

知 F1060路由模式典型组网配置案例6 (OSPF虚链路)

设备部署方式 H3C模拟器 韦家宁 2020-03-29 发表

组网及说明



组网说明:

本案例采用H3C HCL模拟器的F1060防火墙来模拟防火墙路由模式的典型部署。为了实现PC之间能够相互通信,因此需要分别在R1、R2、FW1、FW2采用三层互联,同时FW1、FW2采用路由模式,最终实现PC之间能够相互PING通,由于AREA 1不是骨干区域,因此需要在FW1、FW2之间建立OSPF虚链路。

配置步骤

- 1、按照网络拓扑图正确配置IP地址
- 2、R1、FW1、FW2、R2之间采用三层互联
- 3、R1、FW1、FW2、R2之间采用OSPF路由协议实现互通。
- 4、FW1与FW2建立OSPF虚链路

配置关键点

R1:

```
<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname R1
[R1]int loopback 0
[R1-LoopBack0]ip address 1.1.1.1 32
[R1-LoopBack0]quit
[R1]int gi 0/0
[R1-GigabitEthernet0/0]ip address 192.168.1.1 24
[R1-GigabitEthernet0/0]quit
[R1]int gi 0/1
[R1-GigabitEthernet0/1]des <connect to FW1>
[R1-GigabitEthernet0/1]ip address 10.0.0.1 30
[R1-GigabitEthernet0/1]quit
[R1]ospf 1 router-id 1.1.1.1
[R1-ospf-1]area 0.0.0.0
[R1-ospf-1-area-0.0.0.0]network 10.0.0.1 0.0.0.0
[R1-ospf-1-area-0.0.0.0]network 1.1.1.1 0.0.0.0
[R1-ospf-1-area-0.0.0.0]network 192.168.1.0 0.0.0.255
[R1-ospf-1-area-0.0.0.0]quit
[R1-ospf-1]quit
```

R2:

```
<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname R2
[R2]int loopback 0
[R2-LoopBack0]ip address 4.4.4.4 32
[R2-LoopBack0]quit
[R2]int gi 0/0
[R2-GigabitEthernet0/0]ip address 172.16.1.1 24
[R2-GigabitEthernet0/0]quit
[R2]int gi 0/1
```

```
[R2-GigabitEthernet0/1]ip address 10.0.0.9 30
[R2-GigabitEthernet0/1]quit
[R2]ospf 1 router-id 4.4.4.4
[R2-ospf-1]area 0.0.0.2
[R2-ospf-1-area-0.0.0.2]network 10.0.0.9 0.0.0.0
[R2-ospf-1-area-0.0.0.2]network 4.4.4.4 0.0.0.0
[R2-ospf-1-area-0.0.0.2]network 172.16.1.0 0.0.0.255
[R2-ospf-1-area-0.0.0.2]quit
[R2-ospf-1]quit
```

FW1 :

<H3C>sys

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

[H3C]sysname FW1

[FW1]acl basic 2002

[FW1-acl-ipv4-basic-2002]rule 0 permit source any

[FW1-acl-ipv4-basic-2002]quit

[FW1]

[FW1]zone-pair security source trust destination untrust

[FW1-zone-pair-security-Trust-Untrust]packet-filter 2002

[FW1-zone-pair-security-Trust-Untrust]quit

[FW1]

[FW1]zone-pair security source untrust destination trust

[FW1-zone-pair-security-Untrust-Trust]packet-filter 2002

[FW1-zone-pair-security-Untrust-Trust]quit

[FW1]

[FW1]zone-pair security source trust destination local

[FW1-zone-pair-security-Trust-Local]packet-filter 2002

[FW1-zone-pair-security-Trust-Local]quit

[FW1]

[FW1]zone-pair security source local destination trust

[FW1-zone-pair-security-Local-Trust]packet-filter 2002

[FW1-zone-pair-security-Local-Trust]quit

[FW1]

[FW1]zone-pair security source untrust destination local

[FW1-zone-pair-security-Untrust-Local]packet-filter 2002

[FW1-zone-pair-security-Untrust-Local]quit

[FW1]

