

### S9500交换机MPLS BGP VPN之Hub&Spoke功能的配置

#### 一、组网需求:

通过对不同PE上VPN-target属性的设置, 控制总部与分公司之间的路由发布。采用Hub&Spoke拓扑, CE2和CE3为Spoke站点, CE1为银行数据中心Hub站点, CE2与CE3间的通信由CE1控制。

PE1分别与PE2、PE3建立IBGP邻居关系, 但PE2与PE3不建立IBGP邻居关系, 不交换VPN路由信息;

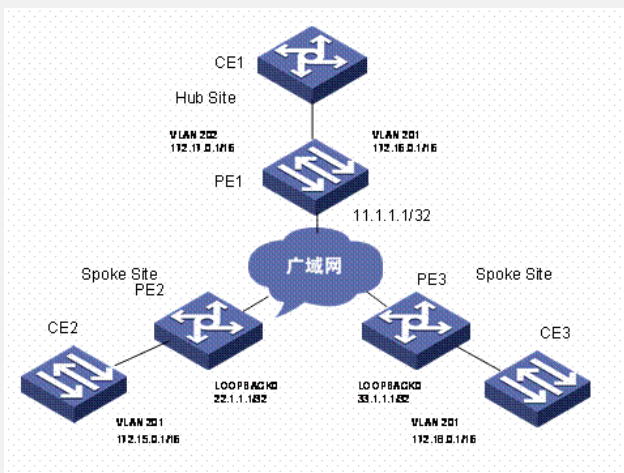
在PE1上创建两个VPN-instance, 引入VPN-target属性为100:11、100:12的VPN路由, 对发布的VPN路由设置VPN-target属性100:2;

在PE2上创建一个VPN-instance, 引入VPN-target属性为100:2的VPN路由, 对发布的VPN路由设置VPN-target属性100:11;

在PE3上创建一个VPN-instance, 引入VPN-target属性为100:2的VPN路由, 对发布的VPN路由设置VPN-target属性100:12。

经过以上配置, PE2和PE3将只能通过PE1学到对方的路由。

#### 二、组网图



#### 三、配置步骤:

软件版本: S9500交换机1200以后软件版本

硬件版本: S9500交换机支持MPLS VPN业务板 (C/CA/CB类业务板)

配置PE1设备

1) 在PE1上配置两个VPN-instance, 对从PE2和PE3接收的路由加上指定的VPN-target属性

```
[PE1] ip vpn-instance vpn-instance2
[PE1-vpn-vpn-instance2] route-distinguisher 100:2
[PE1-vpn-vpn-instance2] vpn-target 100:11 import-extcommunity
[PE1-vpn-vpn-instance2] vpn-target 100:12 import-extcommunity
```

```
[PE1] ip vpn-instance vpn-instance3
[PE1-vpn-vpn-instance3] route-distinguisher 100:3
[PE1-vpn-vpn-instance3] vpn-target 100:2 export-extcommunity
```

2) PE1与CE1间建立EBGP邻居, 将学到的CE1内部VPN路由由引入VPN实例子地址族, 并允许一次路由环路

```
[PE1] bgp 100
[PE1-bgp] ipv4-family vpn-instance vpn-instance2
[PE1-bgp-af-vpn-instance] import-route static
[PE1-bgp-af-vpn-instance] import-route direct
[PE1-bgp-af-vpn-instance] group 17216 external
[PE1-bgp-af-vpn-instance] peer 172.16.1.1 group 17216 as-number 65002
[PE1-bgp] ipv4-family vpn-instance vpn-instance3
[PE1-bgp-af-vpn-instance] import-route static
[PE1-bgp-af-vpn-instance] import-route direct
[PE1-bgp-af-vpn-instance] group 17217 external
[PE1-bgp-af-vpn-instance] peer 172.17.1.1 group 17217 as-number 65002
[PE1-bgp-af-vpn-instance] peer 172.17.1.1 allow-as-loop 1
```

3) 将PE1与CE1相连的VLAN接口绑定到不同的VPN-instance。以太网端口Gigabiteth

ernet 2/1/1所在的VLAN的接口绑定到VPN-instance2, 以太网端口GigabitEthernet 2/1/2所在的VLAN的接口绑定到VPN-instance3

```
[PE1] vlan 201
[PE1-vlan201] port gigabitEthernet 2/1/1
[PE1] interface vlan-interface 201
[PE1-vlan-interface201] ip binding vpn-instance vpn-instance2
[PE1-vlan-interface201] ip address 172.16.0.1 255.255.0.0
[PE1] vlan 202
[PE1-vlan202] port gigabitEthernet 2/1/2
[PE1] interface vlan-interface 202
[PE1-vlan-interface202] ip binding vpn-instance vpn-instance3
[PE1-vlan-interface202] ip address 172.17.0.1 255.255.0.0
```

#### 4) 配置LoopBack接口

```
[PE1] interface loopback 0
[PE1-LoopBack0] ip address 11.1.1.1 255.255.255.255
```

5) 在PE与PE之间建立MP-IBGP邻居, 进行PE内部的VPN路由信息交换。并在VPNv4子地址族视图下激活MP-IBGP对等体

```
[PE1] bgp 100
[PE1-bgp] group 22
[PE1-bgp] peer 22.1.1.1 group 22
[PE1-bgp] peer 22.1.1.1 connect-interface loopback 0
[PE1-bgp] group 33
[PE1-bgp] peer 33.1.1.1 group 33
[PE1-bgp] peer 33.1.1.1 connect-interface loopback 0
[PE1-bgp] ipv4-family vpnv4
[PE1-bgp-af-vpn] peer 22 enable
[PE1-bgp-af-vpn] peer 22.1.1.1 group 22
[PE1-bgp-af-vpn] peer 33 enable
[PE1-bgp-af-vpn] peer 33.1.1.1 group 33
```

