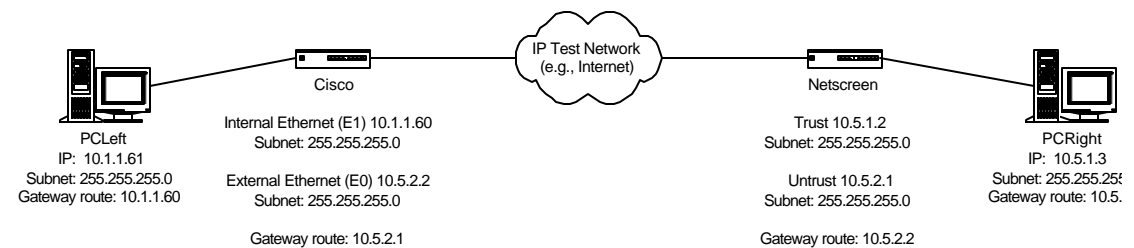


Building VPN tunnels using IKE between Netscreen and Cisco IOS

Introduction

This is a guide, with examples, on how to build an IKE-based VPN tunnel between a Netscreen firewall (version 2.0) and a Cisco IOS (version 12) based router for site-to-site VPN.

Sample network configuration



The site-to-site tunnel was setup between the Cisco on the left and the Netscreen on the right to allow hosts on the 10.1.1.0 network (e.g., PCLeft at 10.1.1.61) to talk with hosts on the 10.5.1.0 network (e.g., PCRight at 10.5.1.3).

Site-to-site VPN

Netscreen Configuration

The complete Netscreen configuration is in Appendix B.

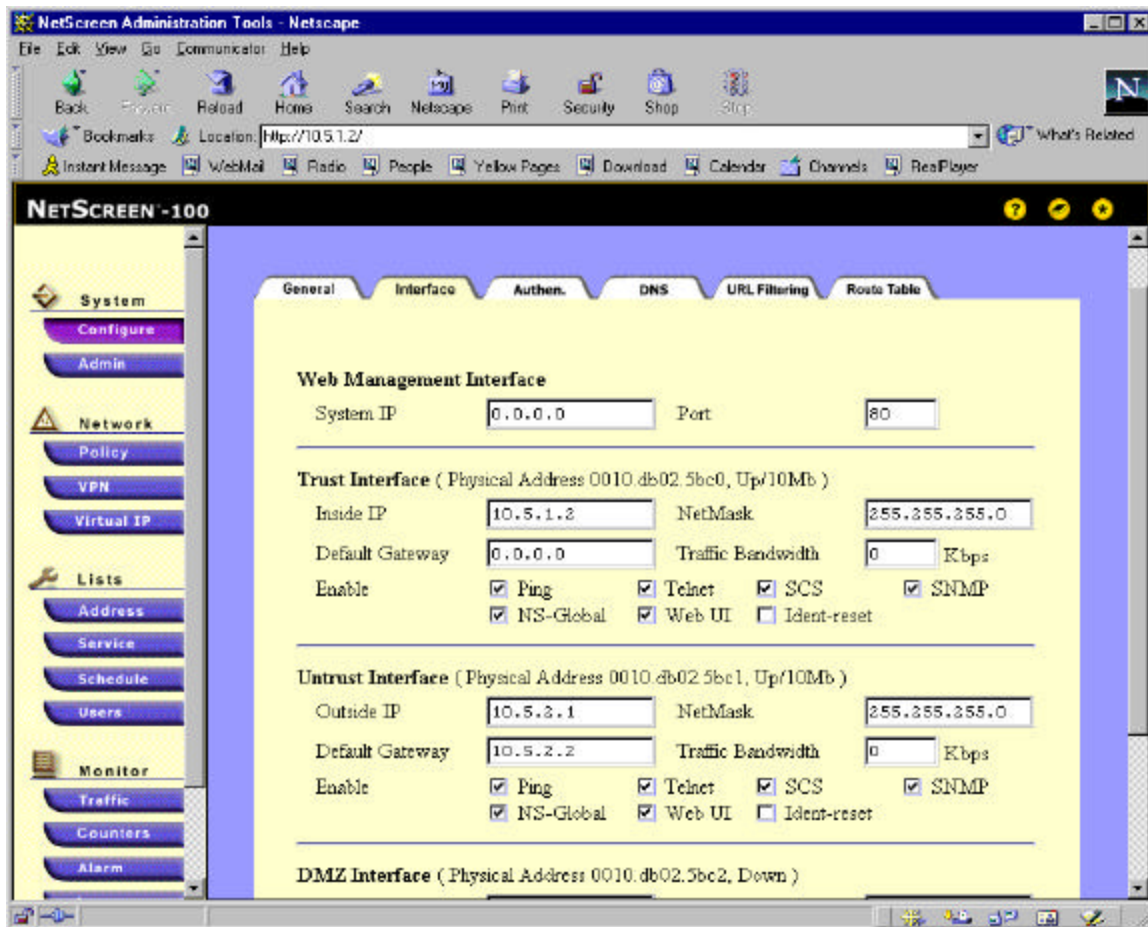
Netscreen Basic Network Configuration

The Netscreen relevant network configuration commands:

```
set admin sys-ip 0.0.0.0
set interface trust ip 10.5.1.2 255.255.255.0
set interface untrust ip 10.5.2.1 255.255.255.0
set interface untrust gateway 10.5.2.2
set flow tcp-mss
```

