使用 RIP 与 CVC 在 Cisco IOS 路由器与 VPN 5000 集中器之间配置 GRE Over IPSec

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简介

此配置示例描述如何配置在IPSec的通用路由封装(GRE)在Cisco VPN 5000集中器和Cisco IOS路由器之间。GRE-over-IPSec功能在VPN 5000集中器6.0(19)软件版本中引入。

路由信息协议(RIP)在此示例中用作动态路由协议，以路由流量通过VPN通道。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco IOS软件版本12.1(5)T7
- VPN 5000 集中器软件版本 6.0(19)

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

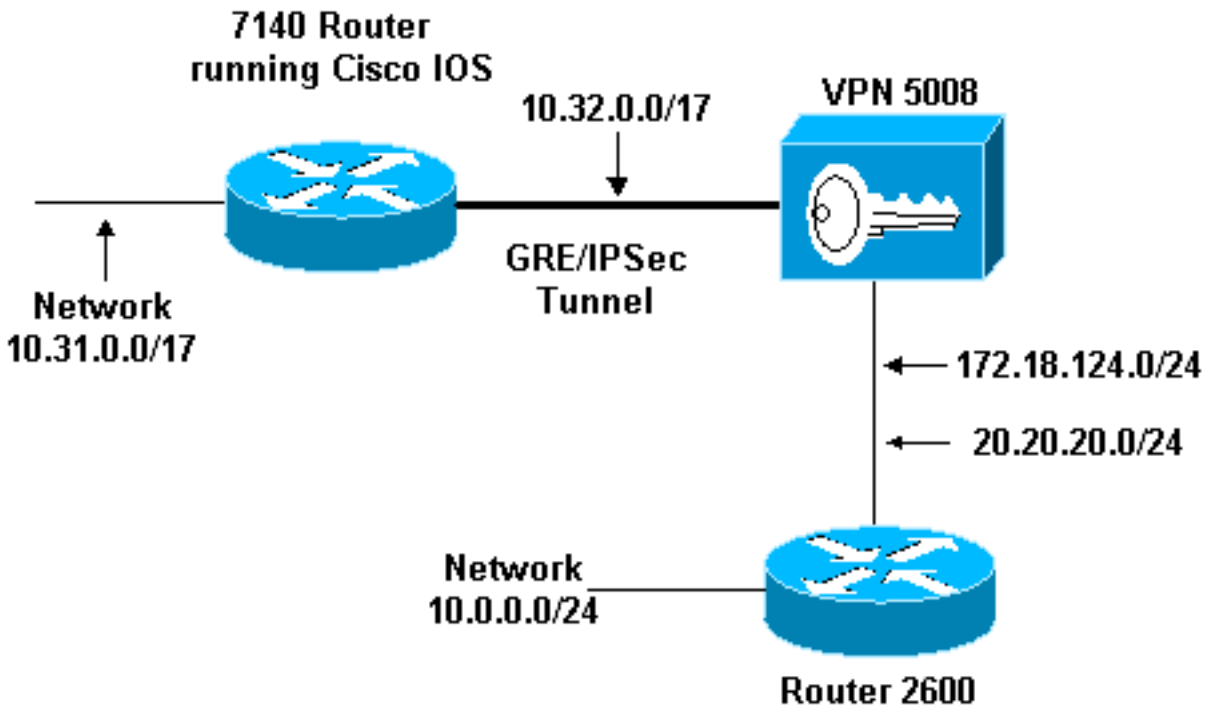
配置

本部分提供有关如何配置本文档所述功能的信息。

注意： 要查找本文档所用命令的其他信息，请使用命令查找工具（仅限注册用户）。

网络图

本文档使用此图所示的网络设置。



GRE over IPSec 配置在Cisco IOS路由器(7140)和Cisco VPN 5008集中器之间。在这些设备后面，多个网络通过RIP被通告，RIP在7140和VPN 5008之间的GRE隧道内运行。

