配置IPSec隧道终端发现

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简介

隧道端点发现(TED)是Cisco IOS®软件功能，允许路由器自动发现IP安全(IPsec)端点。使用互联网密钥交换(IKE)部署IPsec需要为每个对等体配置加密映射，以标识要建立安全隧道的终端。当有许多对等体要建立隧道时，此方法无法很好地扩展。动态加密映射通过自动确定IPsec对等体来简化这种场景。这仅适用于接收IKE请求的路由器。TED允许发起和接收IKE请求的路由器动态发现IPsec隧道终端。

TED使用发现探测功能，该探测功能是从发起对等体发送到原始流量目的地的目的网络或主机的特殊IKE数据包。由于TED探测功能使用受保护实体的地址，因此这些地址必须是全局可路由的。如果涉及网络地址转换(NAT),TED将不起作用。

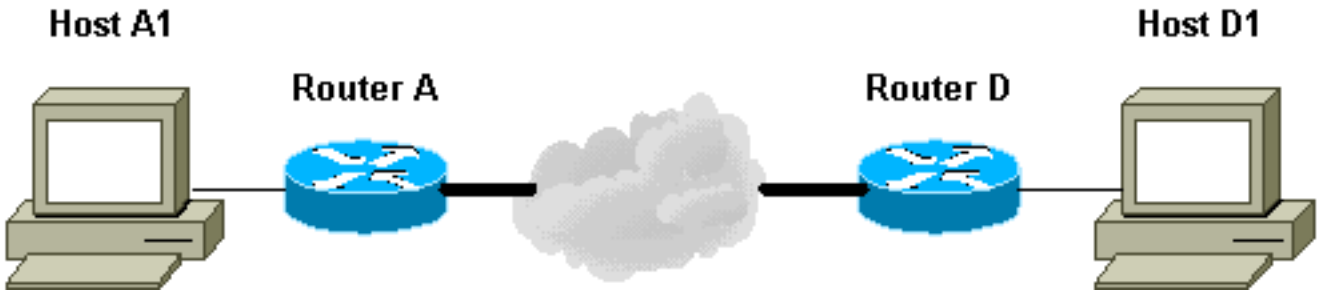
先决条件

要求

尝试进行此配置之前，请确保满足以下要求：

- 如IP安全(IPSec)加密简介中所述，了解IPsec并进行配置

此示例网络显示TED过程的工作方式。



1. D1发送以A1为目标的数据包。SRC=D1 DST=A1
2. D收到它，发现它没有建立IPsec安全关联(SA)（但它确实在访问列表的范围内），丢弃该数据包，并发送TED探测数据包（以查找远程对等体是谁）以A1为目标，IP地址D嵌入负载中。SRC=D1DST=A1Data=IP_of_D
3. TED探测数据包到达A，A将其识别为TED探测数据包。由于D1和A1之间的任何流量都应加密，因此它会丢弃数据包。然后，它发送TED应答数据包，该数据包以D为目标，且IP地址为负载中的A。这是因为D需要知道它需要使用哪台路由器来建立IPsec SA，这就是D最初将TED探测数据包发送出去的原因。SRC=ADST=DData=IP_of_A
4. TED应答数据包到达D。由于D现在知道IKE终端，它可以在主模式或主动模式下启动到A的隧道。

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 12.2(27)
- Cisco 2600 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。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

