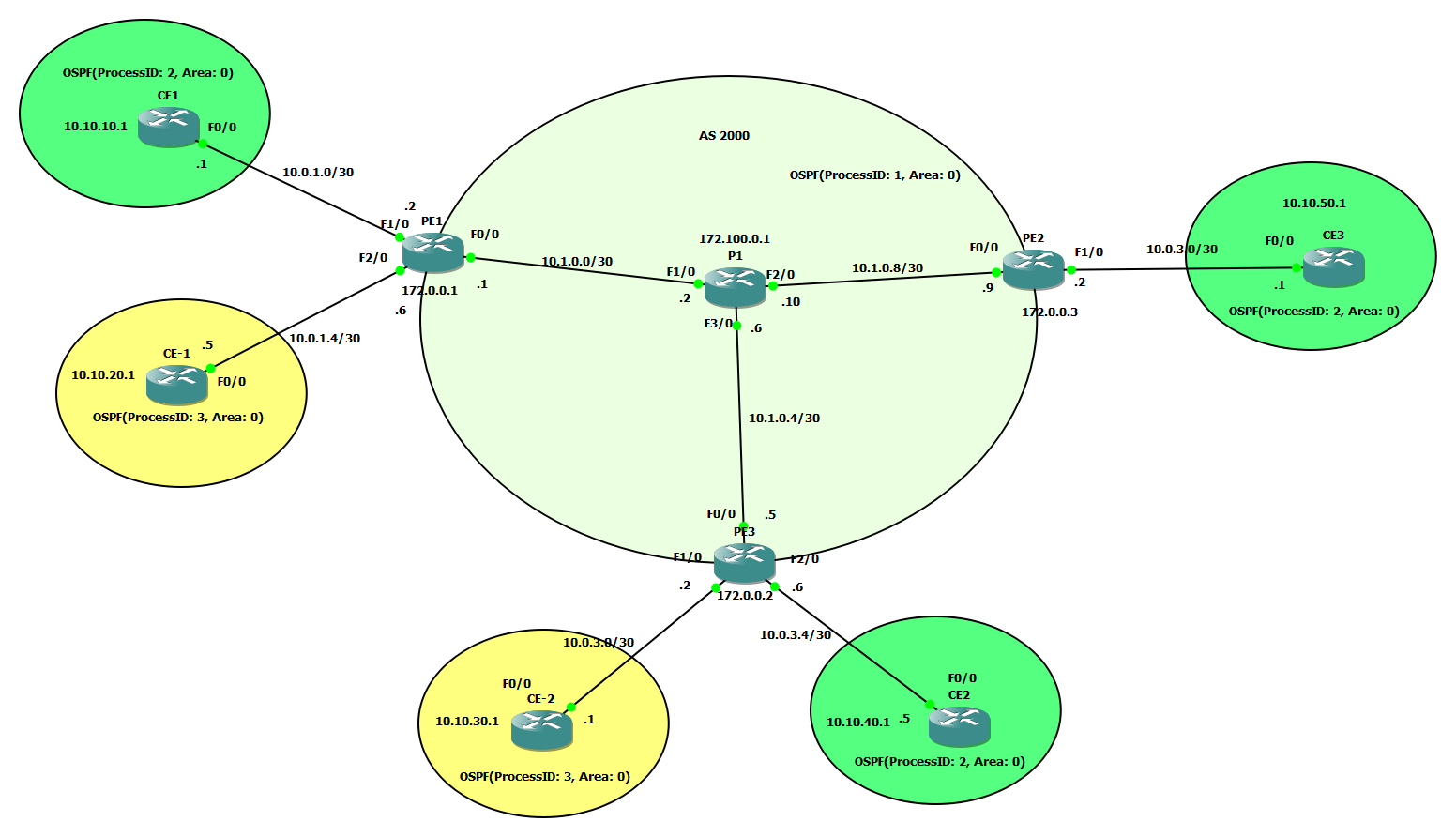


**Redes II**

Matheus Cândido Teixeira

**Exercício 3**

**Topologia**

****

1. **Mostrar e explicar a configuração passo a passo;**
2. Para configurar a rede é necessário, a princípio, configurar os endereços das interfaces de todos os roteadores na rede. Este passo é igual para os CEs, PEs e Ps.

**Configuração para os CEs**

[CE1]

configure terminal

interface loopback 0

ip address 10.10.10.1 255.255.255.255

no shutdown

interface F0/0

ip address 10.0.1.1 255.255.255.252

no shutdown

end

[CE-1]

configure terminal

interface loopback 0

ip address 10.10.20.1 255.255.255.255

no shutdown

interface F0/0

ip address 10.0.1.5 255.255.255.252

no shutdown

end

[CE2]

configure terminal

interface loopback 0

ip address 10.10.40.1 255.255.255.255

no shutdown

interface F0/0

ip address 10.0.3.5 255.255.255.252

no shutdown

end

[CE-2]

configure terminal

interface loopback 0

ip address 10.10.30.1 255.255.255.255

no shutdown

interface F0/0

ip address 10.0.3.1 255.255.255.252

no shutdown

end

[CE3]

configure terminal

interface loopback 0

ip address 10.10.50.1 255.255.255.255

no shutdown

interface F0/0

ip address 10.0.3.1 255.255.255.252

no shutdown

end

**Configuração para os PEs**

[PE1]

configure terminal

interface loopback 0

ip address 172.0.0.1 255.255.255.255

no shutdown

interface F0/0

ip address 10.1.0.1 255.255.255.252

no shutdown

interface F1/0

ip address 10.0.1.2 255.255.255.252

no shutdown

interface F2/0

ip address 10.0.1.6 255.255.255.252

no shutdown

end

[PE2]

configure terminal

interface loopback 0

ip address 172.0.0.3 255.255.255.255

no shutdown

interface F0/0

ip address 10.1.0.9 255.255.255.252

no shutdown

interface F1/0

no shutdown

end

[PE3]

configure terminal

interface loopback 0

ip address 172.0.0.2 255.255.255.255

no shutdown

interface F0/0

ip address 10.1.0.5 255.255.255.252

no shutdown

interface F1/0

ip address 10.0.3.2 255.255.255.252

no shutdown

interface F2/0

ip address 10.0.3.6 255.255.255.252

no shutdown

end

**Para a configuração do Provider**

[P1]

configure terminal

interface loopback 0

ip address 172.100.0.1 255.255.255.255

no shutdown

interface F1/0

ip address 10.1.0.2 255.255.255.252

no shutdown

interface F2/0

ip address 10.1.0.10 255.255.255.252

no shutdown

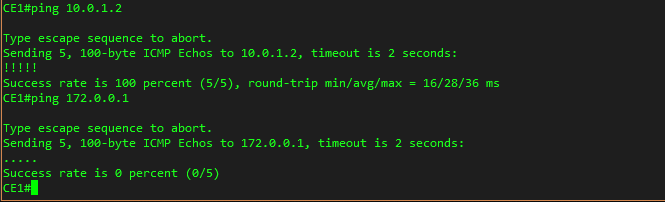
interface F3/0

ip address 10.1.0.6 255.255.255.252

no shutdown

end

A configuração das interfaces permite apenas a comunicação com roteadores que estão no mesmo enlace. Por exemplo, o roteador CE1 pode se comunicar com o roteador PE1 na interface que os conecta, mas não com o loopback dele. Na figura a seguir, é possível verificar este fato:



