Router Commands

Configure CBAC audit trails and alerts (logging)

```
Router(config)# logging on
Router(config)# logging 10.0.1.3
Router(config)# ip inspect audit-trail
Router(config)# no ip inspect alert-off
Router# show ip inspect config
Router(config)#  ip inspect tcp synwait-time<60>
Router(config)#  ip inspect tcp finwait-time<60>
Router(config)#  ip inspect tcp idle-time<60>
Router(config)#  ip inspect udp idle-time<60>
Router(config)#  ip inspect dns-timeout <60>
Router(config)#  ip inspect max-incomplete high <500> (# of existing half-open sessions—incomplete 3way shake)
Router(config)# ip inspect max-incomplete low <400> (# of halp open sessions allowed—not deleted)
Router(config)#  ip inspect one-minute high <500> (# of new half-open sessions)
Router(config)#  ip inspect one-minute low <400> (# not deleted if under)
Router(config)#  ip inspect tcp max-incomplete host <50> block-time<0>
```

Config NAT:

1 To make pool of addresses

```
Router(config)#ip nat pool name start-ip end-ip netmask netmask |prefix-length /?
```

2 To make static translation- inside local to inside global:

```
Router(config)#ip nat inside source static local-ip global-ip
```

3 To create st access list

```
Router(config)#access-list acl# permit source [scr wcm]
```

4 Use access list for translation

```
Router(config)#ip nat inside source list 1 pool nat-pool
```

5 Specify the inside interface

```
Router(config)#int type
```

6 Connect to inside

```
Router(config-if)#ip nat inside.
Router (config-if)#exit
```

7 Specify outside int

```
Router(config)#int type #
```

8 Connect to outside

```
Router(config-if)#ip nat outside
```

Config PAT:

1 Make acl permitting add to be translated

```
Router(config)#access-list acl # source [scr wcm]
```

2a Specify acl in step 1

```
Router(config)#ip nat inside source list acl# int int overload
```

2b Specify global address as pool for overloading

```
Router(config)#ip nat pool name start-ip end ip netmask mask | prefix-length /?
```

2c Establish overload translation

```
Router(config)#ip nat inside source list acl# pool name overload
```

3 Specify inside int

```
Router(config)#int type#
Router(config-if)#ip nat inside
Router(config-if)#exit
```

4 Specify ouside int

```
Router(config)#int type#
Router(config-if)#ip nat outside
Router(config-if)#exit
```

Config DHCP:

To exclude an individual address

```
Router(config)#ip dhcp excluded-address
```

To define a pool of addresses, set the default gateway , dns-server , WINS server, netbios

```
Router(config)#ip dhcp pool name of pool
Router(dhcp-config)#network ip add
Router(dhcp-config)#default-router ip add
Router(dhcp-config)#dns-server ip add
Router(dhcp-config)#netbios-name-server ipadd
Router(dhcp-config)#domain-name name
Router(dhcp-config)#lease {days [hours] [minutes] | infinite}
```

To disable DHCP

```
Router(config)#no service dhcp command service dhcp to re-enable
```

Config SNMP:

To set the read-only community string used by the agent-default = public

```
Router(config)#snmp-server community string ro|rw (default rw =private)
```

To specify location of the managed device and the main system contact for the device

```
Router(config)#snmp-server location text
```

Router(config)#**snmp-server contact** text
To enable logging to all supported destinations:
Router(config)#**logging on**
To send log messages to a syslog server host, such as CiscoWorks2000:
Router(config)#**logging** hostname | ip address
To set logging severity level to level 6, informational:
Router(config)#**logging trap informational**
To include timestamp with syslog message:
Router(config)#**service timestamps log datetime**

Show Commands:

to verify proper configuration of HDLC or PPP
show interfaces serial
displays the authentication
show interfaces
display LMI traffic statistics

AAA setup w/ACS Step by Step

Install Cisco Secure ACS on 2000 server
Cisco Secure ACS Network Access Server Details:
Authenticate users using= TACACS+
Access Server Name= Routers hostname
Access Server IP Add= Routers IP add
Windows Server IP Add= IP add of PC w/ACS installed
TACACS+ or RADIUS Key= password (must match pwd on router)
Select which advanced options to be displayed in the CiscoSecure ACS interface= Check all
Setup can help you configure a single network access server….= NOT
Setup has finished installing…= Only check yes to start the service now
Open the shortcut on the desktop for ACS Admin
Go to Interface configuration
Go to TACACS+(cisco IOS)
Scroll down to Advanced Options
Check the box next to Advanced TACACS+ Features (displays enable feature in user settings)
Click Submit
Click on usersetup
Add name of user in user box
give Real Name and description (this is the name to log into cisco with now.)
enter password
Scroll down to TACACS+ Enable Control: Max Privilege-Level 15
Scroll down to TACACS+ Enable Password: select Use CiscoSecure PAP password
Hit submit
search for name to confirm
(DO NOT CHANGE NIC/SETTINGS ON SERVER AFTER INSTALL)

```
Router(config)#username admin password cisco
Router(config)#aaa new-model
Router(config)#aaa authentication login default group tacacs+
Router(config)#aaa authentication login vty-in group tacas+ local
Router(config)#aaa authentication login console-in group tacacs+ local
Router(config)#aaa authentication enable default group tacacs+ enable
Router(config)#tacacs-server host 192.168.1.5
Router(config)#tacacs-server key secretkey
Router(config)#line console 0
Router(config-line)#login authentication console-in
Router(config-line)#exit
Router(config)#line vty 0 4
Router(config-line)#login authentication vty-in
```

To enable Authentication Proxy using HTTP or HTTPS

Router(config)# **aaa new-model** (to enable the AAA. After AAA is enabled, TACACS commands are no longer available.
Router(config)# **aaa authentication login default group** tacacs+/radius(To set AAA authentication)
Router(config)# **aaa authorization auth-proxy default group** tacacs+/radius(To set AAA authentication)
Router(config)# **tacacs-server host** (To specify the IP address of a TACACS+ server)
Router(config)# **tacacs-server key** (To set the authentication encryption key used for all TACACS+)
or
Router(config)# **radius-server host** (To specify the IP address of a RADIUS server)
Router(config)# **radius-server key** (set the authentication encryption key used for all RADIUS)
The key entered for either the tacacs-server key or the radius-server key command must match the key used on the AAA server

```
router(config)# ip http server
router(config)# ip http authentication aaa
```

To set the global authentication proxy inactivity timeout value
router(config)#ip auth-proxy inactivity-timer

router(config)# **ip auth-proxy name** overrides the absolute timeout value

```
router(config)# ip auth-proxy inactivity-timer 120(To set the global auth proxy inactivity timeout)
router(config)# absolute-timer min (allows administrators to configure a window during which the auth proxy on the enabled interface is active.. turned off by default)
```

To Allow AAA traffic to a router

should be applied to the inbound direction

```
router(config)# access-list 111 permit tcp host 10.0.0.3 eq tacacs host 10.0.0.1
router(config)# accss-list 111 permit icmp any any
router(config)#access-list 111 deny ip any any
router(config)# interface ethernet 0/0
router(config-if)# ip access-group 111 in
```

Passwords

Logins may be completely prevented on any line by configuring the router with the login and no password commands

```
router(config)# line console line-number
router(config)# login
router(config)# password password
```

To configure users

to on local asynchronous terminals to log in before using the system

```
router(config)# line aux line-number
router(config-line)# login
router(config-line)# password password
```

To configure a VTY user-level password

```
router(config)# line vty start-line-number end-line-number
router(config-line)# login
router(config-line)# password password
```

To set timeouts for router lines

```
router(config)# line vty start-line-number end-line-number
router(config-line)# exec-timeout  mins[secs]
```

vty lines accept only ssh

```
router(config)# line vty start-line-number end-line-number
router(config-line)# transport input telnet ssh
```

vty / console access list

```
router(config)# line con 0/ line vty 0 4
router(config-line)# access-list 1 permit 192.168.1.0
router(config-line)#lline con 0/line vty 0 4
router(config-line)#access-class 1 in
router(config-line)#login local
```

To enable TCP keepalives

on incoming connections (guard against both attacks and orphaned sessions caused by remote system crashes)

```
router(config-line)# service tcp-keepalives-in
```

To Configure SSH access

```
router(config)# hostname hostname
router(config)# ip domain-name domainname
router(config)#crypto key generate rsa
How many bits: 1024 is recommended. 768 minimum
router(config)# ip ssh time-out 90
router(config)# ip ssh authentication-retries 4
router(config)# username cisco password class
router(config)# line vty 0 4
router(config-line)# transport input ssh (configs all vty lines w/ssh)
router(config-line)#login local
```

To troubleshoot ssh:

```
Router# show crypto key mypubkey rsa (rsa key info)
Router# debug ip ssh (debug msgs for ssh)
Router# show ssh (ssh server connections status)
Router# show ip ssh (ver and config data for ssh)
```

To disable SSH server

and delete the rsa key pair

```
router(config)# crypto key zeroize rsa
```

To enable passwords

```
router(config)# enable secret secret
router(config)# no enable password
router(config)# service password-encryption
router(config)#security passwords min-length 10
router(config)#no service password-recovery (disables rommon)
```

To create user accounts for auditing:

```
router(config)# username name password password
router(config)# username name privilege 1
router(config)# no username name
```

To set privilege level of different commands.

(user exec commands are L1 + privileged exec are 15 by default)

```
router(config)# privilege exec level 15 connect
router(config)# privilege exec level 15 telnet
router(config)# privilege exec level 15 show ip access-list
router(config)# privilege exec level 1 show ip
```

To disable services on router:

```
router# show proc
router(config)# no ip bootp server
router(config)# no ip source-route
router(config)# no ip proxy-arp (ad-hoc routing)
router(config)# no service tcp-small-servers (disables tcp servers)
router(config)# no service udp-small-servers (disables udp servers)
router(config)# no ip finger
router(config)# no service finger
router(config)# no ip http server
router(config)# no cdp run
router(config)# no boot network (disables bootp)
router(config)# no service config (disables network boot)
router(config)# no ip classless
router(config)# no ip name-server
router(config)# no ip unreachable (stops icmp msgs)
router(config-if)# no ip redirect (disables icmp redirect msgs)
router(config-if)# no ip mask-reply (stops reply's in response to icmp mask req)
router(config-if)# no ip directed-broadcast (stops smurfs)
```

To protect routing table integrity (eigrp):

Use only static routes

```
router(config)# ip route [from ip] [snm].[to ip add]
```

or authenticate route table updates by using routing protocols with authentication.

```
router(config)# router eigrp 10
router(config)# network 192.168.1.0
router(config)# network 10.1.1.0
router(config)# no auto-summary
router(config)# eigrp log-neighbor-changes
router(config)# key chain routername
router(config)# key 1
router(config)# key-string cisco
router(config)# int fa0/1
router(config-if)# ip authen mode eigrp 10 md5
router(config-if)# ip authen key-chain eigrp 10 routername
```

*The **passive-interface** command is used to prevent other routers on the network from learning about routes dynamically*

To enable MD5 for RIP

```
router(config)# router rip
router(config)# version 2
router(config)# network 10.0.0.0
router(config)# network 172.30.0.0
router(config)# no auto-summary (f you have disconnected subnets, disable automatic route summarization to advertise the subnets. When route summarization is disabled, the software transmits subnet and host routing information across classful network boundaries)
router(config-if)# ip rip authentication mode md5.
router(config-if)# ip rip authentication key-chain routername
```

(Configure Key Chain)

```
router(config)# key chain routername
router(config)# key 1
router(config)# key-string 123456789
```

To control networks a router will accept updates from.

a combination of an access list and a distribute list applied in the inbound direction is used.

```
router(config-if)# access-list 10 permit 172.30.0.0 0.0.255.255
```

To tie the access list to the interface in the correct direction.

```
router(config-if)# router rip distribute-list 10 in fa0/1
```

To stop routing updates from being sent by the inside interface.

```
router(config-if)# passive-interface fa0/0
```

To disable NTP

if NTP hierarchy is not available:

```
router(config)# int e0/0
router(config-if)# ntp disable
```

(To disable all NTP msgs use access list)

To disable SNMP if there is an absence of a deployed SNMP scheme
Erase existing community strings, and set a hard-to-guess, read-only community string.
Apply a simple IP access list to SNMP denying all traffic.
Disable SNMP system shutdown and trap features.

```
router(config)# no snmp-server community public ro
router(config)# no snmp-server community config rw
router(config)# no access-list 60
router(config)# access-list 60 deny any
router(config)# snmp-server community dj1973 ro 60
router(config)# no snmp-server enable traps
router(config)# no snmp-server system-shutdown
router(config)# no snmp-server
```

To set the name server addresses

router(config)#ip name-server *addresses*. (*Otherwise, turn off DNS)*
router(config)#no ip domain-lookup

To configure SDM for the first time:

Step 1--Connect a PC to the lowest number LAN Ethernet port of the router using a cross-over cable.
Step 2--Assign a static IP address to the PC. It is recommended to use 10.10.10.2 with a 255.255.255.0 subnet mask.
Step 3--Launch a supported web browser.
Step 4--Use the URL https://10.10.10.1. A login prompt will appear.
Step 5--Log in using the default user account:
    Username: sdm
    Password: sdm
Once the WAN interface is configured, SDM is accessible through a LAN or WAN interface.

