实验：MPLS BGP VPN 跨域

HCIE 综合实验 - MPLS BGP VPN 跨域

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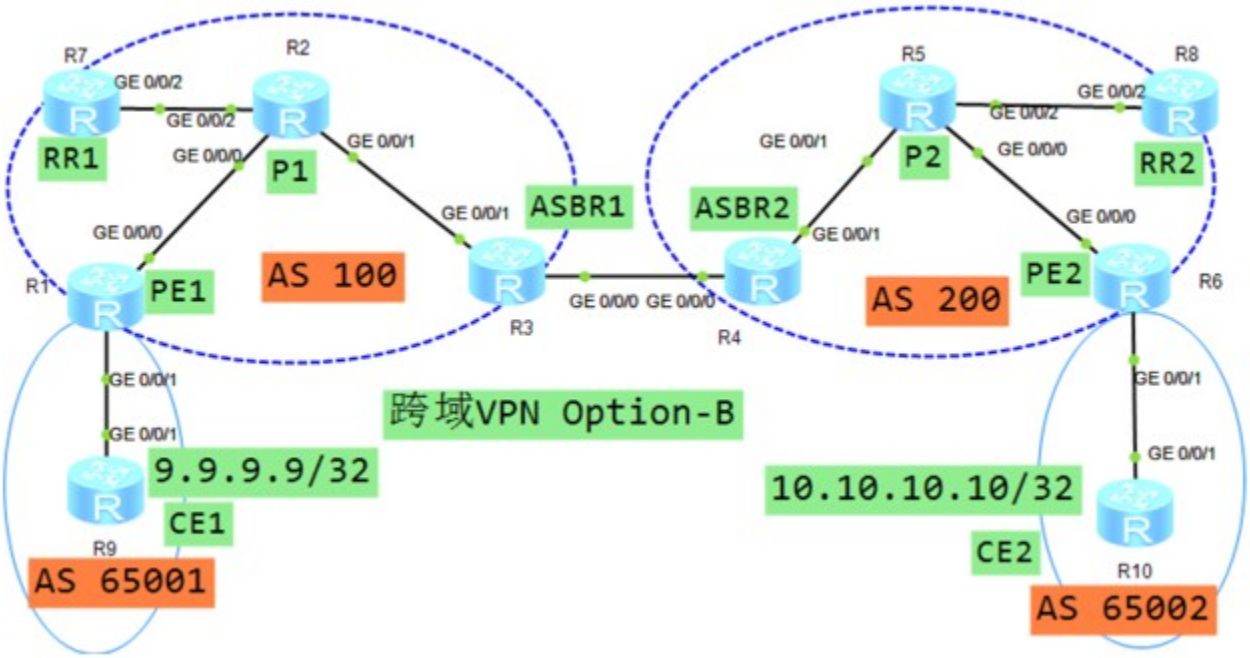
跨域 option B 实验

两个 ASBR 通过 MP-EBGP 交换它们从各自 AS 的 PE 设备接收的标签 VPN-IPv4 路由。
跨域 VPN-OptionB 方案中，ASBR 接收本域内和域外传过来的所有跨域 VPN-IPv4 路由，再把 VPN-IPv4 路由发布出去。但 MPLS VPN 的基本实现中，PE 上只保存与本地 VPN 实例的 VPN Target 相匹配的 VPN 路由。因此，可以在 ASBR 上配置不做 RT 过滤来传递路由，因此无需在 ASBR 创建 VPN 实例，无需绑定任何接口。可以在网络中叠加部署 RR 设备，专门负责客户侧 VPN 路由的传递。
ASBR 间有一层标签需要运行 mpls，不需要运行 mpls ldp



配置思路

1.配置各接口 IP， 配置 OSPF。 2.配置 MPLS/MPLS LDP。 3.配置 IBGP/MP-BGP ，VPN 路由反射 4.配置 VPN 实例。 5.VPN 实例配置 PE 与 CE 的 EBGP。6.ASBR 相连接口使能 MPLS。 7.ASBR 间配置 MP-EBGP。

1.配置各接口 IP OSPF 协议

R1:

```
undo ter mo
sy
sys R1
user-interface console 0
idle-timeout 0 0
int loo0
ip add 1.1.1.1 32
int g0/0/0
```

```
ip add 192.168.12.1 24
int g0/0/1
ip add 192.168.19.1 24
ospf router-id 1.1.1.1
area 0
net 1.1.1.1 0.0.0.0
net 192.168.12.1 0.0.0.0
q
```

R2:

```
undo ter mo
sy
sys R2
user-interface console 0
idle-timeout 0 0
int loo0
ip add 2.2.2.2 32
int g0/0/0
ip add 192.168.12.2 24
int g0/0/1
ip add 192.168.23.2 24
int g0/0/2
ip add 192.168.27.2 24
ospf router-id 2.2.2.2
area 0
net 2.2.2.2 0.0.0.0
net 192.168.12.2 0.0.0.0
net 192.168.23.2 0.0.0.0
net 192.168.27.2 0.0.0.0
q
```

