Reference Manual for the Model FVS318 Cable/DSL ProSafe VPN Firewall

NETGEAR

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- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

EN 55 022 Declaration of Conformance

This is to certify that the Model FVS318 Cable/DSL ProSafe VPN Firewall is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

Bestätigung des Herstellers/Importeurs

Es wird hiermit bestätigt, daß das Model FVS318 Cable/DSL ProSafe VPN Firewall gemäß der im BMPT-AmtsblVfg 243/1991 und Vfg 46/1992 aufgeführten Bestimmungen entstört ist. Das vorschriftsmäßige Betreiben einiger Geräte (z.B. Testsender) kann jedoch gewissen Beschränkungen unterliegen. Lesen Sie dazu bitte die Anmerkungen in der Betriebsanleitung.

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Certificate of the Manufacturer/Importer

It is hereby certified that the Model FVS318 Cable/DSL ProSafe VPN Firewall has been suppressed in accordance with the conditions set out in the BMPT-AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject to certain restrictions. Please refer to the notes in the operating instructions.

Federal Office for Telecommunications Approvals has been notified of the placing of this equipment on the market and has been granted the right to test the series for compliance with the regulations.

Voluntary Control Council for Interference (VCCI) Statement

This equipment is in the second category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential areas.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read instructions for correct handling.

Technical Support

Refer to the Support Information Card that shipped with your Model FVS318 Cable/DSL ProSafe VPN Firewall.

World Wide Web

NETGEAR maintains a World Wide Web home page that you can access at the universal resource locator (URL) *http://www.netgear.com*. A direct connection to the Internet and a Web browser such as Internet Explorer or Netscape are required.

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About This Guide

Congratulations on your purchase of the NETGEAR™ Model FVS318 Cable/DSL ProSafe VPN Firewall. A firewall is a special type of router that incorporates features for security. The FVS318 VPN Firewall is a complete security solution that protects your network from attacks and intrusions while allowing secure connections with other trusted users over the Internet.

This guide describes the features of the firewall and provides installation and configuration instructions.

Typographical Conventions

This guide uses the following typographical conventions:

italics	Book titles and UNIX file, command, and directory names.
`courier font`	Screen text, user-typed command-line entries.
Initial Caps	Menu titles and window and button names.
[Enter]	Named keys in text are shown enclosed in square brackets. The notation [Enter] is used for the Enter key and the Return key.
[Ctrl]+C	Two or more keys that must be pressed simultaneously are shown in text linked with a plus (+) sign.
ALL CAPS	DOS file and directory names.

Special Message Formats

This guide uses the following formats to highlight special messages:

	**Note:** This format is used to highlight information of importance or special interest.

	**Caution:** This format is used to highlight information that will help you prevent equipment failure or loss of data.

	**Warning:** This format is used to highlight information about the possibility of injury or equipment damage.

	**Danger:** This format is used to alert you that there is the potential for incurring an electrical shock if you mishandle the equipment.

Technical Support

For help with any technical issues, contact Customer Support at 1-888-NETGEAR, or visit us on the Web at www.NETGEAR.com. The NETGEAR Web site includes an extensive knowledge base, answers to frequently asked questions, and a means for submitting technical questions online.

Related Publications

As you read this document, you may be directed to various RFC documents for further information. An RFC is a Request For Comment (RFC) published by the Internet Engineering Task Force (IETF), an open organization that defines the architecture and operation of the Internet. The RFC documents outline and define the standard protocols and procedures for the Internet. The documents are listed on the World Wide Web at *www.ietf.org* and are mirrored and indexed at many other sites worldwide.

For more information about address assignment, refer to the IETF documents RFC 1597, *Address Allocation for Private Internets*, and RFC 1466, *Guidelines for Management of IP Address Space*.

For more information about IP address translation, refer to RFC 1631, *The IP Network Address Translator (NAT)*.

Chapter 1
Introduction

This chapter describes the features of the NETGEAR Model FVS318 Cable/DSL ProSafe VPN Firewall.

About the FVS318 VPN Firewall

The FVS318 VPN Firewall is a complete security solution that protects your network from attacks and intrusions while allowing secure connections with other trusted users over the Internet. Unlike simple Internet sharing routers that rely on NAT for security, the FVS318 uses Stateful Packet Inspection, widely considered as the most effective method of filtering IP traffic, to ensure secure firewall filtering. The FVS318 allows Internet access for up to 253 users, and is capable of eight simultaneous VPN connections.

Key Features

The FVS318 VPN Firewall offers the following features.

A Powerful, True Firewall

Unlike simple Internet sharing NAT routers, the FVS318 VPN Firewall is a true firewall, using stateful packet inspection to defend against hacker attacks. Its firewall features include:

- Denial of Service (DoS) protection
  Automatically detects and thwarts Denial of Service (DoS) attacks such as Ping of Death, SYN Flood, LAND Attack and IP Spoofing.
- Blocks unwanted traffic from the Internet to your LAN.
- Blocks access from your LAN to Internet locations that you specify as off-limits

- Logs security incidents
  The FVS318 VPN Firewall will log security events such as blocked incoming traffic, port scans, attacks, and administrator logins. You can configure the firewall to email the log to you at specified intervals. You can also configure the firewall to send immediate alert messages to your email address or email pager whenever a significant event occurs.

Virtual Private Networking (VPN)

The FVS318 VPN Firewall provides a secure encrypted connection between your local network and remote networks or clients. Its VPN features include

- Supports eight simultaneous VPN connections.
- Supports industry standard VPN protocols
  The FVS318 supports standard keying methods (Manual or IKE), standard authentication methods (MD5 and SHA-1), and standard encryption methods (DES, 3DES). It is compatible with many other VPN products.
- Supports up to 168 bit encryption (3DES) for maximum security.

Content Filtering

With its content filtering feature, the FVS318 VPN Firewall prevents objectionable content from reaching your PCs. The FVS318 allows you to control access to Internet content by screening for keywords within Web addresses. You can configure the FVS318 to log and report attempts to access objectional Internet sites.

Configurable Ethernet Connection

With its internal 8-port 10/100 switch, the FVS318 VPN Firewall can connect to either a 10 Mbps standard Ethernet network or a 100 Mbps Fast Ethernet network. The local LAN interface is autosensing and is capable of full-duplex or half-duplex operation.

The firewall incorporates Auto Uplink™ technology. Each LOCAL Ethernet port will automatically sense whether the Ethernet cable plugged into the port should have a 'normal' connection (e.g. connecting to a PC) or an 'uplink' connection (e.g. connecting to a switch or hub). That port will then configure itself to the correct configuration. This feature also eliminates the need to worry about crossover cables, as Auto Uplink will accommodate either type of cable to make the right connection.

Protocol Support

The FVS318 VPN Firewall supports the Transmission Control Protocol/Internet Protocol (TCP/IP) and Routing Information Protocol (RIP).

For further information about TCP/IP, refer to Appendix B, "Networks, Routing, and Firewall Basics."

- IP Address Sharing by NAT
  The FVS318 VPN Firewall allows several networked PCs to share an Internet account using only a single IP address, which may be statically or dynamically assigned by your Internet service provider (ISP). This technique, known as Network Address Translation (NAT), allows the use of an inexpensive single-user ISP account.
- Automatic Configuration of Attached PCs by DHCP
  The FVS318 VPN Firewall dynamically assigns network configuration information, including IP, gateway, and domain name server (DNS) addresses, to attached PCs on the LAN using the Dynamic Host Configuration Protocol (DHCP). This feature greatly simplifies configuration of PCs on your local network.
- DNS Proxy
  When DHCP is enabled and no DNS addresses are specified, the firewall provides its own address as a DNS server to the attached PCs. The firewall obtains actual DNS addresses from the ISP during connection setup and forwards DNS requests from the LAN.
- PPP over Ethernet (PPPoE)
  PPP over Ethernet is a protocol for connecting remote hosts to the Internet over a DSL connection by simulating a dial-up connection. This feature eliminates the need to run a login program such as Entersys or WinPOET on your PC.
- Dynamic DNS
  Dynamic DNS services allow remote users to find your network using a domain name when your IP address is not permanently assigned. The firewall contains a client that can connect to many popular Dynamic DNS services to register your dynamic IP address.

Easy Installation and Management

You can install, configure, and operate the FVS318 VPN Firewall within minutes after connecting it to the network. The following features simplify installation and management tasks:

- Browser-based management
  Browser-based configuration allows you to easily configure your firewall from almost any type of personal computer, such as Windows, Macintosh, or Linux. A user-friendly Setup Wizard is provided and online help documentation is built into the browser-based Web Management Interface.
- Smart Wizard
  The FVS318 automatically senses the type of Internet connection, asking you only for the information required for your type of ISP account.
- Remote management
  The FVS318 allows you to login to the Web Management Interface from a remote location on the Internet. For security, you can limit remote management access to a specified remote IP address or range of addresses, and you can choose a nonstandard port number.
- Visual monitoring
  The firewall's front panel LEDs provide an easy way to monitor its status and activity.

Maintenance and Support

NETGEAR offers the following features to help you maximize your use of the firewall:

- Flash EPROM for firmware upgrade
- Five-year warranty, two years on power adapter
- Free technical support seven days a week, twenty-four hours a day

Chapter 2
Setting Up the Hardware

This chapter describes the Model FVS318 Cable/DSL ProSafe VPN Firewall hardware and provides instructions for installing it.

Package Contents

The product package should contain the following items:

- Model FVS318 Cable/DSL ProSafe VPN Firewall
- AC power adapter
- Category 5 (CAT5) Ethernet cable
- *Model FVS318 Resource* CD, including:
  - This manual
  - Application Notes, Tools, and other helpful information
- *FVS318 Cable/DSL ProSafe VPN Firewall Installation Guide*
- Warranty and registration card
- Support information card

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Keep the carton, including the original packing materials, in case you need to return the product for repair.

Local Network Hardware Requirements

The FVS318 VPN Firewall is intended for use in a network of personal computers (PCs) that are interconnected by twisted-pair Ethernet cables.

PC Requirements

To install and run the FVS318 VPN Firewall over your network of PCs, each PC must have an installed Ethernet Network Interface Card (NIC) and an Ethernet cable. If the PC will connect to your network at 100 Mbps, you must use a Category 5 (CAT5) cable such as the cable provided with your firewall.

Access Device Requirement

The shared broadband access device (cable modem or DSL modem) must provide a standard 10 Mbps (10BASE-T) Ethernet interface.

The Firewall's Front Panel

The front panel of the Model FVS318 Cable/DSL ProSafe VPN Firewall (Figure 2-1) contains status LEDs.

Figure 2-1. FVS318 Front Panel

You can use some of the LEDs to verify connections. Table 2-1 lists and describes each LED on the front panel of the firewall. These LEDs are green when lit, except for the TEST LED, which is amber.

Table 2-1. LED Descriptions

Label	Activity	Description
POWER	On	Power is supplied to the firewall.
TEST	On Off	The system is initializing. The system is ready and running.
INTERNET		
LINK	On	The Internet port has detected a link with an attached device.
ACT (Activity)	Blinking	Data is being transmitted or received by the Internet port.
LOCAL		
100 (100 Mbps)	On Off	The Local port is operating at 100 Mbps. The Local port is operating at 10 Mbps.
LINK/ACT (Link/Activity)	On Blinking	The Local port has detected a link with an attached device. Data is being transmitted or received by the Local port.

The Firewall's Rear Panel

The rear panel of the FVS318 VPN Firewall (Figure 2-2) contains port connections.

Figure 2-2. FVS318 Rear Panel

The rear panel contains the following features:

- Power switch
- AC power adapter outlet
- Internet (WAN) Ethernet port for connecting the firewall to a cable or DSL modem
- Eight Local (LAN) Ethernet ports for connecting the firewall to the local PCs
- Factory Default Reset pushbutton
- Grounding terminal

Connecting the Firewall

Before using your firewall, you need to do the following:

- Connect your cable or DSL modem to the Internet port of the firewall (described next.
- Connect your local Ethernet network to the Local port(s) of the firewall (see page 2-5).
- Connect the power adapter (see page 2-6)

Note: The Resource CD included with your firewall contains an animated Connection Guide to help you through this procedure.

Connecting to Your Internet Access Device

Your cable or DSL modem must provide a standard 10BASE-T Ethernet connection (not USB) for connection to your PC or network. The FVS318 VPN Firewall does not include a cable for this connection. Instead, use the Ethernet cable provided with your access device or any other standard 10BASE-T Ethernet cable. Follow these steps:

1. Locate the Ethernet cable currently going from your DSL or cable modem to the computer that you use to access the Internet.

   Note: You **must** use the existing cable to connect the modem to your firewall, not to connect your PCs to your firewall. The Ethernet cable supplied by your ISP for connecting to your cable or DSL modem may be an Ethernet crossover cable rather than a normal straight-through cable.

2. Remove this cable from the computer and insert that end into the Internet port on the firewall.
3. Turn the cable or DSL modem off for ten seconds, then on again.

Connecting to your Local Ethernet Network

Your local area network (LAN) will attach to the firewall's Local ports shown in Figure 2-2. The Local ports are capable of operation at either 10 Mbps (10BASE-T) or 100 Mbps (100BASE-Tx), depending on the Ethernet interface of the attached PC, hub, or switch. For any connection which will operate at 100 Mbps, you must use a Category 5 (CAT5) rated Ethernet cable, such as the cable included with the firewall.

The FVS318 VPN Firewall incorporates an eight-port switch for connection to your local network. Connect up to eight PCs directly to any of the eight Local ports of the firewall using standard Ethernet cables such as the one included with your firewall.

If your local network consists of more than eight hosts, you will need to connect your firewall to another hub or switch. In this case, connect any LOCAL port of your firewall to any port of an Ethernet hub or switch. The firewall's LOCAL port will automatically configure itself for the uplink connection.

Note: The FVS318 VPN Firewall incorporates Auto Uplink™ technology. Each LOCAL Ethernet port will automatically sense whether the Ethernet cable plugged into the port should have a 'normal' connection (e.g. connecting to a PC) or an 'uplink' connection (e.g. connecting to a switch or hub). That port will then configure itself to the correct configuration. This feature also eliminates the need to worry about crossover cables, as Auto Uplink will accommodate either type of cable to make the right connection.

Connecting the Power Adapter

To connect the firewall to the power adapter:

1. Plug the connector of the power adapter into the power adapter outlet on the rear panel of the firewall.
2. Plug the other end of the adapter into a standard wall outlet.
3. Turn the Power switch to the ON position.
4. Verify that the Power LED on the firewall is lit.