Or if using the WebUI:

All the IP address information can be set in the "Configuration" screen and "Interfaces" tab.



You'll have to execute the "set flow tcp-mss" command from the CLI (command line interface). The CLI can be done by telnet'ing to the Netscreen or using the console on the serial interface.
[Netscreen Address, VPN Gateway and IKE Definitions](#)

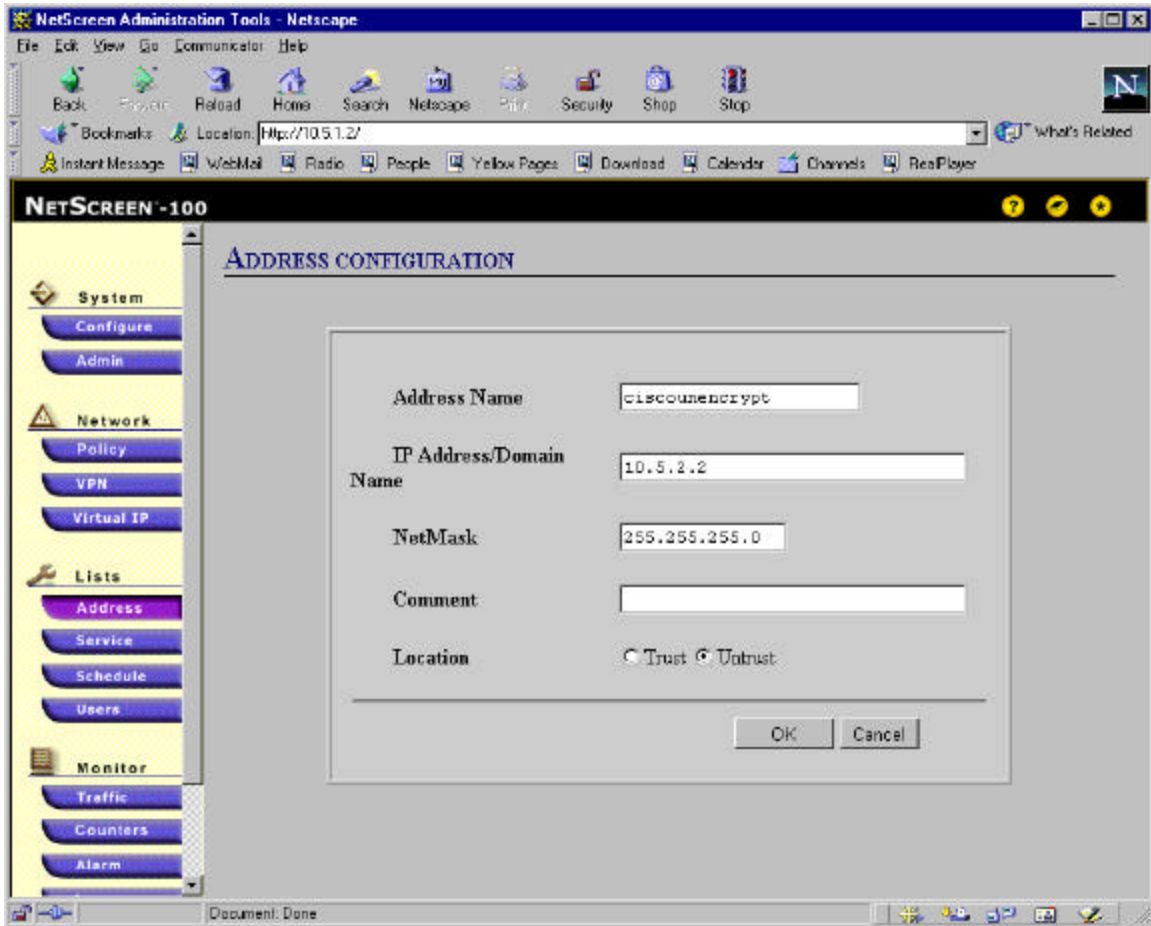
On the Netscreen, define the relevant address blocks:

Via command line:

