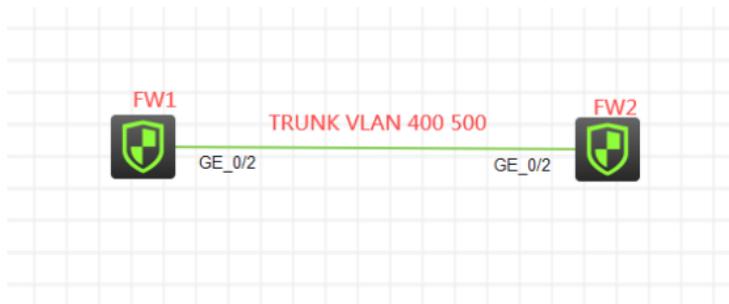


知 F1060防火墙IPv6多VPN实例ISIS典型组网配置案例

设备部署方式 H3C模拟器 韦家宁 2020-04-04 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IPv6多VPN实例ISIS典型组网配置。为了实现业务的相互隔离，需要将不同的业务绑定到不同的VPN实例中进行业务的互通，因此在本案例引入多实例VPN，将相关的业务进行捆绑。FW1与FW2采用路由模式，FW1与FW2的互联使用trunk，允许VLAN 400 VLAN 500通过，最终建立多VPN实例ISIS邻居关系，宣告业务网段，使得相同VPN实例的业务能互通，不同VPN实例的业务不能互通。

VPN实例规划如下:

VPN实例名称	RD值	RT值	业务类型	备注
vpn-rt	100:1	100:1	实时业务	
vpn-nrt	200:1	200:1	非实时业务	

IP地址规划如下:

设备名称	接口/VLAN	IPv4/IPv6地址	IPv4/IPv6地址位数	所属VPN实例	备注
FW1	VLAN 400	1::1	64	vpn-rt	互联
	VLAN 500	1::1	64	vpn-nrt	互联
	Loopback 10	2::1	64	vpn-rt	模拟业务
	Loopback 20	3::1	64	vpn-nrt	模拟业务
	Loopback 0	1.1.1.1	32	vpn-rt	作为vpn-rt router-id
	Loopback 1	2.2.2.2	32	vpn-nrt	作为vpn-nrt router-id
FW2	VLAN 400	1::2	64	vpn-rt	互联
	VLAN 500	1::2	64	vpn-nrt	互联
	Loopback 10	4::1	64	vpn-rt	模拟业务
	Loopback 20	5::1	64	vpn-nrt	模拟业务
	Loopback 0	3.3.3.3	32	vpn-rt	作为vpn-rt router-id
	Loopback 1	4.4.4.4	32	vpn-nrt	作为vpn-nrt router-id

