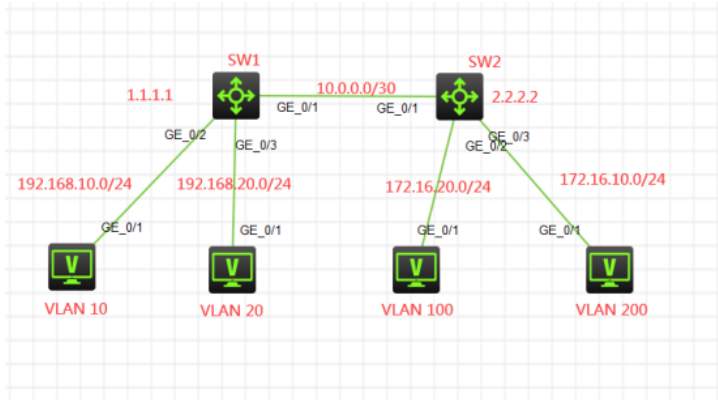## 组网及说明

网络拓扑图如下：

业务地址、互联地址、Loopback地址如拓扑图所示。其中VLAN 10、VLAN 100属于vpn-rt中，VLAN 2
0、VLAN 200属于vpn-nrt实例中，另外SW1与SW2之间的互联采用trunk，互联的VLAN使用VLAN 400
（绑定到vpn-rt）和VLAN 500（绑定到vpn-nrt），全网采用多VPN实例OSPF互联互通，不通VPN实
例的业务地址不能互通。
vpn-rt规划如下：
RD:100:1
RT:100:1
vpn-nrt规划如下：
RD:200:1
RT:200:1

配置步骤

1、分别在SW1和SW2创建VPN实例
2、根据组网说明将各业务地址、互联地址、loopback绑定到vpn实例
3、创建多实例OSPF，并发布业务地址实现互通
4、SW1与SW2之间的互联采用trunk，仅允许互联的VLAN互通。

