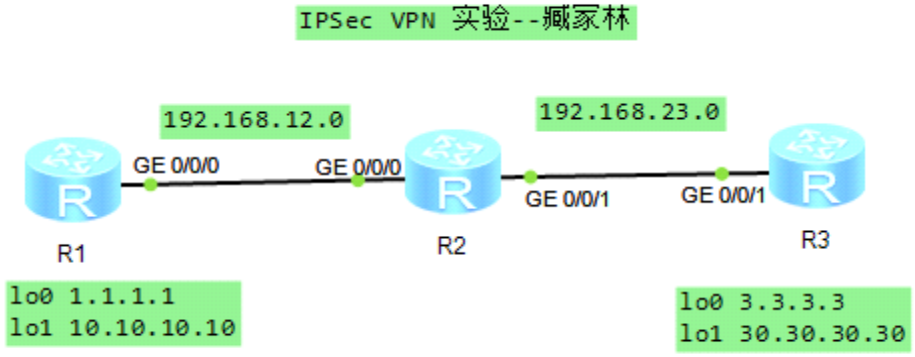
IPSec VPN 实验



基础配置, 在 R1、R2 和 R3 上配置 OSPF

R1 :

```
undo ter mo
sy
sys R1
int loo0
ip add 1.1.1.1 24
int loo1
ip add 10.10.10.10 24
int g0/0/0
ip add 192.168.12.1 24
q

ospf 1 router-id 1.1.1.1
area 0
net 1.1.1.1 0.0.0.0
net 10.10.10.10 0.0.0.0
net 192.168.12.1 0.0.0.0
q
```

R2:

```
undo ter mo
sy
sys R2
int g0/0/0
ip add 192.168.12.2 24
int g0/0/1
ip add 192.168.23.2 24
q

ospf 1 router-id 2.2.2.2
area 0
net 192.168.12.2 0.0.0.0
net 192.168.23.2 0.0.0.0
q
```

R3:

```
undo ter mo
sy
sys R3
int lo0
ip add 3.3.3.3 24
int loo1
ip add 30.30.30.30 24
int g0/0/1
ip add 192.168.23.3 24
q

ospf 1 router-id 3.3.3.3
area 0
net 3.3.3.3 0.0.0.0
net 30.30.30.30 0.0.0.0
net 192.168.23.3 0.0.0.0
q
```

待 OSPF 收敛完成后，查看 OSPF 邻居以及路由表
R1 R3 之间可以通信

```
[R2]dis ospf peer bri

    OSPF Process 1 with Router ID 2.2.2.2
         Peer Statistic Information
 ----------------------------------------------------------------------------
 Area Id          Interface                     Neighbor id      State
 0.0.0.0          GigabitEthernet0/0/0          1.1.1.1          Full
 0.0.0.0          GigabitEthernet0/0/1          3.3.3.3          Full
 ----------------------------------------------------------------------------
```

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配置 ACL 定义感兴趣流

配置高级 ACL 来定义 IPsec VPN 的感兴趣流。高级 ACL 能够基于特定的参数来匹配流量
R1 R3 的源地址，目的地址相反

R1:
acl 3000
rule permit ip source 1.1.1.0 0.0.0.255 destination 3.3.3.0 0.0.0.255

R3:
acl 3000
rule permit ip source 3.3.3.0 0.0.0.255 destination 1.1.1.0 0.0.0.255

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配置 IPSec VPN 提议

创建 IPSec 提议，并进入 IPSec 提议视图来指定安全协议。
注意确保隧道两端的设备使用相同的安全协议

esncapsulation-mode (transport) (tunnel)　　配置报文的封装模式，默认为 tunnel 模式
esp authetication-algorithm sha1　　配置 EPS 协议使用的认证算法
esp encryption-algorithm 3des
配置 ESP 加密算法

R1 R3 配置相同
R1:
ipsec proposal tun
esp authentication-algorithm sha1
esp encryption-algorithm 3des

R3:
ipsec proposal tun
esp authentication-algorithm sha1
esp encryption-algorithm 3des