[FW1]zone-pair security source local destination untrust

[FW1-zone-pair-security-Local-Untrust]packet-filter 2002

[FW1-zone-pair-security-Local-Untrust]quit

[FW1]

[FW1]zone-pair security source trust destination trust

[FW1-zone-pair-security-Trust-Trust]packet-filter 2002

[FW1-zone-pair-security-Trust-Trust]quit

[FW1]

[FW1]zone-pair security source untrust destination untrust

[FW1-zone-pair-security-Untrust-Untrust]packet-filter 2002

[FW1-zone-pair-security-Untrust-Untrust]quit

[FW1]int loopback 0

[FW1-LoopBack0]ip address 2.2.2.2 32

[FW1-LoopBack0]quit

[FW1]int gi 1/0/2

[FW1-GigabitEthernet1/0/2]des <connect to R1>

[FW1-GigabitEthernet1/0/2]ip address 10.0.0.2 30

[FW1-GigabitEthernet1/0/2]quit

[FW1]int gi 1/0/3

[FW1-GigabitEthernet1/0/3]des <connect to FW2>

[FW1-GigabitEthernet1/0/3]ip address 10.0.0.5 30

[FW1-GigabitEthernet1/0/3]quit

[FW1]security-zone name Untrust

[FW1-security-zone-Untrust]im

[FW1-security-zone-Untrust]import in

[FW1-security-zone-Untrust]import interface gi

```
[FW1-security-zone-Untrust]import interface GigabitEthernet 1/0/3
[FW1-security-zone-Untrust]quit
[FW1]security-zone name Trust
[FW1-security-zone-Trust]import interface GigabitEthernet 1/0/2
[FW1-security-zone-Trust]import interface LoopBack 0
[FW1-security-zone-Trust]quit
[FW1]ospf 1 router-id 2.2.2.2
[FW1-ospf-1]area 0.0.0.0
[FW1-ospf-1-area-0.0.0.0]network 10.0.0.2 0.0.0.0
[FW1-ospf-1-area-0.0.0.0]quit
[FW1-ospf-1]area 0.0.0.1
[FW1-ospf-1-area-0.0.0.1]network 10.0.0.5 0.0.0.0
[FW1-ospf-1-area-0.0.0.1]network 2.2.2.2 0.0.0.0
[FW1-ospf-1-area-0.0.0.1]vlink-peer 3.3.3.3
[FW1-ospf-1-area-0.0.0.1]quit
[FW1-ospf-1]quit
```

FW2 :

<H3C>sys

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

```
[H3C]sysname FW2
```

```
[FW2]acl basic 2002
```

```
[FW2-acl-ipv4-basic-2002]rule 0 permit source any
```

```
[FW2-acl-ipv4-basic-2002]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source trust destination untrust
```

```
[FW2-zone-pair-security-Trust-Untrust]packet-filter 2002
```

```
[FW2-zone-pair-security-Trust-Untrust]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source untrust destination trust
```

```
[FW2-zone-pair-security-Untrust-Trust]packet-filter 2002
```

```
[FW2-zone-pair-security-Untrust-Trust]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source trust destination local
```

```
[FW2-zone-pair-security-Trust-Local]packet-filter 2002
```

```
[FW2-zone-pair-security-Trust-Local]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source local destination trust
```

```
[FW2-zone-pair-security-Local-Trust]packet-filter 2002
```

```
[FW2-zone-pair-security-Local-Trust]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source untrust destination local
```

```
[FW2-zone-pair-security-Untrust-Local]packet-filter 2002
```

```
[FW2-zone-pair-security-Untrust-Local]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source local destination untrust
```

```
[FW2-zone-pair-security-Local-Untrust]packet-filter 2002
```

```
[FW2-zone-pair-security-Local-Untrust]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source trust destination trust
```

```
[FW2-zone-pair-security-Trust-Trust]packet-filter 2002
```

```
[FW2-zone-pair-security-Trust-Trust]quit
```

```
[FW2]
```

```
[FW2]zone-pair security source untrust destination untrust
```

```
[FW2-zone-pair-security-Untrust-Untrust]packet-filter 2002
```

```
[FW2-zone-pair-security-Untrust-Untrust]quit
```

```
[FW2]int loopback 0
```

```
[FW2-LoopBack0]ip address 3.3.3.3 32
```

```
[FW2-LoopBack0]quit
```

```
[FW2]int gi 1/0/2
```

```
[FW2-GigabitEthernet1/0/2]des <connect to R2>
```

```
[FW2-GigabitEthernet1/0/2]ip address 10.0.0.10 30
```

