IPsec Tunnel Between PIX 7.x and VPN 3000 Concentrator Configuration Example

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Contents

Introduction

This document provides a sample configuration for how to establish a LAN−to−LAN IPsec VPN tunnel between a PIX Firewall 7.x and a Cisco VPN 3000 Concentrator.

Refer to PIX/ASA 7.x Enhanced Spoke−to−Client VPN with TACACS+ Authentication Configuration Example in order to learn more about the scenario where the LAN−to−LAN tunnel between the PIXes also allows for a VPN Client to access the spoke PIX through the hub PIX.

Refer to PIX/ASA 7.x Security Appliance to an IOS Router LAN−to−LAN IPsec Tunnel Configuration Example in order to learn more about the scenario where the LAN−to−LAN tunnel between the PIX/ASA and an IOS Router.

Prerequisites

Requirements

Ensure that you meet these requirements before you attempt this configuration:

- This document requires a basic understanding of IPsec protocol. Refer to An Introduction to IPsec Encryption to learn more about IPsec.

Components Used

The information in this document is based on these software and hardware versions:

- Cisco PIX 500 Series Security Appliance with software version 7.1(1)
- Cisco VPN 3060 Concentrator with software version 4.7.2(B)

Note: PIX 506/506E does not support 7.x.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

In order to configure PIX 6.x, refer to LAN−to−LAN IPSec Tunnel Between the Cisco VPN 3000 Concentrator and PIX Firewall Configuration Example.

Conventions

Refer to the Cisco Technical Tips Conventions for more information on document conventions.

Configure

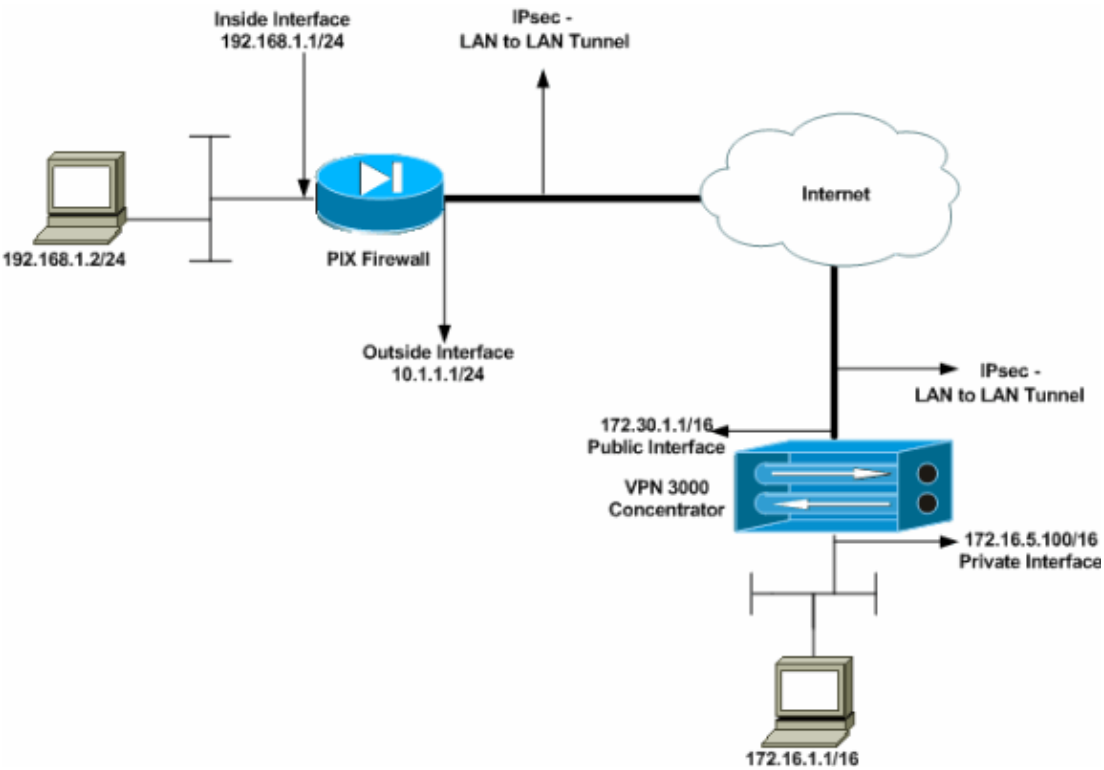
In this section, you are presented with the information to configure the features described in this document.

- Configure the PIX
- Configure the VPN 3000 Concentrator

Note: Use the Command Lookup Tool (registered customers only) to obtain more information on the commands used in this section.