在Cisco 7140背后的网络是：

- 10.31.0.0/17

在VPN 5008背后的网络是：

- 172.18.124.0/24
- 20.20.20.0/24
- 10.0.0.0/24

配置

本文档使用此处所示的配置。

- Cisco IOS 路由器
- VPN 5000 集中器
- CVC

Cisco IOS 路由器

```
Building configuration...

Current configuration : 1607 bytes
!
version 12.1
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 03-vpn-7140
!
boot system flash disk1:c7100-ik8s-mz.122-3
logging rate-limit console 10 except errors
enable password <removed>
!
ip subnet-zero
ip cef
!
!
no ip finger
!
!  !--- Define phase 1 policy. crypto isakmp policy 10
authentication pre-share
!--- Define the PreShared Key for the Remote peer !---
(5000 ) in this example. crypto isakmp key cisco123
address 10.32.1.161
!
!--- Define Phase 2 policy. !--- Make sure that
Transport Mode is enabled. crypto ipsec transform-set
www esp-des esp-sha-hmac
mode transport
!
!--- Define the crypto map that is later !--- applied on
the outbound interface. crypto map temp 10 ipsec-isakmp
set peer 10.32.1.161
set transform-set www
match address 100
!
call rsvp-sync
!
!
!
!
!
!
!
controller ISA 5/1
!
!--- Define the GRE tunnel on the router. !--- Tunnel
source is the outbound interface !--- and tunnel
destination is VPN 5000. interface Tunnel0
ip address 10.1.1.2 255.255.255.0
tunnel source FastEthernet0/0
tunnel destination 10.32.1.161
crypto map temp
```

```
!
!--- Outbound Interface that is connected to the
Internet. interface FastEthernet0/0
ip address 10.32.1.162 255.255.128.0
duplex auto
speed auto
crypto map temp
!
!!--- Inside interface. interface FastEthernet0/1 ip
address 10.31.100.1 255.255.128.0 no keepalive duplex
auto speed auto ! interface Serial1/0 no ip address
shutdown framing c-bit cablelength 10 dsu bandwidth
44210 ! interface Serial1/1 no ip address shutdown
framing c-bit cablelength 10 dsu bandwidth 44210 ! !---
Define RIP Routing Protocol on the router. !--- This
example shows Version 2 for classless routing. router
rip
version 2
network 10.0.0.0
no auto-summary
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.32.1.1
no ip http server
!
!--- Encryption access-list that is used !--- to encrypt
the GRE packets. access-list 100 permit gre host
10.32.1.162 host 10.32.1.161
!
!
line con 0
exec-timeout 0 0
transport input none
line aux 0
line vty 5 15
!
end
```

VPN 5000 集中器

```
show configuration
Edited Configuration not Present, using Running
[ IP Ethernet 0:0 ]
SubnetMask = 255.255.255.0
IPAddress = 1.1.1.1

[ IP Ethernet 1:0 ]Mode = Routed
SubnetMask = 255.255.128.0
IPAddress = 10.32.1.161

[ General ]
VPNGateway = 10.32.1.1
EnablePassword = <removed>
Password = <removed>
EthernetAddress = 00:00:a5:e9:c8:00
DeviceType = VPN 5002/8 Concentrator
ConfiguredOn = Timeserver not configured
ConfiguredFrom = Command Line, from Console

[ IKE Policy ]
Protection = SHA_DES_G1
```

```
[ IP Static ]
0.0.0.0 0.0.0.0 10.32.1.1 1 redist=none

[ Context List ]
flash://rip.cfg

[ Logging ]
Enabled = On
Level = 7

Configuration size is 822 out of 65500 bytes.
VPN5002_8_A5E9C800: Main#
```

CVC

show configuration

```
Edited Configuration not Present, using Running

[ General ]
Context = "rip"

[ IP Ethernet 1:0.1 ]
VLANID = 124
Encapsulation = dot1q
Mode = Routed
SubnetMask = 255.255.255.0
IPAddress = 172.18.124.219

[ IP Static ]


[ Tunnel Partner VPN 1 ]
InactivityTimeout = 120
Transform = esp(sha,des)
KeyManage = ReliablePeer = "10.31.0.0/17"
LocalAccess = "10.5.1.0/24"
SharedKey = "cisco123"
Mode = Main
TunnelType = GREinIPSec
BindTo = "Ethernet 1:0"
Partner = 10.32.1.162

[ IP VPN 1 ]
RIPIn = On
RIPOut = On
RIPVersion = V2
DirectedBroadcast = Off
Numbered = On
Mode = Routed
SubnetMask = 255.255.255.0
IPAddress = 10.1.1.1

[ IP Ethernet 1:0.2 ]
Mode = Routed
SubnetMask = 255.255.255.0
IPAddress = 20.20.20.20

Configuration size is 1127 out of 65500 bytes.


VPN5002_8_A5E9C800: rip#
```