Verifying Connections

After applying power to the firewall, complete the following steps to verify the connections to it:

1. When power is first applied, verify that the POWER LED is on.
2. Verify that the TEST LED turns on within a few seconds.
3. After approximately 10 seconds, verify that:
   a. The TEST LED has turned off.
   b. The LOCAL LINK/ACT LEDs are lit for any local ports that are connected.
   c. The INTERNET LINK/ACT LED is lit.

      If a LINK/ACT LED is lit, a link has been established to the connected device.
4. If any LOCAL port is connected to a 100 Mbps device, verify that the 100 LED for that port is lit.

The firewall is now properly attached to the network. Next, you need to prepare your network to access the Internet through the firewall. See the following chapter.

Chapter 3
Preparing Your Network

This chapter describes how to prepare your PC network to connect to the Internet through the Model FVS318 Cable/DSL ProSafe VPN Firewall and how to order broadband Internet service from an Internet service provider (ISP). .

Note: If an ISP technician configured your PC during the installation of a broadband modem, or if you configured it using instructions provided by your ISP, you may need to copy the current configuration information for use in the configuration of your firewall. Write down this information before reconfiguring your PCs. Refer to "Obtaining ISP Configuration Information (Windows)" on page 3-10 or "Obtaining ISP Configuration Information (Macintosh)" on page 3-11 for further information.

Preparing Your Personal Computers for IP Networking

Personal Computers access the Internet using a protocol called TCP/IP (Transmission Control Protocol/Internet Protocol). Each PC on your network must have TCP/IP installed and selected as its networking protocol. If a Network Interface Card (NIC) is already installed in your PC, then TCP/IP is probably already installed as well.

Note: In this chapter, we use the term "PC" to refer to personal computers in general, and not necessarily Windows computers.

Most PC operating systems include the software components you need for networking with TCP/IP:

- Windows® 95 or later includes the software components for establishing a TCP/IP network.
- Windows 3.1 does not include a TCP/IP component. You need to purchase a third-party TCP/IP application package such as NetManage Chameleon.

- Macintosh Operating System 7 or later includes the software components for establishing a TCP/IP network.
- All versions of UNIX or Linux include TCP/IP components. Follow the instructions provided with your operating system or networking software to install TCP/IP on your computer..

In your IP network, each PC and the firewall must be assigned a unique IP addresses. Each PC must also have certain other IP configuration information such as a subnet mask (netmask), a domain name server (DNS) address, and a default gateway address. In most cases, you should install TCP/IP so that the PC obtains its specific network configuration information automatically from a DHCP server during bootup. For a detailed explanation of the meaning and purpose of these configuration items, refer to "Appendix B, "Networks, Routing, and Firewall Basics."

The FVS318 VPN Firewall is shipped preconfigured as a DHCP server. The firewall assigns the following TCP/IP configuration information automatically when the PCs are rebooted:

- PC or workstation IP addresses—192.168.0.2 through 192.168.0.254
- Subnet mask—255.255.255.0
- Gateway address (the firewall)—192.168.0.1

These addresses are part of the IETF-designated private address range for use in private networks.

Configuring Windows 95, 98, and ME for IP Networking

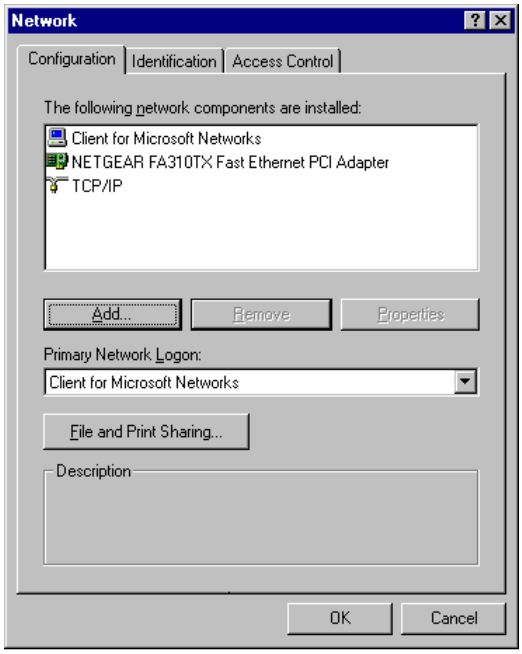
As part of the PC preparation process, you need to manually install and configure TCP/IP on each networked PC. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

Install or Verify Windows Networking Components

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network icon.

   The Network window opens, which displays a list of installed components:



You must have an Ethernet adapter, the TCP/IP protocol, and Client for Microsoft Networks.

Note: It is not necessary to remove any other network components shown in the Network window in order to install the adapter, TCP/IP, or Client for Microsoft Networks.

If you need the adapter:

a. Click the Add button.

b. Select Adapter, and then click Add.

c. Select the manufacturer and model of your Ethernet adapter, and then click OK.

If you need TCP/IP:

a. Click the Add button.

b. Select Protocol, and then click Add.

c. Select Microsoft.

d. Select TCP/IP, and then click OK.

If you need Client for Microsoft Networks:

a. Click the Add button.

b. Select Client, and then click Add.

c. Select Microsoft.

d. Select Client for Microsoft Networks, and then click OK.

3. Restart your PC for the changes to take effect.

Assign TCP/IP configuration by DHCP

After the TCP/IP protocol components are installed, each PC must be assigned specific information about itself and resources that are available on its network. The simplest way to configure this information is to allow the PC to obtain the information from the internal DHCP server of the FVS318 VPN Firewall. To use DHCP with the recommended default addresses, follow these steps:

1. Connect all PCs to the firewall, then restart the firewall and allow it to boot.
2. On each attached PC, open the Network control panel (refer to the previous section) and select the Configuration tab.
3. From the components list, select TCP/IP->(your Ethernet adapter) and click Properties.
4. In the IP Address tab, select “Obtain an IP address automatically”.
5. Select the Gateway tab.
6. If any gateways are shown, remove them.
7. Click OK.
8. Restart the PC.

Repeat steps 2 through 8 for each PC on your network.

Selecting Internet Access Method

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Internet Options icon.

3. Select “I want to set up my Internet connection manually” or “I want to connect through a Local Area Network” and click Next.
4. Select “I want to connect through a Local Area Network” and click Next.
5. Uncheck all boxes in the LAN Internet Configuration screen and click Next.
6. Proceed to the end of the Wizard.

Verifying TCP/IP Properties

After your PC is configured and has rebooted, you can check the TCP/IP configuration using the utility *winipcfg.exe*:

1. On the Windows taskbar, click the Start button, and then click Run.
2. Type **`winipcfg`**, and then click OK.

   The IP Configuration window opens, which lists (among other things), your IP address, subnet mask, and default gateway.
3. From the drop-down box, select your Ethernet adapter.

   The window is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that NETGEAR recommends:

   - The IP address is between 192.168.0.2 and 192.168.0.254
   - The subnet mask is 255.255.255.0
   - The default gateway is 192.168.0.1

Configuring Windows NT or 2000 for IP Networking

As part of the PC preparation process, you need to manually install and configure TCP/IP on each networked PC. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

Install or Verify Windows Networking Components

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network and Dialup Connections icon.

3. If an Ethernet adapter is present in your PC, you should see an entry for Local Area Connection. Double-click that entry.
4. Select Properties.
5. Verify that 'Client for Microsoft Networks' and 'Internet Protocol (TCP/IP)' are present. If not, select Install and add them.
6. Select 'Internet Protocol (TCP/IP)', click Properties, and verify that "Obtain an IP address automatically is selected.
7. Click OK and close all Network and Dialup Connections windows.
8. Make sure your PC is connected to the firewall, then reboot your PC.

Verifying TCP/IP Properties

To check your PC's TCP/IP configuration:

1. On the Windows taskbar, click the Start button, and then click Run.

   The Run window opens.

2. Type **cmd** and then click OK.

   A command window opens

3. Type **ipconfig /all**

   Your IP Configuration information will be listed, and should match the values below if you are using the default TCP/IP settings that NETGEAR recommends:

   - The IP address is between 192.168.0.2 and 192.168.0.254
   - The subnet mask is 255.255.255.0
   - The default gateway is 192.168.0.1

4. Type **exit**

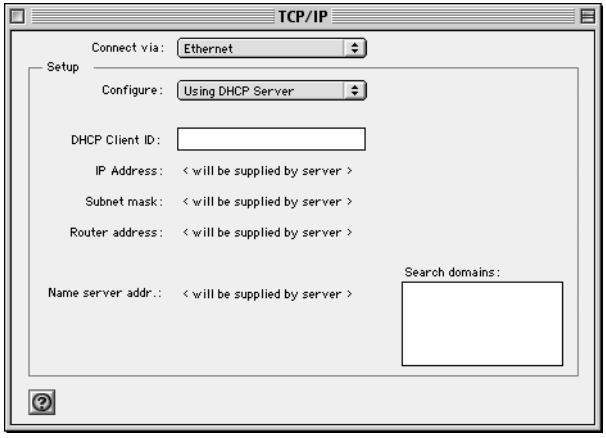
Configuring the Macintosh for IP Networking

Beginning with Macintosh Operating System 7, TCP/IP is already installed on the Macintosh. On each networked Macintosh, you will need to configure TCP/IP to use DHCP.

MacOS 8.6 or 9.x

1. From the Apple menu, select Control Panels, then TCP/IP.

   The TCP/IP Control Panel opens:



2. From the “Connect via” box, select your Macintosh’s Ethernet interface.
3. From the “Configure” box, select Using DHCP Server.

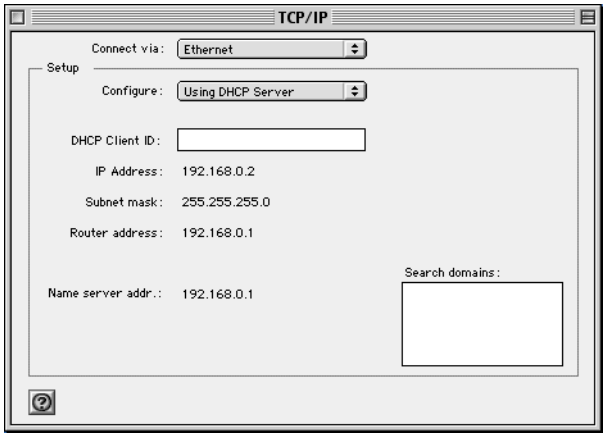
   You can leave the DHCP Client ID box empty.
4. Close the TCP/IP Control Panel.
5. Repeat this for each Macintosh on your network.

MacOS X

1. From the Apple menu, choose System Preferences, then Network.
2. If not already selected, select Built-in Ethernet in the Configure list.
3. If not already selected, Selct Using DHCP in the TCP/IP tab.
4. Click Save.

Verifying TCP/IP Properties (Macintosh)

After your Macintosh is configured and has rebooted, you can check the TCP/IP configuration by returning to the TCP/IP Control Panel. From the Apple menu, select Control Panels, then TCP/IP.



The panel is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that NETGEAR recommends:

- The IP Address is between 192.168.0.2 and 192.168.0.254
- The Subnet mask is 255.255.255.0
- The Router address is 192.168.0.1

If you do not see these values, you may need to restart your Macintosh or you may need to switch the “Configure” setting to a different option, then back again to “Using DHCP Server”.

Your Internet Account

For access to the Internet, you need to contract with an Internet service provider (ISP) for a single-user Internet access account using an external broadband access device such as a cable modem or DSL modem. This modem must be a separate physical box (not a card) and must provide an Ethernet port intended for connection to a Network Interface Card (NIC) in a PC. Your firewall does not support a USB-connected broadband modem.

For a single-user Internet account, your ISP supplies TCP/IP configuration information for one PC. With a typical account, much of the configuration information is dynamically assigned when your PC is first booted up while connected to the ISP, and you will not need to know that dynamic information.

In order to share the Internet connection among several computers, your firewall takes the place of the single PC, and you need to configure it with the TCP/IP information that the single PC would normally use. When the firewall's Internet port is connected to the broadband modem, the firewall appears to be a single PC to the ISP. The firewall then allows the PCs on the local network to masquerade as the single PC to access the Internet through the broadband modem. The method used by the firewall to accomplish this is called Network Address Translation (NAT) or IP masquerading.

Login Protocols

Some ISPs require a special login protocol, in which you must enter a login name and password in order to access the Internet. If you normally log in to your Internet account by running a program such as WinPOET or EnterNet, then your account uses PPP over Ethernet (PPPoE).

When you configure your firewall, you will need to enter your login name and password in the firewall's configuration menus. After your network and firewall are configured, the firewall will perform the login task when needed, and you will no longer need to run the login program from your PC. It is not necessary to uninstall the login program.

Account Information

Unless these items are dynamically assigned by the ISP, your ISP should give you the following basic information for your account:

- An IP address and subnet mask
- A gateway IP address, which is the address of the ISP's router
- One or more domain name server (DNS) IP addresses
- Host name and domain suffix

  For example, your account's full server names may look like this:

  `mail.xxx.yyy.com`

  In this example, the domain suffix is `xxx.yyy.com`.

If any of these items are dynamically supplied by the ISP, your firewall automatically acquires them. If an ISP technician configured your PC during the installation of the broadband modem, or if you configured it using instructions provided by your ISP, you need to copy configuration information from your PC's Network TCP/IP Properties window (or Macintosh TCP/IP Control Panel) before reconfiguring your PC for use with the firewall. These procedures are described next.

Obtaining ISP Configuration Information (Windows)

As mentioned above, you may need to collect configuration information from your PC so that you can use this information when you configure the FVS318 VPN Firewall. Following this procedure is only necessary when your ISP does not dynamically supply the account information.

To get the information you need to configure the firewall for Internet access:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network icon.

   The Network window opens, which displays a list of installed components.
3. Select TCP/IP, and then click Properties.

   The TCP/IP Properties dialog box opens.
4. Select the IP Address tab.

   If an IP address and subnet mask are shown, write down the information. If an address is present, your account uses a fixed (static) IP address. If no address is present, your account uses a dynamically-assigned IP address. Click "Obtain an IP address automatically".
5. Select the Gateway tab.

   If an IP address appears under Installed Gateways, write down the address. This is the ISP's gateway address. Select the address and then click Remove to remove the gateway address.
6. Select the DNS Configuration tab.

