在PIX防火墙和带有叠加专用网络的Cisco VPN 3000集中器之间的IPSec配置示例

目录

简介

本文介绍如何在 VPN 网关后具有重叠专用网络地址的站点到站点 IPSec VPN 中配置 Cisco Secure PIX 防火墙。本示例使用 PIX 6.2 中引入的增强网络地址转换 (NAT) 功能将 IPSec VPN 隧道每一端的重叠网络转换为非重叠地址空间。

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：

- 软件版本为 6.3(3) 的 Cisco Secure PIX 防火墙 506
- 软件版本为 4.1(5) 的 VPN 3030 集中器

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。

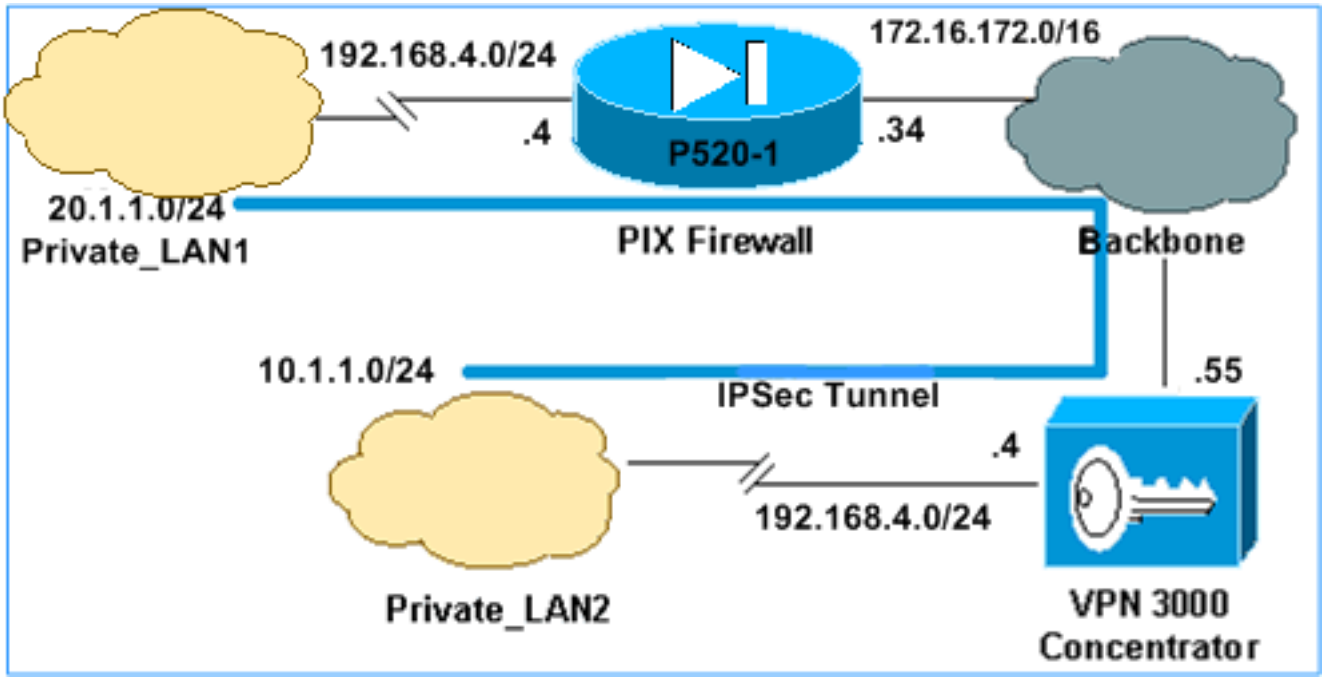
配置

本部分提供有关如何配置本文档所述功能的信息。

注：要查找有关本文档中使用的命令的其他信息，请使用命令查找工具(仅注册客户)。

网络图

本文档使用此图所示的网络设置。



Private_LAN1和Private_LAN2的IP子网都为192.168.4.0/24。这模拟了IPSec隧道两侧后面的重叠地址空间。此处将 VPN 3000 集中器用作一个没有 NAT over VPN 流量功能的集中器的示例。

在本示例中，PIX 执行双向转换，以使两个专用 LAN 可以通过 IPSec 隧道通信。转换意味着 Private_LAN1 通过 IPSec 隧道将 Private_LAN2“视为”10.1.1.0/24，而 Private_LAN2 通过 IPSec 隧道将 Private_LAN1“视为”20.1.1.0/24。

