VRRP典型组网配置案例

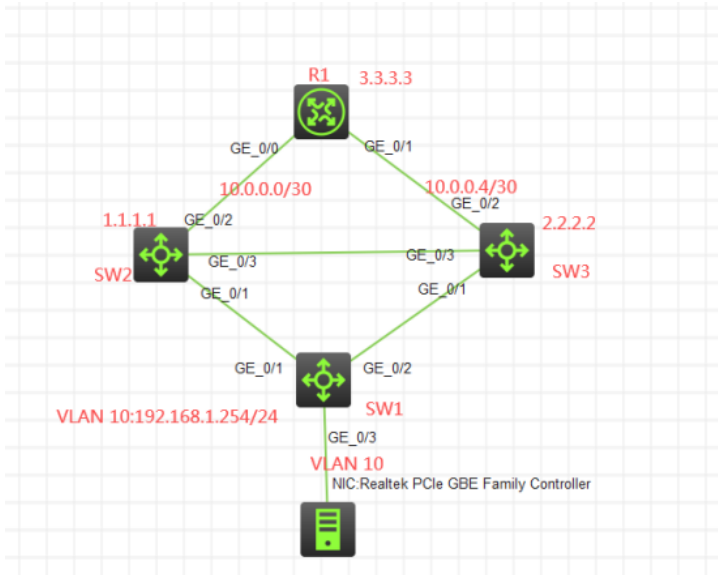OSPF VLAN VRRP Track H3C模拟器 **韦家宁** 2020-02-23 发表

组网及说明

组网说明：

本案例采用H3C HCL模拟器来模拟IPV6 VRRP典型组网配置。为了确保网络的冗余，将SW2和SW3开启VRRP作为网关冗余。SW2为主设备，SW3为备用设备。SW2、SW3与R1的互联采用ospf路由协议互通。当断开SW2的GI1/0/2上联口是，物理机能走SW3方向去往R1。

配置步骤

1、按照网络拓扑图正确配置IP地址和VLAN划分

2、SW2和SW3配置VRRP

3、SW2配置track，方便VRRP的检测与切换

4、SW2、SW3、R1运行OSPF路由协议

配置关键点

SW1：

<H3C>sys

System View: return to User View with Ctrl+Z.

[H3C]sysname SW1

[SW1]vlan 10

[SW1-vlan10]quit

[SW1]int range gi 1/0/1 to gi 1/0/2

[SW1-if-range]port link-type trunk

[SW1-if-range]undo port trunk permit vlan 1

[SW1-if-range]port trunk permit vlan 10

[SW1-if-range]quit

[SW1]int gi 1/0/3

[SW1-GigabitEthernet1/0/3]port link-type access

[SW1-GigabitEthernet1/0/3]port access vlan 10

[SW1-GigabitEthernet1/0/3]quit

[SW1]ip unreachables enable

[SW1]ip ttl-expires enable

SW2:

<H3C>sys

System View: return to User View with Ctrl+Z.

