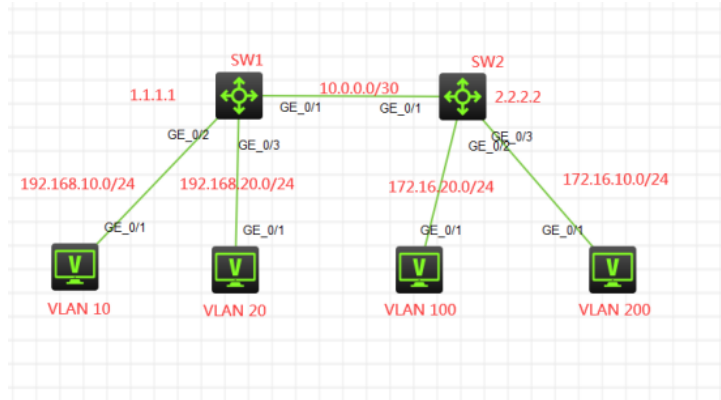


组网及说明

网络拓扑图如下：



组网说明：

本案例采用H3C HCL模拟器来模拟多vpn-instance实例IBGP典型组网配置，为了实现不同VLAN之间通过不同的vpn实例进行隔离，因此采用多vpn实例捆绑到相应的VLAN。

VLAN 400与用于在SW1、SW2的vpn-rt互联使用，VLAN 500用于SW1、SW2的vpn-nrt互联使用。由于VLAN 400与VLAN 500绑定到了不同的VPN实例，因此可以共同使用10.0.0.0/30作为互联地址。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 20、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BGP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、使用BGP路由协议SW1（BGP 100）、SW2（BGP 100），建立IBGP邻居关系，在BGP进程内绑定VPN实例后建立BGP邻居关系，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：

```

sys
[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
```

创建BGP进程100，并在BGP进程内绑定相应的VPN邻居指向及发布网段

```
[SW1]bgp 100
[SW1-bgp-default]router-id 1.1.1.1
[SW1-bgp-default]ip vpn-instance vpn-rt //绑定VPN
[SW1-bgp-default-vpn-rt]peer 10.0.0.2 as-number 200 //指向BGP邻居关系
[SW1-bgp-default-vpn-rt]address-family ipv4 unicast
[SW1-bgp-default-ipv4-vpn-rt]import-route direct
[SW1-bgp-default-ipv4-vpn-rt]peer 10.0.0.2 enable //使能BGP邻居
[SW1-bgp-default-ipv4-vpn-rt]network 1.1.1.1 32
```

```
[SW1-bgp-default-ipv4-vpn-rt]network 192.168.10.0 24 //发布VPN业务网段
[SW1-bgp-default-ipv4-vpn-rt]quit
[SW1-bgp-default-vpn-rt]quit
[SW1-bgp-default]ip vpn-instance vpn-nrt
[SW1-bgp-default-vpn-nrt]peer 10.0.0.2 as-number 200
[SW1-bgp-default-vpn-nrt]address-family ipv4 unicast
[SW1-bgp-default-ipv4-vpn-nrt]peer 10.0.0.2 enable
[SW1-bgp-default-ipv4-vpn-nrt]network 1.1.1.1 32
[SW1-bgp-default-ipv4-vpn-nrt]network 192.168.20.0 24
[SW1-bgp-default-ipv4-vpn-nrt]import-route direct
[SW1-bgp-default-ipv4-vpn-nrt]quit
[SW1-bgp-default-vpn-nrt]quit
[SW1-bgp-default]quit
[SW1]
```

```
SW2:
sys
[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