Network Diagram

This document uses this network setup:



Configure the PIX

PIX

```
PIX7#show running-config
: Saved
:
PIX Version 7.1(1)
!
hostname PIX7
enable password 8Ry2YjIyt7RRXU24 encrypted
names
!

!--- Configures the outside interface of the PIX.


!--- By default, the security level for the outside interface is 0.

interface Ethernet0
 nameif outside
 security-level 0
 ip address 10.1.1.1 255.255.255.0
!

!--- Configures the inside interface of the PIX.


!--- By default, the security level for the inside interface is 100.

interface Ethernet1
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
!

!--- Defines the IP addresses that should not be NATed.

access-list nonat extended permit ip 192.168.1.0 255.255.255.0 172.16.0.0 255.255.0.0
access-list outside extended permit icmp any any

!--- Defines the IP addresses that can communicate via the IPsec tunnel.

access-list 101 extended permit ip 192.168.1.0 255.255.255.0 172.16.0.0 255.255.0.0
access-list OUT extended permit ip any any
pager lines 24
mtu outside 1500
mtu inside 1500
no failover
asdm image flash:/asdm-504.bin
no asdm history enable
arp timeout 14400
nat (inside) 0 access-list nonat
access-group OUT in interface outside
route outside 0.0.0.0 0.0.0.0 10.1.1.2 1

!--- Output is suppressed.


!--- These are the IPsec parameters that are negotiated with the client.

crypto ipsec transform-set my-set esp-aes-256 esp-sha-hmac
crypto map mymap 20 match address 101
crypto map mymap 20 set peer 172.30.1.1
crypto map mymap 20 set transform-set my-set
```

```
crypto map mymap interface outside

!--- These are the Phase I parameters negotiated by the two peers.

isakmp enable outside
isakmp policy 10 authentication pre-share
isakmp policy 10 encryption aes-256
isakmp policy 10 hash sha
isakmp policy 10 group 2
isakmp policy 10 lifetime 86400

!--- A tunnel group consists of a set of records
!--- that contain tunnel connection policies. The two attributes
!--- are General and IPsec. Use the remote peer IP address as the
!--- name of the Tunnel group. In this example 172.30.1.1 is the peer IP address.
!--- Refer to Tunnel Group for more information.

tunnel-group 172.30.1.1 type ipsec-l2l
tunnel-group 172.30.1.1 ipsec-attributes
 pre-shared-key *

!--- Output is suppressed.

!
: end
PIX7#
```

Configure the VPN 3000 Concentrator

VPN Concentrators are not pre−programmed with IP addresses in their factory settings. You have to use the console port in order to configure the initial configurations which are a menu−based command−line interface (CLI). Refer to Configuring VPN Concentrators through the Console for information on how to configure through the console.

After you configure the IP address on the Ethernet 1 (private) interface, you can configure the rest with either the CLI or via the browser interface. The browser interface supports both HTTP and HTTP over Secure Socket Layer (SSL).

These parameters are configured through the console:

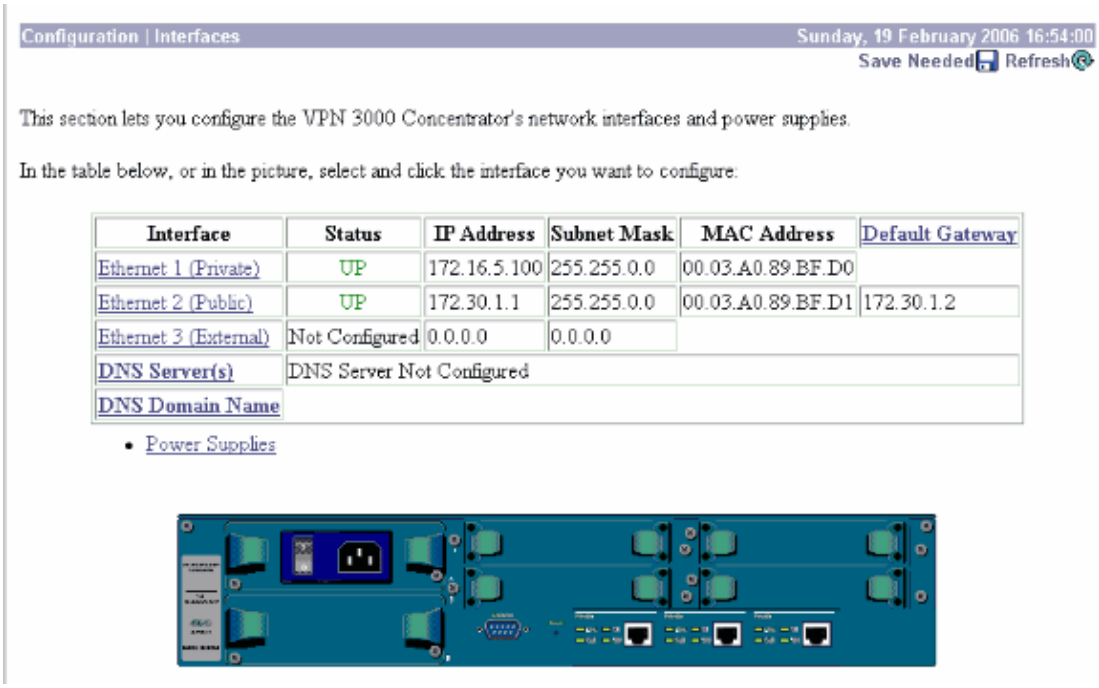
- **Time/Date** The correct time and date are very important. They help ensure that logging and accounting entries are accurate, and that the system can create a valid security certificate.
- **Ethernet 1 (private) interface** The IP address and mask (from the network topology 172.16.5.100/16).

