动态到动态IPsec隧道配置示例

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简介

本文档介绍当思科路由器两端均具有动态IP地址但配置了动态域名系统(DDNS)时，如何在路由器之间构建LAN到LAN IPsec隧道。

先决条件

要求

Cisco 建议您了解以下主题：

- 具有IPSec隧道和通用路由封装(GRE)的站点到站点VPN
- IPsec虚拟隧道接口(VTI)
- [Cisco IOS软件的动态DNS支持](#)

提示：有关详细信息，请参阅Cisco 3900系列、2900系列和1900系列软件配置指南的配置VPN部分以及使用IP安全配置虚拟隧道接口文章。

使用的组件

本文档中的信息基于运行版本15.2(4)M6a的Cisco 2911集成多业务路由器。

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。

背景信息

当需要建立LAN到LAN隧道时，必须知道两个IPSec对等体的IP地址。如果其中一个IP地址因为动态（例如通过DHCP获取的IP地址）而不知道，则另一种选择是使用动态加密映射。这是有效的，但隧道只能由具有动态IP地址的对等体启动，因为其他对等体不知道在哪里找到其对等体。

有关动态到静态的详细信息，请参阅使用NAT配置路由器到路由器动态到静态IPSec。

配置

IPsec隧道对等体的实时解析

Cisco IOS®在版本12.3(4)T中引入了一项新功能，允许指定IPSec对等体的完全限定域名(FQDN)。当存在与加密访问列表匹配的流量时，Cisco IOS会解析FQDN并获取对等体的IP地址，然后尝试启用隧道。

注意：此功能有一个限制：只有将远程IPsec对等体用作启动器时，其DNS名称解析才能工作。要加密的第一个数据包将触发DNS查找；在DNS查找完成后，后续数据包将触发Internet密钥交换(IKE)。实时解析在响应方上不起作用。

为了解决限制并能够从每个站点启动隧道，您将在两台路由器上都有一个动态加密映射条目，以便您可以将传入的IKE连接映射到动态加密。这是必需的，因为具有实时分辨率功能的静态条目在用作响应器时不起作用。

Router A

```
crypto isakmp policy 10
encr aes
authentication pre-share
group 2
!
ip access-list extended crypto-ACL
permit ip 192.168.10.0 0.0.0.255 192.168.20.0 0.0.0.255
!
crypto isakmp key cisco123 address 0.0.0.0 0.0.0.0
!
crypto ipsec transform-set myset esp-aes esp-sha-hmac
!
crypto dynamic-map dyn 10
set transform-set myset
!
crypto map mymap 10 ipsec-isakmp
match address 140
set peer example-b.cisco.com dynamic
set transform-set myset
crypto map mymap 65535 ipsec-isakmp dynamic dyn
!
interface fastethernet0/0
ip address dhcp
crypto map secure_b
```

Router B

```
crypto isakmp policy 10
encr aes
authentication pre-share
group 2
!
ip access-list extended crypto-ACL
permit ip 192.168.20.0 0.0.0.255 192.168.10.0 0.0.0.255
!
crypto isakmp key cisco123 address 0.0.0.0 0.0.0.0
!
crypto ipsec transform-set myset esp-aes esp-sha-hmac
!
crypto dynamic-map dyn 10
set transform-set myset
!
crypto map mymap 10 ipsec-isakmp
match address 140
set peer example-a.cisco.com dynamic
set transform-set myset
crypto map mymap 65535 ipsec-isakmp dynamic dyn
!
interface fastethernet0/0
ip address dhcp
crypto map secure_b
```

注意：由于您不知道FQDN将使用哪个IP地址，因此需要使用通配符预共享密钥：0.0.0.0 0.0.0.0

使用嵌入式事件管理器(EEM)进行隧道目标更新

您也可以使用VTI来完成此任务。基本配置如下所示：

Router A

```
crypto isakmp policy 10
encryption aes
authentication pre-share
group 2

crypto isakmp key cisco123 address 0.0.0.0 0.0.0.0 no-xauth

crypto ipsec transform-set ESP-AES-SHA esp-aes esp-sha-hmac
!
crypto ipsec profile ipsec-profile
set transform-set ESP-AES-SHA
!
interface Tunnel1
ip address 172.16.12.1 255.255.255.0
tunnel source fastethernet0/0
tunnel destination example-b.cisco.com
tunnel mode ipsec ipv4
tunnel protection ipsec profile ipsec-profile
```

Router B

```
crypto isakmp policy 10
encryption aes
authentication pre-share
group 2

crypto isakmp key cisco123 address 0.0.0.0 0.0.0.0 no-xauth

crypto ipsec transform-set ESP-AES-SHA esp-aes esp-sha-hmac
!
crypto ipsec profile ipsec-profile
set transform-set ESP-AES-SHA
!
interface Tunnel1
ip address 172.16.12.2 255.255.255.0
tunnel source fastethernet0/0
tunnel destination example-a.cisco.com
tunnel mode ipsec ipv4
tunnel protection ipsec profile ipsec-profile
```

在以前的配置中，FQDN作为隧道目标后，**show run**命令将显示IP地址而不是名称。这是因为解决方案只发生一次：

```
RouterA(config)#do show run int tunn 1
Building configuration...

Current configuration : 130 bytes
!
```

```
interface Tunnel1
ip address 172.16.12.1 255.255.255.250
tunnel source fastethernet0/0
tunnel destination 209.165.201.1
tunnel mode ipsec ipv4
tunnel protection ipsec profile ipsec-profile
end

RouterB(config)#do show run int tunn 1
Building configuration...

Current configuration : 130 bytes
!
interface Tunnel1
ip address 172.16.12.2 255.255.255.250
tunnel source fastethernet0/0
tunnel destination 209.165.200.225
tunnel mode ipsec ipv4
tunnel protection ipsec profile ipsec-profile
end
```