   If any DNS server addresses are shown, write down the addresses. If any information appears in the Host or Domain information box, write it down. Click Disable DNS.
7. Click OK to save your changes and close the TCP/IP Properties dialog box.

   You are returned to the Network window.
8. Click OK.
9. Reboot your PC at the prompt. You may also be prompted to insert your Windows CD.

Obtaining ISP Configuration Information (Macintosh)

As mentioned above, you may need to collect configuration information from your Macintosh so that you can use this information when you configure the FVS318 VPN Firewall. Following this procedure is only necessary when your ISP does not dynamically supply the account information.

To get the information you need to configure the firewall for Internet access:

1. From the Apple menu, select Control Panels, then TCP/IP.

   The TCP/IP Control Panel opens, which displays a list of configuration settings. If the "Configure" setting is "Using DHCP Server", your account uses a dynamically-assigned IP address. In this case, close the Control Panel and skip the rest of this section.
2. If an IP address and subnet mask are shown, write down the information.
3. If an IP address appears under Router address, write down the address. This is the ISP's gateway address.
4. If any Name Server addresses are shown, write down the addresses. These are your ISP's DNS addresses.
5. If any information appears in the Search domains information box, write it down.
6. Change the "Configure" setting to "Using DHCP Server".
7. Close the TCP/IP Control Panel.

Restarting the Network

Once you've set up your computers to work with the firewall, you must reset the network for the devices to be able to communicate correctly.

1. Turn off the DSL or cable modem, wait 15 seconds, and then turn it on again
2. Turn off the firewall, and then turn it on again and wait until the Test light turns off.
3. Restart any computer that is connected to the firewall.

Note: If the modem doesn't have an on/off switch, either pull the modem's power adapter out of the wall socket or power down the power strip.

Ready for Configuration

After configuring all of your PCs for TCP/IP networking and connecting them to the local network of your FVS318 VPN Firewall, you are ready to access and configure the firewall. Proceed to the next chapter.

Chapter 4
Basic Configuration

This chapter describes how to perform the basic configuration of your Model FVS318 Cable/DSL ProSafe VPN Firewall using the Setup Wizard, which walks you through the configuration process for your Internet connection.

Accessing the Web Configuration Manager

In order to use the browser-based Web Configuration Manager, your PC must have a web browser program installed such as Microsoft Internet Explorer or Netscape Navigator. Because the Configuration Manager uses Java, your Web browser must be Java-enabled and support HTTP uploads. NETGEAR recommends using Microsoft Internet Explorer or Netscape Navigator 4.0 or above. Free browser programs are readily available for Windows, Macintosh, or UNIX/Linux.

To configure for Internet access using your browser:

1. Connect your PC and firewall as described in the previous chapter.
   Make sure your PC has been rebooted since connecting with the firewall.
2. Launch your web browser.

   Note: If you normally use a login program (such as Enternet or WinPOET) to access the Internet, do not launch that program.
3. Click your browser's Stop button.
4. In the Address (or Location) box of your browser, type **http://192.168.0.1** and press ENTER.

A login window opens as shown in Figure 4-1 below:.

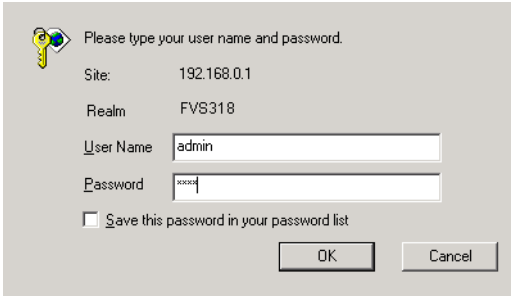


Figure 4-1. Login window

This screen may have a different appearance in other browsers.

5. Type **admin** in the User Name box, **password** in the Password box, and then click OK.

   (If your firewall password was previously changed, enter the current password.)

If your firewall has not yet been configured, the Setup Wizard should launch automatically. Otherwise, the main menu of the Web Configuration Manager will appear as shown in Figure 4-2 below:

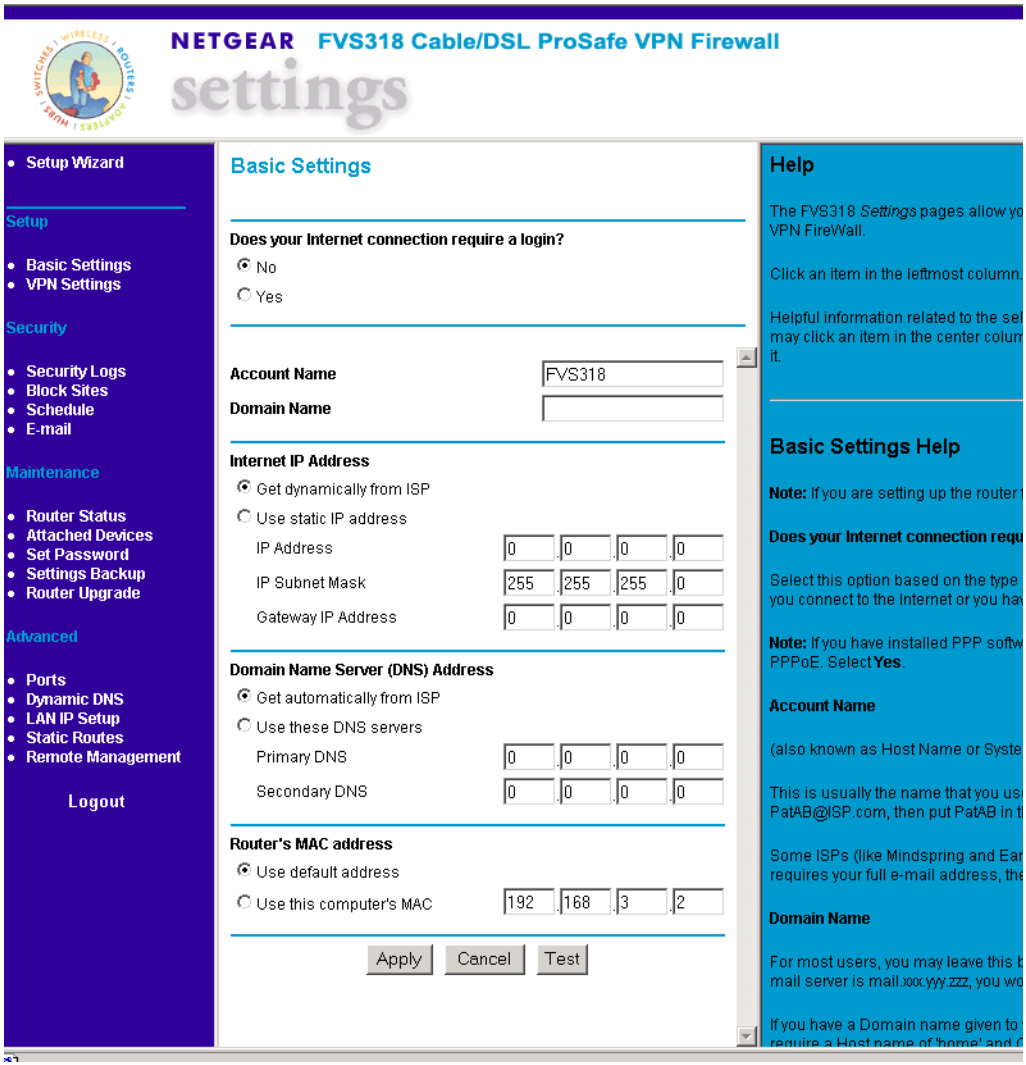


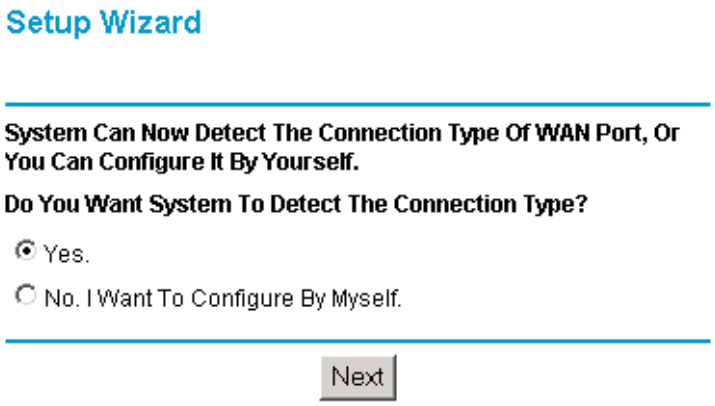
Figure 4-2. Browser-based configuration main menu

You can manually configure your firewall using this menu as described in “Manual Configuration“ on page 4-8, or you can allow the Setup Wizard to determine your configuration as described in the following chapter.

Configuration using the Setup Wizard

The Web Configuration Manager contains a Setup Wizard that can automatically determine your network connection type. If the Setup Wizard does not launch automatically, click on the Setup Wizard heading in the upper left of the opening screen, shown in Figure 4-2.

When the Wizard launches, allow the firewall to automatically determine your connection type by selecting Yes in the menu below and clicking Next:



The Setup Wizard will now check for a connection on the Internet port. If the Setup Wizard determines that there is no connection to the Internet port, you will be prompted to check the physical connection between your firewall and cable or DSL modem. When the connection is properly made, the firewall's Internet LED should be on.

Next, the Setup Wizard will attempt to determine which of the following connection types your Internet service account uses:

- Dynamic IP assignment
- Fixed IP address assignment
- A login protocol such as PPPoE

The Setup Wizard will report which connection type it has discovered, and it will then use the appropriate configuration menu for that connection type.

Configuring for Dynamic IP Account

If the Setup Wizard determines that your Internet service account uses Dynamic IP assignment, you will be directed to the menu shown in Figure 4-3 below:

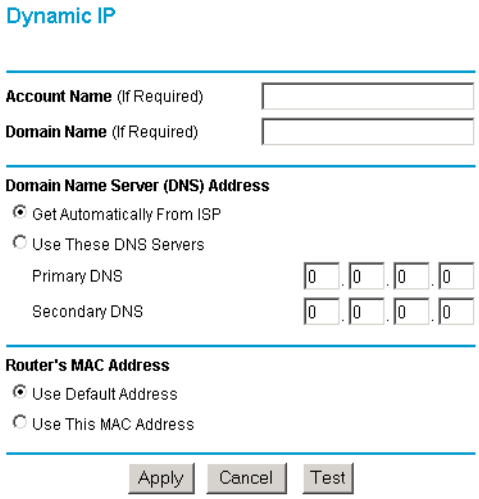


Figure 4-3. Setup Wizard menu for Dynamic IP address

1. Enter your Account Name (may also be called Host Name) and Domain Name. These parameters may be necessary to access your ISP's services such as mail or news servers. If you leave the Domain Name field blank, the firewall will attempt to learn the domain automatically from the ISP. If this is not successful, you may need to enter it manually.
2. Domain Name Server (DNS) Address: If you know that your ISP does not automatically transmit DNS addresses to the firewall during login, select "Use these DNS servers" and enter the IP address of your ISP's Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

   A DNS server is a host on the Internet that translates Internet names (such as www addresses) to numeric IP addresses. Typically your ISP transfers the IP addresses of one or two DNS servers to your firewall during login. If the ISP does not transfer an address, you must obtain it from the ISP and enter it manually here. If you enter an address here, you should reboot your PCs after configuring the firewall.

3. Router's MAC Address: This section determines the Ethernet MAC address that will be used by the firewall on the Internet port. If your ISP allows access by only one specific PC's Ethernet MAC address, select "Use this MAC address". The firewall will then capture and use the MAC address of the PC that you are now using. You must be using the one PC that is allowed by the ISP.

   Some ISPs will register the Ethernet MAC address of the network interface card in your PC when your account is first opened. They will then only accept traffic from the MAC address of that PC. This feature allows your firewall to masquerade as that PC by using its MAC address.

4. Click on Apply, then proceed to "Completing the Configuration" on page 4-9.

Configuring for Fixed IP Account

If the Setup Wizard determines that your Internet service account uses Fixed IP assignment, you will be directed to the menu shown in Figure 4-4 below:

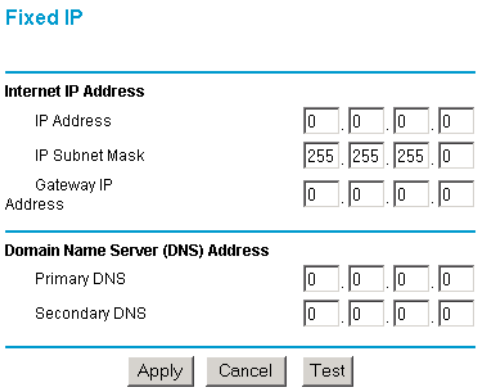


Figure 4-4. Setup Wizard menu for Fixed IP address

1. Enter your assigned IP Address, Subnet Mask, and the IP Address of your ISP's gateway router. This information should have been provided to you by your ISP.
2. Domain Name Server (DNS) Address: If you know that your ISP does not automatically transmit DNS addresses to the firewall during login, select "Use these DNS servers" and enter the IP address of your ISP's Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

A DNS server is a host on the Internet that translates Internet names (such as www addresses) to numeric IP addresses. Typically your ISP transfers the IP addresses of one or two DNS servers to your firewall during login. If the ISP does not transfer an address, you must obtain it from the ISP and enter it manually here. If you enter an address here, you should reboot your PCs after configuring the firewall.

3. Click on Apply, then proceed to "Completing the Configuration" on page 4-9.

Configuring for an Account with Login

If the Setup Wizard determines that your Internet service account uses a login protocol such as PPP over Ethernet (PPPoE), you will be directed to a menu like the PPPoE menu shown in Figure 4-5 below:

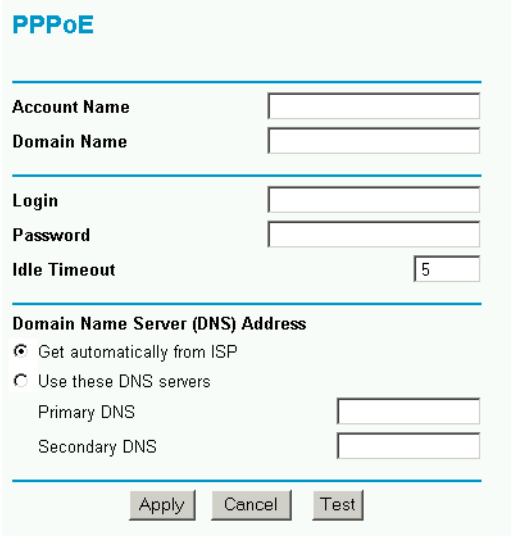


Figure 4-5. Setup Wizard menu for PPPoE login accounts

1. Enter your Account Name (may also be called Host Name) and Domain Name. These parameters may be necessary to access your ISP's services such as mail or news servers. If you leave the Domain Name field blank, the firewall will attempt to learn the domain automatically from the ISP. If this is not successful, you may need to enter it manually.
2. Enter the PPPoE login user name and password provided by your ISP. These fields are case sensitive. If you wish to change the login timeout, enter a new value in minutes.