Troubleshooting SDM Access

1. First determine if there is a web browser problem.
2. Are Java and JavaScript enabled on the browser? Enable them.
3. Are popup windows being blocked? Disable popup blockers on the PC, since SDM requires popup windows.
4. Are there any unsupported Java plug-ins installed and running? Disable them using the Windows Control Panel.
5. Is the router preventing access? Remember that certain configuration settings are required for SDM to work. Check the following:
    1. Is one of the default configurations being used, or is an existing router configuration being used? Sometimes new configurations disable SDM access.
    2. Is HTTP server enabled on the router?
    3. Did SDM access work before, but now its not? Ensure that the PC is not being blocked by a new ACL.
    4. Is SDM installed? The quickest way to determine this is to access it using the appropriate HTTP or HTTPS method https://<router IP address>/flash/sdm.shtml.
    5. Use the show flash command to view the flash file system and make sure that the required SDM files are present.

Router IDS-IPS

Install IOS IPS on Router

to load the default, built-in signatures or the attack-drop.sdf file, but not both
router(config)# ip ips sdf location *url*
OR
router(config)# ip ips sdf location *disk2:attack-drop.sdf* (specify's location of SDF)
router(config)# ip ips name *ips-name* [list *acl*] (creates an ips rule that will be applied to an int.)
router(config)# ip ips signature *signature-id sig-#-ie:1000* disable (attaches policy to a sig(optional.)
router(config-if)# ip ips *ips-name* [in | out]

<u>specify syslog:</u>
ip audit notify
logging (ip add)
<u>start audit service:</u>
ip audit po local
<u>how many events to monitor:</u>
ip audit max-events #
<u>specify protected networks:</u>
ip audit protected (ip) to (ip)
<u>define what to do with info and attacks:</u>
ip audit name (name) info action (alarm,reset,drop)
ip audit name (name) attack action (alarm,reset,drop)
<u>appy the config to interface:</u>
interface X
ip audit (name) (in,out)
<u>config router to ignore certain sigs:</u>
ip audit signature # disable

```
ip audit signature # list #
```

define netword to not be protected:

```
access-list # deny (trusted network)
access-list # permit any
```

verify config:

```
show ip audit statistics
show ip audit config
show ip audit interface
show ip audit debug
```

Clear commands:

```
clear ip audit stats
clear ip audit config (removes all ids)
```

To shun

```
shun (network or IP) (dest IP) (src port) (dst port) protocol)
```

Pix commands:

help? is entered, all commands that are available in the current privilege level and mode are displayed

To save config

Hostname(config)#**write terminal**
To erase the running configuration, enter the following command:
hostname(config)# **write erase**

In order to Ping:

```
pixfirewall(config)# conduit permit icmp any any
```

To enable / view passwords:

```
pixfirewall(config)# enable secret password
pixfirewall(config)# show enable password
```

To apply hostname:

pixfirewall(config)# hostname fw1
Fw1(config)# *default names: PIX-pixfirewall…ASA-ciscoasa*

To config interfaces:

```
Pixfirewall# config t
pixfirewall(config)# conduit permit icmp any any
pixfirewall(config)# hostname Pix2
Pix2(config)ip address inside 192.168.1.1 255.255.255.0
Pix2(config)# interface eth1 10baset
Pix2(config)# ip address outside 1.1.2.1 255.255.255.0
Pix2(config)# int e1 10baset
Pix2(config)# static (inside,outside) 1.1.1.3 192.168.2.2 netmask 255.255.255.255
Pix2(config)# route outside 0.0.0.0 0.0.0.0 1.1.1.2
```

pixfirewall(config)nameif *assigns description/name to interface*.
pixfirewall(config)security-level 0-100 *The inside int has a default of 100 and the outside int has a default of 0. As other interfaces are named, the system assigns a*

To configure dynamic NAT

Pix (config)#nat-control –*makes all packets require a NAT rule*
After adding, changing, or removing a global statement, use the clear xlate command to make the IP addresses available in the translation table.

```
Pix(config)# nat (inside) 1 10.0.0.0 255.255.255.0
Pix(config)# nat (inside) 2 10.2.0.0 255.255.255.0 (for 2 interfaces)
Pix(config)# nat (dmz) 1 172.16.0.0 255.255.255.0 (for dmz zone)

Pix(config)# global (outside) 1 192.168.0.1 - 192.168.0.14 netmask 255.255.255.0
Pix(config)# global (outside) 2 192.168.0.17 - 192.168.0.30 netmask 255.255.255.0
Pix(config)# global (dmz) 1 172.16.0.20 - 172.16.0.254 netmask 255.255.255.0
```

To enable telnet:

```
Pix (config)# telnet netadd netmask inside
Pix (config)# password cisco
Pix (config)# telnet timeout 5
```

To enable ssh

Pix (config)# ssh netadd netmask inside *(netadd is add that is allowed to connect/ inside is the int that is allowed to connect)*

```
Pix (config)# ssh timout 5
Pix (config)# passwd cisco
Pix (config)\# domain-name cisco.com
Pix (config)# ca zeroize rsa
Pix (config)# ca generate rsa key 512
Pix (config)# ca save all
Pix(config)#aaa authentication ssh console LOCAL
```

Static routes:

```
Pix (config)# route inside 10.0.1.0 255.255.255.0 10.0.0.102 1.
Pix (config)# route outside 0.0.0.0 0.0.0.0 1.1.1.1 (no wcm on pix)
```

Setting the clock

```
Pix (config)# clock set hh:mm:ss {md|dm}year
Pix (config)# logging timestamp  adds time to syslog event msgs
Pix (config)# show clock
Pix (config)# clear configure clock
Pix (config)# clock summer-time zone recurring (only displays time zones)
Pix (config)# clock timezone zone hours [mins] (to display zone)
Pix (config)# ntp server ip_add [auth_key number] source if-name [prefer] (takes time from a server)
Pix (config)# show run ntp shows current config
Pix (config)# show ntp status shows ntp clock info
Pix (config)# clear configure ntp removes config
```

To config message output logging

Use Kiwi logging software to monitor

```
Pix (config)# logging on
Pix (config)# logging host inside 10.0.1.11
Pix (config)# logging trap warnings
Pix (config)# logging timestamp
Pix (config)# logging device-id pix6
Pix (config)# show logging/clear logging buffer
```

To configure ASDM

```
enable password password [encrypted]
clock set hh:mm:ss day month year
ip address ip_address [netmask]
hostname newname
domain-name name
http ip_address [netmask] [if_name] IP address of the host running ASDM
http server enable.
```

To view commands ignored by ASDM—Options > View Unparsed Commands.

To configure VLAN Tagging on PIX

VLANs are not supported on the PIX Security Appliance 501 and 506/ 506E models.

```
Pix(config)# interface ethernet3
Pix(config-if)# speed auto
Pix(config-if)#duplex auto
Pix(config-if)#no nameif
Pix(config-if)#no security-level
Pix(config-if)#no ip address

Pix(config)# interface ethernet3.1
Pix(config-subif)# vlan 10
Pix(config-subif)# nameif dmz1
Pix(config-subif)# security-level 10
Pix(config-subif)# ip address 172.16.10.1

Pix(config)# interface ethernet3.2
Pix(config-subif)# vlan 20
Pix(config-subif)# nameif dmz2
Pix(config-subif)# security-level 20
Pix(config-subif)# ip address 172.16.20.1

Pix(config)# interface ethernet3.3
Pix(config-subif)# vlan 30
Pix(config-subif)# nameif dmz3
Pix(config-subif)# security-level 30
Pix(config-subif)# ip address 172.16.30.1
```

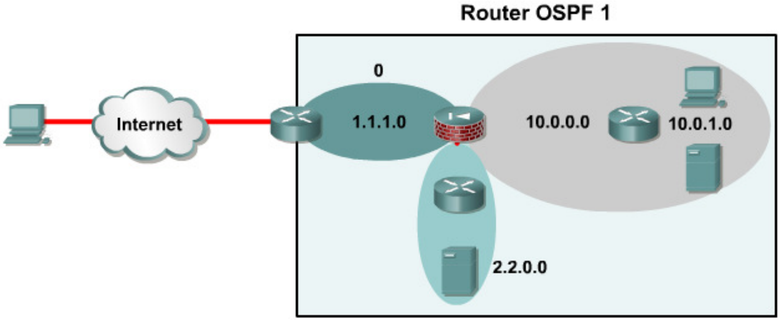
To enter a default route,

```
Pix2(config)# route outside 0.0.0.0 0.0.0.0 1.1.1.2
```

```
show run route
```

routes can be cleared by using the **clear configure route**

To configure OSPF



Pix(config)# **router ospf** pid
Pix(config)# **network** 1.1.1.0 255.255.255.0 **area** 0
Pix(config)# **network** 2.2.1.0 255.255.255.0 **area** 2.2.0.0
Pix(config)# **network** 10.0.0.0 255.255.255.0 **area** 10.0.0.0

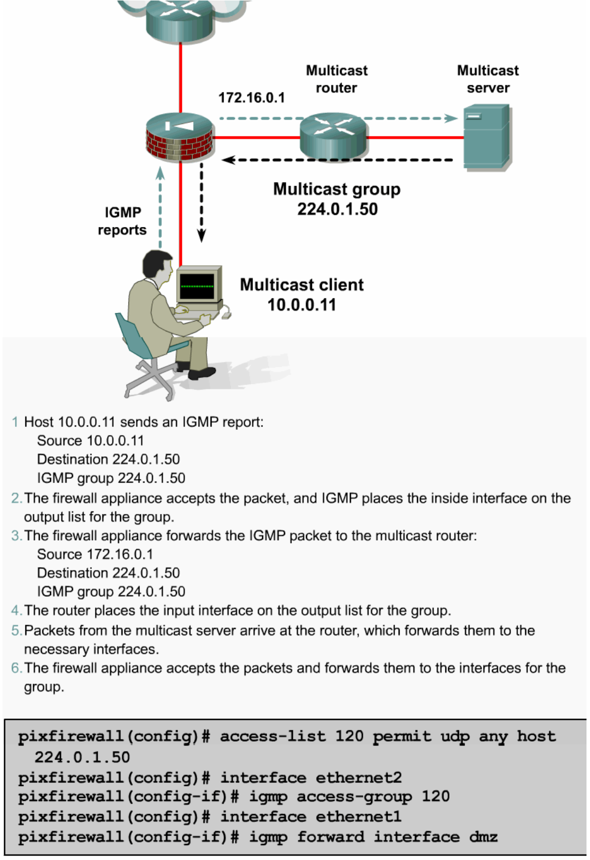
To configure OSPF with two OSPF processes when