1. Após configurar os endereços das interfaces, é necessário configurar os protocolos de roteamento IGP, neste caso o OSPF. Os roteadores PE1, PE2, PE3 e P1 estão no *ProcessID* 1, os roteadores CE1, CE2 e CE3 estão no *ProcessID* 2 e os roteadores CE-1 e CE-2 estão no *ProcessID* 3.

**Configuração para os CEs**

[CE1]

configure terminal

router ospf 2

network 0.0.0.0 255.255.255.255 area 0

end

[CE-1]

configure terminal

router ospf 3

network 0.0.0.0 255.255.255.255 area 0

end

[CE2]

configure terminal

router ospf 2

network 0.0.0.0 255.255.255.255 area 0

end

[CE-2]

configure terminal

router ospf 3

network 0.0.0.0 255.255.255.255 area 0

end

[CE3]

configure terminal

router ospf 2

network 0.0.0.0 255.255.255.255 area 0

end

**Configuração para os PEs**

[PE1]

configure terminal

interface loopback 0

ip ospf 1 area 0

interface F0/0

ip ospf 1 area 0

interface F1/0

ip ospf 2 area 0

interface F2/0

ip ospf 3 area 0

end

[PE2]

configure terminal

interface loopback 0

ip ospf 1 area 0

interface F0/0

ip ospf 1 area

interface F1/0

ip ospf 2 area 0

end

[PE3]

configure terminal

interface loopback 0

ip ospf 1 area 0

interface F0/0

ip ospf 1 area 0

interface F1/0

ip ospf 3 area 0

interface F2/0

ip ospf 2 area 0

end

**Configuração para o Provider**

configure terminal

router ospf 1

network 0.0.0.0 255.255.255.255 area 0

end

1. Até este momento todas as configurações necessárias nos roteadores dos clientes já estão concluídas. Agora é necessário configurar a rede MPLS. Para ativar o MPLS, é preciso ativá-lo nas interfaces dos roteadores que estão na rede MPLS.

**Para a configuração dos PEs**

[PE1]

configure terminal

interface F0/0

mpls ip

end

[PE2]

configure terminal

interface F0/0

mpls ip

end

[PE3]

configure terminal

interface F0/0

mpls ip

end

**Para a configuração do Provider**

configure terminal

interface loopback 0

mpls ip

interface F1/0

mpls ip

interface F2/0

mpls ip

interface F3/0

mpls ip

end

1. Agora com o MPLS ativado é preciso configurar as VPNs nos PEs. Neste exercício há duas VPNs: (1) “Cliente\_A” (Rodando o protocolo OSPF com Process ID igual a 2); (2) “Cliente\_B” (Rodando o protocolo OSPF com Process ID igual a 3);

**Configuração necessária apenas para os PEs**

[PE1]

configure terminal

ip vrf Cliente\_A

rd 2000:1

route-target both 2000:1

ip vrf Cliente\_B

rd 2000:2

route-target both 2000:2

interface F1/0

ip vrf forwarding Cliente\_A

interface F2/0

ip vrf forwarding Cliente\_B

end

[PE2]

configure terminal

ip vrf Cliente\_A

rd 2000:1

route-target both 2000:1

ip vrf Cliente\_B

rd 2000:2

route-target both 2000:2

interface F1/0

ip vrf forwarding Cliente\_A

end

[PE3]

configure terminal

ip vrf Cliente\_A

rd 2000:1

route-target both 2000:1

ip vrf Cliente\_B

rd 2000:2

route-target both 2000:2

interface F1/0

ip vrf forwarding Cliente\_B

interface F2/0

ip vrf forwarding Cliente\_A

end

1. Agora é necessário configurar o protocolo de roteamento BGP. Na configuração do protocolo é necessário declarar que todos os PEs são vizinhos do PE que está sendo configurado. É, também, preciso ativar o IPV4 na rede, isso é feito utilizando o comando **address-family vpnv4**.

[PE1]

configure terminal

router bgp 2000

neighbor 172.0.0.3 remote-as 2000

neighbor 172.0.0.3 update-source loopback 0

neighbor 172.0.0.2 remote-as 2000

neighbor 172.0.0.2 update-source loopback 0

address-family vpnv4

neighbor 172.0.0.2 activate

neighbor 172.0.0.3 activate

end

[PE2]

configure terminal

router bgp 2000

neighbor 172.0.0.1 remote-as 2000

neighbor 172.0.0.1 update-source loopback 0

neighbor 172.0.0.2 remote-as 2000

neighbor 172.0.0.2 update-source loopback 0

address-family vpnv4

neighbor 172.0.0.1 activate

neighbor 172.0.0.2 activate

end

[PE3]

configure terminal

router bgp 2000

neighbor 172.0.0.1 remote-as 2000

neighbor 172.0.0.1 update-source loopback 0

neighbor 172.0.0.3 remote-as 2000

neighbor 172.0.0.3 update-source loopback 0

address-family vpnv4

neighbor 172.0.0.1 activate

neighbor 172.0.0.3 activate

end

1. Por fim, é necessário configurar a redistribuição de rotas OSPF através do protocolo BGP, o que é feito utilizando o comando **address-family ipv4 vrf** *nomaDaVrf*. Também é preciso distribuir o BGP através do OSPF para a distribuição de rotas aprendidas a partir de outros protocolos.