配置关键点

SW1：

[H3C]sysname SW1
#创建vpn-rt实例，并配置RD值和RT值
[SW1]ip vpn-instance vpn-rt
[SW1-vpn-instance-vpn-rt]route-distinguisher 100:1
[SW1-vpn-instance-vpn-rt]vpn-target 100:1
[SW1-vpn-instance-vpn-rt]vpn-target 100:1
[SW1-vpn-instance-vpn-rt]quit
#创建vpn-nrt实例，并配置RD值和RT值
[SW1]ip vpn-instance vpn-nrt
[SW1-vpn-instance-vpn-nrt]route-distinguisher 200:1
[SW1-vpn-instance-vpn-nrt]vpn-target 200:1
[SW1-vpn-instance-vpn-nrt]quit
[SW1]int LoopBack 0
[SW1-LoopBack0]ip binding vpn-instance vpn-rt //将Loopback0绑定到vpn-rt
Some configurations on the interface are removed.
[SW1-LoopBack0]ip address 1.1.1.1 32
[SW1-LoopBack0]quit
[SW1]int LoopBack 1
[SW1-LoopBack1]ip binding vpn-instance vpn-nrt //将Loopback1绑定到vpn-nrt
Some configurations on the interface are removed.
[SW1-LoopBack1]ip address 1.1.1.1 32
[SW1-LoopBack1]quit

```
[SW1]vlan 10
[SW1-vlan10]quit
[SW1]vlan 20
[SW1-vlan20]quit
[SW1]vlan 400
[SW1-vlan400]quit
[SW1]vlan 500
[SW1-vlan500]quit

[SW1]int vlan 10
[SW1-Vlan-interface10]ip binding vpn-instance vpn-rt  //将VLAN 10绑定到vpn-rt
Some configurations on the interface are removed.
[SW1-Vlan-interface10]ip address 192.168.10.1 24
[SW1-Vlan-interface10]quit
[SW1]int vlan 20
[SW1-Vlan-interface20]ip binding vpn-instance vpn-nrt //将VLAN 20绑定到vpn-nrt
Some configurations on the interface are removed.
[SW1-Vlan-interface20]ip address 192.168.20.1 24
[SW1-Vlan-interface20]quit
[SW1]int vlan 400
[SW1-Vlan-interface400]ip binding vpn-instance vpn-rt //将VLAN400绑定到vpn-rt
Some configurations on the interface are removed.
[SW1-Vlan-interface400]description
[SW1-Vlan-interface400]ip address 10.0.0.1 30
[SW1-Vlan-interface400]quit
[SW1]int vlan 500
[SW1-Vlan-interface500]ip binding vpn-instance vpn-nrt //将VLAN 500绑定到vpn-nrt
Some configurations on the interface are removed.
[SW1-Vlan-interface500]description
[SW1-Vlan-interface500]ip address 10.0.0.1 30
[SW1-Vlan-interface500]quit
[SW1]

[SW1]int gi 1/0/2
[SW1-GigabitEthernet1/0/2]port link-type access
[SW1-GigabitEthernet1/0/2]port access vlan 10
[SW1-GigabitEthernet1/0/2]quit
[SW1]int gi 1/0/3
[SW1-GigabitEthernet1/0/3]port link-type access
[SW1-GigabitEthernet1/0/3]port access vlan 20
[SW1-GigabitEthernet1/0/3]quit
[SW1]

[SW1]int gi 1/0/1
[SW1-GigabitEthernet1/0/1]description
[SW1-GigabitEthernet1/0/1]port link-type trunk
[SW1-GigabitEthernet1/0/1]undo port trunk permit vlan 1
[SW1-GigabitEthernet1/0/1]port trunk permit vlan 400 500
[SW1-GigabitEthernet1/0/1]quit

[SW1]ospf 10 vpn-instance vpn-rt router-id 1.1.1.1  //将OSPF 10绑定到vpn-rt
[SW1-ospf-10]area 0.0.0.0
[SW1-ospf-10-area-0.0.0.0]network 10.0.0.1 0.0.0.0