R3:

```
undo ter mo
sy
```

```
sys R3
user-interface console 0
idle-timeout 0 0
int loo0
ip add 3.3.3.3 32
int g0/0/0
ip add 192.168.34.3 24
int g0/0/1
ip add 192.168.23.3 24
ospf router-id 3.3.3.3
area 0
net 3.3.3.3 0.0.0.0
net 192.168.23.3 0.0.0.0
q
```

R4:

```
undo ter mo
sy
sys R4
user-interface console 0
idle-timeout 0 0
int loo0
ip add 4.4.4.4 32
int g0/0/0
ip add 192.168.34.4 24
int g0/0/1
ip add 192.168.45.4 24
ospf router-id 4.4.4.4
area 0
net 4.4.4.4 0.0.0.0
net 192.168.45.4 0.0.0.0
q
```

R5:

```
undo ter mo
sy
sys R5
user-interface console 0
idle-timeout 0 0
int loo0
ip add 5.5.5.5 32
int g0/0/0
ip add 192.168.56.5 24
int g0/0/1
ip add 192.168.45.5 24
int g0/0/2
ip add 192.168.58.5 24
ospf router-id 5.5.5.5
area 0
net 5.5.5.5 0.0.0.0
net 192.168.45.5 0.0.0.0
net 192.168.56.5 0.0.0.0
net 192.168.58.5 0.0.0.0
q
```

R6:

```
undo ter mo
sy
sys R6
user-interface console 0
idle-timeout 0 0
int loo0
ip add 6.6.6.6 32
int g0/0/0
ip add 192.168.56.6 24
int g0/0/1
ip add 192.168.61.6 24
```

```
ospf router-id 6.6.6.6
area 0
net 6.6.6.6 0.0.0.0
net 192.168.56.6 0.0.0.0
q
```

R7:

```
undo ter mo
sy
sys R7
user-interface console 0
idle-timeout 0 0
int loo0
ip add 7.7.7.7 32
int g0/0/2
ip add 192.168.27.7 24
ospf router-id 7.7.7.7
area 0
net 7.7.7.7 0.0.0.0
net 192.168.27.7 0.0.0.0
q
```

R8:

```
undo ter mo
sy
sys R8
user-interface console 0
idle-timeout 0 0
int loo0
ip add 8.8.8.8 32
```

```
int g0/0/2
ip add 192.168.58.8 24
ospf router-id 8.8.8.8
area 0
net 8.8.8.8 0.0.0.0
net 192.168.58.8 0.0.0.0
q
```

R9:

```
undo ter mo
sy
sys R9
user-interface console 0
idle-timeout 0 0
int loo0
ip add 9.9.9.9 32
int g0/0/1
ip add 192.168.19.9 24
q
```

R10:

```
undo ter mo
sy
sys R10
user-interface console 0
idle-timeout 0 0
int loo0
ip add 10.10.10.10 32
int g0/0/1
ip add 192.168.61.1 24
```

q

==========

2.配置 MPLS/MPLS LDP

R1：

```
mpls lsr-id 1.1.1.1
mpls
mpls ldp
int g0/0/0
mpls
mpls ldp
q
```

R2：

```
mpls lsr-id 2.2.2.2
mpls
mpls ldp
int g0/0/0
mpls
mpls ldp
int g0/0/1
mpls
mpls ldp
q
```

R3：

```
mpls lsr-id 3.3.3.3
mpls
mpls ldp
```

```
int g0/0/1
mpls
mpls ldp
q
```

R4 :

```
mpls lsr-id 4.4.4.4
mpls
mpls ldp
int g0/0/1
mpls
mpls ldp
q
```

R5 :

```
mpls lsr-id 5.5.5.5
mpls
mpls ldp
int g0/0/0
mpls
mpls ldp
int g0/0/1
mpls
mpls ldp
q
```

R6 :

```
mpls lsr-id 6.6.6.6
mpls
mpls ldp
```

int g0/0/0
mpls
mpls ldp
q

==========

4.配置 IBGP/MP-BGP ，配置 VPN 路由反射

配置 PE ASBR 与 RR 之间的 IBGP 邻居关系。

undo policy vpn-target

命令用来取消对接收的 VPN 路由或者标签块进行 VPN-Target 过滤。缺省情况下，对接收到的 VPN 路由或者标签块进行 VPN-Target 过滤。

PE 或 RR 上只保存与本地 VPN 实例的 VPN Target 相匹配的 VPN 路由，而本实验中要学习对端 PE 或 RR 发送的 VPN 路由，因此，可以配置不做 RT 过滤来传递路由

R1:

```
bgp 100
router-id 1.1.1.1
peer 7.7.7.7 as-n 100
peer 7.7.7.7 con loo0
ipv4-family vpnv4
peer 7.7.7.7 enable
q
```