**Configurações apenas para os PEs**

[PE1]

configure terminal

router bgp 2000

address-family ipv4 vrf Cliente\_A

redistribute ospf 2

address-family ipv4 vrf Cliente\_B

redistribute ospf 3

router ospf 2

redistribute bgp 2000 subnets

router ospf 3

redistribute bgp 2000 subnets

end

[PE2]

configure terminal

router bgp 2000

address-family ipv4 vrf Cliente\_A

redistribute ospf 2

address-family ipv4 vrf Cliente\_B

redistribute ospf 3

router ospf 2

redistribute bgp 2000 subnets

router ospf 3

redistribute bgp 2000 subnets

end

[PE3]

configure terminal

router bgp 2000

address-family ipv4 vrf Cliente\_A

redistribute ospf 2

address-family ipv4 vrf Cliente\_B

redistribute ospf 3

router ospf 2

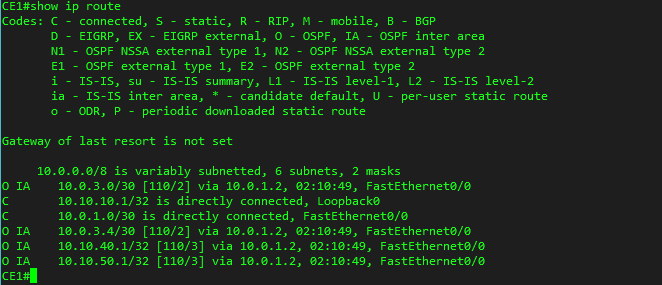
redistribute bgp 2000 subnets

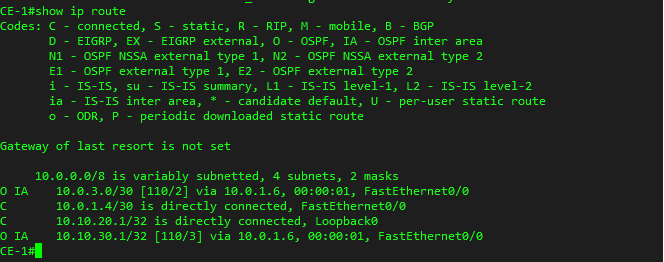
router ospf 3

redistribute bgp 2000 subnets

end

1. Após estas configurações, os roteadores na mesma VRF devem ser capazes de encontrar rotas para os demais





1. **Em cada etapa da configuração, mostrar e explicar a tabela de roteamento de cada roteador e também a tabela LFIB dos roteadores da rede MPLS;**
2. **Apenas os endereços das interfaces configurados:**

Apenas com as interfaces configuradas, apenas as redes conectadas as interfaces devem ser visíveis. Até este momento não há tabela de rotas e, portanto, a tabela LFIB ainda não pode ser construída.

**CE1#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.10.10.1/32 is directly connected, Loopback0

C 10.0.1.0/30 is directly connected, FastEthernet0/0

**CE-1#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.1.4/30 is directly connected, FastEthernet0/0

C 10.10.20.1/32 is directly connected, Loopback0

**CE-2#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

C 10.10.30.1/32 is directly connected, Loopback0

**CE2#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.3.4/30 is directly connected, FastEthernet0/0

C 10.10.40.1/32 is directly connected, Loopback0

**CE3#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

C 10.10.50.1/32 is directly connected, Loopback0

**PE1#show ip route**

172.0.0.0/32 is subnetted, 1 subnets

C 172.0.0.1 is directly connected, Loopback0

10.0.0.0/30 is subnetted, 3 subnets

C 10.1.0.0 is directly connected, FastEthernet0/0

C 10.0.1.0 is directly connected, FastEthernet1/0

C 10.0.1.4 is directly connected, FastEthernet2/0

**PE2#show ip route**

172.0.0.0/32 is subnetted, 1 subnets

C 172.0.0.3 is directly connected, Loopback0

10.0.0.0/30 is subnetted, 1 subnets

C 10.1.0.8 is directly connected, FastEthernet0/0

**PE3#show ip route**

172.0.0.0/32 is subnetted, 1 subnets

C 172.0.0.2 is directly connected, Loopback0

10.0.0.0/30 is subnetted, 3 subnets

C 10.0.3.0 is directly connected, FastEthernet1/0

C 10.0.3.4 is directly connected, FastEthernet2/0

C 10.1.0.4 is directly connected, FastEthernet0/0

**P1#show ip route**

172.100.0.0/32 is subnetted, 1 subnets

C 172.100.0.1 is directly connected, Loopback0

10.0.0.0/30 is subnetted, 3 subnets

C 10.1.0.8 is directly connected, FastEthernet2/0

C 10.1.0.0 is directly connected, FastEthernet1/0

C 10.1.0.4 is directly connected, FastEthernet3/0

1. **Como o protocolo de roteamento IGP configurado já há rotas nos roteadores que constituem a rede MPLS, porém os roteadores dos clientes ainda não possuem rotas pois eles não estão conectados diretamente a redes com mesmo *ProcessID* que eles e, portanto, o protocolo IGP não pode criar rotas.**