[SW1-ospf-10-area-0.0.0.0]network 1.1.1.1 0.0.0.0
[SW1-ospf-10-area-0.0.0.0]network 192.168.10.0 0.0.0.255
[SW1-ospf-10-area-0.0.0.0]quit
[SW1-ospf-10]quit

[SW1]ospf 20 vpn-instance vpn-nrt router-id 1.1.1.1 //将OSPF 20绑定到vpn-nrt
[SW1-ospf-20]area 0.0.0.0
[SW1-ospf-20-area-0.0.0.0]network 10.0.0.1 0.0.0.0
[SW1-ospf-20-area-0.0.0.0]network 1.1.1.1 0.0.0.0
[SW1-ospf-20-area-0.0.0.0]network 192.168.20.0 0.0.0.255
[SW1-ospf-20-area-0.0.0.0]quit
```

```
[SW1-ospf-20]quit

SW2:

[H3C]sysname SW2
[SW2]ip vpn-instance vpn-rt
[SW2-vpn-instance-vpn-rt]route-distinguisher 100:1
[SW2-vpn-instance-vpn-rt]vpn-target 100:1
[SW2-vpn-instance-vpn-rt]quit
[SW2]ip vpn-instance vpn-nrt
[SW2-vpn-instance-vpn-nrt]route-distinguisher 200:1
[SW2-vpn-instance-vpn-nrt]vpn-target 200:1
[SW2-vpn-instance-vpn-nrt]quit
[SW2]int LoopBack 0
[SW2-LoopBack0]ip binding vpn-instance vpn-rt
Some configurations on the interface are removed.
[SW2-LoopBack0]ip address 2.2.2.2 32
[SW2-LoopBack0]quit
[SW2]int LoopBack 1
[SW2-LoopBack1]ip binding vpn-instance vpn-nrt
Some configurations on the interface are removed.
[SW2-LoopBack1]ip address 2.2.2.2 32
[SW2-LoopBack1]quit
[SW2]vlan 100
[SW2-vlan100]quit
[SW2]vlan 200
[SW2-vlan200]quit
[SW2]vlan 400
[SW2-vlan400]quit
[SW2]vlan 500
[SW2-vlan500]quit
[SW2]int vlan 100
[SW2-Vlan-interface100]ip binding vpn-instance vpn-rt
Some configurations on the interface are removed.
[SW2-Vlan-interface100]ip address 172.16.20.1 24
[SW2-Vlan-interface100]quit
[SW2]int vlan 200
[SW2-Vlan-interface200]ip binding vpn-instance vpn-nrt
Some configurations on the interface are removed.
[SW2-Vlan-interface200]ip address 172.16.10.1 24
[SW2-Vlan-interface200]quit
[SW2]int vlan 400
[SW2-Vlan-interface400]ip binding vpn-instance vpn-rt
Some configurations on the interface are removed.
[SW2-Vlan-interface400]description
[SW2-Vlan-interface400]ip address 10.0.0.2 30
[SW2-Vlan-interface400]quit
[SW2]int vlan 500
[SW2-Vlan-interface500]ip binding vpn-instance vpn-nrt
Some configurations on the interface are removed.
[SW2-Vlan-interface500]description
[SW2-Vlan-interface500]ip address 10.0.0.2 30
[SW2-Vlan-interface500]quit
[SW2]int gi 1/0/2
[SW2-GigabitEthernet1/0/2]port link-type access
[SW2-GigabitEthernet1/0/2]port access vlan 100
[SW2-GigabitEthernet1/0/2]quit
[SW2]int gi 1/0/3
[SW2-GigabitEthernet1/0/3]port link-type access
[SW2-GigabitEthernet1/0/3]port access vlan 200
[SW2-GigabitEthernet1/0/3]quit
[SW2]int gi 1/0/1
[SW2-GigabitEthernet1/0/1]description
[SW2-GigabitEthernet1/0/1]port link-type trunk
```