Note: You will no longer need to launch the ISP's login program on your PC in order to access the Internet. When you start an Internet application, your firewall will automatically log you in.

3. Domain Name Server (DNS) Address: If you know that your ISP does not automatically transmit DNS addresses to the firewall during login, select "Use these DNS servers" and enter the IP address of your ISP's Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

   A DNS server is a host on the Internet that translates Internet names (such as www addresses) to numeric IP addresses. Typically your ISP transfers the IP addresses of one or two DNS servers to your firewall during login. If the ISP does not transfer an address, you must obtain it from the ISP and enter it manually here. If you enter an address here, you should reboot your PCs after configuring the firewall.

4. Click on Apply, then proceed to "Completing the Configuration" on page 4-9.

Manual Configuration

You can manually configure the firewall in the Basic Settings menu shown in Figure 4-2 using these steps:

1. Select whether your Internet connection requires a login.

   Select 'Yes' if you normally must launch a login program such as Enternet or WinPOET in order to access the Internet.

2. Enter your Account Name (may also be called Host Name) and Domain Name. These parameters may be necessary to access your ISP's services such as mail or news servers.

3. (If displayed) Enter the PPPoE login user name and password provided by your ISP. These fields are case sensitive. If you wish to change the login timeout, enter a new value in minutes.

   Note: You will no longer need to launch the ISP's login program on your PC in order to access the Internet. When you start an Internet application, your firewall will automatically log you in.

4. Internet IP Address: If your ISP has assigned you a permanent, fixed (static) IP address for your PC, select "Use static IP address". Enter the IP address that your ISP assigned. Also enter the netmask and the Gateway IP address. The Gateway is the ISP's router to which your firewall will connect.

5. Domain Name Server (DNS) Address: If you know that your ISP does not automatically transmit DNS addresses to the firewall during login, select “Use these DNS servers” and enter the IP address of your ISP’s Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

   A DNS server is a host on the Internet that translates Internet names (such as www addresses) to numeric IP addresses. Typically your ISP transfers the IP addresses of one or two DNS servers to your firewall during login. If the ISP does not transfer an address, you must obtain it from the ISP and enter it manually here. If you enter an address here, you should reboot your PCs after configuring the firewall.

6. Router’s MAC Address: This section determines the Ethernet MAC address that will be used by the firewall on the Internet port. Some ISPs will register the Ethernet MAC address of the network interface card in your PC when your account is first opened. They will then only accept traffic from the MAC address of that PC. This feature allows your firewall to masquerade as that PC by “cloning” its MAC address.

   To change the MAC address, select "Use this Computer’s MAC address". The firewall will then capture and use the MAC address of the PC that you are now using. You must be using the one PC that is allowed by the ISP.

7. Click Apply, then proceed to Completing the Configuration.

Completing the Configuration

Click on the Test button to test your Internet connection. If the NETGEAR website does not appear within one minute, refer to Chapter 9, “Troubleshooting”.

Your firewall is now configured to provide Internet access for your network. When your firewall and PCs are configured correctly, your firewall automatically accesses the Internet when one of your LAN devices requires access. It is not necessary to run a dialer or login application such as Dial-Up Networking or Enternet to connect, log in, or disconnect. These functions are performed by the firewall as needed.

To access the Internet from any PC connected to your firewall, launch a browser such as Microsoft Internet Explorer or Netscape Navigator. You should see the firewall’s Internet LED blink, indicating communication to the ISP. The browser should begin to display a Web page.

The following chapters describe how to configure the Advanced features of your firewall, and how to troubleshoot problems that may occur.

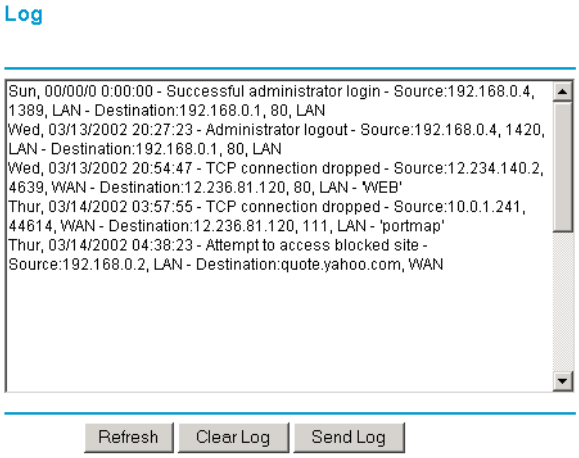
Chapter 5
Configuring Security Features

This chapter describes how to use the security features of your Model FVS318 Cable/DSL ProSafe VPN Firewall. The firewall provides you with Web content filtering by keyword, and with security incident logging. You can configure the firewall to e-mail its log to you at specified intervals. You can also configure the firewall to send immediate alert messages to your e-mail address or e-mail pager whenever a significant security event occurs.

To configure these features of your firewall, click on the subheadings under the Security heading in the Main Menu of the browser interface.

Security Log

The firewall will log security-related events such as denied incoming service requests, hacker probes, and administrator logins. If you enabled content filtering in the Block Sites menu, the Logs page shows you when someone on your network tried to access a blocked site. If you enabled e-mail notification, you'll receive these logs in an e-mail message. If you don't have e-mail notification enabled, you can view the logs here. An example is shown below:



Log entries are described in Table 5-1

Table 5-1. Log entry descriptions

Field	Description
Date and Time	The date and time the log entry was recorded.
Description or Action	The type of event and what action was taken if any.
Source IP	The IP address of the initiating device for this log entry.
Source port and interface	The service port number of the initiating device, and whether it originated from the LAN or WAN
Destination	The name or IP address of the destination device or website.
Destination port and interface	The service port number of the destination device, and whether it's on the LAN or WAN.

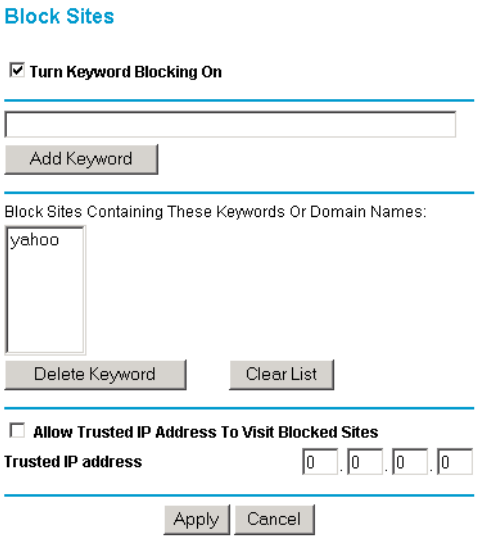
Log action buttons are described in Table 5-2

Table 5-2. Log action buttons

Field	Description
Refresh	Click this button to refresh the log screen.
Clear Log	Click this button to clear the log entries.
Send Log	Click this button to email the log immediately.

Block Sites

The FVS318 VPN Firewall allows you to restrict access based on Web addresses and Web address keywords. Up to 255 entries are supported in the Keyword list. The Keyword Blocking menu is shown below:



To enable keyword blocking, check “Turn keyword blocking on”, then click Apply. Be sure that a time period for blocking is specified on the Schedule menu.

To add a keyword or domain, type it in the Keyword box, click Add Keyword, then click Apply.

To delete a keyword or domain, select it from the list, click Delete Keyword, then click Apply.

Keyword application examples:

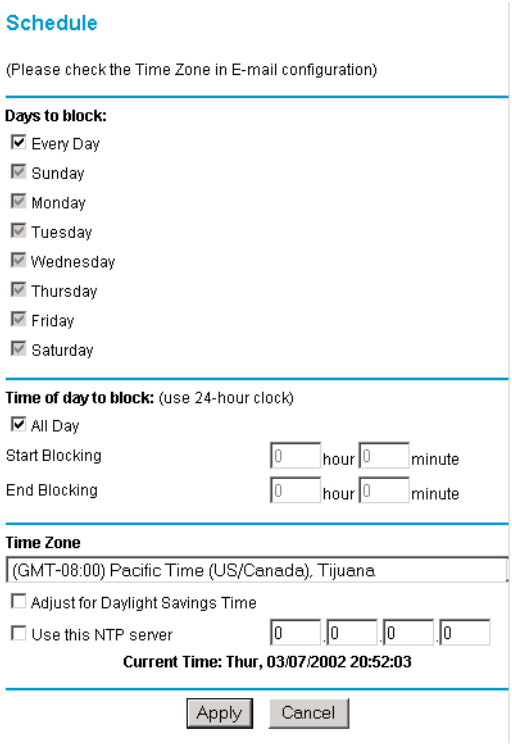
- If the keyword "XXX" is specified, the URL <http://www.badstuff.com/xxx.html> is blocked.
- If the keyword ".com" is specified, only websites with other domain suffixes (such as .edu or .gov) can be viewed.
- If you wish to block all Internet browsing access during a scheduled period, enter the keyword "." and set the schedule in the Schedule menu.

To specify a Trusted User, enter that PC's IP address in the Trusted User box and click Apply.

You may specify one Trusted User, which is a PC that will be exempt from blocking and logging. Since the Trusted User will be identified by an IP address, you should configure that PC with a fixed IP address.

Schedule

If you enabled content filtering in the Block Sites menu, you can set up a schedule for when blocking occurs or when access isn't restricted. The firewall allows you to specify when blocking will be enforced by configuring the Schedule tab shown below:



To block keywords or Internet domains based on a schedule:

1. Select Every Day or select one or more days.
2. If you want to limit access completely for the selected days, select All Day.
   Otherwise, If you want to limit access during certain times for the selected days, type a Start Blocking time and an End Blocking time.

   Note: Note: Enter the values as 24-hour time. For example, 10:30 am would be 10 hours and 30 minutes and 10:30 pm would be 22 hours and 30 minutes.
3. Click Apply

Time Zone

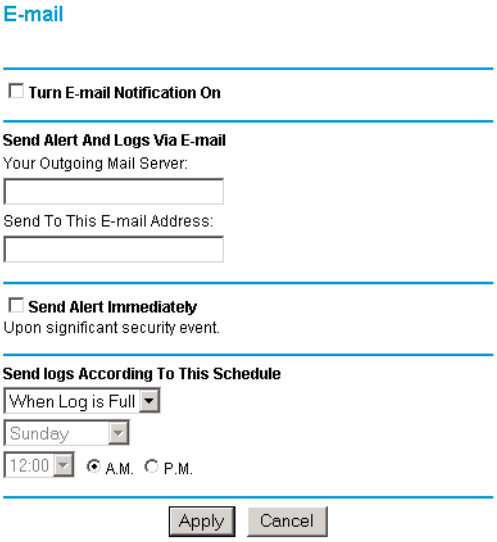
The FVS318 VPN Firewall uses the Network Time Protocol (NTP) to obtain the current time and date from one of several Network Time Servers on the Internet. In order to localize the time for your log entries, you must select your Time Zone from the list.

If your region uses Daylight Savings Time, you must manually check Adjust for Daylight Savings Time at the beginning of the Daylight Savings Time, and uncheck it at the end. Enabling Daylight Savings Time will cause one hour to be added to the standard time.

The firewall has a list of publicly available NTP servers. If you would prefer to use a particular NTP server as the primary server, enter its IP address under Use this NTP Server.

E-Mail

In order to receive logs and alerts by e-mail, you must provide your e-mail information in the E-Mail subheading:



- Turn e-mail notification on
  Check this box if you wish to receive e-mail logs and alerts from the firewall.
- Your outgoing mail server
  Enter the name or IP address of your ISP's outgoing (SMTP) mail server (such as mail.myISP.com). You may be able to find this information in the configuration menu of your e-mail program. If you leave this box blank, log and alert messages will not be sent via e-mail.
- Send to this e-mail address
  Enter the e-mail address to which logs and alerts are sent. This e-mail address will also be used as the From address. If you leave this box blank, log and alert messages will not be sent via e-mail.

You can specify that logs are automatically sent to the specified e-mail address with these options:

- Send alert immediately
  Check this box if you would like immediate notification of a significant security event, such as a known attack, port scan, or attempted access to a blocked site.

- Send logs according to this schedule
  Specifies how often to send the logs: Hourly, Daily, Weekly, or When Full.
  - Day for sending log
    Specifies which day of the week to send the log. Relevant when the log is sent weekly or daily.
  - Time for sending log
    Specifies the time of day to send the log. Relevant when the log is sent daily or weekly.

  If the Weekly, Daily or Hourly option is selected and the log fills up before the specified period, the log is automatically e-mailed to the specified e-mail address. After the log is sent, the log is cleared from the firewall's memory. If the firewall cannot e-mail the log file, the log buffer may fill up. In this case, the firewall overwrites the log and discards its contents.

The FVS318 VPN Firewall uses the Network Time Protocol (NTP) to obtain the current time and date from one of several Network Time Servers on the Internet. In order to localize the time for your log entries, you must specify your Time Zone:

- Time Zone
  Select your local time zone. This setting will be used for the blocking schedule and for time-stamping log entries.
- Daylight Savings Time
  Check this box if your time zone is currently under daylight savings time.

