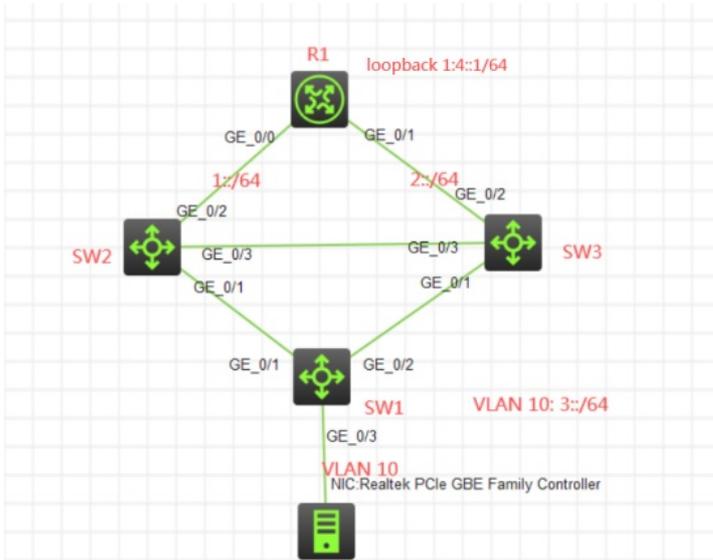


# 知 IPv6之VRRP典型组网配置案例

IPv6 OSPF VRRP 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ospfv3路由协议互通。当断开SW2的G11/0/2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OSPFv3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 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]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]ip unreachable enable
[SW1]ip ttl-expires enable
[SW1]ipv6 unreachable 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]int vlan 10
[SW2-Vlan-interface10]ipv6 address fe80::2 link-local
[SW2-Vlan-interface10]vrrp ipv6 vrid 1 virtual-ip fe80::1 link-local
[SW2-Vlan-interface10]vrrp ipv6 vrid 1 priority 120
[SW2-Vlan-interface10]vrrp ipv6 vrid 1 track 1 priority reduced 30
[SW2-Vlan-interface10]ipv6 address 3::1 64
[SW2-Vlan-interface10]ospfv3 1 area 0
[SW2-Vlan-interface10]quit
[SW2]track 1 interface GigabitEthernet 1/0/2
[SW2-track-1]quit
[SW2]int LoopBack 0
[SW2-LoopBack0]ip address 1.1.1.1 32
[SW2-LoopBack0]quit
[SW2]ospfv3 1
[SW2-ospfv3-1]import-route direct
[SW2-ospfv3-1]router-id 1.1.1.1
[SW2-ospfv3-1]silent-interface Vlan-interface 10
[SW2-ospfv3-1]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]ipv6 address 1::1 64
[SW2-GigabitEthernet1/0/2]ospfv3 1 area 0
[SW2-GigabitEthernet1/0/2]quit
[SW2]ip unreachable enable
[SW2]ip ttl-expires enable
[SW2]ipv6 unreachable 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 vlan 10
[SW3-Vlan-interface10]ipv6 address fe80::3 link-local
[SW3-Vlan-interface10]vrrp ipv6 vrid 1 virtual-ip fe80::1 link-local
[SW3-Vlan-interface10]ipv6 address 3::2 64
[SW3-Vlan-interface10]ospfv3 1 area 0
[SW3-GigabitEthernet1/0/2]ospfv3 cost 200
[SW3-Vlan-interface10]quit
[SW3]ospfv3 1
[SW3-ospfv3-1]silent-interface Vlan-interface 10
[SW3-ospfv3-1]import-route direct
[SW3-ospfv3-1]router-id 2.2.2.2
[SW3-ospfv3-1]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]ipv6 address 2::1 64
[SW3-GigabitEthernet1/0/2]ospfv3 1 area 0
```

```
[SW3-GigabitEthernet1/0/2]quit
[SW3]ip unreachable enable
[SW3]ip ttl-expires enable
[SW3]ipv6 unreachable enable
```

R1:

```
<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname R1
[R1]int loopback 0
[R1-LoopBack0]ip address 3.3.3.3 32
[R1-LoopBack0]quit
[R1]int loopback 1
[R1-LoopBack1]ipv6 address 4::1 64
[R1-LoopBack1]ospfv3 1 area 0
[R1-LoopBack1]quit
[R1]ospfv3 1
[R1-ospfv3-1]router-id 3.3.3.3
[R1-ospfv3-1]import-route direct
[R1-ospfv3-1]quit
[R1]int gi 0/0
[R1-GigabitEthernet0/0]des <connect to SW2>
[R1-GigabitEthernet0/0]ipv6 address 1::2 64
[R1-GigabitEthernet0/0]ospfv3 1 area 0
[R1-GigabitEthernet0/0]quit
[R1]int gi 0/1
[R1-GigabitEthernet0/1]des <connect to SW3>
[R1-GigabitEthernet0/1]ipv6 address 2::2 64
[R1-GigabitEthernet0/1]ospfv3 1 area 0
[R1-GigabitEthernet0/1]quit
[R1]ip unreachable enable
[R1]ip ttl-expires enable
[R1]ipv6 unreachable enable
```

查看SW2的VRRP显示信息为master:

