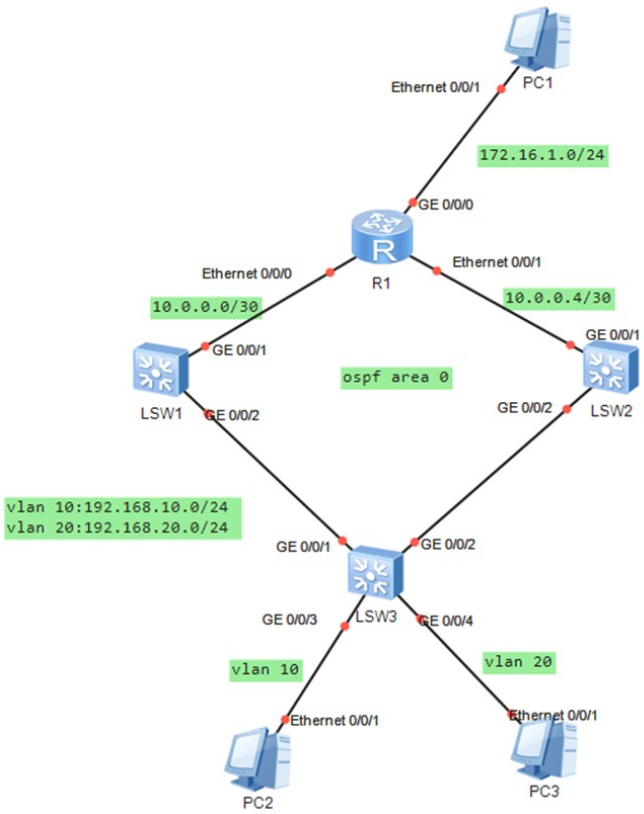
【MVS】华为交换机VRRP+STP典型组网配置案例

可靠性技术 韦家宁 2024-07-08 发表

组网及说明



本案例采用ENSP模拟器来部署VRRP+STP，实现主备和网关冗余，其中LSW1作为STP的根桥和VRRP的主设备，LSW2作为STP的备用根桥和VRRP的备用设备。

配置步骤

1、按照网络拓扑图配置VLAN和IP地址。
2、配置LSW1为STP主设备和VRRP主设备。
3、配置LSW2为STP备设备和VRRP备设备。
4、配置OSPF实现全网三层互通。

配置关键点

LSW3：

```
<Huawei>u t m
Info: Current terminal monitor is off.
<Huawei>u t d
Info: Current terminal debugging is off.
<Huawei>system
Enter system view, return user view with Ctrl+Z.
[Huawei]sysname LSW3
[LSW3]vlan 10
[LSW3-vlan10]quit
[LSW3]vlan 20
[LSW3-vlan20]quit
[LSW3]int gi 0/0/3
[LSW3-GigabitEthernet0/0/3]po li acc
[LSW3-GigabitEthernet0/0/3]po de vlan 10
[LSW3-GigabitEthernet0/0/3]quit
[LSW3]int gi 0/0/4
[LSW3-GigabitEthernet0/0/4]po li acc
[LSW3-GigabitEthernet0/0/4]po de vlan 20
[LSW3-GigabitEthernet0/0/4]quit
[LSW3]int gi 0/0/1
[LSW3-GigabitEthernet0/0/1]po li tr
```

```
[LSW3]int gi 0/0/2
[LSW3-GigabitEthernet0/0/2]po li tr
[LSW3-GigabitEthernet0/0/2]undo po tr all vlan 1
[LSW3-GigabitEthernet0/0/2]po tr all vlan 10 20
[LSW3-GigabitEthernet0/0/2]quit
[LSW3]quit
[LSW3]stp enable
[LSW3]stp mode STP
```