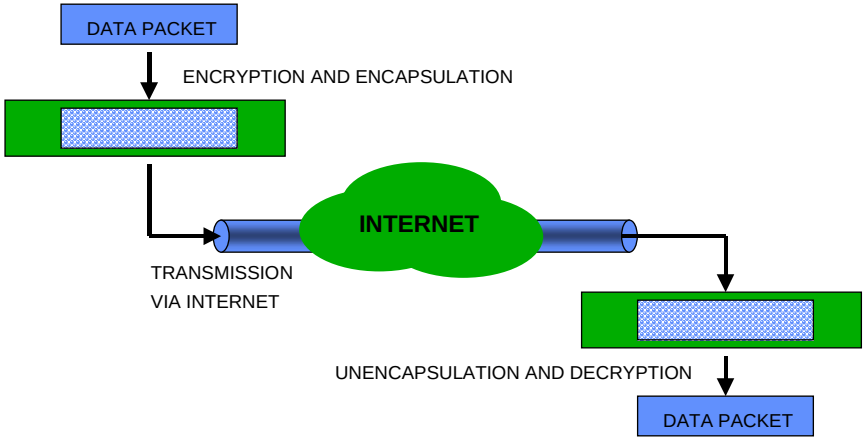
Chapter 6
Virtual Private Networking

This chapter describes how to use the the virtual private networking (VPN) features of the FVS318 VPN Firewall. A VPN provides secure, encrypted communication between your local network and a remote network or computer.

Note: The FVS318 VPN Firewall uses industry standard VPN protocols. However, due to variations in how manufacturers interpret these standards, many VPN products are not interoperable. NETGEAR provides support for connections between two FVS318 VPN Firewalls, and between an FVS318 VPN Firewall and the SafeNet Secure VPN Client for Windows. Although the FVS318 can interoperate with many other VPN products, it is not possible for NETGEAR to provide specific technical support for every other interconnection.

What is a VPN

A VPN can be thought of as a secure tunnel passing through the Internet, connecting two devices such as a PC or router, which form the two tunnel endpoints. At one endpoint, data is encapsulated and encrypted, then transmitted through the Internet. At the far endpoint, the data is received, unencapsulated and decrypted. Although the data may pass through several Internet routers between the endpoints, the encapsulation and encryption forms a virtual “tunnel” for the data.



The tunnel endpoint device, which encodes or decodes the data, can either be a PC running VPN client software or a VPN-enabled router or server. Several software standards exist for VPN data encapsulation and encryption, such as PPTP and IPSec. Your FVS318 VPN Firewall uses IPSec.

To set up a VPN connection, you must configure each endpoint with specific identification and connection information describing the other endpoint. This set of configuration information defines a security association (SA) between the two points. The FVS318 is capable of eight Security Associations.

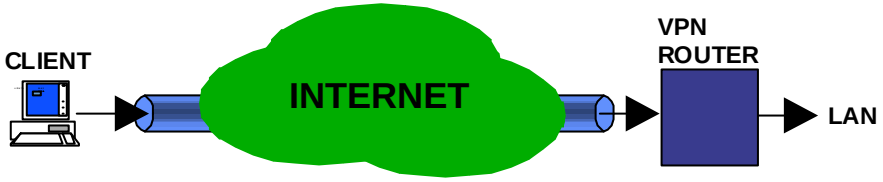
Two common applications of VPN are

- secure access from a remote PC, such as a telecommuter connecting to an office network
- secure access between two networks, such as a branch office and a main office

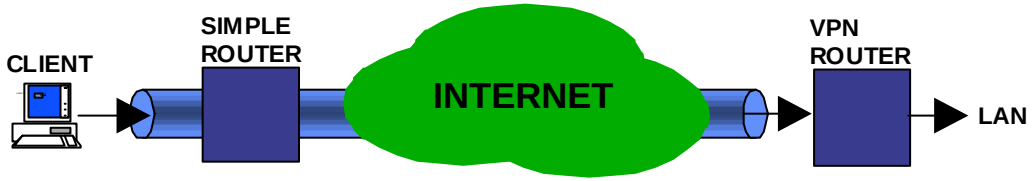
These applications are described below.

Accessing Network Resources from a VPN Client PC

VPN client remote access allows a remote PC to connect to your network from any location on the Internet. In this case, the remote PC is one tunnel endpoint, running VPN client software. The NETGEAR VPN-enabled router on your network is the other tunnel endpoint, as shown below.



In some cases, the client PC may connect to the Internet through a local non-VPN-enabled router, as shown below:

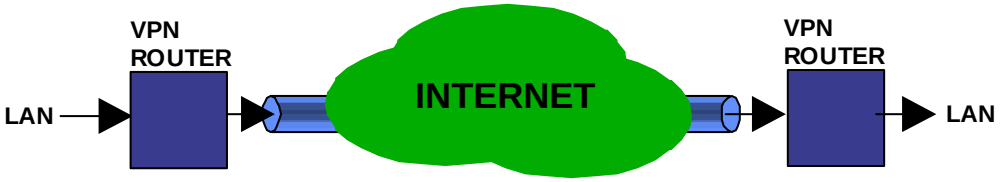


If the non-VPN router is performing NAT, it must support “VPN-passthrough” of IPSec-encoded data.

For a PC to act as a tunnel endpoint to your FVS318 VPN Firewall, the PC must run a VPN client program based on the IPSec protocol. NETGEAR recommends that you use the SafeNet SoftRemote (or Soft-PK) VPN client program, which is available from SafeNet (www.safenet-inc.com). Installation and configuration instructions for the SafeNet client program are provided on page 6-13.

Linking Two Networks Together

A VPN between two NETGEAR VPN-enabled routers is a good way to connect branch offices and business partners over the Internet, offering an affordable, high-performance alternative to leased site-to-site lines. The VPN also provides access to remote network resources when NAT is enabled and remote computers have been assigned private IP addresses.



Planning the VPN

When planning your VPN, you must make a few choices first:

- Will the remote end be a network or a single PC?

  If Network: The two endpoint networks must have different LAN IP address ranges. For example, if both ends are using the NETGEAR default address range of 192.168.0.x, the connection will not work. Change one router's LAN IP Address and DHCP range to a different range such as 192.168.1.x.

  If Single PC: If the remote endpoint is a single PC running a VPN client, its destination address must be a single IP address, with a subnet mask of 255.255.255.255.

- Does one side have a dynamic IP address?
  At least one side must have a fixed IP address.
  The side with a dynamic IP address must always be the initiator of the connection.
- Will you be using the simpler Internet Key Exchange (IKE) setup, or Manual Keying, in which you must specify each phase of the connection?
- What level of encryption will you use (56 bit DES or 168 bit 3DES)?

Configuring a VPN Between Two LANs

This procedure describes linking two LANs using an FVS318 at each end.

Check the LAN Address Ranges

First, be sure that the two LANs have different IP address ranges. If both networks are using the NETGEAR default address range of 192.168.0.x, the connection will not work. In this case, you must change one FVS318's LAN IP Address and DHCP range to a different range such as 192.168.3.x.. To change the second FVS318's LAN address range, follow these steps:

1. Go to the LAN IP Setup menu of the second FVS318
2. Change the IP Address to 192.168.3.1
3. Change the DHCP Starting Address to 192.168.3.2
4. Change the DHCP Ending Address to 192.168.3.100
5. Change any Reserved IP Addresses to be part of the 192.168.3.x network
6. If you have configured Port Forwarding, Trusted User, or Static Routes, you may need to change these configurations as well.
7. Click Apply
   At this point the firewall's IP address will change and you will be disconnected from the firewall's configuration.
8. Reboot all PCs on this network.

Configure the First Firewall

The simplest method of linking the two firewalls will be to use the IKE protocol, allowing them to automatically negotiate the connection and exchange keying information. In this case, the configuration of the two firewalls differs only in the setting of the destination address ranges. To configure the first firewall, follow these steps:

1. From the Main Menu of the browser interface click the link labeled VPN Settings. The VPN Settings window opens as shown in Figure 6-1 below:

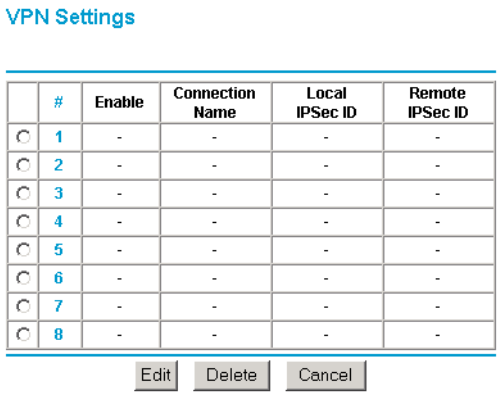


Figure 6-1. VPN Settings Window

2. Click the button next to an unused profile in the table and click Edit. The VPN Settings - IKE window opens as shown in Figure 6-2 below:

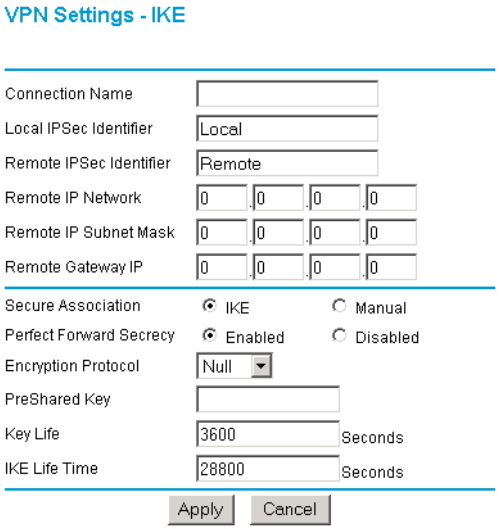


Figure 6-2. VPN Edit menu for IKE

3. Type a name for this Security Association in the Connection Name box.
   (This name is only to help you identify the Security Association)
4. Enter a Local IPSec Identifier name for this FVS318.
   You can leave this as ‘Local’.
5. Enter a Remote IPSec Identifier name for the remote FVS318.
   You can leave this as ‘Remote’.
6. Define the remote network by entering its Remote IP Address and IP Subnet Mask.
   In this case, the Remote network address is the LAN network address of the second FVS318, which is 192.168.3.0 and the Subnet Mask is 255.255.255.0.
7. Type the Remote Gateway IP Address, which is the public IP address of the second FVS318.
   If the second FVS318 has a dynamic address, type 0.0.0.0.

   Note: Only one side may have a dynamic IP address, and that side must always initiate the connection.

At this point, you must choose whether the Security Association (SA) will use the simpler Internet Key Exchange (IKE) setup, or Manual Keying. IKE is an automated method for establishing a shared security policy and authenticated keys. A preshared key is used for mutual identification. With Manual Keying, you must specify each phase of the connection.

8. Under Secure Association, click the radio button for IKE.
9. Enable Perfect Forward Secrecy.
10. For Encryption Protocol, select one:
    a. Null - Fastest, but no security.
    b. DES - Faster but less secure than 3DES.
    c. 3DES - (Triple DES) Most secure.
11. Enter a PreShared Key - Use a secure combination of letters, numbers, and symbols
    The PreShared Key should be between 8 and 80 characters. For greater security, enter a combination of letters, numbers and symbols, such as "r>T(h4&3@#kB". Letters are case sensitive.
12. Key Life - Default is 3600 seconds (1 hour)
13. IKE Life Time - Default is 28800 seconds (8 hours).
    A shorter time increases security, but users will be temporarily disconnected upon renegotiation.
14. Click Apply to enter the SA into the table.

Configure the Second Firewall

To configure the second FVS318, follow the same steps as the first FVS318, except for steps 6 and 7. For those steps, do the following:

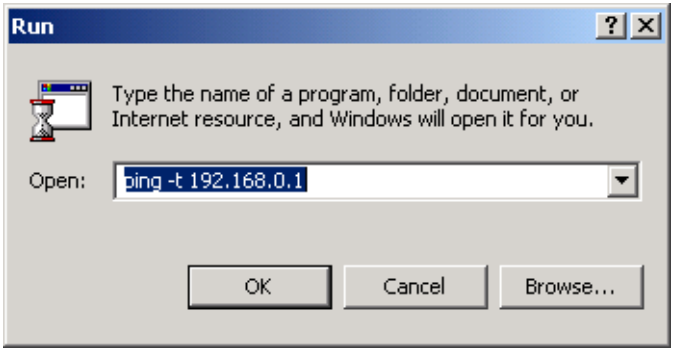
6) Define the remote network by entering its Remote IP Address and IP Subnet Mask.
In this case, the Remote network address is the LAN network address of the first FVS318, which is 192.168.0.0 and the Subnet Mask is 255.255.255.0.

7) Type the Remote Gateway IP Address, which is the public IP address of the first FVS318.

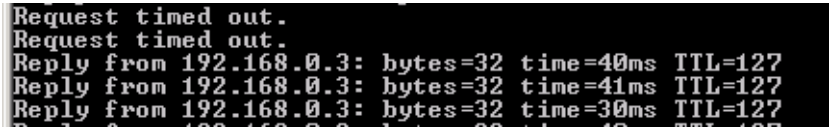
Check the VPN Connection

To check the VPN Connection, you can initiate a request from one network to the other. If one FVS318 has a dynamically assigned WAN IP address, you must initiate the request from that FVS318's network. The simplest method is to ping from a PC on the LAN of the FVS318 to the LAN IP address of the other FVS318. Using our example, start from a PC attached to the second FVS318:

1. On the Windows taskbar, click the Start button, and then click Run.
2. Type **`ping -t 192.168.0.1`** , and then click OK.

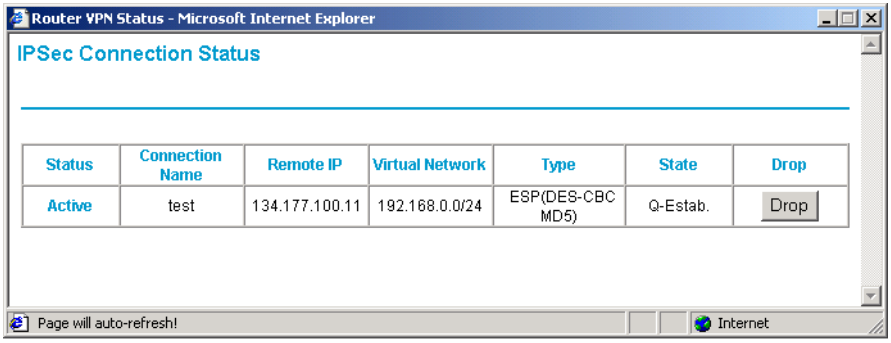


This will cause a continuous ping to be sent to the first FVS318. After several seconds (up to two minutes), the ping response should change from "timed out" to "reply".



At this point the connection is established. You can also verify the progress of the connection by viewing the FVS318's VPN Log and Status windows. Go to the main menu and click on Router Status. At the bottom of that menu appear two buttons labeled "Show VPN Logs" and "Show VPN Status".

Clicking on Show VPN Status displays the following screen:



When the tunnel is active, the State will show "Q-Established". To drop the connection manually, you can click the Drop button.

