Avaya Solution & Interoperability Test Lab

Application Notes for Configuring VPN Tunnels between Avaya IP Office and WatchGuard Firebox X and SOHO Products – Issue 1.0

Abstract

These Application Notes cover the configuration of site-to-site VPN tunnels between Avaya IP Office and WatchGuard Firebox X and SOHO products. Client VPN tunnels to IP Office are also covered. Information in these Application Notes has been obtained through compliance testing and additional technical discussions. Testing was conducted via the Developer*Connection* Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

These Application Notes cover the configuration of site-to-site VPN (Virtual Private Network) tunnels between Avaya IP Office and WatchGuard Firebox X and SOHO products. Client VPN tunnels to IP Office are also covered.

Configuration 1 in **Figure 1** will be used to refer to the site-to-site VPN tunnels established between the Avaya Small Office Edition and the Firebox X or SOHO products. Configuration 2 in **Figure 1** will be used to refer to the client VPN tunnels established between the Avaya Small Office Edition and the Mobile User VPN (MUVPN) client running on the Phone Manager Pro PC.

The Firebox X2500 is an integrated security appliance for small and medium enterprises that combines firewall, VPN, application proxies (HTTP, SMTP, FTP, etc.), web content filtering, anti-virus, anti-spam, and secure remote management.

The SOHO 6tc Wireless is an integrated security appliance for the small office/home office/teleworker that combines firewall, VPN, web content filtering, anti-virus, and secure remote management.

The WatchGuard Firebox X2500 and SOHO 6tc Wireless were tested separately. The same IP addresses were assigned to the external and trusted interfaces of both devices.

For configuration of the data network infrastructure shown in **Figure 1**; refer to the appropriate documentation listed in Section 9.

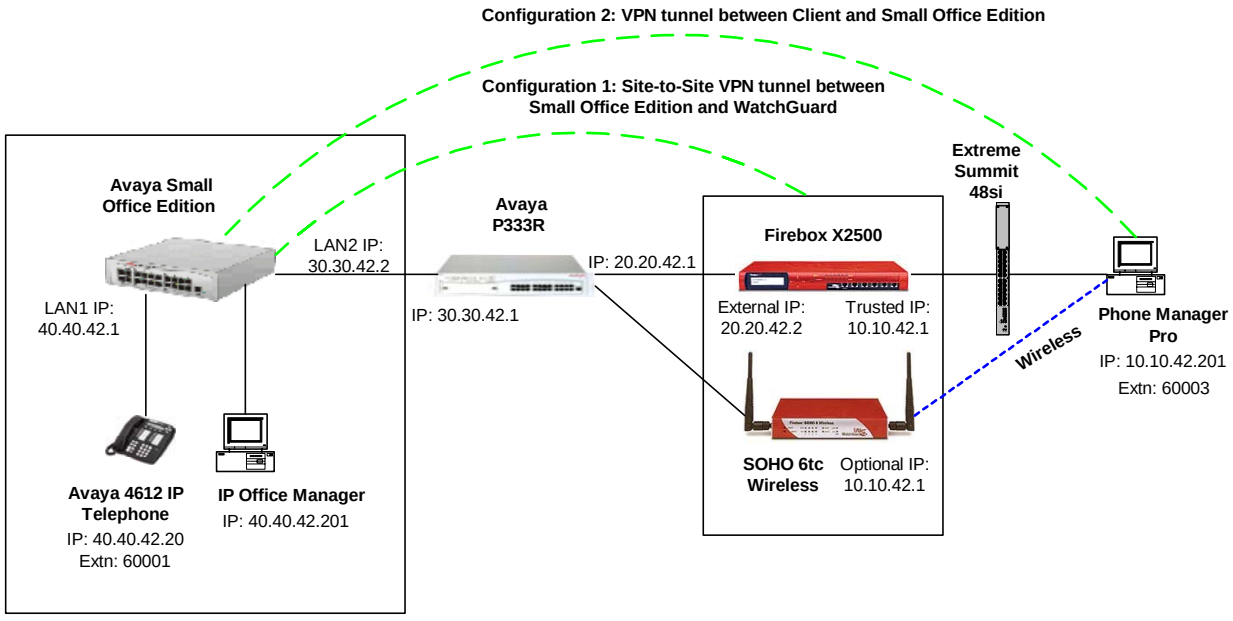


Figure 1 – Network Configuration Diagram

In order to establish an IPSec (IP Security) VPN tunnel, two phases have to be negotiated successfully. Phase 1 or IKE (Internet Key Exchange) is used for authentication and Phase 2 or (IPSec) is used for encryption. The following tunnel configurations will be used in these Application Notes:

Tunnel Type	IKE Exchange Type	Encryption Method	Password Authentication	Diffie-Hellman Group	Encryption Protocol
Site-to-site	ID Prot	3DES	SHA	2	ESP
Client	Aggressive	3DES	SHA	2	ESP

Table 1 – IPSec Tunnel Configurations

2. Equipment and Software Validated

The following products and software were used for the configuration in **Figure 1**:

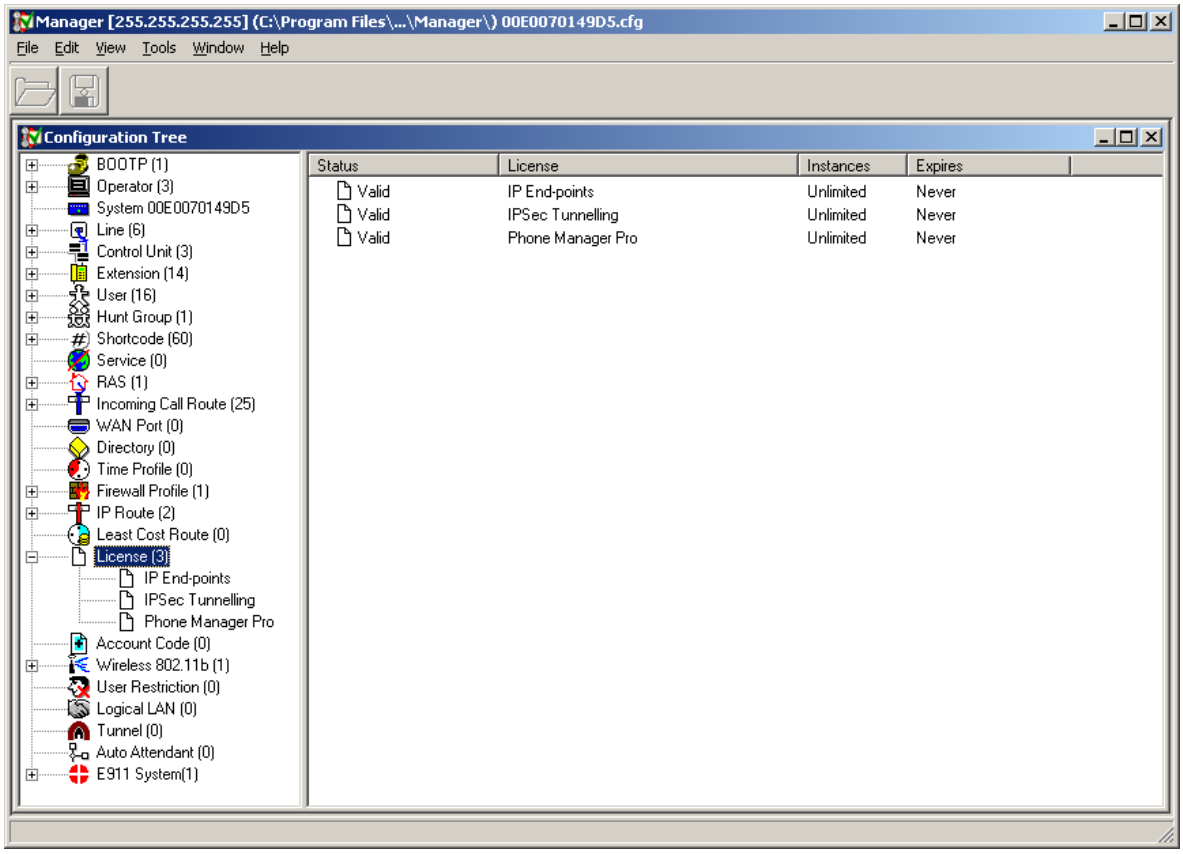
Product	Software/Version
Avaya IP Office Small Office Edition	2.1 (15)
Avaya P333R Stackable Switch	4.0.9
Avaya 4612 IP Telephone	1.8.2
Avaya Phone Manager Pro	2.1.7
Extreme Summit 48si	6.2.2 (Build 68)
WatchGuard Firebox X2500	7.21.B1596
WatchGuard SOHO 6tc Wireless	6.3 Build 19

Table 2 – Product and Software Version

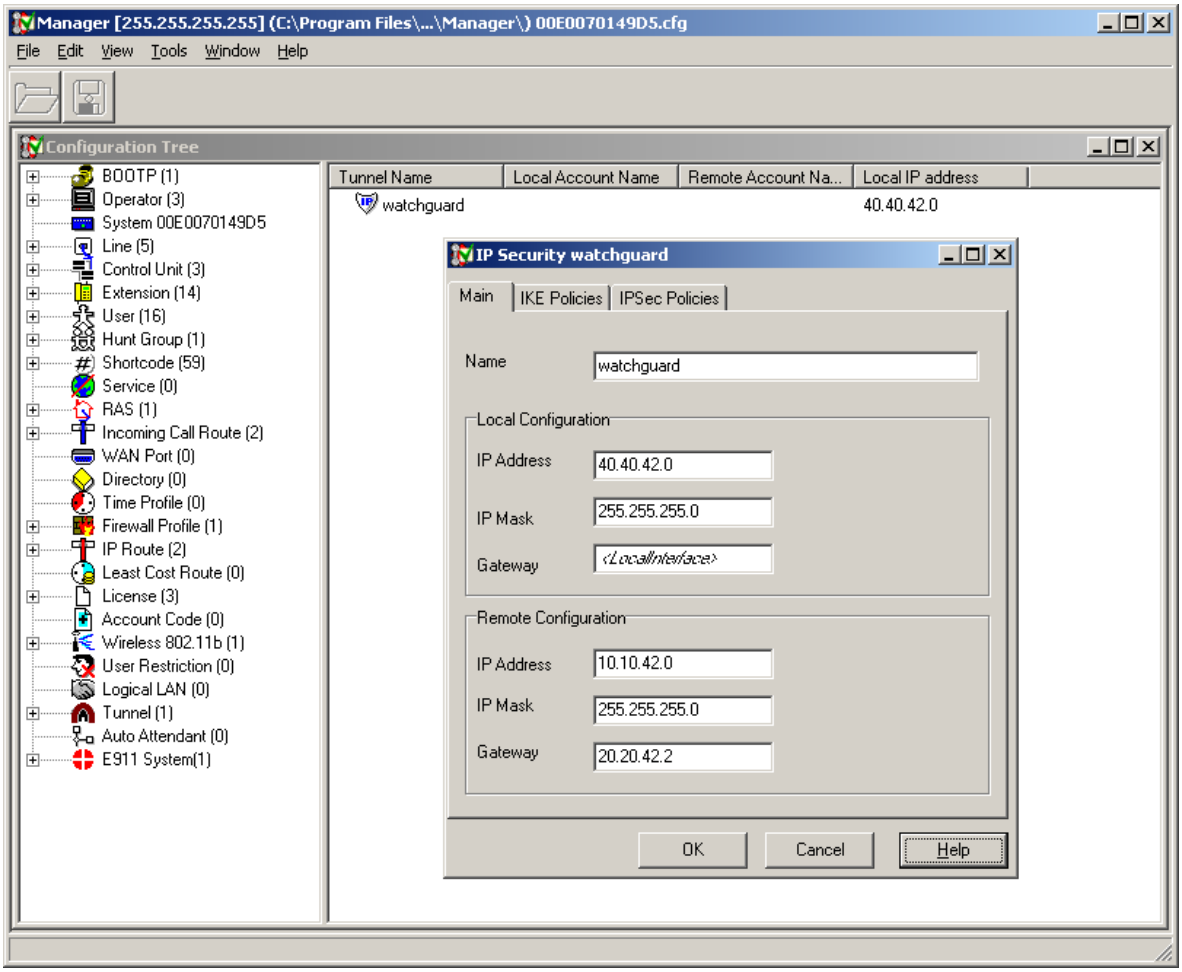
3. Configuration 1 (Site-to-Site VPN Tunnel between IP Office and WatchGuard)