**CE1#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.10.10.1/32 is directly connected, Loopback0

C 10.0.1.0/30 is directly connected, FastEthernet0/0

**CE-1#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.1.4/30 is directly connected, FastEthernet0/0

C 10.10.20.1/32 is directly connected, Loopback0

**CE-2#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

C 10.10.30.1/32 is directly connected, Loopback0

**CE2#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.3.4/30 is directly connected, FastEthernet0/0

C 10.10.40.1/32 is directly connected, Loopback0

**CE3#show ip route**

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

C 10.10.50.1/32 is directly connected, Loopback0

**PE1#show ip route**

172.100.0.0/32 is subnetted, 1 subnets

O 172.100.0.1 [110/2] via 10.1.0.2, 00:01:10, FastEthernet0/0

172.0.0.0/32 is subnetted, 3 subnets

C 172.0.0.1 is directly connected, Loopback0

O 172.0.0.2 [110/3] via 10.1.0.2, 00:01:10, FastEthernet0/0

O 172.0.0.3 [110/3] via 10.1.0.2, 00:01:10, FastEthernet0/0

10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks

O 10.1.0.8/30 [110/2] via 10.1.0.2, 00:01:10, FastEthernet0/0

O 10.10.10.1/32 [110/2] via 10.0.1.1, 00:03:52, FastEthernet1/0

C 10.1.0.0/30 is directly connected, FastEthernet0/0

C 10.0.1.0/30 is directly connected, FastEthernet1/0

O 10.1.0.4/30 [110/2] via 10.1.0.2, 00:01:11, FastEthernet0/0

C 10.0.1.4/30 is directly connected, FastEthernet2/0

O 10.10.20.1/32 [110/2] via 10.0.1.5, 00:03:44, FastEthernet2/0

**PE2#show ip route**

172.100.0.0/32 is subnetted, 1 subnets

O 172.100.0.1 [110/2] via 10.1.0.10, 00:02:02, FastEthernet0/0

172.0.0.0/32 is subnetted, 3 subnets

O 172.0.0.1 [110/3] via 10.1.0.10, 00:01:52, FastEthernet0/0

O 172.0.0.2 [110/3] via 10.1.0.10, 00:02:02, FastEthernet0/0

C 172.0.0.3 is directly connected, Loopback0

10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks

C 10.1.0.8/30 is directly connected, FastEthernet0/0

C 10.0.3.0/30 is directly connected, FastEthernet1/0

O 10.1.0.0/30 [110/2] via 10.1.0.10, 00:01:52, FastEthernet0/0

O 10.1.0.4/30 [110/2] via 10.1.0.10, 00:02:02, FastEthernet0/0

O 10.10.50.1/32 [110/2] via 10.0.3.1, 00:02:31, FastEthernet1/0

**PE3#show ip route**

172.100.0.0/32 is subnetted, 1 subnets

O 172.100.0.1 [110/2] via 10.1.0.6, 00:02:03, FastEthernet0/0

172.0.0.0/32 is subnetted, 3 subnets

O 172.0.0.1 [110/3] via 10.1.0.6, 00:02:03, FastEthernet0/0

C 172.0.0.2 is directly connected, Loopback0

O 172.0.0.3 [110/3] via 10.1.0.6, 00:02:03, FastEthernet0/0

10.0.0.0/8 is variably subnetted, 7 subnets, 2 masks

O 10.1.0.8/30 [110/2] via 10.1.0.6, 00:02:03, FastEthernet0/0

C 10.0.3.0/30 is directly connected, FastEthernet1/0

O 10.1.0.0/30 [110/2] via 10.1.0.6, 00:02:03, FastEthernet0/0

C 10.0.3.4/30 is directly connected, FastEthernet2/0

C 10.1.0.4/30 is directly connected, FastEthernet0/0

O 10.10.30.1/32 [110/2] via 10.0.3.1, 00:03:46, FastEthernet1/0

O 10.10.40.1/32 [110/2] via 10.0.3.5, 00:03:48, FastEthernet2/0

**P1#show ip route**

172.100.0.0/32 is subnetted, 1 subnets

C 172.100.0.1 is directly connected, Loopback0

172.0.0.0/32 is subnetted, 3 subnets

O 172.0.0.1 [110/2] via 10.1.0.1, 00:02:09, FastEthernet1/0

O 172.0.0.2 [110/2] via 10.1.0.5, 00:02:09, FastEthernet3/0

O 172.0.0.3 [110/2] via 10.1.0.9, 00:02:09, FastEthernet2/0

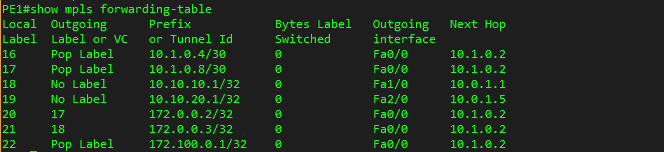
10.0.0.0/30 is subnetted, 3 subnets

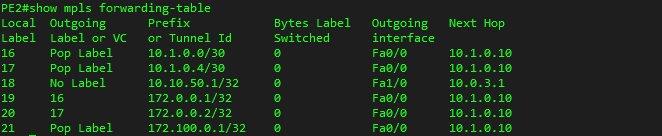
C 10.1.0.8 is directly connected, FastEthernet2/0

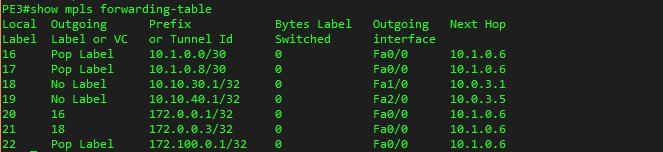
C 10.1.0.0 is directly connected, FastEthernet1/0

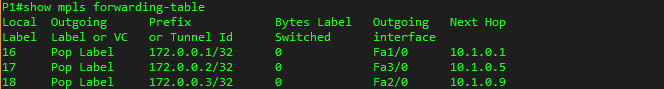
C 10.1.0.4 is directly connected, FastEthernet3/0

1. **Com o protocol IGP atuando, é possível ativar o MPLS nas redes e, assim, criar rotas. O MPLS utiliza o IGP para distribuir labels utilizando o protocolo LDP. Porém, mesmo com o MPLS configurado ainda não há VPN criadas, portanto, não houve alterações para os nós clientes.**







****

1. **Com o forwarding ativado nos PEs, já é possível ver os clientes (CEs) que pertencem a cada VPN.**

**PE1#show ip route vrf Cliente\_A**

10.0.0.0/30 is subnetted, 1 subnets

C 10.0.1.0 is directly connected, FastEthernet1/0

**PE1#show ip route vrf Cliente\_B**

10.0.0.0/30 is subnetted, 1 subnets

C 10.0.1.4 is directly connected, FastEthernet2/0

**PE2#show ip route vrf Cliente\_A**

10.0.0.0/30 is subnetted, 1 subnets

C 10.0.3.0 is directly connected, FastEthernet1/0

**PE3#show ip route vrf Cliente\_A**

10.0.0.0/30 is subnetted, 1 subnets

C 10.0.3.4 is directly connected, FastEthernet2/0

**PE3#show ip route vrf Cliente\_B**

10.0.0.0/30 is subnetted, 1 subnets

C 10.0.3.0 is directly connected, FastEthernet1/0

1. **Apenas ativando o VPNV4 não há alterações na rede. É necessário ativar a redistribuição do protocolo BGP e das rotas OSPF ainda. Após ativar a redistribuição de BGP e de OSPF:**
   1. **Os CEs são capazes de ver as rotas dos demais CEs através da rede MPLS:**

**CE1#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.1.2, 00:00:24, FastEthernet0/0

C 10.10.10.1/32 is directly connected, Loopback0

C 10.0.1.0/30 is directly connected, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.1.2, 00:00:24, FastEthernet0/0

**O IA 10.10.40.1/32 [110/3] via 10.0.1.2, 00:00:24, FastEthernet0/0**

**O IA 10.10.50.1/32 [110/3] via 10.0.1.2, 00:00:24, FastEthernet0/0**

**CE-1#show ip route**

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.1.6, 00:02:58, FastEthernet0/0