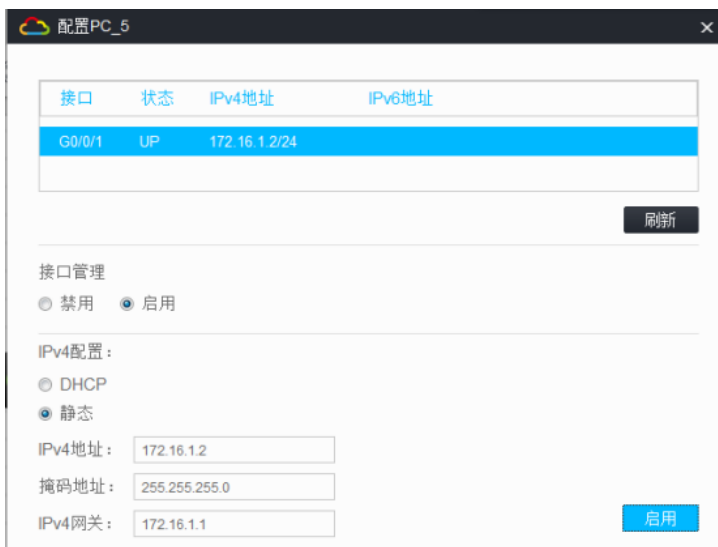
```
[FW2-GigabitEthernet1/0/2]quit
```

```
[FW2]int gi 1/0/3
```

```
[FW2-GigabitEthernet1/0/3]des <connect to FW1>
[FW2-GigabitEthernet1/0/3]ip address 10.0.0.6 30
[FW2-GigabitEthernet1/0/3]quit
[FW2]security-zone name Untrust
[FW2-security-zone-Untrust]import interface GigabitEthernet 1/0/3
[FW2-security-zone-Untrust]quit
[FW2]security-zone name Trust
[FW2-security-zone-Trust]import interface GigabitEthernet 1/0/2
[FW2-security-zone-Trust]import interface LoopBack 0
[FW2-security-zone-Trust]quit
[FW2]ospf 1 router-id 3.3.3.3
[FW2-ospf-1]area 0.0.0.2
[FW2-ospf-1-area-0.0.0.2]network 10.0.0.10 0.0.0.0
[FW2-ospf-1-area-0.0.0.2]quit
[FW2-ospf-1]area 0.0.0.1
[FW2-ospf-1-area-0.0.0.1]network 10.0.0.6 0.0.0.0
[FW2-ospf-1-area-0.0.0.1]network 3.3.3.3 0.0.0.0
[FW2-ospf-1-area-0.0.0.1]vlink-peer 2.2.2.2
[FW2-ospf-1-area-0.0.0.1]quit
[FW2-ospf-1]quit
```

测试:

PC都填写IP地址:



PC之间可以相互PING通:

```

h3c_qcwrmy
MSR36-20_1 MSR36-20_2 F1060_3 PC_4 PC_5
<H3C>Mar 29 09:23:35:581 2020 H3C SHELL/5/SHELL_LOGIN: Console logged in from con0.
<H3C>
<H3C>
<H3C>ping 172.16.1.2
Ping 172.16.1.2 (172.16.1.2): 56 data bytes, press CTRL_C to break
56 bytes from 172.16.1.2: icmp_seq=0 ttl=252 time=3.000 ms
56 bytes from 172.16.1.2: icmp_seq=1 ttl=252 time=3.000 ms
56 bytes from 172.16.1.2: icmp_seq=2 ttl=252 time=4.000 ms
56 bytes from 172.16.1.2: icmp_seq=3 ttl=252 time=3.000 ms
56 bytes from 172.16.1.2: icmp_seq=4 ttl=252 time=3.000 ms
--- Ping statistics for 172.16.1.2 ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 3.000/3.200/4.000/0.400 ms
<H3C>Mar 29 09:23:48:465 2020 H3C PING/6/PING_STATISTICS: Ping statistics for 172.16.1.2:
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss, round-trip min/avg/max/
std-dev = 3.000/3.200/4.000/0.400 ms.