```

创建BGP进程200，并在BGP进程内绑定相应的VPN邻居指向及发布网段

```

[SW2]bgp 200
[SW2-bgp-default]router-id 2.2.2.2
[SW2-bgp-default]ip vpn-instance vpn-rt //绑定VPN实例
[SW2-bgp-default-vpn-rt]peer 10.0.0.1 as-number 100 //指向BGP邻居关系
[SW2-bgp-default-vpn-rt]address-family ipv4 unicast
[SW2-bgp-default-ipv4-vpn-rt]import-route direct
[SW2-bgp-default-ipv4-vpn-rt]peer 10.0.0.1 enable //使能BGP邻居
[SW2-bgp-default-ipv4-vpn-rt]network 2.2.2.2 32
[SW2-bgp-default-ipv4-vpn-rt]network 172.16.20.0 //发布VPN业务网段
[SW2-bgp-default-ipv4-vpn-rt]quit
[SW2-bgp-default-vpn-rt]quit
[SW2-bgp-default]ip vpn-instance vpn-nrt
[SW2-bgp-default-vpn-nrt]peer 10.0.0.1 as-number 100
[SW2-bgp-default-vpn-nrt]address-family ipv4 unicast
[SW2-bgp-default-ipv4-vpn-nrt]import-route direct
[SW2-bgp-default-ipv4-vpn-nrt]peer 10.0.0.1 enable
[SW2-bgp-default-ipv4-vpn-nrt]network 2.2.2.2 32
[SW2-bgp-default-ipv4-vpn-nrt]network 172.16.10.0 24
[SW2-bgp-default-ipv4-vpn-nrt]quit
[SW2-bgp-default-vpn-nrt]quit
[SW2-bgp-default]quit

```

查看各VPN路由表确认VPN业务路由可达：

```
[SW1]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	BGP	255	0	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	BGP	255	0	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
[SW1]
```

```
[SW1]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	BGP	255 0	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	BGP	255 0	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

```
[SW1]
```

```
[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	BGP	255 0	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	BGP	255 0	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	BGP	255 0	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 BGP 255 0   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]

```

查看BGP邻居状态信息:

[SW1]dis bgp peer ipv4 vpn-instance vpn-rt

```

BGP local router ID: 1.1.1.1
Local AS number: 100
Total number of peers: 1          Peers in established state: 1

```

\* - Dynamically created peer

Peer	AS	MsgRcvd	MsgSent	OutQ	PrefRcv	Up/Down	State
10.0.0.2	200	11	10	0	3	00:04:45	Established

[SW1]

[SW1]dis bgp peer ipv4 vpn-instance vpn-rt

```

BGP local router ID: 1.1.1.1
Local AS number: 100
Total number of peers: 1          Peers in established state: 1

```

\* - Dynamically created peer

Peer	AS	MsgRcvd	MsgSent	OutQ	PrefRcv	Up/Down	State
10.0.0.2	200	10	9	0	3	00:04:12	Established

[SW1]

[SW2]dis bgp peer ipv4 vpn-instance vpn-rt

```

BGP local router ID: 2.2.2.2
Local AS number: 200
Total number of peers: 1          Peers in established state: 1

```

\* - Dynamically created peer

Peer	AS	MsgRcvd	MsgSent	OutQ	PrefRcv	Up/Down	State
10.0.0.1	100	11	11	0	3	00:05:07	Established

[SW2]

[SW2]dis bgp peer ipv4 vpn-instance vpn-rt

```

BGP local router ID: 2.2.2.2
Local AS number: 200
Total number of peers: 1          Peers in established state: 1

```

\* - Dynamically created peer

Peer	AS	MsgRcvd	MsgSent	OutQ	PrefRcv	Up/Down	State
10.0.0.1	100	9	10	0	2	00:04:33	Established

[SW2]

PC填写相应的IP地址，同VPN实例内能PING通，不同VPN实例的不能PING通

配置PC\_3

接口	状态	IPv4地址	IPv6地址
G0/0/1	UP	192.168.10.2/24	

刷新

接口管理  
 禁用  启用

IPv4配置：  
 DHCP  
 静态

IPv4地址：  
掩码地址：  
IPv4网关：

启用

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：  
掩码地址：  
IPv4网关：

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：  
掩码地址：  
IPv4网关：

启用



同VPN实例能互通，不同VPN实例不能PING通