LSW1：

```
<Huawei>u t m
Info: Current terminal monitor is off.
<Huawei>u t d
Info: Current terminal debugging is off.
<Huawei>system
Enter system view, return user view with Ctrl+Z.
[Huawei]sysname LSW1
[LSW1]vlan 10
[LSW1-vlan10]quit
[LSW1]vlan 20
[LSW1-vlan20]quit
[LSW1]stp enable
[LSW1]stp mode STP
[LSW1]stp priority 4096
[LSW1]int vlan 10
[LSW1-Vlanif10]ip address 192.168.10.2 24
[LSW1-Vlanif10]vrrp vrid 1 virtual-ip 192.168.10.1
[LSW1-Vlanif10]vrrp vrid 1 priority 120
[LSW1-Vlanif10]quit
[LSW1]int vlan 20
[LSW1-Vlanif20]ip address 192.168.20.2 24
[LSW1-Vlanif20]vrrp vrid 2 virtual-ip 192.168.20.1
[LSW1-Vlanif20]vrrp vrid 2 priority 120
[LSW1-Vlanif20]quit
[LSW1]int gi 0/0/2
[LSW1-GigabitEthernet0/0/2]po li tr
[LSW1-GigabitEthernet0/0/2]undo po tr all vlan 1
[LSW1-GigabitEthernet0/0/2]po tr all vlan 10 20
[LSW1-GigabitEthernet0/0/2]quit
[LSW1]vlan 100
[LSW1-vlan100]quit
[LSW1]int vlan 100
[LSW1-Vlanif100]ip address 10.0.0.1 30
[LSW1-Vlanif100]quit
[LSW1]int gi 0/0/1
[LSW1]int gi 0/0/1
[LSW1-GigabitEthernet0/0/1]po li acc
[LSW1-GigabitEthernet0/0/1]po de vlan 100
[LSW1-GigabitEthernet0/0/1]quit
[LSW1]ospf 1
[LSW1-ospf-1]silent-interface vlan 10
[LSW1-ospf-1]silent-interface vlan 20
[LSW1-ospf-1]area 0.0.0.0
[LSW1-ospf-1-area-0.0.0.0]network 10.0.0.0 0.0.0.3
[LSW1-ospf-1-area-0.0.0.0]network 192.168.10.0 0.0.0.255
[LSW1-ospf-1-area-0.0.0.0]network 192.168.20.0 0.0.0.255
[LSW1-ospf-1-area-0.0.0.0]quit
[LSW1-ospf-1]quit
```

LSW2：

```
<Huawei>u t m
Info: Current terminal monitor is off.
```

```
<Huawei>u t d
Info: Current terminal debugging is off.
<Huawei>system
Enter system view, return user view with Ctrl+Z.
[Huawei]sysname LSW2
[LSW2]vlan 10
[LSW2-vlan10]quit
[LSW2]vlan 20
[LSW2-vlan20]quit
[LSW2]stp enable
[LSW2]stp mode STP
[LSW2]stp priority 8192
[LSW2]int vlan 10
[LSW2-Vlanif10]ip address 192.168.10.3 24
[LSW2-Vlanif10]vrrp vrid 10 virtual-ip 192.168.10.1
[LSW2-Vlanif10]quit
[LSW2]int vlan 20
[LSW2-Vlanif20]ip address 192.168.20.3 24
[LSW2-Vlanif20]vrrp vrid 2 virtual-ip 192.168.20.1
[LSW2-Vlanif20]quit
[LSW2]int gi 0/0/2
[LSW2-GigabitEthernet0/0/2]po li tr
[LSW2-GigabitEthernet0/0/2]undo po tr all vlan 1
[LSW2-GigabitEthernet0/0/2]po tr all vlan 10 20
[LSW2-GigabitEthernet0/0/2]quit
[LSW2]vlan 101
[LSW2-vlan101]quit
[LSW2]int vlan 101
[LSW2-Vlanif101]ip address 10.0.0.5 30
[LSW2-Vlanif101]quit
[LSW2]int gi 0/0/1
[LSW2-GigabitEthernet0/0/1]po li acc
[LSW2-GigabitEthernet0/0/1]po de vlan 101
[LSW2-GigabitEthernet0/0/1]quit
[LSW2]ospf 1
[LSW2-ospf-1]silent-interface vlan 10
[LSW2-ospf-1]silent-interface vlan 20
[LSW2-ospf-1]area 0.0.0.0
[LSW2-ospf-1-area-0.0.0.0]network 10.0.0.4 0.0.0.3
[LSW2-ospf-1-area-0.0.0.0]network 192.168.10.0 0.0.0.255
[LSW2-ospf-1-area-0.0.0.0]network 192.168.20.0 0.0.0.255
[LSW2-ospf-1-area-0.0.0.0]quit
[LSW2-ospf-1]quit
```