The VPN Concentrator is now accessible through an HTML browser from the inside network. Refer to Using the Command−Line Interface for Quick Configuration for information on how to configure the VPN Concentrator in CLI mode.

Type the IP address of the private interface from the web browser in order to enable the GUI interface.

Click the **save needed** icon to save changes to memory. The factory default username and password are **admin**, which is case sensitive.

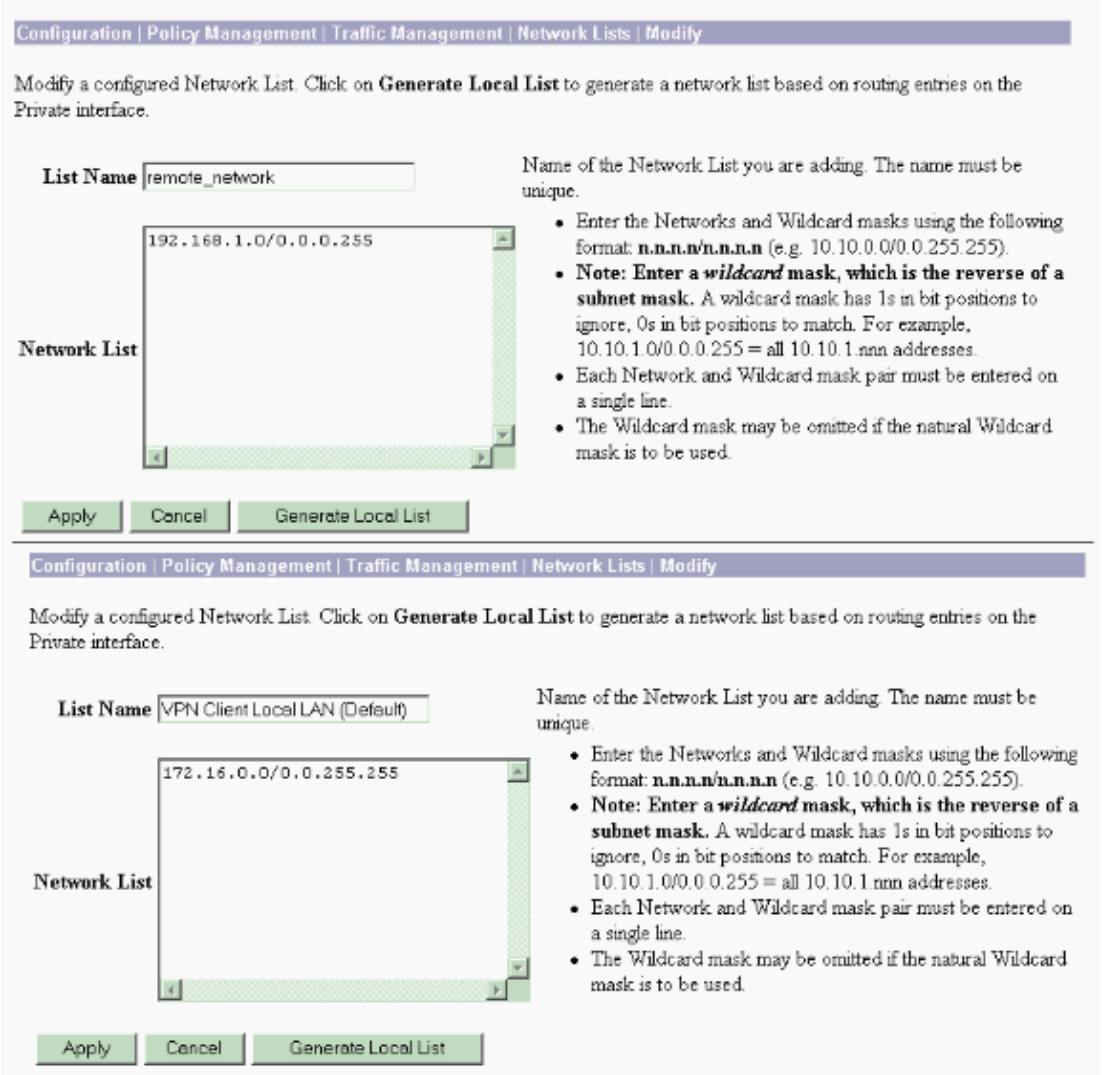
1. Launch the GUI and select **Configuration** > **Interfaces** to configure the IP address for the public interface and the default gateway.