[H3C]sysname SW2

[SW2]vlan 10

[SW2-vlan10]quit

[SW2]int range gi 1/0/1 gi 1/0/3

```
[SW2-if-range]port link-type trunk
[SW2-if-range]undo port trunk permit vlan 1
[SW2-if-range]port trunk permit vlan 10
[SW2-if-range]quit
[SW2]track 1 interface GigabitEthernet 1/0/2
[SW2-track-1]quit
[SW2]int gi 1/0/2
[SW2-GigabitEthernet1/0/2]port link-mode route
[SW2-GigabitEthernet1/0/2]des <connect to R1>
[SW2-GigabitEthernet1/0/2]ip address 10.0.0.1 30
[SW2-GigabitEthernet1/0/2]quit
[SW2]track 1 interface GigabitEthernet 1/0/2
[SW2-track-1]quit
[SW2]int vlan 10
[SW2-Vlan-interface10]ip address 192.168.1.252 24
[SW2-Vlan-interface10]vrrp vrid 1 virtual-ip 192.168.1.254
[SW2-Vlan-interface10]vrrp vrid 1 priority 120
[SW2-Vlan-interface10]vrrp vrid 1 track 1 priority reduced 30
[SW2-Vlan-interface10]quit
[SW2]int loopback 0
[SW2-LoopBack0]ip address 1.1.1.1 32
[SW2-LoopBack0]quit
[SW2]ospf 1 router-id 1.1.1.1
[SW2-ospf-1]silent-interface Vlan-interface 10
[SW2-ospf-1]area 0.0.0.0
[SW2-ospf-1-area-0.0.0.0]network 10.0.0.1 0.0.0.0
[SW2-ospf-1-area-0.0.0.0]network 1.1.1.1 0.0.0.0
[SW2-ospf-1-area-0.0.0.0]network 192.168.1.0 0.0.0.255
[SW2-ospf-1-area-0.0.0.0]quit
[SW2-ospf-1]quit
[SW2]ip unreachables enable
[SW2]ip ttl-expires enable

SW3:
<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname SW3
[SW3]int loopback 0
[SW3-LoopBack0]ip address 2.2.2.2 32
[SW3-LoopBack0]quit
[SW3]vlan 10
[SW3-vlan10]quit
[SW3]int range gi 1/0/1 gi 1/0/3
[SW3-if-range]port link-type trunk
[SW3-if-range]undo port trunk permit vlan 1
[SW3-if-range]port trunk permit vlan 10
[SW3-if-range]quit
[SW3]int gi 1/0/2
[SW3-GigabitEthernet1/0/2]port link-mode route
[SW3-GigabitEthernet1/0/2]des <connect to R1>
[SW3-GigabitEthernet1/0/2]ip address 10.0.0.5 30
[SW3-GigabitEthernet1/0/2]ospf cost 200
[SW3-GigabitEthernet1/0/2]quit
[SW3]int vlan 10
[SW3-Vlan-interface10]ip address 192.168.1.253 24
[SW3-Vlan-interface10]vrrp vrid 1 virtual-ip 192.168.1.254
[SW3-Vlan-interface10]quit
[SW3]ospf 1 router-id 2.2.2.2
[SW3-ospf-1]silent-interface Vlan-interface 10
[SW3-ospf-1]area 0.0.0.0
[SW3-ospf-1-area-0.0.0.0]network 10.0.0.5 0.0.0.0
[SW3-ospf-1-area-0.0.0.0]network 2.2.2.2 0.0.0.0
[SW3-ospf-1-area-0.0.0.0]network 192.168.1.0 0.0.0.255
[SW3-ospf-1-area-0.0.0.0]quit
```

[SW3-ospf-1]quit

[SW3]ip unreachables enable

[SW3]ip ttl-expires enable

R1：

<H3C>sys

System View: return to User View with Ctrl+Z.

[H3C]sysname R3

[R3]int loopback 0

[R3-LoopBack0]ip address 3.3.3.3 32

[R3-LoopBack0]quit

[R3]int gi 0/0

[R3-GigabitEthernet0/0]des <connect to SW2>

[R3-GigabitEthernet0/0]ip address 10.0.0.2 30

[R3-GigabitEthernet0/0]quit

[R3]int gi 0/1

[R3-GigabitEthernet0/1]des <connect to SW3>

[R3-GigabitEthernet0/1]ip address 10.0.0.6 30

[R3-GigabitEthernet0/1]ospf cost 200

[R3-GigabitEthernet0/1]quit

[R3]ospf 1 router-id 3.3.3.3

[R3-ospf-1]area 0.0.0.0

[R3-ospf-1-area-0.0.0.0]network 10.0.0.2 0.0.0.0

[R3-ospf-1-area-0.0.0.0]network 3.3.3.3 0.0.0.0

[R3-ospf-1-area-0.0.0.0]quit

[R3-ospf-1]quit

[R3]ip unreachables enable

[R3]ip ttl-expires enable

查看SW2的VRRP显示信息为master：

```
[SW2]dis vrrp verbose
IPv4 virtual router information:
 Running mode : Standard
 Total number of virtual routers : 1
   Interface Vlan-interface10
     VRID          : 1               Adver timer  : 100 centiseconds
     Admin status  : Up              State        : Master
     Config pri    : 120             Running pri  : 120
     Preempt mode  : Yes             Delay time   : 0 centiseconds
     Auth type     : None
     Virtual IP    : 192.168.1.254
     Virtual MAC   : 0000-5e00-0101
     Master IP     : 192.168.1.252
   VRRP track information:
     Track object  : 1               State : NotReady   Pri reduced : 30

[SW2]
```