验证

本部分所提供的信息可用于确认您的配置是否正常工作。

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

- **show ip route** —显示路由表的当前状态。
- **show crypto engine connection active** -显示每个IPSec安全关联的数据包加密/解密计数器。
- **show crypto ipsec sa** —显示所有当前IPSec安全关联。
- **show system log buffer** - 显示基本 syslog 信息。
- **vpn trace dump** - 显示 VPN 进程的详细信息。

```
03-vpn-7140#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 10.32.1.1 to network 0.0.0.0

20.0.0.0/24 is subnetted, 1 subnets
R 20.20.20.0 [120/1] via 10.1.1.1, 00:00:10, Tunnel0
172.18.0.0/16 is variably subnetted, 2 subnets, 2 masks
R 172.18.124.0/24 [120/1] via 10.1.1.1, 00:00:10, Tunnel0
10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
R 10.0.0.0/24 [120/2] via 10.1.1.1, 00:00:10, Tunnel0
C 10.1.1.0/24 is directly connected, Tunnel0
C 10.31.0.0/17 is directly connected, FastEthernet0/1
C 10.32.0.0/17 is directly connected, FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 10.32.1.1
03-vpn-7140#

03-vpn-7140#show crypto enggine connection active

ID Interface IP-Address State Algorithm Encrypt Decrypt
3 FastEthernet0/0 10.32.1.162 set HMAC_SHA+DES_56_CB 0 0
4 FastEthernet0/0 10.32.1.162 set HMAC_SHA+DES_56_CB 0 0
5 FastEthernet0/0 10.32.1.162 set HMAC_SHA+DES_56_CB 0 0
2098 FastEthernet0/0 10.32.1.162 set HMAC_SHA+DES_56_CB 0 1892
2099 FastEthernet0/0 10.32.1.162 set HMAC_SHA+DES_56_CB 11552 0


03-vpn-7140#show crypto ipsec sa

interface: FastEthernet0/0
Crypto map tag: temp, local addr. 10.32.1.162

local ident (addr/mask/prot/port): (10.32.1.162/255.255.255.255/0/0)
remote ident (addr/mask/prot/port): (10.32.1.161/255.255.255.255/0/0)
current_peer: 10.32.1.161
PERMIT, flags={transport_parent,}
#pkts encaps: 0, #pkts encrypt: 0, #pkts digest 0
#pkts decaps: 0, #pkts decrypt: 0, #pkts verify 0
#pkts compressed: 0, #pkts decompressed: 0
```

```
#pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 10.32.1.162, remote crypto endpt.: 10.32.1.161
path mtu 1500, media mtu 1500
current outbound spi: 0

inbound esp sas:

inbound ah sas:

inbound pcp sas:

outbound esp sas:

outbound ah sas:

outbound pcp sas:


local ident (addr/mask/prot/port): (10.32.1.162/255.255.255.255/47/0)
remote ident (addr/mask/prot/port): (10.32.1.161/255.255.255.255/47/0)
current_peer: 10.32.1.161
PERMIT, flags={origin_is_acl,transport_parent,}
#pkts encaps: 12912, #pkts encrypt: 12912, #pkts digest 12912
#pkts decaps: 2382, #pkts decrypt: 2382, #pkts verify 2382
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 10.32.1.162, remote crypto endpt.: 10.32.1.161