对此的解决方法是配置小程序，以便每分钟解析隧道目标：

Router A

```
event manager applet change-tunnel-dest
event timer cron name TAC cron-entry "* * * * *"
action 1.0 cli command "enable"
action 1.1 cli command "configure terminal"
action 1.2 cli command "interface tunnel1"
action 1.3 cli command "tunnel destination example-b.cisco.com"
```

Router B

```
event manager applet change-tunnel-dest
event timer cron name TAC cron-entry "* * * * *"
action 1.0 cli command "enable"
action 1.1 cli command "configure terminal"
action 1.2 cli command "interface tunnel1"
action 1.3 cli command "tunnel destination example-a.cisco.com"
```

验证

使用本部分可确认配置能否正常运行。

```
RouterA(config)#do show ip int brie
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 209.165.200.225 YES NVRAM up up
FastEthernet0/1 192.168.10.1 YES NVRAM up up
Tunnel1 172.16.12.1 YES manual up up

RouterB(config)#do show ip int brie
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 209.165.201.1 YES TFTP up up
```

```
FastEthernet0/1 192.168.20.1 YES manual up up
Tunnel1 172.16.12.2 YES manual up up

RouterA(config)#do show cry isa sa
dst src state conn-id slot status
209.165.200.225 209.165.201.1 QM_IDLE 2 0 ACTIVE

RouterB(config)#do show cry isa sa
dst src state conn-id slot status
209.165.200.225 209.165.201.1 QM_IDLE 1002 0 ACTIVE

RouterA(config)#do show cry ipsec sa

interface: Tunnel1
Crypto map tag: Tunnel1-head-0, local addr 209.165.200.225

protected vrf: (none)
local ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
remote ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
current_peer 209.165.201.1 port 500
PERMIT, flags={origin_is_acl,}
#pkts encaps: 10, #pkts encrypt: 10, #pkts digest: 10
#pkts decaps: 10, #pkts decrypt: 10, #pkts verify: 10
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0
#pkts not decompressed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 209.165.200.225, remote crypto endpt.: 209.165.201.1
path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0
current outbound spi: 0x8F1592D2(2400555730)

inbound esp sas:
spi: 0xF7B373C0(4155732928)
transform: esp-3des esp-sha-hmac ,
in use settings ={Tunnel, }
conn id: 2002, flow_id: AIM-VPN/BPII-PLUS:2, crypto map: Tunnel1-head-0
sa timing: remaining key lifetime (k/sec): (4501866/3033)
IV size: 8 bytes
replay detection support: Y
Status: ACTIVE

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0x8F1592D2(2400555730)
transform: esp-3des esp-sha-hmac ,
in use settings ={Tunnel, }
conn id: 2001, flow_id: AIM-VPN/BPII-PLUS:1, crypto map: Tunnel1-head-0
sa timing: remaining key lifetime (k/sec): (4501866/3032)
IV size: 8 bytes
replay detection support: Y
Status: ACTIVE

outbound ah sas:

outbound pcp sas:
```

```
RouterB(config)#do show cry ipsec sa

interface: Tunnel1
Crypto map tag: Tunnel1-head-0, local addr 209.165.201.1

protected vrf: (none)
local ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
remote ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
current_peer 209.165.200.225 port 500
PERMIT, flags={origin_is_acl,}
#pkts encaps: 10, #pkts encrypt: 10, #pkts digest: 10
#pkts decaps: 10, #pkts decrypt: 10, #pkts verify: 10
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0
#pkts not decompressed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 209.165.201.1, remote crypto endpt.: 209.165.200.225
path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0
current outbound spi: 0xF7B373C0(4155732928)
PFS (Y/N): N, DH group: none

inbound esp sas:
spi: 0x8F1592D2(2400555730)
transform: esp-3des esp-sha-hmac ,
in use settings ={Tunnel, }
conn id: 2003, flow_id: NETGX:3, sibling_flags 80000046, crypto map: Tunnel1-head-0
sa timing: remaining key lifetime (k/sec): (4424128/3016)
IV size: 8 bytes
replay detection support: Y
Status: ACTIVE

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0xF7B373C0(4155732928)
transform: esp-3des esp-sha-hmac ,
in use settings ={Tunnel, }
conn id: 2004, flow_id: NETGX:4, sibling_flags 80000046, crypto map: Tunnel1-head-0
sa timing: remaining key lifetime (k/sec): (4424128/3016)
IV size: 8 bytes
replay detection support: Y
Status: ACTIVE

outbound ah sas:

outbound pcp sas:
```

在DNS服务器上将b.cisco.com的DNS记录从209.165.201.1更改为209.165.202.129后，EEM将使路由器A实现，并且隧道将使用正确的新IP地址重新建立。

```
RouterB(config)#do show ip int brie
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 209.165.202.129 YES TFTP up up
FastEthernet0/1 192.168.20.1 YES manual up up
Tunnel1 172.16.12.2 YES manual up up



RouterA(config-if)#do show run int tunn1
```

```
Building configuration...

Current configuration : 192 bytes
!
interface Tunnel1
ip address 172.16.12.1 255.255.255.252
tunnel source fastethernet0/0
tunnel destination 209.165.202.129
tunnel mode ipsec ipv4
tunnel protection ipsec profile ipsec-profile
end

Router1841A#show cry isa sa
dst src state conn-id slot status
209.165.200.225 209.165.202.129 QM_IDLE 3 0 ACTIVE
```

故障排除

有关常见IKE/IPsec故障排除，请参阅IOS IPSec和IKE调试 — IKEv1主模式故障排除。

相关信息

- IPsec隧道对等体的实时解析
- 技术支持和文档 - Cisco Systems