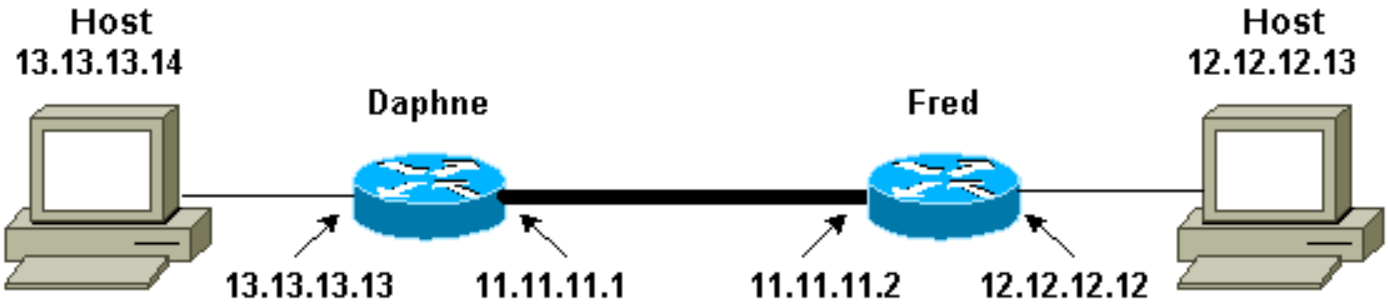
配置

本部分提供有关如何配置本文档所述功能的信息。

注意：使用命令查找工具(仅限注册客户)可查找有关本文档中使用的命令的详细信息。

网络图

本文档使用以下网络设置：



注意：在路由器Daphne和Fred之间建立隧道。

配置

本文档使用以下配置：

- 达芙妮
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Daphne 配置

```
Daphne#show running-config
Building configuration...

Current configuration : 1426 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Daphne
!
boot system flash  c2600-jk9s-mz.122-27.bin


enable password cisco
!

memory-size iomem 10
ip subnet-zero
!
!
no ip domain-lookup
!
!
!
!
!--- Defines the IKE policy. While using TED, the peer
!--- address associated with the pre-shared key should
be defined as wildcard !--- in the IKE policy, to
authenticate any discovered peer. crypto isakmp policy
10
 authentication pre-share
crypto isakmp key abc123 address 0.0.0.0 0.0.0.0
!
!
!--- Defines the transform to use for IPsec SAs. crypto
ipsec transform-set ted-transforms esp-des esp-md5-hmac
!
```

```
!--- Defines a dynamic crypto map to use for
establishing IPsec SAs. crypto dynamic-map ted-map 10
 set transform-set ted-transforms
 match address 101
!
!
!--- The 'discover' keyword used with the dynamic crypto
map !--- enables peer discovery. crypto map tedtag 10
ipsec-isakmp dynamic ted-map discover
!



!
interface FastEthernet0/0
 ip address 11.11.11.1 255.255.255.0
 duplex auto
 speed auto
 crypto map tedtag
!
interface FastEthernet0/1
 ip address 13.13.13.13 255.255.255.0
 duplex auto
 speed auto
!
ip classless
ip route 0.0.0.0 0.0.0.0 11.11.11.2
ip http server

!
!
!
!--- Defines the traffic to be encrypted using IPsec.
access-list 101 permit ip 13.13.13.0 0.0.0.255
12.12.12.0 0.0.0.255

!
!
!--- Output is suppressed. ! ! line con 0 line aux 0
line vty 0 4 login ! end
```

Fred 配置

```
fred#show running-config
Building configuration...

Current configuration : 1295 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname fred
!
boot system flash  c2600-jk9s-mz.122-27.bin



!
memory-size iomem 10
ip subnet-zero
!
!
!
```

```
!
!
!
!--- Defines the IKE policy. While using TED, the peer
!--- address associated with the pre-shared key should
be defined as wildcard !--- in the IKE policy, to
authenticate any discovered peer. crypto isakmp policy
10
 authentication pre-share
crypto isakmp key abc123 address 0.0.0.0 0.0.0.0
!
!
!--- Defines the transform to use for IPsec SAs. crypto
ipsec transform-set ted-transforms esp-des esp-md5-hmac
!
!--- Defines a dynamic crypto map used to establish
IPsec SAs. crypto dynamic-map ted-map 10
 set transform-set ted-transforms
 match address 101
!
!
!--- The 'discover' keyword used with the dynamic crypto
map !--- enables peer discovery. crypto map tedtag 10
ipsec-isakmp dynamic ted-map discover
!

!
!
interface FastEthernet0/0
 ip address 11.11.11.2 255.255.255.0
 duplex auto
 speed auto
 crypto map tedtag
!
interface FastEthernet0/1
 ip address 12.12.12.12 255.255.255.0
 duplex auto
 speed auto
!
ip classless
ip route 0.0.0.0 0.0.0.0 11.11.11.1
ip http server

!
!
!
!--- Defines the traffic encrypted using IPsec. access-
list 101 permit ip 12.12.12.0 0.0.0.255 13.13.13.0
0.0.0.255

!
!
!--- Output is suppressed. ! line con 0 line aux 0 line
vty 0 4 login ! end
```

验证

使用本部分可确认配置能否正常运行。

命令输出解释程序（仅限注册用户）(OIT) 支持某些 show 命令。使用 OIT 可查看对 show 命令输出的分析。

- show crypto isakmp sa — 通过显示路由器的IKE SA显示第1阶段安全关联。显示的状态为QM_IDLE，IKE SA将被视为正常运行。
- show crypto ipsec sa — 通过显示路由器的活动IPsec SA的详细列表来显示第2阶段安全关联。
- show crypto map — 显示路由器上配置的加密映射及其详细信息，如加密访问列表、转换集、对等体等。
- show crypto engine connections active — 显示活动 SA 的列表，以及与这些 SA 关联的接口、转换和计数器。