查看SW3的VRRP显示信息为backup：

```
[SW3]dis vrrp verbose
IPv4 virtual router information:
 Running mode : Standard
 Total number of virtual routers : 1
   Interface Vlan-interface10
     VRID          : 1               Adver timer  : 100 centiseconds
     Admin status  : Up              State        : Backup
     Config pri    : 100             Running pri  : 100
     Preempt mode  : Yes             Delay time   : 0 centiseconds
     Become master : 3570 millisecond left
     Auth type     : None
     Virtual IP    : 192.168.1.254
     Master IP     : 192.168.1.252
[SW3]
```

查看SW2的OSPF邻居信息：

```
[SW2]dis ospf peer

         OSPF Process 1 with Router ID 1.1.1.1
              Neighbor Brief Information

 Area: 0.0.0.0
 Router ID       Address         Pri Dead-Time  State         Interface
 3.3.3.3         10.0.0.2        1   30         Full/BDR      GE1/0/2
[SW2]
```

查看SW3的OSPF邻居信息：

```
[SW3]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
 3.3.3.3         10.0.0.6       1   35          Full/BDR     GE1/0/2
[SW3]
```

查看R1的OSPF邻居信息：

```
[R3]dis ospf peer

        OSPF Process 1 with Router ID 3.3.3.3
            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   34          Full/DR      GE0/0
 2.2.2.2         10.0.0.5       1   33          Full/DR      GE0/1
[R3]
```

查看SW2的路由表：

```
[SW2]dis ip routing-table

Destinations : 21      Routes : 21

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  201      10.0.0.2        GE1/0/2
3.3.3.3/32               O_INTRA  10  1        10.0.0.2        GE1/0/2
10.0.0.0/30              Direct   0   0        10.0.0.1        GE1/0/2
10.0.0.0/32              Direct   0   0        10.0.0.1        GE1/0/2
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        GE1/0/2
10.0.0.4/30              O_INTRA  10  201      10.0.0.2        GE1/0/2
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
192.168.1.0/24           Direct   0   0        192.168.1.252   Vlan10
192.168.1.0/32           Direct   0   0        192.168.1.252   Vlan10
192.168.1.252/32         Direct   0   0        127.0.0.1       InLoop0
192.168.1.254/32         Direct   1   0        127.0.0.1       InLoop0
192.168.1.255/32         Direct   0   0        192.168.1.252   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
[SW2]
```

查看SW3的路由表：

```
[SW3]dis ip routing-table

Destinations : 20      Routes : 20

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  201      10.0.0.6        GE1/0/2
2.2.2.2/32               Direct   0   0        127.0.0.1       InLoop0
3.3.3.3/32               O_INTRA  10  200      10.0.0.6        GE1/0/2
10.0.0.0/30              O_INTRA  10  201      10.0.0.6        GE1/0/2
10.0.0.4/30              Direct   0   0        10.0.0.5        GE1/0/2
10.0.0.4/32              Direct   0   0        10.0.0.5        GE1/0/2
10.0.0.5/32              Direct   0   0        127.0.0.1       InLoop0
10.0.0.7/32              Direct   0   0        10.0.0.5        GE1/0/2
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
192.168.1.0/24           Direct   0   0        192.168.1.253   Vlan10
192.168.1.0/32           Direct   0   0        192.168.1.253   Vlan10
192.168.1.253/32         Direct   0   0        127.0.0.1       InLoop0
192.168.1.255/32         Direct   0   0        192.168.1.253   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
[SW3]
```
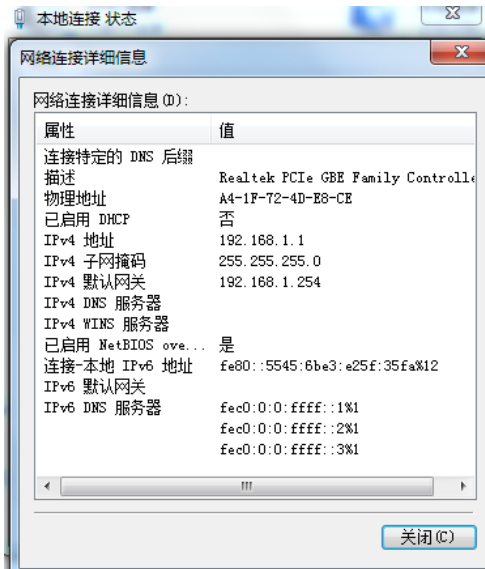
查看R1的路由表：