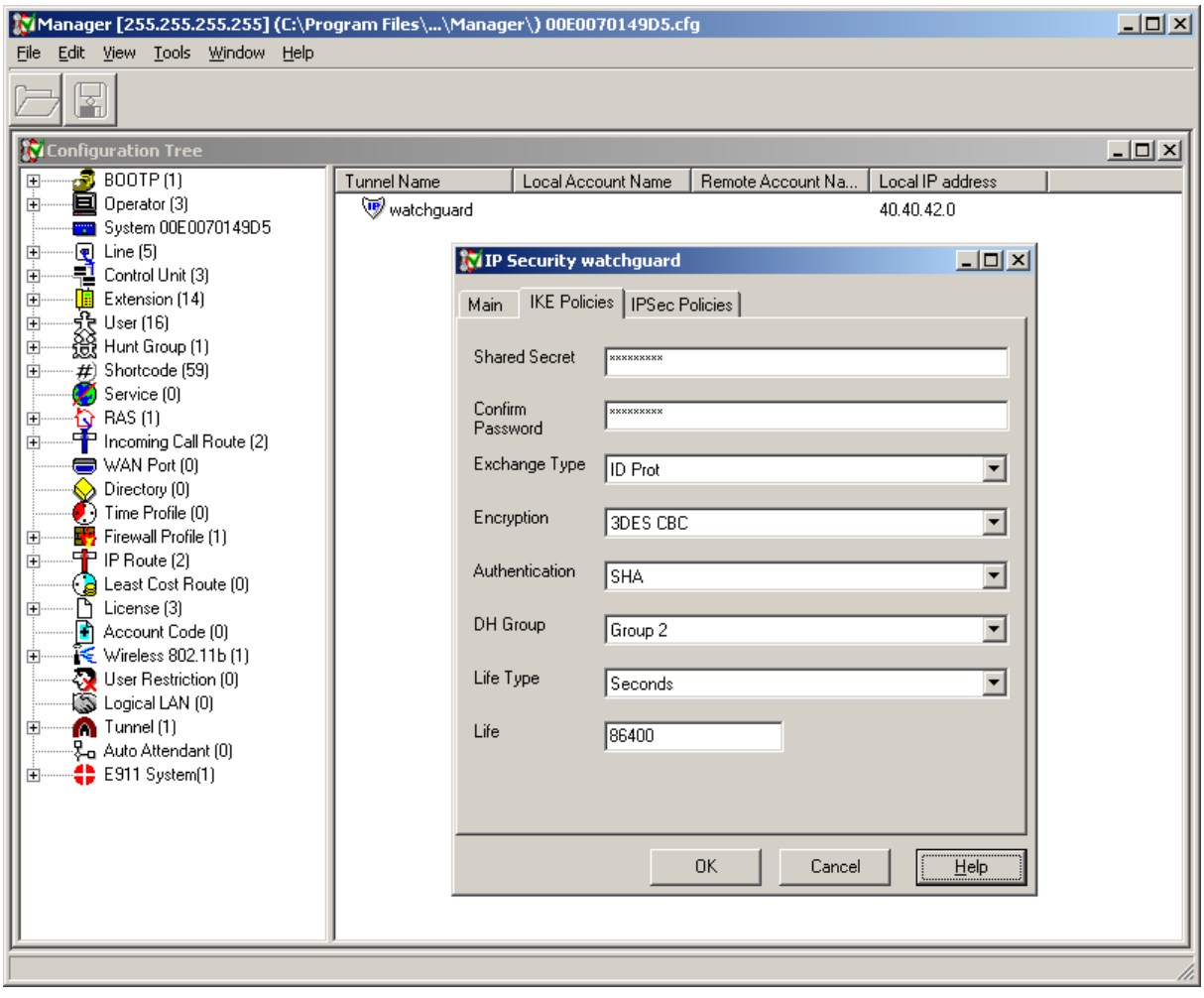
3.1. Configure Avaya IP Office

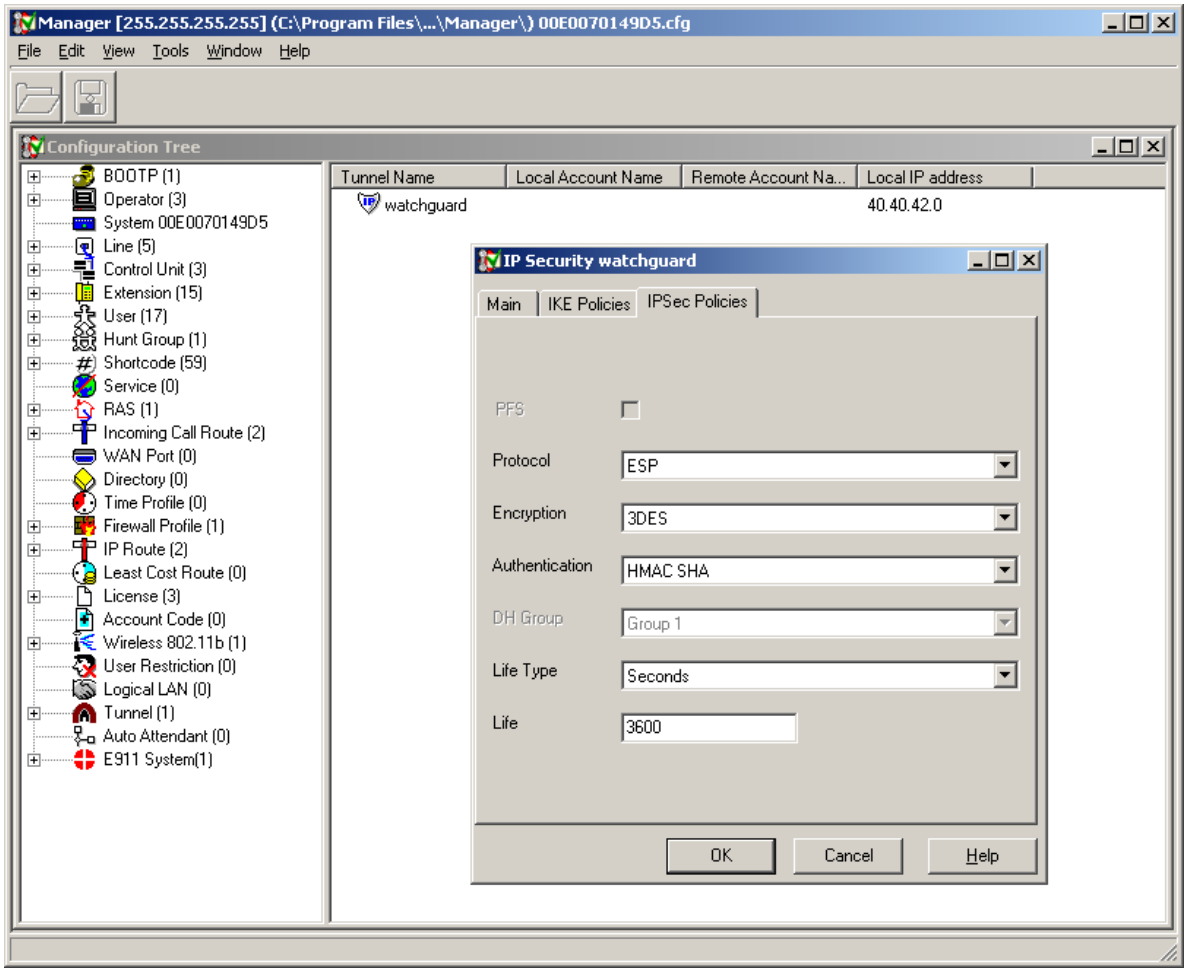
Step	Description
1.	Navigate to **Start → Programs → IP Office → Manager**. Log in with the appropriate credentials. In the **Manager** window, double-click **License** under the Configuration Tree panel. Ensure that the licenses shown below are listed as **Valid** under the *Status* column.



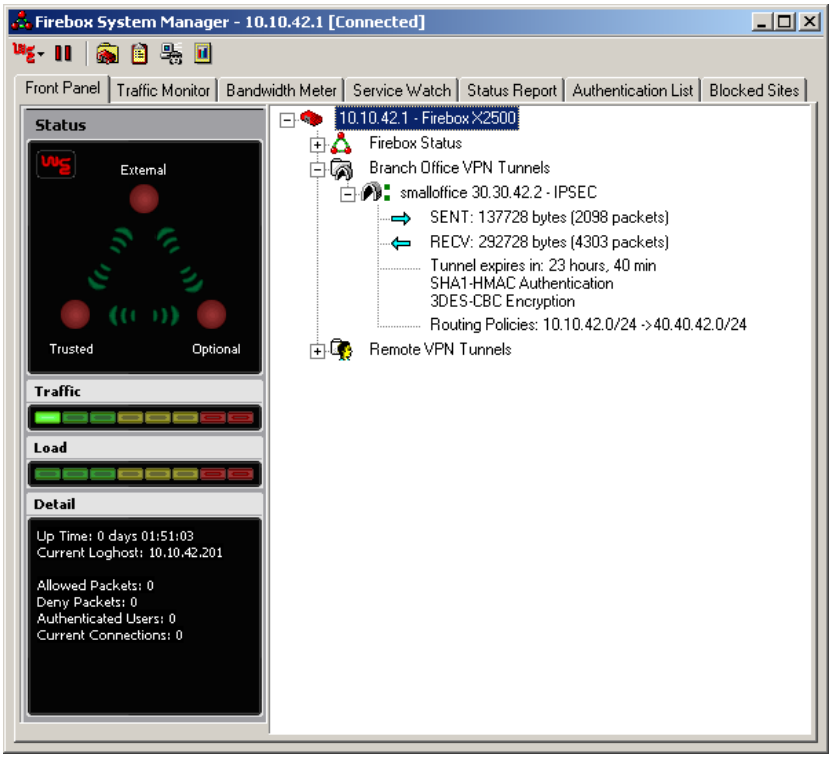
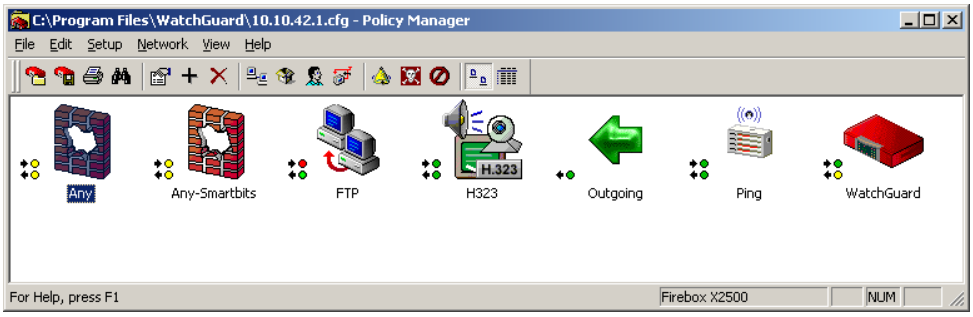
Step	Description
2.	Click on the **Tunnel** item under the Configuration Tree panel. Right-click over the tunnel view and select **New** to create an IPSec tunnel. Enter the values shown below to assign a name for the tunnel, the local and remote subnets for the tunnel, and the external IP address of the WatchGuard device in the *Gateway* field.

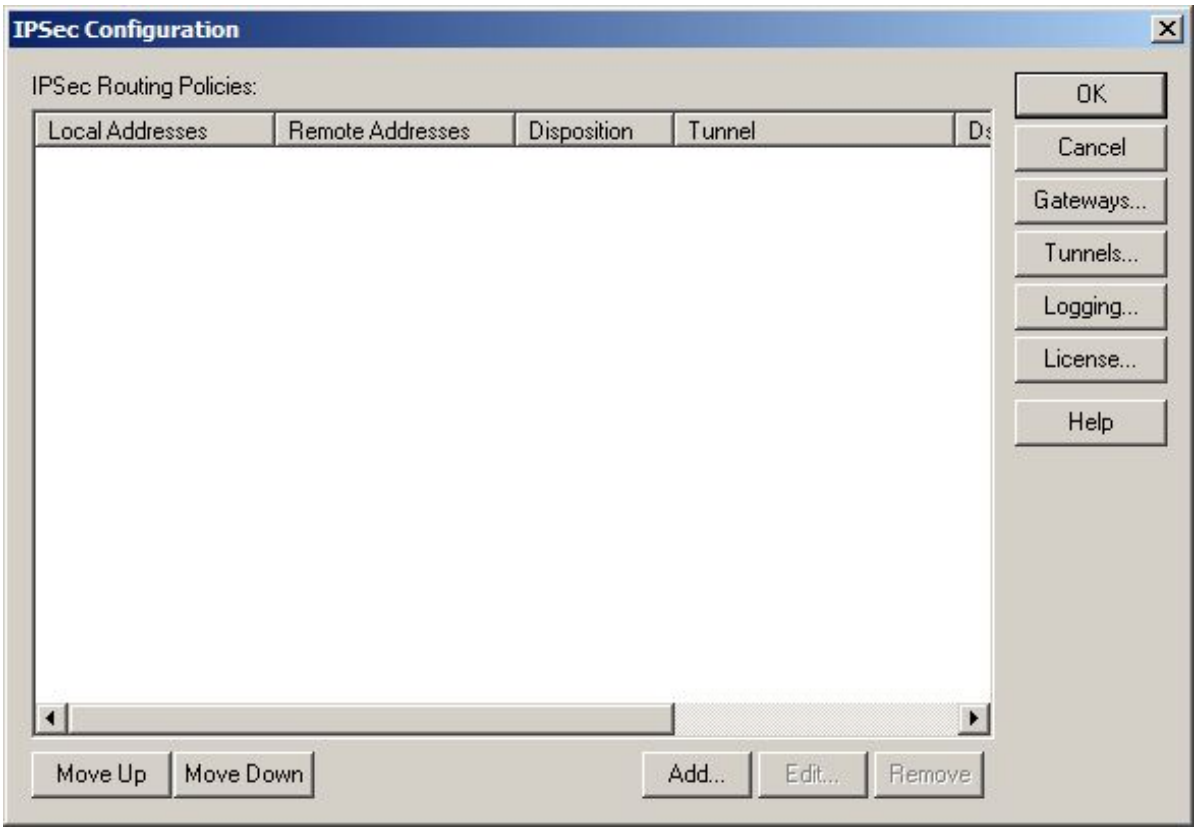


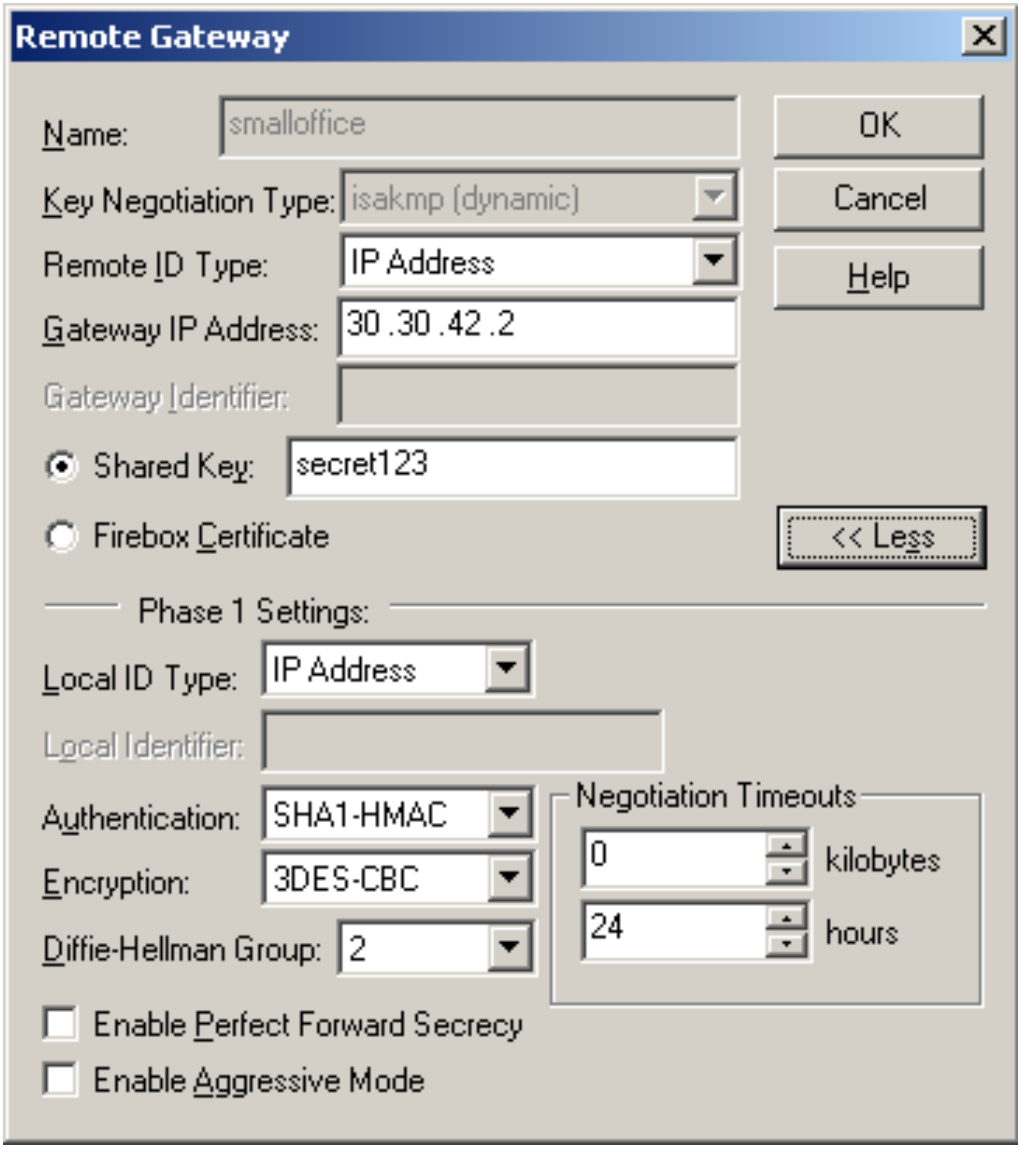
Step	Description
3.	Click the **IKE Policies** tab. Enter the values shown below for Phase 1 from **Table 1** for a site-to-site tunnel: • Shared secret – The password used for authentication and must match on the device at the other end of the tunnel. • Confirm Password – Re-enter the shared secret again. • Exchange Type – **ID Prot** is equivalent to **Main Mode** on the WatchGuard SOHO (see step 2 of Section 3.3) and will hide the ID's of the communicating devices. • Encryption – The encryption method used by the tunnel. • Authentication – The password authentication used by the tunnel. • DH Group – Diffie Hellmann Group. • Life Type – Sets whether the Life value is measured in seconds or kilobytes. • Life – The duration before Phase 1 re-authentication is required. 

