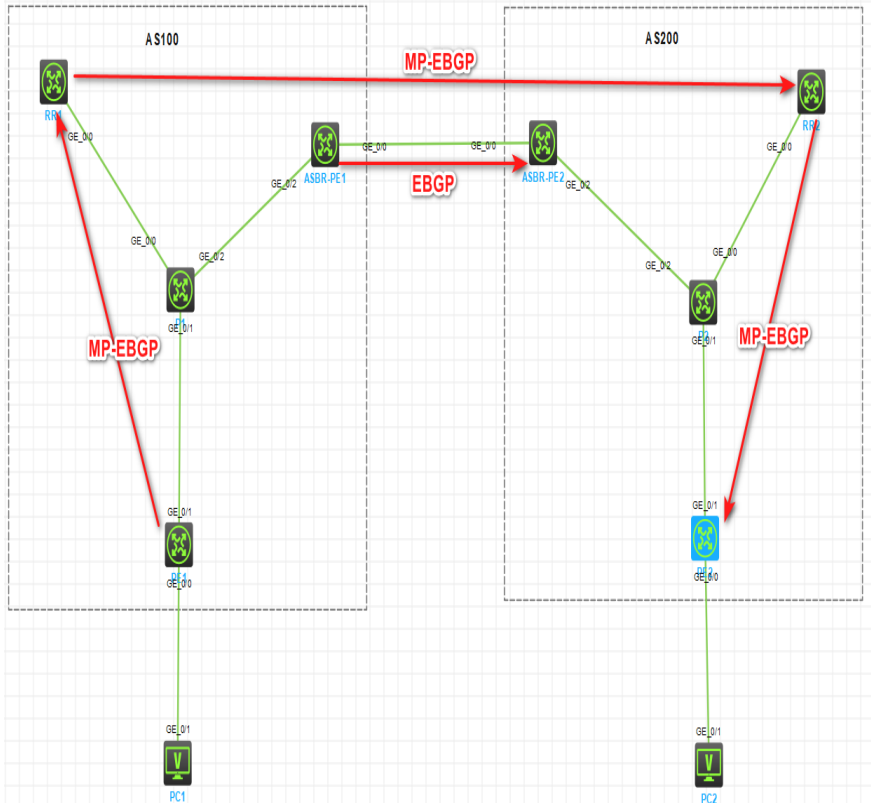


知 Mpls 跨域 option C2实验 (带RR)

BGP L2TP VPN MPLS L2VPN MPLS L3VPN 王英凯 1天前 发表

组网及说明



配置思路,

- 1、起底层IGP与MPLS传输，RR的接口和环回口需要起IGP用于起BGP邻居。
- 2、PE上起VPN实例，控制VPNV4路由收发，AR1/AR10与PE上VPN实例起EBGP邻居，PE与RR间起VPNV4邻居通过RR与对端交互VPNV4路由条目。
- 3、RR与对端RR间起VPNV4的EBGP邻居，向对端RR传输路由时不更改下一跳；RR与PE起VPNV4的IBGP邻居，需要undo掉VPN TAG 属性，且向PE传输路由时不更改下一跳。
- 4、ASBR之间起IPv4的EBGP邻居，且需要使能MPLS BGP标签能力；宣告本地MPLS域内的PE与RR环回口，接口下启用MPLS，MPLS视图下启用为BGP分配标签功能，配置route-policy在BGP下调用，最后在IGP下引入BGP路由。

配置步骤

PE1配置*****

```
#
isis 1
network-entity 10.0000.0000.0000.0001.00
#
mpls lsr-id 1.1.1.1
mpls ldp
#
interface LoopBack0
ip address 1.1.1.1 255.255.255.255
isis enable 1
#
interface GigabitEthernet0/0
ip binding vpn-instance vpn1
ip address 200.1.1.1 255.255.255.0
#
interface GigabitEthernet0/1
ip address 10.1.1.1 255.255.255.0
isis enable 1
mpls enable
mpls ldp enable
```

```
#
bgp 100
peer 3.3.3.3 as-number 100
peer 3.3.3.3 connect-interface LoopBack0
#
address-family vpnv4
peer 3.3.3.3 enable
#
ip vpn-instance vpn1
#
address-family ipv4 unicast
import-route direct
```