C 10.0.1.4/30 is directly connected, FastEthernet0/0

C 10.10.20.1/32 is directly connected, Loopback0

**O IA 10.10.30.1/32 [110/3] via 10.0.1.6, 00:02:44, FastEthernet0/0**

**CE-2#show ip route**

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.0.1.4/30 [110/2] via 10.0.3.2, 00:02:51, FastEthernet0/0

**O IA 10.10.20.1/32 [110/3] via 10.0.3.2, 00:02:51, FastEthernet0/0**

C 10.10.30.1/32 is directly connected, Loopback0

**CE2#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.3.6, 00:04:10, FastEthernet0/0

**O IA 10.10.10.1/32 [110/3] via 10.0.3.6, 00:03:10, FastEthernet0/0**

O IA 10.0.1.0/30 [110/2] via 10.0.3.6, 00:04:23, FastEthernet0/0

C 10.0.3.4/30 is directly connected, FastEthernet0/0

C 10.10.40.1/32 is directly connected, Loopback0

**O IA 10.10.50.1/32 [110/3] via 10.0.3.6, 00:04:23, FastEthernet0/0**

**CE3#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

**O IA 10.10.10.1/32 [110/3] via 10.0.3.2, 00:03:03, FastEthernet0/0**

O IA 10.0.1.0/30 [110/2] via 10.0.3.2, 00:04:43, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.3.2, 00:04:03, FastEthernet0/0

**O IA 10.10.40.1/32 [110/3] via 10.0.3.2, 00:04:18, FastEthernet0/0**

C 10.10.50.1/32 is directly connected, Loopback0

* 1. **Os PEs são capazes de verificar as rotas para todos os clientes que pertencem a uma determinada VPN.**

**PE1#show ip route vrf Cliente\_A**

Routing Table: Cliente\_A

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.3, 00:08:23

**O 10.10.10.1/32 [110/2] via 10.0.1.1, 00:07:29, FastEthernet1/0**

C 10.0.1.0/30 is directly connected, FastEthernet1/0

B 10.0.3.4/30 [200/0] via 172.0.0.2, 00:08:23

**B 10.10.40.1/32 [200/2] via 172.0.0.2, 00:08:23**

**B 10.10.50.1/32 [200/2] via 172.0.0.3, 00:08:38**

**PE1#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.2, 00:08:39

C 10.0.1.4/30 is directly connected, FastEthernet2/0

**O 10.10.20.1/32 [110/2] via 10.0.1.5, 00:07:42, FastEthernet2/0**

**B 10.10.30.1/32 [200/2] via 172.0.0.2, 00:07:24**

**PE2#show ip route vrf Cliente\_A**

Routing Table: Cliente\_A

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet1/0

**B 10.10.10.1/32 [200/2] via 172.0.0.1, 00:09:07**

B 10.0.1.0/30 [200/0] via 172.0.0.1, 00:11:22

B 10.0.3.4/30 [200/0] via 172.0.0.2, 00:10:07

**B 10.10.40.1/32 [200/2] via 172.0.0.2, 00:10:22**

**O 10.10.50.1/32 [110/2] via 10.0.3.1, 00:10:42, FastEthernet1/0**

**PE2#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.2, 00:10:07

B 10.0.1.4/30 [200/0] via 172.0.0.1, 00:11:22

**B 10.10.20.1/32 [200/2] via 172.0.0.1, 00:09:07**

**B 10.10.30.1/32 [200/2] via 172.0.0.2, 00:08:52**

**PE3#show ip route vrf Cliente\_A**

Routing Table: Cliente\_A

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.3, 00:10:33

**B 10.10.10.1/32 [200/2] via 172.0.0.1, 00:09:33**

B 10.0.1.0/30 [200/0] via 172.0.0.1, 00:11:33

C 10.0.3.4/30 is directly connected, FastEthernet2/0

**O 10.10.40.1/32 [110/2] via 10.0.3.5, 00:10:41, FastEthernet2/0**

**B 10.10.50.1/32 [200/2] via 172.0.0.3, 00:10:48**

**PE3#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet1/0

B 10.0.1.4/30 [200/0] via 172.0.0.1, 00:11:33

**B 10.10.20.1/32 [200/2] via 172.0.0.1, 00:09:18**

**O 10.10.30.1/32 [110/2] via 10.0.3.1, 00:09:17, FastEthernet1/0**

1. **Com a rede configurada e o redistribute do BGP e do OSPF a tabela LFIB adiciona todos os Clientes na tabela e cria labels para eles.**