R1：

```
<Huawei>u t m
Info: Current terminal monitor is off.
<Huawei>u t d
Info: Current terminal debugging is off.
<Huawei>system
Enter system view, return user view with Ctrl+Z.
[Huawei]sysname R1
[R1]int eth 0/0/0
[R1-Ethernet0/0/0]ip address 10.0.0.2 30
[R1-Ethernet0/0/0]quit
[R1]int eth 0/0/1
[R1-Ethernet0/0/1]ip address 10.0.0.6 30
[R1-Ethernet0/0/1]ospf cost 100
[R1-Ethernet0/0/1]quit
[R1]int gi 0/0/0
[R1-GigabitEthernet0/0/0]ip address 172.16.1.1 24
[R1-GigabitEthernet0/0/0]quit
[R1]ospf 1
```

[R1-ospf-1]area 0.0.0.0
[R1-ospf-1-area-0.0.0.0]network 10.0.0.0 0.0.0.3
[R1-ospf-1-area-0.0.0.0]network 10.0.0.4 0.0.0.3
[R1-ospf-1-area-0.0.0.0]network 172.16.1.0 0.0.0.255
[R1-ospf-1-area-0.0.0.0]quit
[R1-ospf-1]quit

分别查看LSW1、LSW2、LSW3的STP根桥，目前根桥在LSW1：

```
[LSW1]dis stp brief
 MSTID  Port                        Role  STP State     Protection
   0    GigabitEthernet0/0/1        DESI  FORWARDING      NONE
   0    GigabitEthernet0/0/2        DESI  FORWARDING      NONE
[LSW1]
```

```
[LSW2]dis stp brief
 MSTID  Port                        Role  STP State     Protection
   0    GigabitEthernet0/0/1        DESI  FORWARDING      NONE
   0    GigabitEthernet0/0/2        ROOT  FORWARDING      NONE
[LSW2]
```

```
[LSW3]dis stp brief
 MSTID  Port                        Role  STP State     Protection
   0    GigabitEthernet0/0/1        ROOT  FORWARDING      NONE
   0    GigabitEthernet0/0/2        DESI  FORWARDING      NONE
   0    GigabitEthernet0/0/3        DESI  FORWARDING      NONE
   0    GigabitEthernet0/0/4        DESI  FORWARDING      NONE
```

```
[LSW1]dis stp instance 0
-------[CIST Global Info][Mode STP]-------
CIST Bridge          :4096 .4c1f-cc06-6430
Config Times         :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
Active Times         :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC       :4096 .4c1f-cc06-6430 / 0
CIST RegRoot/IRPC    :4096 .4c1f-cc06-6430 / 0
CIST RootPortId      :0.0
BPDU-Protection      :Disabled
TC or TCN received   :29
TC count per hello   :0
STP Converge Mode    :Normal
Time since last TC   :0 days 0h:24m:32s
Number of TC         :30
Last TC occurred     :GigabitEthernet0/0/2
----[Port26(GigabitEthernet0/0/1)][FORWARDING]----
 Port Protocol       :Enabled
 Port Role           :Designated Port
 Port Priority       :128
 Port Cost(Dot1T )   :Config=auto / Active=20000
 Designated Bridge/Port   :4096.4c1f-cc06-6430 / 128.26
 Port Edged          :Config=default / Active=disabled
 Point-to-point      :Config=auto / Active=true
 Transit Limit       :147 packets/hello-time
 Protection Type     :None
 Port STP Mode       :STP
 Port Protocol Type  :Config=auto / Active=dot1s