R3:

```
bgp 100
router-id 3.3.3.3
peer 7.7.7.7 as-n 100
peer 7.7.7.7 con loo0
```

ipv4-family vpnv4
peer 7.7.7.7 enable
q

R7:
bgp 100
router-id 7.7.7.7
peer 1.1.1.1 as-n 100
peer 1.1.1.1 con loo0
peer 3.3.3.3 as-n 100
peer 3.3.3.3 con loo0
ipv4-family vpnv4
peer 1.1.1.1 enable
peer 3.3.3.3 enable
peer 1.1.1.1 reflect-client
peer 3.3.3.3 reflect-client
undo policy vpn-target
q

=====

R4:
bgp 200
router-id 4.4.4.4
peer 8.8.8.8 as-n 200
peer 8.8.8.8 con loo0
ipv4-family vpnv4
peer 8.8.8.8 enable
q

R6:
bgp 200
router-id 6.6.6.6
peer 8.8.8.8 as-n 200
peer 8.8.8.8 con loo0
ipv4-family vpnv4
peer 8.8.8.8 enable
q

R8:
bgp 200
router-id 8.8.8.8
peer 4.4.4.4 as-n 200
peer 4.4.4.4 con loo0
peer 6.6.6.6 as-n 200
peer 6.6.6.6 con loo0
ipv4-family vpnv4
peer 4.4.4.4 enable
peer 6.6.6.6 enable
peer 4.4.4.4 reflect-client
peer 6.6.6.6 reflect-client
undo policy vpn-target
q

5.配置 VPN 实例

R1:
ip vpn-instance huawei
route-distinguisher 100:1
vpn-target 100:1 both

int g0/0/1
ip binding vpn-instance huawei
ip add 192.168.19.1 24
q

R6:
ip vpn-instance huawei
route-distinguisher 100:1
vpn-target 100:1 both
int g0/0/1
ip binding vpn-instance huawei
ip add 192.168.61.6 24
q
==========
6.VPN 实例配置 PE 与 CE 的 EBGP
R1:
bgp 100
ipv4-family vpn-instance huawei
peer 192.168.19.9 as-n 65001
q

R9:
bgp 65001
router-id 9.9.9.9
peer 192.168.19.1 as-n 100
net 9.9.9.9 32
q

R6:
bgp 200

ipv4-family vpn-instance huawei
peer 192.168.61.1 as-n 65002
q

R10:
bgp 65002
router-id 10.10.10.10
peer 192.168.61.6 as-n 200
net 10.10.10.10 32
q
==========
7.ASBR 相连接口使能 MPLS
R3:
int g0/0/0
mpls
q

R4:
int g0/0/0
mpls
q
==========
8.ASBR 间配置 MP-EBGP
R3:
bgp 100
peer 192.168.34.4 as-n 200
ipv4-family vpnv4
peer 192.168.34.4 enable
undo policy vpn-target
q

R4:
bgp 200
peer 192.168.34.3 as-n 100
ipv4-family vpnv4
peer 192.168.34.3 enable
undo policy vpn-target
q
==========
检查配置结果

全部配置完成后，进行查看和检测
R1: display bgp vpnv4 vpn-instance huawei peer 查看 VPN 实例邻居状态

```
 BGP local router ID : 1.1.1.1
 Local AS number : 100

 VPN-Instance huawei, Router ID 1.1.1.1:
Peer        V          AS    MsgRcvd
MsgSent    OutQ    Up/Down    State Pre
fRcv

192.168.19.9      4        65001          4
4          0 00:01:18 Established        1
```

R7:display bgp vpnv4 all routing-table 查看 RR 上是否接收到正确的 VPN 路由

```
[R7]dis bgp vpnv4 all routing-table
```

```
 BGP Local router ID is 7.7.7.7
 Route Distinguisher: 100:1
Network              NextHop
MED                LocPrf        PrefVal
Path/Ogn
*>i    9.9.9.9/32          1.1.1.1
0             100      0             65001i
*>i    10.10.10.10/32 3.3.3.3
100      0             200 65002i
```

R9 做连通性测试，可以通 ping -a 9.9.9.9 10.10.10.10

```
[R9]ping -a 9.9.9.9 10.10.10.10
    PING 10.10.10.10: 56    data bytes,
press CTRL_C to break
        Reply from 10.10.10.10: bytes=56
Sequence=1 ttl=250 time=170 ms
        Reply from 10.10.10.10: bytes=56
Sequence=2 ttl=250 time=150 ms
        Reply from 10.10.10.10: bytes=56
Sequence=3 ttl=250 time=150 ms
        Reply from 10.10.10.10: bytes=56
Sequence=4 ttl=250 time=180 ms
        Reply from 10.10.10.10: bytes=56
Sequence=5 ttl=250 time=170 ms
```