P1配置*****

```
#
isis 1
network-entity 10.0000.0000.0000.0002.00
#
mpls lsr-id 2.2.2.2
mpls ldp
#
interface LoopBack0
ip address 2.2.2.2 255.255.255.255
isis enable 1
#
interface GigabitEthernet0/0
ip address 20.1.1.2 255.255.255.0
isis enable 1
#
interface GigabitEthernet0/1
ip address 10.1.1.2 255.255.255.0
isis enable 1
mpls enable
mpls ldp enable
#
interface GigabitEthernet0/2
ip address 30.1.1.2 255.255.255.0
isis enable 1
mpls enable
mpls ldp enable
```

RR1配置*****

```
#
interface LoopBack0
ip address 3.3.3.3 255.255.255.255
isis enable 1
#
interface GigabitEthernet0/0
ip address 20.1.1.1 255.255.255.0
isis enable 1
#
bgp 100
peer 1.1.1.1 as-number 100
peer 1.1.1.1 connect-interface LoopBack0
peer 7.7.7.7 as-number 200
peer 7.7.7.7 connect-interface LoopBack0
peer 7.7.7.7 ebgp-max-hop 10
#
address-family vpnv4
undo policy vpn-target
peer 1.1.1.1 enable
peer 1.1.1.1 next-hop-invariable
peer 1.1.1.1 reflect-client
peer 7.7.7.7 enable
```

peer 7.7.7.7 next-hop-invariable

asbr-pe1: *****

```
#
isis 1
network-entity 10.0000.0000.0000.0004.00
#
address-family ipv4 unicast
import-route bgp
#
mpls lsr-id 4.4.4.4
mpls ldp
#
interface LoopBack0
ip address 4.4.4.4 255.255.255.255
isis enable 1
#
interface GigabitEthernet0/0
ip address 40.1.1.1 255.255.255.0
mpls enable
#
interface GigabitEthernet0/2
ip address 30.1.1.1 255.255.255.0
isis enable 1
mpls enable
mpls ldp enable
#
bgp 100
peer 40.1.1.2 as-number 200
#
address-family ipv4 unicast
network 1.1.1.1 255.255.255.255
network 3.3.3.3 255.255.255.255
peer 40.1.1.2 enable
peer 40.1.1.2 route-policy policy1 export
peer 40.1.1.2 label-route-capability
#
route-policy policy1 permit node 1
apply mpls-label
```

ASBR-PE2: *****

```
isis 2
network-entity 20.0000.0000.0000.0004.00
#
address-family ipv4 unicast
import-route bgp
#
mpls lsr-id 5.5.5.5
#
mpls ldp
#
interface LoopBack0
ip address 5.5.5.5 255.255.255.255
isis enable 2
#
interface GigabitEthernet0/0
port link-mode route
combo enable copper
ip address 40.1.1.2 255.255.255.0
mpls enable
#
interface GigabitEthernet0/2
port link-mode route
combo enable copper
```

```
ip address 50.1.1.1 255.255.255.0
isis enable 2
mpls enable
mpls ldp enable
#
bgp 200
peer 7.7.7.7 as-number 200
peer 7.7.7.7 connect-interface LoopBack0
peer 40.1.1.1 as-number 100
#
address-family ipv4 unicast
import-route isis 2
peer 7.7.7.7 enable
peer 7.7.7.7 route-policy policy2 export
peer 7.7.7.7 label-route-capability
peer 40.1.1.1 enable
peer 40.1.1.1 route-policy policy1 export
peer 40.1.1.1 label-route-capability
#
route-policy policy1 permit node 1
apply mpls-label
```