show 输出示例

本部分捕获在主机13.13.13.4上执行**ping**命令以发往主机12.12.12.13时路由器Daphne上的**show** 命令输出。路由器Fred上的输出也类似。输出中的关键参数以粗体显示。有关命令输出的说明，请参阅IP安全故障排除 — 了解和使用debug命令。

```
Daphne#show crypto isakmp sa
dst             src             state          conn-id    slot
11.11.11.2      11.11.11.1      QM_IDLE              2       0


Daphne#show crypto ipsec sa

interface: FastEthernet0/0
    Crypto map tag: tedtag, local addr. 11.11.11.1

   protected vrf:
   local  ident (addr/mask/prot/port): (13.13.13.0/255.255.255.0/0/0)
   remote ident (addr/mask/prot/port): (12.12.12.0/255.255.255.0/0/0)
   current_peer: 11.11.11.2
     PERMIT, flags={}
    #pkts encaps: 9, #pkts encrypt: 9, #pkts digest 9
    #pkts decaps: 9, #pkts decrypt: 9, #pkts verify 9
    #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.: 11.11.11.1, remote crypto endpt.: 11.11.11.2
     path mtu 1500, media mtu 1500
     current outbound spi: B326CBE6

     inbound esp sas:
      spi: 0xD8870500(3632727296)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        slot: 0, conn id: 2000, flow_id: 1, crypto map: tedtag
        sa timing: remaining key lifetime (k/sec): (4414715/2524)
        IV size: 8 bytes
        replay detection support: Y

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0xB326CBE6(3005664230)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        slot: 0, conn id: 2001, flow_id: 2, crypto map: tedtag
```

```
        sa timing: remaining key lifetime (k/sec): (4414715/2524)
        IV size: 8 bytes
        replay detection support: Y

     outbound ah sas:

     outbound pcp sas:


Daphne#show crypto map
Crypto Map "tedtag" 10 ipsec-isakmp
        Dynamic map template tag: ted-map
        Discover enabled

Crypto Map "tedtag" 11 ipsec-isakmp
        Peer = 11.11.11.2
        Extended IP access list
            access-list  permit ip 13.13.13.0 0.0.0.255 12.12.12.0 0.0.0.255
            dynamic (created from dynamic map ted-map/10)
        Current peer: 11.11.11.2
        Security association lifetime: 4608000 kilobytes/3600 seconds
        PFS (Y/N): N
        Transform sets={ ted-transforms, }
        Interfaces using crypto map tedtag:
                FastEthernet0/0


Daphne#show crypto engine connections active
  ID Interface            IP-Address      State  Algorithm           Encrypt  Decrypt
   2 <none>               <none>          set    HMAC_SHA+DES_56_CB        0        0
2000 FastEthernet0/0      11.11.11.1      set    HMAC_MD5+DES_56_CB        0        9
2001 FastEthernet0/0      11.11.11.1      set    HMAC_MD5+DES_56_CB        9        0
```

故障排除

使用本部分可排除配置故障。

故障排除命令

注意：在使用debug命令之前，请参阅有关Debug命**令的**重要信息。

- debug crypto engine — 显示有关执行加密和解密过程的加密引擎的信息。
- debug crypto ipsec - 显示第 2 阶段的 IPsec 协商。
- debug crypto isakmp — 显示第1阶段的IKE协商。

调试输出示例

本部分捕获在主机13.13.13.4上执行**ping** 命令以发往主机12.12.12.13时，在配置了IPsec的路由器上输出的**debug** 命令。

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```
Daphne#show debug
Cryptographic Subsystem:
  Crypto ISAKMP debugging is on
  Crypto Engine debugging is on
  Crypto IPSEC debugging is on
Daphne#
!--- TED process begins here. *Mar  1 02:07:18.850: IPSEC(tunnel discover request): ,
  (key eng. msg.) INBOUND local= 13.13.13.14, remote= 12.12.12.13,
    local_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 11.11.11.1/255.255.255.255/0/0 (type=1),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 3600s and 4608000kb,
    spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4004 dest=FastEthernet0
    /0:11.11.11.2
*Mar  1 02:07:18.854: ISAKMP: received ke message (1/1)
*Mar  1 02:07:18.854: ISAKMP: GOT A PEER DISCOVERY MESSAGE FROM THE SA MANAGER!!!
*Mar  1 02:07:18.854: src = 13.13.13.14 to 12.12.12.13, protocol 3,
   transform 2, hmac 1
*Mar  1 02:07:18.854: proxy source is 13.13.13.0/255.255.255.0 and my
   address (not used now) is 11.11.11.1
!--- IKE uses UDP port 500. *Mar 1 02:07:18.854: ISAKMP: local port 500, remote port 500