#### 配置PE2设备

1) 在PE2上创建VPN-instance, 允许引入VPN-target属性为100:2的VPN路由, 发布的VPN路由的VPN-target属性为100:11

```
[PE2] ip vpn-instance vpn-instance1
[PE2-vpn-vpn-instance1] route-distinguisher 100:1
[PE2-vpn-vpn-instance1] vpn-target 100:11 export-extcommunity
[PE2-vpn-vpn-instance1] vpn-target 100:2 import-extcommunity
```

2) PE2与CE2间建立EBGP邻居, 将学到的CE2内部VPN路由引入VPN实例子地址族

```
[PE2] bgp 100
[PE2-bgp] ipv4-family vpn-instance vpn-instance1
[PE2-bgp-af-vpn-instance] import-route static
[PE2-bgp-af-vpn-instance] import-route direct
[PE2-bgp-af-vpn-instance] group 172 external
[PE2-bgp-af-vpn-instance] peer 172.15.1.1 group 172 as-number 65003
```

3) 将PE2与CE2相连的端口所在的VLAN的接口绑定到VPN-instance

```
[PE2] vlan 201
[PE2-vlan201] port gigabitEthernet 2/1/1
[PE2] interface vlan-interface 201
[PE2-vlan-interface201] ip binding vpn-instance vpn-instance1
[PE2-vlan-interface201] ip address 172.15.0.1 255.255.0.0
```

#### 4) 配置LoopBack接口

```
[PE2] interface loopback 0
[PE2-LoopBack0] ip address 22.1.1.1 255.255.255.255
```

5) 在PE2与PE1之间建立MP-IBGP邻居, 进行PE内部的VPN路由信息交换。并在VPNv4子地址族视图下激活MP-IBGP对等体

```
[PE2] bgp 100
[PE2-bgp] group 11
[PE2-bgp] peer 11.1.1.1 group 11
[PE2-bgp] peer 11.1.1.1 connect-interface loopback 0
[PE2-bgp] ipv4-family vpnv4
[PE2-bgp-af-vpn] peer 11 enable
[PE2-bgp-af-vpn] peer 11.1.1.1 group 11
[PE2-bgp-af-vpn] peer 11.1.1.1 allow-as-loop 1
```

#### 配置PE3设备

1) 在PE3上创建VPN-instance, 允许引入VPN-target属性为100:2的VPN路由, 发布

的VPN路由的VPN-target属性为100:12

```
[PE3] ip vpn-instance vpn-instance2  
[PE3-vpn-vpn-instance2] route-distinguisher 100:4  
[PE3-vpn-vpn-instance2] vpn-target 100:12 export-extcommunity  
[PE3-vpn-vpn-instance2] vpn-target 100:2 import-extcommunity
```

2) PE3与CE3间建立EBGP邻居, 将学到的CE3内部VPN路由引入VPN实例子地址族

```
[PE3] bgp 100  
[PE3-bgp] ipv4-family vpn-instance vpn-instance2  
[PE3-bgp-af-vpn-instance] import-route static  
[PE3-bgp-af-vpn-instance] import-route direct  
[PE3-bgp-af-vpn-instance] group 172 external  
[PE3-bgp-af-vpn-instance] peer 172.18.1.1 group 172 as-number 65001
```

3) 将PE3与CE3相连的端口所在的VLAN的接口绑定到VPN-instance

```
[PE3] vlan 201  
[PE3-vlan201] port gigabitethernet 2/1/1  
[PE3] interface vlan-interface 201  
[PE3-vlan-interface201] ip binding vpn-instance vpn-instance2  
[PE3-vlan-interface201] ip address 172.18.0.1 255.255.0.0
```

4) 配置LoopBack接口

```
[PE3] interface loopback 0  
[PE3-LoopBack0] ip address 33.1.1.1 255.255.255.255
```

5) 在PE3与PE1之间建立MP-IBGP邻居, 进行PE内部的VPN路由信息交换。并在VPN子地址族视图下激活MP-IBGP对等体

```
[PE3] bgp 100  
[PE3-bgp] group 11  
[PE3-bgp] peer 11.1.1.1 group 11  
[PE3-bgp] peer 11.1.1.1 connect-interface loopback 0  
[PE3-bgp] ipv4-family vpnv4  
[PE3-bgp-af-vpn] peer 11 enable  
[PE3-bgp-af-vpn] peer 11.1.1.1 group 11  
[PE3-bgp-af-vpn] peer 11.1.1.1 allow-as-loop 1
```

#### 四、配置关键点:

- 1) HUB&SPOKE组网中PE1上用于发布路由的VPN-instance (VPN-instance3) 的VPN-target不能跟PE1上用于引入路由的VPN-instance (VPN-instance2) 的任何一个VPN-target相同;
- 2) 允许一次路由环路, 使PE能够接收CE发送的含本AS号的路由更新;
- 3) HUB&SPOKE组网中PE1上用于发布路由的VPN-instance的route-distinguisher rd 2 (100:3) 不能跟各个PE2、PE3上相应VPN-instance的route-distinguisher rd1 (100:1)、rd4 (100:4) 中的任一个相同, 而rd1、rd4可以相同也可以不同。