2. Select **Configuration > Policy Management > Traffic Management > Network Lists > Add or Modify** to create the network lists that define the traffic to be encrypted.

   Add both the local and remote networks here. The IP addresses should mirror those in the access list configured on the remote PIX.

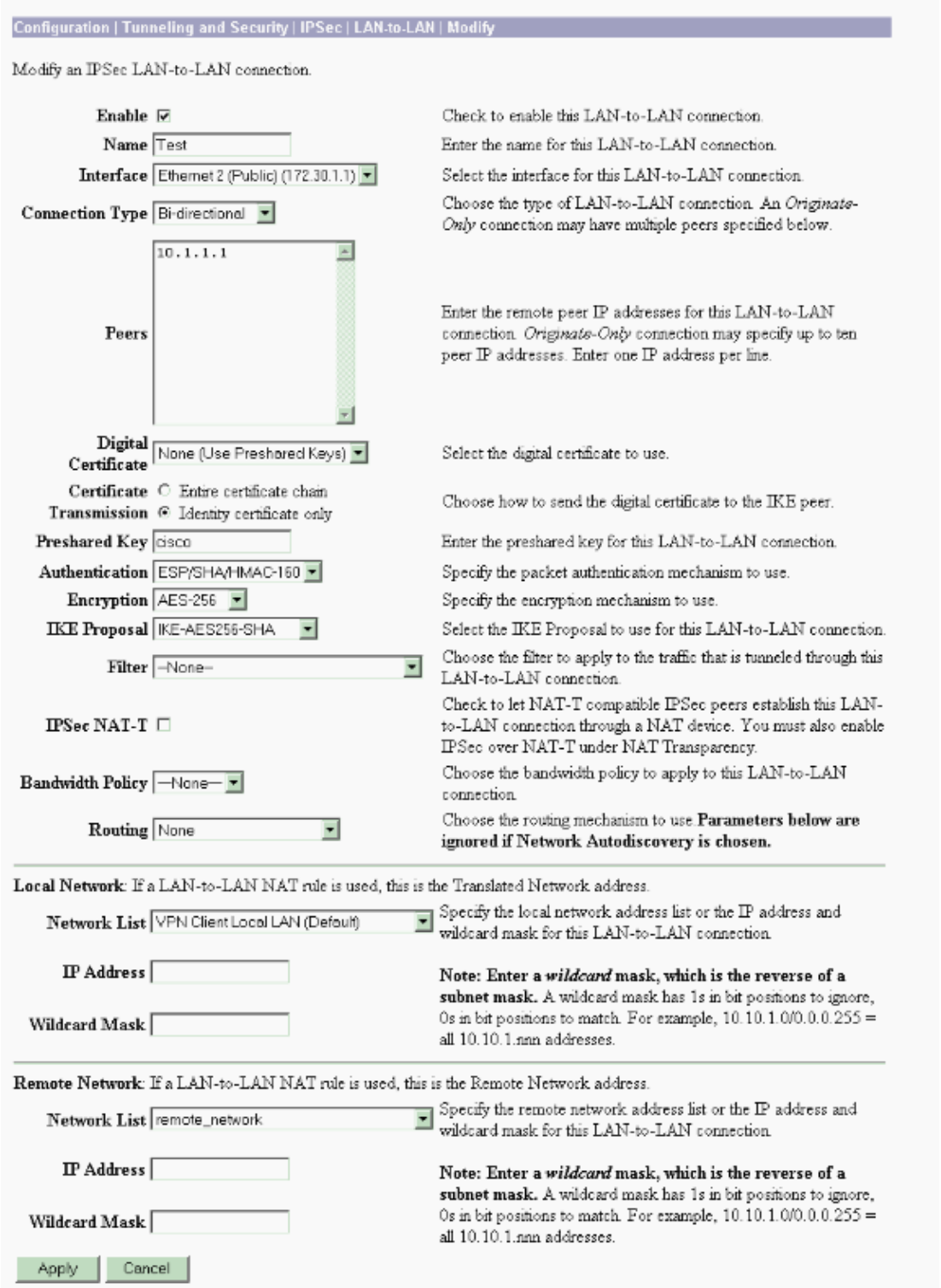
   In this example, the two network lists are **remote_network** and **VPN Client Local LAN**.



