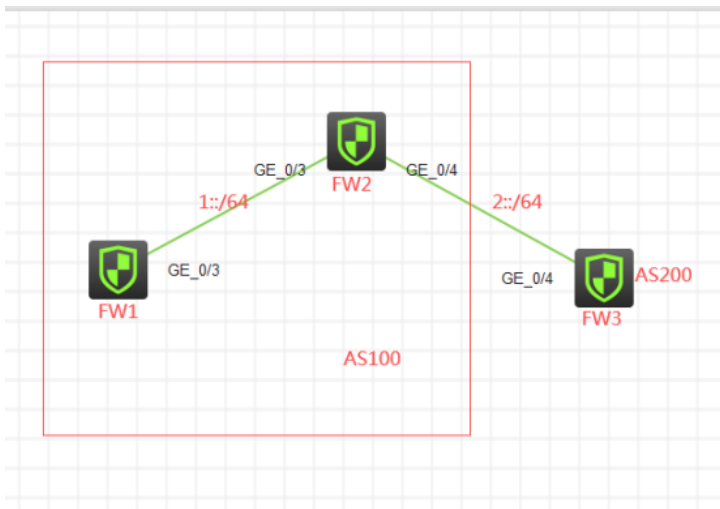


知 F1060 IPV6 BGP4+ RR一级路由反射器典型组网配置案例

设备部署方式 H3C模拟器 韦家宁 2020-04-11 发表

组网及说明



组网说明:

本案例使用H3C HCL模拟器的F1060防火墙来模拟IPv6 BGP一级RR路由反射器的典型组网配置。FW 1、FW2属于AS100，FW3属于AS200。由于FW1与FW3没有互联，又想实现PC的互通，因此需要采用RR路由反射器技术，FW2为FW1的RR路由反射器，FW1为FW2的RR路由反射器的客户端。为了使得FW1与FW2之间能够建立IBGP邻居关系及达到路由反射的效果，因此FW1与FW2之间同时运行OSPFV3路由协议，为IBGP邻居的建立及路由反射提供承载。最后FW2与FW3之间建立IBGP邻居关系。

IP地址规划如下:

设备名称	接口/VLAN	IP地址	子网掩码位数	备注
FW1	Gi 1/0/3	1::1	64	
	Loopback 10	3::1	64	模拟业务
	Loopback 0	1.1.1.1	32	Ipv4 Router-id
	Loopback 1	7::1	64	Ipv6 Router-id
FW2	Gi 1/0/3	1::2	64	
	Gi 1/0/4	2::1	64	
	Loopback 0	3.3.3.3	32	Ipv4 Router-id
	Loopback 1	8::1	64	Ipv6 Router-id
FW3	Gi 1/0/4	2::2	64	
	Loopback 10	5::1	64	模拟业务
	Loopback 0	2.2.2.2	32	Ipv4 Router-id
	Loopback 1	9::1	64	Ipv6 Router-id