 BPDU Encapsulation  :Config=stp / Active=stp
 PortTimes           :Hello 2s MaxAge 20s FwDly 15s RemHop 20
 TC or TCN send      :4
 TC or TCN received  :0
 BPDU Sent           :699
         TCN: 0, Config: 182, RST: 517, MST: 0
 BPDU Received       :0
         TCN: 0, Config: 0, RST: 0, MST: 0
----[Port2(GigabitEthernet0/0/2)][FORWARDING]----
 Port Protocol       :Enabled
 Port Role           :Designated Port
 Port Priority       :128
 Port Cost(Dot1T )   :Config=auto / Active=20000
 Designated Bridge/Port   :4096.4c1f-cc06-6430 / 128.2
 Port Edged          :Config=default / Active=disabled
 Point-to-point      :Config=auto / Active=true
 Transit Limit       :147 packets/hello-time
 Protection Type     :None
 Port STP Mode       :STP
 Port Protocol Type  :Config=auto / Active=dot1s
 BPDU Encapsulation  :Config=stp / Active=stp
 PortTimes           :Hello 2s MaxAge 20s FwDly 15s RemHop 20
 TC or TCN send      :2
 TC or TCN received  :4
 BPDU Sent           :702
         TCN: 0, Config: 184, RST: 518, MST: 0
 BPDU Received       :6
         TCN: 0, Config: 1, RST: 5, MST: 0
```

```
[LSW2]dis stp instance 0
-------[CIST Global Info][Mode STP]-------
CIST Bridge         :8192 .4c1f-ccb0-7f30
Config Times        :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
Active Times        :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC      :4096 .4c1f-cc06-6430 / 40000
CIST RegRoot/IRPC   :8192 .4c1f-ccb0-7f30 / 0
CIST RootPortId     :128.2
BPDU-Protection     :Disabled
TC or TCN received  :33
TC count per hello  :0
STP Converge Mode   :Normal
Time since last TC  :0 days 0h:26m:24s
Number of TC        :29
Last TC occurred    :GigabitEthernet0/0/1
----[Port1(GigabitEthernet0/0/1)][FORWARDING]----
 Port Protocol       :Enabled
 Port Role           :Designated Port
 Port Priority       :128
 Port Cost(Dot1T )   :Config=auto / Active=20000
 Designated Bridge/Port   :8192.4c1f-ccb0-7f30 / 128.1
 Port Edged          :Config=default / Active=disabled
 Point-to-point      :Config=auto / Active=true
 Transit Limit       :147 packets/hello-time
 Protection Type     :None
 Port STP Mode       :STP
 Port Protocol Type  :Config=auto / Active=dot1s
 BPDU Encapsulation  :Config=stp / Active=stp
 PortTimes           :Hello 2s MaxAge 20s FwDly 15s RemHop 20
 TC or TCN send      :1
 TC or TCN received  :0
 BPDU Sent           :730
         TCN: 0, Config: 230, RST: 500, MST: 0
 BPDU Received       :0
         TCN: 0, Config: 0, RST: 0, MST: 0
----[Port2(GigabitEthernet0/0/2)][FORWARDING]----
 Port Protocol       :Enabled
 Port Role           :Root Port
 Port Priority       :128
 Port Cost(Dot1T )   :Config=auto / Active=20000
 Designated Bridge/Port   :32768.4c1f-cc2b-4fb7 / 128.2