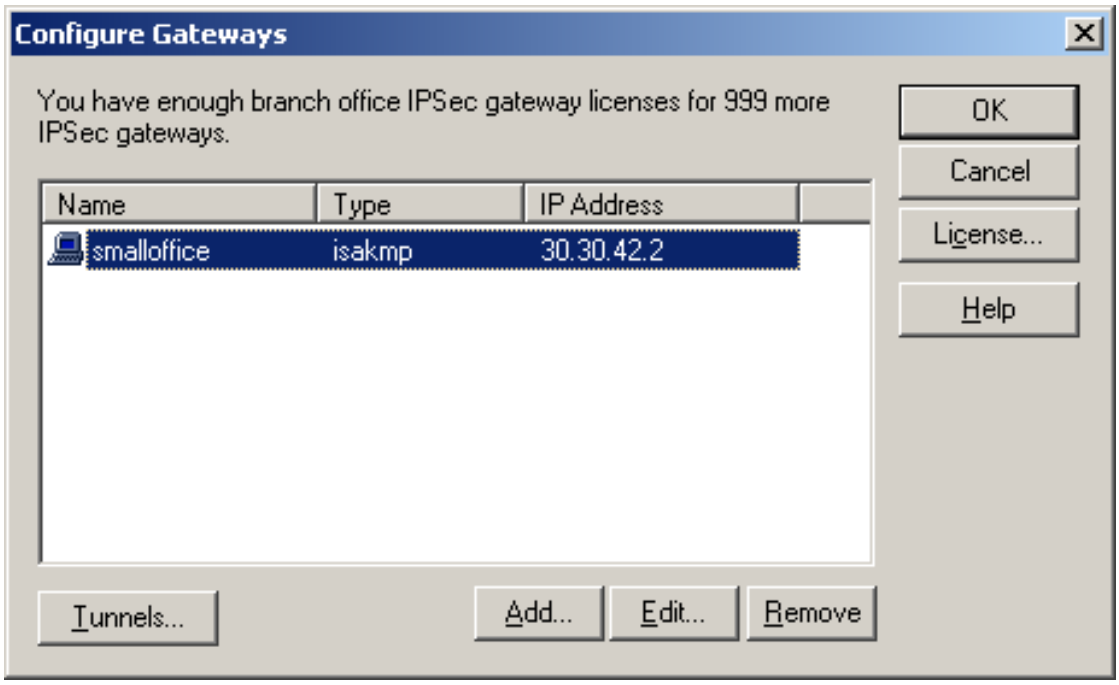
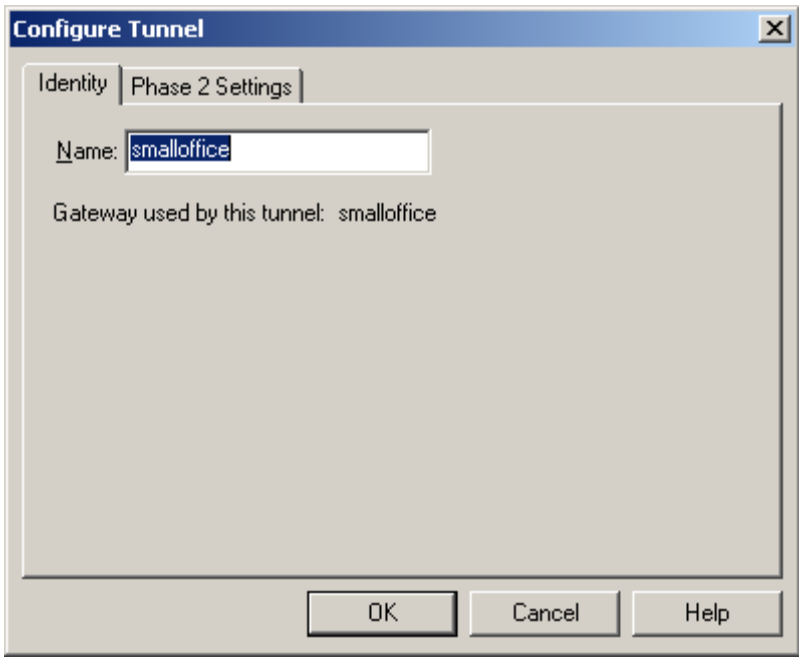
Step	Description
4.	Click the **IPSec Policies** tab. Enter the values shown below for Phase 2 from **Table 1** for a site-to-site tunnel: • Protocol – The encryption protocol used by the tunnel. • Encryption – The encryption method used by the tunnel. • Authentication – The password authentication used by the tunnel. • Life Type – Sets whether the Life value is measured in seconds or kilobytes. • Life – The duration before Phase 2 re-authentication is required.  Click **OK**.

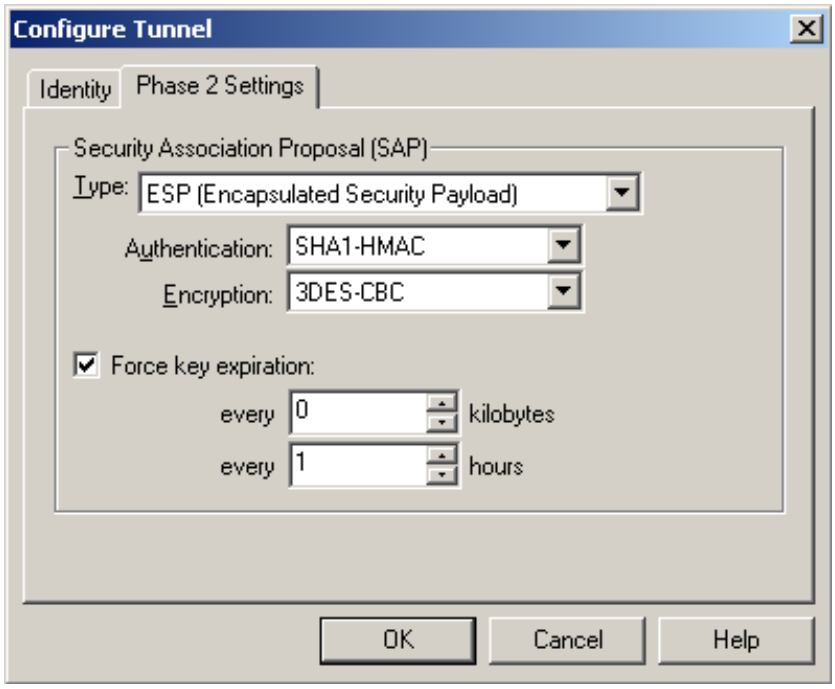
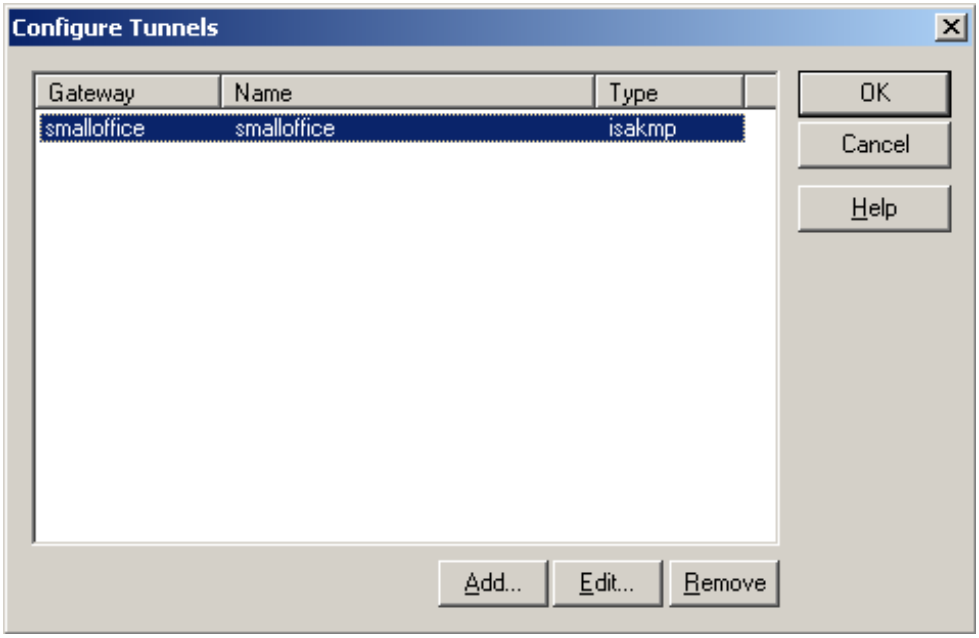
3.2. Configure WatchGuard Firebox X

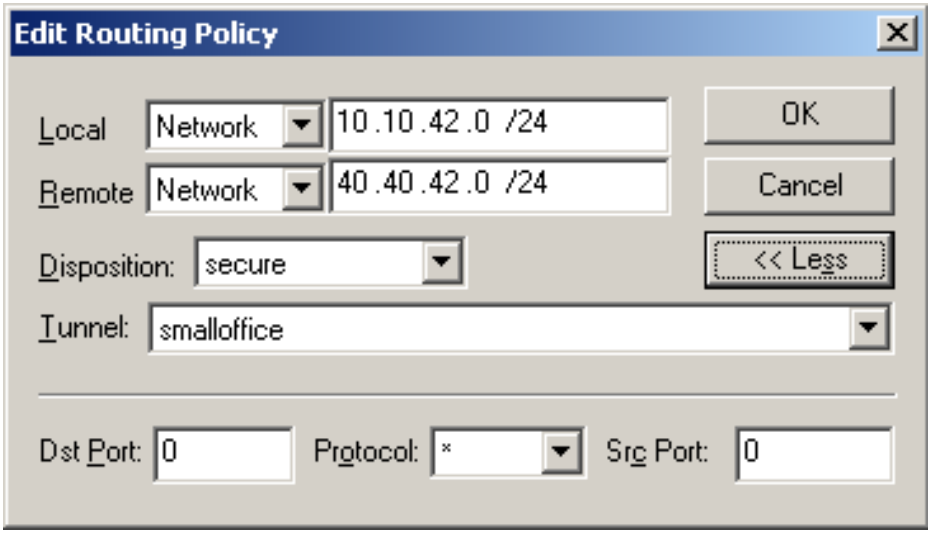
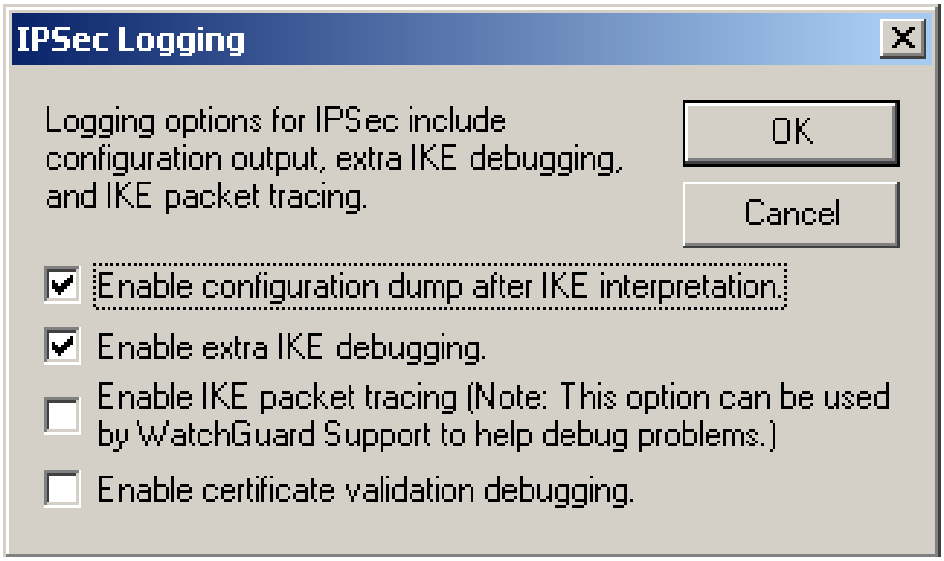
Step	Description
1.	Log into the Firebox X by navigating to **Start → Programs → WatchGuard → Firebox System Manager**.  Select **Tools → Policy Manager** or click on the taskbar icon.
2.	 Click on **Network → Branch Office VPN → Manual IPSec…** to add a new branch office tunnel with manual security.

Step	Description
3.	Click **Gateways** and then click **Add** to add a remote gateway. 

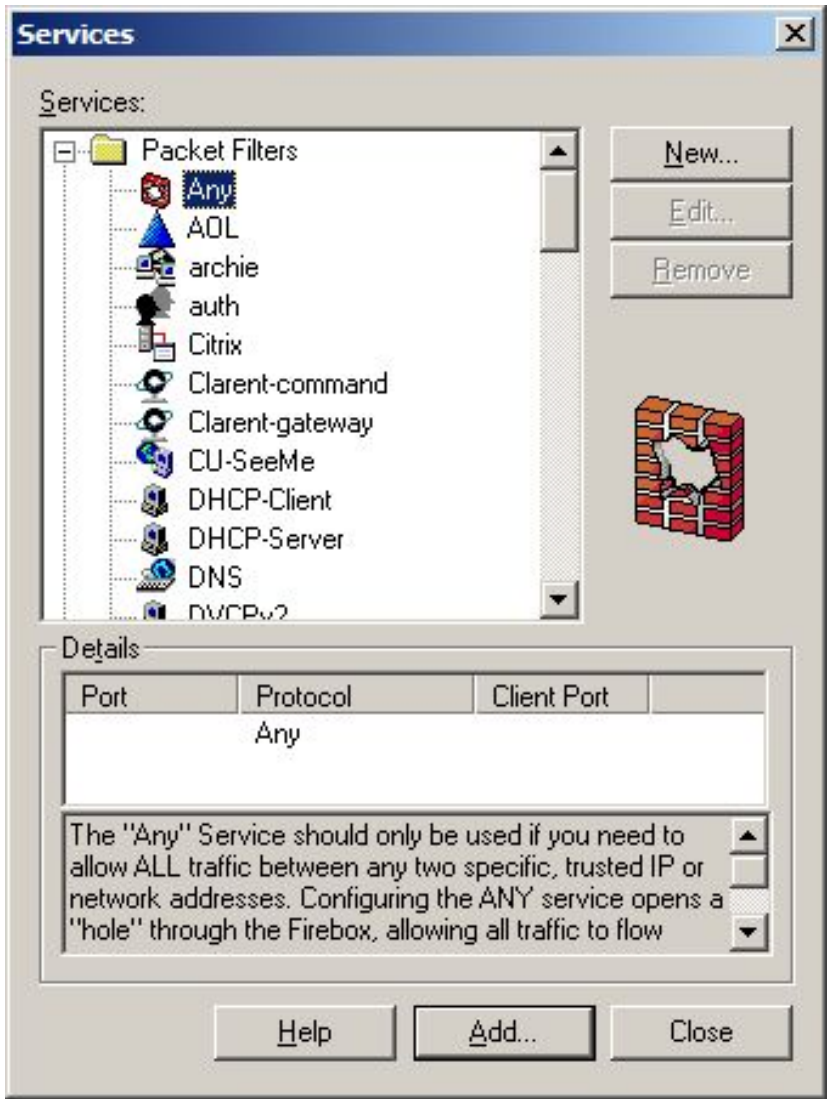
Step	Description
4.	Click **More** to display the Phase 1 Settings. Enter the values shown below to match the IP Office tunnel configuration for Phase 1. Click **OK**. 