**PE1#show mpls forwarding-table**

Local Outgoing Prefix Bytes Label Outgoing Next Hop

Label Label or VC or Tunnel Id Switched interface

16 Pop Label 10.1.0.4/30 0 Fa0/0 10.1.0.2

17 Pop Label 10.1.0.8/30 0 Fa0/0 10.1.0.2

**18 No Label 10.0.1.0/30[V] 0 aggregate/Cliente\_A**

**19 No Label 10.0.1.4/30[V] 0 aggregate/Cliente\_B**

20 17 172.0.0.2/32 0 Fa0/0 10.1.0.2

21 18 172.0.0.3/32 0 Fa0/0 10.1.0.2

22 Pop Label 172.100.0.1/32 0 Fa0/0 10.1.0.2

**23 No Label 10.10.10.1/32[V] 0 Fa1/0 10.0.1.1**

**24 No Label 10.10.20.1/32[V] 0 Fa2/0 10.0.1.5**

**PE2#show mpls forwarding-table**

Local Outgoing Prefix Bytes Label Outgoing Next Hop

Label Label or VC or Tunnel Id Switched interface

16 Pop Label 10.1.0.0/30 0 Fa0/0 10.1.0.10

17 Pop Label 10.1.0.4/30 0 Fa0/0 10.1.0.10

**18 No Label 10.10.50.1/32[V] 0 Fa1/0 10.0.3.1**

19 16 172.0.0.1/32 0 Fa0/0 10.1.0.10

20 17 172.0.0.2/32 0 Fa0/0 10.1.0.10

21 Pop Label 172.100.0.1/32 0 Fa0/0 10.1.0.10

**22 No Label 10.0.3.0/30[V] 0 aggregate/Cliente\_A**

**PE3#show mpls forwarding-table**

Local Outgoing Prefix Bytes Label Outgoing Next Hop

Label Label or VC or Tunnel Id Switched interface

16 Pop Label 10.1.0.0/30 0 Fa0/0 10.1.0.6

17 Pop Label 10.1.0.8/30 0 Fa0/0 10.1.0.6

**18 No Label 10.10.40.1/32[V] 0 Fa2/0 10.0.3.5**

**19 No Label 10.0.3.4/30[V] 0 aggregate/Cliente\_A**

20 16 172.0.0.1/32 0 Fa0/0 10.1.0.6

21 18 172.0.0.3/32 0 Fa0/0 10.1.0.6

22 Pop Label 172.100.0.1/32 0 Fa0/0 10.1.0.6

**23 No Label 10.0.3.0/30[V] 0 aggregate/Cliente\_B**

**24 No Label 10.10.30.1/32[V] 0 Fa1/0 10.0.3.1**

**P1#show mpls forwarding-table**

Local Outgoing Prefix Bytes Label Outgoing Next Hop

Label Label or VC or Tunnel Id Switched interface

16 Pop Label 172.0.0.1/32 13656 Fa1/0 10.1.0.1

17 Pop Label 172.0.0.2/32 13745 Fa3/0 10.1.0.5

18 Pop Label 172.0.0.3/32 12975 Fa2/0 10.1.0.9

1. **Explicar o resultado dos seguintes comandos em todos os LSR;**

**PE1**

Este comando exibe todas as interfaces do roteador que estão com o MPLS ativo. Neste caso, apenas F0/0 está ativo.

**PE1#show mpls interfaces**

Interface IP Tunnel BGP Static Operational

FastEthernet0/0 Yes (ldp) No No No Yes

Este comando lista a interfaces que estão associadas a alguma VRF.

**PE1#show ip vrf interfaces**

Interface IP-Address VRF Protocol

Fa1/0 10.0.1.2 Cliente\_A up

Fa2/0 10.0.1.6 Cliente\_B up

Este comando mostra as rotas para atingir todos os clientes que estão na VPN “Cliente\_A”.

**PE1#show ip route vrf Cliente\_A**

Routing Table: Cliente\_A

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.3, 01:20:17

O 10.10.10.1/32 [110/2] via 10.0.1.1, 01:19:23, FastEthernet1/0

C 10.0.1.0/30 is directly connected, FastEthernet1/0

B 10.0.3.4/30 [200/0] via 172.0.0.2, 01:20:17

B 10.10.40.1/32 [200/2] via 172.0.0.2, 01:20:17

B 10.10.50.1/32 [200/2] via 172.0.0.3, 01:20:32

Este comando mostra as rotas para atingir todos os clientes que estão na VPN “Cliente\_B”.

**PE1#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.2, 01:20:17

C 10.0.1.4/30 is directly connected, FastEthernet2/0

B 10.10.30.1/32 [200/2] via 172.0.0.2, 01:19:02

Este comando mostra todas as redes associadas a VRF “Cliente\_A”.

**PE1#show ip bgp vpnv4 vrf Cliente\_A**

Network Next Hop Metric LocPrf Weight Path

Route Distinguisher: 2000:1 (default for vrf Cliente\_A)

\*> 10.0.1.0/30 0.0.0.0 0 32768 ?

\*>i10.0.3.0/30 172.0.0.3 0 100 0 ?

\*>i10.0.3.4/30 172.0.0.2 0 100 0 ?

\*> 10.10.10.1/32 10.0.1.1 2 32768 ?

\*>i10.10.40.1/32 172.0.0.2 2 100 0 ?

\*>i10.10.50.1/32 172.0.0.3 2 100 0 ?

Este comando mostra todas as redes associadas a VRF “Cliente\_B”.

**PE1#show ip bgp vpnv4 vrf Cliente\_B**

Network Next Hop Metric LocPrf Weight Path

Route Distinguisher: 2000:2 (default for vrf Cliente\_B)

\*> 10.0.1.4/30 0.0.0.0 0 32768 ?

\*>i10.0.3.0/30 172.0.0.2 0 100 0 ?

\*>i10.10.30.1/32 172.0.0.2 2 100 0 ?

Envia um ICMP para o Cliente 10.10.10.1 que está na VRF “Cliente\_A”

**PE1#ping vrf Cliente\_A 10.10.10.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 20/26/40 ms

**PE2**

Este comando exibe todas as interfaces do roteador que estão com o MPLS ativo. Neste caso, apenas F0/0 está ativo.

**PE2#show mpls interfaces**

Interface IP Tunnel BGP Static Operational

FastEthernet0/0 Yes (ldp) No No No Yes

Este comando lista a interfaces que estão associadas a alguma VRF.

**PE2#show ip vrf interfaces**

Interface IP-Address VRF Protocol

Fa1/0 10.0.3.2 Cliente\_A up

Este comando mostra as rotas para atingir todos os clientes que estão na VPN “Cliente\_A”.

**PE2#show ip route vrf Cliente\_A**

Routing Table: Cliente\_A

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet1/0

B 10.10.10.1/32 [200/2] via 172.0.0.1, 01:19:15

B 10.0.1.0/30 [200/0] via 172.0.0.1, 01:21:30

B 10.0.3.4/30 [200/0] via 172.0.0.2, 01:20:15

B 10.10.40.1/32 [200/2] via 172.0.0.2, 01:20:30

O 10.10.50.1/32 [110/2] via 10.0.3.1, 01:20:50, FastEthernet1/0

Este comando mostra as rotas para atingir todos os clientes que estão na VPN “Cliente\_B”.

**PE2#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.2, 01:20:15

B 10.0.1.4/30 [200/0] via 172.0.0.1, 01:21:30

B 10.10.30.1/32 [200/2] via 172.0.0.2, 01:19:00

Este comando mostra todas as redes associadas a VRF “Cliente\_A”.

**PE2#show ip bgp vpnv4 vrf Cliente\_A**

Network Next Hop Metric LocPrf Weight Path

Route Distinguisher: 2000:1 (default for vrf Cliente\_A)

\*>i10.0.1.0/30 172.0.0.1 0 100 0 ?

\*> 10.0.3.0/30 0.0.0.0 0 32768 ?

\*>i10.0.3.4/30 172.0.0.2 0 100 0 ?

\*>i10.10.10.1/32 172.0.0.1 2 100 0 ?

\*>i10.10.40.1/32 172.0.0.2 2 100 0 ?

\*> 10.10.50.1/32 10.0.3.1 2 32768 ?

Este comando mostra todas as redes associadas a VRF “Cliente\_B”.