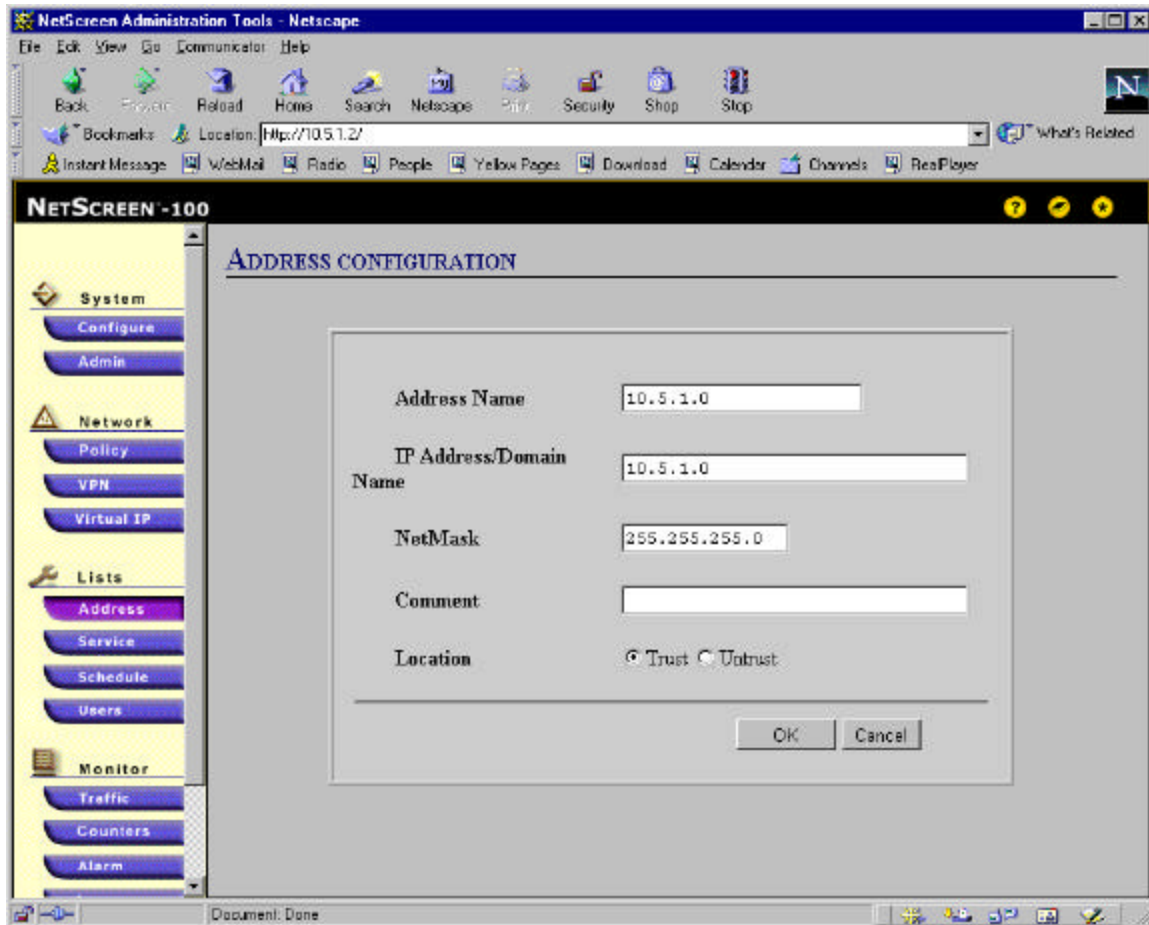
```
set address untrust "ITS LAN" 10.1.1.0 255.255.255.0  
set address trust "10.5.1.0" 10.5.1.0 255.255.255.0
```

Or via the WebUI, select the "Address" button and enter the relevant address blocks:

This defines the LAN addresses behind the remote Cisco, hence the "Untrust" radio button is selected since this subnet is reachable through the Netscreen's "Untrust" interface:

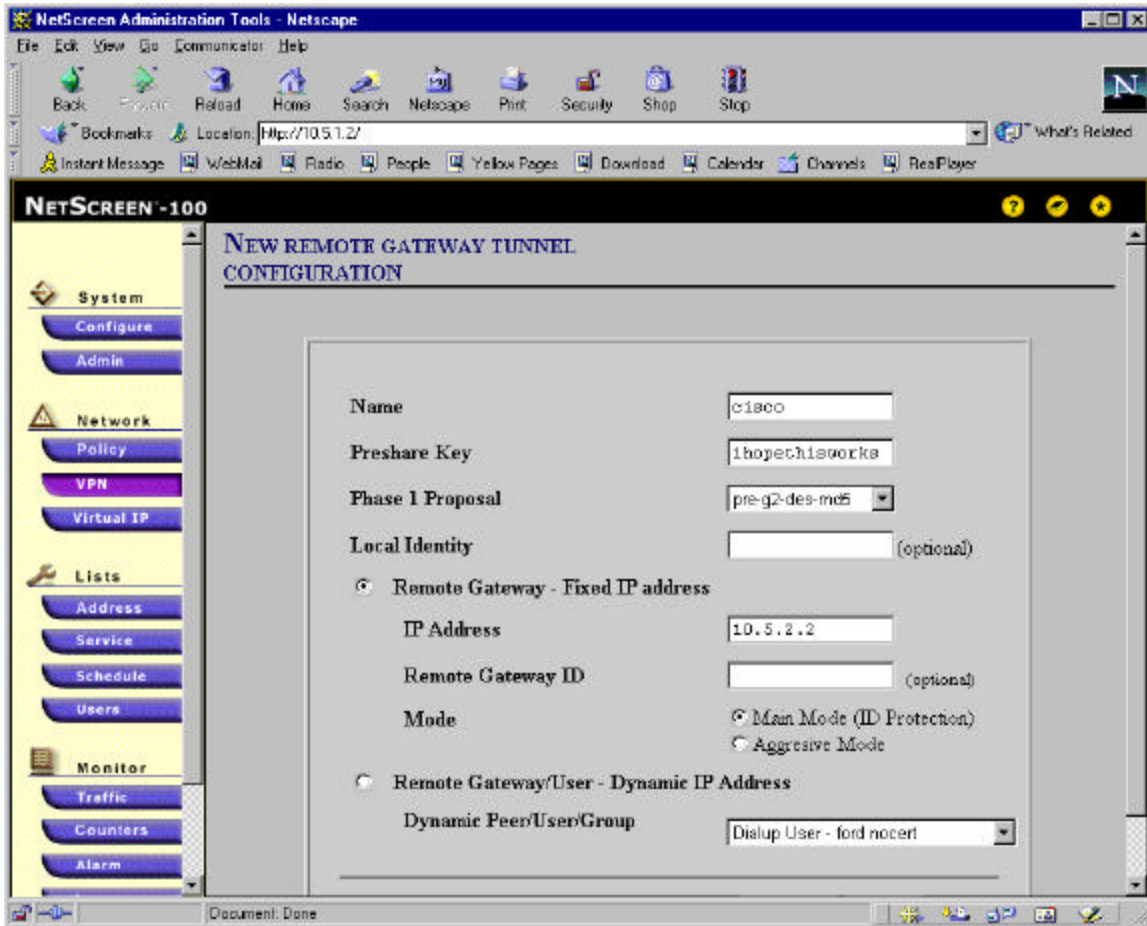


On the Netscreen, we should also define the internal IP numbers that can use this VPN tunnel. In our example, this is the 10.5.1.0/24 subnet. Via the WebUI, we select the "Trust" button since this subnet is reachable (from the Netscreen's perspective) via its "Trust" interface:



Now we need to create the VPN gateway and AutoIKE definitions. Click on the "VPN" button of the WebUI's left frame and select the "Gateway" tab.

Select the "New Remote Gateway" link at the bottom of the right frame to define the parameters related to the gateway at the other end of the tunnel. In our example, this is the Cisco:



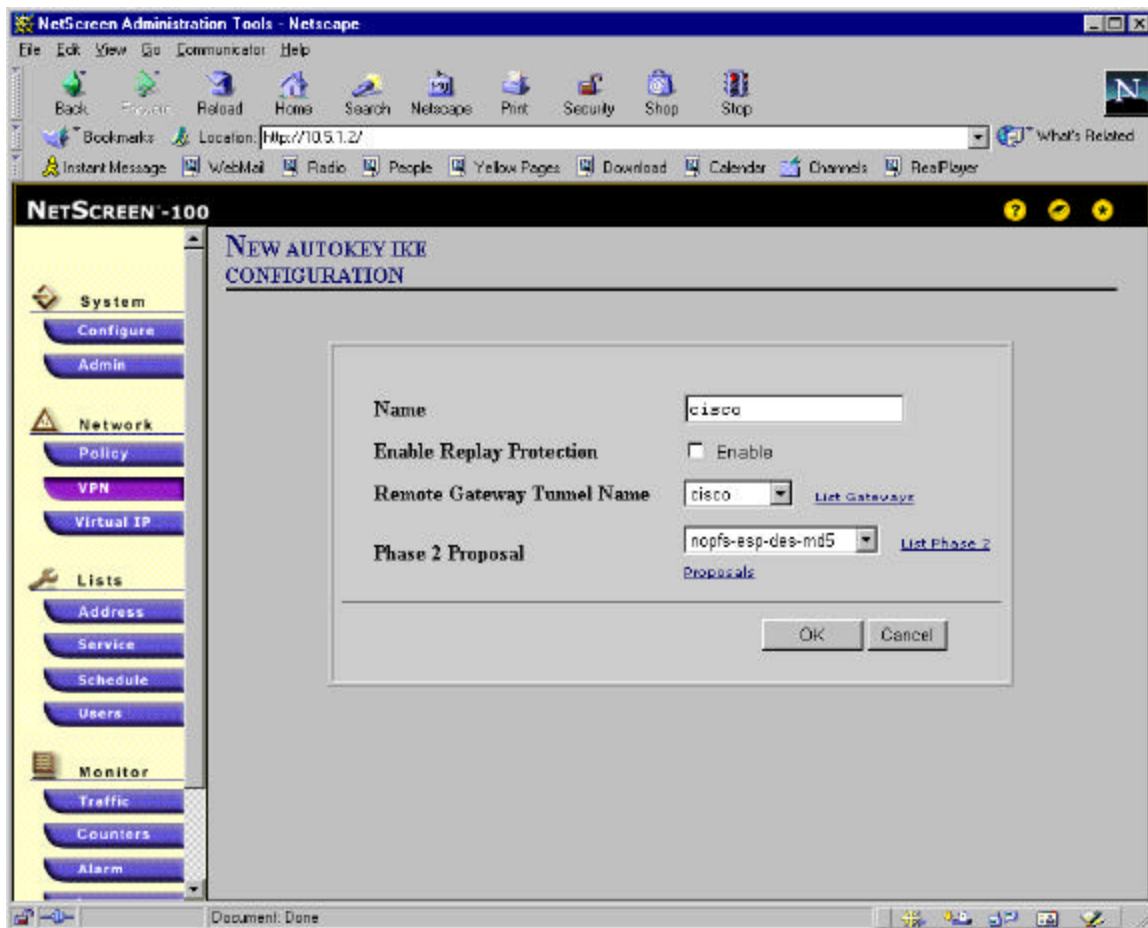
Set the "Preshare Key". This is then activated on the netscreen by choosing a Phase 1 Proposal that starts with a "pre-..." instead of a "rsa-..." option (which is for use with certificates). In our case, we chose "pre-g2-des-md5". We are going to use pre-shared secrets and not certificates, Diffie-Hellman group 2 for the shared secret calculation, DES encryption, and MD5 authentication hash. These same options need to be selected on the other VPN tunnel end-point. In this case, the Cisco.

The Cisco's external interface IP address is entered in the "Remote Gateway's IP Address" field. In our example, this is 10.5.2.2.

You should use "Main Mode" when you can, as it is a bit more secure than "Aggressive Mode".

After you click "OK" at the bottom of the screen, then click on the "AutoKey IKE" tab to finish adding the VPN definitions.

Click on "New AutoKey IKE Entry" at the bottom of the right frame:



Here we define the rest of the IKE parameters. In our example, we have chosen to disable "replay" protection. Just make sure you set this option to be the same on both ends of the tunnel.

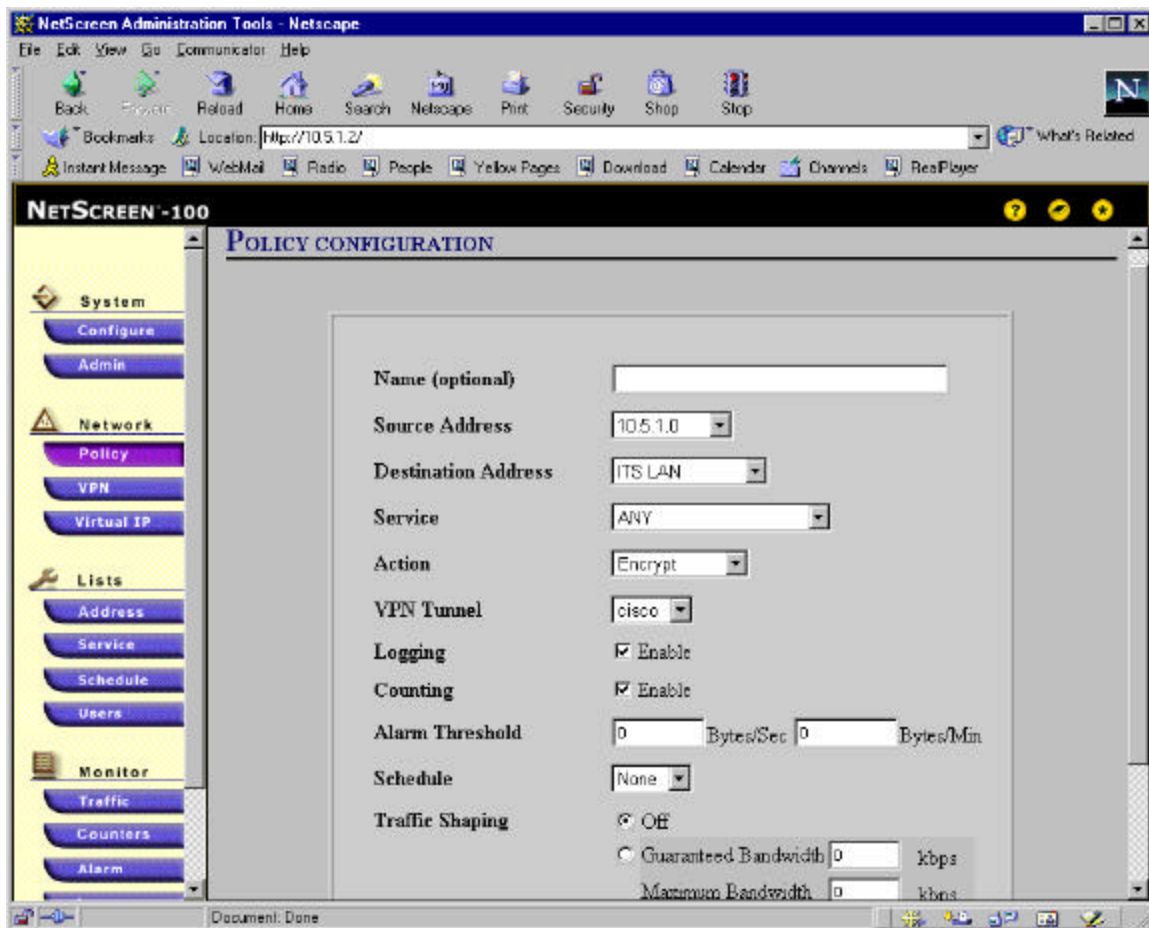
The "Remote Gateway Tunnel Name" is the gateway we just defined above under the "Gateway" tab.