The Show VPN Logs button displays details of the VPN authentication and protocol negotiation. For a successful connection, the log will appear similar to the following:

```
Sun, 03/31/02 0:00:04 - FVS318 IPsec:Initiating Main Mode
Sun, 03/31/02 0:00:04 - FVS318 IKE:[test] Initializing IKE Main Mode
Sun, 03/31/02 0:00:04 - FVS318 IKE:[test] TX >> MM_I1 : 134.177.100.11
Sun, 03/31/02 0:00:04 - FVS318 IPsec:Packet retransmission, timeout in 5 seconds for #1
Sun, 03/31/02 0:00:08 - FVS318 IPsec:Packet retransmission, timeout in 10 seconds for #1
Sun, 03/31/02 0:00:14 - FVS318 IPsec:Interface-UP(1):12.236.100.244
Sun, 03/31/02 0:00:14 - FVS318 IPsec:Interface-UP(3):12.236.100.244
Sun, 03/31/02 0:00:18 - FVS318 IPsec:Packet retransmission, timeout in 20 seconds for #1
Sun, 03/31/02 0:00:20 - FVS318 IKE:[test] RX << MM_R1 : 134.177.100.11
Sun, 03/31/02 0:00:20 - FVS318 IKE:OAKLEY_PRESHARED_KEY/OAKLEY_DES_CBC/MODP1024
Sun, 03/31/02 0:00:20 - FVS318 IKE:[test] TX >> MM_I2 : 134.177.100.11
Sun, 03/31/02 0:00:20 - FVS318 IPsec:Packet retransmission, timeout in 5 seconds for #1
Sun, 03/31/02 0:00:24 - FVS318 IKE:[test] RX << MM_R2 : 134.177.100.11
Sun, 03/31/02 0:00:24 - FVS318 IKE:[test] TX >> MM_I3 : 134.177.100.11
Sun, 03/31/02 0:00:24 - FVS318 IPsec:Packet retransmission, timeout in 5 seconds for #1
Sun, 03/31/02 0:00:26 - FVS318 IKE:[test] RX << MM_R3 : 134.177.100.11
Sun, 03/31/02 0:00:26 - FVS318 IPsec:Peer's ID is ID_IPV4_ADDR:134.177.100.11
Sun, 03/31/02 0:00:26 - FVS318 IPsec:Packet retransmission, timeout in 28620 seconds for #1
Sun, 03/31/02 0:00:26 - FVS318 IPsec:initiating Quick Mode PSK+ENCRYPT+TUNNEL+PFS
Sun, 03/31/02 0:00:26 - FVS318 IKE:[test] TX >> QM_I1 : 134.177.100.11
Sun, 03/31/02 0:00:26 - FVS318 IPsec:Packet retransmission, timeout in 5 seconds for #2
Sun, 03/31/02 0:00:30 - FVS318 IKE:[test] RX << QM_R1 : 134.177.100.11
Sun, 03/31/02 0:00:30 - FVS318 IKE:[test] TX >> QM_I2 : 134.177.100.11
Sun, 03/31/02 0:00:30 - FVS318 IKE:[test] established with 134.177.100.11 successfully
Sun, 03/31/02 0:00:30 - FVS318 IPsec:Packet retransmission, timeout in 3420 seconds for #2
```

Using the VPN Connection

Now that your VPN connection is working, whenever a PC on the second LAN needs to access an IP address on the first LAN, the firewalls will automatically establish the connection. This is fine when you know the IP address of a resource on the other network. However, since Windows Network Neighborhood broadcasts are not IP traffic, and are therefore not routed by the firewall, you will not be able to browse the remote LAN without taking a few more steps. These steps are described in “Accessing Remote Resources across a VPN“ on page 6-23.

Configuring a VPN Between a LAN and a Remote PC

This procedure describes linking a LAN and a remote PC. The LAN will connect to the Internet using an FVS318 with a fixed IP address. The PC can be connected to the Internet through dialup, cable or DSL modem, or other means, and we will assume it has a dynamically assigned IP address.

The PC must have a VPN client program that supports IPSec. NETGEAR recommends and supports the SafeNet SoftRemote (or Soft-PK) Secure VPN Client for Windows, Version 5 or later. The SafeNet VPN Client can be purchased from SafeNet at www.safenet-inc.com.

Configuring the Firewall

The simplest method of linking the firewall and client will be to use the IKE protocol, allowing them to automatically negotiate the connection and exchange keying information. To configure the firewall, follow these steps:

1. From the Main Menu of the browser interface click the link labeled VPN Settings. The VPN Settings window opens as shown in Figure 6-1 below:

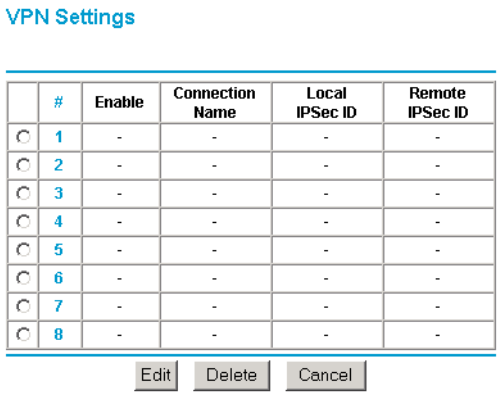


Figure 6-3. VPN Settings Window

2. Click the button next to an unused profile in the table and click Edit. The VPN Settings - IKE window opens as shown in Figure 6-4 below:

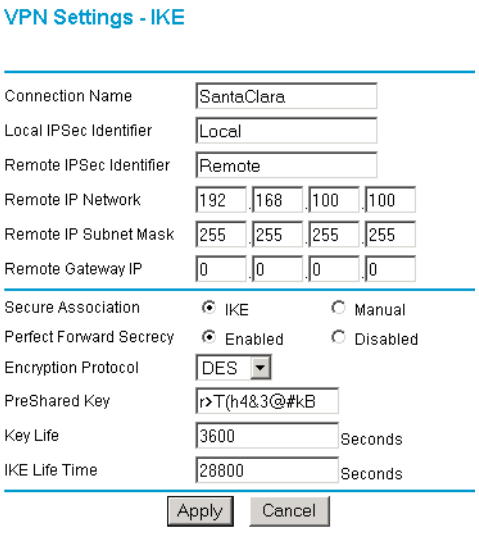


Figure 6-4. VPN Edit menu for connecting with a VPN client

3. Type a name for this Security Association in the Connection Name box.
   (This name is only to help you identify the Security Association)
4. Enter a Local IPSec Identifier name for this FVS318.
   You can leave this as ‘Local’.
5. Enter a Remote IPSec Identifier name for the remote FVS318.
   You can leave this as ‘Remote’.
6. Define the remote network by entering its Remote IP Address and IP Subnet Mask.
   In this case, the remote network is a single PC, and its IP address is unknown since it will be assigned dynamically by the user’s ISP. We will choose an arbitrary “fixed virtual” IP address to define this connection. This IP address will be used in the configuration of the VPN client. For this example, we will choose 192.168.100.100.
7. Since the remote network is a single PC, enter 255.255.255.255 for the Subnet Mask.
8. Since the remote PC has a dynamically assigned IP address, enter 0.0.0.0 as the Remote Gateway IP Address.

   Note: Only one side may have a dynamic IP address, and that side must always initiate the connection.

Choose whether the Security Association (SA) will use the simpler Internet Key Exchange (IKE) setup, or Manual Keying. IKE is an automated method for establishing a shared security policy and authenticated keys. A preshared key is used for mutual identification. With Manual Keying, you must specify each phase of the connection.

9. Under Secure Association, click the radio button for IKE.
10. Enable Perfect Forward Secrecy.
11. For Encryption Protocol, select one:
    a. Null - Fastest, but no security.
    b. DES - Faster but less secure than 3DES.
    c. 3DES - (Triple DES) Most secure.
12. Enter a PreShared Key - Use a secure combination of letters, numbers, and symbols
    The PreShared Key should be between 8 and 80 characters. For greater security, enter a combination of letters, numbers and symbols, such as "r>T(h4&3@#kB". Letters are case sensitive.
13. Key Life - Default is 3600 seconds (1 hour)

14. IKE Life Time - Default is 28800 seconds (8 hours).
    A shorter time increases security, but users will be temporarily disconnected upon renegotiation.
15. Click Apply to enter the SA into the table.

Installing the VPN Client Software

Note: Use Windows98 Second Edition or a later release of Windows with this VPN Client software.

To install and configure the Secure VPN Client, follow the instructions below:

1. Purchase and download the Secure VPN Client installation software to your PC and decompress it using an unzip utility such as WinZip.
2. Go to the folder where you saved the installation files and run SETUP.EXE.

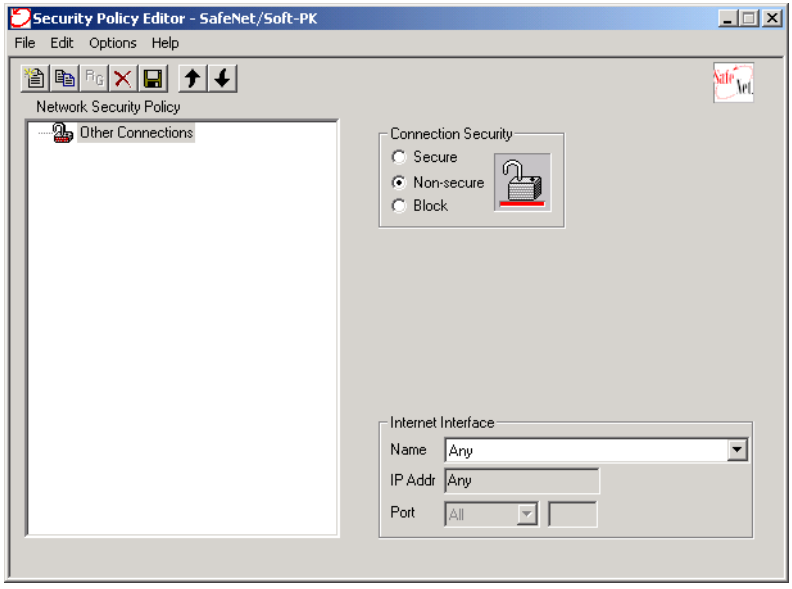
   You may need to insert your Windows CD to complete the installation.

   If you do not have a modem or dial-up adapter installed in your PC, you may see the warning message stating “The SafeNet VPN Component requires at least one dial-up adapter be installed.” You can disregard this message.
3. You may have the option to install either or both of the VPN Adapter or the IPSec Component. Install the IPSec Component. The VPN Adapter is not necessary.
4. Reboot your PC after installing the client software.

Configuring the Client Software

Open the Security Policy Editor

To launch the VPN client, click on the Windows Start button, then select Programs, then SafeNet Soft-PK (or SoftRemote), then Security Policy Editor. The Security Policy Editor window window will appear:.



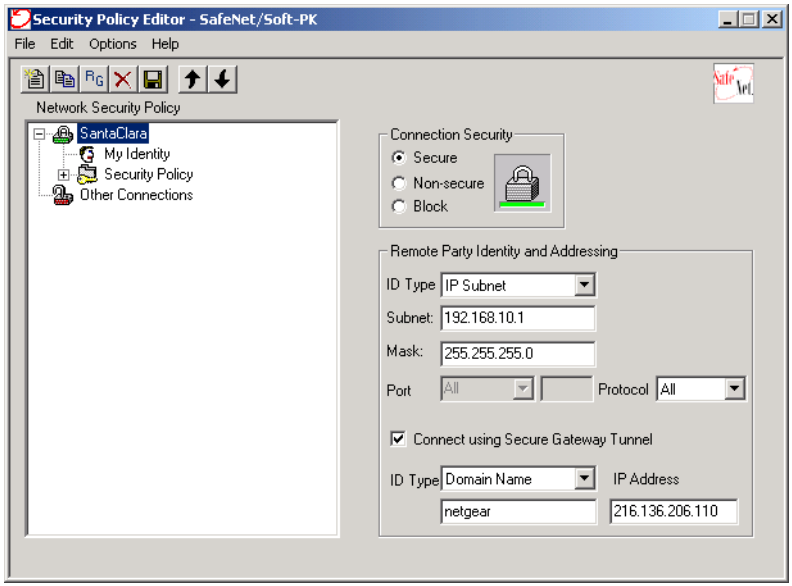
Create a VPN Connection

In this step you will need to provide information about the FVS318 to which you will be connecting. You will need to provide:

- A descriptive name for the connection
- The network address range of the FVS318 (its LAN IP address and netmask)
- The WAN IP address of the FVS318

You will also need to provide the shared key that will match the FVS318's key.

From the Edit menu at the top of the Security Policy Editor window, click Add, then Connection. A ”New Connection” listing will appear in the list of policies..



1. Click and rename the “New Connection” list item to a descriptive name such as “SantaClara”
2. In the Connection Security box on the right side of the Security Policy Editor window, select Secure.
3. In the ID Type menu, select IP Subnet.
4. In the Subnet field, type the network address of the FVS318’s LAN. The network address is usually the LAN IP Address of the FVS318 with the last character set to 0.
   This address will usually be 192.168.0.0.
5. In the Mask field, type the LAN Subnet Mask of the FVS318
   This will usually be 255.255.255.0.
6. In the Protocol menu, Select All to allow all traffic through the VPN tunnel.
7. Check the Connect using Secure Gateway Tunnel checkbox.
8. In the ID Type menu below the checkbox, select IP Address.
9. Enter the public WAN IP Address of the FVS318 in the field directly below the ID Type menu.

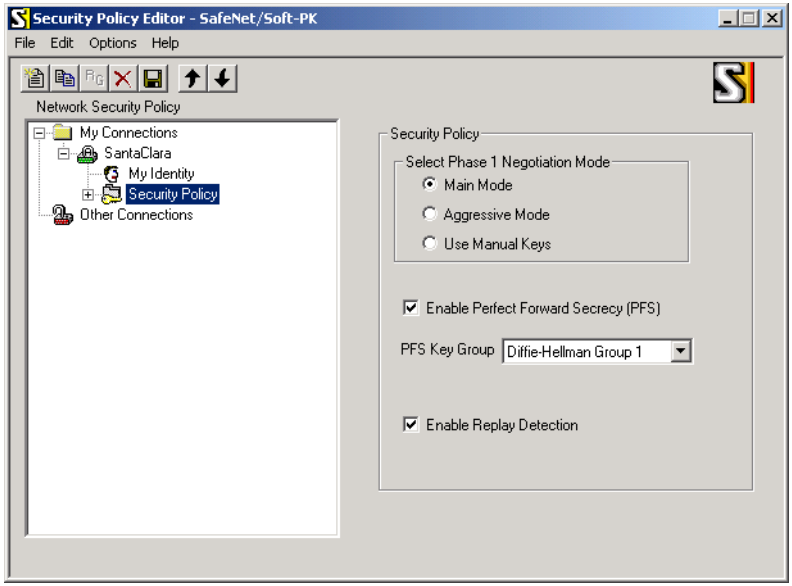
Configure the Security Policy

These settings do not depend on your network information.