配置步骤

FW1:

```
sys
System View: return to User View with Ctrl+Z.
[H3C]sysname FW1
#创建VPN实例，指定RD值、RT值
[FW1]ip vpn-instance vpn-rt
[FW1-vpn-instance-vpn-rt]route-distinguisher 100:1
[FW1-vpn-instance-vpn-rt]vpn-target 100:1
[FW1-vpn-instance-vpn-rt]quit
[FW1]ip vpn-instance vpn-nrt
[FW1-vpn-instance-vpn-nrt]route-distinguisher 200:1
[FW1-vpn-instance-vpn-nrt]vpn-target 200:1
[FW1-vpn-instance-vpn-nrt]quit
[FW1]acl ipv6 basic 2001
[FW1-acl-ipv6-basic-2001]rule 0 permit source any
[FW1-acl-ipv6-basic-2001]rule 1 permit source any vpn-instance vpn-rt
[FW1-acl-ipv6-basic-2001]rule 2 permit source any vpn-instance vpn-nrt
```

```
[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]vlan 400
[FW1-vlan400]quit
[FW1]vlan 500
[FW1-vlan500]quit
[FW1]int vlan 400
[FW1-Vlan-interface400]ip binding vpn-instance vpn-rt //将VLAN绑定到VPN实例
[FW1-Vlan-interface400]des
[FW1-Vlan-interface400]ipv6 address 1::1 64
[FW1-Vlan-interface400]quit
[FW1]int vlan 500
[FW1-Vlan-interface500]ip binding vpn-instance vpn-nrt
[FW1-Vlan-interface500]des
[FW1-Vlan-interface500]ipv6 address 1::1 64
[FW1-Vlan-interface500]quit
[FW1]int gi 1/0/2
[FW1-GigabitEthernet1/0/2]port link-mode bridge
[FW1-GigabitEthernet1/0/2]port link-type trunk
[FW1-GigabitEthernet1/0/2]undo port trunk permit vlan 1
[FW1-GigabitEthernet1/0/2]port trunk permit vlan 400 500
[FW1-GigabitEthernet1/0/2]quit
[FW1]int loopback 10
[FW1-LoopBack10]ip binding vpn-instance vpn-rt
[FW1-LoopBack10]ipv6 address 2::1 64
[FW1-LoopBack10]quit
[FW1]int loopback 20
[FW1-LoopBack20]ip binding vpn-instance vpn-nrt
[FW1-LoopBack20]ipv6 address 3::1 64
[FW1-LoopBack20]quit
[FW1]int loopback 0
[FW1-LoopBack0]ip binding vpn-instance vpn-rt
[FW1-LoopBack0]ip address 1.1.1.1 32
[FW1-LoopBack0]quit
[FW1]int loopback 1
[FW1-LoopBack1]ip binding vpn-instance vpn-nrt
[FW1-LoopBack1]ip address 2.2.2.2 32
[FW1-LoopBack1]quit
[FW1]security-zone name Untrust
[FW1-security-zone-Untrust]import interface LoopBack 0
[FW1-security-zone-Untrust]import interface LoopBack 1
```

```
[FW1-security-zone-Untrust]import interface vlan 400
[FW1-security-zone-Untrust]import interface vlan 500
[FW1-security-zone-Untrust]import interface GigabitEthernet 1/0/2 vlan 400 500
[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 20
[FW1-security-zone-Trust]quit
[FW1]isis 10 vpn-instance vpn-rt //将ISIS进程绑定到VPN实例
[FW1-isis-10]network 10.0000.0000.0001.00
[FW1-isis-10]jis-level level-1
[FW1-isis-10]address-family ipv6 unicast
[FW1-isis-10-ipv6]import-route direct
[FW1-isis-10-ipv6]quit
[FW1-isis-10]quit
[FW1]isis 20 vpn-instance vpn-nrt
[FW1-isis-20]network-entity 10.0000.0000.0001.00
[FW1-isis-20]jis-level level-1
[FW1-isis-20]address-family ipv6 unicast
[FW1-isis-20-ipv6]import-route direct
[FW1-isis-20-ipv6]quit
[FW1-isis-20]quit
[FW1]int LoopBack 10
[FW1-LoopBack10]isis ipv6 enable 10
[FW1-LoopBack10]quit
[FW1]int vlan 400
[FW1-Vlan-interface400]isis ipv6 enable 10
[FW1-Vlan-interface400]quit
[FW1]int loopback 20
[FW1-LoopBack20]isis ipv6 enable 20
[FW1-LoopBack20]quit
[FW1]int vlan 500
[FW1-Vlan-interface500]isis ipv6 enable 20
[FW1-Vlan-interface500]quit
```

FW2:

sys

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

```
[H3C]sysname FW2
```

```
[FW2]ip vpn-instance vpn-rt
```

```
[FW2-vpn-instance-vpn-rt]route-distinguisher 100:1
```

```
[FW2-vpn-instance-vpn-rt]vpn-target 100:1
```

```
[FW2-vpn-instance-vpn-rt]quit
```

```
[FW2]ip vpn-instance vpn-nrt
```

```
[FW2-vpn-instance-vpn-nrt]route-distinguisher 200:1
```

```
[FW2-vpn-instance-vpn-nrt]vpn-target 200:1
```

```
[FW2-vpn-instance-vpn-nrt]quit
```

```
[FW2]acl ipv6 basic 2001
```

```
[FW2-acl-ipv6-basic-2001]rule 0 permit source any
```

```
[FW2-acl-ipv6-basic-2001]rule 1 permit source any vpn-instance vpn-rt
```

```
[FW2-acl-ipv6-basic-2001]rule 2 permit source any vpn-instance vpn-nrt
```

```
[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]vlan 400
[FW2-vlan400]quit
[FW2]vlan 500
[FW2-vlan500]quit
[FW2]int vlan 400
[FW2-Vlan-interface400]ip binding vpn-instance vpn-rt
Some configurations on the interface are removed.
[FW2-Vlan-interface400]des
[FW2-Vlan-interface400]ipv6 address 1::2 64
[FW2-Vlan-interface400]quit
[FW2]int vlan 500
[FW2-Vlan-interface500]ip binding vpn-instance vpn-nrt
Some configurations on the interface are removed.
[FW2-Vlan-interface500]des
[FW2-Vlan-interface500]ipv6 address 1::2 64
[FW2-Vlan-interface500]quit
[FW2]int LoopBack 10
[FW2-LoopBack10]ip binding vpn-instance vpn-rt
Some configurations on the interface are removed.
[FW2-LoopBack10]ipv6 address 4::1 64
[FW2-LoopBack10]quit
[FW2]int loopback 20
[FW2-LoopBack20]ip binding vpn-instance vpn-nrt
Some configurations on the interface are removed.
[FW2-LoopBack20]ipv6 address 5::1 64
[FW2-LoopBack20]quit
[FW2]int loopback 0
[FW2-LoopBack0]ip binding vpn-instance vpn-rt
Some configurations on the interface are removed.
[FW2-LoopBack0]ip address 3.3.3.3 32
[FW2-LoopBack0]quit
[FW2]int loopback 1
[FW2-LoopBack1]ip binding vpn-instance vpn-nrt
Some configurations on the interface are removed.
[FW2-LoopBack1]ip address 4.4.4.4 32
[FW2-LoopBack1]quit
[FW2]int gi 1/0/2
[FW2-GigabitEthernet1/0/2]port link-mode bridge
[FW2-GigabitEthernet1/0/2]des
[FW2-GigabitEthernet1/0/2]port link-type trunk
[FW2-GigabitEthernet1/0/2]undo port trunk permit vlan 1
[FW2-GigabitEthernet1/0/2]port trunk permit vlan 400 500
[FW2-GigabitEthernet1/0/2]quit
[FW2]security-zone name Trust
[FW2-security-zone-Trust]import interface LoopBack 10
[FW2-security-zone-Trust]import interface LoopBack 20
[FW2-security-zone-Trust]quit
[FW2]security-zone name Untrust
[FW2-security-zone-Untrust]import interface LoopBack 0
[FW2-security-zone-Untrust]import interface LoopBack 1
[FW2-security-zone-Untrust]import interface GigabitEthernet 1/0/2 vlan 400 500
[FW2-security-zone-Untrust]import interface vlan 400
```

```

[FW2-security-zone-Untrust]import interface vlan 500
[FW2-security-zone-Untrust]quit
[FW2]isis 10 vpn-instance vpn-rt
[FW2-isis-10]network-entity 10.0000.0000.0002.00
[FW2-isis-10]jis-level level-1
[FW2-isis-10]address-family ipv6 unicast
[FW2-isis-10-ipv6]import-route direct
[FW2-isis-10-ipv6]quit
[FW2-isis-10]quit
[FW2]isis 20 vpn-instance vpn-nrt
[FW2-isis-20]network-entity 10.0000.0000.0002.00
[FW2-isis-20]jis-level level-1
[FW2-isis-20]address-family ipv6 unicast
[FW2-isis-20-ipv6]import-route direct
[FW2-isis-20-ipv6]quit
[FW2-isis-20]quit
[FW2]int loopback 10
[FW2-LoopBack10]isis ipv6 enable 10
[FW2-LoopBack10]quit
[FW2]int vlan 400
[FW2-Vlan-interface400]isis ipv6 enable 10
[FW2-Vlan-interface400]quit
[FW2]int loopback 20
[FW2-LoopBack20]isis ipv6 enable 20
[FW2-LoopBack20]quit
[FW2]int vlan 500
[FW2-Vlan-interface500]isis ipv6 enable 20
[FW2-Vlan-interface500]quit