RR2:

```
#
isis 2
network-entity 20.0000.0000.0002.00
#
interface LoopBack0
ip address 7.7.7.7 255.255.255.255
isis enable 2
#
interface GigabitEthernet0/0
ip address 60.1.1.1 255.255.255.0
isis enable 2
#
bgp 200
peer 3.3.3.3 as-number 100
peer 3.3.3.3 connect-interface LoopBack0
peer 3.3.3.3 ebgp-max-hop 10
peer 8.8.8.8 as-number 200
peer 8.8.8.8 connect-interface LoopBack0
#
address-family vpnv4
undo policy vpn-target
peer 3.3.3.3 enable
peer 3.3.3.3 next-hop-invariable
peer 8.8.8.8 enable
peer 8.8.8.8 next-hop-invariable
peer 8.8.8.8 reflect-client
```

P2:

```
#
isis 2
network-entity 20.0000.0000.0000.0003.00
#
mpls lsr-id 6.6.6.6
mpls ldp
#
interface LoopBack0
ip address 6.6.6.6 255.255.255.255
isis enable 2
#
interface GigabitEthernet0/0
```

```

ip address 60.1.1.2 255.255.255.0
isis enable 2
#
interface GigabitEthernet0/1
ip address 70.1.1.2 255.255.255.0
isis enable 2
mpls enable
mpls ldp enable
#
interface GigabitEthernet0/2
ip address 50.1.1.2 255.255.255.0
isis enable 2
mpls enable
mpls ldp enable

```

PE2:

```

#
isis 2
network-entity 20.0000.0000.0000.0001.00
#
mpls lsr-id 8.8.8.8
vlan 1
#
mpls ldp
#
interface LoopBack0
ip address 8.8.8.8 255.255.255.255
isis enable 2
#
interface GigabitEthernet0/0
ip binding vpn-instance vpn1
ip address 200.2.1.1 255.255.255.0
#
interface GigabitEthernet0/1
ip address 70.1.1.1 255.255.255.0
isis enable 2
mpls enable
mpls ldp enable
#
bgp 200
peer 7.7.7.7 as-number 200
peer 7.7.7.7 connect-interface LoopBack0
#
address-family vpnv4
peer 7.7.7.7 enable
#
ip vpn-instance vpn1
#
address-family ipv4 unicast
import-route direct

```

[pe1]dis ip routing-table vpn-instance vpn1

Destinations : 11 Routes : 11

Destination/Mask	Proto	Pre	Cost	NextHop	Interface
0.0.0.0/32	Direct	0	0	127.0.0.1	InLoop0
127.0.0.0/8	Direct	0	0	127.0.0.1	InLoop0
127.0.0.1/32	Direct	0	0	127.0.0.1	InLoop0
127.255.255.255/32	Direct	0	0	127.0.0.1	InLoop0
200.1.1.0/24	Direct	0	0	200.1.1.1	GE0/0
200.1.1.1/32	Direct	0	0	127.0.0.1	InLoop0
200.1.1.255/32	Direct	0	0	200.1.1.1	GE0/0

```
200.2.1.0/24 BGP 255 0 8.8.8.8 GE0/1
224.0.0.0/4 Direct 0 0 0.0.0.0 NULL0
224.0.0.0/24 Direct 0 0 0.0.0.0 NULL0
255.255.255.255/32 Direct 0 0 127.0.0.1 InLoop0
```

```
[pe1]dis bgp routing-table vpnv4 200.2.1.0 24
```

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

```
Route distinguisher: 100:1(vpn1)
Total number of routes: 1
Paths: 1 available, 1 best
```

```
BGP routing table information of 200.2.1.0/24:
```

```
From : 3.3.3.3 (3.3.3.3)
Rely nexthop : 10.1.1.2
Original nexthop: 8.8.8.8
OutLabel : 24256
Ext-Community : <RT: 200:1>
AS-path : 200
Origin : incomplete
Attribute value : localpref 100, pref-val 0
State : valid, internal, best
IP precedence : N/A
QoS local ID : N/A
Traffic index : N/A
VPN-Peer UserID : N/A
DSCP : N/A
EXP : N/A
Tunnel policy : NULL
Rely tunnel IDs : 6
```

```
<H3C>ping -c 2 200.2.1.2 //pingCE2可以通, 转发正常
Ping 200.2.1.2 (200.2.1.2): 56 data bytes, press CTRL_C to break
56 bytes from 200.2.1.2: icmp_seq=0 ttl=253 time=5.000 ms
56 bytes from 200.2.1.2: icmp_seq=1 ttl=253 time=6.000 ms
```