*Mar  1 02:07:18.858: ISAKMP (0:1): no idb in request
*Mar  1 02:07:18.858: ISAKMP (1): ID payload
        next-payload : 5
        type         : 1
        protocol     : 17
        port         : 500
        length       : 8
*Mar  1 02:07:18.858: ISAKMP (1): Total payload length: 12
*Mar  1 02:07:18.858: 1st ID is 11.11.11.1
*Mar  1 02:07:18.862: 2nd ID is 13.13.13.0/255.255.255.0
*Mar  1 02:07:18.862: ISAKMP (0:1): beginning peer discovery exchange
!--- TED probe is sent to the original destination of the !--- IP packet that matches the crypto
access-list for encryption. *Mar  1 02:07:18.862: ISAKMP (0:1): sending packet to 12.12.12.13
(I)
PEER_DISCOVERY via FastEthernet0/0:11.11.11.2
!--- TED response is received and the peer discovered. *Mar  1 02:07:18.962: ISAKMP (0:1):
received packet from
11.11.11.2 (I) PEER_DISCOVERY
*Mar  1 02:07:18.966: ISAKMP (0:1): processing vendor id payload
*Mar  1 02:07:18.966: ISAKMP (0:1): speaking to another IOS box!
*Mar  1 02:07:18.966: ISAKMP (0:1): processing ID payload. message ID = 0
*Mar  1 02:07:18.966: ISAKMP:received payload type 16
*Mar  1 02:07:18.966: ISAKMP (0:1): received response to my peer discovery probe!
*Mar  1 02:07:18.966: ISAKMP (0:1): ted negotiated proxies:
 0 13.13.13.0/255.255.255.0:0, 12.12.12.0
/255.255.255.0:0
!--- Normal IKE process begins here to form a secure tunnel to the !--- peer discovered through
TED. *Mar  1 02:07:18.970: ISAKMP (0:1): initiating IKE to 11.11.11.2
 in response to probe.
*Mar  1 02:07:18.970: ISAKMP: local port 500, remote port 500
*Mar  1 02:07:18.970: ISAKMP (0:1): created new SA after peer-discovery
  with 11.11.11.2
*Mar  1 02:07:18.974: ISAKMP (0:2): sending packet to 11.11.11.2 (I) MM_NO_STATE
*Mar  1 02:07:18.974: ISAKMP (0:1): peer does not do paranoid keepalives.

*Mar  1 02:07:18.974: ISAKMP (0:1): deleting SA reason "delete_me flag/throw"
state (I) PEER_DISCOVE
RY (peer 12.12.12.13) input queue 0
*Mar  1 02:07:19.975: ISAKMP (0:1): purging SA., sa=82687F70, delme=82687F70
*Mar  1 02:07:19.975: CryptoEngine0: delete connection 1
*Mar  1 02:07:20.608: ISAKMP (0:2): received packet from 11.11.11.2 (I) MM_NO_STATE
*Mar  1 02:07:20.608: ISAKMP (0:2): processing SA payload. message ID = 0
```