1. In the Network Security Policy list on the left side of the Security Policy Editor window, expand the new connection by double clicking its name or clicking on the "+" symbol.

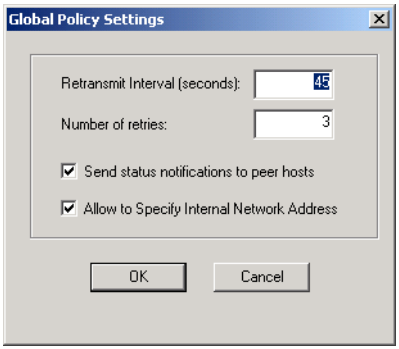
   My Identity and Security Policy subheadings should appear below the connection name.

2. Click on the Security Policy subheading to show the Security Policy menu.



3. In the Select Phase 1 Negotiation Mode box, select Main Mode.
4. Check the Enable Perfect Forward Secrecy (PFS) checkbox.
5. For PFS Key Group, select Diffie-Helman Group 1.
6. Check the Enable Replay Detection checkbox.

7. From the Options menu at the top of the Security Policy Editor window, select Global Policy Settings.



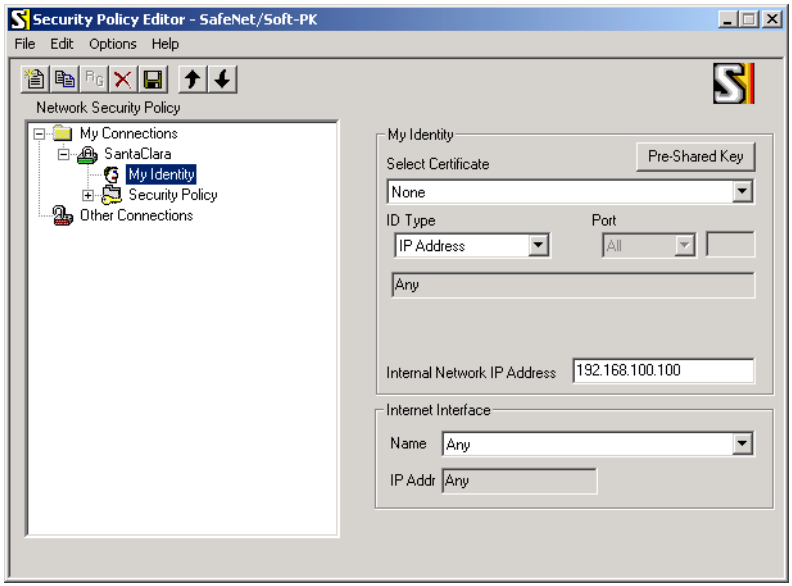
8. Increase the Retransmit Interval (seconds) period to 45.
9. Check the Allow to Specify Internal Network Address checkbox and click OK.

Configure the VPN Client Identity

In this step, you will provide information about the remote VPN client PC. You will need to provide:

- The PreShared Key that you configured in the FVS318.
- Either a fixed IP address or a “fixed virtual” IP address of the VPN client PC.

1. In the Network Security Policy list on the left side of the Security Policy Editor window, click on My Identity.



2. In the Select Certificate menu, choose None.
3. In the ID Type menu, select IP Address.
4. If you are using a “virtual fixed” IP address as discussed in “Configuring the Firewall“ on page 6-10, enter this address in the Internal Network IP Address box. Otherwise, leave this box empty.
   For this example, use 192.168.100.100.
5. In the Internet Interface box, select the adapter you use to access the Internet. Select PPP Adapter in the Name menu if you have a dial-up Internet account. Select your Ethernet adapter if you have dedicated Cable, ISDN or DSL line. You may also choose Any if you will be switching between adapters or if you have only one adapter.
6. Click the Pre-Shared Key button.
7. In the Pre-Shared Key dialog box, click the Enter Key button.
8. Enter the FVS318's Pre-Shared Key and click OK. Note that this field is case sensitive.

Configure VPN Client Authentication Proposal

These settings do not depend on your network information.

1. In the Network Security Policy list on the left side of the Security Policy Editor window, expand the Security Policy heading by double clicking its name or clicking on the "+" symbol.
2. Expand the Authentication subheading by double clicking its name or clicking on the "+" symbol. Then select Proposal 1 below Authentication.
3. In the Authentication Method menu, select Pre-Shared key.
4. In the Encrypt Alg menu, select DES.
5. In the Hash Alg menu, select MD5.
6. In the SA Life menu, select Unspecified.
7. In the Key Group menu, select Diffie-Hellman Group 1.

Configure VPN Client Key Exchange Proposal

In this step, you will provide the type of encryption (DES or 3DES) to be used for this connection. This selection must match your selection in the FVS318 configuration.

1. Expand the Key Exchange subheading by double clicking its name or clicking on the "+" symbol. Then select Proposal 1 below Key Exchange.
2. In the SA Life menu, select Unspecified.
3. In the Compression menu, select None.
4. Check the Encapsulation Protocol (ESP) checkbox.
5. In the Encrypt Alg menu, select the type of encryption to correspond with what you configured for the Encryption Protocol in the FVS318 in "Configuring the Firewall" on page 6-10.
6. In the Hash Alg menu, select MD5.
7. In the Encapsulation menu, select Tunnel.
8. Leave the Authentication Protocol (AH) checkbox unchecked.

Save the VPN Client Settings

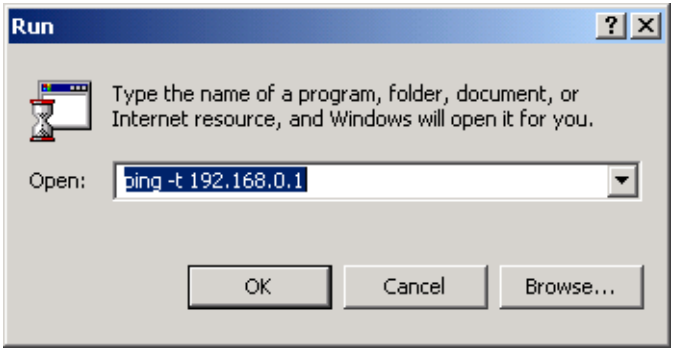
From the File menu at the top of the Security Policy Editor window, select Save Changes.

After you have configured and saved the VPN client information, your PC will automatically open the VPN connection when you attempt to access any IP addresses in the range of the remote VPN router's LAN.

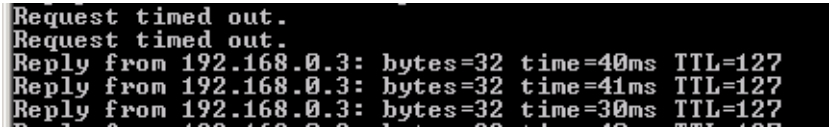
Check the VPN Connection

To check the VPN Connection, you can initiate a request from the remote PC to the FVS318's network. Since the remote PC has a dynamically assigned WAN IP address, it must initiate the request. The simplest method is to ping from the remote PC to the LAN IP address of the FVS318. Using our example, start from the remote PC:

1. On the Windows taskbar, click the Start button, and then click Run.
2. Type **`ping -t 192.168.0.1`** , and then click OK.



This will cause a continuous ping to be sent to the FVS318. After several seconds (up to two minutes), the ping response should change from "timed out" to "reply".

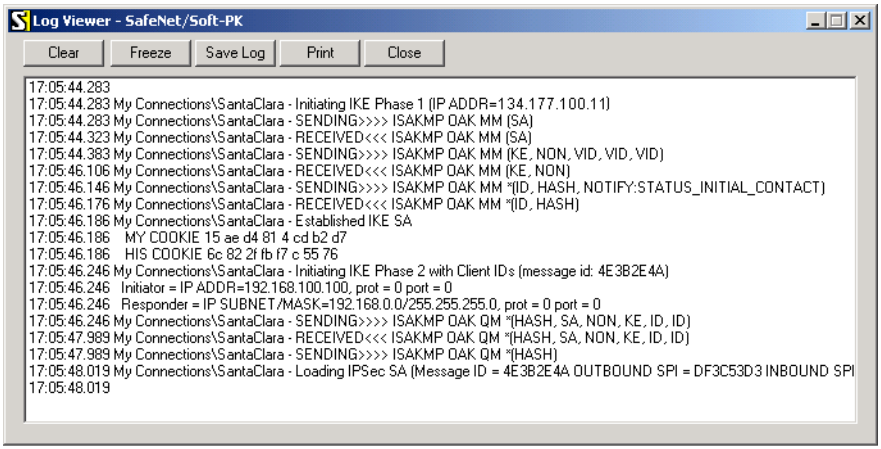


Once the connection is established, you can open the browser of the remote PC and enter the LAN IP Address of the remote FVS318. After a short wait, you should see the login screen of the firewall.

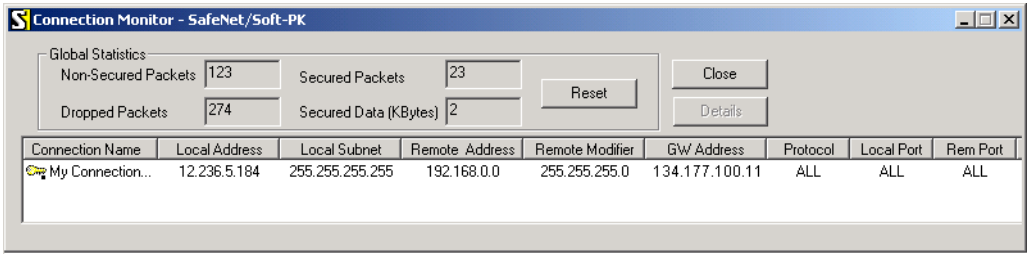
Monitoring the VPN Connection using SafeNet Tools

Information on the progress and status of the VPN client connection can be viewed by opening the SafeNet Connection Monitor or Log Viewer. To launch these functions, click on the Windows Start button, then select Programs, then SafeNet Soft-PK, then either the Connection Monitor or Log Viewer.

The Log Viewer screen for a successful connection is shown below:



The Connection Monitor screen for this connection is shown below:



In this example:

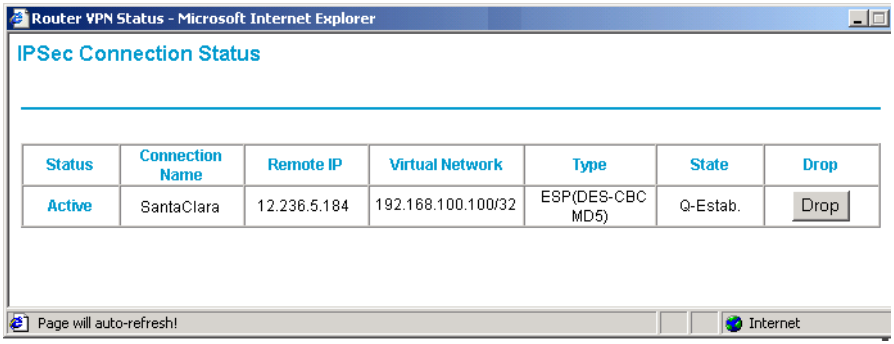
- The FVS318 has a public IP WAN address of 134.177.100.11
- The FVS318 has a LAN IP address of 192.168.0.1
- The VPN client PC has a dynamically assigned address of 12.236.5.184
- The VPN client PC is using a “virtual fixed” IP address of 192.168.100.100

While the connection is being established, the Connection Name field in this menu will say “SA” before the name of the connection. When the connection is successful, the “SA” will change to the yellow key symbol shown in the illustration above.

Monitoring the VPN Connection from the FVS318

You can also verify the progress of the connection by viewing the FVS318’s VPN Log and Status windows. Go to the main menu and click on Router Status. At the bottom of that menu appear two buttons labeled “Show VPN Logs” and “Show VPN Status”.

Clicking on Show VPN Status displays the following screen:



When the tunnel is active, the State will show “Q-Established”. To drop the connection manually, you can click the Drop button.

The Show VPN Logs button displays details of the VPN authentication and protocol negotiation. For a successful connection, the log will appear similar to the following:

```
Sun, 03/31/2002 12:01:55 - FVS318 IKE:Peer Initialized IKE Main Mode
Sun, 03/31/2002 12:01:55 - FVS318 IKE:[SantaClara_tmp0] RX << MM_I1 : 12.236.5.184
Sun, 03/31/2002 12:01:55 - FVS318 IKE:OAKLEY_PRESHARED_KEY/OAKLEY_DES_CBC/MODP768
Sun, 03/31/2002 12:01:55 - FVS318 IKE:[SantaClara_tmp0] TX >> MM_R1 : 12.236.5.184
Sun, 03/31/2002 12:01:57 - FVS318 IKE:[SantaClara_tmp0] RX << MM_I2 : 12.236.5.184
Sun, 03/31/2002 12:01:57 - FVS318 IKE:[SantaClara_tmp0] TX >> MM_R2 : 12.236.5.184
Sun, 03/31/2002 12:01:59 - FVS318 IKE:[SantaClara_tmp0] RX << MM_I3 : 12.236.5.184
Sun, 03/31/2002 12:01:59 - FVS318 IKE:[SantaClara_tmp0] TX >> MM_R3 : 12.236.5.184
Sun, 03/31/2002 12:01:59 - FVS318 IKE:[SantaClara_tmp0] RX << QM_I1 : 12.236.5.184
Sun, 03/31/2002 12:01:59 - FVS318 IKE:[SantaClara_tmp0] TX >> QM_R1 : 12.236.5.184
Sun, 03/31/2002 12:02:01 - FVS318 IKE:[SantaClara_tmp0] RX << QM_I2 : 12.236.5.184
Sun, 03/31/2002 12:02:01 - FVS318 IKE:[SantaClara_tmp0] established with 12.236.5.184 successfully
```

Using the VPN Connection

Now that your VPN connection is working, whenever the remote PC needs to access an IP address on the firewall’s LAN, the VPN client will automatically establish the connection. This is fine when you know the IP address of a resource on the network. However, since Windows Network Neighborhood broadcasts are not IP traffic, and are therefore not routed by the firewall, you will not be able to browse the remote LAN without taking a few more steps. These steps are described in “Accessing Remote Resources across a VPN“ on page 6-23.