```
[SW2]dis vrrp ipv6 verbose
IPv6 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    : FE80::1
  Virtual MAC   : 0000-5e00-0201
  Master IP     : FE80::2
```

查看SW3的VRRP显示信息为backup:

```
[SW3]dis vrrp ipv6 verbose
IPv6 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 : 3550 millisecond left
  Auth type     : None
  Virtual IP    : FE80::1
  Master IP     : FE80::2
```

查看SW2的OSPF邻居信息:

```
[SW2]dis ospfv3 peer

OSPFv3 Process 1 with Router ID 1.1.1.1

Area: 0.0.0.0
-----
Router ID   Pri State      Dead-Time InstID Interface
3.3.3.3     1 Full/BDR   00:00:34 0 GE1/0/2
```

查看SW3的OSPF邻居信息:

```
[SW3]dis ospfv3 peer

          OSPFv3 Process 1 with Router ID 2.2.2.2

Area: 0.0.0.0
-----
Router ID   Pri State           Dead-Time InstID Interface
3.3.3.3     1 Full/BDR           00:00:36 0      GE1/0/2
[SW3]
```

查看R1的OSPF邻居信息:

```
[R1]dis ospfv3 peer

          OSPFv3 Process 1 with Router ID 3.3.3.3

Area: 0.0.0.0
-----
Router ID   Pri State           Dead-Time InstID Interface
1.1.1.1     1 Full/DR           00:00:38 0      GE0/0
2.2.2.2     1 Full/DR           00:00:30 0      GE0/1
[R1]
```

查看SW2的路由表:

[SW2]dis ipv6 routing-table

Destinations : 10    Routes : 10

```
Destination: ::1/128          Protocol : Direct
NextHop : ::1                Preference: 0
Interface : InLoop0          Cost : 0

Destination: 1::/64          Protocol : Direct
NextHop : ::                 Preference: 0
Interface : GE1/0/2          Cost : 0

Destination: 1::1/128        Protocol : Direct
NextHop : ::1                Preference: 0
Interface : InLoop0          Cost : 0

Destination: 2::/64          Protocol : O_INTRA
NextHop : FE80::867D:FF:FE9A:405 Preference: 10
Interface : GE1/0/2          Cost : 2

Destination: 3::/64          Protocol : Direct
NextHop : ::                 Preference: 0
Interface : Vlan10           Cost : 0

Destination: 3::1/128        Protocol : Direct
NextHop : ::1                Preference: 0
Interface : InLoop0          Cost : 0

Destination: 4::/64          Protocol : O_ASE2
NextHop : FE80::867D:FF:FE9A:405 Preference: 150
Interface : GE1/0/2          Cost : 1

Destination: 4::1/128        Protocol : O_INTRA
NextHop : FE80::867D:FF:FE9A:405 Preference: 10
Interface : GE1/0/2          Cost : 1

Destination: FE80::/10        Protocol : Direct
NextHop : ::                 Preference: 0
Interface : InLoop0          Cost : 0

Destination: FF00::/8        Protocol : Direct
NextHop : ::                 Preference: 0
Interface : NULL0            Cost : 0
[SW2]
```

查看SW3的路由表:

[SW3]dis ipv6 routing-table

Destinations : 10    Routes : 10

```

Destination: ::1/128          Protocol : Direct
NextHop   : ::1              Preference: 0
Interface : InLoop0          Cost    : 0

Destination: 1::/64          Protocol : O_INTRA
NextHop   : FE80::867D:FF:FE9A:406 Preference: 10
Interface : GE1/0/2          Cost    : 201

Destination: 2::/64          Protocol : Direct
NextHop   : ::               Preference: 0
Interface : GE1/0/2          Cost    : 0

Destination: 2::1/128        Protocol : Direct
NextHop   : ::1              Preference: 0
Interface : InLoop0          Cost    : 0

Destination: 3::/64          Protocol : Direct
NextHop   : ::               Preference: 0
Interface : Vlan10           Cost    : 0

Destination: 3::2/128        Protocol : Direct
NextHop   : ::1              Preference: 0
Interface : InLoop0          Cost    : 0

Destination: 4::/64          Protocol : O_ASE2
NextHop   : FE80::867D:FF:FE9A:406 Preference: 150
Interface : GE1/0/2          Cost    : 1

Destination: 4::1/128        Protocol : O_INTRA
NextHop   : FE80::867D:FF:FE9A:406 Preference: 10
Interface : GE1/0/2          Cost    : 200

Destination: FE80::/10       Protocol : Direct
NextHop   : ::               Preference: 0
Interface : InLoop0          Cost    : 0