配置步骤

FW1:

```
<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname FW1
[FW1]acl ipv6 basic 2001
[FW1-acl-ipv6-basic-2001]rule 0 permit source any
[FW1-acl-ipv6-basic-2001]quit
[FW1]zone-pair security source trust destination untrust
[FW1-zone-pair-security-Trust-Untrust]packet-filter ipv6 2001
[FW1-zone-pair-security-Trust-Untrust]quit
[FW1]zone-pair security source untrust destination trust
[FW1-zone-pair-security-Untrust-Trust]packet-filter ipv6 2001
[FW1-zone-pair-security-Untrust-Trust]quit
[FW1]zone-pair security source trust destination local
[FW1-zone-pair-security-Trust-Local]packet-filter ipv6 2001
[FW1-zone-pair-security-Trust-Local]quit
```

```

[FW1]zone-pair security source local destination trust
[FW1-zone-pair-security-Local-Trust]packet-filter ipv6 2001
[FW1-zone-pair-security-Local-Trust]quit
[FW1]zone-pair security source untrust destination local
[FW1-zone-pair-security-Untrust-Local]packet-filter ipv6 2001
[FW1-zone-pair-security-Untrust-Local]quit
[FW1]zone-pair security source local destination untrust
[FW1-zone-pair-security-Local-Untrust]packet-filter ipv6 2001
[FW1-zone-pair-security-Local-Untrust]quit
[FW1]zone-pair security source trust destination trust
[FW1-zone-pair-security-Trust-Trust]packet-filter ipv6 2001
[FW1-zone-pair-security-Trust-Trust]quit
[FW1]zone-pair security source untrust destination untrust
[FW1-zone-pair-security-Untrust-Untrust]packet-filter ipv6 2001
[FW1-zone-pair-security-Untrust-Untrust]quit
[FW1]int loopback 0
[FW1-LoopBack0]ip address 1.1.1.1 32
[FW1-LoopBack0]quit
[FW1]int loopback 1
[FW1-LoopBack1]ipv6 address 7::1 64
[FW1-LoopBack1]quit
[FW1]int loopback 10
[FW1-LoopBack10]ipv6 address 3::1 64
[FW1-LoopBack10]quit
[FW1]int gi 1/0/3
[FW1-GigabitEthernet1/0/3]port link-mode route
[FW1-GigabitEthernet1/0/3]description <connect to FW2>
[FW1-GigabitEthernet1/0/3]ipv6 address 1::1 64
[FW1-GigabitEthernet1/0/3]quit
[FW1]ospfv3 1
[FW1-ospfv3-1]router-id 1.1.1.1
[FW1-ospfv3-1]quit
[FW1]int gi 1/0/3
[FW1-GigabitEthernet1/0/3]ospfv3 1 area 0
[FW1-GigabitEthernet1/0/3]quit
[FW1]int loopback 1
[FW1-LoopBack1]ospfv3 1 area 0
[FW1-LoopBack1]quit
[FW1]bgp 100
[FW1-bgp-default]router-id 1.1.1.1
[FW1-bgp-default]peer 8::1 as-number 100
[FW1-bgp-default]peer 8::1 connect-interface LoopBack 1
[FW1-bgp-default]address-family ipv6 unicast
[FW1-bgp-default-ipv6]peer 8::1 enable
[FW1-bgp-default-ipv6]network 3:: 64
[FW1-bgp-default-ipv6]quit
[FW1-bgp-default]quit
[FW1]security-zone name Untrust
[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 LoopBack 10
[FW1-security-zone-Trust]import interface LoopBack 1
[FW1-security-zone-Trust]quit

```

FW2:

```

<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname FW2
[FW2]acl ipv6 basic 2001
[FW2-acl-ipv6-basic-2001]rule 0 permit source any
[FW2-acl-ipv6-basic-2001]quit
[FW2]zone-pair security source trust destination untrust
[FW2-zone-pair-security-Trust-Untrust]packet-filter ipv6 2001