 Port Edged          :Config=default / Active=disabled
 Point-to-point      :Config=auto / Active=true
 Transit Limit       :147 packets/hello-time
 Protection Type     :None
 Port STP Mode       :STP
 Port Protocol Type  :Config=auto / Active=dot1s
 BPDU Encapsulation  :Config=stp / Active=stp
 PortTimes           :Hello 2s MaxAge 20s FwDly 15s RemHop 0
 TC or TCN send      :2
 TC or TCN received  :1
 BPDU Sent           :4
         TCN: 0, Config: 1, RST: 3, MST: 0
 BPDU Received       :732
         TCN: 0, Config: 231, RST: 501, MST: 0
```

```
[LSW3]dis stp instance 0
-------[CIST Global Info][Mode STP]-------
CIST Bridge         :32768.4c1f-cc2b-4fb7
Config Times        :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
Active Times        :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC      :4096 .4c1f-cc06-6430 / 20000
CIST RegRoot/IRPC   :32768.4c1f-cc2b-4fb7 / 0
CIST RootPortId     :128.1
BPDU-Protection     :Disabled
TC or TCN received  :26
TC count per hello  :0
STP Converge Mode   :Normal
Time since last TC  :0 days 0h:27m:15s
Number of TC        :39
Last TC occurred    :GigabitEthernet0/0/2
----[Port1(GigabitEthernet0/0/1)][FORWARDING]----
 Port Protocol       :Enabled
 Port Role           :Root Port
 Port Priority       :128
 Port Cost(Dot1T )   :Config=auto / Active=20000
 Designated Bridge/Port   :4096.4c1f-cc06-6430 / 128.2
 Port Edged          :Config=default / Active=disabled
 Point-to-point      :Config=auto / Active=true
 Transit Limit       :147 packets/hello-time
 Protection Type     :None
 Port STP Mode       :STP
 Port Protocol Type  :Config=auto / Active=dot1s
 BPDU Encapsulation  :Config=stp / Active=stp
 PortTimes           :Hello 2s MaxAge 20s FwDly 15s RemHop 0
 TC or TCN send      :5
 TC or TCN received  :2
 BPDU Sent           :8
         TCN: 0, Config: 1, RST: 7, MST: 0
 BPDU Received       :790
         TCN: 0, Config: 257, RST: 533, MST: 0
----[Port2(GigabitEthernet0/0/2)][FORWARDING]----
 Port Protocol       :Enabled
 Port Role           :Designated Port
 Port Priority       :128
 Port Cost(Dot1T )   :Config=auto / Active=20000
 Designated Bridge/Port   :32768.4c1f-cc2b-4fb7 / 128.2
 Port Edged          :Config=default / Active=disabled
 Point-to-point      :Config=auto / Active=true
 Transit Limit       :147 packets/hello-time
 Protection Type     :None
 Port STP Mode       :STP
 Port Protocol Type  :Config=auto / Active=dot1s
 BPDU Encapsulation  :Config=stp / Active=stp
 PortTimes           :Hello 2s MaxAge 20s FwDly 15s RemHop 20
 TC or TCN send      :5
 TC or TCN received  :2
 BPDU Sent           :791
         TCN: 0, Config: 254, RST: 537, MST: 0
 BPDU Received       :6
```

