SR66/SR66X系列路由器OSPF Sham-link应用的典型配置

OSPF 张玺 2013-08-06 发表

一、组网需求：

客户使用两台SR66设备（SR66-1、SR66-2）做为PE、两台MSR设备（MSR-1、MSR-3）做为CE搭建了MPLS L3VPN网络，用来运行业务。其中PE设备与CE设备之间使用OSPF路由协议。

为了保证业务的可靠性，客户在两台CE设备间添加了另外一台MSR设备（MSR-2），三台MSR设备之间运行OSPF协议，做为后门链路。正常情况下，业务从MPLS L3VPN中运行；如果MPLS L3VPN网络故障，则业务切至后门链路。这样可以保证业务不中断。

实现以上需求需要在两台PE设备上配置OSPF Sham-link功能。

设备及版本：SR6602路由器2台（版本为R2604P10）、MSR30-20路由器3台（版本为R2209P15）。

二、组网图：

三、配置步骤：

MSR-1 配置

```
#
 sysname MSR-1
#
interface LoopBack0
 ip address 3.3.3.3 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 11.0.0.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 ip address 20.0.0.1 255.255.255.0
 ospf cost 20
#
ospf 1
 area 0.0.0.0
  network 11.0.0.0 0.0.0.255
  network 3.3.3.3 0.0.0.0
  network 20.0.0.0 0.0.0.255
#
```

MSR-2 配置

```
#
 sysname MSR-2
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 20.0.0.2 255.255.255.0
 ospf cost 20
#
interface GigabitEthernet0/1
 port link-mode route
 ip address 21.0.0.2 255.255.255.0
 ospf cost 20
#
ospf 1
 area 0.0.0.0
  network 20.0.0.0 0.0.0.255
  network 21.0.0.0 0.0.0.255
#
```

MSR-3 配置

```
#
 sysname MSR-3
#
interface LoopBack0
 ip address 4.4.4.4 255.255.255.255
#
interface GigabitEthernet0/0
 port link-mode route
 ip address 12.0.0.2 255.255.255.0
#
interface GigabitEthernet0/1
 port link-mode route
 ip address 21.0.0.1 255.255.255.0
 ospf cost 20
#
ospf 1
 area 0.0.0.0
  network 4.4.4.4 0.0.0.0
  network 12.0.0.0 0.0.0.255
  network 21.0.0.0 0.0.0.255
#
```

SR66-1 配置

```
#
 sysname SR66-1
#
 mpls lsr-id 1.1.1.1
#
ip vpn-instance vpn1
 route-distinguisher 100:1
 vpn-target 100:1 export-extcommunity
 vpn-target 100:1 import-extcommunity
#
mpls
#
mpls ldp
#
interface LoopBack0
 ip address 1.1.1.1 255.255.255.255
#
interface LoopBack1
 ip binding vpn-instance vpn1
 ip address 1.1.1.2 255.255.255.255   //Sham-link的源地址，此接口需加入VPN1中
#
interface GigabitEthernet0/0
 ip binding vpn-instance vpn1
 ip address 11.0.0.1 255.255.255.0
#
interface GigabitEthernet0/1
 ip address 10.0.0.1 255.255.255.0
 mpls
 mpls ldp
#
bgp 100
 undo synchronization
 peer 2.2.2.2 as-number 100
 peer 2.2.2.2 connect-interface LoopBack0
 #
 ipv4-family vpn-instance vpn1
  import-route direct
  import-route ospf 10
 #
 ipv4-family vpnv4
  peer 2.2.2.2 enable
#
ospf 1
 area 0.0.0.0
  network 1.1.1.1 0.0.0.0
  network 10.0.0.0 0.0.0.255
#
ospf 10 vpn-instance vpn1
 area 0.0.0.0
  network 11.0.0.0 0.0.0.255
  sham-link 1.1.1.2 2.2.2.1 cost 10  //Sham-link配置，需保证此处的cost值小于后门链路的cost值
#
```

SR66-2 配置

```
#
 sysname SR66-2
#
 mpls lsr-id 2.2.2.2
#
ip vpn-instance vpn1
 route-distinguisher 100:1
 vpn-target 100:1 export-extcommunity
 vpn-target 100:1 import-extcommunity
#
mpls
#
mpls ldp
#
interface LoopBack0
 ip address 2.2.2.2 255.255.255.255
#
interface LoopBack1
 ip binding vpn-instance vpn1
 ip address 2.2.2.1 255.255.255.255   //Sham-link的源地址，此接口需加入VPN1中
#
interface GigabitEthernet0/0
 ip binding vpn-instance vpn1
 ip address 12.0.0.1 255.255.255.0
#
interface GigabitEthernet0/1
 ip address 10.0.0.2 255.255.255.0
 mpls
 mpls ldp
#
bgp 100
 undo synchronization
 peer 1.1.1.1 as-number 100
 peer 1.1.1.1 connect-interface LoopBack0
 #
 ipv4-family vpn-instance vpn1
  import-route direct
  import-route ospf 10
 #
 ipv4-family vpnv4
  peer 1.1.1.1 enable
#
ospf 1
 area 0.0.0.0
  network 2.2.2.2 0.0.0.0
  network 10.0.0.0 0.0.0.255
#
ospf 10 vpn-instance vpn1
 area 0.0.0.0
  network 12.0.0.0 0.0.0.255
  sham-link 2.2.2.1 1.1.1.2 cost 10   //Sham-link配置，需保证此处的cost值小于后门链路的cost
值
#
```

四、功能测试：

配置完成后，在SR66-1上查看Sham-link信息：

```
dis ospf sham-link
        OSPF Process 10 with Router ID 11.0.0.1
Sham Link:
 Area           NeighborId      Source-IP       Destination-IP  State Cost
0.0.0.0         12.0.0.1        1.1.1.2         2.2.2.1         P-2-P 10

display  ospf sham-link area 0
        OSPF Process 10 with Router ID 11.0.0.1
  Sham-Link: 1.1.1.2 --> 2.2.2.1
  Neighbor ID: 12.0.0.1     State: Full            //对端状态为Full
  Area: 0.0.0.0
  Cost: 10  State: P-2-P  Type: Sham
  Timers: Hello 10, Dead 40, Retransmit 5, Transmit Delay 1
```

此时查看MSR-1上去往4.4.4.4/32以及12.0.0.0/24网段的路由表：

```
Destination/Mask    Proto  Pre  Cost        NextHop         Interface
4.4.4.4/32          OSPF   10   12          11.0.0.1        GE0/0
12.0.0.0/24         OSPF   10   12          11.0.0.1        GE0/0
……
```

然后，将SR66-1的G0/0口shutdown掉，再次查看MSR-1上去往4.4.4.4/32以及12.0.0.0/24网段的路由表，可见业务已经切至后门链路：

Destination/Mask Proto Pre Cost NextHop Interface

4.4.4.4/32 OSPF 10 40 20.0.0.2 GE0/1

12.0.0.0/24 OSPF 10 41 20.0.0.2 GE0/1

……

五、配置关键点：

1、 Sham-link的端点地址被BGP做为VPN-IPv4地址发布，如果路由经过了Sham-link，它就不能再以VPN-IPv4路由的形式被引入到BGP。

2、 配置Sham-link时，需要在PE上配置BGP引入OSPF的私网路由，但不能配置OSPF引入BGP路由，否则会引起路由环路。