[SW2-GigabitEthernet1/0/1]undo port trunk permit vlan 1
[SW2-GigabitEthernet1/0/1]port trunk permit vlan 400 500
[SW2-GigabitEthernet1/0/1]quit

[SW2]ospf 1 vpn-instance vpn-rt router-id 2.2.2.2
[SW2-ospf-1]area 0.0.0.0
[SW2-ospf-1-area-0.0.0.0]network 10.0.0.2 0.0.0.0
[SW2-ospf-1-area-0.0.0.0]network 2.2.2.2 0.0.0.0
[SW2-ospf-1-area-0.0.0.0]network 172.16.20.0 0.0.0.255
[SW2-ospf-1-area-0.0.0.0]quit
[SW2-ospf-1]quit

[SW2]ospf 2 vpn-instance vpn-nrt router-id 2.2.2.2
[SW2-ospf-2]area 0.0.0.0
[SW2-ospf-2-area-0.0.0.0]network 10.0.0.2 0.0.0.0
[SW2-ospf-2-area-0.0.0.0]network 2.2.2.2 0.0.0.0
[SW2-ospf-2-area-0.0.0.0]network 172.16.10.0 0.0.0.255
[SW2-ospf-2-area-0.0.0.0]quit
[SW2-ospf-2]quit

查看OSPF邻居状态：
dis ospf peer

      OSPF Process 10 with Router ID 1.1.1.1
        Neighbor Brief Information

 Area: 0.0.0.0
 Router ID   Address   Pri Dead-Time State   Interface
 2.2.2.2   10.0.0.2   1   37   Full/BDR   Vlan400

      OSPF Process 20 with Router ID 1.1.1.1
        Neighbor Brief Information

 Area: 0.0.0.0
 Router ID   Address   Pri Dead-Time State   Interface
 2.2.2.2   10.0.0.2   1   35   Full/BDR   Vlan500

[SW2]dis ospf peer

      OSPF Process 1 with Router ID 2.2.2.2
        Neighbor Brief Information

 Area: 0.0.0.0
 Router ID   Address   Pri Dead-Time State   Interface
 1.1.1.1   10.0.0.1   1   37   Full/DR   Vlan400

