Labák MPLS VPN

4. Nakonfigurujte OSPF smerovací protokol medzi smerovačmi poskytovateľa služieb (PE1, PE2, P) na zabezpečenie dostupnosti Loop 0 adries. Overte zobrazením smerovacej tabuľky a pomocou ping.

```
Pridam vsetky siete do ospf na kazdom routeri
```

5. Aktivujte MPLS medzi smerovačmi poskytovateľa a overte zobrazením LDP susedov, LIB a LFIB

```
Router(config)# mpls ip
 !aktivácia MPLS na rozhraní
Router(config-if)# mpls ip
```

6. Na PE smerovačoch vytvorte a nakonfigurujte VRF tak, aby CE1 + CE3 boli v jednej VPN a CE2 + CE4 v druhej VPN.
   • Vytvorte VRF s výstižným menom.
   • Nakonfigurujte RD (route distinguisher) a RT (route target). Použite číslo AS 100.
   • Rozhrania smerom k CE priraďte do príslušných VRF. Nezabudnite znovu nakonfigurovať IP adresu, pretože priradenie do VRF ju odstránilo.

```
PE1(config)#ip vrf VPNA
PE1(config-vrf)#rd 100:1
PE1(config-vrf)#route-target 100:1
PE1(config-vrf)#exit

PE1(config)#ip vrf VPNB
PE1(config-vrf)#rd 100:2
PE1(config-vrf)#route-target 100:2
PE1(config-vrf)#exit

PE1(config)#int g0/1
PE1(config-if)#ip vrf forwarding VPNA
% Interface GigabitEthernet0/1 IPv4 disabled and address(es) removed due to enabling VRF VPNA
PE1(config-if)#ip add 172.16.0.2 255.255.255.252

PE1(config)#int g0/2
PE1(config-if)#ip vrf forwarding VPNB
% Interface GigabitEthernet0/2 IPv4 disabled and address(es) removed due to enabling VRF VPNB
PE1(config-if)#ip add 172.16.0.6 255.255.255.252
PE1(config-if)#exit


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PE2(config)#ip vrf VPNA
PE2(config-vrf)#rd 100:3
PE2(config-vrf)#route-target 100:do sh
PE2(config-vrf)#exit

PE2(config)#int g0/3
PE2(config-if)#ip vrf forwarding VPNA
% Interface GigabitEthernet0/3 IPv4 disabled and address(es) removed due to enabling VRF VPNA
PE2(config-if)#ip add 172.16.0.10 255.255.255.252
PE2(config-if)#exit

PE2(config)#ip vrf VPNB
PE2(config-vrf)#rd 100:4
PE2(config-vrf)#route-target 100:4
PE2(config-vrf)#exit

PE2(config)#int g0/0
PE2(config-if)#ip vrf forwarding VPNB
% Interface GigabitEthernet0/0 IPv4 disabled and address(es) removed due to enabling VRF VPNB
PE2(config-if)#ip add 172.16.0.14 255.255.255.252
PE2(config-if)#exit
```

7. Overte priradenie rozhraní do VRF zobrazením VRF informácií o rozhraniach.

```
PE1(config)#do sh ip vrf
  Name                     Default RD          Interfaces
  VPNA                     100:1               Gi0/1
  VPNB                     100:2               Gi0/2

PE2(config)#do sh ip vrf
```

```
Name                      Default RD      Interfaces
VPNA                      100:3           Gi0/3
VPNB                      100:4           Gi0/0
```

