

# ASA/PIX : Security Appliance to an IOS Router LAN-to-LAN IPsec Tunnel Configuration Example

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## [Introduction](#)

This document demonstrates how to configure an IPsec tunnel from PIX Security Appliance 7.x and later or the Adaptive Security Appliance (ASA) with one internal network to a 2611 router that runs a crypto image. Static routes are used for simplicity.

Refer to [Configuring IPsec - Router to PIX](#) for more information about a LAN-to-LAN tunnel configuration between a router and the PIX.

Refer to [LAN-to-LAN IPsec Tunnel Between the Cisco VPN 3000 Concentrator and PIX Firewall Configuration Example](#) for more information about a LAN-to-LAN tunnel configuration between the PIX Firewall and Cisco VPN 3000 Concentrator.

Refer to [IPsec Tunnel Between PIX 7.x and VPN 3000 Concentrator Configuration Example](#) in order to learn more about the scenario where the LAN-to-LAN tunnel is between the PIX and VPN 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 [SDM: Site-to-Site IPsec VPN Between ASA/PIX and an IOS Router Configuration](#)

[Example](#) in order to learn more about the same scenario where the PIX/ASA Security Appliance runs software version 8.x.

Refer to [Configuration Professional: Site-to-Site IPsec VPN Between ASA/PIX and an IOS Router Configuration Example](#) in order to learn more about the same scenario where the ASA-related configuration is shown using ASDM GUI and the Router-related configuration is shown using Cisco CP GUI.

## [Prerequisites](#)

### [Requirements](#)

There are no specific requirements for this document.

### [Components Used](#)

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

- PIX-525 with PIX Software version 7.0
- Cisco 2611 router with Cisco IOS® Software Release 12.2(15)T13

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.

### [Conventions](#)

Refer to the [Cisco Technical Tips Conventions](#) for more information on document conventions.

## [Background Information](#)

On the PIX, the **access-list** and **nat 0** commands work together. When a user on the 10.1.1.0 network goes to the 10.2.2.0 network, the access list is used to permit the 10.1.1.0 network traffic to be encrypted without Network Address Translation (NAT). On the router, the **route-map** and **access-list** commands are used to permit the 10.2.2.0 network traffic to be encrypted without NAT. However, when those same users go anywhere else, they are translated to the 172.17.63.230 address through Port Address Translation (PAT).

These are the configuration commands required on the PIX Security Appliance in order for traffic *not* to run through PAT over the tunnel, and traffic to the Internet to run through PAT

```
access-list nonat permit ip 10.1.1.0 255.255.255.0 10.2.2.0 255.255.255.0
nat (inside) 0 access-list nonat
nat (inside) 1 10.1.1.0 255.255.255.0 0 0
```

## [Configure](#)

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

**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:

## [Configurations](#)

These configuration examples are for the command line interface. See the [Configuration using Adaptive Security Device Manager \(ASDM\)](#) section of this document if you prefer to configure using ASDM.

- [Headquarters PIX](#)
- [Branch Router](#)