The Phase 2 proposal needs to be the same on both systems. In our example, we chose "nopfs-esp-des-md5" meaning we want the tunnel to do no Perfect Forward Secrecy and set the tunnel up using DES encryption and the MD5 authentication hash.

Don't forget to click the "OK" button at the bottom of the screen.

Setting the Policy on the Netscreen

Now set the policy to link all the Address and VPN definitions together and activate the tunnel. Select the "Policy" button of the left frame. Select the "Outgoing" tab. Then select "New Policy" at the bottom of the right frame:



We've selected the source and destination addresses to be the two Address blocks we've defined earlier. The service is "Any" meaning allow all IP traffic between these two sites across this tunnel. You could change this to limit traffic to a particular protocol or set of protocols.

The action is to "Encrypt" which tells the Netscreen to VPN.

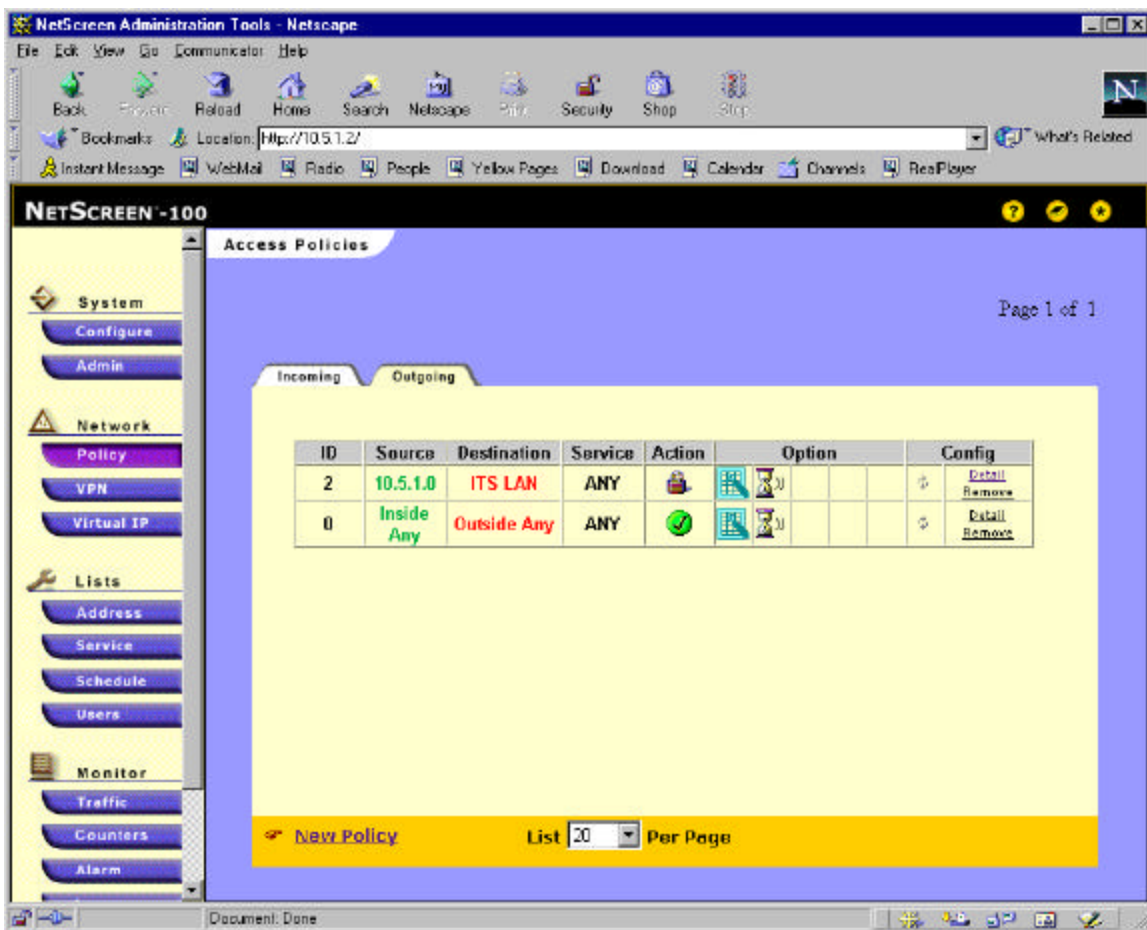
The "VPN Tunnel" is set to the tunnel we defined under the "AutoKey IKE" tab of the "VPN" screen.