path mtu 1500, media mtu 1500
current outbound spi: 101

inbound esp sas:
spi: 0x4624F3AD(1176826797)
transform: esp-des esp-sha-hmac ,
in use settings ={Transport, }
slot: 0, conn id: 2098, flow_id: 69, crypto map: temp



sa timing: remaining key lifetime (k/sec): (1048130/3179)
IV size: 8 bytes
replay detection support: Y

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0x101(257)
transform: esp-des esp-sha-hmac ,
in use settings ={Transport, }
slot: 0, conn id: 2099, flow_id: 70, crypto map: temp
sa timing: remaining key lifetime (k/sec): (1046566/3179)
IV size: 8 bytes
replay detection support: Y

outbound ah sas:

outbound pcp sas:
```

```
interface: Tunnel0
Crypto map tag: temp, local addr. 10.32.1.162

local ident (addr/mask/prot/port): (10.32.1.162/255.255.255.255/0/0)
remote ident (addr/mask/prot/port): (10.32.1.161/255.255.255.255/0/0)
current_peer: 10.32.1.161
PERMIT, flags={transport_parent,}
#pkts encaps: 0, #pkts encrypt: 0, #pkts digest 0
#pkts decaps: 0, #pkts decrypt: 0, #pkts verify 0
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 10.32.1.162, remote crypto endpt.: 10.32.1.161
path mtu 1500, media mtu 1500
current outbound spi: 0

inbound esp sas:

inbound ah sas:

inbound pcp sas:

outbound esp sas:

outbound ah sas:

outbound pcp sas:


local ident (addr/mask/prot/port): (10.32.1.162/255.255.255.255/47/0)
remote ident (addr/mask/prot/port): (10.32.1.161/255.255.255.255/47/0)
current_peer: 10.32.1.161
PERMIT, flags={origin_is_acl,transport_parent,}
#pkts encaps: 13017, #pkts encrypt: 13017, #pkts digest 13017
#pkts decaps: 2410, #pkts decrypt: 2410, #pkts verify 2410
#pkts compressed: 0, #pkts decompressed: 0

#pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 10.32.1.162, remote crypto endpt.: 10.32.1.161
path mtu 1500, media mtu 1500
current outbound spi: 101

inbound esp sas:
spi: 0x4624F3AD(1176826797)
transform: esp-des esp-sha-hmac ,
in use settings ={Transport, }
slot: 0, conn id: 2098, flow_id: 69, crypto map: temp
sa timing: remaining key lifetime (k/sec): (1048124/3176)
IV size: 8 bytes
replay detection support: Y

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0x101(257)
transform: esp-des esp-sha-hmac ,
in use settings ={Transport, }
slot: 0, conn id: 2099, flow_id: 70, crypto map: temp
```

```
sa timing: remaining key lifetime (k/sec): (1046566/3176)
IV size: 8 bytes
replay detection support: Y

outbound ah sas:

outbound pcp sas:
```