NAT is used. OSPF is operating on the public and private interfaces.LSA type 3 advertisement filtering is required.
Pix(config)# router ospf 1 //public AS
Pix(config-router)# network 1.1.1.0 255.255.255.0 area 0
Pix(config)# router ospf 2 //private AS
Pix(config-router)# network 10.0.0.0 255.255.255.0 area 10.0.0.0
Pix(config-router)# network 192.168.1.0 255.255.255.0 area 192.168.1.0

To allow hosts to receive multicast transmissions through the PIX

Configuring the Outside Interface
1 Pix(config)# interface Ethernet 0
2 Pix(config-if)# igmp access-group 110
3 Pix(config)# access-list 110 permit udp any host 224.0.1.50

Configuring the Inside Interface
4 Pix(config)# interface ethernet1
5 Pix(config-if)# igmp forward interface outside
6 Pix(config-if)# igmp join-goup 224.0.1.50
Optional: igmp ver 2/ igmp query-interval 120/ igmp query-max-response-time 50



1 Host 10.0.0.11 sends an IGMP report:
Source 10.0.0.11
Destination 224.0.1.50
IGMP group 224.0.1.50
2. The firewall appliance accepts the packet, and IGMP places the inside interface on the output list for the group.
3. The firewall appliance forwards the IGMP packet to the multicast router:
Source 172.16.0.1
Destination 224.0.1.50
IGMP group 224.0.1.50
4. The router places the input interface on the output list for the group.
5. Packets from the multicast server arrive at the router, which forwards them to the necessary interfaces.
6. The firewall appliance accepts the packets and forwards them to the interfaces for the group.

```
pixfirewall(config)# access-list 120 permit udp any host
  224.0.1.50
pixfirewall(config)# interface ethernet2
pixfirewall(config-if)# igmp access-group 120
pixfirewall(config)# interface ethernet1
pixfirewall(config-if)# igmp forward interface dmz
```

To enable AAA on PIX

Pix(config)# **aaa-server** <name of server> **protocol** tacacs+/radius
Pix(config)# **aaa-server** server-tag **host** host ip
Pix(config)# **aaa authentication serial console** (to access the console) [serial | enable | telnet | ssh] console

```
Pix(config)# username admin password cisco
Pix(config)# aaa authentication telnet console local
Pix(config)# aaa local authentication attempts max-fail  # of tries
Pix(config)# auth-prompt prompt Please Authenticate
Pix(config)# auth-prompt reject Authentication Failed
Pix(config)# auth-prompt accept Login successful
Pix(config)# timeout uauth 3:00:00 absolute (from time at login)
Pix(config)# timeout uauth 0:30:00 inactivity (when traffic stops)
Pix(config)# radius-server key string (specifys aaa group)
```

Block Active X / Java

```
Pix(config)# filter activex 80 0.0.0.0 0.0.0.0. 0.0.0.0. 0.0.0.0.
Pix(config)# filter java 80 0.0.0.0 0.0.0.0. 0.0.0.0. 0.0.0.0.
```

URL filtering

```
Pix(config)# url-server (interface) host [ip of websense server] timeout 10 protocol TCP version 4
Pix(config)# filter url http 0 0 0 0 allow (the allow says if websense server goes down, allow…if not
```

Filtering http/https/ftp 6.3 and later

```
Pix(config)# filter https 0 0 0 0 allow
```

Pix ACL's

```
Pix(config)# access-list DMZ1 deny tcp 192.168.1.0 255.255.255.0 host 192.168.0.1 lt 1025
```
(denies access from the 1.0 network to tcp ports less than 1025 to DMZ host 0.1)
```
Pix(config)# access-group DMZ1 in interface dmz
```
(binds ACL DMZ1 to interface dmz)
```
Pix(config)# Access-list NONAT permit ip host 10.0.0.11 host 10.2.1.3
Pix(config)# nat (inside) 0 access-list NONAT
```
(allows the ACL to define traffic that is to be excluded from the NAT process)
```
Pix(config)# show access-list
Pix(config)# clear access-list
Pix(config)# no access-list
Pix(config)# access-list mode auto-commit|manual-commit
```
(auto= any acl entered will take effect immediately…. Manual= any acl entered will take effect when the access-list commit command is used.)
```
Pix(config)# access-list DMZ1 line 2 permit tcp any host 192.168.0.1 eq www
```
(inserts a new line into exsisting acl. This line will now be 2 and line 2 in the list will now be 3)

In order to Ping:
```
pixfirewall(config)# conduit permit icmp any any
```
or
```
pixfirewall(config)# icmp deny any echo outside (all pings denied at outside int)
pixfirewall(config)# icmp permit any unreachable outside (all unreachable allowed at outside int)
```

VPN ACL's

```
pixfirewall(config)# access-list [name of acl] permit ip [source/snm] [destination/snm]
pixfirewall(config)# nat (inside) 0 access-list [name of acl for vpn]
```

Turbo ACL

Sorts acl's over 19 entries long into table for faster processing
```
pixfirewall(config)# access-list compiled (all acl's will be scanned)
pixfirewall(config)# access-list [acl name] (only that acl will be compiled)
```

Configure Groups for ACLs

```
Usage:  [no] object-group protocol | network | icmp-type <obj_grp_id>
        [no] object-group service <obj_grp_id> tcp|udp|tcp-udp
        show object-group [protocol | service | icmp-type | network]
        show object-group id <obj_grp_id>
        clear object-group [protocol | service | icmp-type | network]
```

Contexts

```
pixfirewall(config)# show mode ( mult or single. Flash mode is the same as running mode)
pixfirewall(config)# mode {single | multiple} [noconfirm] (noconfirm sets mode w/o promting, wr mem first)
pixfirewall(config)# context name (adds the context)
pixfirewall(config-ctx)# allocate-interface gigabitethernet 0/1 (must enable interface in config first. Initial context has no int's)
pixfirewall(config-ctx)# config-url [disk0/flash (stored in flash), disk1 (stored on compact flash card), tftp (tftp server), ftp, http(s) (webserver-read only)
example: pixfirewall(config-ctx)# config-url disk0:/context3.cfg (wr mem saves to the config url specified now.)
pixfirewall(config)# no context nameofcontext (removes the context)
pixfirewall(config)# clear configure context (removes all context including admin)
pixfirewall(config)# admin-context name (sets any context to the admin)
pixfirewall(config)# changeto {system | context name} (changes environment)
pixfirewall(config)# show context name [detail]
```

Failover-Serial cable-Active/Standby

Step 1 Attach a network cable for each network interface that is planned to be used.
Step 2 Connect the failover cable between the primary PIX Security Appliance and the secondary PIX.
Step 3 Configure the following failover parameters on the PIX Security Appliance. When this configuration is finished, save it to the Flash memory of the primary unit.

1. Failover
2. Standby IP addresses
3. Stateful failover interface. This is optional, for use with stateful failover.
4. Failover poll time (optional).

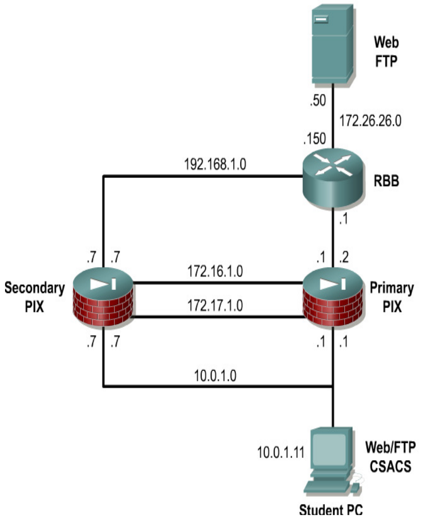
Step 4 Power on the secondary PIX Security Appliance.

Failover-Lan based

Step 1 Install a LAN-based failover connection between the two PIX Security Appliances. Verify that any switch port that connects to a PIX interface is configured to support LAN-based failover. Disconnect the secondary PIX.
Step 2 Configure the primary PIX Security Appliance for failover.
Step 3 Save the configuration of the primary unit to Flash memory.
Step 4 Power on the secondary PIX Security Appliance.
Step 5 Configure the secondary PIX Security Appliance with the LAN-based failover command set.
Step 6 Save the configuration of the secondary unit to Flash memory.
Step 7 Connect the PIX Security Appliance LAN-based failover interface to the network.
Step 8 Reboot the secondary unit.

Failover-commands:

```
pixprimary(config)# write mem (save config first)
pixprimary(config)# clear configure int eth2 (this will be used for failover)
pixprimary(config)# int eth2 (enable for failover)
pixprimary(config-if)# no shutdown
pixprimary(config-if)# exit
pixprimary(config)# int eth0 (standby IP on e0)
pixprimary(config-if)# ip add 192.168.1.2 255.255.255.0 standby 192.168.1.7
pixprimary(config-if)# exit (next create standy on e1)
pixprimary(config)# int e1
pixprimary(config-if)# ip address 10.0.1.1 255.255.255.0 standby 10.0.1.7
pixprimary(config-if)# exit
pixprimary(config)# failover lan int MyFailover eth2 (specifies the name of failover)
pixprimary(config)# failover int ip MyFailover 172.16.1.1 255.255.255.0 standby 172.16.1.7
pixprimary(config)# failover lan key 123456 (enables encryption of failover msgs)
pixprimary(config)# failover lan unit primary (sets this pix as primary)
pixprimary(config)# failover lan enable (enables failover)
pixprimary(config)# wr mem (save)
pixprimary(config)# show failover
:NO RESPONSE FROM MATE:
Config secondary from blank config::::
pix(config)# int e2
pix(config)# no shutdown
pix(config)# failover lan int MyFailover eth2
pix(config)# failover int ip MyFailover 172.16.1.1 255.255.255.0 standby 172.16.1.7
pix(config)# failover lan key 123456
pix(config)# failover lan unit secondary
pix(config)# failover lan enable (enables lan-based failover)
pix(config)# failover (enables failover)
pix(config)# wr mem
```

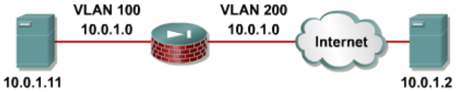


Transparent firewall

```
pix(config)# show firewall (views current mode routed/transparent)
pix(config)# firewall transparent (no firewall transparent returns to routed)
```

*When the mode is changed, the PIX Security Appliance clears the configuration because many commands are not supported for both modes. If a text configuration that changes the mode with the **firewall transparent** command is downloaded to the PIX Security Appliance, be sure to put the command at the top of the configuration.*

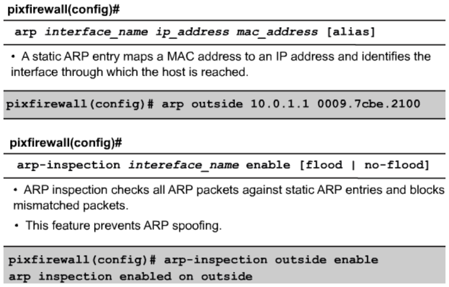
```
pix(config)# interface eth1 100 full
pix(config)# interface eth2 100 full
pix(config)# ip add 10.0.1.1 255.255.255.0 (must be on the same subnet as the upstream and downstream routers. Only for management)
pix(config)# access-list NAME permit icmp 10.0.1.0 255.255.255.0 10.0.1.0 255.255.255.0
pix(config)# access-group NAME in int inside
pix(config)# access-group NAME in int outside
```



Add an ethertype acl: (allows non-IP packets)

```
pix(config)# access-list ETHER ethertype permit ipx
pix(config)# access-group ETHER in int inside
pix(config)# access-group ETHER in int outside (Only one ACL of each type, extended and EtherType, can be applied to each direction of an interface.)
```

ethertypes: ipx, bpdu, mpls, Other Ethernet V2/DIX-encapsulated frames can be allowed based on their 2-byte ethertype, 802.3-encapsulated frames cannot pass through the firewall at this time.