**PE2#show ip bgp vpnv4 vrf Cliente\_B**

Network Next Hop Metric LocPrf Weight Path

Route Distinguisher: 2000:2 (default for vrf Cliente\_B)

\*>i10.0.1.4/30 172.0.0.1 0 100 0 ?

\*>i10.0.3.0/30 172.0.0.2 0 100 0 ?

\*>i10.10.30.1/32 172.0.0.2 2 100 0 ?

Envia um ICMP para o Cliente 10.10.10.1 que está na VRF “Cliente\_A”

**PE2#ping vrf Cliente\_A 10.10.10.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 56/61/68 ms

**PE3**

Este comando exibe todas as interfaces do roteador que estão com o MPLS ativo. Neste caso, apenas F0/0 está ativo.

**PE3#show mpls interfaces**

Interface IP Tunnel BGP Static Operational

FastEthernet0/0 Yes (ldp) No No No Yes

Este comando lista a interfaces que estão associadas a alguma VRF.

**PE3#show ip vrf interfaces**

Interface IP-Address VRF Protocol

Fa2/0 10.0.3.6 Cliente\_A up

Fa1/0 10.0.3.2 Cliente\_B up

Este comando mostra as rotas para atingir todos os clientes que estão na VPN “Cliente\_A”.

**PE3#show ip route vrf Cliente\_A**

Routing Table: Cliente\_A

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.3, 01:20:30

B 10.10.10.1/32 [200/2] via 172.0.0.1, 01:19:30

B 10.0.1.0/30 [200/0] via 172.0.0.1, 01:21:30

C 10.0.3.4/30 is directly connected, FastEthernet2/0

O 10.10.40.1/32 [110/2] via 10.0.3.5, 01:20:38, FastEthernet2/0

B 10.10.50.1/32 [200/2] via 172.0.0.3, 01:20:45

Este comando mostra as rotas para atingir todos os clientes que estão na VPN “Cliente\_B”.

**PE3#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet1/0

B 10.0.1.4/30 [200/0] via 172.0.0.1, 01:21:30

O 10.10.30.1/32 [110/2] via 10.0.3.1, 01:19:13, FastEthernet1/0

Este comando mostra todas as redes associadas a VRF “Cliente\_A”.

**PE3#show ip bgp vpnv4 vrf Cliente\_A**

Network Next Hop Metric LocPrf Weight Path

Route Distinguisher: 2000:1 (default for vrf Cliente\_A)

\*>i10.0.1.0/30 172.0.0.1 0 100 0 ?

\*>i10.0.3.0/30 172.0.0.3 0 100 0 ?

\*> 10.0.3.4/30 0.0.0.0 0 32768 ?

\*>i10.10.10.1/32 172.0.0.1 2 100 0 ?

\*> 10.10.40.1/32 10.0.3.5 2 32768 ?

\*>i10.10.50.1/32 172.0.0.3 2 100 0 ?

Este comando mostra todas as redes associadas a VRF “Cliente\_B”.

**PE3#show ip bgp vpnv4 vrf Cliente\_B**

Network Next Hop Metric LocPrf Weight Path

Route Distinguisher: 2000:2 (default for vrf Cliente\_B)

\*>i10.0.1.4/30 172.0.0.1 0 100 0 ?

\*> 10.0.3.0/30 0.0.0.0 0 32768 ?

\*> 10.10.30.1/32 10.0.3.1 2 32768 ?

Envia um ICMP para o Cliente 10.10.10.1 que está na VRF “Cliente\_A”

**PE3#ping vrf Cliente\_A 10.10.10.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 48/56/72 ms

**P1**

Este comando exibe todas as interfaces do roteador que estão com o MPLS ativo.

**P1#show mpls interfaces**

Interface IP Tunnel BGP Static Operational

FastEthernet1/0 Yes (ldp) No No No Yes

FastEthernet2/0 Yes (ldp) No No No Yes

FastEthernet3/0 Yes (ldp) No No No Yes

1. **Mostrar e explicar as tabelas de rotas dos roteadores dos clientes;**

O roteador CE1 (OSPF 2) aprende as rotas dos roteadores CE2 e CE3 através do OSPF 2 que é distribuído através do BGP.

**CE1#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.1.2, 00:21:58, FastEthernet0/0

C 10.10.10.1/32 is directly connected, Loopback0 **(CE1)**

C 10.0.1.0/30 is directly connected, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.1.2, 00:21:58, FastEthernet0/0

O IA 10.10.40.1/32 [110/3] via 10.0.1.2, 00:21:58, FastEthernet0/0 **(CE2)**

O IA 10.10.50.1/32 [110/3] via 10.0.1.2, 00:21:58, FastEthernet0/0 **(CE3)**

O roteador CE-1 (OSPF 3) aprende as rotas do roteador CE-2 através do OSPF 3 que é distribuído através do BGP.

**CE-1#show ip route**

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.1.6, 00:02:58, FastEthernet0/0

C 10.0.1.4/30 is directly connected, FastEthernet0/0

C 10.10.20.1/32 is directly connected, Loopback0 **(CE-1)**

O IA 10.10.30.1/32 [110/3] via 10.0.1.6, 00:02:44, FastEthernet0/0 **(CE-2)**

O roteador CE-2 (OSPF 3) aprende as rotas do roteador CE-1 através do OSPF 3 que é distribuído através do BGP.

**CE-2#show ip route**

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.0.1.4/30 [110/2] via 10.0.3.2, 00:02:51, FastEthernet0/0

O IA 10.10.20.1/32 [110/3] via 10.0.3.2, 00:02:51, FastEthernet0/0 **(CE-1)**

C 10.10.30.1/32 is directly connected, Loopback0 **(CE-2)**

O roteador CE2 (OSPF 2) aprende as rotas dos roteadores CE1 e CE3 através do OSPF 2 que é distribuído através do BGP.

**CE2#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.3.6, 00:04:10, FastEthernet0/0

O IA 10.10.10.1/32 [110/3] via 10.0.3.6, 00:03:10, FastEthernet0/0 **(CE1)**

O IA 10.0.1.0/30 [110/2] via 10.0.3.6, 00:04:23, FastEthernet0/0

C 10.0.3.4/30 is directly connected, FastEthernet0/0

C 10.10.40.1/32 is directly connected, Loopback0 **(CE2)**

O IA 10.10.50.1/32 [110/3] via 10.0.3.6, 00:04:23, FastEthernet0/0 **(CE3)**

O roteador CE3 (OSPF 2) aprende as rotas dos roteadores CE1 e CE2 através do OSPF 2 que é distribuído através do BGP.