故障排除

本部分提供的信息可用于对配置进行故障排除。

故障排除命令

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

注意： 在发出 **debug** 命令之前，请参阅有关 Debug 命令的重要信息。

- **debug crypto isakmp** (Cisco IOS路由器) -显示关于互联网密钥交换(IKE)第I阶段(主模式)协商的详细信息。
- **debug crypto ipsec** (Cisco IOS路由器) —显示关于IKE第II阶段(快速模式)协商的详细信息。
- **debug crypto engine** (Cisco IOS路由器) —调试数据包加密/解密和Diffie-Hellman (DH)进程。
- **debug ip rip** (Cisco IOS路由器) —调试RIP路由协议。

从VPN 5000集中器发出**show ip routing**命令。

```
VPN5002_8_A5E9C800: rip#show ip routing

IP Routing Table for rip
Directly Connected Routes:
Destination Mask Ref Uses Type Interface
10.1.1.0 FFFFFF00 5 STIF VPN0:1
10.1.1.0 FFFFFFFF 0 STIF Local
10.1.1.1 @FFFFFFFF 5 LocalLocal
10.1.1.255 FFFFFFFF 0 STIF Local
20.20.20.0 FFFFFF00 1352 STIF Ether1:0.2
20.20.20.0 FFFFFFFF 0 STIF Local
20.20.20.20 @FFFFFFFF 14 LocalLocal
20.20.20.255 FFFFFFFF 1318 STIF Local
127.0.0.1 FFFFFFFF 0 STIF Local
172.18.124.0 FFFFFF00 13789 STIF Ether1:0.1
172.18.124.0 FFFFFFFF 0 STIF Local
172.18.124.219 @FFFFFFFF 6 LocalLocal
172.18.124.255 FFFFFFFF 13547 STIF Local
224.0.0.5 FFFFFFFF 0 STIF Local
224.0.0.6 FFFFFFFF 0 STIF Local
224.0.0.9 FFFFFFFF 15 STIF Local
255.255.255.255 @FFFFFFFF 221 LocalLocal

Static Routes:
Destination Mask Gateway Metric Ref Uses Type Interface
10.31.0.0 FFFF0000 Interface 1 0 Stat VPN0:1
10.32.1.162 @FFFFFFFF 10.32.1.161 2 0 *Stat VPN0:1

Dynamic Routes:
Src/
Destination Mask Gateway Metric Ref Uses Type TTL Interface
```

DEFAULT 10.1.1.2 1 293 RIP2 165 VPN0:1
10.0.0.0 FFFFFF00 172.18.124.216 1 0 RIP1 160 Ether1:0.1
10.31.0.0 FFFF8000 10.1.1.2 1 0 RIP2 165 VPN0:1
10.32.0.0 FFFF8000 10.1.1.2 1 0 RIP2 165 VPN0:1

Configured IP Routes:
Destination Mask Gateway Metric IFnum Flags
10.31.0.0 FFFF0000 Interface 1 VPN 0:1 Redist = none

Total Routes in use: 23 Mask -> @Host route Type -> Redist *rip #ospf

VPN5002_8_A5E9C800: rip#**show vpn stat ver**

Current In High Running Script Script Script
Active Negot Water Total Starts OK Error

Users 0 0 0 0 0 0 0
Partners 1 0 1 1 1 0 0
Total 1 0 1 1 1 0 0

Stats VPN0:1
Wrapped 2697
Unwrapped 14439
BadEncap 0
BadAuth 0
BadEncrypt 0
rx IP 14439
rx IPX 0
rx Other 0
tx IP 2697
tx IPX 0
tx Other 0
IKE rekey 0

Input VPN pkts dropped due to no SA: 1

Input VPN pkts dropped due to no free queue entries: 0

IOP slot 1:

Current In High Running Script Script Script
Active Negot Water Total Starts OK Error

Users 0 0 0 0 0 0 0
Partners 0 0 0 0 0 0 0
Total 0 0 0 0 0 0 0

Stats
Wrapped
Unwrapped
BadEncap
BadAuth
BadEncrypt
rx IP
rx IPX
rx Other
tx IP
tx IPX
tx Other

IKE rekey

Input VPN pkts dropped due to no SA: 0

```
Input VPN pkts dropped due to no free queue entries: 0

IOP slot 2:

Current In High Running Script Script Script
Active Negot Water Total Starts OK Error
-------------------------------------------------------------
Users 0 0 0 0 0 0 0
Partners 0 0 0 0 0 0 0
Total 0 0 0 0 0 0 0

Stats
Wrapped
Unwrapped
BadEncap
BadAuth
BadEncrypt
rx IP
rx IPX
rx Other
tx IP
tx IPX
tx Other
IKE rekey

Input VPN pkts dropped due to no SA: 0

Input VPN pkts dropped due to no free queue entries: 0

IOP slot 3:

Current In High Running Script Script Script
Active Negot Water Total Starts OK Error
-------------------------------------------------------------
Users 0 0 0 0 0 0 0
Partners 0 0 0 0 0 0 0
Total 0 0 0 0 0 0 0

Stats
Wrapped
Unwrapped
BadEncap
BadAuth
BadEncrypt
rx IP
rx IPX
rx Other
tx IP
tx IPX
tx Other
IKE rekey

Input VPN pkts dropped due to no SA: 0

Input VPN pkts dropped due to no free queue entries: 0
```

相关信息

- Cisco VPN 5000 系列集中器支持页面
- Cisco VPN 5000 客户端支持页
- IPSec（IP 安全协议）支持页

- 技术支持 - Cisco Systems