查看LSW1与LSW2的VRRP状态，目前LSW1是主，LSW2是备。

```
<LSW1>dis vrrp brief
VRID  State        Interface                Type     Virtual IP
------------------------------------------------------------------
1     Master       Vlanif10                 Normal   192.168.10.1
2     Master       Vlanif20                 Normal   192.168.20.1
------------------------------------------------------------------
Total:2     Master:2     Backup:0     Non-active:0
```

```
[LSW2]dis vrrp brief
VRID  State        Interface                 Type      Virtual IP
------------------------------------------------------------------
1     Backup       Vlanif10                  Normal    192.168.10.1
2     Backup       Vlanif20                  Normal    192.168.20.1
------------------------------------------------------------------
Total:2     Master:0     Backup:2     Non-active:0
```

查看LSW1、LSW2、R1的OSPF邻居状态，已完成建立。

```
<LSW1>dis ospf peer brief

       OSPF Process 1 with Router ID 192.168.10.2
              Peer Statistic Information
 ----------------------------------------------------------------------------
 Area Id          Interface                     Neighbor id      State
 0.0.0.0          Vlanif100                     10.0.0.2         Full
 ----------------------------------------------------------------------------
<LSW1>
```

```
[LSW2]dis ospf peer brief

       OSPF Process 1 with Router ID 192.168.10.3
              Peer Statistic Information
 ----------------------------------------------------------------------------
 Area Id          Interface                     Neighbor id      State
 0.0.0.0          Vlanif101                     10.0.0.2         Full
 ----------------------------------------------------------------------------
[LSW2]
```

分别查看LSW1、LSW2、R1的路由表，均已学习到对端的业务网段。

```
<LSW1>dis ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 12        Routes : 12

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        10.0.0.0/30  Direct  0    0           D   10.0.0.1        Vlanif100
        10.0.0.1/32  Direct  0    0           D   127.0.0.1       Vlanif100
        10.0.0.4/30  OSPF    10   2           D   10.0.0.2        Vlanif100
      127.0.0.0/8    Direct  0    0           D   127.0.0.1       InLoopBack0
      127.0.0.1/32   Direct  0    0           D   127.0.0.1       InLoopBack0
     172.16.1.0/24   OSPF    10   2           D   10.0.0.2        Vlanif100
   192.168.10.0/24   Direct  0    0           D   192.168.10.2    Vlanif10
   192.168.10.1/32   Direct  0    0           D   127.0.0.1       Vlanif10
   192.168.10.2/32   Direct  0    0           D   127.0.0.1       Vlanif10
   192.168.20.0/24   Direct  0    0           D   192.168.20.2    Vlanif20
   192.168.20.1/32   Direct  0    0           D   127.0.0.1       Vlanif20
   192.168.20.2/32   Direct  0    0           D   127.0.0.1       Vlanif20
```

```
[LSW2]dis ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 12        Routes : 12

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        10.0.0.0/30  OSPF    10   2           D   10.0.0.6        Vlanif101
        10.0.0.4/30  Direct  0    0           D   10.0.0.5        Vlanif101
        10.0.0.5/32  Direct  0    0           D   127.0.0.1       Vlanif101
      127.0.0.0/8    Direct  0    0           D   127.0.0.1       InLoopBack0
      127.0.0.1/32   Direct  0    0           D   127.0.0.1       InLoopBack0
     172.16.1.0/24   OSPF    10   2           D   10.0.0.6        Vlanif101
   192.168.10.0/24   Direct  0    0           D   192.168.10.3    Vlanif10
   192.168.10.1/32   OSPF    10   3           D   10.0.0.6        Vlanif101
   192.168.10.3/32   Direct  0    0           D   127.0.0.1       Vlanif10
   192.168.20.0/24   Direct  0    0           D   192.168.20.3    Vlanif20
   192.168.20.1/32   OSPF    10   3           D   10.0.0.6        Vlanif101
   192.168.20.3/32   Direct  0    0           D   127.0.0.1       Vlanif20

[LSW2]
```

```
[R1]dis ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 12        Routes : 12

Destination/Mask    Proto   Pre  Cost      Flags NextHop         Interface

        10.0.0.0/30  Direct  0    0           D   10.0.0.2        Ethernet0/0/0
        10.0.0.2/32  Direct  0    0           D   127.0.0.1       Ethernet0/0/0
        10.0.0.4/30  Direct  0    0           D   10.0.0.6        Ethernet0/0/1
        10.0.0.6/32  Direct  0    0           D   127.0.0.1       Ethernet0/0/1
       127.0.0.0/8   Direct  0    0           D   127.0.0.1       InLoopBack0
       127.0.0.1/32  Direct  0    0           D   127.0.0.1       InLoopBack0
     172.16.1.0/24   Direct  0    0           D   172.16.1.1      GigabitEthernet
0/0/0
     172.16.1.1/32   Direct  0    0           D   127.0.0.1       GigabitEthernet
0/0/0
   192.168.10.0/24   OSPF    10   2           D   10.0.0.1        Ethernet0/0/0
   192.168.10.1/32   OSPF    10   2           D   10.0.0.1        Ethernet0/0/0
   192.168.20.0/24   OSPF    10   2           D   10.0.0.1        Ethernet0/0/0
   192.168.20.1/32   OSPF    10   2           D   10.0.0.1        Ethernet0/0/0
```