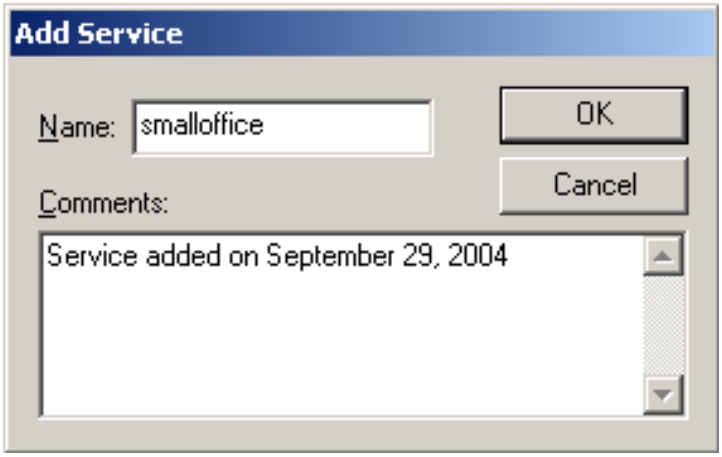
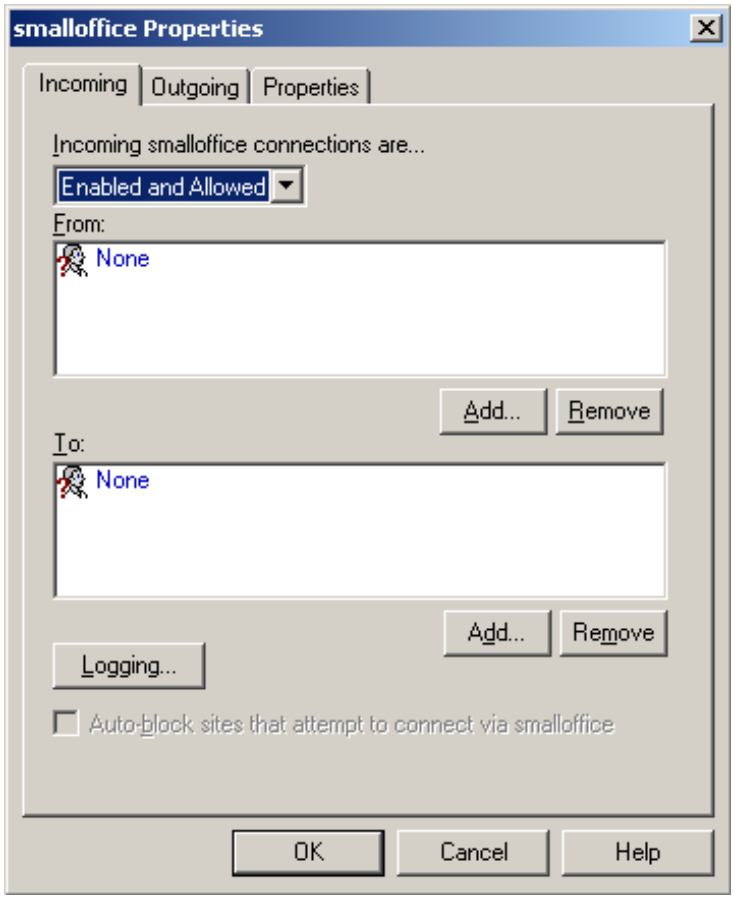
Step	Description
5.	Click **Tunnels…** and then click **Add** to add a new tunnel. 
6.	Select a remote gateway to associate with this tunnel in the **Select Gateway** dialog window and click **OK**. Enter a name for the tunnel in the *Name* field and click the **Phase 2 Settings** tab. 

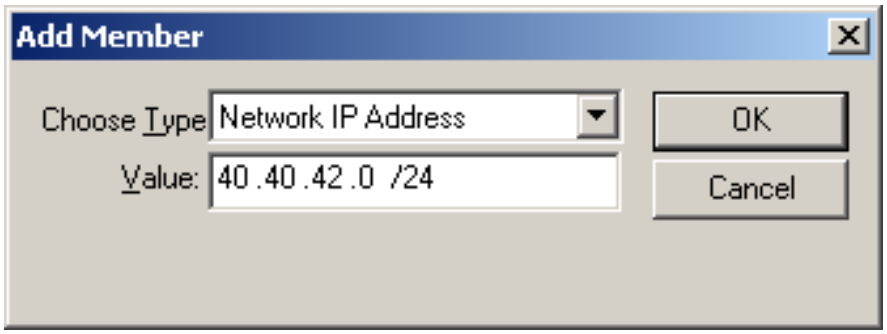
Step	Description
7.	Enter the Phase 2 values shown below to match the IP Office tunnel configuration for Phase 2. 
8.	Click **OK** to return to the **Configure Tunnels** window.  Click **OK** to return to the **IPSec Configuration** window.

Step	Description
9.	Click **Add** to add a routing policy. Click **More** to display the port and protocol fields. Enter the values shown below to specify the local and remote subnets of the tunnel to match the IP Office tunnel configuration and select the tunnel name in the drop-down list to be associated with this routing policy. Click **OK**. 
10.	If desired, click **Logging…** to enable IPSec logging for debugging by checking the options shown below. Click **OK**. 

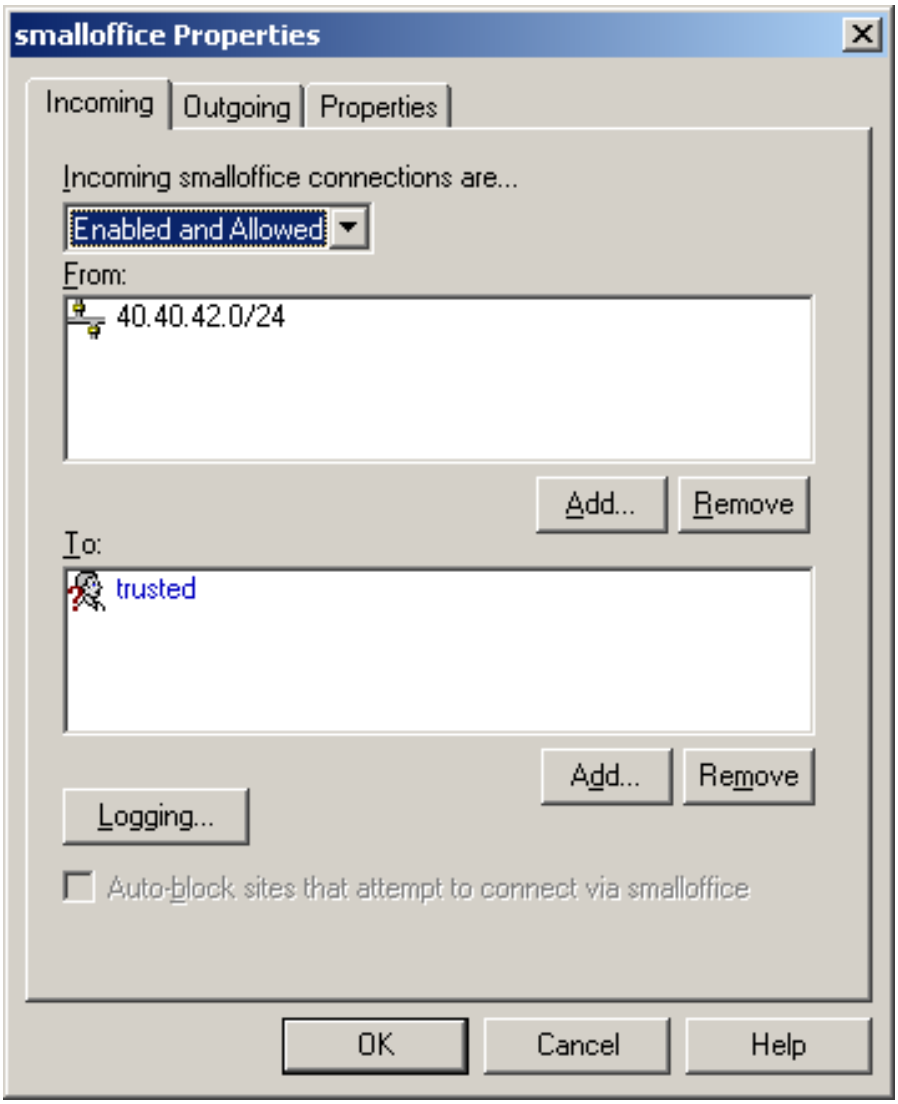
Step	Description
11.	Add a service to allow any access between the network behind Small Office Edition and the trusted network of the Firebox X. In the Policy Manager, select **Edit → Add Service**, expand the **Packet Filters** and select the **Any** service and click **Add**.

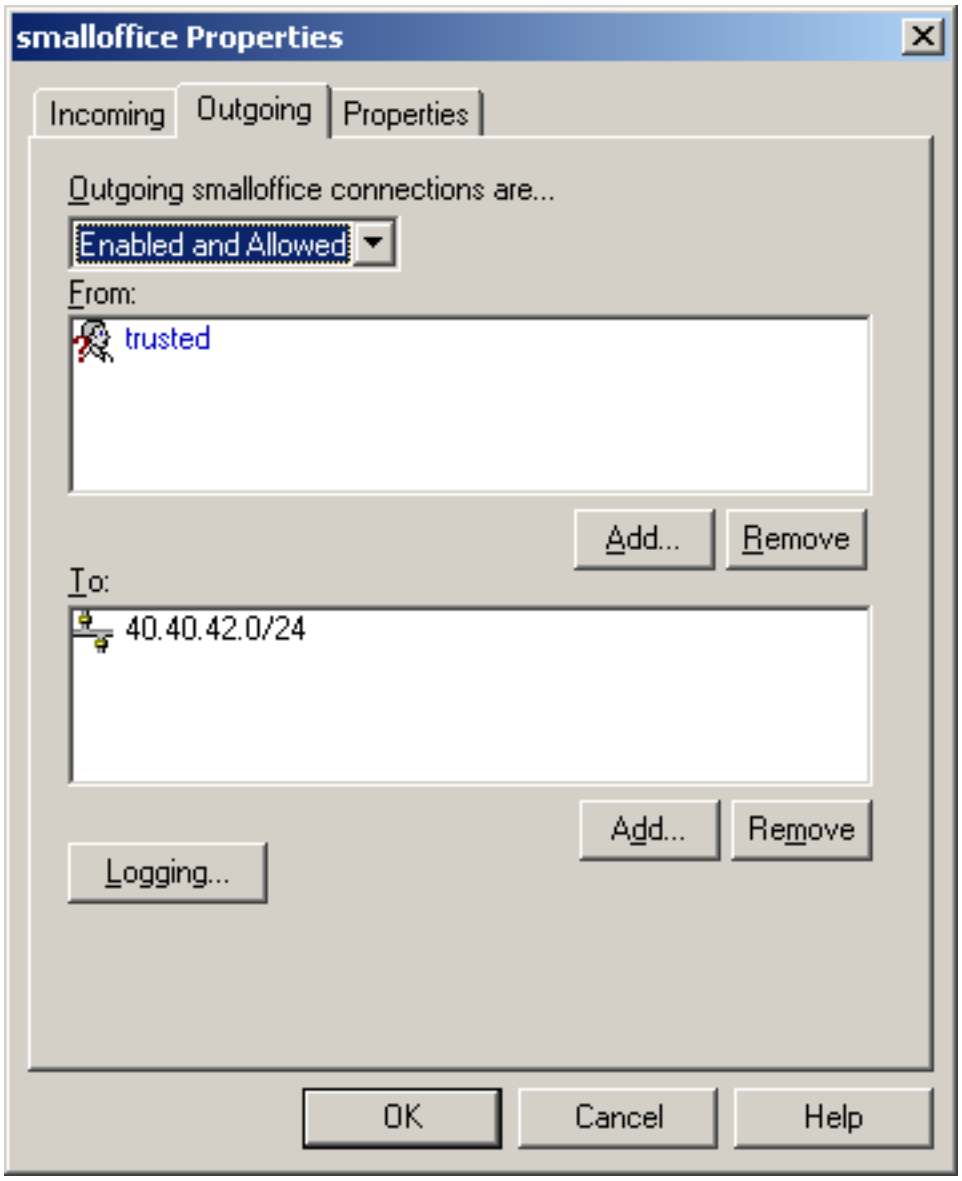


Step	Description
12.	In the **Add Service** window, enter a name (e.g., **smalloffice**) that identifies what this service is being used for and click **OK**. 
13.	In the **Incoming** tab, select **Enabled and Allowed** from the drop-down list. Click **Add** under the **From** frame. 

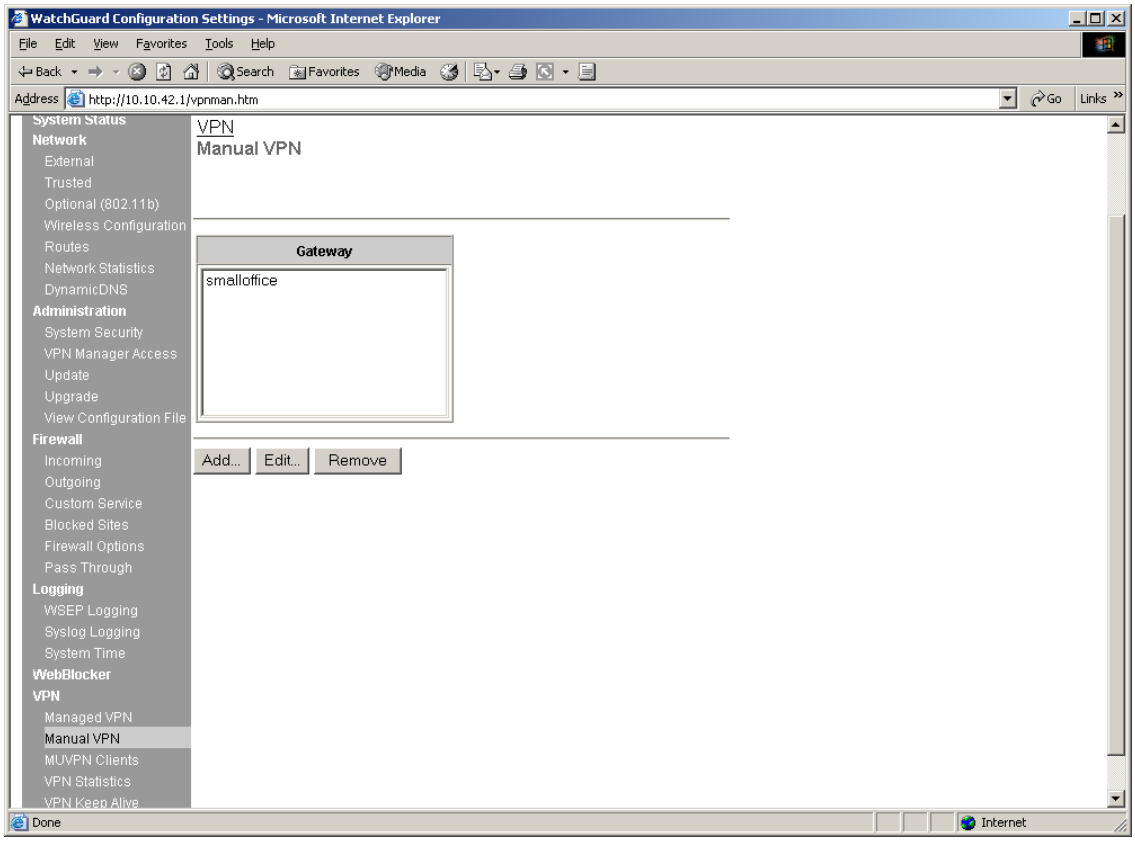
Step	Description
14.	Click **Add Other** in order to specify the network behind Small Office Edition. 
15.	Select **Network IP Address** from the drop-down list in the *Choose Type* field and enter the network behind IP Office in the *Value* field. Click **OK** twice to return to the **smalloffice properties** window. Click **Add** under the **To** frame. 

Step	Description
16.	Select **trusted** and click **Add** to specify the trusted network behind the Firebox X. Click **OK** to return to the **smalloffice properties** window. 