配置

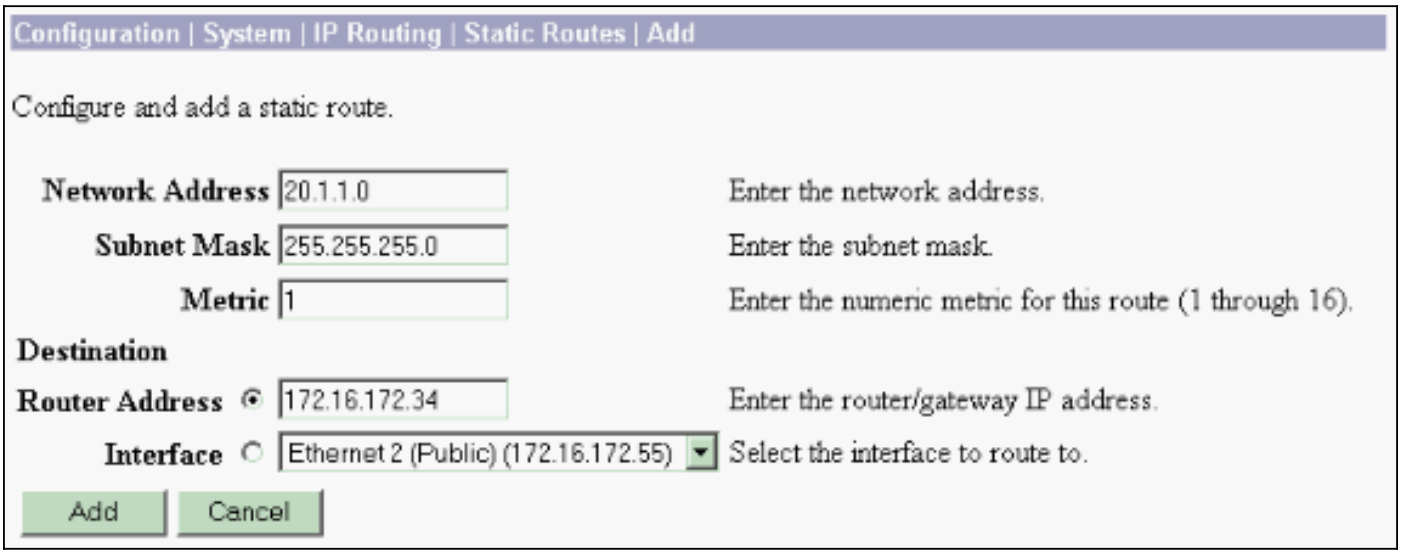
PIX
P520-1(config)#**show run** : Saved : PIX Version 6.3(3) **interface ethernet0 auto** **interface ethernet1 auto** nameif ethernet0 outside security0 nameif ethernet1 inside security100

```
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname P520-1
domain-name bru-ch.com
fixup protocol dns maximum-length 512
fixup protocol ftp 21
fixup protocol h323 h225 1720
fixup protocol h323 ras 1718-1719
fixup protocol http 80
fixup protocol rsh 514
fixup protocol rtsp 554
fixup protocol sip 5060
fixup protocol sip udp 5060
fixup protocol skinny 2000
fixup protocol smtp 25
fixup protocol sqlnet 1521
fixup protocol tftp 69
names
!--- Defines IPSec interesting traffic. !--- Note that
the host behind PIX communicates !--- to Private_LAN1
using 10.1.1.0/24. !--- When the packets arrive at the
PIX, they are first !--- translated to 192.168.4.0/24
and then encrypted by IPSec. access-list 101 permit ip
20.1.1.0 255.255.255.0 192.168.4.0 255.255.255.0
pager lines 24
mtu outside 1500
mtu inside 1500
ip address outside 172.16.172.34 255.255.255.0
ip address inside 192.168.4.4 255.255.255.0
ip audit info action alarm
ip audit attack action alarm
pdm history enable
arp timeout 14400
!--- Static translation defined to translate
Private_LAN2 !--- from 192.168.4.0/24 to 10.1.1.0/24.
static (outside,inside) 10.1.1.0 192.168.4.0 netmask
255.255.255.0 0 0
!--- Static translation defined to translate
Private_LAN1 !--- from 192.168.4.0/24 to 20.1.1.0/24. !-
-- Note that this translation is used for both !--- VPN
and Internet traffic from Private_LAN1. !--- A routable
global IP address range, or an extra NAT !--- at the ISP
router (in front of PIX), is !--- required if
Private_LAN1 also needs internal access. static
(inside,outside) 20.1.1.0 192.168.4.0 netmask
255.255.255.0 0 0
route outside 0.0.0.0 0.0.0.0 172.16.172.55 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc
0:10:00 h225 1:00:00
timeout h323 0:05:00 mgcp 0:05:00 sip 0:30:00 sip_media
0:02:00
timeout uauth 0:05:00 absolute
aaa-server TACACS+ protocol tacacs+
aaa-server RADIUS protocol radius
aaa-server LOCAL protocol local
no snmp-server location
no snmp-server contact
snmp-server community public
no snmp-server enable traps
floodguard enable
sysopt connection permit-ipsec
!--- Defines IPSec encryption and authentication
algorithms. crypto ipsec transform-set myset esp-des
```