3. Select **Configuration > System > Tunneling Protocols > IPSec LAN−to−LAN > Add** to configure the IPsec LAN−to−LAN tunnel. Click **Apply** when you are finished.

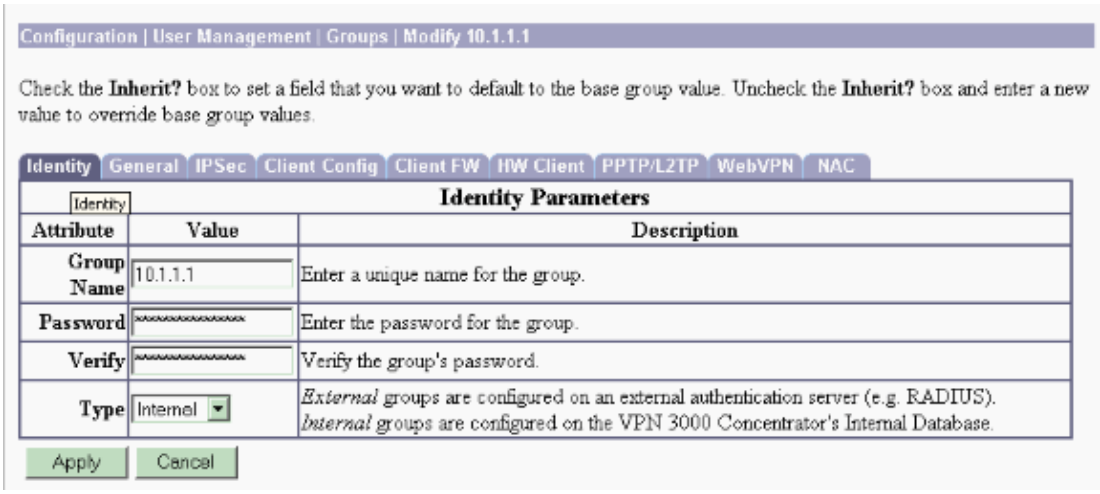
   Enter the peer IP address, the network lists created in step 2, the IPsec and ISAKMP parameters, and the pre−shared key.

   In this example the peer IP address is **10.1.1.1**, the network lists are **remote_network** and **VPN Client Local LAN**, and **cisco** is the pre−shared key.



4. Select **Configuration > User Management > Groups > Modify 10.1.1.1** to view the automatically generated Group information.

   Note: Do not modify these group settings.



Verify

Use this section to confirm that your configuration works properly.

- Verify the PIX
- Verify the VPN 3000 Concentrator

Verify the PIX

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

- **show isakmp sa** Displays all current IKE security associations (SAs) at a peer. The state MM_ACTIVE denotes that Main Mode is used to set up the IPsec VPN tunnel.

  In this example the PIX Firewall initiates the IPsec connection. The peer IP address is 172.30.1.1 and uses Main Mode to establish the connection.

```
PIX7#show isakmp sa

   Active SA: 1
    Rekey SA: 0 (A tunnel will report 1 Active and 1 Rekey SA during rekey)
Total IKE SA: 1

1   IKE Peer: 172.30.1.1
    Type    : L2L             Role    : initiator
    Rekey   : no              State   : MM_ACTIVE
```

- **show ipsec sa** Displays the settings used by current SAs. Check for the peer IP addresses, the networks accessible at both the local and remote ends, and the transform set that is used. There are two ESP SAs, one in each direction.

```
PIX7#show ipsec sa
interface: outside
    Crypto map tag: mymap, seq num: 20, local addr: 10.1.1.1

      access-list 101 permit ip 192.168.1.0 255.255.255.0 172.16.0.0 255.255.0.0

      local ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)
      remote ident (addr/mask/prot/port): (172.16.0.0/255.255.0.0/0/0)
      current_peer: 172.30.1.1

      #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: 4, #pkts comp failed: 0, #pkts decomp failed: 0
    #send errors: 0, #recv errors: 0

    local crypto endpt.: 10.1.1.1, remote crypto endpt.: 172.30.1.1

    path mtu 1500, ipsec overhead 76, media mtu 1500
    current outbound spi: 136580F6

  inbound esp sas:
    spi: 0xF24F4675 (4065281653)
       transform: esp-aes-256 esp-sha-hmac
       in use settings ={L2L, Tunnel,}
       slot: 0, conn_id: 1, crypto-map: mymap
       sa timing: remaining key lifetime (kB/sec): (3824999/28747)
       IV size: 16 bytes
       replay detection support: Y
  outbound esp sas:
    spi: 0x136580F6 (325419254)
       transform: esp-aes-256 esp-sha-hmac
       in use settings ={L2L, Tunnel,}
       slot: 0, conn_id: 1, crypto-map: mymap
       sa timing: remaining key lifetime (kB/sec): (3824999/28745)
       IV size: 16 bytes
       replay detection support: Y
```

Use the **clear ipsec sa** and **clear isakmp sa** commands to reset the tunnel.