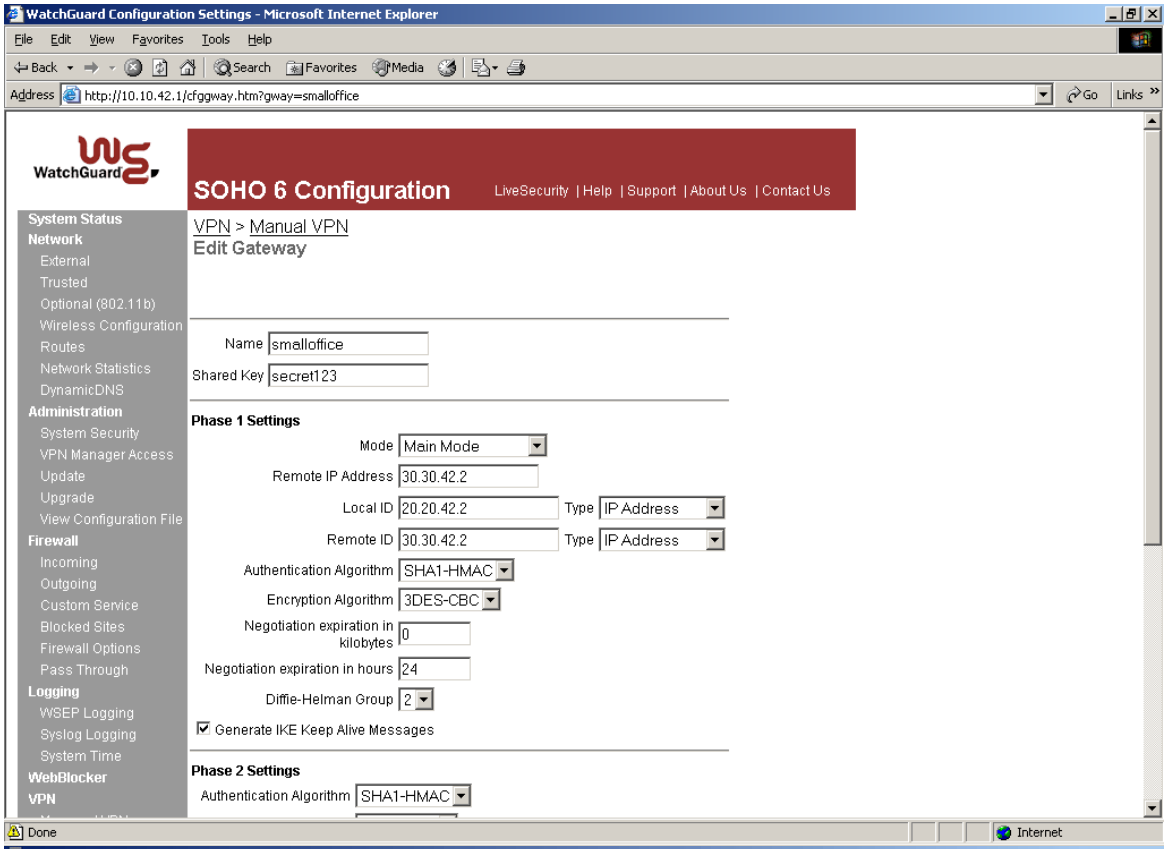
Step	Description
17.	Click the **Outgoing** tab and repeat steps 13-16 to enable and allow outgoing connections from the trusted network to the network behind Small Office Edition. 

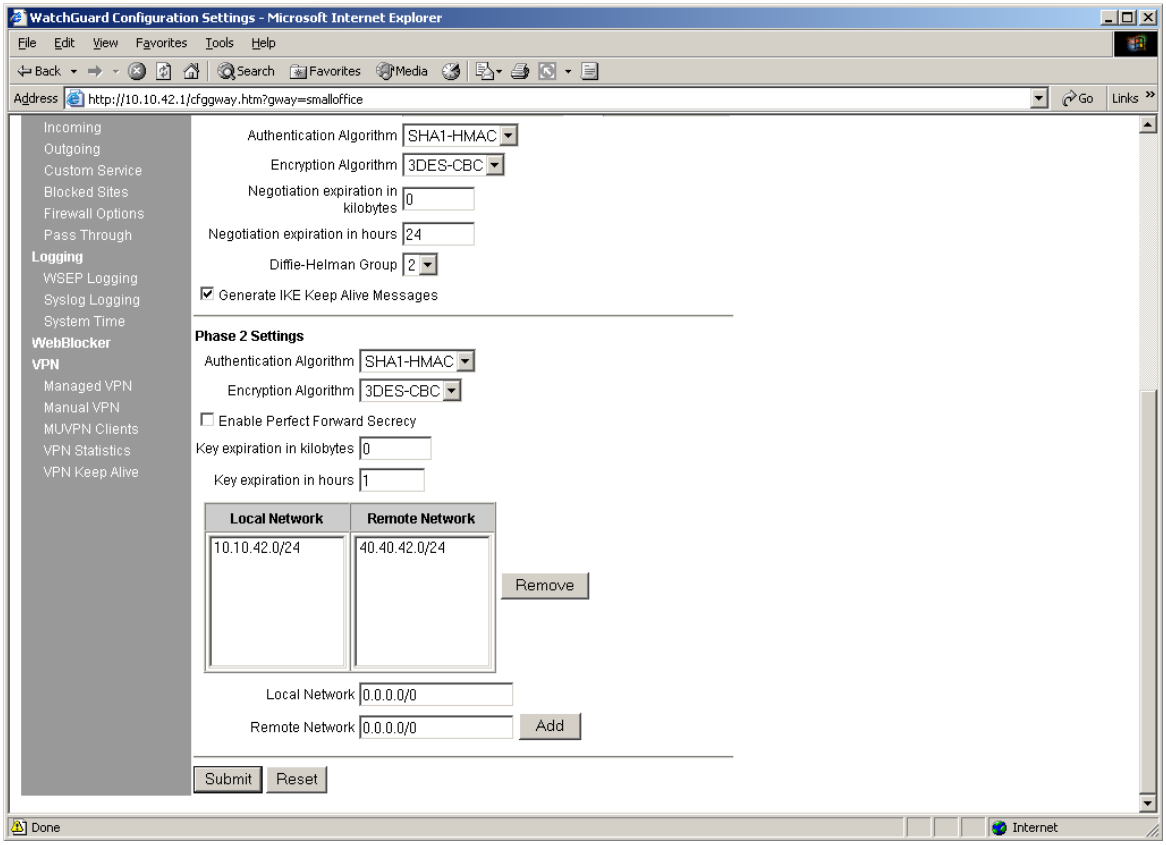
Step	Description
18.	Click **OK** and **Close** on the **Services** window to return to the **Policy Manager** window. 

3.3. Configure the WatchGuard SOHO

Step	Description
1.	Open the SOHO 6 Configuration screen by specifying the IP address of private interface of the SOHO 6tc Wireless in a browser window. Click the **Manual VPN** option on the left pane and click **Add** to create a VPN tunnel to the IP Office. 

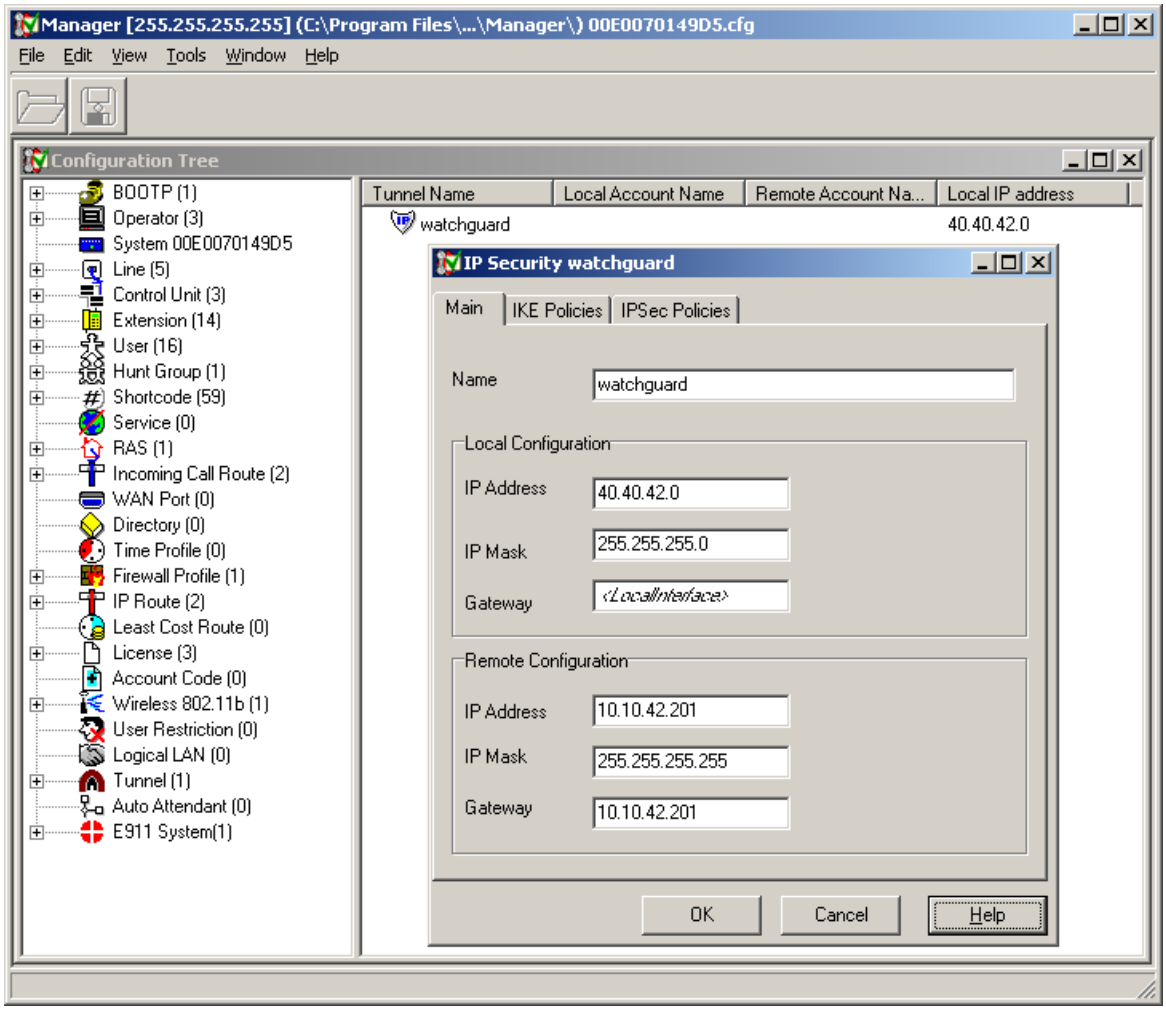
Step	Description
2.	Enter the values shown below to match the IP Office tunnel configuration for Phase 1 and the shared key.



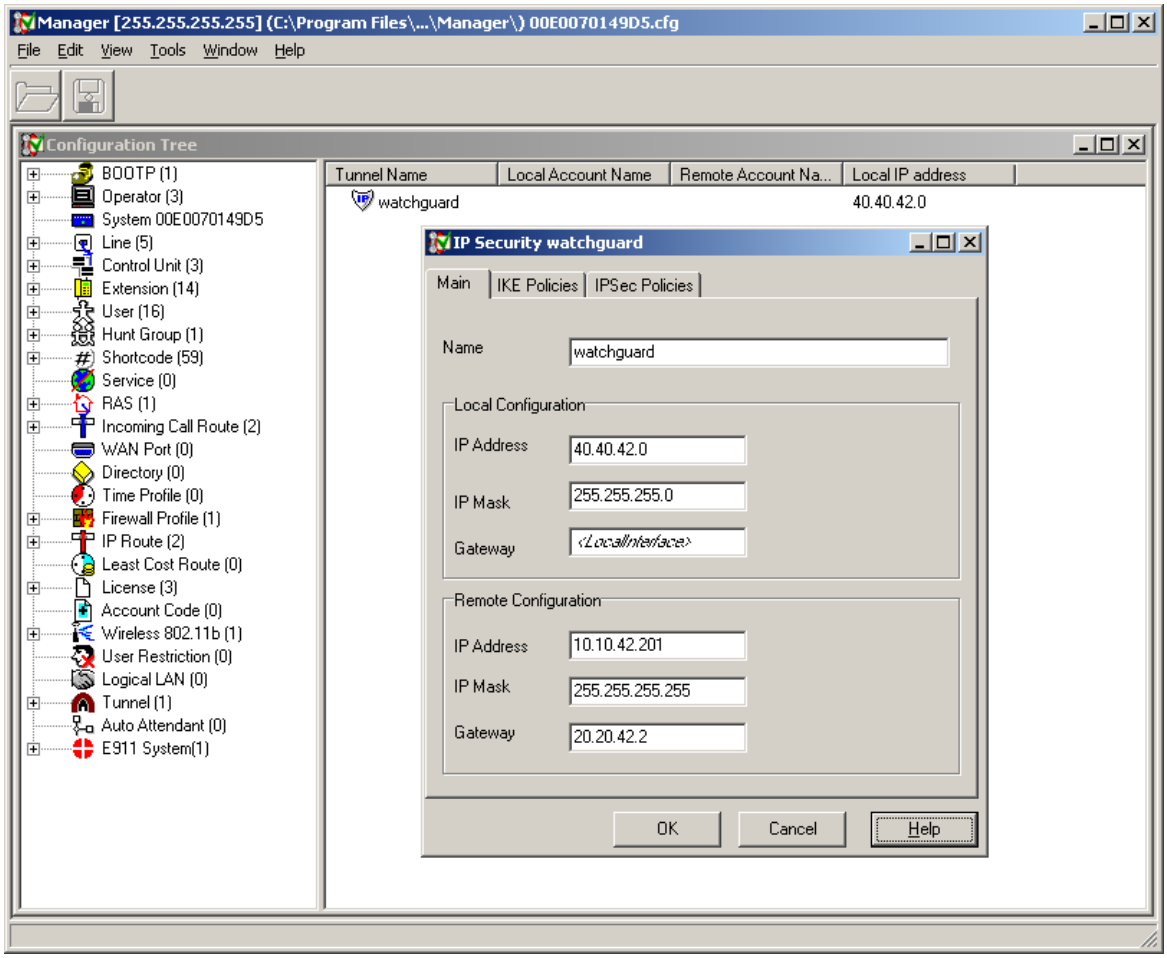
Step	Description
3.	Enter the values shown below to match the Phase 2 IP Office tunnel configuration. Enter the subnet of the Phone Manager PC in the *Local Network* field and the subnet of the IP telephone and IP Office in the *Remote Network* field and click on **Add** to specify the local and remote networks for the tunnel. 