```

```
[FW2-zone-pair-security-Trust-Untrust]quit
[FW2]zone-pair security source untrust destination trust
[FW2-zone-pair-security-Untrust-Trust]packet-filter ipv6 2001
[FW2-zone-pair-security-Untrust-Trust]quit
[FW2]zone-pair security source trust destination local
[FW2-zone-pair-security-Trust-Local]packet-filter ipv6 2001
[FW2-zone-pair-security-Trust-Local]quit
[FW2]zone-pair security source local destination trust
[FW2-zone-pair-security-Local-Trust]packet-filter ipv6 2001
[FW2-zone-pair-security-Local-Trust]quit
[FW2]zone-pair security source untrust destination local
[FW2-zone-pair-security-Untrust-Local]packet-filter ipv6 2001
[FW2-zone-pair-security-Untrust-Local]quit
[FW2]zone-pair security source local destination untrust
[FW2-zone-pair-security-Local-Untrust]packet-filter ipv6 2001
[FW2-zone-pair-security-Local-Untrust]quit
[FW2]zone-pair security source trust destination trust
[FW2-zone-pair-security-Trust-Trust]packet-filter ipv6 2001
[FW2-zone-pair-security-Trust-Trust]quit
[FW2]zone-pair security source untrust destination untrust
[FW2-zone-pair-security-Untrust-Untrust]packet-filter ipv6 2001
[FW2-zone-pair-security-Untrust-Untrust]quit
[FW2]int loopback 1
[FW2-LoopBack1]ipv6 address 8::1 64
[FW2-LoopBack1]quit
[FW2]int gi 1/0/3
[FW2-GigabitEthernet1/0/3]port link-mode route
[FW2-GigabitEthernet1/0/3]des <connect to FW1>
[FW2-GigabitEthernet1/0/3]ipv6 address 1::2 64
[FW2-GigabitEthernet1/0/3]quit
[FW2]int gi 1/0/4
[FW2-GigabitEthernet1/0/4]port link-mode route
[FW2-GigabitEthernet1/0/4]des <connect to FW3>
[FW2-GigabitEthernet1/0/4]ipv6 address 2::1 64
[FW2-GigabitEthernet1/0/4]quit
[FW2]ospfv3 1
[FW2-ospfv3-1]router-id 3.3.3.3
[FW2-ospfv3-1]import-route direct
[FW2-ospfv3-1]quit
[FW2]int gi 1/0/3
[FW2-GigabitEthernet1/0/3]ospfv3 1 area 0
[FW2-GigabitEthernet1/0/3]quit
[FW2]int gi 1/0/4
[FW2-GigabitEthernet1/0/4]ospfv3 1 area 0
[FW2-GigabitEthernet1/0/4]quit
[FW2]int loopback 1
[FW2-LoopBack1]ospfv3 1 area 0
[FW2-LoopBack1]quit
[FW2]bgp 100
[FW2-bgp-default]router-id 3.3.3.3
[FW2-bgp-default]peer 7::1 as-number 100
[FW2-bgp-default]peer 7::1 connect-interface LoopBack 1
[FW2-bgp-default]peer 2::2 as-number 200
[FW2-bgp-default]address-family ipv6 unicast
[FW2-bgp-default-ipv6]import-route direct
[FW2-bgp-default-ipv6]peer 7::1 enable
[FW2-bgp-default-ipv6]peer 7::1 reflect-client //指向7::1作为RR反射器客户端
[FW2-bgp-default-ipv6]peer 2::2 enable
[FW2-bgp-default-ipv6]quit
[FW2-bgp-default]quit
[FW2]security-zone name Untrust
[FW2-security-zone-Untrust]import interface GigabitEthernet 1/0/4
[FW2-security-zone-Untrust]quit
[FW2]security-zone name Trust
```

```
[FW2-security-zone-Trust]import interface GigabitEthernet 1/0/3
[FW2-security-zone-Trust]import interface LoopBack 1
[FW2-security-zone-Trust]quit
```

FW3 :

```
<H3C>sys
```

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

```
[H3C]sysname FW3
```

```
[FW3]acl ipv6 basic 2001
```

```
[FW3-acl-ipv6-basic-2001]rule 0 permit source any
```

```
[FW3-acl-ipv6-basic-2001]quit
```

```
[FW3]zone-pair security source trust destination untrust
```

```
[FW3-zone-pair-security-Trust-Untrust]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Trust-Untrust]quit
```

```
[FW3]zone-pair security source untrust destination trust
```

```
[FW3-zone-pair-security-Untrust-Trust]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Untrust-Trust]quit
```

```
[FW3]zone-pair security source trust destination local
```

```
[FW3-zone-pair-security-Trust-Local]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Trust-Local]quit
```

```
[FW3]zone-pair security source local destination trust
```

```
[FW3-zone-pair-security-Local-Trust]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Local-Trust]quit
```

```
[FW3]zone-pair security source untrust destination local
```

```
[FW3-zone-pair-security-Untrust-Local]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Untrust-Local]quit
```

```
[FW3]zone-pair security source local destination untrust
```

```
[FW3-zone-pair-security-Local-Untrust]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Local-Untrust]quit
```

```
[FW3]zone-pair security source trust destination trust
```

```
[FW3-zone-pair-security-Trust-Trust]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Trust-Trust]quit
```

```
[FW3]zone-pair security source untrust destination untrust
```

```
[FW3-zone-pair-security-Untrust-Untrust]packet-filter ipv6 2001
```

```
[FW3-zone-pair-security-Untrust-Untrust]quit
```

```
[FW3]int loopback 0
```

```
[FW3-LoopBack0]ip address 2.2.2.2 32
```

```
[FW3-LoopBack0]quit
```

```
[FW3]int loopback 1
```

```
[FW3-LoopBack1]ipv6 address 9::1 64
```

```
[FW3-LoopBack1]quit
```

```
[FW3]int loopback 10
```

```
[FW3-LoopBack10]ipv6 address 5::1 64
```

```
[FW3-LoopBack10]quit
```

```
[FW3]int gi 1/0/4
```

```
[FW3-GigabitEthernet1/0/4]port link-mode route
```

```
[FW3-GigabitEthernet1/0/4]description <connect to FW2>
```

```
[FW3-GigabitEthernet1/0/4]ipv6 address 2::2 64
```

```
[FW3-GigabitEthernet1/0/4]quit
```

```
[FW3]bgp 200
```

```
[FW3-bgp-default]router-id 2.2.2.2
```

```
[FW3-bgp-default]peer 2::1 as-number 100
```

```
[FW3-bgp-default]address-family ipv6 unicast
```

```
[FW3-bgp-default-ipv6]peer 2::1 enable
```

```
[FW3-bgp-default-ipv6]network 5:: 64
```

```
[FW3-bgp-default-ipv6]quit
```

```
[FW3-bgp-default]quit
```

```
[FW3]security-zone name Untrust
```

```
[FW3-security-zone-Untrust]import interface GigabitEthernet 1/0/4
```

```
[FW3-security-zone-Untrust]quit
```

```
[FW3]security-zone name Trust
```

```
[FW3-security-zone-Trust]import interface LoopBack 10
```

```
[FW3-security-zone-Trust]import interface LoopBack 1
```

```
[FW3-security-zone-Trust]quit
```