pixfirewall(config)#

```
arp interface_name ip_address mac_address [alias]
```

- A static ARP entry maps a MAC address to an IP address and identifies the interface through which the host is reached.

```
pixfirewall(config)# arp outside 10.0.1.1 0009.7cbe.2100
```

pixfirewall(config)#

```
arp-inspection intereface_name enable [flood | no-flood]
```

- ARP inspection checks all ARP packets against static ARP entries and blocks mismatched packets.
- This feature prevents ARP spoofing.

```
pixfirewall(config)# arp-inspection outside enable
arp inspection enabled on outside
```

MAC address learning can be disabled if desired, however, unless MAC addresses are statically added to the table, no traffic can pass through the PIX
pix(config)# **mac-learn** outside **disable** (to re-enable- no mac-learn disable)
to add a static MAC:
pix(config)# **mac-address-table static** inside 0010.7cbe.6101 (guards against mac spoofing too)
pix(config)# **show mac-address-table** [int_name]
pix(config)# debug arp-inspection (tracks path of arp fwding and inspection module in trsp fw)
pix(config)# debug mac-address-table (tracks insert/delete/update to the bridge table for trsp fw)

Switches

To enable port security/stop CAM overflow-MAC,ARP,DHCP Vulnerabilitys

Switch(config)# **interface** int_id
Switch(config-if)# **switchport mode access**
Switch(config-if)# **switchport port-security**
Switch(config-if)# **switchport port-security** 00.0F.A2.13.D6.7F (set's 1 mac only to port)
OR
Switch(config-if)# **switchport port-security maximum** 1-132 (sets max # of mac's allowed)
Switch(config-if)# **switchport port-security violation** [protect|restrict|shutdown]
Switch# **show port-security int** int_id
Switch# **show port-security** address

To Stop MAC Spoofing

Switch(config-if)# **port security max-mac-count** (1-132)
Switch(config-if)# **port security action** [shutdown|trap]
Switch(config-if)# **arp timeout** 30 (seconds)

To config DHCP Snooping (stops false arp's from non dhcp servers)

Switch(config)# **ip dhcp snooping** (enables it globally)
Switch(config)# **ip dhcp snooping vlan** 10 (enables on a vlan OR range of vlans *must have*)
Switch(config)# **interface** int_id
Switch(config-if)# **ip dhcp snooping trust** (a dhcp server is on this port)
Switch(config-if)# **ip dhcp snooping limit rate** 100 (per second)
Switch# **show ip dhcp snooping**
Switch# **show ip dhcp snooping binding**

To verify new module installation of FWSM

is online Enter the **show module** command on the switch.

To configure the FWSM on the switch:

1st: config the switch:
Switch(config)# **vlan** 100
Switch(config-vlan)# **no shutdown**
Switch(config)# **int vlan** 100
Switch(config-if)# **ip add** 192.168.1.2.255.255.255.0
Switch(config-if)# **no shut down**

2nd : associate VLANs to be inspected by the FWSM
Switch(config)# **firewall vlan-group** 1 100 (200, 300 etc)
Switch(config)# **firewall module** 4 **vlan-group** 1

3rd: Verify the MSFC Configuration
Switch(config)# **show firewall vlan-group**
Switch(config)# **show firewall module**.

4th: Configure the security policy on the FWSM
Switch(config)# **session slot** 4 **processor 1**
Fwsm(config)# nameif 100 outside 0
Fwsm(config)# ip add outside 192.168.1.2 255.255.255.0
Fwsm(config)# nameif 200 inside 100
Fwsm(config)# ip add inside 10.0.1.1 255.255.255.0
Fwsm(config)# nameif 300 dmz 50
Fwsm(config)# ip add dmz 172.16.1.1 255.255.255.0

5th: Configure a default route
(static routes must be used to reach any networks to which the FWSM is not directly connected)
Fwsm(config)# route outside 0.0.0.0 0.0.0.0 192.168.1.1

6th: Configure access-lists
(by default all traffic is denied throught the fwsm)
Fwsm(config)# access-list 200 permit ip 10.1.1.0 255.255.255.0 any
Fwsm(config)# access-group 200 in interface inside

Use PDM to configure FWSM

copy the PDM image into FWSM flash
copy tftp flash
copy tftp://10.1.1.1/pdm-XXX.bin flash:pdm
(where XXX = pdm image version number)
** Enable the http server on the FWSM. Without it, PDM will not start.*
http server enable
** Identify the specific hosts/networks that can access the FWSM using HTTP.*
http 1.1.1.0 255.255.255.0 inside
Hosts from network 10.1.1.0 (on the inside interface) are permitted http access.
** Launch the browser and enter the following address:*
https://10.1.1.1 (FWSM inside interface)

Resetting and Rebooting the FWSM

When FWSM boots, it runs a partial memory test. To perform a full memory tes
hw-module module # **reset**
hw-module module # **mem-test-full**

To configure 802.1x on Switch

Enable aaa on switch

Switch# **config t**
Switch (config)# **aaa new-model**
Switch (config)# aaa **authentication dot1x default group** radius
Switch (config)# **interface fastethernet** 0/12
Switch (config-if)# **dot1x port-control** auto
Switch (config-if)# **end**

Config radius server on switch

Switch (config)# **radius-server host** <ip add of acs> **auth-port** <1812 default udp port> **key** secret
Set the IP of switch and key string on the RADIUS server

To set Periodic 802.1x client re-authentication

Switch (config)# **dot1x re-authentication**
Switch (config)# **dot1x timeout re-authperiod** <time>
To manually re-authenticate a client
Switch (config)# **dot1x re-authenticate interface** fastethernet 0/12

To enable multiple host on one port

Switch (config)# **interface** fastethernet 0/1
Switch (config-if)# **dot1x port-control** auto
Switch (config-if)# **dot1x** multiple-hosts

To reset all dot1x to default

Switch (config)# **dot1x** default
Switch# **show dot1x**
Switch# **show dot1x statistics**
Switch# **show dot1x statistics interface** fastethernet 0/1

VPN’s

Router with IKE Using Pre-shared Keys

Prepare IKE pre-shared keys in Cisco routers

Build a site-to-site IPSec VPN or a router-to-router IPSec VPN. Site-to-site IPSec VPNs can be established between any combination of routers, PIX Security Appliances, VPN concentrators, VPN clients, and other devices that are IPSec compliant…Based on a pre-shared secret. Both peers share a secret password string between them:
(Authentication is based on the IP address of the remote peer, not its IKE identity-significant problems with dynamic addresses)
A chooses a string and sends it to B.
B hashes the string with the pre-shared secret and yields a hash value

B sends the hashing back to A.
A calculates its own hash and matches it with the result from B
If they match, B is considered authenticated.
B chooses a different random string and sends it to A.
A also hashes the string with the pre-shared secret.
A sends the hash back to B.
B locally hashes the value and the secret and matches it against the received authenticated hash. If they match, A is authenticated.

Prepare:

Step 1 –Determine IKE phase one policy between IPSec peers based on the # and location of the peers:
Determine the key distribution method
Determine the authentication method
Identify IPSec peer IP addresses and host names
Determine ISAKMP policies for peers

Step 2 – Determine IKE phase two policy . Identify IPSec peer details such as IP addresses, IPSec transform sets, and IPSec modes , . Crypto maps will be used to gather all IPSec policy details together during the configuration phase .

RouterA(config)# crypto ipsec transform-set [set-name]
(AH is not compatible with NAT or PAT.)

Step 3 – Check the current configuration . **show**:
Crypto ipsec transform-set [name] (view previously configured transform sets)
Crypto map (viewing any previously configured crypto maps)
Run
Crypto isakmp policy (examine IKE policies)

Step 4 – Ensure that the network works without encryption. **Ping**
.
Step 5 – Ensure that the ACLs are compatible with IPSec. Ensure that perimeter routers and the IPSec peer router permit IPSec traffic. Use the **show access-lists** command for this step.
<u>To add ACL entries to permit IPSec traffic:</u>
Copy the existing ACL configuration and paste it into a text editor.
Add the ACL entries to the top of the list in the text editor.

```
RouterA(config)# access-list 102 permit ahp host [A's IP-add] host [B's IP-add]
RouterA(config)# access-list 102 permit esp host [A's IP-add] host [B's IP-add]
RouterA(config)# access-list 102 permit udp host [A's IP-add] host [B's IP-add] eq isakmp

RouterB(config)# access-list 102 permit ahp host [B's IP-add] host [A's IP-add]
RouterB(config)# access-list 102 permit esp host [B's IP-add] host [A's IP-add]
RouterB(config)# access-list 102 permit udp host [B's IP-add] host [A's IP-add] eq isakmp
```

Delete the existing ACL with the no access-list access-list number command.
Enter configuration mode and copy and paste the new ACL into the router.
Verify that the ACL is correct with the show access-lists command.

```
RouterA(config)# show run
RouterA(config)# show crypto isakmp policy
RouterA(config)# show crypto map
RouterA(config)# ping
RouterA(config)# show access-list
```

Create isakmp policy

RouterA(config)# crypto isakmp enable (globally enables/disables.)
RouterA(config)# crypto isakmp policy # (creates a policy)
RouterA(config-isakmp)# **encryption** [**des**|3des] (sets algorithm)
RouterA(config-isakmp)# **hash** [sha|**md5**] (sets hash algorithm)
RouterA(config-isakmp)# **authentication** [rsa-sig|rsa-encr|**pre-shar**] (sets auth method)
RouterA(config-isakmp)# **group** [**1**|2|5] (sets diffie group ID)
RouterA(config-isakmp)# **lifetime** [secs] (sets lifetime of SA. ie: 86400)
RouterA(config)# crypto isakmp identity [int-IP-add|hostname] (By default, a peer's identity is the IP address of the peer. Either all peers should use their IP addresses or all peers should use their host names)

Config Pre-Shared Keys:

RouterA(config)# **crypto isakmp key** [string] **address** [peer-address] (assigns a keystring and the peer's add)
OR
RouterA(config)# **crypto isakmp key** [keystring] **hostname** [hostname] (the peer's IP add or hostname can be used)
Repeat for each remote peer
RouterA# show crypto isakmp policy

Configure a Router with <u>IPSec</u> Using Pre-shared Keys

Step 1 Configure transform set suites with the crypto ipsec transform-set command.
Step 2 Configure global IPSec security association lifetimes with the crypto ipsec security-association lifetime command.
Step 3 Configure crypto ACLs with the access-list command.
Step 4 Configure crypto maps with the crypto map command.

Step 5 Apply the crypto maps to the terminating/originating interface with the interface and crypto map commands.