```
*Mar  1 02:07:20.608: ISAKMP (0:2): found peer pre-shared key matching 11.11.11.2
 !--- IKE SAs are negotiated. *Mar  1 02:07:20.612: ISAKMP (0:2): Checking ISAKMP transform 1
 against priority 10 policy
*Mar  1 02:07:20.612: ISAKMP:      encryption DES-CBC
*Mar  1 02:07:20.612: ISAKMP:      hash SHA
*Mar  1 02:07:20.612: ISAKMP:      default group 1
*Mar  1 02:07:20.612: ISAKMP:      auth pre-share
*Mar  1 02:07:20.612: ISAKMP:      life type in seconds
*Mar  1 02:07:20.612: ISAKMP:      life duration (VPI) of  0x0 0x1 0x51 0x80
*Mar  1 02:07:20.612: ISAKMP (0:2): atts are acceptable. Next payload is 0
*Mar  1 02:07:20.616: CryptoEngine0: generate alg parameter
*Mar  1 02:07:20.781: CRYPTO_ENGINE: Dh phase 1 status: 0
*Mar  1 02:07:20.781: CRYPTO_ENGINE: Dh phase 1 status: 0
*Mar  1 02:07:20.781: ISAKMP (0:2): SA is doing pre-shared key authentication
      using id type ID_IPV4_ADDR
*Mar  1 02:07:20.797: ISAKMP (0:2): sending packet to 11.11.11.2 (I) MM_SA_SETUP
*Mar  1 02:07:22.972: ISAKMP (0:2): received packet from 11.11.11.2 (I) MM_SA_SETUP
*Mar  1 02:07:22.972: ISAKMP (0:2): processing KE payload. message ID = 0
*Mar  1 02:07:22.972: CryptoEngine0: generate alg parameter
*Mar  1 02:07:23.177: ISAKMP (0:2): processing NONCE payload. message ID = 0
*Mar  1 02:07:23.177: ISAKMP (0:2): found peer pre-shared key matching 11.11.11.2
*Mar  1 02:07:23.181: CryptoEngine0: create ISAKMP SKEYID for conn id 2
*Mar  1 02:07:23.181: ISAKMP (0:2): SKEYID state generated
*Mar  1 02:07:23.185: ISAKMP (0:2): processing vendor id payload
*Mar  1 02:07:23.185: ISAKMP (0:2): speaking to another IOS box!
*Mar  1 02:07:23.185: ISAKMP (2): ID payload
        next-payload : 8
        type         : 1
        protocol     : 17
        port         : 500
        length       : 8
*Mar  1 02:07:23.185: ISAKMP (2): Total payload length: 12
*Mar  1 02:07:23.185: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:23.189: ISAKMP (0:2): sending packet to 11.11.11.2 (I) MM_KEY_EXCH
*Mar  1 02:07:23.277: ISAKMP (0:2): received packet from 11.11.11.2 (I) MM_KEY_EXCH
*Mar  1 02:07:23.281: ISAKMP (0:2): processing ID payload. message ID = 0
*Mar  1 02:07:23.281: ISAKMP (0:2): processing HASH payload. message ID = 0
*Mar  1 02:07:23.281: CryptoEngine0: generate hmac context for conn id 2
!--- Peer is authenticated. *Mar  1 02:07:23.285: ISAKMP (0:2): SA has been authenticated with
11.11.11.2
*Mar  1 02:07:23.285: ISAKMP (0:2): beginning Quick Mode exchange, M-ID of 409419560
*Mar  1 02:07:23.285: ISAKMP (0:2): asking for 1 spis from ipsec
*Mar  1 02:07:23.285: ISAKMP (0:2): had to get SPI's from ipsec.
*Mar  1 02:07:23.289: CryptoEngine0: clear dh number for conn id 1
*Mar  1 02:07:23.289: IPSEC(key_engine): got a queue event...
*Mar  1 02:07:23.289: IPSEC(spi_response): getting spi 4160804383 for SA
        from 11.11.11.1      to 11.11.11.2      for prot 3
*Mar  1 02:07:23.289: ISAKMP: received ke message (2/1)
*Mar  1 02:07:23.537: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:23.541: ISAKMP (0:2): sending packet to 11.11.11.2 (I) QM_IDLE
*Mar  1 02:07:23.958: ISAKMP (0:2): received packet from 11.11.11.2 (I) QM_IDLE
*Mar  1 02:07:23.962: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:23.962: ISAKMP (0:2): processing HASH payload. message ID = 409419560
*Mar  1 02:07:23.962: ISAKMP (0:2): processing SA payload. message ID = 409419560
!--- IPsec SAs are negotiated. *Mar  1 02:07:23.962: ISAKMP (0:2): Checking IPSec proposal 1
*Mar  1 02:07:23.962: ISAKMP: transform 1, ESP_DES
*Mar  1 02:07:23.966: ISAKMP:   attributes in transform:
*Mar  1 02:07:23.966: ISAKMP:      encaps is 1
*Mar  1 02:07:23.966: ISAKMP:      SA life type in seconds
*Mar  1 02:07:23.966: ISAKMP:      SA life duration (basic) of 3600
*Mar  1 02:07:23.966: ISAKMP:      SA life type in kilobytes
*Mar  1 02:07:23.966: ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
*Mar  1 02:07:23.966: ISAKMP:      authenticator is HMAC-MD5
*Mar  1 02:07:23.970: validate proposal 0
```