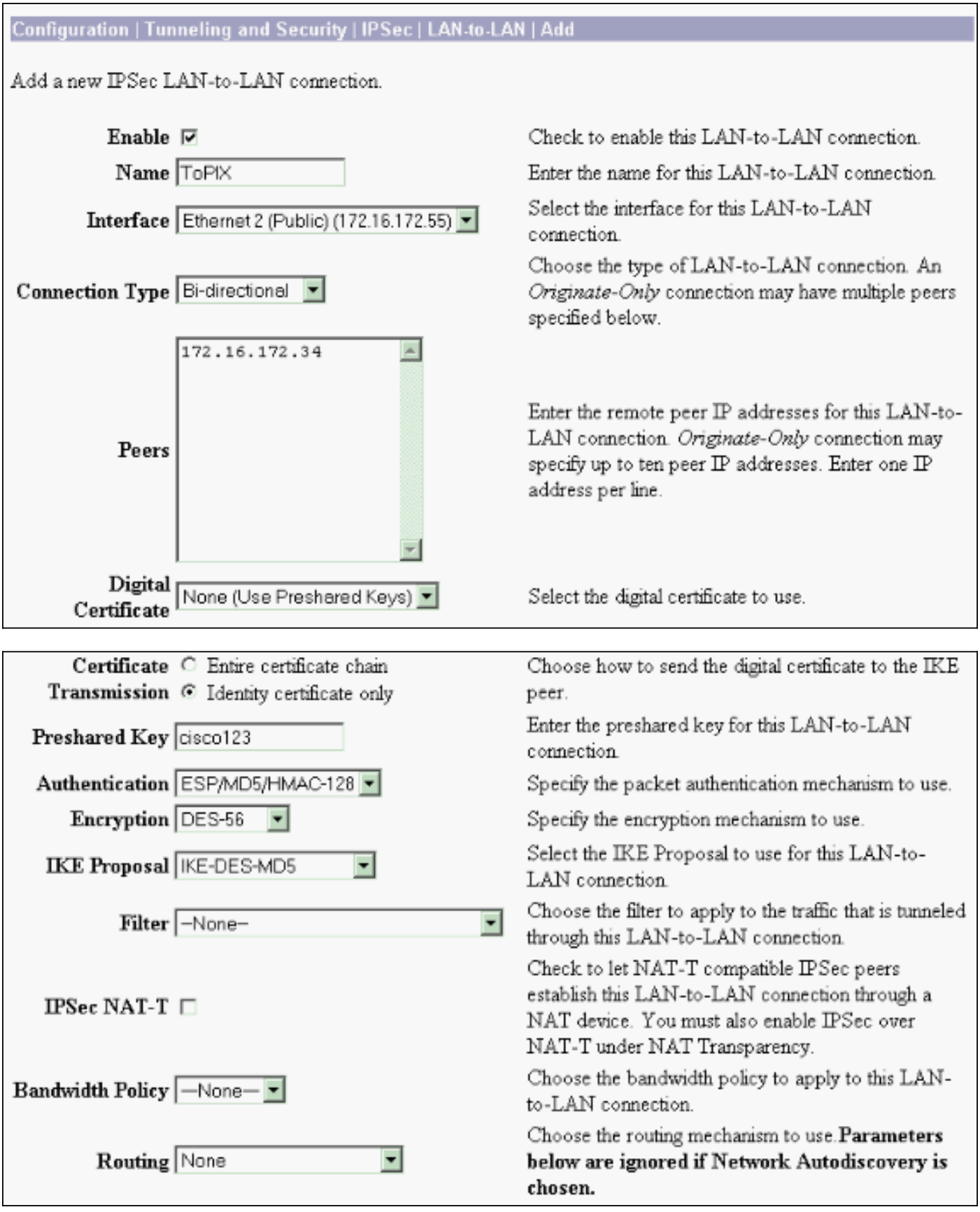
```
esp-md5-hmac
!--- Defines crypto map. crypto map vpn 10 ipsec-isakmp
crypto map vpn 10 match address 101
crypto map vpn 10 set peer 172.16.172.55
crypto map vpn 10 set transform-set myset
!--- Apply crypto map on the outside interface. crypto
map vpn interface outside
isakmp enable outside
!--- Defines pre-shared secret (cisco123) used for IKE
authentication. isakmp key ******** address
172.16.172.55 netmask 255.255.255.255
isakmp identity address
!--- Defines ISAKMP policy. isakmp policy 1
authentication pre-share
isakmp policy 1 encryption des
isakmp policy 1 hash md5
isakmp policy 1 group 1
isakmp policy 1 lifetime 86400
telnet timeout 5
ssh timeout 5
console timeout 0
terminal width 80
Cryptochecksum:6cc25fc2fea20958dfe74c1fca45ada2
: end
```