Configure transform set suites

During IPSec security association negotiations with IKE, the peers search for a transform set that is the same at both peers.
RouterA(config)# **crypto ipsec transform-set** [name] [transoform1|trans2|trans3] (defines set.)
RouterA(cfg-crypto-trans)# **mode** [**tunnel** | **transport**] (optional: changes mode of trans set only applicable to traffic whose src and dst are the IPSec peer add.)
To edit a Transform Set:
Config trans set suites
Delete the trans set from crypto map
Delete trans set from global config
Reenter the trans set
Assign the set to a crypto map
Clear SA DB
To force the new settings to take effect
RouterA(config)# clear crypto sa

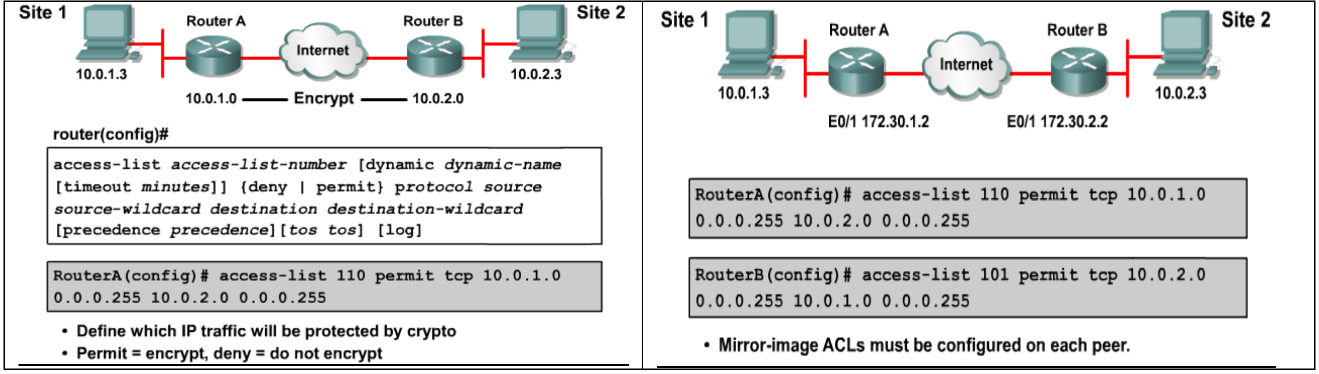
Configure global IPSec SA lifetimes

only apply to security associations established via IKE-- default -3,600 seconds, and 4,608,000 kilobytes per/hour.
routerA(config)# **crypto ipsec security-association lifetime** [secs|**kilobytes** bytes](configs global SA lifetime. Crypto maps lifetimes will override these)
To use the new values immediately
routerA(config)# **clear crypto sa** (Associations established manually, marked as **ipsec-manual**, have an infinite lifetime.)

Config Crypto access lists

To define which IP traffic will be protected by IPSec and which traffic will not. Note: **permit** specifies that matching packets must be encrypted. **deny** specifies that matching packets need not be encrypted. Any unprotected inbound traffic that matches a permit entry in the crypto ACL for a crypto map entry flagged as IPSec will be dropped, because this traffic was expected to be protected by IPSec. permit **any any** statement is strongly discouraged, as this will cause all outbound traffic to be protected, and will require protection for all inbound traffic.

<u>Use symmetrical ACLs</u>



router(config)#

```
access-list access-list-number [dynamic dynamic-name
[timeout minutes]] {deny | permit} protocol source
source-wildcard destination destination-wildcard
[precedence precedence][tos tos] [log]
```

```
RouterA(config)# access-list 110 permit tcp 10.0.1.0
0.0.0.255 10.0.2.0 0.0.0.255
```

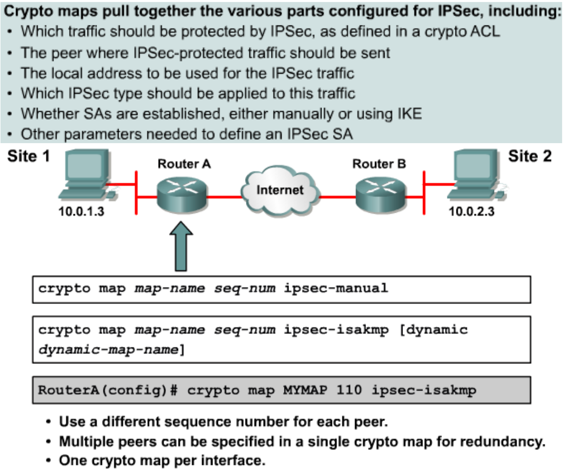
- Define which IP traffic will be protected by crypto
- Permit = encrypt, deny = do not encrypt

```
RouterA(config)# access-list 110 permit tcp 10.0.1.0
0.0.0.255 10.0.2.0 0.0.0.255
```

```
RouterB(config)# access-list 101 permit tcp 10.0.2.0
0.0.0.255 10.0.1.0 0.0.0.255
```

- Mirror-image ACLs must be configured on each peer.

Create crypto maps



Crypto maps pull together the various parts configured for IPSec, including:

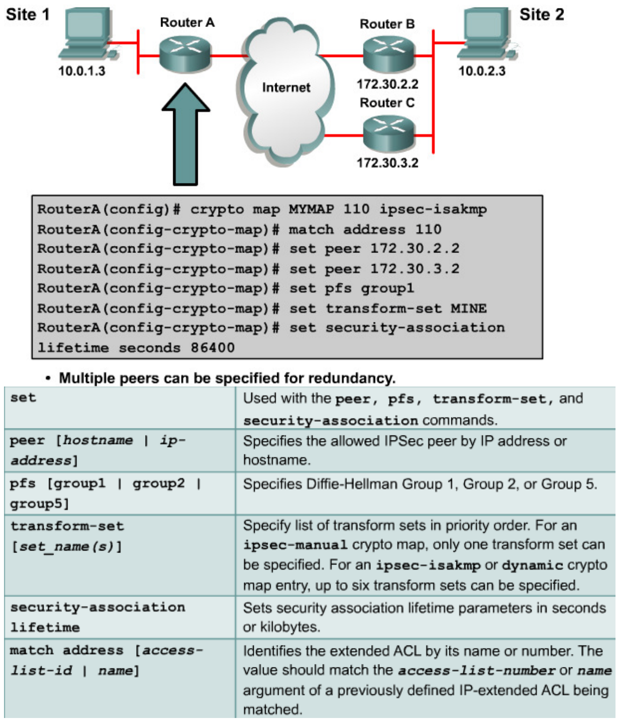
- Which traffic should be protected by IPSec, as defined in a crypto ACL
- The peer where IPSec-protected traffic should be sent
- The local address to be used for the IPSec traffic
- Which IPSec type should be applied to this traffic
- Whether SAs are established, either manually or using IKE
- Other parameters needed to define an IPSec SA

```
crypto map map-name seq-num ipsec-manual
```

```
crypto map map-name seq-num ipsec-isakmp [dynamic
dynamic-map-name]
```

```
RouterA(config)# crypto map MYMAP 110 ipsec-isakmp
```

- Use a different sequence number for each peer.
- Multiple peers can be specified in a single crypto map for redundancy.
- One crypto map per interface.



```
RouterA(config)# crypto map MYMAP 110 ipsec-isakmp
RouterA(config-crypto-map)# match address 110
RouterA(config-crypto-map)# set peer 172.30.2.2
RouterA(config-crypto-map)# set peer 172.30.3.2
RouterA(config-crypto-map)# set pfs group1
RouterA(config-crypto-map)# set transform-set MINE
RouterA(config-crypto-map)# set security-association
lifetime seconds 86400
```

- **Multiple peers can be specified for redundancy.**

set	Used with the **peer, pfs, transform-set,** and **security-association** commands.
peer [*hostname* | *ip-address*]	Specifies the allowed IPSec peer by IP address or hostname.
pfs [group1 | group2 | group5]	Specifies Diffie-Hellman Group 1, Group 2, or Group 5.
transform-set [*set_name(s)*]	Specify list of transform sets in priority order. For an **ipsec-manual** crypto map, only one transform set can be specified. For an **ipsec-isakmp** or **dynamic** crypto map entry, up to six transform sets can be specified.
security-association lifetime	Sets security association lifetime parameters in seconds or kilobytes.
match address [*access-list-id* | *name*]	Identifies the extended ACL by its name or number. The value should match the ***access-list-number*** or ***name*** argument of a previously defined IP-extended ACL being matched.

Apply crypto maps to interfaces

If the same crypto map set is applied to multiple interfaces for redundancy, an identifying interface needs to be specified. suggestion is to use a loopback
To specify redundant interfaces and name an identifying interface
Router(config)# **int** eth0/1
Router(config-if) **crypto map** MYMAP (apply's to interface/activates the IPSec policy)
Router(config)# **crypto map** *MYMAP* **local-address** *interface-id*

Show Commands

Test and Verify the IPSec Configuration of the Router
* Display the configured ISAKMP policies using the **show crypto isakmp policy** command.
* Display the configured transform sets using the **show crypto ipsec transform-set** command.
* Display the current state of the IPSec SAs with the **show crypto ipsec sa** command.
* View the configured crypto maps with the **show crypto map** command.
* Debug ISAKMP and IPSec traffic through the Cisco IOS with the **debug crypto ipsec** and **debug crypto isakmp** commands. Example:

- %CRYPTO-6-IKMP_SA_NOT_AUTH: Cannot accept Quick Mode exchange from %15i if SA is not authenticated!
  The ISAKMP security association with the remote peer was not authenticated yet the peer attempted to begin a Quick Mode exchange. This exchange must only be done with an authenticated security association. The recommended action is to contact the administrator of the remote peer to resolve the improper configuration.
- %CRYPTO-6-IKMP_SA_NOT_OFFERED: Remote peer %15i responded with attribute [chars] not offered or changed
  ISAKMP peers negotiate policy by the initiator offering a list of possible alternate protection suites. The responder responded with an ISAKMP policy that the initiator did not offer. The recommended action is to contact the administrator of the remote peer to resolve the improper configuration.

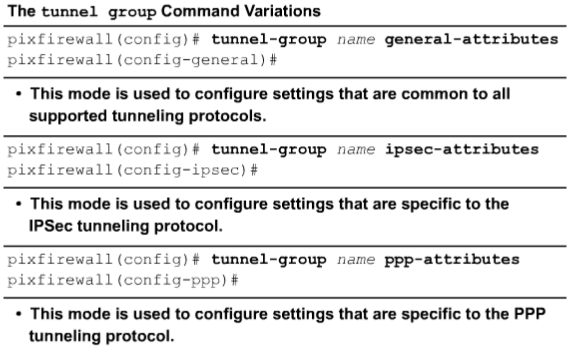
PIX Site-to-Site VPN using Pre-shared Keys

Prepare to configure VPN support

Determine the IKE policies between peers based on the number and location of IPSec peers.
Identify IPSec peer details such as IP addresses and IPSec modes. Determine the IPSec policies applied to the encrypted data passing between peers.
Ensure that basic connectivity has been achieved between IPSec peers using the desired IP services before configuring firewall appliance IPSec.
Implicitly permit IPSec packets to bypass PIX Secuity Appliance ACLs and access groups. This can be done with the **sysopt connection permit-ipsec** command.

Configure IKE parameters

Enable IKE
Pix(config)# **isakmp enable** outside (disables IKE on int not for IPSec
Pix(config)# **isakmp policy** 10 **encryption** des (10=priority)
Pix(config)# **isakmp policy** 10 **hash** share (default is sha)
Pix(config)# **isakmp policy** 10 **authentication** pre-share
Pix(config)# **isakmp policy** 10 **group** 1 (specifies the DH group ID. 1 = default)
Pix(config)# **isakmp policy** 10 **lifetime** 86400 (lifetime in secs..86400 =default)
Config tunnel group:
Pix(config)# **tunnel-group** name **type** type (names the tunnel + says the type of VPN)
Ie Pix(config)# **tunnel-group** 192.168.6.2 **type** IPSec-L2L
Config tunnel group attributes- pre-shared key:
Pix(config)# **tunnel-group** name [**general-attributes | IPSec-att | pppattributes**]
Pix(config-ipsec)# **pre-shared-key** cisco123 (associates the key w/the policy)



The `tunnel group` Command Variations

```
pixfirewall(config)# tunnel-group name general-attributes
pixfirewall(config-general)#
```

- This mode is used to configure settings that are common to all supported tunneling protocols.

```
pixfirewall(config)# tunnel-group name ipsec-attributes
pixfirewall(config-ipsec)#
```

- This mode is used to configure settings that are specific to the IPSec tunneling protocol.

```
pixfirewall(config)# tunnel-group name ppp-attributes
pixfirewall(config-ppp)#
```

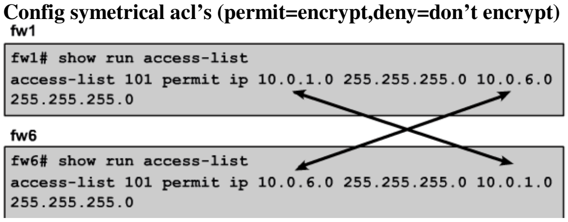
- This mode is used to configure settings that are specific to the PPP tunneling protocol.