物理机设置IP地址：

物理机能PING通3.3.3.3

路由追踪，走SW2方向去往3.3.3.3

关闭SW2的GI 1/0/2端口：
[SW2]int gi 1/0/2
[SW2-GigabitEthernet1/0/2]shutdown

查看SW2和SW3的VRRP状态：

SW2的VRRP状态为backup

```
[SW2]dis vrrp verbose
IPv4 virtual router information:
 Running mode : Standard
 Total number of virtual routers : 1
   Interface Vlan-interface10
     VRID            : 1            Adver timer  : 100 centiseconds
     Admin status    : Up           State        : Backup
     Config pri      : 120          Running pri  : 90
     Preempt mode    : Yes          Delay time   : 0 centiseconds
     Become master   : 3020 millisecond left
     Auth type       : None
     Virtual IP      : 192.168.1.254
     Master IP       : 192.168.1.253
   VRRP track information:
     Track object    : 1                      State : Negative   Pri reduced : 30

[SW2]
```

SW3的VRRP状态为main

```
[SW3]dis vrrp verbose
IPv4 virtual router information:
 Running mode : Standard
 Total number of virtual routers : 1
   Interface Vlan-interface10
     VRID            : 1            Adver timer  : 100 centiseconds
     Admin status    : Up           State        : Master
     Config pri      : 100          Running pri  : 100
     Preempt mode    : Yes          Delay time   : 0 centiseconds
     Auth type       : None
     Virtual IP      : 192.168.1.254
     Virtual MAC     : 0000-5e00-0101
     Master IP       : 192.168.1.253

[SW3]
```

此时物理机依然可以PING通3.3.3.3

```
C:\Users\Administrator.USER-20190510MA>ping 3.3.3.3

正在 Ping 3.3.3.3 具有 32 字节的数据:
来自 3.3.3.3 的回复: 字节=32 时间=3ms TTL=254
来自 3.3.3.3 的回复: 字节=32 时间=1ms TTL=254
来自 3.3.3.3 的回复: 字节=32 时间=1ms TTL=254
来自 3.3.3.3 的回复: 字节=32 时间=1ms TTL=254

3.3.3.3 的 Ping 统计信息:
    数据包: 已发送 = 4, 已接收 = 4, 丢失 = 0 (0% 丢失),
往返行程的估计时间(以毫秒为单位):
    最短 = 1ms, 最长 = 3ms, 平均 = 1ms

C:\Users\Administrator.USER-20190510MA>
```

使用trecert -d 3.3.3.3，物理机去往3.3.3.3已经走SW3方向：

```
C:\Users\Administrator.USER-20190510MA>tracert -d 3.3.3.3

通过最多 30 个跃点跟踪到 3.3.3.3 的路由

  1     1 ms     1 ms     1 ms  192.168.1.253
  2     2 ms     2 ms     2 ms  3.3.3.3

跟踪完成。

C:\Users\Administrator.USER-20190510MA>
```

根据测试结果得知，VRRP能正常切换，同时在切换后VLAN10走的是SW3方向去往3.3.3.3。

至此，VRRP典型组网配置案例已完成！