      OSPF Process 2 with Router ID 2.2.2.2
        Neighbor Brief Information

 Area: 0.0.0.0
 Router ID   Address   Pri Dead-Time State   Interface
 1.1.1.1   10.0.0.1   1   38   Full/DR   Vlan500
[SW2]

查看VPN路由表是否已学习到对端的VPN路由：
dis ip routing-table vpn-instance vpn-rt

Destinations : 19   Routes : 19

Destination/Mask Proto Pre Cost   NextHop   Interface
0.0.0.0/32   Direct 0   0   127.0.0.1   InLoop0
1.1.1.1/32   Direct 0   0   127.0.0.1   InLoop0
2.2.2.2/32   O_INTRA 10 1   10.0.0.2   Vlan400
10.0.0.0/30   Direct 0   0   10.0.0.1   Vlan400

```
10.0.0.0/32      Direct 0  0       10.0.0.1     Vlan400
10.0.0.1/32      Direct 0  0       127.0.0.1    InLoop0
10.0.0.3/32      Direct 0  0       10.0.0.1     Vlan400
127.0.0.0/8      Direct 0  0       127.0.0.1    InLoop0
127.0.0.0/32     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
172.16.20.0/24   O_INTRA 10 2      10.0.0.2     Vlan400
192.168.10.0/24  Direct 0  0       192.168.10.1 Vlan10
192.168.10.0/32  Direct 0  0       192.168.10.1 Vlan10
192.168.10.1/32  Direct 0  0       127.0.0.1    InLoop0
192.168.10.255/32 Direct 0  0      192.168.10.1 Vlan10
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


dis ip routing-table vpn-instance vpn-nrt


Destinations : 19      Routes : 19


Destination/Mask  Proto  Pre Cost      NextHop        Interface
0.0.0.0/32       Direct 0  0       127.0.0.1    InLoop0
1.1.1.1/32       Direct 0  0       127.0.0.1    InLoop0
2.2.2.2/32       O_INTRA 10 1      10.0.0.2     Vlan500
10.0.0.0/30      Direct 0  0       10.0.0.1     Vlan500
10.0.0.0/32      Direct 0  0       10.0.0.1     Vlan500
10.0.0.1/32      Direct 0  0       127.0.0.1    InLoop0
10.0.0.3/32      Direct 0  0       10.0.0.1     Vlan500
127.0.0.0/8      Direct 0  0       127.0.0.1    InLoop0
127.0.0.0/32     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
172.16.10.0/24   O_INTRA 10 2      10.0.0.2     Vlan500
192.168.20.0/24  Direct 0  0       192.168.20.1 Vlan20
192.168.20.0/32  Direct 0  0       192.168.20.1 Vlan20
192.168.20.1/32  Direct 0  0       127.0.0.1    InLoop0
192.168.20.255/32 Direct 0  0      192.168.20.1 Vlan20
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


[SW2]dis ip routing-table vpn-instance vpn-rt


Destinations : 19      Routes : 19


Destination/Mask  Proto  Pre Cost      NextHop        Interface
0.0.0.0/32       Direct 0  0       127.0.0.1    InLoop0
1.1.1.1/32       O_INTRA 10 1      10.0.0.1     Vlan400
2.2.2.2/32       Direct 0  0       127.0.0.1    InLoop0
10.0.0.0/30      Direct 0  0       10.0.0.2     Vlan400
10.0.0.0/32      Direct 0  0       10.0.0.2     Vlan400
10.0.0.2/32      Direct 0  0       127.0.0.1    InLoop0
10.0.0.3/32      Direct 0  0       10.0.0.2     Vlan400
127.0.0.0/8      Direct 0  0       127.0.0.1    InLoop0
127.0.0.0/32     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
172.16.20.0/24   Direct 0  0       172.16.20.1  Vlan100
172.16.20.0/32   Direct 0  0       172.16.20.1  Vlan100
172.16.20.1/32   Direct 0  0       127.0.0.1    InLoop0
172.16.20.255/32 Direct 0  0       172.16.20.1  Vlan100
192.168.10.0/24  O_INTRA 10 2      10.0.0.1     Vlan400
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
[SW2]
[SW2]dis ip routing-table vpn-instance vpn-nrt

Destinations : 19   Routes : 19

Destination/Mask Proto Pre Cost   NextHop   Interface
0.0.0.0/32   Direct 0   0   127.0.0.1   InLoop0
1.1.1.1/32   O_INTRA 10 1   10.0.0.1   Vlan500
2.2.2.2/32   Direct 0   0   127.0.0.1   InLoop0
10.0.0.0/30   Direct 0   0   10.0.0.2   Vlan500
10.0.0.0/32   Direct 0   0   10.0.0.2   Vlan500
10.0.0.2/32   Direct 0   0   127.0.0.1   InLoop0
10.0.0.3/32   Direct 0   0   10.0.0.2   Vlan500
127.0.0.0/8   Direct 0   0   127.0.0.1   InLoop0
127.0.0.0/32   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
172.16.10.0/24   Direct 0   0   172.16.10.1   Vlan200
172.16.10.0/32   Direct 0   0   172.16.10.1   Vlan200
172.16.10.1/32   Direct 0   0   127.0.0.1   InLoop0
172.16.10.255/32 Direct 0   0   172.16.10.1   Vlan200
192.168.20.0/24   O_INTRA 10 2   10.0.0.1   Vlan500
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
[SW2]

PC填写相应的IP地址，同VPN实例能互通，不同VPN实例不能互通

配置PC_5

接口	状态	IPv4地址	IPv6地址
G0/0/1	UP	192.168.20.2/24	

刷新

接口管理
◯ 禁用　◉ 启用

IPv4配置：
◯ DHCP
◉ 静态

IPv4地址：　192.168.20.2
掩码地址：　255.255.255.0
IPv4网关：　192.168.20.1　　　启用

配置PC_6

接口	状态	IPv4地址	IPv6地址
G0/0/1	UP	172.16.20.2/24	

刷新

接口管理
◯ 禁用　◉ 启用

IPv4配置：
◯ DHCP
◉ 静态

IPv4地址：　172.16.20.2
掩码地址：　255.255.255.0
IPv4网关：　172.16.20.1　　　启用

配置PC_4

接口	状态	IPv4地址	IPv6地址
G0/0/1	UP	172.16.10.2/24	

刷新

接口管理
◯ 禁用　◉ 启用

IPv4配置：
◯ DHCP
◉ 静态

IPv4地址：　172.16.10.2
掩码地址：　255.255.255.0
IPv4网关：　172.16.10.1　　　启用

同VPN实例能PING通，不同VPN实例不能互通：

```
<H3C>ping 172.16.10.2
Ping 172.16.10.2 (172.16.10.2): 56 data bytes, press CTRL_C to break
Request time out
Request time out

--- Ping statistics for 172.16.10.2 ---
3 packet(s) transmitted, 0 packet(s) received, 100.0% packet loss
<H3C>%Dec 22 15:00:01:981 2019 H3C PING/6/PING_STATISTICS: Ping statistics for 172.16.10.2
: 3 packet(s) transmitted, 0 packet(s) received, 100.0% packet loss.
ping 172.16.20.2
Ping 172.16.20.2 (172.16.20.2): 56 data bytes, press CTRL_C to break
56 bytes from 172.16.20.2: icmp_seq=0 ttl=253 time=2.000 ms
56 bytes from 172.16.20.2: icmp_seq=1 ttl=253 time=2.000 ms
56 bytes from 172.16.20.2: icmp_seq=2 ttl=253 time=2.000 ms
56 bytes from 172.16.20.2: icmp_seq=3 ttl=253 time=2.000 ms
56 bytes from 172.16.20.2: icmp_seq=4 ttl=253 time=2.000 ms
```

至此，多VPN实例OSPF典型组网配置案例已完成！