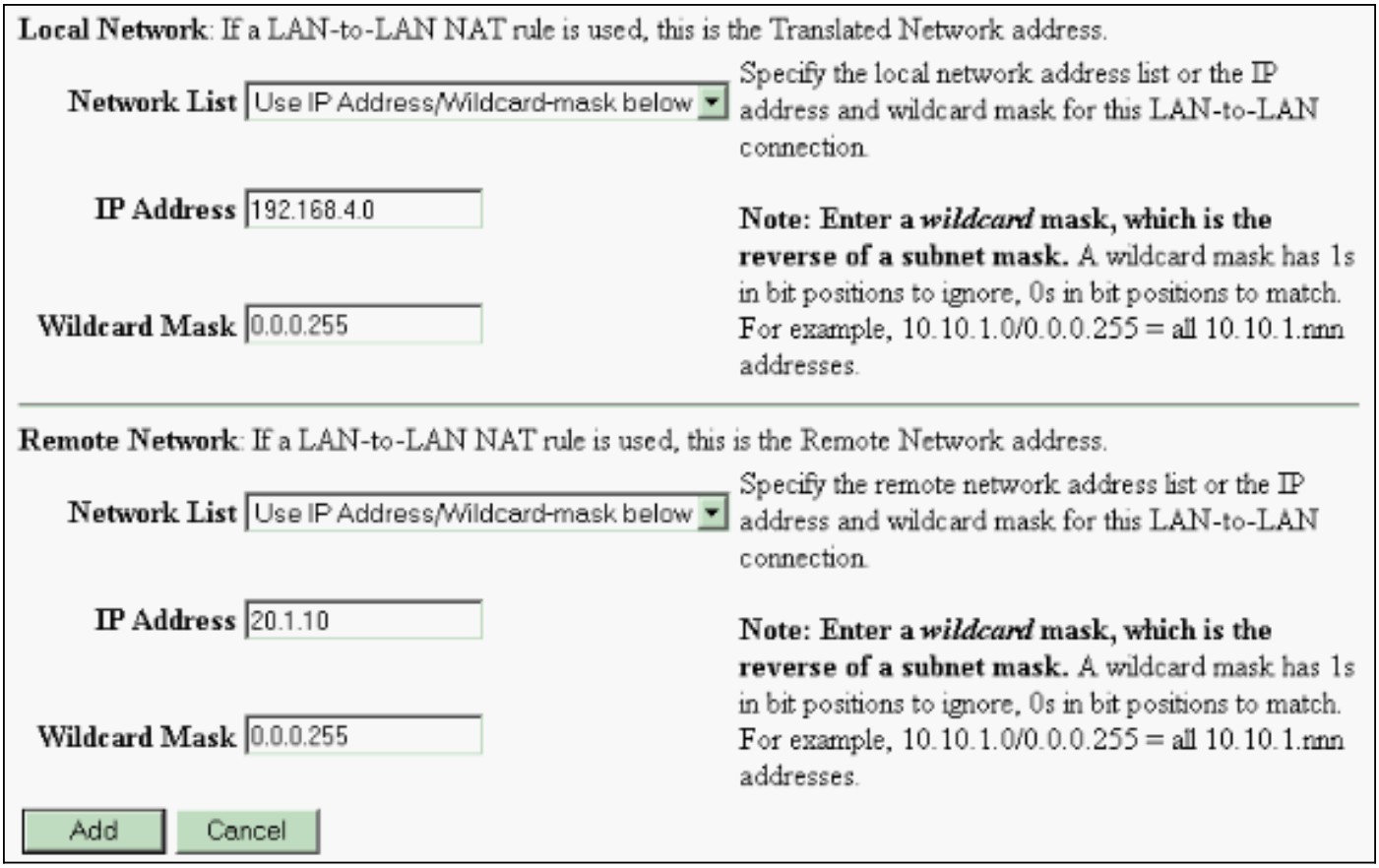
VPN 3000 集中器 LAN 到 LAN 隧道配置

对于目标地址 20.1.1.0 /24 (Private_LAN1)，您需要在 VPN 3000 上具有静态路由。为此，请选择 **Configuration > System > IP Routing > Static Routes，然后选择 Add**。填写完字段之后，请单击 **Add**。



使用下列图像中的设置来配置您的 VPN 3000 集中器。


Configuration | Tunneling and Security | IPSec | LAN-to-LAN | Add
Add a new IPSec LAN-to-LAN connection.
Enable
Check to enable this LAN-to-LAN connection.
Name
ToPIX
Enter the name for this LAN-to-LAN connection.
Interface
Ethernet 2 (Public) (172.16.172.55)
Select the interface for this LAN-to-LAN connection.
Connection Type
Bi-directional
Choose the type of LAN-to-LAN connection. An Originate-Only connection may have multiple peers specified below.
Peers
172.16.172.34
Enter the remote peer IP addresses for this LAN-to-LAN connection. Originate-Only connection may specify up to ten peer IP addresses. Enter one IP address per line.
Digital Certificate
None (Use Preshared Keys)
Select the digital certificate to use.
Certificate Transmission
Entire certificate chain
Identity certificate only
Choose how to send the digital certificate to the IKE peer.
Preshared Key
cisco123
Enter the preshared key for this LAN-to-LAN connection.
Authentication
ESP/MD5/HMAC-128
Specify the packet authentication mechanism to use.
Encryption
DES-56
Specify the encryption mechanism to use.
IKE Proposal
IKE-DES-MD5
Select the IKE Proposal to use for this LAN-to-LAN connection.
Filter
-None-
Choose the filter to apply to the traffic that is tunneled through this LAN-to-LAN connection.
IPSec NAT-T
Check to let NAT-T compatible IPSec peers establish this LAN-to-LAN connection through a NAT device. You must also enable IPSec over NAT-T under NAT Transparency.
Bandwidth Policy
-None-
Choose the bandwidth policy to apply to this LAN-to-LAN connection.
Routing
None
Choose the routing mechanism to use. Parameters below are ignored if Network Autodiscovery is chosen.



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 crypto isakmp sa - 显示对等体上的所有当前 Internet 密钥交换 (IKE) 安全关联 (SA)。**
- **show crypto isakmp sa detail - 显示对等体上的所有当前 IKE SA 的详细信息。**
- **show crypto ipsec sa - 显示当前 SA 使用的设置。**