Verify IKE policies

Pix# **show run crypto isakmp** (displays configured and default policies)
Pix# **show run tunnel-group** (displays tunnel group information about all or a specified tunnel group and tunnel group attributes)

Configure IPSec parameters

Config symetrical acl's (permit=encrypt,deny=don't encrypt)



fw1

```
fw1# show run access-list
access-list 101 permit ip 10.0.1.0 255.255.255.0 10.0.6.0
255.255.255.0
```

fw6

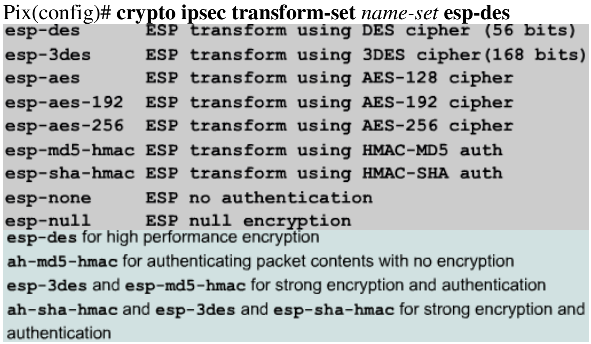
```
fw6# show run access-list
access-list 101 permit ip 10.0.6.0 255.255.255.0 10.0.1.0
255.255.255.0
```

Exclude traffic w/nat0

Pix(config)# **nat** (inside) **0 access-list** 101 (do not translate these addresses)

Config an IPSec transform Set

Pix(config)# **crypto ipsec transform-set** *name-set* **esp-des**



```
esp-des      ESP transform using DES cipher (56 bits)
esp-3des     ESP transform using 3DES cipher(168 bits)
esp-aes      ESP transform using AES-128 cipher
esp-aes-192  ESP transform using AES-192 cipher
esp-aes-256  ESP transform using AES-256 cipher
esp-md5-hmac ESP transform using HMAC-MD5 auth
esp-sha-hmac ESP transform using HMAC-SHA auth
esp-none     ESP no authentication
esp-null     ESP null encryption
```

`esp-des` for high performance encryption
`ah-md5-hmac` for authenticating packet contents with no encryption
`esp-3des` and `esp-md5-hmac` for strong encryption and authentication
`ah-sha-hmac` and `esp-3des` and `esp-sha-hmac` for strong encryption and authentication

Config the crypto map:

Pix(config)# **crypto map** *map-name seq-num* [**ipsec-isakmp |ipsec-manual | [dynamic** *dynamic-map-name*]
Ipsec-isakmp= IKE will be used to protect traff
Ipsec-maual=IKE will not be used. (not on 501)
Pix(config)# **crypto map** *name seq#* **match address** *access-list-name* (assign an ACL to map)
Pix(config)# **crypto map** *name seq#* **set peer** [hostname |ip-add] (sets peer name /add, multi can be used)
Pix(config)# **crypto map** *name seq#* **set transform-set** [transform-set-name1-6] (up to 6, list in order of priority)

Apply map to interface:

Pix(config)# **crypto map** *name* **interface** *int-name*
Ie: crypto map fw1map interface outside

Test

- Verify ACLs and select interesting traffic with the **show run access-list** command.
- Verify correct IKE configuration with the **show run isakmp** and **show run tunnel-group** commands.
- Verify correct IPSec configuration of transform sets with the **show run ipsec** command.
- Verify the correct crypto map configuration with the **show run crypto map** command.
- Clear IPSec SAs for testing of SA establishment with the **clear crypto ipsec sa** command.
- Clear IKE SAs for testing of IKE SA establishment with the **clear crypto isakmp sa** command.
- Debug IKE and IPSec traffic with the **debug crypto ipsec** and **debug crypto isakmp** commands.

Example config

Show commands
Show static
Show isakmp policy

```
Pix2(config)# access-list 102 permit ah host 1.1.1.1 host 1.1.1.2
Pix2(config)# access-list 102 permit esp host 1.1.1.1 host 1.1.1.2
Pix2(config)# access-list 102 permit udp host 1.1.1.1 host 1.1.1.2 eq isakmp
Pix2(config)# sysopt connection permit-ipsec
Pix2(config)# isakmp enable outside
Pix2(config)# isakmp policy 10 authentication pre-share
Pix2(config)# isakmp policy 10 encrypt des
Pix2(config)# isakmp policy 10 hash md5
Pix2(config)# isakmp policy 10 group 1
Pix2(config)# isakmp policy 10 lifetime 86400
Pix2(config)# isakmp identity address
Pix2(config)# name 1.1.1.1 Pix1
Pix2(config)# isakmp key cisco123 address 1.1.1.1 netmask 255.255.255.255
Pix2(config)# crypto ipsec transform-set MYIPSEC esp-des
Pix2(config)# static (inside,outside) 1.1.1.5 192.168.2.5 netmask 255.255.255.255
Pix2(config)# access-list 102 permit ip host 1.1.1.5 host 1.1.1.5
Pix2(config)# crypto map MYMAP 10 ipsec-isakmp
Pix2(config)# crypto map MYMAP 10 match address 102
WARNING: access-list has port selectors may have performance impact
Pix2(config)# crypto map MYMAP 10 set peer 1.1.1.1
Pix2(config)# crypto map MYMAP 10 set transform-set MYIPSEC
Pix2(config)# crypto map MYMAP interface outside
```

Router Site to Site VPN using Digital Certificates

Basic steps:

manage NVRAM (date/time)

set router time and date

a. router(config)#**clock timezone** *zone* **hours** [mins]
b. router(config)#**clock set** *hh:mm:ss day month year* or
c. router(config)#**clock set** *hh:mm:ss month day year*

The router can optionally be set to automatically update the calendar and time from a Network Time Protocol (NTP) server with the **ntp** series of commands.

config hostname and domain name

d. router(config)#**hostname** *name*
e. router(config)#**ip domain-name** *name*
f. router(config)#**ip host** *name ip-add-of-CAserver* (if domain name is not resolvable)

To define a default domain name that the Cisco IOS software uses to complete unqualified hostnames use the **ip domain-name global** configuration command. Unqualified names are names without a dotted-decimal domain name

generate RSA key pair

g. router(config)#**crypto key generate rsa** [*general-keys* | *usage-keys*]

using the keyword 'usage-keys' generates two sets of rsa keys. Use on set for rsa signatures and rsa encrypted nonces. 512 = default bits 1024= recommended.

Declare a CA

Note that in 12.3(7)T, crypto pki trustpoint replaces the crypto ca trustpoint command from previous Cisco IOS software releases. The crypto ca trustpoint command can be entered, but the command will be written in the configuration as crypto pki trustpoint.

h. Router(config)# **crypto pki trustpoint** *name* (will allow the router to re-enroll to the CA server automatically when its certificates expire)
i. Router(ca-trustpoint)# **enrollment** url http://vpnca/certsrv/mscep/mscep.dll
j. Router(ca-trustpoint)# **enrollment** mode ra
k. Router(ca-trustpoint)# **crl** optional

This example declares an Entrust CA and identifies characteristics of the CA. In this example, the name vpnca is created for the CA, which is located at http://vpnca. The example also declares a CA using an RA. The scripts for the CA are stored in the default location, and the CA uses SCEP instead of LDAP. This is the minimum possible configuration required to declare a CA that uses an RA. Note that the enrollment URL points to the MSCEP DLL.

Authenticate the CA

To get the public key of the CA, use the **crypto pki authenticate**name command in global configuration mode. Use the same name that was used when declaring the CA with the **crypto pki trustpoint** command in step 5.

l. Router(config)# **crypto pki authenticate** *name*

Request a certificate for the router.

m. Router(config)# **crypto pki enroll** *name* (request signed certificates from the CA)

Save the config

n. Router# **wr**

Use the **copy system:running-config nvram:startup-config** command to save the configuration. This command includes saving RSA keys to private NVRAM. RSA keys are not saved with the configuration when a **copy system:running-config rcp:** or **copy system:running-config tftp:** command is issued.

optional: monitor and maintain CA interoperability

o. crypto pki trustpoint *name*

Verify config

p. Show crypto pki certificates
q. Show crypto key *mypubkey* | pubkey-chain

To specify that certificates and CRLs should not be stored locally on the router, but should be retrieved when required, turn on query mode by using the **crypto ca certificate query**

If query mode is turned on initially, it can turned off later. If query mode is turned off later, the **copy system:running-config nvram:startup-config** command can be issued beforehand to save all current certificates and CRLs to NVRAM.

Easy VPN Server for XAUTH with Easy VPN Remote clients :

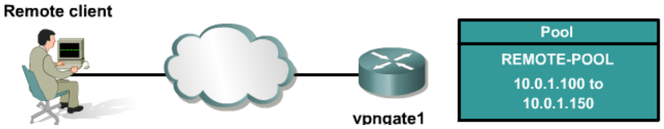
1 – Create an IP address pool.

router(config)#

```
ip local pool {default | pool-name low-ip-
  address [high-ip-address]}
```

```
vpngate1(config)# ip local pool REMOTE-POOL
  10.0.1.100 10.0.1.150
```

- Creating a local address pool is optional if an external DHCP server is in use on the network.



2 – Configure group policy lookup.

router(config)#

```
aaa new-model
```

router(config)#

```
aaa authorization network list-name local
[method1 [method2…]]
```

```
vpngate1(config)# aaa new-model
vpngate1(config)# aaa authorization network
 VPN-REMOTE-ACCESS local
```

- Creates a user group for local AAA policy lookup

3 – Create an ISAKMP policy for remote VPN client access.

```
vpngate1(config)# crypto isakmp enable
vpngate1(config)# crypto isakmp policy 1
vpngate1(config-isakmp)# authen pre-share
vpngate1(config-isakmp)# encryption 3des
vpngate1(config-isakmp)# group 2
vpngate1(config-isakmp)# exit
```

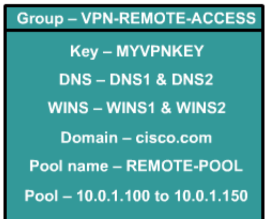
- Use standard ISAKMP configuration commands.

4 – Define a group policy for a mode configuration push.

router(config)#

```
crypto isakmp client configuration group
{group-name | default}
```

```
vpngate1(config)# crypto isakmp client
configuration group VPN-REMOTE-ACCESS
vpngate1(config-isakmp-group)#
```



```
vpngate1(config-isakmp-group)# key MYVPNKEY
```

router(config-isakmp-group)#

```
dns primary-server secondary-server
```

```
vpngate1(config-isakmp-group)# dns DNS1 DNS2
```

```
vpngate1(config-isakmp-group)# dns
172.26.26.120 172.26.26.130
```

router(config-isakmp-group)#

```
wins primary-server secondary-server
```

```
vpngate1(config-isakmp-group)# wins WINS1 WINS2
```

```
vpngate1(config-isakmp-group)# wins
172.26.26.160 172.26.26.170
```

```
vpngate1(config-isakmp-group)# domain cisco.com
```

```
vpngate1(config-isakmp-group)# pool REMOTE-POOL
```

5 – Create a transform set.

router(config)#

```
crypto ipsec transform-set transform-set-name
transform1 [transform2 [transform3]]
```

```
vpngate1(config)# crypto ipsec transform-set
VPNTRANSFORM esp-3des esp-sha-hmac
vpngate1(cfg-crypto-trans)# exit
```

6 – Create a dynamic crypto map with RRI.

router(config)#

```
crypto dynamic-map dynamic-map-name
 dynamic-seq-num
```

```
vpngate1(config)# crypto dynamic-map DYNMAP 1
vpngate1(config-crypto-map)#
```

router(config-crypto-map)#

```
set transform-set transform-set-name
 [transform-set-name2…transform-set-name6]
```

```
vpngate1(config-crypto-map)# set transform-set
 VPNTRANSFORM
```

```
vpngate1(config-crypto-map)# reverse-route
vpngate1(config-crypto-map)# exit
```

7 – Apply a mode configuration to the dynamic crypto map.

router(config)#

```
crypto map map-name client configuration
address {initiate | respond}
```

```
vpngate1(config)# crypto map CLIENTMAP client
configuration address respond
```

router(config-crypto-map)#

```
crypto map map-name isakmp authorization list
list-name
```

```
vpngate1(config)# crypto map CLIENTMAP isakmp
authorization list VPN-REMOTE-ACCESS
```

router(config)#

```
crypto map map-name seq-num ipsec-isakmp
dynamic dynamic-map-name
```

```
vpngate1(config)# crypto map CLIENTMAP 65535
ipsec-isakmp dynamic DYNMAP
```

8 – Apply the crypto map to the router interface.

