.3:1
 route-target import 1.1.1.1:1
!
ip vrf CE-B2
 rd 4.4.4.4:2
 route-target export 3.3.3.3:2
 route-target import 1.1.1.1:2

!




Step:04 --Bind PE-CE Interface under VRF and IP setup
#PE-1
interface GigabitEthernet0/1
 no shut
 ip vrf forwarding CE-A1
 ip address 20.20.20.1 255.255.255.0
!
interface GigabitEthernet0/2
 no shut
 ip vrf forwarding CE-B1
 ip address 20.20.20.1 255.255.255.0
!
```

```
#PE-2
interface GigabitEthernet0/1
 no shut
 ip vrf forwarding CE-A2
 ip address 30.30.30.1 255.255.255.0
!
interface GigabitEthernet0/2
 no shut
 ip vrf forwarding CE-B2
 ip address 30.30.30.1 255.255.255.0
!
```

VERIACTION:
show ip vrf
show ip vrf detail
show run vrf
show vrf
ping vrf CUST-A <ip>
R1#show ip interface brief
R1#show ip route vrf ABC

Step: 05 -iBGP configure between PE1 and PE2 (optional)

```
#PE-1
router bgp 1
 no bgp default ipv4-unicast
 neighbor 3.3.3.3 remote-as 1
 neighbor 3.3.3.3 update-source Loopback0
 !
 address-family ipv4
  neighbor 4.4.4.4 activate
!

#PE-2
router bgp 1
 no bgp default ipv4-unicast
 neighbor 1.1.1.1 remote-as 1
 neighbor 1.1.1.1 update-source Loopback0
```

```
!
 address-family ipv4
  neighbor 1.1.1.1 activate
!
```

verification:
show run | section router bgp
show bgp ipv4 unicast summary

Step: 06 --VPNv4 IBGP (MP-iBGP) Configuration between PE1 and PE2
#PE-1
```
router bgp 1
 address-family vpnv4
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
  neighbor 3.3.3.3 next-hop-self
exit-address-family
!
```

#PE-2
```
router bgp 1
 address-family vpnv4
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community extended
  neighbor 1.1.1.1 next-hop-self
 exit-address-family
!
```

verifaction:
show bgp all
show run | section router bgp
sh ip bgp vpnv4 all
show bgp vpnv4 unicast all summary
show bgp vpnv4 unicast all neighbors

//Step:07 EBGP configuration between PE(on vrf) and CE router

using -->ospf
using --> eigrp or
using --> BGP
Note: if using ospf or eigrp then need route redistribute.

#PE-1

```
router bgp 1
 address-family ipv4 vrf CE-A1
  neighbor 20.20.20.2 remote-as 64512
  neighbor 20.20.20.2 activate
  neighbor 20.20.20.2 soft-reconfiguration inbound
!
router bgp 1
 address-family ipv4 vrf CE-B1
  neighbor 20.20.20.2 remote-as 64513
  neighbor 20.20.20.2 activate
  neighbor 20.20.20.2 soft-reconfiguration inbound
  !
```

#PE-2

```
router bgp 1
 address-family ipv4 vrf CE-A2
  neighbor 30.30.30.2 remote-as 64512
  neighbor 30.30.30.2 activate
  neighbor 0.30.30.2 soft-reconfiguration inbound
 !
 router bgp 1
 address-family ipv4 vrf CE-B2
  neighbor 30.30.30.2 remote-as 64513
  neighbor 30.30.30.2 activate
  neighbor 30.30.30.2 soft-reconfiguration inbound
 !
```

//Step: 08 Client side configure on CE router

CE-A1

```
interface Loopback0
 ip address 5.5.5.5 255.255.255.255
!
```

```
interface gigabitEthernet 0/0
 no shut
 ip address 20.20.20.2 255.255.255.252
 !
router bgp 64512
 no synchronization
 bgp log-neighbor-changes
 network 5.5.5.5 mask 255.255.255.255
 network 20.20.20.0 mask 255.255.255.0
 neighbor 20.20.20.1 remote-as 1
 neighbor 20.20.20.1 allowas-in
 !
 ip route 20.20.20.0 255.255.255.0 null 0

 //CE-A2
 interface Loopback0
 ip address 6.6.6.6 255.255.255.255
!
 interface gigabitEthernet 0/0
  no shut
  ip address 30.30.30.2 255.255.255.252
 !
router bgp 64512
 no synchronization
 bgp log-neighbor-changes
 network 6.6.6.6 mask 255.255.255.255
 network 30.30.30.0 mask 255.255.255.0
 neighbor 30.30.30.1 remote-as 1
 neighbor 30.30.30.1 allowas-in
 !
 //null route for advertise on BGP
ip route 30.30.30.0 255.255.255.0 null 0
!

 CE-B1
interface gigabitEthernet 0/0
 no shut
 ip address 20.20.20.2 255.255.255.0
!
interface Loopback0
 ip address 7.7.7.7 255.255.255.255
!
router bgp 64513
```

```
 no synchronization
 bgp log-neighbor-changes
 network 7.7.7.7 mask 255.255.255.255
 network 20.20.20.0 mask 255.255.255.0
 neighbor 20.20.20.1 remote-as 1
 neighbor 20.20.20.1 allowas-in
 !
 ip route 20.20.20.0 255.255.255.0 null 0
 !


CE-B2

interface Loopback0
 ip address 8.8.8.8 255.255.255.255
!
interface gigabitEthernet 0/0
 no shut
 ip address 30.30.30.2 255.255.255.0
!
router bgp 64513
 no synchronization
 bgp log-neighbor-changes
 network 8.8.8.8 mask 255.255.255.255
 network 30.30.30.0 mask 255.255.255.0
 neighbor 30.30.30.1 remote-as 1
 neighbor 30.30.30.1 allowas-in
!
ip route 30.30.30.0 255.255.255.0 null 0
!


//verifaction:
sh ip bgp summary
sh ip bgp nei
sh ip bgp


verifaction:
show bgp vpnv4 unicast vrf CE-A1
show bgp vpnv4 unicast vrf CE-B1
show bgp vpnv4 unicast all 5.5.5.5/32
show bgp vpnv4 unicast all
show bgp vpnv4 unicast all summary -- for vpnv4 bgp
```

```
show ip bgp summary -- for global bgp
show ip route vrf CE-A1
show ip route vrf CE-A2
PE1#ping vrf CE-A 20.20.20.2


show ip bgp neighbors 20.20.20.2 received-routes
show ip bgp vpnv4 vrf CE-A neighbors 20.20.20.2 received-routes
show ip bgp vpnv4 all neighbors 3.3.3.3 received-routes
show ip bgp vpnv4 rd 3.3.3.3:1
show ip bgp vpnv4 rd 3.3.3.3:2
```