PC分别填写IP地址，且能相互PING通。

PC2

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
Welcome to use PC Simulator!

PC>ping 172.16.1.2

Ping 172.16.1.2: 32 data bytes, Press Ctrl_C to break
From 172.16.1.2: bytes=32 seq=1 ttl=126 time=188 ms
From 172.16.1.2: bytes=32 seq=2 ttl=126 time=140 ms
From 172.16.1.2: bytes=32 seq=3 ttl=126 time=157 ms
From 172.16.1.2: bytes=32 seq=4 ttl=126 time=109 ms
From 172.16.1.2: bytes=32 seq=5 ttl=126 time=125 ms

--- 172.16.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 109/143/188 ms
```

PC3

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
Welcome to use PC Simulator!

PC>ping 172.16.1.2

Ping 172.16.1.2: 32 data bytes, Press Ctrl_C to break
From 172.16.1.2: bytes=32 seq=1 ttl=126 time=172 ms
From 172.16.1.2: bytes=32 seq=2 ttl=126 time=125 ms
From 172.16.1.2: bytes=32 seq=3 ttl=126 time=140 ms
From 172.16.1.2: bytes=32 seq=4 ttl=126 time=110 ms
From 172.16.1.2: bytes=32 seq=5 ttl=126 time=125 ms

--- 172.16.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 110/134/172 ms
```

PC1

基础配置 | 命令行 | 组播 | UDP发包工具 | 串口

```
PC>ping 192.168.10.10

Ping 192.168.10.10: 32 data bytes, Press Ctrl_C to break
From 192.168.10.10: bytes=32 seq=1 ttl=126 time=109 ms
From 192.168.10.10: bytes=32 seq=2 ttl=126 time=110 ms

--- 192.168.10.10 ping statistics ---
  2 packet(s) transmitted
  2 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 109/109/110 ms

PC>ping 192.168.20.10

Ping 192.168.20.10: 32 data bytes, Press Ctrl_C to break
From 192.168.20.10: bytes=32 seq=1 ttl=126 time=156 ms
From 192.168.20.10: bytes=32 seq=2 ttl=126 time=188 ms

--- 192.168.20.10 ping statistics ---
  2 packet(s) transmitted
  2 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 156/172/188 ms
```

以PC2为例做冗余测试，在网络正常时，主走LSW1去访问PC1

```
PC>tracert  172.16.1.2

traceroute to 172.16.1.2, 8 hops max
(ICMP), press Ctrl+C to stop
 1  192.168.10.2   62 ms  47 ms  63 ms
 2  10.0.0.2   93 ms  110 ms  140 ms
 3    *172.16.1.2   94 ms  125 ms

PC>
```

关闭LSW2的所有接口，模拟LSW2故障，PC2去往PC1走LSW2：

```
PC>ping 172.16.1.2

Ping 172.16.1.2: 32 data bytes, Press Ctrl_C to break
Request timeout!
From 172.16.1.2: bytes=32 seq=2 ttl=126 time=125 ms
From 172.16.1.2: bytes=32 seq=3 ttl=126 time=125 ms
From 172.16.1.2: bytes=32 seq=4 ttl=126 time=78 ms
From 172.16.1.2: bytes=32 seq=5 ttl=126 time=109 ms

--- 172.16.1.2 ping statistics ---
  5 packet(s) transmitted
  4 packet(s) received
  20.00% packet loss
  round-trip min/avg/max = 0/109/125 ms
```