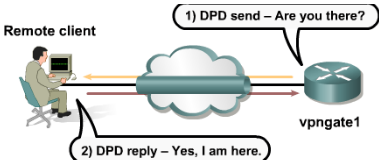
```
vpngate1(config)# interface ethernet0/1
vpngate1(config-if)# crypto map CLIENTMAP
vpngate1(config-if)# exit
```

9 – Enable IKE dead peer detection (DPD).

router(config)#

```
crypto isakmp keepalive secs retries
```

```
vpngate1(config)# crypto isakmp keepalive 20 10
```



10 – Configure XAUTH. XAUTH is not required when using Easy VPN. This option can be disabled.

```
aaa authentication login list-name method1
[method2…]
```

```
vpngate1(config)# aaa authentication login
VPNUSERS local
```

```
crypto isakmp xauth timeout seconds
```

```
vpngate1(config)# crypto isakmp xauth timeout 20
```

```
crypto map map-name client authentication list
list-name
```

```
vpngate1(config)# crypto map CLIENTMAP
client authentication list VPNUSERS
```

11 – (Optional) Enable XAUTH save password feature.

```
vpngate1(config)# crypto isakmp client
 configuration group VPN-REMOTE-ACCESS
vpngate1(config-isakmp-group)# save-password
```

- **This step could have been completed in Step 1 of Task 4 following the `crypto isakmp client configuration group` command.**

Cisco VPN Client 4.x for Easy VPN Remote access:

1 – Install the Cisco VPN Client 4.x on the remote user's PC.

2 – Create a new client connection entry.

at least one connection entry must be created, which identifies the following information:
* The VPN device, also known as the remote server, to access
* Preshared keys – The IPSec group to which the user is assigned to. The group determines how the user can access and use the remote network. For example, the group specifies access hours, number of simultaneous logins, user authentication method, and the IPSec algorithms that the VPN Client uses.
* Certificates – The name of the certificate that will be used for authentication
Multiple connection entries can be created if the VPN Client is used to connect to multiple networks, though not simultaneously, or if the remote user belongs to more than one VPN remote access group.

Creating a New Connection Entry

Step 1 Start the VPN Client by choosing Start > Programs > Cisco Systems VPN Client > VPN Client.
Step 2 The VPN Client application starts and displays the advanced mode main window. If necessary, open the Options menu in simple mode and choose Advanced Mode or press Ctrl-M.
Step 3 Select New from the toolbar or the Connection Entries menu. The VPN Client displays a form.
Step 4 Enter a unique name for this new connection. Any name can be used to identify this connection.
Step 5 Enter a description of this connection. This field is optional, but it helps to further identify this connection.
Step 6 Enter the hostname or IP address of the remote VPN device that the client will connect to.

3 – Choose an authentication method.

Under the Authentication tab, enter the information for the authentication method that will be used.

Group Authentication

The network administrator usually configures group authentication for the remote user. If this is not the case, use the following procedure:
Step 1 Click the Group Authentication radio button.
Step 2 In the Name field, enter the name of the IPSec group to which the remote user belongs. This entry is case-sensitive.
Step 3 In the Password field, enter the password, which is also case-sensitive, for the IPSec group to which the remote user belongs. The field displays only asterisks.
Step 4 Verify the password by entering it again in the Confirm Password field.

Mutual Group Authentication

To use mutual group authentication, a root certificate that is compatible with the central-site VPN installed on the system is needed.

Certificate Authentication

Step 1 Click the Certificate Authentication radio button.
Step 2 Choose the name of the certificate that is being used from the menu.

4 – Configure transparent tunneling.

1. The most common application for transparent tunneling is behind a home router performing PAT. Some vendors support ESP PAT, also known as IPSec passthrough, which might let the VPN Client operate without enabling transparent tunneling. To use transparent tunneling, the central-site VPN device must be configured to support it.
2. Transparent tunneling can be done over UDP or over TCP. The mode used must match that used by the secure gateway to which the VPN Client is connecting. UDP does not operate with statefull firewalls, so in this case, TCP should be used.
3. To enable IPSec over TCP, click the radio button. When using TCP, the port number for TCP must also be enteredin the TCP port field. This port number must match the port number configured on the secure gateway. The default port number is 10000.
4. The Allow Local LAN Access parameter gives the remote user access to the resources -- resources could include printers, fax machines, shared files, or other systems, When this parameter is enabled and the central site is configured to permit it, remote users can access local resources while connected. When this parameter is disabled, all traffic from the Client system goes through the IPSec connection to the secure gateway. If the local LAN that the remote user is on is not secure, this feature should be disabled. For example, this feature would be disabled when the local LAN is in a hotel or airport. When this feature is enabled and configured on the VPN Client and permitted on the central-site VPN device, the remote user can see a list of the local LANs available by looking at the Routes table in the VPN Client statistics.

To display the Routes table, use the following procedure:
Step 1 Display the Status menu and choose Statistics.
Step 2 Choose Route Details from the Statistics dialog box.

The routes table shows local LAN routes, which do not traverse the IPSec tunnel, and secured routes, which do traverse an IPSec tunnel to a central-site device. The routes in the local LAN routes column are for locally available resources.

5 – Enable and add backup servers.

The private network may include one or more backup VPN servers to use if the primary server is not available. The system administrator should tell the remote user whether to enable backup servers. Information on backup servers can download automatically from the VPN Concentrator, or this information can be entered manually.

To enable backup servers from the VPN Client, use the following procedure:

Step 1 Open the Backup Servers tab.
Step 2 Check Enable Backup Server(s). This is not checked by default.
Step 3 Click Add to enter the address of a backup server.
Step 4 Enter the hostname or IP address of the backup server. Use a maximum of 255 characters.
Step 5 To add more backup devices, repeat Steps 2, 3, and 4.

6– Configure a connection to the Internet through dial-up networking.

To connect to a private network using a dial-up connection, perform the following steps:

Step 1 Use a dial-up connection to an Internet service provider (ISP) to connect to the Internet.
Step 2 Use the VPN Client to connect to the private network through the Internet.

To enable and configure this feature, check the Connect to the Internet via dial-up check box. This feature is not checked by default.

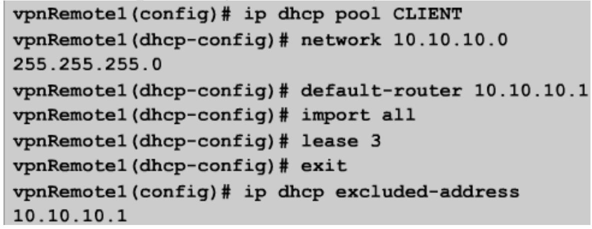
Remote users can connect to the Internet using the VPN Client application in either of the following ways:

* Microsoft Dial-up Networking (DUN)
* Third party dial-up program

Configure Cisco Easy VPN Remote for Access Routers

1 – (Optional) Configure the DHCP server pool.

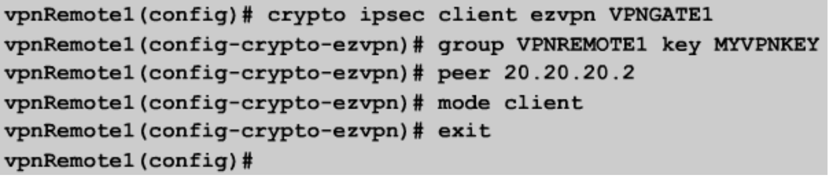
```
Router(config)# ip dhcp pool pool-name
Router(dhcp-config)# network ip-add [mask]
Router(dhcp-config)# default-router add [add2..addN]
Router(dhcp-config)# import all
Router(dhcp-config)# lease [days hours mins| infinite]
```



```
vpnRemote1(config)# ip dhcp pool CLIENT
vpnRemote1(dhcp-config)# network 10.10.10.0
255.255.255.0
vpnRemote1(dhcp-config)# default-router 10.10.10.1
vpnRemote1(dhcp-config)# import all
vpnRemote1(dhcp-config)# lease 3
vpnRemote1(dhcp-config)# exit
vpnRemote1(config)# ip dhcp excluded-address
10.10.10.1
```

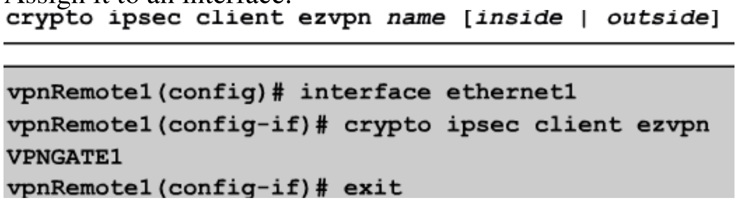
2 – Configure and assign the Cisco Easy VPN client profile.

```
Router(config)# crypto ipsec client ezvpn name
Router(config-crypto-ezvpn)# group group-name key group-key
Router(config-crypto-ezvpn)# peer [ip-add | hostname]
Router(config-crypto-ezvpn)# mode [client | network-extension | network-plus]
```



```
vpnRemote1(config)# crypto ipsec client ezvpn VPNGATE1
vpnRemote1(config-crypto-ezvpn)# group VPNREMOTE1 key MYVPNKEY
vpnRemote1(config-crypto-ezvpn)# peer 20.20.20.2
vpnRemote1(config-crypto-ezvpn)# mode client
vpnRemote1(config-crypto-ezvpn)# exit
vpnRemote1(config)#
```

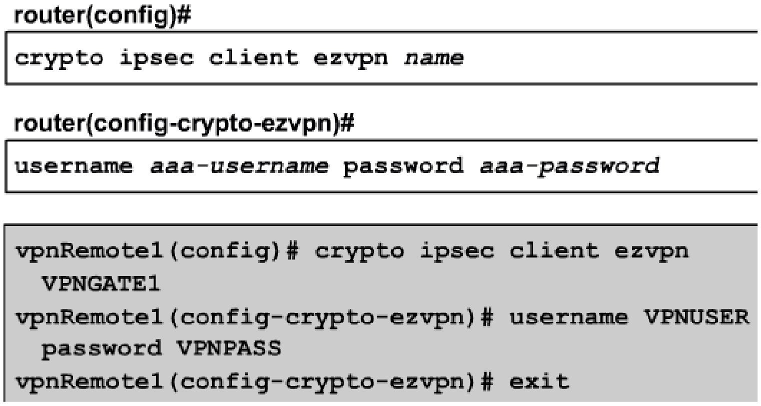
Assign it to an interface:



```
crypto ipsec client ezvpn name [inside | outside]
```

```
vpnRemote1(config)# interface ethernet1
vpnRemote1(config-if)# crypto ipsec client ezvpn
VPNGATE1
vpnRemote1(config-if)# exit
```

3 – (Optional) Configure XAUTH password save.



router(config)#

```
crypto ipsec client ezvpn name
```

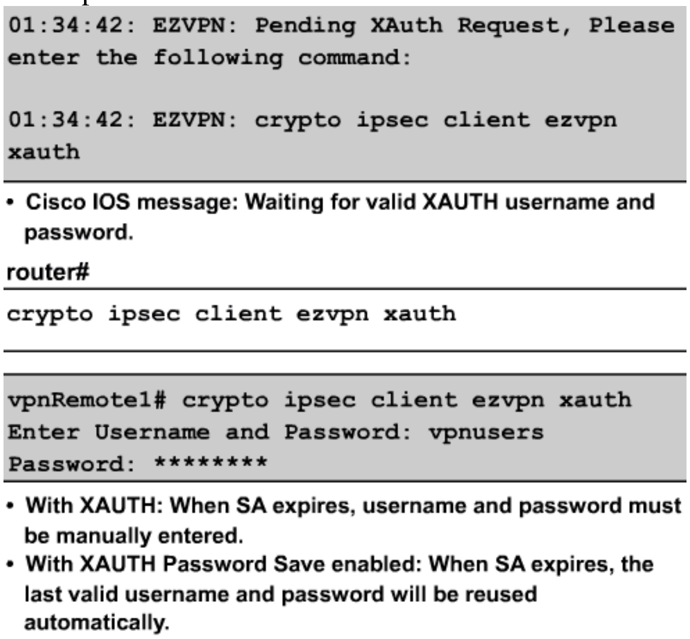
router(config-crypto-ezvpn)#

```
username aaa-username password aaa-password
```

```
vpnRemote1(config)# crypto ipsec client ezvpn
  VPNGATE1
vpnRemote1(config-crypto-ezvpn)# username VPNUSER
  password VPNPASS
vpnRemote1(config-crypto-ezvpn)# exit
```

4 – Initiate the VPN tunnel.