- **show xlate detail - 显示转换插槽信息。**

PIX

```
P520-1(config)#
P520-1(config)#show crypto isakmp sa
Total     : 1
Embryonic : 0
        dst               src        state     pending     created
   172.16.172.55    172.16.172.34    QM_IDLE           0           1

P520-1(config)#show crypto isakmp sa detail
Total     : 1
Embryonic : 0
         Local            Remote          Encr Hash     Auth  State       Lifetime
   172.16.172.34:500    172.16.172.55:500  des  md5      psk QM_IDLE        86211
P520-1(config)#

P520-1(config)#show crypto ipsec sa
```

```
interface: outside
    Crypto map tag: vpn, local addr. 172.16.172.34

   local  ident (addr/mask/prot/port): (20.1.1.0/255.255.255.0/0/0)
   remote ident (addr/mask/prot/port): (192.168.4.0/255.255.255.0/0/0)
   current_peer: 172.16.172.55:500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 4, #pkts encrypt: 4, #pkts digest 4
    #pkts decaps: 4, #pkts decrypt: 4, #pkts verify 4
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
    #send errors 1, #recv errors 0

     local crypto endpt.: 172.16.172.34, remote crypto endpt.: 172.16.172.55
     path mtu 1500, ipsec overhead 56, media mtu 1500
     current outbound spi: 734575cb

     inbound esp sas:
      spi: 0xe028850d(3760751885)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        slot: 0, conn id: 1, crypto map: vpn
        sa timing: remaining key lifetime (k/sec): (4607999/28751)
        IV size: 8 bytes
        replay detection support: Y


    inbound ah sas:


     inbound pcp sas:


     outbound esp sas:
      spi: 0x734575cb(1933931979)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        slot: 0, conn id: 2, crypto map: vpn
        sa timing: remaining key lifetime (k/sec): (4607999/28751)
        IV size: 8 bytes
        replay detection support: Y


     outbound ah sas:

P520-1(config)#show xlate detail
2 in use, 2 most used
Flags: D - DNS, d - dump, I - identity, i - inside, n - no random,
       o - outside, r - portmap, s - static
NAT from inside:192.168.4.1 to outside:20.1.1.1 flags s
NAT from outside:192.168.4.1 to inside:10.1.1.1 flags s
```