```
*Mar  1 02:07:23.970: ISAKMP (0:2): atts are acceptable.
*Mar  1 02:07:23.970: IPSEC(validate_proposal_request): proposal part #1,
  (key eng. msg.) INBOUND local= 11.11.11.1, remote= 11.11.11.2,
    local_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 12.12.12.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 0s and 0kb,
    spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
*Mar  1 02:07:23.974: validate proposal request 0
*Mar  1 02:07:23.974: ISAKMP (0:2): processing NONCE payload. message ID = 409419560
*Mar  1 02:07:23.974: ISAKMP (0:2): processing ID payload. message ID = 409419560
*Mar  1 02:07:23.974: ISAKMP (0:2): processing ID payload. message ID = 409419560
*Mar  1 02:07:23.974: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:23.978: ipsec allocate flow 0
*Mar  1 02:07:23.978: ipsec allocate flow 0
!--- IPsec SAs are generated for inbound and outbound traffic. *Mar  1 02:07:23.986: ISAKMP
(0:2): Creating IPSec SAs
*Mar  1 02:07:23.986:         inbound SA from 11.11.11.2 to 11.11.11.1
        (proxy 12.12.12.0 to 13.13.13.0)
*Mar  1 02:07:23.986:         has spi 0xF800D61F and conn_id 2000 and flags 4
*Mar  1 02:07:23.986:         lifetime of 3600 seconds
*Mar  1 02:07:23.986:         lifetime of 4608000 kilobytes
*Mar  1 02:07:23.990: outbound SA from 11.11.11.1 to 11.11.11.2
(proxy 13.13.13.0 to 12.12.12.0     )
*Mar  1 02:07:23.990: has spi -1535570016 and conn_id 2001 and flags C
*Mar  1 02:07:23.990:         lifetime of 3600 seconds
*Mar  1 02:07:23.990:         lifetime of 4608000 kilobytes
*Mar  1 02:07:23.990: ISAKMP (0:2): sending packet to 11.11.11.2 (I) QM_IDLE
*Mar  1 02:07:23.994: ISAKMP (0:2): deleting node 409419560 error FALSE reason ""
*Mar  1 02:07:23.994: IPSEC(key_engine): got a queue event...
*Mar  1 02:07:23.994: IPSEC(initialize_sas): ,
  (key eng. msg.) INBOUND local= 11.11.11.1, remote= 11.11.11.2,
    local_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 12.12.12.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 3600s and 4608000kb,
    spi= 0xF800D61F(4160804383), conn_id= 2000, keysize= 0, flags= 0x4
*Mar  1 02:07:23.998: IPSEC(initialize_sas): ,
  (key eng. msg.) OUTBOUND local= 11.11.11.1, remote= 11.11.11.2,
    local_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 12.12.12.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 3600s and 4608000kb,
    spi= 0xA4790FA0(2759397280), conn_id= 2001, keysize= 0, flags= 0xC
*Mar  1 02:07:24.002: IPSEC(create_sa): sa created,
  (sa) sa_dest= 11.11.11.1, sa_prot= 50,
    sa_spi= 0xF800D61F(4160804383),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2000
*Mar  1 02:07:24.002: IPSEC(create_sa): sa created,
  (sa) sa_dest= 11.11.11.2, sa_prot= 50,
    sa_spi= 0xA4790FA0(2759397280),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2001


Daphne#
```

弗雷德

```
fred#show debug

Cryptographic Subsystem:
  Crypto ISAKMP debugging is on
  Crypto Engine debugging is on
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  Crypto IPSEC debugging is on
fred#
!--- Receives the TED probe. *Mar  1 02:07:45.763: ISAKMP (0:0): received packet from
 13.13.13.14 (N) NEW SA
*Mar  1 02:07:45.767: ISAKMP: local port 500, remote port 500
*Mar  1 02:07:45.779: ISAKMP (0:1): processing vendor id payload
*Mar  1 02:07:45.783: ISAKMP (0:1): speaking to another IOS box!
*Mar  1 02:07:45.783: ISAKMP (0:1): processing ID payload. message ID = 0
*Mar  1 02:07:45.787: ISAKMP (0:1): processing ID payload. message ID =
 -1992472852
*Mar  1 02:07:45.791: ISAKMP (1): ID_IPV4_ADDR_SUBNET src 13.13.13.0
 /255.255.255.0 prot 0 port 0
*Mar  1 02:07:45.791: ISAKMP (0:1): processing vendor id payload
!--- Sends a response to the other peer for the TED probe. *Mar  1 02:07:45.795: ISAKMP (0:1):
responding to peer discovery probe!
*Mar  1 02:07:45.799: peer's address is 11.11.11.1
*Mar  1 02:07:45.799: src (him) 4, 13.13.13.0/255.255.255.0 to dst
(me) 0, 0.0.0.0/0.0.0.0
*Mar  1 02:07:45.803: ISAKMP (0:1): peer can handle TED V3: changing source
to 11.11.11.1 and dest to 11.11.11.2
*Mar  1 02:07:45.811: ISAKMP (1): ID payload
        next-payload : 239
        type         : 1
        protocol     : 17
        port         : 500
        length       : 8
*Mar  1 02:07:45.815: ISAKMP (1): Total payload length: 12
*Mar  1 02:07:45.819: ISAKMP (0:1): sending packet to 11.11.11.1 (R)
 PEER_DISCOVERY
*Mar  1 02:07:45.823: ISAKMP (0:1): peer does not do paranoid keepalives.