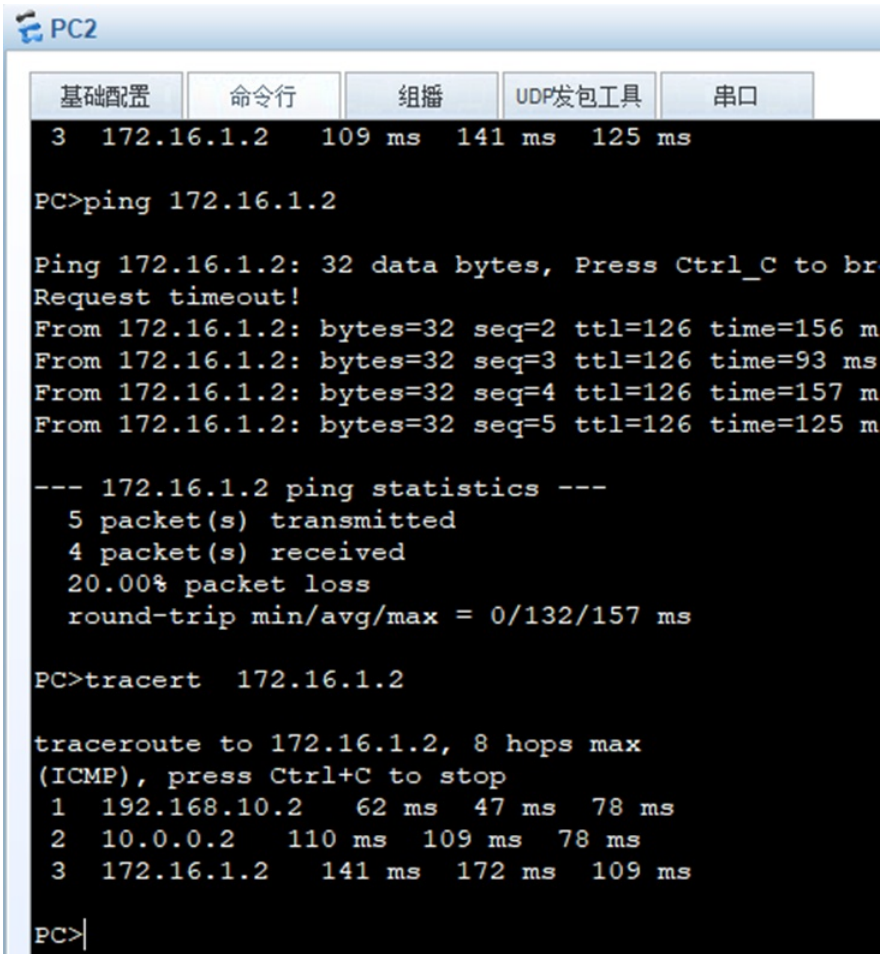
```
PC>tracert  172.16.1.2

traceroute to 172.16.1.2, 8 hops max
(ICMP), press Ctrl+C to stop
 1  192.168.10.3   47 ms  62 ms  63 ms
 2  10.0.0.6   109 ms  94 ms  94 ms
 3  172.16.1.2   109 ms  141 ms  125 ms
```

此时LSW2是VRRP主设备。

```
<LSW2>dis vrrp brief
VRID  State        Interface                Type     Virtual IP
------------------------------------------------------------------
1     Master       Vlanif10                 Normal   192.168.10.1
2     Master       Vlanif20                 Normal   192.168.20.1
------------------------------------------------------------------
Total:2     Master:2     Backup:0     Non-active:0
<LSW2>
```

开启LSW1的所有接口，模拟LSW1恢复使用，业务可以切换到主走LSW1。



从冗余测试的情况来看，VRRP能完成主备切换。

至此，华为交换机VRRP+STP典型组网配置案例已完成！