```

测试:

在FW1使用loopback 10作为源, 带VPN能PING通FW2的loopback 10, PING不通FW2的loopback 20

:

```

<FW1>ping ipv6 -vpn-instance vpn-rt -a 2::1 4::1
Ping6(56 data bytes) 2::1 --> 4::1, press CTRL_C to break
56 bytes from 4::1, icmp_seq=0 hlim=64 time=1.000 ms
56 bytes from 4::1, icmp_seq=1 hlim=64 time=0.000 ms
56 bytes from 4::1, icmp_seq=2 hlim=64 time=0.000 ms
56 bytes from 4::1, icmp_seq=3 hlim=64 time=1.000 ms
56 bytes from 4::1, icmp_seq=4 hlim=64 time=1.000 ms

```

```

<FW1>ping ipv6 -vpn-instance vpn-rt -a 2::1 5::1
Ping6(56 data bytes) 2::1 --> 5::1, press CTRL_C to break
Request time out

```

在FW1使用loopback 20作为源, 带VPN能PING通FW2的loopback20, PING不通FW2的loopback 10

:

```

<FW1>ping ipv6 -vpn-instance vpn-nrt -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=64 time=1.000 ms
56 bytes from 5::1, icmp_seq=1 hlim=64 time=1.000 ms
56 bytes from 5::1, icmp_seq=2 hlim=64 time=1.000 ms
56 bytes from 5::1, icmp_seq=3 hlim=64 time=1.000 ms
56 bytes from 5::1, icmp_seq=4 hlim=64 time=0.000 ms

```

```

ping ipv6 -vpn-instance vpn-nrt -a 3::1 4::1
Ping6(56 data bytes) 3::1 --> 4::1, press CTRL_C to break
Request time out

```

在FW2使用loopback 10作为源, 带VPN能PING通FW1的loopback 10, PING不通FW1的loopback 20

:

```
[FW2]ping ipv6 -vpn-instance vpn-rt -a 4::1 2::1
Ping6(56 data bytes) 4::1 --> 2::1, press CTRL_C to break
56 bytes from 2::1, icmp_seq=0 hlim=64 time=2.000 ms
56 bytes from 2::1, icmp_seq=1 hlim=64 time=1.000 ms
56 bytes from 2::1, icmp_seq=2 hlim=64 time=1.000 ms
56 bytes from 2::1, icmp_seq=3 hlim=64 time=1.000 ms
56 bytes from 2::1, icmp_seq=4 hlim=64 time=1.000 ms
```

```
[FW2]ping ipv6 -vpn-instance vpn-rt -a 4::1 3::1
Ping6(56 data bytes) 4::1 --> 3::1, press CTRL_C to break
Request time out
```

在FW2使用loopback 20作为源，带VPN能PING通FW1的loopback20，PING不通FW1的loopback 10：

```
[FW2]ping ipv6 -vpn-instance vpn-nrt -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=64 time=1.000 ms
56 bytes from 3::1, icmp_seq=1 hlim=64 time=0.000 ms
56 bytes from 3::1, icmp_seq=2 hlim=64 time=1.000 ms
56 bytes from 3::1, icmp_seq=3 hlim=64 time=1.000 ms
56 bytes from 3::1, icmp_seq=4 hlim=64 time=2.000 ms
```

```
[FW2]ping ipv6 -vpn-instance vpn-nrt -a 5::1 4::1
Ping6(56 data bytes) 5::1 --> 4::1, press CTRL_C to break
Request time out
```

根据测试结果得知，相同VPN实例内的业务可以互通，不同VPN实例内的业务不能互通，达到了隔离的效果。

查看FW1的ISIS邻居信息：

```
[FW1]dis isis peer

Peer information for IS-IS(vpn-rt-10)
-----

System ID: 0000.0000.0002
Interface: Vlan400          Circuit Id: 0000.0000.0002.01
State: Up      HoldTime: 9s      Type: L1      PRI: 64

Peer information for IS-IS(vpn-nrt-20)
-----

System ID: 0000.0000.0002
Interface: Vlan500          Circuit Id: 0000.0000.0002.01
State: Up      HoldTime: 8s      Type: L1      PRI: 64
[FW1]
```