*Mar  1 02:07:45.823: ISAKMP (0:1): deleting SA reason "delete_me flag/throw"
state (R) PEER_DISCOVE
RY (peer 11.11.11.1) input queue 0
*Mar  1 02:07:45.827: ISAKMP (0:1): deleting node 0 error TRUE reason
"delete_me flag/throw"
 !--- IKE processing begins here. *Mar  1 02:07:45.871: ISAKMP (0:0): received packet from
11.11.11.1
(N) NEW SA
*Mar  1 02:07:45.875: ISAKMP: local port 500, remote port 500
*Mar  1 02:07:45.883: ISAKMP (0:2): processing SA payload. message ID = 0
*Mar  1 02:07:45.887: ISAKMP (0:2): found peer pre-shared key matching 11.11.11.1
!--- IKE SAs are negotiated. *Mar  1 02:07:45.887: ISAKMP (0:2): Checking ISAKMP transform 1
against priority 10 policy
*Mar  1 02:07:45.891: ISAKMP:      encryption DES-CBC
*Mar  1 02:07:45.891: ISAKMP:      hash SHA
*Mar  1 02:07:45.895: ISAKMP:      default group 1
*Mar  1 02:07:45.895: ISAKMP:      auth pre-share
*Mar  1 02:07:45.899: ISAKMP:      life type in seconds
*Mar  1 02:07:45.899: ISAKMP:      life duration (VPI) of  0x0 0x1 0x51 0x80
*Mar  1 02:07:45.903: ISAKMP (0:2): atts are acceptable. Next payload is 0
*Mar  1 02:07:45.907: CryptoEngine0: generate alg parameter
*Mar  1 02:07:47.455: CRYPTO_ENGINE: Dh phase 1 status: 0
*Mar  1 02:07:47.455: CRYPTO_ENGINE: Dh phase 1 status: 0
*Mar  1 02:07:47.459: ISAKMP (0:2): SA is doing pre-shared key authentication
using id type ID_IPV4_
ADDR
*Mar  1 02:07:47.463: ISAKMP (0:2): sending packet to 11.11.11.1 (R) MM_SA_SETUP
*Mar  1 02:07:47.467: ISAKMP (0:1): purging SA., sa=2349E0, delme=2349E0
*Mar  1 02:07:47.471: ISAKMP (0:1): purging node 0
*Mar  1 02:07:47.475: CryptoEngine0: delete connection 1
*Mar  1 02:07:47.707: ISAKMP (0:2): received packet from 11.11.11.1 (R) MM_SA_SETUP
*Mar  1 02:07:47.711: ISAKMP (0:2): processing KE payload. message ID = 0
*Mar  1 02:07:47.715: CryptoEngine0: generate alg parameter
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*Mar  1 02:07:49.767: ISAKMP (0:2): processing NONCE payload. message ID = 0
*Mar  1 02:07:49.775: ISAKMP (0:2): found peer pre-shared key matching 11.11.11.1
*Mar  1 02:07:49.783: CryptoEngine0: create ISAKMP SKEYID for conn id 2
*Mar  1 02:07:49.799: ISAKMP (0:2): SKEYID state generated
*Mar  1 02:07:49.803: ISAKMP (0:2): processing vendor id payload
*Mar  1 02:07:49.807: ISAKMP (0:2): speaking to another IOS box!
*Mar  1 02:07:49.815: ISAKMP (0:2): sending packet to 11.11.11.1 (R) MM_KEY_EXCH
*Mar  1 02:07:50.087: ISAKMP (0:2): received packet from 11.11.11.1 (R) MM_KEY_EXCH
*Mar  1 02:07:50.095: ISAKMP (0:2): processing ID payload. message ID = 0
*Mar  1 02:07:50.099: ISAKMP (0:2): processing HASH payload. message ID = 0
*Mar  1 02:07:50.103: CryptoEngine0: generate hmac context for conn id 2
!--- Peer is authenticated. *Mar  1 02:07:50.111: ISAKMP (0:2): SA has been authenticated with
11.11.11.1
*Mar  1 02:07:50.115: ISAKMP (2): ID payload
        next-payload : 8
        type         : 1
        protocol     : 17
        port         : 500
        length       : 8
*Mar  1 02:07:50.115: ISAKMP (2): Total payload length: 12
*Mar  1 02:07:50.119: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:50.131: CryptoEngine0: clear dh number for conn id 1
*Mar  1 02:07:50.135: ISAKMP (0:2): sending packet to 11.11.11.1 (R) QM_IDLE
*Mar  1 02:07:50.451: ISAKMP (0:2): received packet from 11.11.11.1 (R) QM_IDLE
*Mar  1 02:07:50.467: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:50.475: ISAKMP (0:2): processing HASH payload. message ID = 409419560
*Mar  1 02:07:50.475: ISAKMP (0:2): processing SA payload. message ID = 409419560
!--- IPsec SAs are negotiated. *Mar  1 02:07:50.479: ISAKMP (0:2): Checking IPSec proposal 1
*Mar  1 02:07:50.479: ISAKMP: transform 1, ESP_DES
*Mar  1 02:07:50.483: ISAKMP:   attributes in transform:
*Mar  1 02:07:50.483: ISAKMP:      encaps is 1
*Mar  1 02:07:50.487: ISAKMP:      SA life type in seconds
*Mar  1 02:07:50.487: ISAKMP:      SA life duration (basic) of 3600
*Mar  1 02:07:50.487: ISAKMP:      SA life type in kilobytes
*Mar  1 02:07:50.491: ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
*Mar  1 02:07:50.495: ISAKMP:      authenticator is HMAC-MD5
*Mar  1 02:07:50.495: validate proposal 0
*Mar  1 02:07:50.499: ISAKMP (0:2): atts are acceptable.
*Mar  1 02:07:50.503: IPSEC(validate_proposal_request): proposal part #1,
  (key eng. msg.) INBOUND local= 11.11.11.2, remote= 11.11.11.1,
    local_proxy= 12.12.12.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 0s and 0kb,
    spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
*Mar  1 02:07:50.515: validate proposal request 0
*Mar  1 02:07:50.519: ISAKMP (0:2): processing NONCE payload. message
ID = 409419560
*Mar  1 02:07:50.523: ISAKMP (0:2): processing ID payload. message ID = 409419560
*Mar  1 02:07:50.523: ISAKMP (0:2): processing ID payload. message ID = 409419560
*Mar  1 02:07:50.527: ISAKMP (0:2): asking for 1 spis from ipsec
*Mar  1 02:07:50.535: IPSEC(key_engine): got a queue event...
*Mar  1 02:07:50.543: IPSEC(spi_response): getting spi 2759397280 for SA
        from 11.11.11.2      to 11.11.11.1      for prot 3
*Mar  1 02:07:50.551: ISAKMP: received ke message (2/1)
*Mar  1 02:07:50.787: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:50.803: ISAKMP (0:2): sending packet to 11.11.11.1 (R) QM_IDLE
*Mar  1 02:07:50.887: ISAKMP (0:2): received packet from 11.11.11.1 (R) QM_IDLE
*Mar  1 02:07:50.899: CryptoEngine0: generate hmac context for conn id 2
*Mar  1 02:07:50.907: ipsec allocate flow 0
*Mar  1 02:07:50.907: ipsec allocate flow 0
!--- IPsec SAs are generated for inbound and outbound traffic. *Mar  1 02:07:50.939: ISAKMP
(0:2): Creating IPSec SAs
*Mar  1 02:07:50.939:         inbound SA from 11.11.11.1 to 11.11.11.2
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        (proxy 13.13.13.0 to 12.12.12.0)
*Mar  1 02:07:50.947:         has spi 0xA4790FA0 and conn_id 2000 and
flags 4
*Mar  1 02:07:50.947:         lifetime of 3600 seconds
*Mar  1 02:07:50.951:         lifetime of 4608000 kilobytes
*Mar  1 02:07:50.951: outbound SA from 11.11.11.2 to 11.11.11.1
(proxy 12.12.12.0 to 13.13.13.0     )
*Mar  1 02:07:50.959:  has spi -134162913 and conn_id 2001 and flags C
*Mar  1 02:07:50.959:         lifetime of 3600 seconds
*Mar  1 02:07:50.963:         lifetime of 4608000 kilobytes
*Mar  1 02:07:50.963: ISAKMP (0:2): deleting node 409419560 error FALSE
 reason "quick mode done (awa
it()"
*Mar  1 02:07:50.971: IPSEC(key_engine): got a queue event...
*Mar  1 02:07:50.971: IPSEC(initialize_sas): ,
  (key eng. msg.) INBOUND local= 11.11.11.2, remote= 11.11.11.1,
    local_proxy= 12.12.12.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 3600s and 4608000kb,
    spi= 0xA4790FA0(2759397280), conn_id= 2000, keysize= 0, flags= 0x4
*Mar  1 02:07:50.983: IPSEC(initialize_sas): ,
  (key eng. msg.) OUTBOUND local= 11.11.11.2, remote= 11.11.11.1,
    local_proxy= 12.12.12.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 13.13.13.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 3600s and 4608000kb,
    spi= 0xF800D61F(4160804383), conn_id= 2001, keysize= 0, flags= 0xC
*Mar  1 02:07:51.003: IPSEC(create_sa): sa created,
  (sa) sa_dest= 11.11.11.2, sa_prot= 50,
    sa_spi= 0xA4790FA0(2759397280),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2000
*Mar  1 02:07:51.007: IPSEC(create_sa): sa created,
  (sa) sa_dest= 11.11.11.1, sa_prot= 50,
    sa_spi= 0xF800D61F(4160804383),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2001

fred#
```

相关信息

- 部署IPsec
- 隧道终端发现增强
- 技术支持和文档 - Cisco Systems