### Headquarters PIX

```
HQPIX(config)#show run
PIX Version 7.0(0)102
names
!
interface Ethernet0
description WAN interface
nameif outside
security-level 0
ip address 172.17.63.229 255.255.255.240
!
interface Ethernet1
nameif inside
security-level 100
ip address 10.1.1.1 255.255.255.0
!
interface Ethernet2
shutdown
no nameif
no security-level
no ip address
!
interface Ethernet3
shutdown
no nameif
no security-level
no ip address
!
interface Ethernet4
shutdown
no nameif
no security-level
no ip address
!
interface Ethernet5
shutdown
no nameif
```

```
no security-level
no ip address
!
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname HQPIX
domain-name cisco.com
ftp mode passive
clock timezone AEST 10

access-list Ipsec-conn extended permit ip 10.1.1.0
255.255.255.0 10.2.2.0 255.255.255.0
access-list nonat extended permit ip 10.1.1.0
255.255.255.0 10.2.2.0 255.255.255.0
pager lines 24
logging enable
logging buffered debugging
mtu inside 1500
mtu outside 1500
no failover
monitor-interface inside
monitor-interface outside
asdm image flash:/asdmfile.50073
no asdm history enable
arp timeout 14400
nat-control
global (outside) 1 interface
nat (inside) 0 access-list nonat
nat (inside) 1 10.1.1.0 255.255.255.0
access-group 100 in interface inside
route outside 0.0.0.0 0.0.0.0 172.17.63.230 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00
icmp 0:00:02
  sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00
mgcp-pat 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 partner protocol tacacs+
username cisco password 3USUCOPFUimCO4Jk encrypted
http server enable
http 10.1.1.2 255.255.255.255 inside
no snmp-server location
no snmp-server contact
snmp-server community public
snmp-server enable traps snmp
crypto ipsec transform-set avalanche esp-des esp-md5-
hmac
crypto ipsec security-association lifetime seconds 3600
crypto ipsec df-bit clear-df outside
crypto map forsberg 21 match address Ipsec-conn
crypto map forsberg 21 set peer 172.17.63.230
crypto map forsberg 21 set transform-set avalanche
crypto map forsberg interface outside
isakmp identity address
isakmp enable outside
isakmp policy 1 authentication pre-share
isakmp policy 1 encryption 3des
isakmp policy 1 hash sha
isakmp policy 1 group 2
isakmp policy 1 lifetime 86400
isakmp policy 65535 authentication pre-share
```

```
isakmp policy 65535 encryption 3des
isakmp policy 65535 hash sha
isakmp policy 65535 group 2
isakmp policy 65535 lifetime 86400
telnet timeout 5
ssh timeout 5
console timeout 0
tunnel-group 172.17.63.230 type ipsec-l2l
tunnel-group 172.17.63.230 ipsec-attributes
pre-shared-key *
!
class-map inspection_default
match default-inspection-traffic
!
!
policy-map asa_global_fw_policy
class inspection_default
inspect dns maximum-length 512
inspect ftp
inspect h323 h225
inspect h323 ras
inspect netbios
inspect rsh
inspect rtsp
inspect skinny
inspect esmtp
inspect sqlnet
inspect sunrpc
inspect tftp
inspect sip
inspect xdmcp
inspect http
!
service-policy asa_global_fw_policy global
Cryptochecksum:3a5851f7310d14e82bdf17e64d638738
: end
SV-2-8#
```

## Branch Router

```
BranchRouter#show run
Building configuration...

Current configuration : 1719 bytes
!
! Last configuration change at 13:03:25 AEST Tue Apr 5
2005
! NVRAM config last updated at 13:03:44 AEST Tue Apr 5
2005
!
version 12.2
service timestamps debug datetime msec
service timestamps log uptime
no service password-encryption
!
hostname BranchRouter
!
logging queue-limit 100
logging buffered 4096 debugging
!
username cisco privilege 15 password 0 cisco
memory-size iomem 15
clock timezone AEST 10
```

```
ip subnet-zero
!
!
!
ip audit notify log
ip audit po max-events 100
!
!
!
crypto isakmp policy 11
encr 3des
authentication pre-share
group 2
crypto isakmp key cisco123 address 172.17.63.229
!
!
crypto ipsec transform-set sharks esp-des esp-md5-hmac
!
crypto map nolan 11 ipsec-isakmp
set peer 172.17.63.229
set transform-set sharks
match address 120
!
!
!
!
!
!
!
!
!
!
no voice hpi capture buffer
no voice hpi capture destination
!
!
mta receive maximum-recipients 0
!
!
!
!
interface Ethernet0/0
ip address 172.17.63.230 255.255.255.240
ip nat outside
no ip route-cache
no ip mroute-cache
half-duplex
crypto map nolan
!
interface Ethernet0/1
ip address 10.2.2.1 255.255.255.0
ip nat inside
half-duplex
!
ip nat pool branch 172.17.63.230 172.17.63.230 netmask
255.255.255.0
ip nat inside source route-map nonat pool branch
overload
no ip http server
no ip http secure-server
ip classless
ip route 10.1.1.0 255.255.255.0 172.17.63.229
!
!
```

```

!
access-list 120 permit ip 10.2.2.0 0.0.0.255 10.1.1.0
0.0.0.255
access-list 130 deny ip 10.2.2.0 0.0.0.255 10.1.1.0
0.0.0.255
access-list 130 permit ip 10.2.2.0 0.0.0.255 any
!
route-map nonat permit 10
match ip address 130
!
call rsvp-sync
!
!
mgcp profile default
!
dial-peer cor custom
!
!
!
!
!
line con 0
line aux 0
line vty 0 4
login
!
!
end