```

```

h3c_qcwrmy
MSR36-20_1 MSR36-20_2 F1060_3 PC_4 PC_5
<H3C>Mar 29 09:23:42:560 2020 H3C SHELL/5/SHELL_LOGIN: Console logged in from con0.
<H3C>ping 192.168.1.2
Ping 192.168.1.2 (192.168.1.2): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.2: icmp_seq=0 ttl=252 time=5.000 ms
56 bytes from 192.168.1.2: icmp_seq=1 ttl=252 time=3.000 ms
56 bytes from 192.168.1.2: icmp_seq=2 ttl=252 time=3.000 ms
56 bytes from 192.168.1.2: icmp_seq=3 ttl=252 time=4.000 ms
56 bytes from 192.168.1.2: icmp_seq=4 ttl=252 time=4.000 ms
--- Ping statistics for 192.168.1.2 ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 3.000/3.800/5.000/0.748 ms
<H3C>Mar 29 09:24:06:924 2020 H3C PING/6/PING_STATISTICS: Ping statistics for 192.168.1.2
: 5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss, round-trip min/avg/max/
std-dev = 3.000/3.800/5.000/0.748 ms.

```

分别查看R1、R2、FW1、FW2的OSPF邻居信息:

```

[R1]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
2.2.2.2     10.0.0.2    1   40           Full/BDR      GE0/1
[R1]

```

```

[R2]dis ospf peer

OSPF Process 1 with Router ID 4.4.4.4
Neighbor Brief Information

Area: 0.0.0.2
Router ID    Address      Pri Dead-Time  State          Interface
3.3.3.3     10.0.0.10   1   35           Full/BDR      GE0/1
[R2]

```

```

[FW1]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
1.1.1.1     10.0.0.1    1   35           Full/DR       GE1/0/2

Area: 0.0.0.1
Router ID    Address      Pri Dead-Time  State          Interface
3.3.3.3     10.0.0.6    1   38           Full/BDR      GE1/0/3

Virtual link:
Router ID    Address      Pri Dead-Time  State          Interface
3.3.3.3     10.0.0.6    1   36           Full          GE1/0/3
[FW1]

```

```

[FW2]dis ospf peer

OSPF Process 1 with Router ID 3.3.3.3
Neighbor Brief Information

Area: 0.0.0.1
Router ID    Address      Pri Dead-Time  State          Interface
2.2.2.2     10.0.0.5    1   38           Full/DR       GE1/0/3

Area: 0.0.0.2
Router ID    Address      Pri Dead-Time  State          Interface
4.4.4.4     10.0.0.9    1   33           Full/DR       GE1/0/2

Virtual link:
Router ID    Address      Pri Dead-Time  State          Interface
2.2.2.2     10.0.0.5    1   33           Full          GE1/0/3
[FW2]