执行 display ipsec proposal 命令，验证配置结果

```
[R1]dis ipsec proposal

Number of proposals: 1

IPSec proposal name: tun
 Encapsulation mode: Tunnel
 Transform          : esp-new
 ESP protocol       : Authentication SHA1-HMAC-96
                      Encryption     3DES

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```

创建 IPSec 策略

手工创建 IPSec 策略，每一个 IPSec 安全策略都使用唯一的名称和序号来标识，IPSec 策略中会应用 IPSec 提议中定义的安全协议、认证算法、加密算法和封装模式，手工创建的 IPSec 策略还需配置安全联盟（SA）中的参数

执行 ipsec policy　　创建策略
执行 ipsec-policy　　指定 SA 建立方式 可使用 IKE 或是手工建立
执行 security ACL　　指定 IPSEC 策略所引用的访问控制列表
执行 proposal　　指定 IPSEC 策略所引用的提议
执行 tunnel local　　用来指定安全隧道的本端地址
执行 tunnel remote　　指定隧道的对端地址
执行 sa spi　　指定安全索引参数

执行 sa string-key　　指定安全联盟的认证密钥

R1 :
ipsec policy p1 10 manual
security acl 3000
proposal tun
tunnel remote 192.168.23.3
tunnel local 192.168.12.1
sa spi outbound esp 54321
sa spi inbound esp 12345
sa string-key outbound esp simple huawei
sa string-key inbound esp simple huawei
q

R3 :
ipsec policy p1 10 manual
security acl 3000
proposal tun
tunnel remote 192.168.12.1
tunnel local 192.168.23.3
sa spi outbound esp 12345
sa spi inbound esp 54321
sa string-key outbound esp simple huawei
sa string-key inbound esp simple huawei
q

执行 display ipsec policy 命令，验证配置结果

```
[R1]dis ipsec policy

==============================================
IPSec policy group: "p1"
Using interface:
==============================================

    Sequence number: 10
    Security data flow: 3000
    Tunnel local  address: 192.168.12.1
    Tunnel remote address: 192.168.23.3
    Qos pre-classify: Disable
    Proposal name:tun
    Inbound AH setting:
      AH SPI:
      AH string-key:
      AH authentication hex key:
    Inbound ESP setting:
      ESP SPI: 12345 (0x3039)
      ESP string-key: huawei
      ESP encryption hex key:

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```

在接口下应用 IPSec 策略

在物理接口应用 IPSec 策略，接口将对感兴趣流量进行 IPSec 加密处理
R1:
int g0/0/0
ipsec policy p1

R3:
int g0/0/1
ipsec policy p1

验证设备将对感兴趣流量进行 IPSec 加密处理
R1:ping -a 1.1.1.1 3.3.3.3
R1：display ipsec statistics esp

```
[R1]display ipsec statistics esp
 Inpacket count                :5
 Inpacket auth count           : 0
 Inpacket decap count          : 0
 Outpacket count               :5
 Outpacket auth count          : 0
 Outpacket encap count         : 0
 Inpacket drop count           : 0
```

ping 之后，会有加密解密的报文

不是感兴趣流量不加解密
ping -a 10.10.10.10 30.30.30.30

```
[R1]ping -a 10.10.10.10 30.30.30.30
  PING 30.30.30.30: 56  data bytes, press CTRL_C to break
    Reply from 30.30.30.30: bytes=56 Sequence=1 ttl=254 time=40 ms
    Reply from 30.30.30.30: bytes=56 Sequence=2 ttl=254 time=30 ms
    Reply from 30.30.30.30: bytes=56 Sequence=3 ttl=254 time=30 ms
    Reply from 30.30.30.30: bytes=56 Sequence=4 ttl=254 time=30 ms
    Reply from 30.30.30.30: bytes=56 Sequence=5 ttl=254 time=20 ms
```

加密解密的报文 还是 5

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配置动态 IKE v2 IPSec VPN

R1:
int g0/0/0
undo ipsec policy
q

undo ipsec policy p1 10
undo ipsec proposal tran

R3:
int g0/0/1
undo ipsec policy
q

undo ipsec policy p1 10
undo ipsec proposal tran

==========
R1:
ipsec proposal tran1

ike peer huawei v2
pre-shared-key simple huawei
remote-address 192.168.23.3
q

ipsec policy p1 10 isakmp
security acl 3000
proposal tran1
ike-peer huawei
q

int g0/0/0

ipsec policy p1

R3:
ipsec proposal tran1

ike peer huawei v2
pre-shared-key simple huawei
remote-address 192.168.12.1
q

ipsec policy p1 10 isakmp
security acl 3000
proposal tran1
ike-peer huawei
q

int g0/0/1
ipsec policy p1

=========

dis ike proposal
display ipsec sa