测试:

FW1的loopback 10能与FW3的loopback 10互通:

```
<FW1>ping ipv6 -a 3::1 5::1
Ping6(56 data bytes) 3::1 --> 5::1, press CTRL_C to break
56 bytes from 5::1, icmp_seq=0 hlim=63 time=2.000 ms
56 bytes from 5::1, icmp_seq=1 hlim=63 time=2.000 ms
56 bytes from 5::1, icmp_seq=2 hlim=63 time=1.000 ms
56 bytes from 5::1, icmp_seq=3 hlim=63 time=1.000 ms
56 bytes from 5::1, icmp_seq=4 hlim=63 time=1.000 ms

--- Ping6 statistics for 5::1 ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 1.000/1.400/2.000/0.490 ms
<FW1>Apr 11 09:50:44:191 2020 FW1 PING/6/PING_STATISTICS: -Context=1; P
nd-trip min/avg/max/std-dev = 1.000/1.400/2.000/0.490 ms.
```

```
[FW3]ping ipv6 -a 5::1 3::1
Ping6(56 data bytes) 5::1 --> 3::1, press CTRL_C to break
56 bytes from 3::1, icmp_seq=0 hlim=63 time=2.000 ms
56 bytes from 3::1, icmp_seq=1 hlim=63 time=1.000 ms
56 bytes from 3::1, icmp_seq=2 hlim=63 time=1.000 ms
56 bytes from 3::1, icmp_seq=3 hlim=63 time=1.000 ms
56 bytes from 3::1, icmp_seq=4 hlim=63 time=1.000 ms

--- Ping6 statistics for 3::1 ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 1.000/1.200/2.000/0.400 ms
[FW3]Apr 11 09:51:52:079 2020 FW3 PING/6/PING_STATISTICS: -Context=
nd-trip min/avg/max/std-dev = 1.000/1.200/2.000/0.400 ms.
```

分别查看FW1、FW2的OSPFV3邻居信息:

```
<FW1>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         00:00:37 0      GE1/0/3
<FW1>
```

```
[FW2]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          00:00:37 0      GE1/0/3
[FW2]
```