Destination: FF00::/8        Protocol : Direct
NextHop   : ::               Preference: 0
Interface : NULL0            Cost    : 0
[SW3]

```

查看R1的路由表:

[R1]dis ipv6 routing-table

Destinations : 10    Routes : 11

```

Destination: ::1/128          Protocol : Direct
NextHop   : ::1              Preference: 0
Interface : InLoop0          Cost    : 0

Destination: 1::/64          Protocol : Direct
NextHop   : ::               Preference: 0
Interface : GE0/0            Cost    : 0

Destination: 1::2/128        Protocol : Direct
NextHop   : ::1              Preference: 0
Interface : InLoop0          Cost    : 0

Destination: 2::/64          Protocol : Direct
NextHop   : ::               Preference: 0
Interface : GE0/1            Cost    : 0

Destination: 2::2/128        Protocol : Direct

```

```

NextHop  :::1                Preference: 0
Interface : InLoop0          Cost      : 0

Destination: 3::/64          Protocol : O_INTRA
NextHop   : FE80::867C:9AFF:FE0A:207    Preference: 10
Interface : GE0/0            Cost      : 2

Destination: 3::/64          Protocol : O_INTRA
NextHop   : FE80::867C:9FFF:FEF2:307    Preference: 10
Interface : GE0/1            Cost      : 2

Destination: 4::/64          Protocol : Direct
NextHop   :::                Preference: 0
Interface : Loop1            Cost      : 0

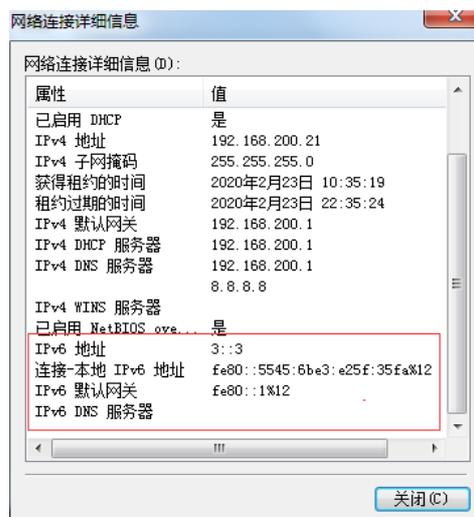
Destination: 4::1/128        Protocol : Direct
NextHop   :::1              Preference: 0
Interface : InLoop0          Cost      : 0

Destination: FE80::/10       Protocol : Direct
NextHop   :::                Preference: 0
Interface : InLoop0          Cost      : 0

Destination: FF00::/8        Protocol : Direct
NextHop   :::                Preference: 0
Interface : NULL0            Cost      : 0
[R1]

```

物理机设置IPv6地址:



物理机能PING通4::1 : 1



路由追踪, 走SW2方向去往4::1

```
C:\Users\Administrator.USER-20190510MA>tracert -d 4::1
通过最多 30 个跃点跟踪到 4::1 的路由
  1    2 ms    1 ms    <1 毫秒  3::1
  2    2 ms    2 ms    1 ms    4::1
跟踪完成。
C:\Users\Administrator.USER-20190510MA>
```

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-GigabitEthernet1/0/2]dis vrrp ipv6 verbose
IPv6 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 : 2710 millisecond left
  Auth type     : None
  Virtual IP    : FE80::1
  Master IP     : FE80::3
VRRP track information:
Track object   : 1                State : Negative Pri reduced : 30
[SW2-GigabitEthernet1/0/2]
```

SW3的VRRP状态为main

```
[SW3]dis vrrp ipv6 verbose
IPv6 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    : FE80::1
  Virtual MAC   : 0000-5e00-0201
  Master IP     : FE80::3
[SW3]
```

此时物理机依然可以PING通4::1

```
管理员: C:\Windows\system32\cmd.exe
最短 = 1ms, 最长 = 4ms, 平均 = 2ms
C:\Users\Administrator.USER-20190510MA>ping 4::1
正在 Ping 4::1 具有 32 字节的数据:
来自 4::1 的回复: 时间=1ms
来自 4::1 的回复: 时间=1ms
来自 4::1 的回复: 时间=1ms
来自 4::1 的回复: 时间=1ms
4::1 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 = 1ms, 平均 = 1ms
```

使用tracert -d 4::1, 物理机去往4::1已经走SW3方向:

```
C:\Users\Administrator.USER-20190510MA>tracert -d 4::1
通过最多 30 个跃点跟踪到 4::1 的路由
  1    1 ms    <1 毫秒  <1 毫秒  3::2
  2    1 ms    1 ms    17 ms  4::1
跟踪完成。
C:\Users\Administrator.USER-20190510MA>
```

由以上测试结果得知, VRRP可以正常切换, 同时在切换后, VLAN10的流量可以正常走SW3方向去往R1.

至此, IPV6之VRRP典型组网配置案例已完成!