Verify the VPN 3000 Concentrator

Select **Monitoring > Statistics > IPsec** to verify if the tunnel has come up in the VPN 3000 Concentrator. This contains the statistics for both IKE and IPsec parameters.

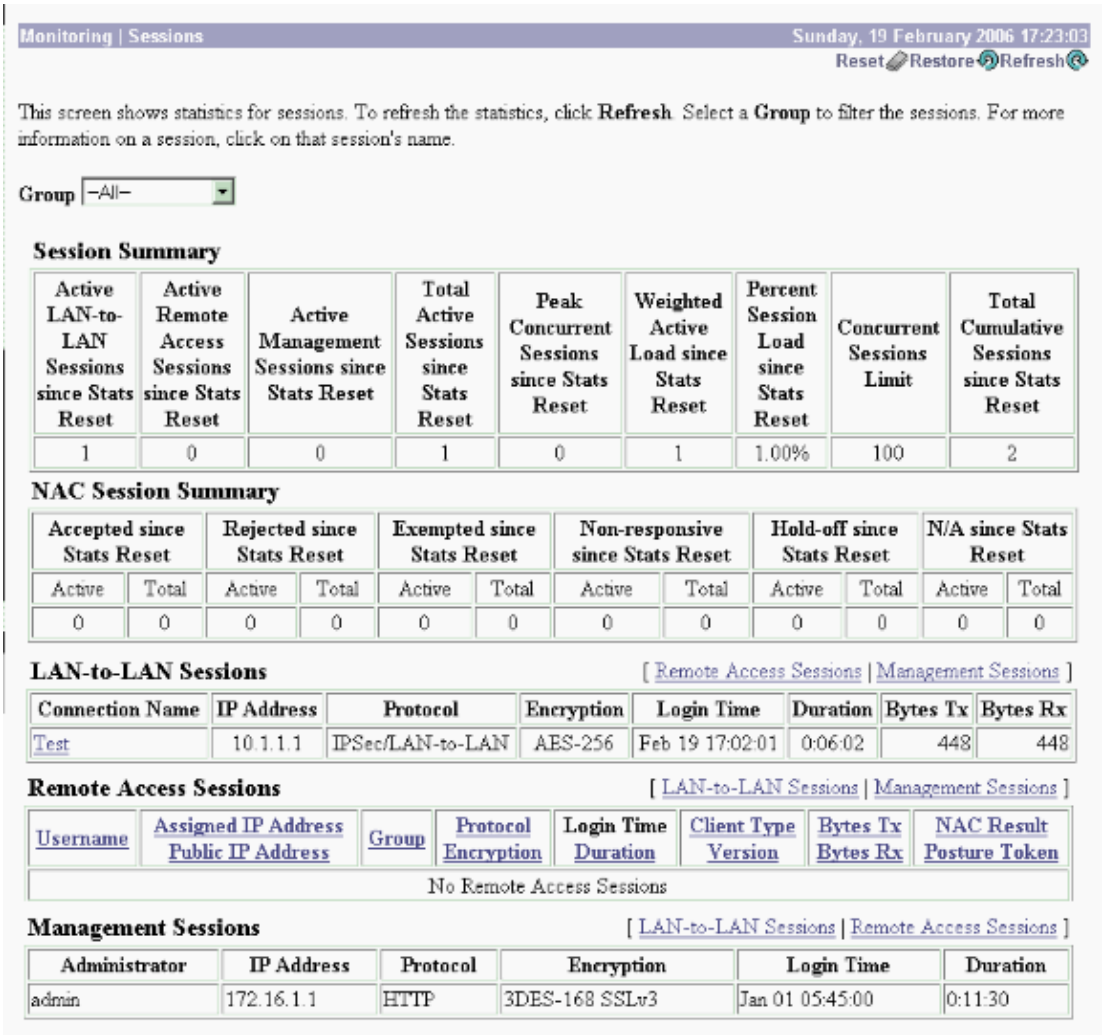
Monitoring | Statistics | IPSec — Sunday, 19 February 2006 17:25:57