```

分别查看R1、R2、FW1、FW2的路由表:

```
[R1]dis ip routing-table
Destinations : 23          Routes : 23

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_INTER 10  1              10.0.0.2         GE0/1
3.3.3.3/32          O_INTER 10  2              10.0.0.2         GE0/1
4.4.4.4/32          O_INTER 10  3              10.0.0.2         GE0/1
10.0.0.0/30         Direct 0   0              10.0.0.1         GE0/1
10.0.0.0/32         Direct 0   0              10.0.0.1         GE0/1
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         GE0/1
10.0.0.4/30         O_INTER 10  2              10.0.0.2         GE0/1
10.0.0.8/30         O_INTER 10  3              10.0.0.2         GE0/1
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
172.16.1.0/24       O_INTER 10  4              10.0.0.2         GE0/1
192.168.1.0/24      Direct 0   0              192.168.1.1      GE0/0
192.168.1.0/32      Direct 0   0              192.168.1.1      GE0/0
192.168.1.1/32      Direct 0   0              127.0.0.1        InLoop0
192.168.1.255/32    Direct 0   0              192.168.1.1      GE0/0
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
[R1]
```

```
[R2]dis ip routing-table
Destinations : 23          Routes : 23

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_INTER 10  3              10.0.0.10        GE0/1
2.2.2.2/32          O_INTER 10  2              10.0.0.10        GE0/1
3.3.3.3/32          O_INTER 10  1              10.0.0.10        GE0/1
4.4.4.4/32          Direct 0   0              127.0.0.1        InLoop0
10.0.0.0/30         O_INTER 10  3              10.0.0.10        GE0/1
10.0.0.4/30         O_INTER 10  2              10.0.0.10        GE0/1
10.0.0.8/30         Direct 0   0              10.0.0.9         GE0/1
10.0.0.8/32         Direct 0   0              10.0.0.9         GE0/1
10.0.0.9/32         Direct 0   0              127.0.0.1        InLoop0
10.0.0.11/32        Direct 0   0              10.0.0.9         GE0/1
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
172.16.1.0/24       Direct 0   0              172.16.1.1       GE0/0
172.16.1.0/32       Direct 0   0              172.16.1.1       GE0/0
172.16.1.1/32       Direct 0   0              127.0.0.1        InLoop0
172.16.1.255/32     Direct 0   0              172.16.1.1       GE0/0
192.168.1.0/24      O_INTER 10  4              10.0.0.10        GE0/1
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
[R2]
```

```
[FW1]dis ip routing-table
Destinations : 23          Routes : 23

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  1              10.0.0.1         GE1/0/2
2.2.2.2/32          Direct 0   0              127.0.0.1        InLoop0
3.3.3.3/32          O_INTRA 10  1              10.0.0.6         GE1/0/3
4.4.4.4/32          O_INTER 10  2              10.0.0.6         GE1/0/3
10.0.0.0/30         Direct 0   0              10.0.0.2         GE1/0/2
10.0.0.0/32         Direct 0   0              10.0.0.2         GE1/0/2
10.0.0.2/32         Direct 0   0              127.0.0.1        InLoop0
10.0.0.3/32         Direct 0   0              10.0.0.2         GE1/0/2
10.0.0.4/30         Direct 0   0              10.0.0.5         GE1/0/3
10.0.0.4/32         Direct 0   0              10.0.0.5         GE1/0/3
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         GE1/0/3
10.0.0.8/30         O_INTER 10  2              10.0.0.6         GE1/0/3
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
172.16.1.0/24       O_INTER 10  3              10.0.0.6         GE1/0/3
192.168.1.0/24      O_INTRA 10  2              10.0.0.1         GE1/0/2
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
[FW1]
```

```
[FW2]dis ip routing-table
Destinations : 23          Routes : 23

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  2              10.0.0.5          GE1/0/3
2.2.2.2/32          O_INTRA 10  1              10.0.0.5          GE1/0/3
3.3.3.3/32          Direct 0    0              127.0.0.1         InLoop0
4.4.4.4/32          O_INTRA 10  1              10.0.0.9          GE1/0/2
10.0.0.0/30         O_INTRA 10  2              10.0.0.5          GE1/0/3
10.0.0.4/30         Direct 0    0              10.0.0.6          GE1/0/3
10.0.0.4/32         Direct 0    0              10.0.0.6          GE1/0/3
10.0.0.6/32         Direct 0    0              127.0.0.1         InLoop0
10.0.0.7/32         Direct 0    0              10.0.0.6          GE1/0/3
10.0.0.8/30         Direct 0    0              10.0.0.10         GE1/0/2
10.0.0.8/32         Direct 0    0              10.0.0.10         GE1/0/2
10.0.0.10/32        Direct 0    0              127.0.0.1         InLoop0
10.0.0.11/32        Direct 0    0              10.0.0.10         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
172.16.1.0/24       O_INTRA 10  2              10.0.0.9          GE1/0/2
192.168.1.0/24      O_INTRA 10  3              10.0.0.5          GE1/0/3
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
[FW2]
```

至此，F1060路由模式典型组网配置案例6（OSPF虚链路）已完成！