查看FW2的ISIS邻居信息：

```
[FW2]dis isis peer

Peer information for IS-IS(vpn-rt-10)
-----

System ID: 0000.0000.0001
Interface: Vlan400          Circuit Id: 0000.0000.0002.01
State: Up      HoldTime: 28s     Type: L1      PRI: 64

Peer information for IS-IS(vpn-nrt-20)
-----

System ID: 0000.0000.0001
Interface: Vlan500          Circuit Id: 0000.0000.0002.01
State: Up      HoldTime: 22s     Type: L1      PRI: 64
[FW2]
```

查看FW1 IPV6 VPN实例路由表：

```

[FW1]dis ipv6 routing-table vpn-instance vpn-rt
Destinations : 8      Routes : 8
Destination: ::1/128      Protocol : Direct
NextHop : ::1            Preference: 0
Interface : InLoop0      Cost : 0
Destination: 1::/64      Protocol : Direct
NextHop : ::            Preference: 0
Interface : Vlan400      Cost : 0
Destination: 1::1/128    Protocol : Direct
NextHop : ::1          Preference: 0
Interface : InLoop0      Cost : 0
Destination: 2::/64      Protocol : Direct
NextHop : ::            Preference: 0
Interface : Loop10       Cost : 0
Destination: 2::1/128    Protocol : Direct
NextHop : ::1          Preference: 0
Interface : InLoop0      Cost : 0
Destination: 4::/64      Protocol : IS_L1
NextHop : FE80::E97:22FF:FEF8:202 Preference: 15
Interface : Vlan400      Cost : 10
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]

```

```

[FW1]dis ipv6 routing-table vpn-instance vpn-nrt
Destinations : 8      Routes : 8
Destination: ::1/128      Protocol : Direct
NextHop : ::1            Preference: 0
Interface : InLoop0      Cost : 0
Destination: 1::/64      Protocol : Direct
NextHop : ::            Preference: 0
Interface : Vlan500      Cost : 0
Destination: 1::1/128    Protocol : Direct
NextHop : ::1          Preference: 0
Interface : InLoop0      Cost : 0
Destination: 3::/64      Protocol : Direct
NextHop : ::            Preference: 0
Interface : Loop20       Cost : 0
Destination: 3::1/128    Protocol : Direct
NextHop : ::1          Preference: 0
Interface : InLoop0      Cost : 0
Destination: 5::/64      Protocol : IS_L1
NextHop : FE80::E97:22FF:FEF8:202 Preference: 15
Interface : Vlan500      Cost : 10
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]

```

查看FW2 IPV6 VPN实例的路由表:

```
[FW2]dis ipv6 routing-table vpn-instance vpn-rt
Destinations : 8      Routes : 8

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

Destination: 1::/64      Protocol : Direct
NextHop   : ::          Preference: 0
Interface : Vlan400      Cost      : 0

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

Destination: 2::/64      Protocol : IS_L1
NextHop   : FE80::E97:1DFF:FE3F:102 Preference: 15
Interface : Vlan400      Cost      : 10

Destination: 4::/64      Protocol : Direct
NextHop   : ::          Preference: 0
Interface : Loop10       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
[FW2]
```

```
[FW2]dis ipv6 routing-table vpn-instance vpn-rt
Destinations : 8      Routes : 8

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

Destination: 1::/64      Protocol : Direct
NextHop   : ::          Preference: 0
Interface : Vlan500      Cost      : 0

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

Destination: 3::/64      Protocol : IS_L1
NextHop   : FE80::E97:1DFF:FE3F:102 Preference: 15
Interface : Vlan500      Cost      : 10

Destination: 5::/64      Protocol : Direct
NextHop   : ::          Preference: 0
Interface : Loop20       Cost      : 0

Destination: 5::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]
```

至此，F1060 IPV6多VPN实例ISIS典型组网配置案例。

配置关键点