Reset Restore Refresh

IKE (Phase 1) Statistics	
Active Tunnels	1
Total Tunnels	1
Received Bytes	5720
Sent Bytes	5576
Received Packets	57
Sent Packets	56
Received Packets Dropped	0
Sent Packets Dropped	0
Received Notifies	52
Sent Notifies	104
Received Phase-2 Exchanges	1
Sent Phase-2 Exchanges	0
Invalid Phase-2 Exchanges Received	0
Invalid Phase-2 Exchanges Sent	0
Rejected Received Phase-2 Exchanges	0
Rejected Sent Phase-2 Exchanges	0
Phase-2 SA Delete Requests Received	0
Phase-2 SA Delete Requests Sent	0
Initiated Tunnels	0
Failed Initiated Tunnels	0
Failed Remote Tunnels	0
Authentication Failures	0
Decryption Failures	0
Hash Validation Failures	0
System Capability Failures	0
No-SA Failures	0

IPSec (Phase 2) Statistics	
Active Tunnels	1
Total Tunnels	1
Received Bytes	448
Sent Bytes	448
Received Packets	4
Sent Packets	4
Received Packets Dropped	0
Received Packets Dropped (Anti-Replay)	0
Sent Packets Dropped	0
Inbound Authentications	4
Failed Inbound Authentications	0
Outbound Authentications	4
Failed Outbound Authentications	0
Decryptions	4
Failed Decryptions	0
Encryptions	4
Failed Encryptions	0
System Capability Failures	0
No-SA Failures	0
Protocol Use Failures	0

You can actively monitor the session at **Monitoring > Sessions**. You can reset the IPsec tunnel here.



Monitoring | Sessions — Sunday, 19 February 2006 17:23:03

Reset Restore Refresh

This screen shows statistics for sessions. To refresh the statistics, click **Refresh**. Select a **Group** to filter the sessions. For more information on a session, click on that session's name.

Group –All–

Session Summary

Active LAN-to-LAN Sessions since Stats Reset	Active Remote Access Sessions since Stats Reset	Active Management Sessions since Stats Reset	Total Active Sessions since Stats Reset	Peak Concurrent Sessions since Stats Reset	Weighted Active Load since Stats Reset	Percent Session Load since Stats Reset	Concurrent Sessions Limit	Total Cumulative Sessions since Stats Reset
1	0	0	1	0	1	1.00%	100	2

NAC Session Summary

Accepted since Stats Reset		Rejected since Stats Reset		Exempted since Stats Reset		Non-responsive since Stats Reset		Hold-off since Stats Reset		N/A since Stats Reset	
Active	Total	Active	Total	Active	Total	Active	Total	Active	Total	Active	Total
0	0	0	0	0	0	0	0	0	0	0	0

LAN-to-LAN Sessions [Remote Access Sessions | Management Sessions]

Connection Name	IP Address	Protocol	Encryption	Login Time	Duration	Bytes Tx	Bytes Rx
Test	10.1.1.1	IPSec/LAN-to-LAN	AES-256	Feb 19 17:02:01	0:06:02	448	448

Remote Access Sessions [LAN-to-LAN Sessions | Management Sessions]

Username	Assigned IP Address Public IP Address	Group	Protocol Encryption	Login Time Duration	Client Type Version	Bytes Tx Bytes Rx	NAC Result Posture Token
No Remote Access Sessions							

Management Sessions [LAN-to-LAN Sessions | Remote Access Sessions]

Administrator	IP Address	Protocol	Encryption	Login Time	Duration
admin	172.16.1.1	HTTP	3DES-168 SSLv3	Jan 01 05:45:00	0:11:30

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

- Troubleshoot the PIX
- Troubleshoot the VPN 3000 Concentrator
- PFS

Troubleshoot the PIX

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

Note: Refer to Important Information on Debug Commands before you use **debug** commands.