**CE3#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.10.10.1/32 [110/3] via 10.0.3.2, 00:03:03, FastEthernet0/0 **(CE1)**

O IA 10.0.1.0/30 [110/2] via 10.0.3.2, 00:04:43, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.3.2, 00:04:03, FastEthernet0/0

O IA 10.10.40.1/32 [110/3] via 10.0.3.2, 00:04:18, FastEthernet0/0 **(CE2)**

C 10.10.50.1/32 is directly connected, Loopback0 **(CE3)**

1. **Depois de configurada e testada a rede, pare o algoritmo de roteamento no CE-1 e mostre o que muda na tabela de rotas no PE1, CE1 e CE3;**
2. Antes de parar o algoritmo de roteamento, o estado das rotas dos roteadores é:

**PE1#show mpls forwarding-table**

Local Outgoing Prefix Bytes Label Outgoing Next Hop

Label Label or VC or Tunnel Id Switched interface

16 Pop Label 10.1.0.4/30 0 Fa0/0 10.1.0.2

17 Pop Label 10.1.0.8/30 0 Fa0/0 10.1.0.2

18 No Label 10.0.1.0/30[V] 0 aggregate/Cliente\_A

**19 No Label 10.0.1.4/30[V] 0 aggregate/Cliente\_B (CE-1)**

20 17 172.0.0.2/32 0 Fa0/0 10.1.0.2

21 18 172.0.0.3/32 0 Fa0/0 10.1.0.2

22 Pop Label 172.100.0.1/32 0 Fa0/0 10.1.0.2

23 No Label 10.10.10.1/32[V] 0 Fa1/0 10.0.1.1

**24 No Label 10.10.20.1/32[V] 0 Fa2/0 10.0.1.5 (CE-1)**

**PE1#show ip route vrf Cliente\_B (CE-1 pertence a vrf Cliente\_B)**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.2, 00:48:41

C 10.0.1.4/30 is directly connected, FastEthernet2/0

**O 10.10.20.1/32 [110/2] via 10.0.1.5, 00:47:44, FastEthernet2/0 (CE-1)**

B 10.10.30.1/32 [200/2] via 172.0.0.2, 00:47:26

**CE1#show ip route (CE1 não “vê” CE-1 pois está em VRF diferente)**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.1.2, 00:43:27, FastEthernet0/0

C 10.10.10.1/32 is directly connected, Loopback0

C 10.0.1.0/30 is directly connected, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.1.2, 00:43:27, FastEthernet0/0

O IA 10.10.40.1/32 [110/3] via 10.0.1.2, 00:43:27, FastEthernet0/0

O IA 10.10.50.1/32 [110/3] via 10.0.1.2, 00:43:27, FastEthernet0/0

**CE3#show ip route (CE3 não “vê” CE-1 pois está em VRF diferente)**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.10.10.1/32 [110/3] via 10.0.3.2, 00:43:32, FastEthernet0/0

O IA 10.0.1.0/30 [110/2] via 10.0.3.2, 00:45:12, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.3.2, 00:44:32, FastEthernet0/0

O IA 10.10.40.1/32 [110/3] via 10.0.3.2, 00:44:47, FastEthernet0/0

C 10.10.50.1/32 is directly connected, Loopback0

**CE-2#show ip route (CE-2 está na mesma VRF que CE-1)**

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.0.1.4/30 [110/2] via 10.0.3.2, 00:43:47, FastEthernet0/0

**O IA 10.10.20.1/32 [110/3] via 10.0.3.2, 00:43:47, FastEthernet0/0 (CE-1)**

C 10.10.30.1/32 is directly connected, Loopback0

**CE-1#show running-config**

Building configuration...

**router ospf 3**

**log-adjacency-changes**

**network 0.0.0.0 255.255.255.255 area 0**

1. Após parar o algoritmo de roteamento (**no router ospf 3**)

**PE1#show mpls forwarding-table**

Local Outgoing Prefix Bytes Label Outgoing Next Hop

Label Label or VC or Tunnel Id Switched interface

16 Pop Label 10.1.0.4/30 0 Fa0/0 10.1.0.2

17 Pop Label 10.1.0.8/30 0 Fa0/0 10.1.0.2

18 No Label 10.0.1.0/30[V] 0 aggregate/Cliente\_A

19 No Label 10.0.1.4/30[V] 0 aggregate/Cliente\_B

20 17 172.0.0.2/32 0 Fa0/0 10.1.0.2

21 18 172.0.0.3/32 0 Fa0/0 10.1.0.2

22 Pop Label 172.100.0.1/32 0 Fa0/0 10.1.0.2

23 No Label 10.10.10.1/32[V] 0 Fa1/0 10.0.1.1

**PE1#show ip route vrf Cliente\_B**

Routing Table: Cliente\_B

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

B 10.0.3.0/30 [200/0] via 172.0.0.2, 00:56:31

C 10.0.1.4/30 is directly connected, FastEthernet2/0

B 10.10.30.1/32 [200/2] via 172.0.0.2, 00:55:16

**CE1#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O IA 10.0.3.0/30 [110/2] via 10.0.1.2, 00:43:27, FastEthernet0/0

C 10.10.10.1/32 is directly connected, Loopback0

C 10.0.1.0/30 is directly connected, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.1.2, 00:43:27, FastEthernet0/0

O IA 10.10.40.1/32 [110/3] via 10.0.1.2, 00:43:27, FastEthernet0/0

O IA 10.10.50.1/32 [110/3] via 10.0.1.2, 00:43:27, FastEthernet0/0

**CE3#show ip route**

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.10.10.1/32 [110/3] via 10.0.3.2, 01:01:29, FastEthernet0/0

O IA 10.0.1.0/30 [110/2] via 10.0.3.2, 01:03:09, FastEthernet0/0

O IA 10.0.3.4/30 [110/2] via 10.0.3.2, 01:02:29, FastEthernet0/0

O IA 10.10.40.1/32 [110/3] via 10.0.3.2, 01:02:44, FastEthernet0/0

C 10.10.50.1/32 is directly connected, Loopback0

**CE-2#show ip route**

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.0.3.0/30 is directly connected, FastEthernet0/0

O IA 10.0.1.4/30 [110/2] via 10.0.3.2, 00:56:41, FastEthernet0/0

C 10.10.30.1/32 is directly connected, Loopback0