105	266.332222	40:fb:5b:6f:01:04	Broadcast	0xb003	4	Protocol	: LDP
106	266.820834	40:fb:5f:3f:02:06	Broadcast	0xb003	5	LSR Type	: Transit
107	266.967077	10.1.1.2	224.0.0.2	LDP	6	Service	: -
108	267.539039	1.1.1.1	3.3.3.3	BGP	7	In-Label	: 24125
109	267.540825	3.3.3.3	1.1.1.1	TCP	8	Path ID	: 0x40000000.1
110	267.633678	40:fb:5f:3f:02:06	ISIS-all-level-2-IS's	ISIS	9	State	: Active
111	268.311924	40:fb:5f:3f:02:06	ISIS-all-level-1-IS's	ISIS	10	Out-Label	: 24125
112	268.312238	40:fb:5f:3f:02:06	ISIS-all-level-2-IS's	ISIS	11	NextHop	: 10.1.1.2
113	268.371345	40:fb:5b:6f:01:04	Broadcast	0xb003	12	Out-Interface	: GE0/1
114	268.888053	40:fb:5f:3f:02:06	Broadcast	0xb003	13		
115	270.404426	40:fb:5b:6f:01:04	Broadcast	0xb003	14	Destination	: 8.8.8.8
116	270.464257	10.1.1.1	224.0.0.2	LDP	15	FEC	: 8.8.8.8/32
117	270.960070	40:fb:5f:3f:02:06	Broadcast	0xb003	16	Protocol	: LDP
118	270.996985	200.1.1.2	200.2.1.2	ICMP	17	LSR Type	: Ingress
119	271.001274	200.2.1.2	200.1.1.2	ICMP	18	Service	: -
120	271.208621	200.1.1.2	200.2.1.2	ICMP	19	NHLFE ID	: 1
121	271.214595	200.2.1.2	200.1.1.2	ICMP	20	State	: Active
122	271.731139	40:fb:5f:3f:02:06	ISIS-all-level-1-IS's	ISIS	21	Out-Label	: 24125
123	271.738586	40:fb:5f:3f:02:06	ISIS-all-level-1-IS's	ISIS	22	NextHop	: 10.1.1.2
124	271.738846	40:fb:5f:3f:02:06	ISIS-all-level-2-IS's	ISIS	23	Out-Interface	: GE0/1
125	272.126700	10.1.1.2	224.0.0.2	LDP	24		
126	272.473394	40:fb:5b:6f:01:04	Broadcast	0xb003	25	[p]dis bgp routing-table vpnv4 200.2.1.0 24	
127	272.632062	3.3.3.3	1.1.1.1	BGP	26	


```

Frame 118: 106 bytes on wire (848 bits), 106 bytes captured (848 bits)
Ethernet II, Src: 40:fb:5b:6f:01:06 (40:fb:5b:6f:01:06), Dst: 40:fb:5f:3f:02:06 (40:fb:5f:3f:02:06)
MultiProtocol Label Switching Header, Label: 24125, Exp: 0, S: 0, TTL: 255
MultiProtocol Label Switching Header, Label: 24256, Exp: 0, S: 1, TTL: 255
Internet Protocol Version 4, Src: 200.1.1.2, Dst: 200.2.1.2
Internet Control Message Protocol
  
```

在P1下行抓包查看标签，如下C2方式理论有两层标签，如下，可以看到第一层和第二层封装的标签，第一层是私网路由标签24256，第二层是ldp分配的标签24125

配置关键点

无