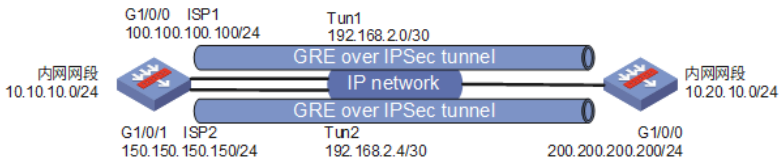
V7防火墙GRE over IPSec主备链路典型配置案例

IKE IPSec VPN 孙轶宁 2020-09-29 发表

组网及说明



F1与F2建立两条IPsec隧道，一条主用，一条备用，当主用隧道出现故障时，流量切换到备用隧道。

配置步骤

1. Internet配置

```
interface GigabitEthernet0/0
 ip address 100.100.100.1 255.255.255.0
#
interface GigabitEthernet0/1
 ip address 150.150.150.1 255.255.255.0
#
interface GigabitEthernet0/2
 ip address 200.200.200.1 255.255.255.0
```

2. F1配置

```
interface LoopBack0 # 配置作为建立GRE隧道源地址的环回口
 ip address 192.168.1.1 255.255.255.255
#
interface LoopBack1 # 配置作为建立GRE隧道源地址的环回口
 ip address 192.168.1.3 255.255.255.255
#
interface LoopBack10 # 配置作为内网地址的环回口
 ip address 10.10.10.1 255.255.255.0
#
interface GigabitEthernet1/0/0 # 配置ISP1公网接口，调用IPSec策略
 ip address 100.100.100.100 255.255.255.0
 nat outbound name nat
 ipsec apply policy ipsec-isp1
#
interface GigabitEthernet1/0/1 # 配置ISP2公网接口，调用IPSec策略
 ip address 150.150.150.150 255.255.255.0
 nat outbound name nat
 ipsec apply policy ipsec-isp2
#
interface Tunnel1 mode gre # 配置GRE隧道1
 ip address 192.168.2.1 255.255.255.252
 source 192.168.1.1 # 源地址为lo 0地址
 destination 192.168.1.2 # 目的地址为对端lo 0地址
 keepalive 10 3 # 配置Keepalive检测GRE隧道是否正常通信
#
interface Tunnel2 mode gre # 配置GRE隧道2
 ip address 192.168.2.5 255.255.255.252
 source 192.168.1.3 # 源地址为lo 1地址
 destination 192.168.1.4 # 目的地址为对端lo 1地址
 keepalive 10 3
#
policy-based-route ipsec permit node 10 # 配置PBR，匹配主用公网出口和对端建立ipsec的流量走主用出口
 if-match acl 3500
 apply next-hop 100.100.100.1
#
policy-based-route ipsec permit node 20 # 配置PBR，匹配备用公网出口和对端建立ipsec的流量走备用出口
 if-match acl 3501
```

```
 apply next-hop 150.150.150.1
#
ip local policy-based-route ipsec # 本地调用策略路由，如果不配置这个，会导致备用出口的ipsec流量根据路由表走主用出口，从而导致ipsec协商失败。
#
security-zone name Trust # 将GRE隧道口与内网口加入Trust域
 import interface LoopBack10
 import interface Tunnel1
 import interface Tunnel2
#
security-zone name Untrust # 将公网口加入Untrust域
 import interface GigabitEthernet1/0/0
 import interface GigabitEthernet1/0/1
#
zone-pair security source Local destination Trust # 放通Local到Trust，用于业务网段互访，由于实验环境时环回口模拟内网网段，因此是Local到Trust而不是Trust到Trust
 packet-filter 2000
#
zone-pair security source Local destination Untrust # 放通Local到Untrust，使GRE over IPSec隧道正常建立
 packet-filter 2000
#
zone-pair security source Trust destination Local # 放通Trust到Local，用于业务网段互访，由于实验环境时环回口模拟内网网段，因此是Trust到Local而不是Trust到Trust