Make sure you hit "OK" at the bottom.

For new policies, the Netscreen places the policy at the bottom (or last) of the list. When a Netscreen receives an IP packet, the Netscreen does a policy search starting at the top of the policy list. Once it matches a policy, it executes the action associated with that policy. So you want to reorder your policies so the VPN is before the general "permit" policy that allows outbound (unencrypted) traffic to the Internet.

To reorder, just click on the "circular" arrows under the "Config" header at the right hand side of the policy table and move the policy to the appropriate place in the list.

Once reordered:



All this WebUI work will have generated the following commands on the Netscreen for the VPN:

```
set ike gateway "cisco" ip 10.5.2.2 Main preshare "ihopethisworks" proposal "pre-g2-des-md5"  
set vpn "cisco" gateway "cisco" no-replay proposal "nopfs-esp-des-md5"  
set policy id 2 outgoing "10.5.1.0" "ITS LAN" "ANY" Encrypt vpn-tunnel "cisco" log count  
set policy id 0 outgoing "Inside Any" "Outside Any" "ANY" Permit log count
```

Now we need to setup the Cisco router at the other end of the tunnel.

Cisco Configuration

The complete Cisco configuration is in Appendix A.

Cisco Basic Network Configuration

The following configuration information sets up the basic network information for the Cisco for the test environment depicted in the "Sample network configuration" earlier in this document.

```
!  
interface Ethernet0  
 ip address 10.5.2.2 255.255.255.0  
 no ip directed-broadcast  
!  
interface Ethernet1  
 ip address 10.1.1.60 255.255.255.0  
 no ip directed-broadcast  
!  
ip classless  
ip route 0.0.0.0 0.0.0.0 10.5.2.1  
!
```

Cisco VPN and IKE Parameters

The following configuration information sets up the IPSEC and IKE information for the Cisco for the test environment depicted in the "Sample network configuration" earlier in this document.

```
!  
crypto isakmp policy 10  
 hash md5  
 authentication pre-share  
 group 2  
 lifetime 28800  
crypto isakmp key ihopethisworks address 10.5.2.1  
!  
crypto ipsec transform-set ciscotrans esp-des esp-md5-hmac  
!  
crypto map test 10 ipsec-isakmp  
 set peer 10.5.2.1  
 set transform-set ciscotrans  
 match address 101  
!
```

Setting the Policy on the Cisco

The following configuration information sets up the policy information and applies it to the external interface of the Cisco for the test environment depicted in the "Sample network configuration" earlier in this document.

```
!  
interface Ethernet0  
ip address 10.5.2.2 255.255.255.0  
no ip directed-broadcast  
crypto map test  
!  
!  
access-list 101 permit ip 10.5.1.0 0.0.0.255 10.1.1.0 0.0.0.255  
access-list 101 permit ip 10.1.1.0 0.0.0.255 10.5.1.0 0.0.0.255  
!
```

Testing and Debugging the Client's VPN

At this point, the client on the 10.1.1.0 subnet should be able to talk to the systems on the 10.5.1.0 subnet via the VPN tunnel and vice-versa. You can watch the IKE negotiations on the Netscreen by activating the "debug ike 10" command on the console.