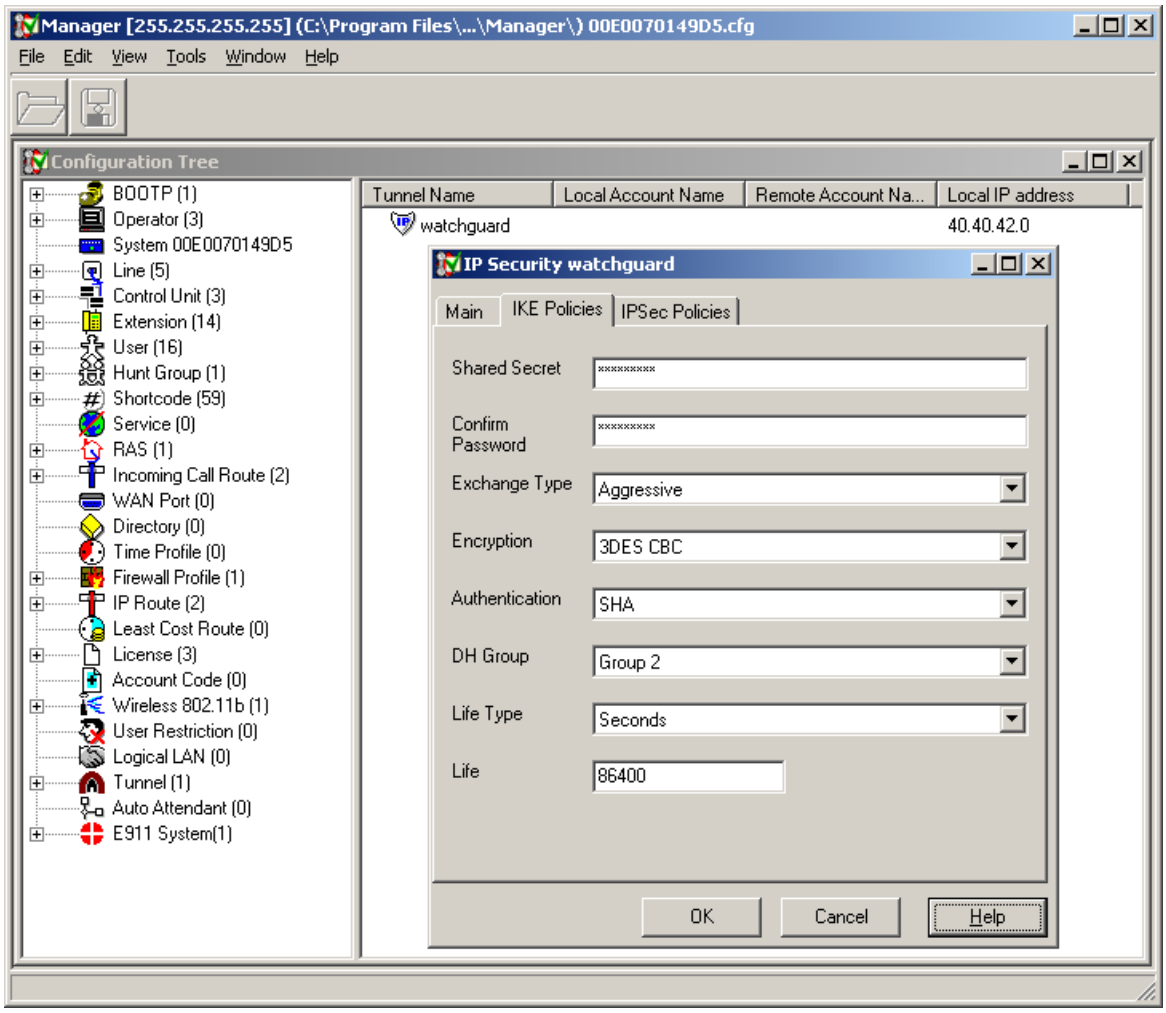
4. Configuration 2 (VPN tunnel between client and IP Office)

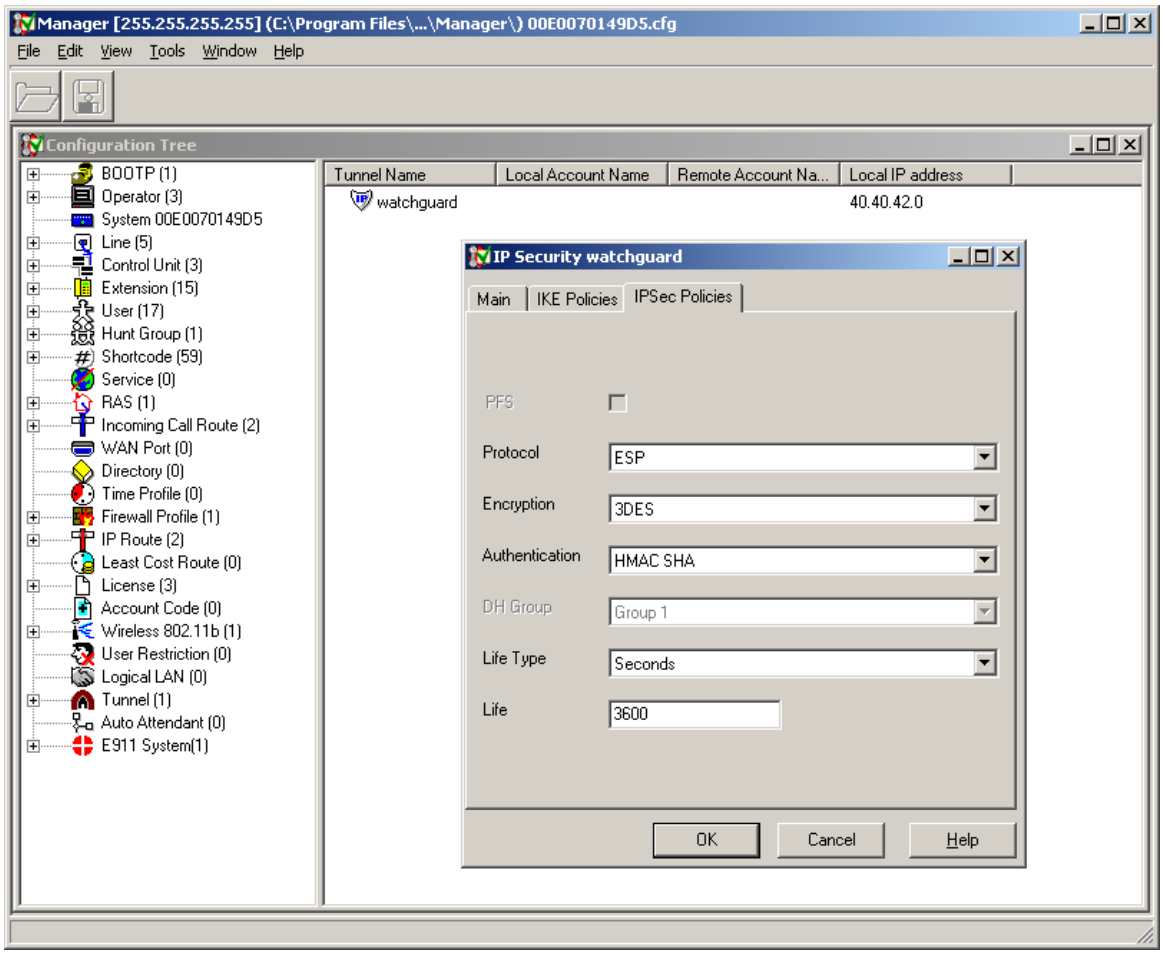
4.1. Configuring Avaya IP Office

Step	Description
1.	The following screen applies when the Firebox X is used in configuration 2. Click on the **Tunnel** item under the Configuration Tree view. Right-click over the tunnel window Enter the values shown below for the local and remote networks and the remote tunnel endpoint address of the Phone Manager PC in the *Gateway* field. 

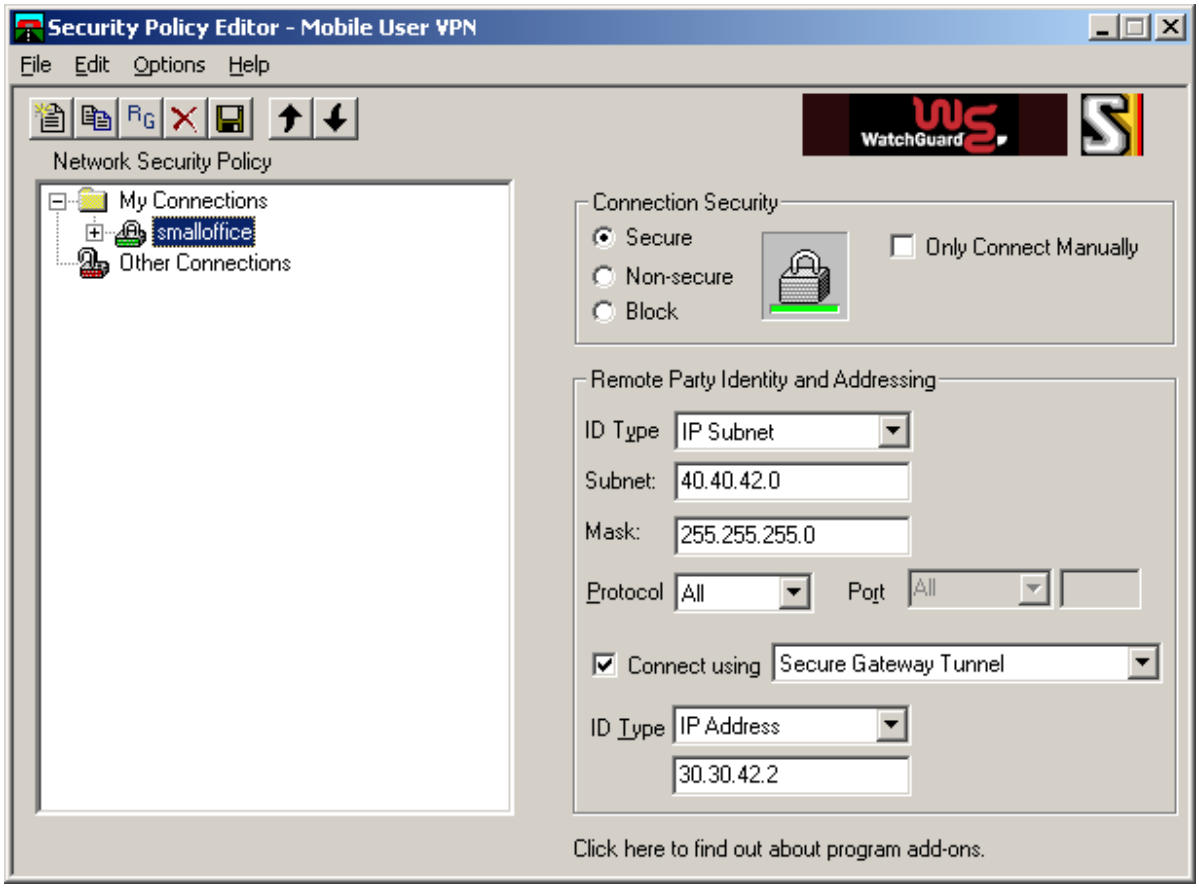
Step	Description
	Note: The following screen applies when the SOHO is used in configuration 2. The external IP address of the SOHO (e.g., **20.20.42.2**) must be specified as the remote tunnel endpoint address in *the Gateway* field because NAT (Network Address Translation) cannot be turned off on the SOHO.

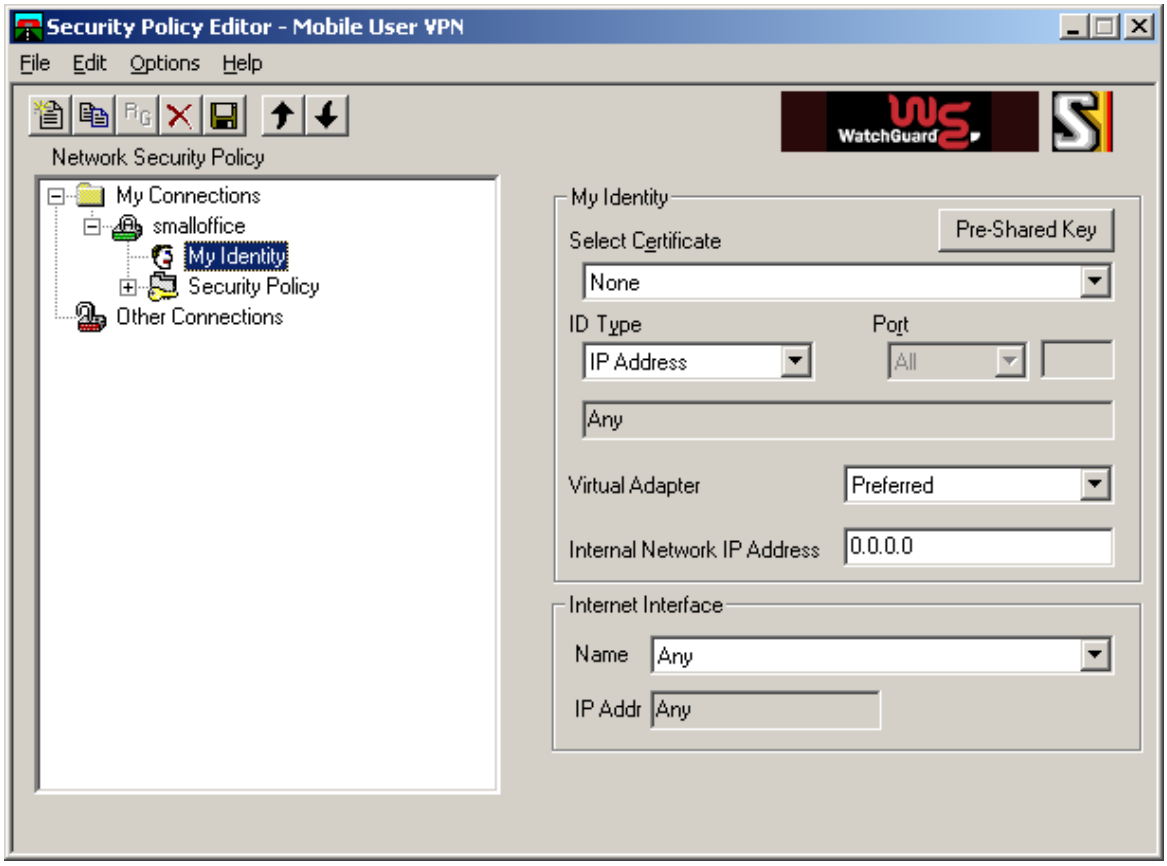


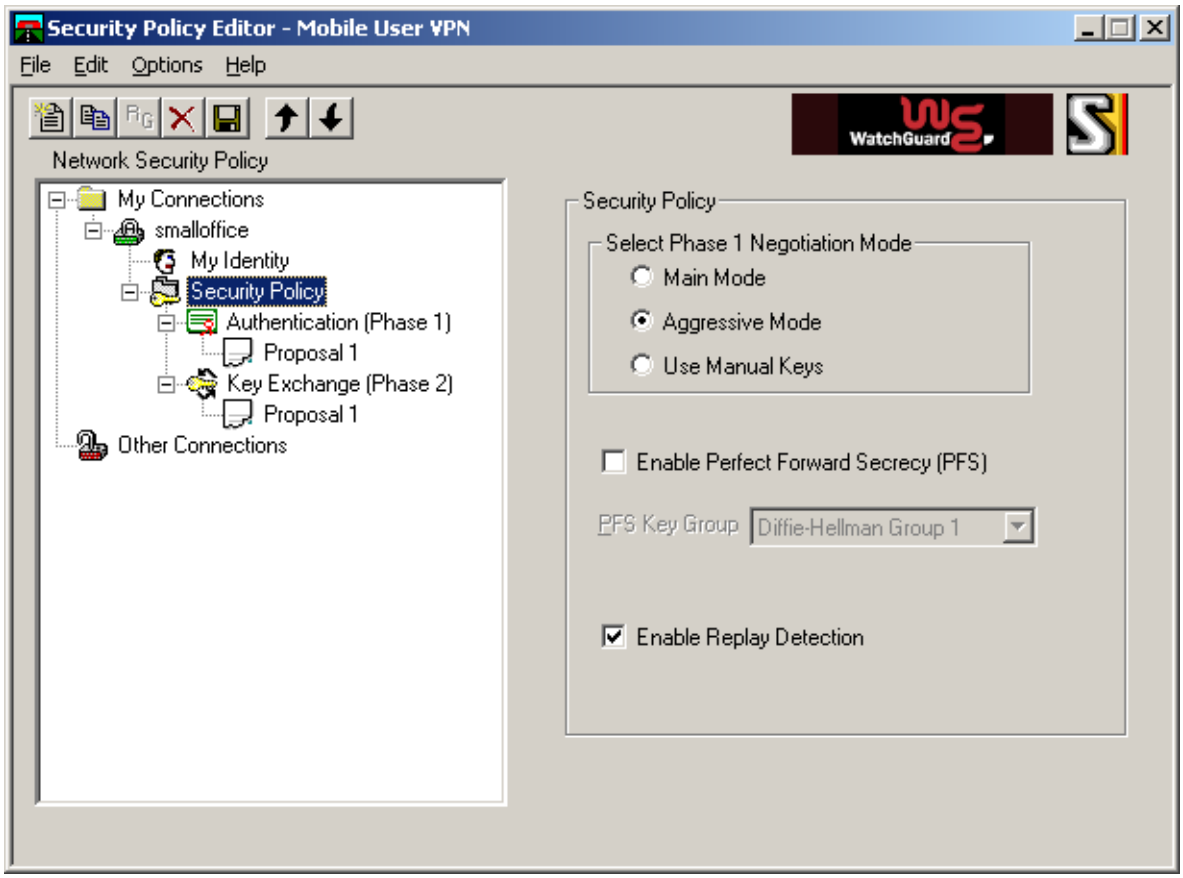
Step	Description
3.	Click the **IKE Policies** tab. Enter the values shown below for Phase 1 from **Table 1** for a client tunnel: • Shared secret – The password used for authentication and must match on the device at the other end of the tunnel. • Confirm Password – Re-enter the shared secret again • Exchange Type – Aggressive provides faster security setup but does not hide the ID's of the communicating devices • Encryption – The encryption method used by the tunnel. • Authentication – The password authentication used by the tunnel. • DH Group – Diffie Hellmann Group • Life Type – Sets whether the Life value is measured in seconds or kilobytes. • Life – The duration before re-authentication is required. 