 packet-filter 2000
#
zone-pair security source Trust destination Trust # 放通Trust到Trust，在真实的环境下配置实现业务网段互访
 packet-filter 2000
#
zone-pair security source Untrust destination Local # 放通Untrust到Local，使GRE over IPSec隧道正常建立
 packet-filter 2000
#
 ip route-static 0.0.0.0 0 100.100.100.1 # 公网主用路由
 ip route-static 0.0.0.0 0 150.150.150.1 preference 65 # 公网备份路由
 ip route-static 10.20.20.0 24 192.168.2.2 # 业务互访走主用隧道
 ip route-static 10.20.20.0 24 192.168.2.6 preference 65 # 业务网段备份路由
 ip route-static 192.168.1.2 32 100.100.100.1 # GRE over IPsec隧道1走ISP1
 ip route-static 192.168.1.4 32 150.150.150.1 # GRE over IPSec隧道2走ISP2，若没有此条路由，会因为接口地址与需协商的IPsec SA不一致导致无法正常协商IPSec SA
#
acl basic 2000 # 域间策略ACL
 rule 0 permit
#
acl advance 3500 # PBR ACL1
 rule 10 permit ip source 100.100.100.100 0 destination 200.200.200.200 0
#
acl advance 3501 # PBR ACL2
 rule 10 permit ip source 150.150.150.150 0 destination 200.200.200.200 0
#
acl advanced name ipsec # IPSec ACL
 rule 10 permit ip source 192.168.1.1 0 destination 192.168.1.2 0
 rule 20 permit ip source 192.168.1.3 0 destination 192.168.1.4 0
#
acl advanced name nat # NAT ACL，拒绝IPSec流量
 rule 10 deny ip source 192.168.1.1 0 destination 192.168.1.2 0
 rule 20 deny ip source 192.168.1.3 0 destination 192.168.1.4 0
 rule 30 permit ip
#
ipsec transform-set 1 # 配置IPSec转换集
 esp encryption-algorithm aes-cbc-256
 esp authentication-algorithm sha1
#
```

```
ipsec policy ipsec-isp1 10 isakmp # 配置ISP1的IPSec策略
 transform-set 1
 security acl name ipsec # 匹配GRE隧道流
 local-address 100.100.100.100
 remote-address 200.200.200.200 # policy必须配置remote-address，若采用policy-template则不是必
选
 ike-profile isp1
#
ipsec policy ipsec-isp2 10 isakmp # 配置ISP2的IPSec策略
 transform-set 1
 security acl name ipsec # 匹配GRE隧道流
 local-address 150.150.150.150
 remote-address 200.200.200.200
 ike-profile isp2
#
ike profile isp1 # 配置ISP1的IKE策略集
 keychain 1
 local-identity address 100.100.100.100
 match remote identity address 200.200.200.200 255.255.255.255
 proposal 1
#
ike profile isp2 # 配置ISP2的IKE策略集
 keychain 1
 local-identity address 150.150.150.150
 match remote identity address 200.200.200.200 255.255.255.255
 proposal 1
#
ike proposal 1 # 配置IKE proposal
 encryption-algorithm aes-cbc-256
 dh group2
#
ike keychain 1 # 配置IKE密钥
 pre-shared-key address 200.200.200.200 255.255.255.255 key simple ipsec
```