The following commands are useful for debugging on the Netscreen:

On the console via the CLI (command line interface):

"get session" will show you existing sessions and the tunnels they are using;

"get sa" will show you the security associations (e.g., VPN tunnels) that have been negotiated;

"debug ike 10" will show you the IKE negotiation as it happens;

"debug ike 0" will turn off the IKE debugging;

"debug flow 1" will show you all the information related to every packet traversing the Netscreen;

"debug flow 0" will turn off the flow debugging.

Never leave the debug options enabled. They cause the system to substantially slow down.

If you are having troubles getting a tunnel to form, try issue the following commands:

"unset ike policy-checking"

"save"

Also, always make sure the Netscreen has the "set flow tcp-mss" option enabled.

Conclusion

This document has sample configurations to set up a site-to-site VPN using IKE with pre-shared secrets between a Netscreen running ScreenOS 2.0 and a Cisco router with IOS 12.

Appendix A – Complete Cisco Configuration

```
Router#sh run
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router
!
boot system flash c1600-sy-mz.121-1.bin
enable secret 5 $1$Wjs9$kb7bvw1eexaU3TIh0VSP01
!
!
!
!
ip subnet-zero
no ip domain-lookup
!
!
!
crypto isakmp policy 10
  hash md5
  authentication pre-share
  group 2
  lifetime 28800
crypto isakmp key ihopethisworks address 10.5.2.1
!
!
crypto ipsec transform-set ciscotrans esp-des esp-md5-hmac
!
!
crypto map test 10 ipsec-isakmp
  set peer 10.5.2.1
  set transform-set ciscotrans
  match address 101
!
!
!
interface Ethernet0
  ip address 10.5.2.2 255.255.255.0
  no ip directed-broadcast
  crypto map test
!
interface Ethernet1
  ip address 10.1.1.60 255.255.255.0
  no ip directed-broadcast
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.5.2.1
no ip http server
!
access-list 101 permit ip 10.5.1.0 0.0.0.255 10.1.1.0 0.0.0.255
access-list 101 permit ip 10.1.1.0 0.0.0.255 10.5.1.0 0.0.0.255
access-list 199 permit ip any any
!
```

```
line con 0
transport input none
line vty 0 4
password chair
login
!
end
```

Appendix B – Complete Netscreen Configuration

```
set auth type 0
set auth timeout 10
set admin format dos
set admin sys-ip 10.5.1.2
set interface trust ip 10.5.1.2 255.255.255.0
set interface untrust ip 10.5.2.1 255.255.255.0
set interface untrust gateway 10.5.2.2
set interface trust ping
set interface trust telnet
set interface trust scs
set interface trust snmp
set interface trust global
set interface trust web
unset interface trust ident-reset
unset interface untrust ping
unset interface untrust telnet
unset interface untrust scs
unset interface untrust snmp
unset interface untrust global
unset interface untrust web
unset interface untrust ident-reset
set interface DMZ ping
unset interface DMZ telnet
unset interface DMZ scs
unset interface DMZ snmp
unset interface DMZ global
unset interface DMZ web
unset interface DMZ ident-reset
set flow tcp-mss
set address untrust "ITS LAN" 10.1.1.0 255.255.255.0
set address trust "10.5.1.0" 10.5.1.0 255.255.255.0
set syn-alarm 1024
set syn-qsize 10240
set syn-timeout 20
set syn-threshold 200
set firewall tear-drop
set firewall syn-attack
set firewall ip-spoofing
set firewall ping-of-death
set firewall src-route
set firewall land
unset firewall icmp-flood
unset firewall udp-flood
unset firewall winnuke
unset firewall port-scan
unset firewall addr-sweep
unset firewall applet
set firewall default-deny
unset firewall bypass-others-ipsec
unset firewall bypass-non-ip
```

```
set snmp name "ns100"  
set ike gateway "cisco" ip 10.5.2.2 Main preshare "ihopethisworks" proposal "pre-g2-des-md5"  
unset ike policy-checking  
unset ike accept-all-proposal  
set vpn "cisco" gateway "cisco" no-replay proposal "nopfs-esp-des-md5"  
set ike id-mode subnet  
set policy id 2 outgoing "10.5.1.0" "ITS LAN" "ANY" Encrypt vpn-tunnel "cisco" log count  
set policy id 0 outgoing "Inside Any" "Outside Any" "ANY" Permit log count  
set pki ldap server-name "10.1.1.126"  
set pki x509 dn country-name "US"  
set pki x509 dn state-name "Michigan"  
set pki x509 dn local-name "Detroit"  
set pki x509 dn org-name "Ideal"  
set pki x509 dn org-unit-name "IT"  
set pki x509 dn name "ns100"  
set pki x509 dn phone "248-398-5500"  
set pki x509 dn email "test@itsusnow.com"  
set pki x509 dn ip "10.5.2.1"  
set pki x509 default crl-refresh "default"
```