Also optional:



```
01:34:42: EZVPN: Pending XAuth Request, Please
enter the following command:

01:34:42: EZVPN: crypto ipsec client ezvpn
xauth
```

- Cisco IOS message: Waiting for valid XAUTH username and password.

router#

```
crypto ipsec client ezvpn xauth
```

```
vpnRemote1# crypto ipsec client ezvpn xauth
Enter Username and Password: vpnusers
Password: ********
```

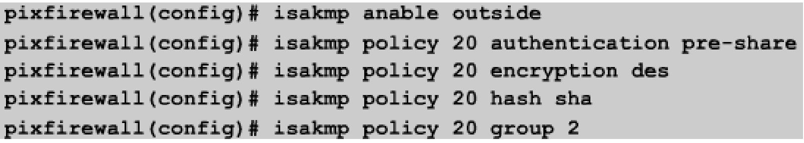
- With XAUTH: When SA expires, username and password must be manually entered.
- With XAUTH Password Save enabled: When SA expires, the last valid username and password will be reused automatically.

5 – Verify the Cisco Easy VPN configuration.

Router#show crypto ipsec client ezvpn

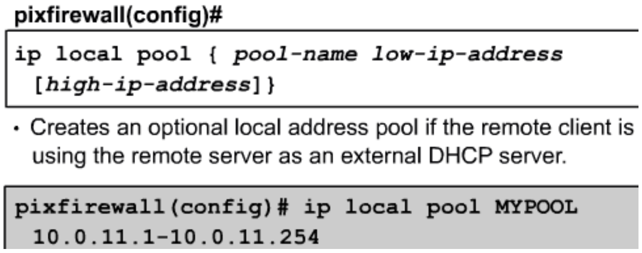
Configure the PIX Security Appliance as an Easy VPN Server

1 – Create an ISAKMP policy for remote Cisco VPN Client access.



```
pixfirewall(config)# isakmp anable outside
pixfirewall(config)# isakmp policy 20 authentication pre-share
pixfirewall(config)# isakmp policy 20 encryption des
pixfirewall(config)# isakmp policy 20 hash sha
pixfirewall(config)# isakmp policy 20 group 2
```

2 – Create an IP address pool.



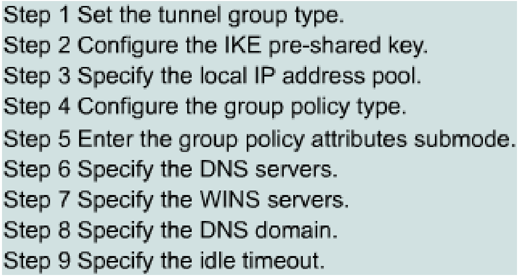
pixfirewall(config)#

```
ip local pool { pool-name low-ip-address
  [high-ip-address]}
```

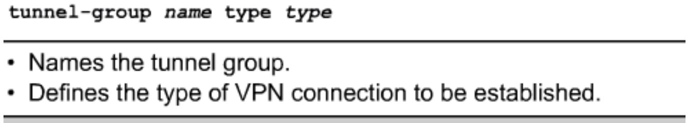
- Creates an optional local address pool if the remote client is using the remote server as an external DHCP server.

```
pixfirewall(config)# ip local pool MYPOOL
  10.0.11.1-10.0.11.254
```

3 – Define a group policy for a mode configuration push.

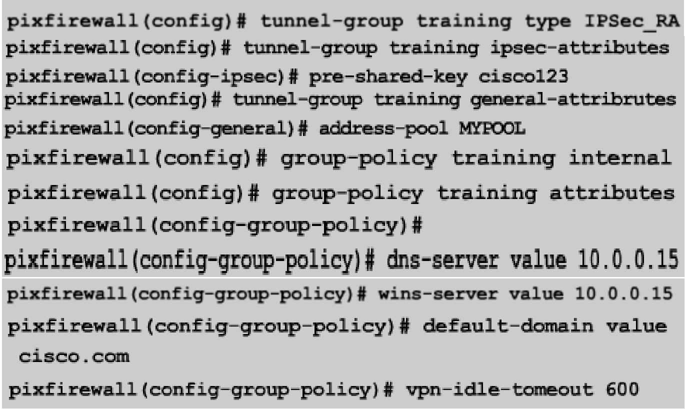


Step 1 Set the tunnel group type.
Step 2 Configure the IKE pre-shared key.
Step 3 Specify the local IP address pool.
Step 4 Configure the group policy type.
Step 5 Enter the group policy attributes submode.
Step 6 Specify the DNS servers.
Step 7 Specify the WINS servers.
Step 8 Specify the DNS domain.
Step 9 Specify the idle timeout.



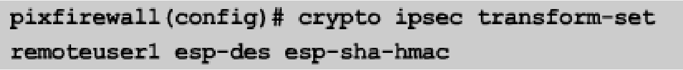
```
tunnel-group name type type
```

- Names the tunnel group.
- Defines the type of VPN connection to be established.



```
pixfirewall(config)# tunnel-group training type IPSec_RA
pixfirewall(config)# tunnel-group training ipsec-attributes
pixfirewall(config-ipsec)# pre-shared-key cisco123
pixfirewall(config)# tunnel-group training general-attribrutes
pixfirewall(config-general)# address-pool MYPOOL
pixfirewall(config)# group-policy training internal
pixfirewall(config)# group-policy training attributes
pixfirewall(config-group-policy)#
pixfirewall(config-group-policy)# dns-server value 10.0.0.15
pixfirewall(config-group-policy)# wins-server value 10.0.0.15
pixfirewall(config-group-policy)# default-domain value
 cisco.com
pixfirewall(config-group-policy)# vpn-idle-tomeout 600
```

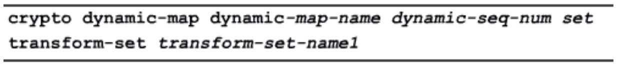
4 – Create a transform set.



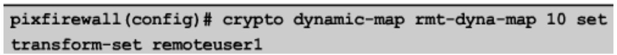
```
pixfirewall(config)# crypto ipsec transform-set
remoteuser1 esp-des esp-sha-hmac
```

5 – Create a dynamic crypto map.

pixfirewall(config)#



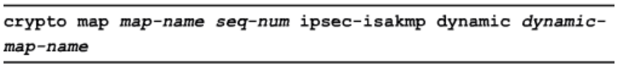
```
crypto dynamic-map dynamic-map-name dynamic-seq-num set
transform-set transform-set-name1
```



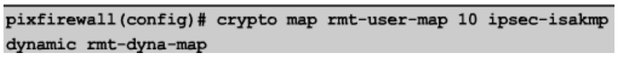
```
pixfirewall(config)# crypto dynamic-map rmt-dyna-map 10 set
transform-set remoteuser1
```

6 – Assign a dynamic crypto map to a static crypto map.

pixfirewall(config)#



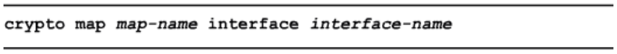
```
crypto map map-name seq-num ipsec-isakmp dynamic dynamic-
map-name
```



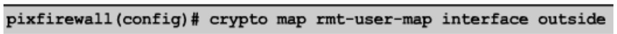
```
pixfirewall(config)# crypto map rmt-user-map 10 ipsec-isakmp
dynamic rmt-dyna-map
```

7 – Apply a dynamic crypto map to the PIX Security Appliance interface.

pixfirewall(config)#



```
crypto map map-name interface interface-name
```

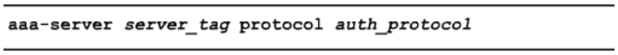


```
pixfirewall(config)# crypto map rmt-user-map interface outside
```

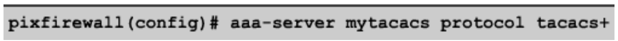
8 – Configure XAUTH.

Step 1 Enable AAA login authentication.

pixfirewall(config)#



```
aaa-server server_tag protocol auth_protocol
```



```
pixfirewall(config)# aaa-server mytacacs protocol tacacs+
```

Step 2 Define AAA server IP address and encryption key.

pixfirewall(config-aaa-server)#

```
aaa server sertve_tag [(if name)] host server_ip [key]
[timeout seconds]
```

```
pixfirewall(config-aaa-server)# aaa-server mytacacs
(inside) host 10.0.0.15 cisco123 timeout 5
```

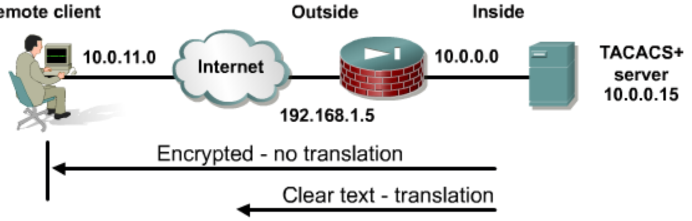
Step 3 Enable IKE XAUTH for the crypto map.

pixfirewall(config-general)#

```
authentication-server-group [interface name] server group
[LOCAL | NONE]
```

```
pixfirewall(config)# tunnel-group training general-
attributes
pixfirewall(config-general)# authentication-server-group
mytacacs
```

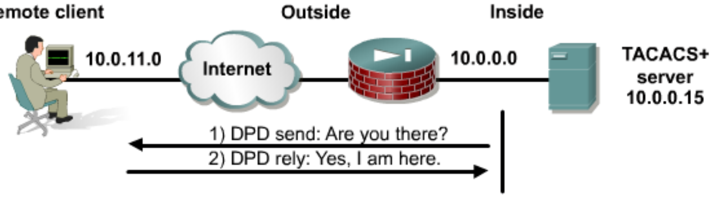
9 – Configure NAT and NAT 0.



```
pixfirewall(config)# access-list 101 permit 10.0.0.0
255.255.0 10.0.11.0 255.255.255.0
pixfirewall(config)# nat (inside) 0 access-list 101
pixfirewall(config)# nat (inside) 1 0.0.0.0 0.0.0.0 0 0
pixfirewall(config)# global (outside) 1 interface
```

- Matches ACL: Encrypted data and no translation (NAT 0)
- Does not match ACL: CLear text and translation (PAT)

10 – Enable IKE dead peer detection (DPD).



pixfirewall(config-ipsec)#

```
isakmp keepalive [thrshold seconds] [retry seconds]
[disable]
```

- Configure the IKE DPD parameters.

```
pixfirewall(config)# tunnel-group training ipsec-
attributes
pixfirewall(config ipsec)# isakmp keepalive
threshold 30 retry 10
```

Configure a PIX 501 or 506E as an Easy VPN Client

Configure the Adaptive Security Appliance to Support WebVPN