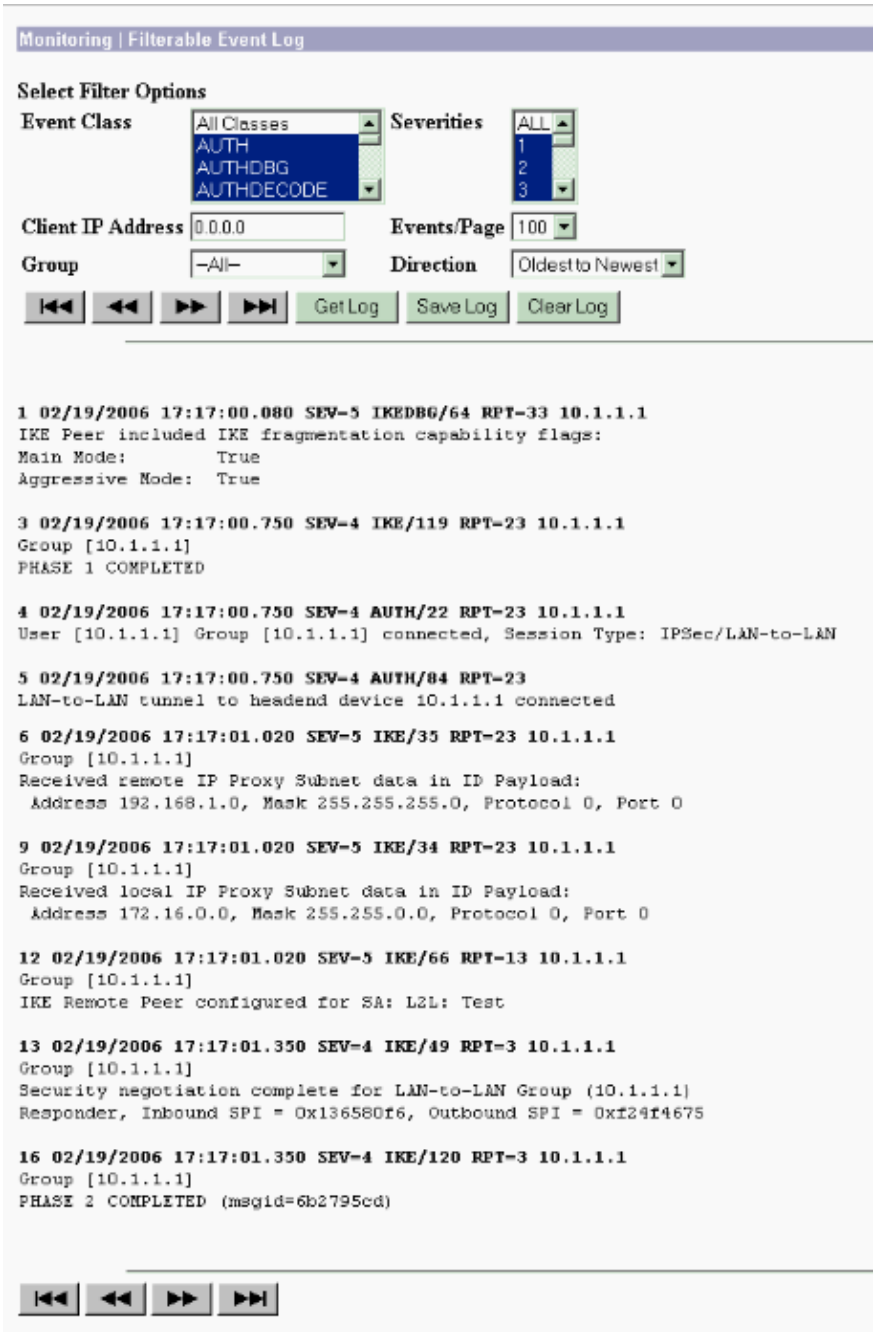
The **debug** commands on PIX for VPN tunnels are:

- **debug crypto isakmp** Debugs ISAKMP SA negotiations.
- **debug crypto ipsec** Debugs IPsec SA negotiations.

Troubleshoot the VPN 3000 Concentrator

Similar to debug commands on the Cisco routers, you can configure Event Classes to view all alarms. Select **Configuration > System > Events > Classes > Add** to turn on the logging of Event Classes.

Select **Monitoring > Filterable Event Log** to monitor the enabled Events.



PFS

In IPsec negotiations, Perfect Forward Secrecy (PFS) ensures that each new cryptographic key is unrelated to any previous key. Either enable or disable PFS on both the tunnel peers, otherwise the LAN−to−LAN (L2L) IPsec tunnel is not established in the PIX/ASA.

PFS is disabled by default. In order to enable PFS use the **pfs** command with the *enable* keyword in group−policy configuration mode. In order to disable PFS, enter the *disable* keyword.

```
hostname(config-group-policy)#pfs {enable | disable}
```

In order to remove the PFS attribute from the running configuration, enter the **no** form of this command. A group policy can inherit a value for PFS from another group policy. Enter the **no** form of this command in order to prevent inheriting a value.

```
hostname(config-group-policy)#no pfs
```

Related Information

- **Cisco PIX 500 Series Security Appliances − Support Page**
- **Cisco VPN 3000 Series Concentrator − Support Page**
- **Cisco PIX 500 Series Security Appliance Command Reference**
- **Technical Support & Documentation − Cisco Systems**

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