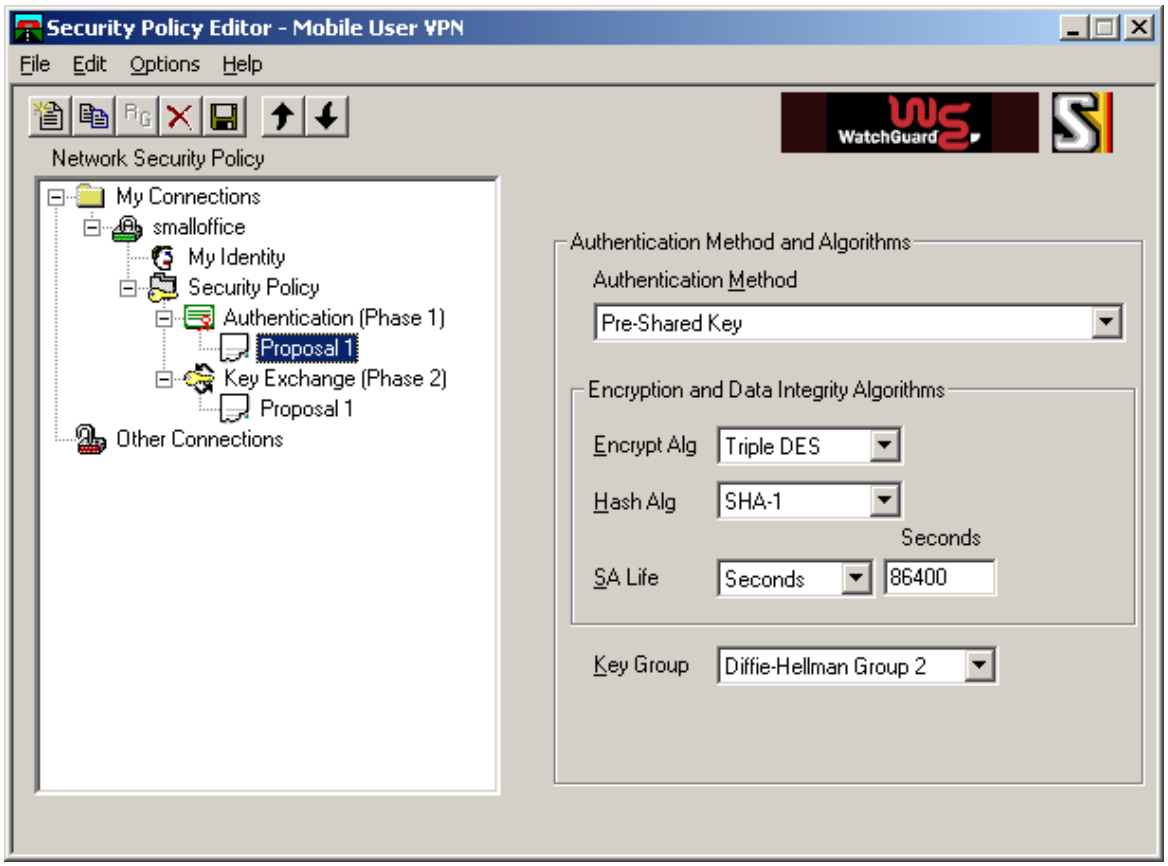
Step	Description
4.	Click the **IPSec Policies** tab. Enter the values shown below for Phase 2 from **Table 1** for a client tunnel: • Protocol – The encryption protocol used by the tunnel. • Encryption – The encryption method used by the tunnel. • Authentication – The password authentication used by the tunnel. • Life Type – Sets whether the Life value is measured in seconds or kilobytes. • Life – The duration before re-authentication is required  Click **OK**.

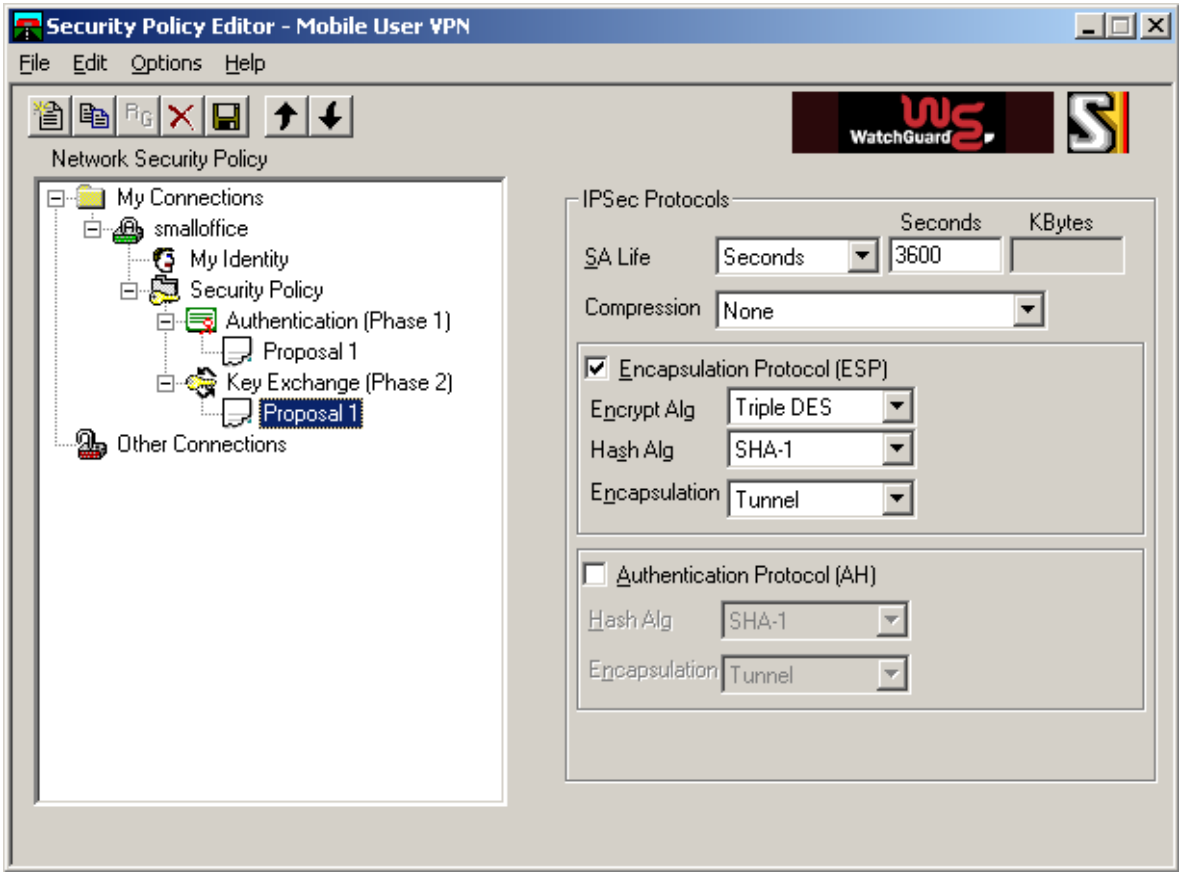
4.2. Configure MUVPN Client

Step	Description
1.	Open the Security Policy Editor by navigating to **Start → Programs → Mobile User VPN → Security Policy Editor**. Right-click **My Connections** and select **Add → Connection**. Specify the name of the new connection (e.g., **smalloffice**) and enter the values shown below, matching the IP Office tunnel configuration by specifying the remote subnet and IP address of the Small Office Edition as the remote tunnel endpoint address. 

Step	Description
2.	Expand the new connection by clicking on the "+" next to the connection name and click **My Identity**. Select **None** in the *Select Certificate* drop-down list. Click **Pre-Shared Key** and **Enter Key** to supply the same password specified in the IP Office tunnel configuration. Select **Preferred** in the Virtual Adapter drop-down list and leave the other fields as default. 

Step	Description
3.	Click **Security Policy** and select **Aggressive Mode** for *Select Phase 1 Negotiation Mode* and leave the other fields as defaults. 

Step	Description
4.	Expand **Security Policy** and **Authentication (Phase1)**. Click **Proposal 1** and enter the values shown below to match the IP Office tunnel configuration for Phase 1. 

Step	Description
5.	Expand **Key Exchange (Phase2)**. Click **Proposal 1** and enter the values shown below to match the IP Office tunnel configuration for Phase 2. 
6.	Click **File → Save** or the floppy disk icon on the tool bar to save the configuration.

5. Interoperability Compliance Testing

The features of the WatchGuard Firebox and SOHO products were tested to determine if VPN tunnels could be established with IP Office.

5.1. General Test Approach

The following scenarios were tested using the network configuration diagram shown in **Figure 1**:

- Ability to establish a site-to-site VPN tunnel (Configuration 1) between the WatchGuard products (Firebox X2500 or SOHO 6tc Wireless) and the Small Office Edition
- Ability to establish a VPN tunnel (Configuration 2) between the Phone Manager Pro client and the Small Office Edition using the MUVPN client provided by WatchGuard
- Two-way tunnel creation
- Support for two IPSec (IP Security) tunnel types, as defined in **Table 1,** for the site-to-site and client VPN tunnels
- Voice calls were placed manually and subjective quality noted for both G.711 and G.729 codecs. Direct Media Path was enabled for the Small Office Edition
- RAS (Registration Admission Status) over the VPN tunnel

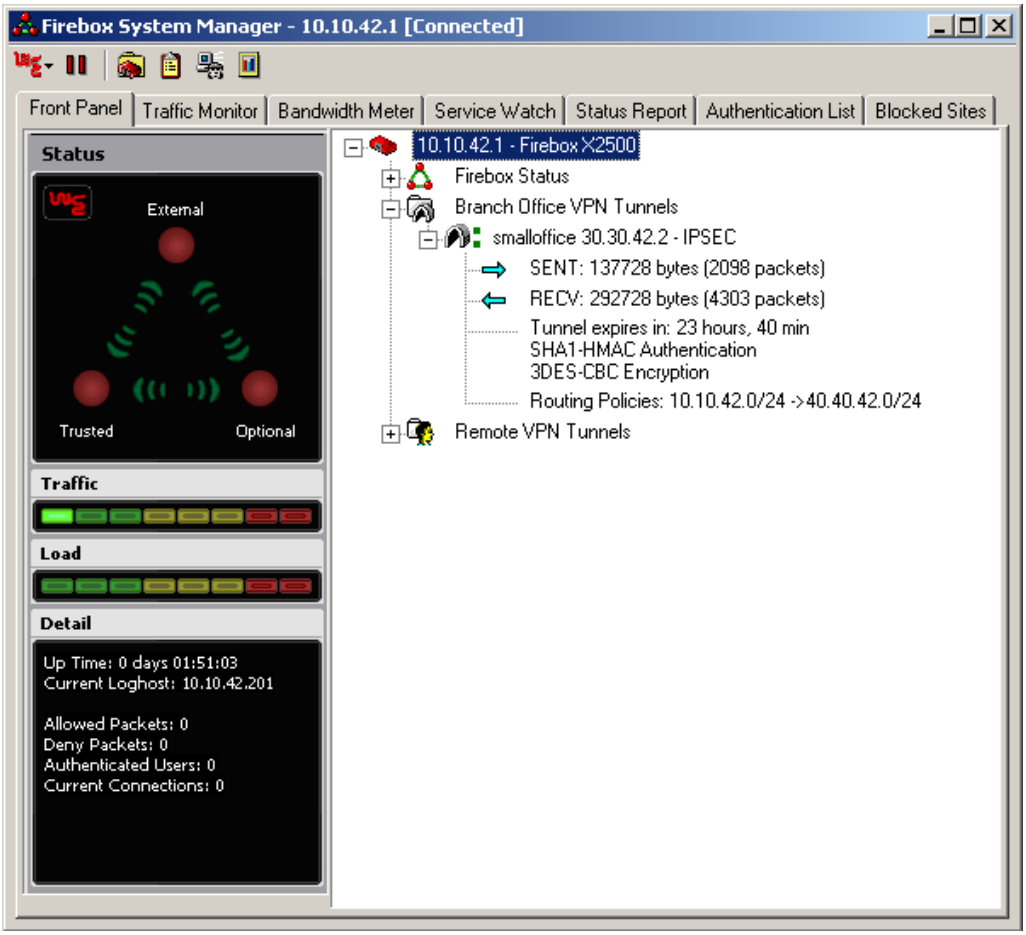
5.2. Test Results

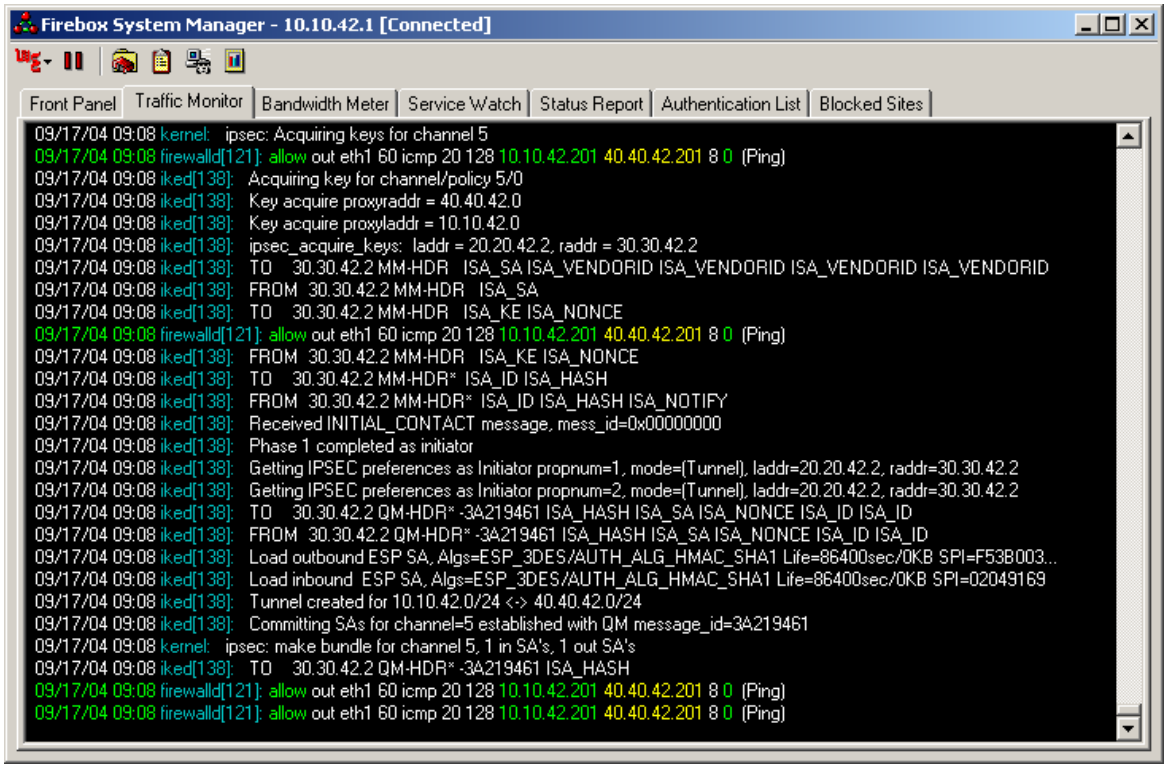
Testing was successful. Site-to-site and client VPN tunnels could be established between IP Office and the WatchGuard Firebox X and SOHO products.