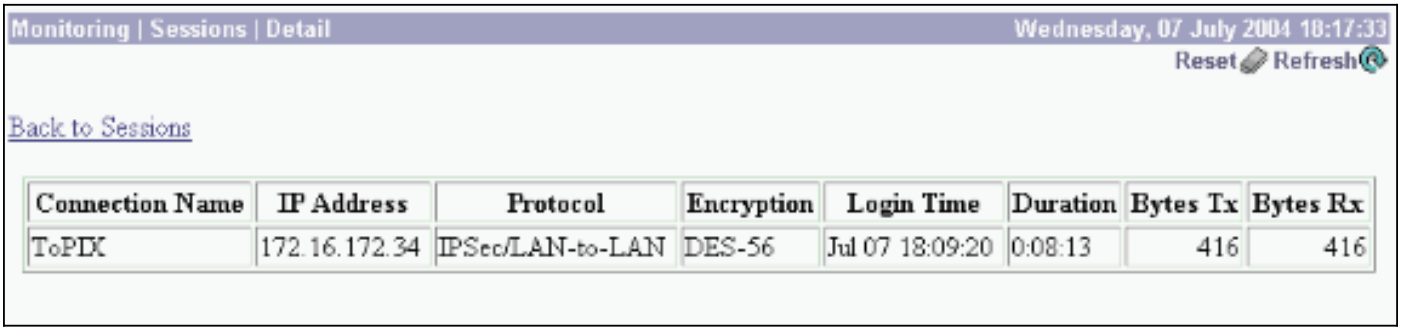
使用 ping 流量验证隧道。在 PIX 上收集的此 debug icmp trace 输出说明 NAT 如何转换数据包。

```
P520-1(config)# debug icmp trace
ICMP trace on
Warning: this may cause problems on busy networks
P520-1(config)#
1: ICMP echo-request from inside:192.168.4.1 to 10.1.1.1 ID=3060 seq=4391 length=80
2: ICMP echo-request: translating inside:192.168.4.1 to outside:20.1.1.1
```

```
3: ICMP echo-request: untranslating inside:10.1.1.1 to outside:192.168.4.1
4: ICMP echo-reply from outside:192.168.4.1 to 20.1.1.1 ID=3060 seq=4391 length=80
5: ICMP echo-reply: translating outside:192.168.4.1 to inside:10.1.1.1
6: ICMP echo-reply: untranslating outside:20.1.1.1 to inside:192.168.4.1
7: ICMP echo-request from inside:192.168.4.1 to 10.1.1.1 ID=3061 seq=4391 length=80
8: ICMP echo-request: translating inside:192.168.4.1 to outside:20.1.1.1
9: ICMP echo-request: untranslating inside:10.1.1.1 to outside:192.168.4.1
10: ICMP echo-reply from outside:192.168.4.1 to 20.1.1.1 ID=3061 seq=4391 length=80
11: ICMP echo-reply: translating outside:192.168.4.1 to inside:10.1.1.1
12: ICMP echo-reply: untranslating outside:20.1.1.1 to inside:192.168.4.1
13: ICMP echo-request from inside:192.168.4.1 to 10.1.1.1 ID=3062 seq=4391 length=80
14: ICMP echo-request: translating inside:192.168.4.1 to outside:20.1.1.1
15: ICMP echo-request: untranslating inside:10.1.1.1 to outside:192.168.4.1
16: ICMP echo-reply from outside:192.168.4.1 to 20.1.1.1 ID=3062 seq=4391 length=80
17: ICMP echo-reply: translating outside:192.168.4.1 to inside:10.1.1.1
18: ICMP echo-reply: untranslating outside:20.1.1.1 to inside:192.168.4.1
19: ICMP echo-request from inside:192.168.4.1 to 10.1.1.1 ID=3063 seq=4391 length=80
20: ICMP echo-request: translating inside:192.168.4.1 to outside:20.1.1.1
21: ICMP echo-request: untranslating inside:10.1.1.1 to outside:192.168.4.1
22: ICMP echo-reply from outside:192.168.4.1 to 20.1.1.1 ID=3063 seq=4391 length=80
23: ICMP echo-reply: translating outside:192.168.4.1 to inside:10.1.1.1
24: ICMP echo-reply: untranslating outside:20.1.1.1 to inside:192.168.4.1
25: ICMP echo-request from inside:192.168.4.1 to 10.1.1.1 ID=3064 seq=4391 length=80
26: ICMP echo-request: translating inside:192.168.4.1 to outside:20.1.1.1
27: ICMP echo-request: untranslating inside:10.1.1.1 to outside:192.168.4.1
28: ICMP echo-reply from outside:192.168.4.1 to 20.1.1.1 ID=3064 seq=4391 length=80
29: ICMP echo-reply: translating outside:192.168.4.1 to inside:10.1.1.1
30: ICMP echo-reply: untranslating outside:20.1.1.1 to inside:192.168.4.1
P520-1(config)#
```