8. Pomocou MP-BGP zabezpečte ohlasovanie ciest pre jednotlivé VRF medzi PE smerovačmi.
   • Použite AS 100 a vytvorenie susedstva pomocou Router ID.
   • Aktivujte výmenu BGP informácii so susedom v adresnej rodine VPNv4.

```
PE1(config)#router bgp 100
PE1(config-router)#bgp router-id 1.1.1.1
PE1(config-router)#neighbor 2.2.2.2 remote-as 100
PE1(config-router)#neighbor 2.2.2.2 update-source loop0
*Nov 11 09:36:44.251: %BGP-5-ADJCHANGE: neighbor 2.2.2.2 Up

PE2(config)#router bgp 100
PE2(config-router)#bgp router-id 2.2.2.2
PE2(config-router)#neighbor 1.1.1.1 remote-as 100
*Nov 11 09:36:43.006: %BGP-5-ADJCHANGE: neighbor 1.1.1.1 Up
PE2(config-router)#neighbor 1.1.1.1 update-source loop0

---

PE1(config-router)#address-family vpnv4
PE1(config-router-af)#neighbor 2.2.2.2 activate
*Nov 11 09:39:42.123: %BGP-5-NBR_RESET: Neighbor 2.2.2.2 reset (Capability changed)
*Nov 11 09:39:42.124: %BGP-5-ADJCHANGE: neighbor 2.2.2.2 Down Capability changed
*Nov 11 09:39:42.124: %BGP_SESSION-5-ADJCHANGE: neighbor 2.2.2.2 IPv4 Unicast topology base removed from session  Capability changed
*Nov 11 09:39:42.429: %BGP_SESSION-5-ADJCHANGE: neighbor 2.2.2.2 VPNv4 Unicast topology base removed from session  Capability changed
*Nov 11 09:39:42.430: %BGP-5-ADJCHANGE: neighbor 2.2.2.2 Up
PE1(config-router-af)#exit

PE2(config-router)#address-family vpnv4
PE2(config-router-af)#neighbor 1.1.1.1 activate
*Nov 11 09:41:01.345: %BGP-5-NBR_RESET: Neighbor 1.1.1.1 reset (Capability changed)
*Nov 11 09:41:01.347: %BGP-5-ADJCHANGE: neighbor 1.1.1.1 Down Capability changed
*Nov 11 09:41:01.347: %BGP_SESSION-5-ADJCHANGE: neighbor 1.1.1.1 IPv4 Unicast topology base removed from session  Capability changed
*Nov 11 09:41:02.044: %BGP-5-ADJCHANGE: neighbor 1.1.1.1 Up
```

9. Overte vytvorenie MP-BGP susedstva medzi PE smerovačmi.

```
PE1(config)#do sh bgp vpnv4 unicast all sum
BGP router identifier 1.1.1.1, local AS number 100
BGP table version is 1, main routing table version 1

Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
2.2.2.2         4          100       6       6        1    0    0 00:01:15        0

PE2(config)#do sh bgp vpnv4 unicast all summary
BGP router identifier 2.2.2.2, local AS number 100
BGP table version is 1, main routing table version 1

Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
1.1.1.1         4          100       8       8        1    0    0 00:03:37        0
```

10. Zobrazte aktuálnu (bežiacu) konfiguráciu pre sekciu BGP. Všimnite si, aké konfigurácie tam pribudli po
    nastavení MP-BGP.

```
// co mi toto ma povedat kurva neviem
//PE1
router bgp 100
 bgp router-id 1.1.1.1
 bgp log-neighbor-changes
 neighbor 2.2.2.2 remote-as 100
 neighbor 2.2.2.2 update-source Loopback0
 !
 address-family vpnv4
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
 exit-address-family
 !
 address-family ipv4 vrf VPNA
 exit-address-family
 !
 address-family ipv4 vrf VPNB
 exit-address-family
!

router bgp 100
 bgp router-id 2.2.2.2
```

```
   bgp log-neighbor-changes
   neighbor 1.1.1.1 remote-as 100
   neighbor 1.1.1.1 update-source Loopback0
   !
   address-family vpnv4
    neighbor 1.1.1.1 activate
    neighbor 1.1.1.1 send-community extended
   exit-address-family
   !
   address-family ipv4 vrf VPNA
   exit-address-family
   !
   address-family ipv4 vrf VPNB
   exit-address-family
  !
```

11. Nakonfigurujte smerovanie medzi CE a PE smerovačmi pomocou EIGRP. Na PE je potrebné konfigurovať EIGRP pre konkrétnu VRF.

```
#Pre lavu vetvu, prava analogicky
PE1(config)#router eigrp 1
PE1(config-router)#addr
PE1(config-router)#address-family ipv4 vrf VPNA
PE1(config-router-af)#network 172.16.0.128 0.0.0.3
PE1(config-router-af)#autonomous-system 1
PE1(config-router-af)#ex
PE1(config-router)#ex

PE1(config)#router eigrp 2
PE1(config-router)#address-family ipv4 vrf VPNB
PE1(config-router-af)#network 172.16.0.64 0.0.0.3
PE1(config-router-af)#autonomous-system 2

CE1(config)#router eigrp 1
CE1(config-router)#network 172.16.0.128 0.0.0.3
CE1(config-router)#network 10.10.10.0 0.0.0.255

CE2(config)#router eigrp 2
CE2(config-router)#network 172.16.0.64 0.0.0.3
CE2(config-router)#network 20.20.20.0 0.0.0.255
```