6. Verification Steps

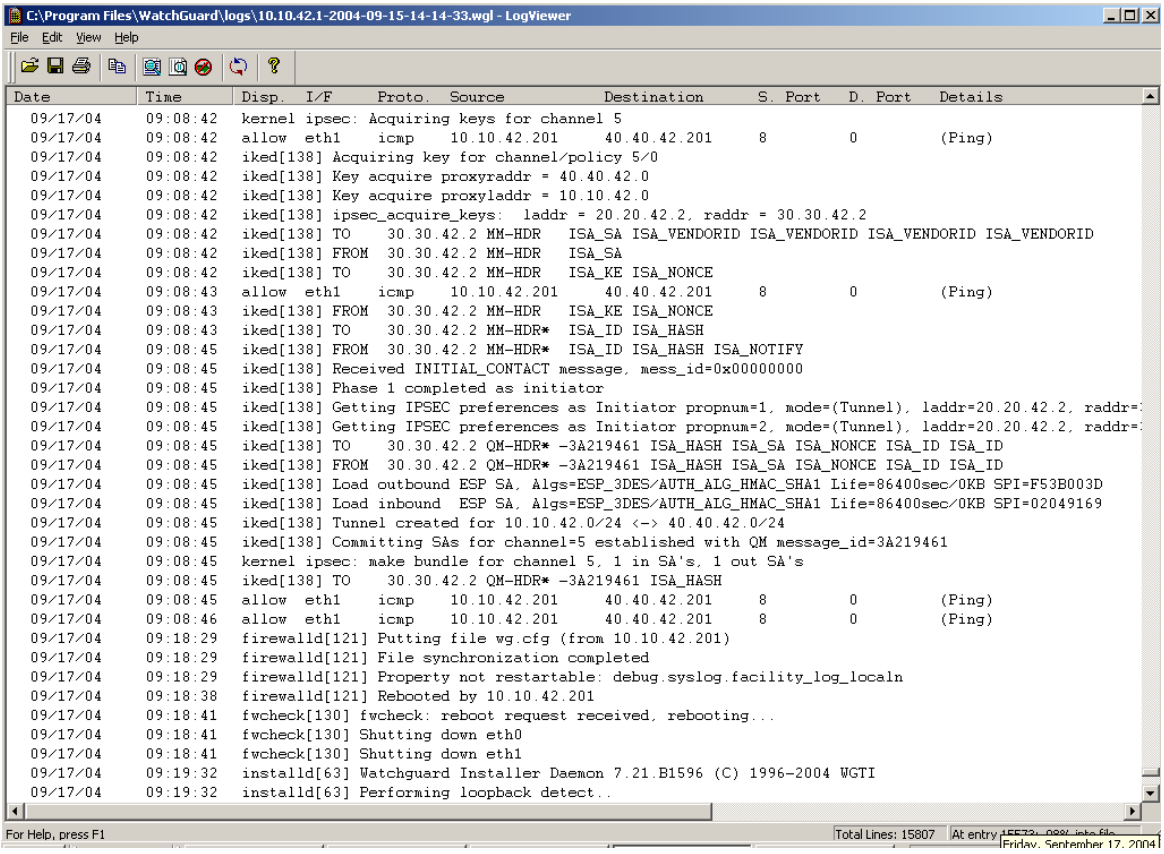
Step	Description
1.	Using the IP Office SysMonitor log, verify that Phase 1 and Phase 2 negotiations completed. The negotiation messages will only appear if the trace option **IPSec Events** is checked under the **VPN** tab for the SysMonitor log filter. Following is an example of the Phase 1 and Phase 2 negotiation messages.

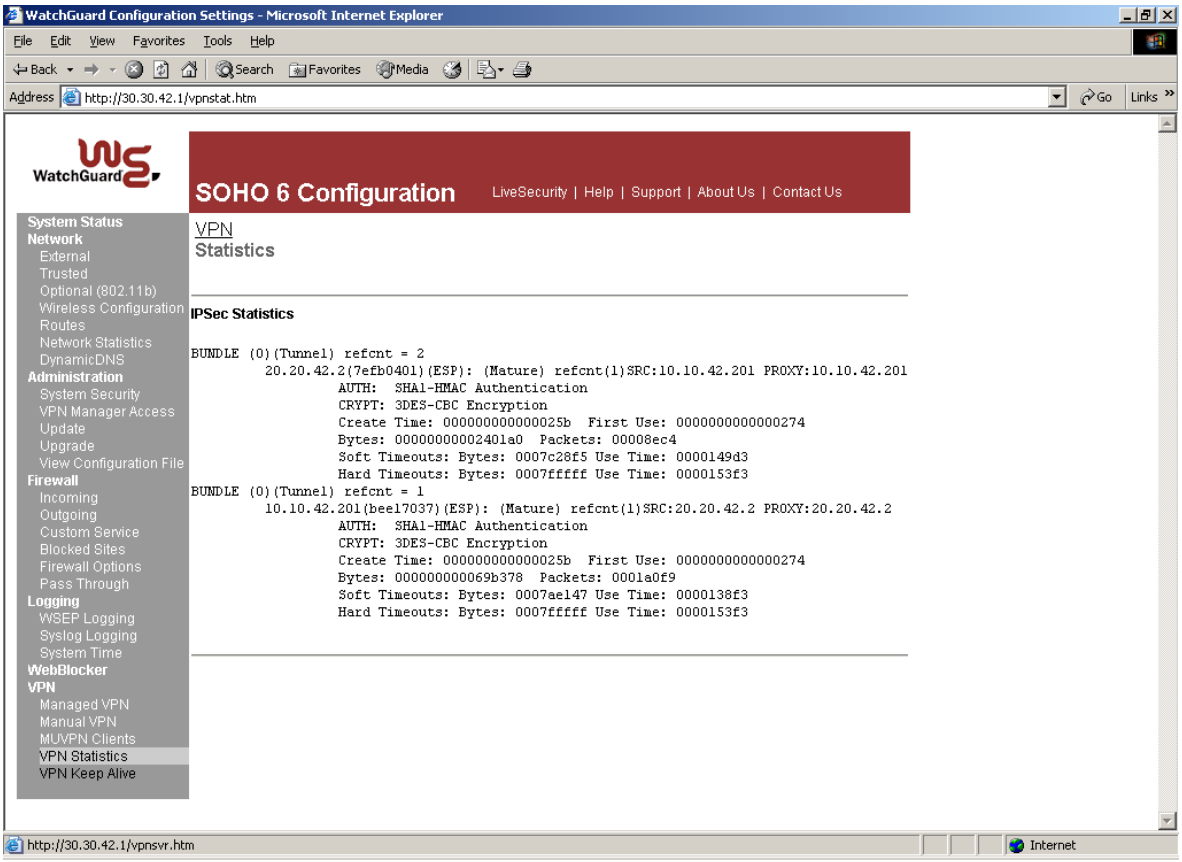
```
297545mS IPSecEvent: transport_add: adding ffe8e6c0
297546mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 1 references
297546mS IPSecEvent: Received request to negotiate ID_PROT Mode Phase 1 security for
policy watchguard
297548mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 2 references
297550mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 3 references
297572mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 4 references
297573mS IPSecEvent: transport_release: transport ffe8e6c0 had 4 references
297573mS IPSecEvent: transport_release: transport ffe8e6c0 had 3 references
297573mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 3 references
300022mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 4 references
300022mS IPSecEvent: transport_release: transport ffe8e6c0 had 4 references
300024mS IPSecEvent: transport_release: transport ffe8e6c0 had 3 references
300025mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 3 references
300028mS IPSecEvent: Phase 1 negotiations completed: src: 30.30.42.2 dst: 20.20.42.2
300028mS IPSecEvent: exchange_free: calling: timer_remove_event(exchange->death)
300029mS IPSecEvent: transport_release: transport ffe8e6c0 had 3 references
300029mS IPSecEvent: transport_release: transport ffe8e6c0 had 2 references
300040mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 2 references
300042mS IPSecEvent: Received request to start Phase 2 security negotiations, src:
30.30.42.2 dst: 20.20.42.2
300042mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 3 references
300044mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 4 references
300068mS IPSecEvent: transport_reference: transport ffe8e6c0 now has 5 references
300068mS IPSecEvent: transport_release: transport ffe8e6c0 had 5 references
300073mS IPSecEvent: transport_release: transport ffe8e6c0 had 4 references
300074mS IPSecEvent: IPSec: Chosen IPSec Auth Algo = 7
300074mS IPSecEvent: IPSec Object=ffdeeae0 created for SA=ffdef10c destination=20.20.42.2
300075mS IPSecEvent: IPSec: Chosen IPSec Auth Algo = 7
300075mS IPSecEvent: IPSec Object=ffdee6f0 created for SA=ffdedb90 destination=30.30.42.2
300076mS IPSecEvent: Completed Phase 2 negotiations between src: 30.30.42.2 dst:
20.20.42.2
300076mS IPSecEvent: exchange_free: calling: timer_remove_event(exchange->death)
300076mS IPSecEvent: transport_release: transport ffe8e6c0 had 3 references
```

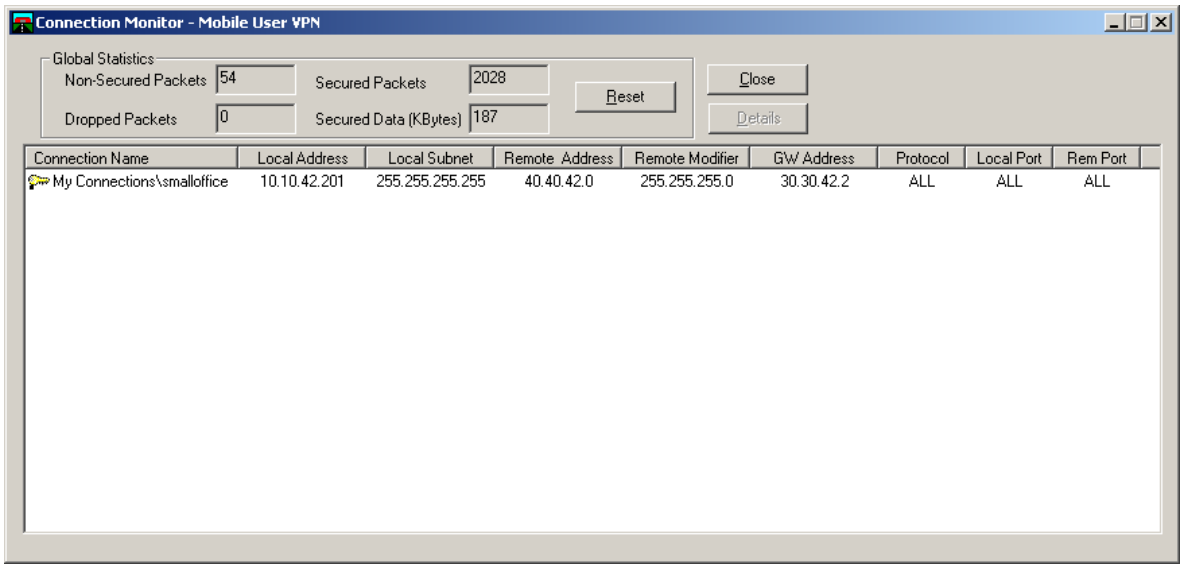
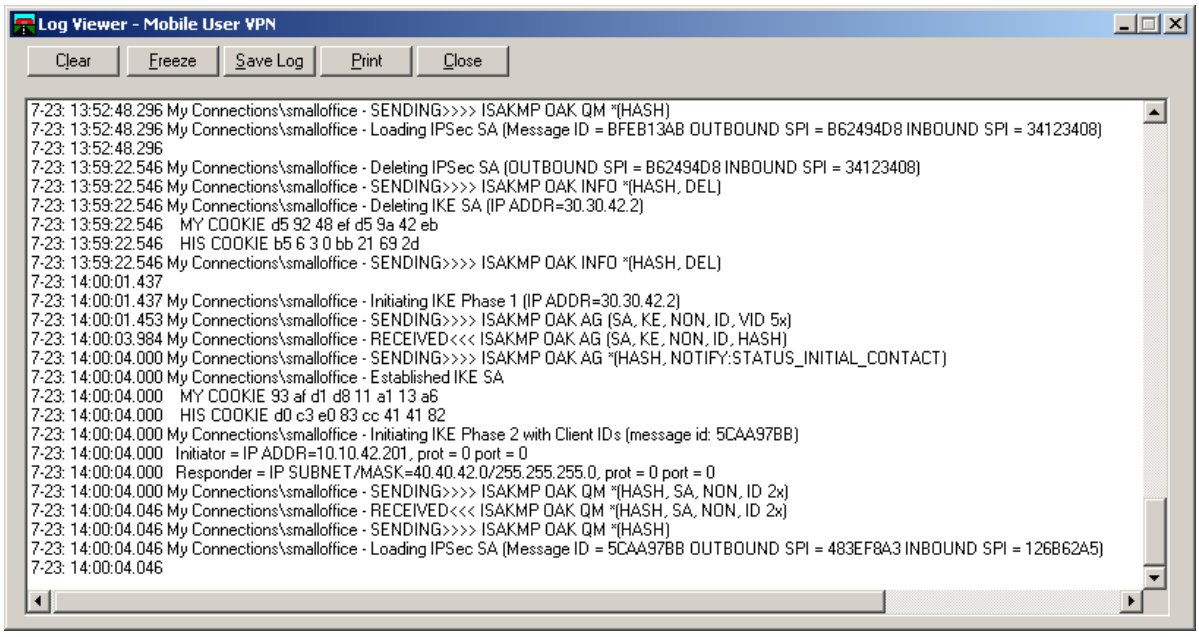
Step	Description
2.	From the **Firebox System Manager** window, expand the tunnel name listed under the Branch Office VPN Tunnels item to view statistics for the site-to-site tunnel between the Firebox X and Small Office Edition. 

Step	Description
3.	Click on the **Traffic Monitor** tab to view Phase 1 negotiation messages. 

Step	Description
4.	From the Firebox System Manager, select **Tools → Log Viewer** or click on the taskbar icon to view the Phase 1 negotiation message history.



Step	Description
5.	Open the SOHO 6 Configuration screen by specifying the IP address of the private interface of the SOHO 6tc Wireless in a browser window. Click the **VPN Statistics** option on the left pane to view statistics for the site-to-site tunnel between the SOHO 6tc Wireless and Small Office Edition. 

Step	Description
6.	Navigate to **Start → Programs → Mobile User VPN → Connection Monitor** to view statistics for the client VPN tunnel to Small Office Edition. 
7.	Navigate to **Start → Programs → Mobile User VPN → Log Viewer** to view Phase 1 and Phase 2 negotiation messages for the client VPN tunnel to Small Office Edition. 

7. Support

For technical support on WatchGuard, visit http://www.watchguard.com/support.

8. Conclusion

The configuration of site-to-site VPN tunnels between the Avaya IP Office and WatchGuard Firebox X and SOHO products as well as client VPN tunnels to IP Office has been successfully compliance tested.

9. References

[1] *WatchGuard Firebox X Reviewer's Guide,* April 2004

[2] *WatchGuard System Manager User Guide*, 2004.

[3] *WatchGuard Firebox SOHO 6 Wireless User Guide*, Firmware Version 6.3, 2003

[4] *ExtremeWare Software User Guide*, Software Version 6.2.1, April 2002; Document Number: 100049-00 Rev.05

[5] *Avaya IP Office 2.1 Manager Application*, Issue 15c, 6th May 2004; Document Number: 40DHB0002USAU

[6] *Avaya P333R Installation and Configuration Guide*, Software Version 4.0, April 2003

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Developer*Connection* Program at devconnect@avaya.com.