VPN 集中器

选择 Monitoring > Sessions > Detail 验证 VPN 3000 集中器配置。



IKE Sessions: 1
IPSec Sessions: 1

IKE Session			
Session ID	1	Encryption Algorithm	DES-56
Hashing Algorithm	MD5	Diffie-Hellman Group	Group 1 (768-bit)
Authentication Mode	Pre-Shared Keys	IKE Negotiation Mode	Main
Rekey Time Interval	86400 seconds		
IPSec Session			
Session ID	2	Remote Address	20.1.1.0/0.0.0.255
Local Address	192.168.4.0/0.0.0.255	Encryption Algorithm	DES-56
Hashing Algorithm	MD5	SEP	1
Encapsulation Mode	Tunnel	Rekey Time Interval	28800 seconds
Rekey Data Interval	4608000 KBytes		
Bytes Received	416	Bytes Transmitted	416

故障排除

本部分提供的信息可用于对配置进行故障排除。可在下列文档中查找有关故障排除的其他信息：

- VPN 3000 集中器连接问题疑难解答
- IP安全故障排除-了解和使用debug命令
- 排除 PIX 故障以在已建立的 IPSec 隧道上传递数据流量

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。

此输出说明 IKE 协商的运行调试。此处显示了 **debug crypto isakmp 和 debug crypto ipsec 命令的输出。**

```
P520-1(config)#show debug
debug crypto ipsec 1
debug crypto isakmp 1
P520-1(config)#
ISAKMP (0): beginning Main Mode exchange

crypto_isakmp_process_block:src:172.16.172.55, dest:172.16.172.34 spt:500 dpt:500
OAK_MM exchange
ISAKMP (0): processing SA payload. message ID = 0

ISAKMP (0): Checking ISAKMP transform 1 against priority 1 policy
ISAKMP:      encryption DES-CBC
ISAKMP:      hash MD5
ISAKMP:      default group 1
ISAKMP:      auth pre-share
ISAKMP:      life type in seconds
ISAKMP:      life duration (VPI) of  0x0 0x1 0x51 0x80
ISAKMP (0): atts are acceptable. Next payload is 0
```

```
ISAKMP (0): processing vendor id payload

ISAKMP (0): SA is doing pre-shared key authentication using id type ID_IPV4_ADDR
return status is IKMP_NO_ERROR
crypto_isakmp_process_block:src:172.16.172.55, dest:172.16.172.34 spt:500 dpt:500
OAK_MM exchange
ISAKMP (0): processing KE payload. message ID = 0
ISAKMP (0): processing NONCE payload. message ID = 0
ISAKMP (0): processing vendor id payload
ISAKMP (0): processing vendor id payload
ISAKMP (0): received xauth v6 vendor id
ISAKMP (0): processing vendor id payload
ISAKMP (0): speaking to another IOS box!
ISAKMP (0): processing vendor id payload
ISAKMP (0): speaking to a VPN3000 concentrator
ISAKMP (0): ID payload
        next-payload : 8
        type         : 1
        protocol     : 17
        port         : 500
        length       : 8
ISAKMP (0): Total payload length: 12
return status is IKMP_NO_ERROR
crypto_isakmp_process_block:src:172.16.172.55, dest:172.16.172.34 spt:500 dpt:500
OAK_MM exchange
ISAKMP (0): processing ID payload. message ID = 0
ISAKMP (0): processing HASH payload. message ID = 0
ISAKMP (0): processing vendor id payload
ISAKMP (0): remote peer supports dead peer detection
ISAKMP (0): SA has been authenticated

ISAKMP (0): beginning Quick Mode exchange, M-ID of -995061605:c4b0909bIPSEC
(key_engine): got a queue event...
IPSEC(spi_response): getting spi 0xe028850d(3760751885) for SA
        from   172.16.172.55 to   172.16.172.34 for prot 3

return status is IKMP_NO_ERROR
ISAKMP (0): sending INITIAL_CONTACT notify