3. F2配置

```
interface LoopBack0 # 配置作为建立GRE隧道源地址的环回口
 ip address 192.168.1.2 255.255.255.255
#
interface LoopBack1 # 配置作为建立GRE隧道源地址的环回口
 ip address 192.168.1.4 255.255.255.255
#
interface LoopBack10 # 配置作为内网地址的环回口
 ip address 10.20.10.1 255.255.255.0
#
interface GigabitEthernet1/0/0 # 配置公网接口，调用IPSec策略
 ip address 200.200.200.200 255.255.255.0
 nat outbound name nat
 ipsec apply policy ipsec
#
interface Tunnel1 mode gre # 配置GRE隧道1
 ip address 192.168.2.2 255.255.255.252
 source 192.168.1.2
 destination 192.168.1.1
 keepalive 10 3
#
interface Tunnel2 mode gre # 配置GRE隧道2
 ip address 192.168.2.6 255.255.255.252
 source 192.168.1.4
 destination 192.168.1.3
 keepalive 10 3
#
security-zone name Trust # 将GRE隧道口与内网口加入Trust域
 import interface LoopBack10
 import interface Tunnel1
 import interface Tunnel2
```

```
#
security-zone name Untrust # 将公网口加入Untrust域
 import interface GigabitEthernet1/0/0
#
zone-pair security source Local destination Trust # 放通Local到Trust
 packet-filter 2000
#
zone-pair security source Local destination Untrust # 放通Local到Untrust
 packet-filter 2000
#
zone-pair security source Trust destination Local # 放通Trust到Local
 packet-filter 2000
#
zone-pair security source Trust destination Trust # 放通Trust到Trust
 packet-filter 2000
#
zone-pair security source Untrust destination Local # 放通Untrust到Local
 packet-filter 2000
#
 ip route-static 0.0.0.0 0 200.200.200.1 # 默认路由
 ip route-static 10.20.10.0 24 192.168.2.1 # 业务互访走主用隧道
 ip route-static 10.20.10.0 24 192.168.2.5 preference 65 # 业务网段备份路由
#
acl basic 2000 # 域间策略ACL
 rule 0 permit
#
acl advanced name ipsec_to_isp1 # 前往ISP1的IPSec ACL
 rule 10 permit ip source 192.168.1.2 0 destination 192.168.1.1 0
#
acl advanced name ipsec_to_isp2 # 前往ISP2的IPSec ACL
 rule 10 permit ip source 192.168.1.4 0 destination 192.168.1.3 0
#
acl advanced name nat # NAT ACL
 rule 10 deny ip source 192.168.1.2 0 destination 192.168.1.1 0
 rule 20 deny ip source 192.168.1.4 0 destination 192.168.1.3 0
 rule 30 permit ip
#
ipsec transform-set 1 # 配置IPSec转换集
 esp encryption-algorithm aes-cbc-256
 esp authentication-algorithm sha1
#
ipsec policy ipsec 10 isakmp # 配置前往ISP1的IPSec策略
 transform-set 1
 security acl name ipsec_to_isp1
 local-address 200.200.200.200
 remote-address 100.100.100.100
 ike-profile to_isp1
#
ipsec policy ipsec 20 isakmp # 配置前往ISP2的IPSec策略
 transform-set 1
 security acl name ipsec_to_isp2
 local-address 200.200.200.200
 remote-address 150.150.150.150
 ike-profile to_isp2
#
ike profile to_isp1 # 配置前往ISP1的IKE策略集
 keychain to_isp1
 local-identity address 200.200.200.200
 match remote identity address 100.100.100.100 255.255.255.255
 proposal 1
#
ike profile to_isp2 # 配置前往ISP2的IKE策略集
 keychain to_isp2
 local-identity address 200.200.200.200
```

```
 match remote identity address 150.150.150.150 255.255.255.255
 proposal 1
#
ike proposal 1 # 配置IKE proposal
 encryption-algorithm aes-cbc-256
 dh group2
#
ike keychain to_isp1 # 配置前往ISP1的IKE密钥
 pre-shared-key address 100.100.100.100 255.255.255.255 key simple ipsec
#
ike keychain to_isp2 # 配置前往ISP2的IKE密钥
 pre-shared-key address 150.150.150.150 255.255.255.255 key simple ipsec
```

配置关键点

1. IPSec本身没有虚接口，无法实现主备切换，因此采用GRE over IPsec方式利用GRE的Tunnel接口实现主备切换。
2. NAT的优先级比IPSec高，因此必须在NAT的感兴趣流中拒绝掉IPSec的数据流，否则数据流会优先被NAT转换，然后会导致无法匹配IPSec感兴趣流。
3. F1是双出口，F2是单出口，因此F1必须要配置本地策略路由，确保主接口去对端协商IPSec的流量和备接口协商IPSec的流量分别走各自出口，否则会导致备接口协商IPSec的流量根据路由表走主接口，从而无法协商IPSec SA。