分别查看FW1、FW2、FW3的BGP4+邻居信息:

```
<FW1>dis bgp peer ipv6

BGP local router ID: 1.1.1.1
Local AS number: 100
Total number of peers: 1                Peers in established state: 1

* - Dynamically created peer
Peer      AS  MsgRcvd  MsgSent  OutQ  PrefRcv  Up/Down  State
8::1     100    15      13      0     4 00:07:51 Established
<FW1>
```

```
[FW2]dis bgp peer ipv6

BGP local router ID: 3.3.3.3
Local AS number: 100
Total number of peers: 2                Peers in established state: 2

* - Dynamically created peer
Peer      AS  MsgRcvd  MsgSent  OutQ  PrefRcv  Up/Down  State
2::2     200     7        8      0     1 00:03:07 Established
7::1     100    14       15      0     1 00:08:24 Established
[FW2]
```

```
[FW3]dis bgp peer ipv6
BGP local router ID: 2.2.2.2
Local AS number: 200
Total number of peers: 1          Peers in established state: 1
* - Dynamically created peer
Peer          AS  MsgRcvd  MsgSent  OutQ  PrefRcv  Up/Down  State
2::1         100    9        7        0     4 00:03:13  Established
[FW3]
```

分别查看FW1、FW2、FW3的IPV6路由表:

<FW1>dis ipv6 routing-table

Destinations : 13 Routes : 13

```

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

Destination: 1::/64          Protocol : Direct
NextHop   : ::              Preference: 0
Interface : GE1/0/3          Cost    : 0

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

Destination: 2::/64          Protocol : O_INTRA
NextHop   : FE80::3CE1:18FF:FEDC:208 Preference: 10
Interface : GE1/0/3          Cost    : 2

Destination: 3::/64          Protocol : Direct
NextHop   : ::              Preference: 0
Interface : Loop10           Cost    : 0

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

Destination: 5::/64          Protocol : BGP4+
NextHop   : 2::2             Preference: 255
Interface : GE1/0/3          Cost    : 0

Destination: 7::/64          Protocol : Direct
NextHop   : ::              Preference: 0
Interface : Loop1            Cost    : 0

Destination: 7::1/128        Protocol : Direct
NextHop   : ::1             Preference: 0
Interface : InLoop0          Cost    : 0

Destination: 8::/64          Protocol : O_ASE2
NextHop   : FE80::3CE1:18FF:FEDC:208 Preference: 150
Interface : GE1/0/3          Cost    : 1

Destination: 8::1/128        Protocol : O_INTRA
NextHop   : FE80::3CE1:18FF:FEDC:208 Preference: 10
Interface : GE1/0/3          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
<FW1>

[FW2]dis ipv6 routing-table

Destinations : 12 Routes : 12

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

Destination: 1::/64 Protocol : Direct
NextHop : :: Preference: 0
Interface : GE1/0/3 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 : GE1/0/4 Cost : 0

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

Destination: 3::/64 Protocol : BGP4+
NextHop : 7::1 Preference: 255
Interface : GE1/0/3 Cost : 0

Destination: 5::/64 Protocol : BGP4+
NextHop : 2::2 Preference: 255
Interface : GE1/0/4 Cost : 0

Destination: 7::1/128 Protocol : O_INTRA
NextHop : FE80::3CE1:11FF:FEA6:108 Preference: 10
Interface : GE1/0/3 Cost : 1

Destination: 8::/64 Protocol : Direct
NextHop : :: Preference: 0
Interface : Loop1 Cost : 0

Destination: 8::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

[FW2]

[FW3]dis ipv6 routing-table

Destinations : 12 Routes : 12

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

```
Destination: 1::/64          Protocol : BGP4+
NextHop   : 2::1            Preference: 255
Interface : GE1/0/4         Cost     : 0

Destination: 2::/64          Protocol : Direct
NextHop   : ::              Preference: 0
Interface : GE1/0/4         Cost     : 0

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

Destination: 3::/64          Protocol : BGP4+
NextHop   : 2::1            Preference: 255
Interface : GE1/0/4         Cost     : 0

Destination: 5::/64          Protocol : Direct
NextHop   : ::              Preference: 0
Interface : Loop10          Cost     : 0

Destination: 5::1/128        Protocol : Direct
NextHop   : ::1             Preference: 0
Interface : InLoop0         Cost     : 0

Destination: 8::/64          Protocol : BGP4+
NextHop   : 2::1            Preference: 255
Interface : GE1/0/4         Cost     : 0

Destination: 9::/64          Protocol : Direct
NextHop   : ::              Preference: 0
Interface : Loop1           Cost     : 0

Destination: 9::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
[FW3]
```

至此，F1060 BGP4+ RR一级路由反射器典型组网配置案例已完成！

配置关键点