```

## [Configuration using ASDM](#)

This example demonstrates how to configure the PIX using the ASDM GUI. A PC with a browser and IP address 10.1.1.2 is connected to the inside interface e1 of the PIX. Ensure http is enabled on the PIX.

This procedure illustrates the ASDM configuration of the Headquarters PIX.

1. Connect the PC to the PIX and choose a download method. ASDM loads the existing configuration from the PIX. This window provides monitoring instruments and menus.
2. Select **Configuration > Features > Interfaces** and select **Add** for new interfaces or **Edit** for an existing configuration.
3. Select the security options for the inside interface.
4. In the NAT configuration, encrypted traffic is NAT-exempt and all other traffic is NAT/PAT to the outside interface.
5. Select **VPN > General > Tunnel Group** and enable a Tunnel Group
6. Select **VPN > IKE > Global Parameters** and enable IKE on the outside interface.
7. Select **VPN > IKE > Policies** and choose the IKE policies.
8. Select **VPN > IPsec > IPsec Rules** and choose **IPsec** for the local tunnel and remote addressing.
9. Select **VPN > IPsec > Tunnel Policy** and choose the tunnel policy.
10. Select **VPN > IPsec > Transform Sets** and choose a Transform set.
11. Select **Routing > Routing > Static Route** and choose a static route to gateway router. In this example, the static route points to the remote VPN peer for simplicity.

## Verify

Use this section to confirm that your configuration works properly.

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

- **show crypto ipsec sa**—Shows the phase 2 security associations.
- **show crypto isakmp sa**—Shows the phase 1 security associations.

## Troubleshoot

You can use ASDM to enable logging and to view the logs.

- Select **Configuration > Properties > Logging > Logging Setup**, choose **Enable Logging** and click **Apply** to enable logging.
- Select **Monitoring > Logging > Log Buffer > On Logging Level**, choose **Logging Buffer**, and click **View** to view the logs.

## Troubleshooting Commands

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.

- **debug crypto ipsec**—Shows the IPsec negotiations of phase 2.
- **debug crypto isakmp**—Shows the ISAKMP negotiations of phase 1.
- **debug crypto engine**—Shows the traffic that is encrypted.
- **clear crypto isakmp**—Clears the security associations related to phase 1.
- **clear crypto sa**—Clears the security associations related to phase 2.
- **debug icmp trace**—Shows whether ICMP requests from the hosts reach the PIX. You need to add the **access-list** command to permit ICMP in your configuration in order to run this debug.
- **logging buffer debugging**—Shows connections being established and denied to hosts that go through the PIX. The information is stored in the PIX log buffer and you can see the output with the **show log** command.

## Related Information

- [Most Common L2L and Remote Access IPsec VPN Troubleshooting Solutions](#)
- [Cisco PIX Firewall Software](#)
- [Cisco Secure PIX Firewall Command References](#)
- [Security Product Field Notices \(including PIX\)](#)
- [Requests for Comments \(RFCs\)](#)