ISAKMP (0): sending NOTIFY message 24578 protocol 1
VPN Peer: ISAKMP: Added new peer: ip:172.16.172.55/500 Total VPN Peers:1
VPN Peer: ISAKMP: Peer ip:172.16.172.55/500 Ref cnt incremented to:1 Total
VPN Peers:1
crypto_isakmp_process_block:src:172.16.172.55, dest:172.16.172.34 spt:500 dpt:500
OAK_QM exchange
oakley_process_quick_mode:
OAK_QM_IDLE
ISAKMP (0): processing SA payload. message ID = 3299905691
ISAKMP : Checking IPSec proposal 1
ISAKMP: transform 1, ESP_DES
ISAKMP:   attributes in transform:
ISAKMP:      SA life type in seconds
ISAKMP:      SA life duration (basic) of 28800
ISAKMP:      SA life type in kilobytes
ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
ISAKMP:      encaps is 1
ISAKMP:      authenticator is HMAC-MD5
ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part #1,
  (key eng. msg.) dest= 172.16.172.55, src= 172.16.172.34,
    dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
   src_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 0s and 0kb,
    spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
```

```
ISAKMP (0): processing NONCE payload. message ID = 3299905691
ISAKMP (0): processing ID payload. message ID = 3299905691
ISAKMP (0): processing ID payload. message ID = 3299905691
ISAKMP (0): Creating IPSec SAs
        inbound SA from   172.16.172.55 to   172.16.172.34
        (proxy 192.168.4.0 to   20.1.1.0)
        has spi 3760751885 and conn_id 1 and flags 4
        lifetime of 28800 seconds
        lifetime of 4608000 kilobytes
        outbound SA from   172.16.172.34 to   172.16.172.55
       (proxy        20.1.1.0 to     192.168.4.0)
        has spi 1933931979 and conn_id 2 and flags 4
        lifetime of 28800 seconds
        lifetime of 4608000 kilobytesIPSEC(key_engine): got a queue event...
IPSEC(initialize_sas): ,
  (key eng. msg.) dest= 172.16.172.34, src= 172.16.172.55,
    dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
    src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 28800s and 4608000kb,
    spi= 0xe028850d(3760751885), conn_id= 1, keysize= 0, flags= 0x4
IPSEC(initialize_sas): ,
  (key eng. msg.) src= 172.16.172.34, dest= 172.16.172.55,
    src_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
    dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 28800s and 4608000kb,
    spi= 0x734575cb(1933931979), conn_id= 2, keysize= 0, flags= 0x4

VPN Peer: IPSEC: Peer ip:172.16.172.55/500 Ref cnt incremented to:2 Total VPN Peers:1
VPN Peer: IPSEC: Peer ip:172.16.172.55/500 Ref cnt incremented to:3 Total VPN Peers:1
return status is IKMP_NO_ERROR
P520-1(config)#
P520-1(config)#
crypto_isakmp_process_block:src:172.16.172.55, dest:172.16.172.34 spt:500 dpt:500
ISAKMP (0): processing NOTIFY payload 36136 protocol 1
        spi 0, message ID = 1690390088
ISAMKP (0): received DPD_R_U_THERE from peer 172.16.172.55
ISAKMP (0): sending NOTIFY message 36137 protocol 1
return status is IKMP_NO_ERR_NO_TRANS
P520-1(config)#
```

相关信息

- 安全与 VPN 产品支持页
- 安全与 VPN 技术支持页
- IPSec 支持页面
- 技术支持 - Cisco Systems