Note: While your PC is connected to a remote LAN through a VPN, you might not have normal Internet access. If this is the case, you will need to close the VPN connection in order to have normal Internet access.

Accessing Remote Resources across a VPN

Only non-broadcast IP traffic will pass over the VPN tunnel. This prevents browsing with Network Neighborhood (which relies on broadcast traffic), or using LAN protocols (such as IPX, AppleTalk, NetBEUI, etc.) to establish connections to machines at the other end of the VPN tunnel.

Some methods by which a VPN client may access remote resources across a VPN are:

- Use the IP address.
  For example, if a remote office operates a Microsoft SQL server, users at your office will be able to access the SQL server at the server's private IP address.
- Use Windows' Find Computer tool to locate a remote workstation.
- Create an LMHOSTS file in a local computer's registry.
- Configure a WINS server to resolve a name to a remote IP address.

Refer to Windows documentation for information on using Find Computer, LMHOSTS files, and WINS servers.

Other Topics

Deleting a Security Association

To delete a security association:

1. Go to the VPN Configure window.
2. In the Security Association drop-down box, select the security association to be deleted.
3. Click on the Delete This SA button.
4. Click on the Update button.

Security Association Notes

- The firewall does not support Aggressive Mode in security negotiation.

- SA Life Time is 8 Hours
  A finite SA Life Time increases security by forcing the two VPN endpoints to update the encryption and authentication keys. However, every time the VPN tunnel renegotiates, users accessing remote resources are disconnected.
- For increased reliability, Keep Alive will always be enabled for connections router to router VPN connections.

Alternative: Using Manual Keying

As an alternative to IKE, you may use Manual Keying, in which you must specify each phase of the connection. The steps for Manual Keying are as follows:

1. When editing the VPN Settings, you may select manual keying. At that time, the edit menu changes to look like Figure 6-5:

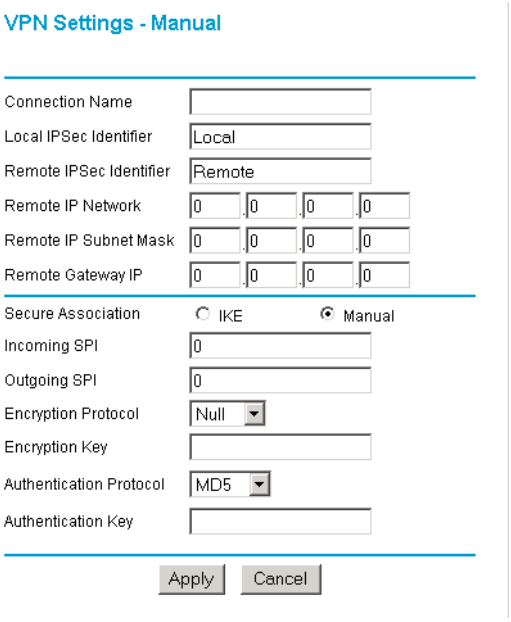


Figure 6-5. VPN Edit menu for Manual Keying

2. Incoming SPI - Enter the Security Parameter Index that the remote host will send to identify the Security Association (SA). This will be the remote host's Outgoing SPI.

3. Outgoing SPI - Enter the Security Parameter Index that this router will send to identify the Security Association (SA). This will be the remote host's Incoming SPI.

   The SPI should be a string of hexadecimal [0-9,A-F] characters, and should not be used in any other Security Association.

   Tip: For simplicity (or troubleshooting), the Incoming and Outgoing SPI can be identical.

4. For Encryption Protocol, select one:

   a. Null - Fastest, but no security.

   b. DES - Faster but less secure than 3DES.

   c. 3DES - (Triple DES) Most secure.

5. Enter a hexadecimal Encryption Key

   — For DES, enter 16 hexadecimal [0-9,A-F] characters.

   — For 3DES, enter 48 hexadecimal [0-9,A-F] characters.

   The encryption key must match exactly the key used by the remote router or host.

6. Select the Authentication Protocol

   — MD5 (default) - 128 bits, faster but less secure.

   — SHA-1 - 160 bits, slower but more secure.

7. Enter 32 hexadecimal characters for the Authentication Key
   The authentication key must match exactly the key used by the remote router or host.

• Click Apply to enter the SA into the table.

Chapter 7
Maintenance

This chapter describes how to use the maintenance features of your Model FVS318 Cable/DSL ProSafe VPN Firewall. These features can be found by clicking on the Maintenance heading in the Main Menu of the browser interface.

System Status

The System Status menu provides a limited amount of status and usage information. From the Main Menu of the browser interface, under Maintenance, select System Status to view the System Status screen, shown in Figure 7-1.

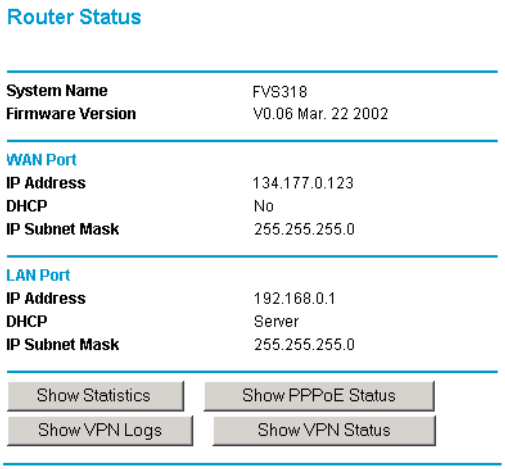


Figure 7-1. System Status screen

This screen shows the following parameters:

Table 7-1. Menu 3.2 - System Status Fields

Field	Description
System Name	This field displays the Host Name assigned to the firewall in the Basic Settings menu.
Firmware Version	This field displays the firewall firmware version.
WAN Port	These parameters apply to the Internet (WAN) port of the firewall.
IP Address	This field displays the IP address being used by the Internet (WAN) port of the firewall. If no address is shown, the firewall cannot connect to the Internet.
IP Subnet Mask	This field displays the IP Subnet Mask being used by the Internet (WAN) port of the firewall.
DHCP	If set to None, the firewall is configured to use a fixed IP address on the WAN. If set to Client, the firewall is configured to obtain an IP address dynamically from the ISP.
LAN Port	These parameters apply to the Local (WAN) port of the firewall.
IP Address	This field displays the IP address being used by the Local (LAN) port of the firewall. The default is 192.168.0.1
IP Subnet Mask	This field displays the IP Subnet Mask being used by the Local (LAN) port of the firewall. The default is 255.255.255.0
DHCP	If set to None, the firewall will not assign IP addresses to local PCs on the LAN. If set to Server, the firewall is configured to assign IP addresses to local PCs on the LAN.

Click on the “Show Statistics” button to display firewall usage statistics, as shown in Figure 7-2 below:

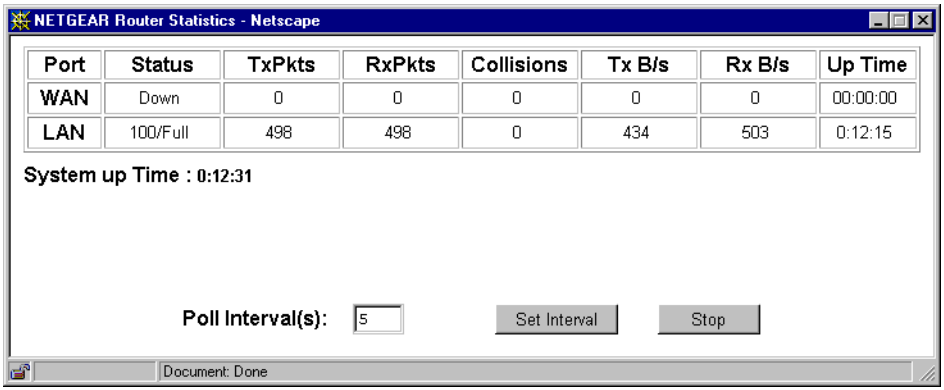


Figure 7-2. Router Statistics screen

This screen shows the following statistics:.

Table 7-2. Router Statistics Fields

Field	Description
Port	The statistics for the WAN (Internet) and LAN (local) ports. For each port, the screen displays:
Status	The link status of the port.
TxPkts	The number of packets transmitted on this port since reset or manual clear.
RxPkts	The number of packets received on this port since reset or manual clear.
Collisions	The number of collisions on this port since reset or manual clear.
Tx B/s	The current line utilization—percentage of current bandwidth used on this port.
Tx B/s	The average line utilization —average CLU for this port.
Up Time	The time elapsed since this port acquired link.
System up Time	The time elapsed since the last power cycle or reset.
Poll Interval	Specifies the intervals at which the statistics are updated in this window. Click on Stop to freeze the display.

Click on the “Show PPPoE Status” button to display the progress of the PPPoE connection, as shown in Figure 7-2.

Click on the “Show VPN Log” “Show VPN Status” buttons to display VPN connection information, as described in Chapter 6, “Virtual Private Networking.”

Attached Devices

The Attached Devices menu contains a table of all IP devices that the firewall has discovered on the local network. From the Main Menu of the browser interface, under the Maintenance heading, select Attached Devices to view the table, shown in Figure 7-3

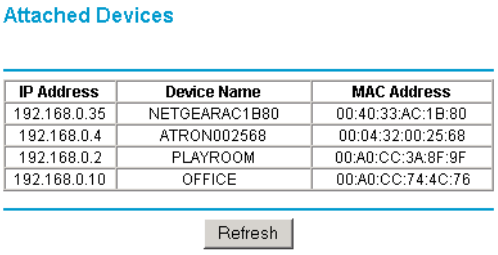


Figure 7-3. Attached Devices menu

For each device, the table shows the IP address, NetBIOS Host Name (if available), and Ethernet MAC address. Note that if the firewall is rebooted, the table data is lost until the firewall rediscovers the devices. To force the firewall to look for attached devices, click the Refresh button.

Changing the Administration Password

You can use the Set Password menu to change the firewall administrator's password for accessing the Settings pages. (Note that this is NOT your ISP account password).

The default password for the firewall’s Web Configuration Manager is **password**. NETGEAR recommends that you change this password to a more secure password. The ideal password should contain no dictionary words from any language, and should be a mixture of letters (both upper and lower case), numbers, and symbols. Your password can be up to 30 characters.

From the Main Menu of the browser interface, under the Maintenance heading, select Set Password to bring up the menu shown in Figure 7-4.

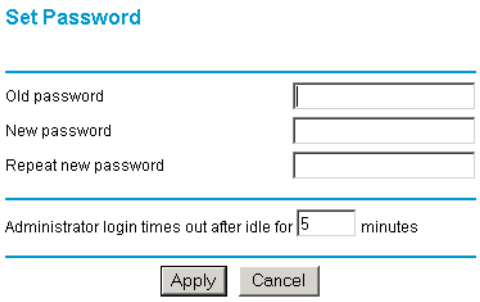


Figure 7-4. Set Password menu

To change the password, first enter the old password, and then enter the new password twice. Click Apply.

After changing the password, you may be required to log in again to continue the configuration. If you have backed up the firewall settings previously, you should do a new backup so that the saved settings file includes the new password.

For security, the administrator's login to the firewall configuration will timeout after a period of inactivity. To change the login timeout period:

1. Type the value in ‘Administrator login times out’ field.The suggested default value is 5 minutes.
2. Click Apply to save your changes or click Cancel to keep the current period.

Configuration File Settings Management

The configuration settings of the FVS318 VPN Firewall are stored within the firewall in a configuration file. This file can be saved (backed up) to a user’s PC, retrieved (restored) from the user’s PC, or cleared to factory default settings.

From the Main Menu of the browser interface, under the Maintenance heading, select the Settings Backup heading to bring up the menu shown in Figure 7-5.

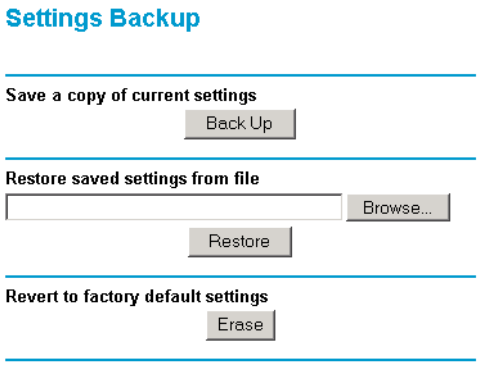


Figure 7-5. Settings Backup menu

Three options are available, and are described in the following sections.

Restore and Backup the Configuration

The Restore and Backup options in the Settings Backup menu allow you to save and retrieve a file containing your firewall's configuration settings.

To save your settings, select the Backup tab. Click the Backup button. Your browser will extract the configuration file from the firewall and will prompt you for a location on your PC to store the file. You can give the file a meaningful name at this time, such as pacbell.cfg.

To restore your settings from a saved configuration file, enter the full path to the file on your PC or click the Browse button to browse to the file. When you have located it, click the Restore button to send the file to the firewall. The firewall will then reboot automatically.

Erase the Configuration

It is sometimes desirable to restore the firewall to a known blank condition. This can be done by using the Erase function, which will restore all factory settings. After an erase, the firewall's password will be **password**, the LAN IP address will be 192.168.0.1, and the firewall's DHCP client will be enabled.

To erase the configuration, click the Erase button.

To restore the factory default configuration settings without knowing the login password or IP address, you must use the Default Reset button on the rear panel of the firewall. See “Using the Default Reset button“ on page 9-8.

Router Upgrade

The software of the FVS318 VPN Firewall is stored in FLASH memory, and can be upgraded as new software is released by NETGEAR. Upgrade files can be downloaded from NETGEAR's website. If the upgrade file is compressed (.ZIP file), you must first extract the binary (.BIN) file before sending it to the firewall. The upgrade file can be sent to the firewall using your browser.

Note: The Web browser used to upload new firmware into the firewall must support HTTP uploads. NETGEAR recommends using Microsoft Internet Explorer or Netscape Navigator 4.0 or above.

From the Main Menu of the browser interface, under the Maintenance heading, select the Router Upgrade heading to display the menu shown in Figure 7-6.

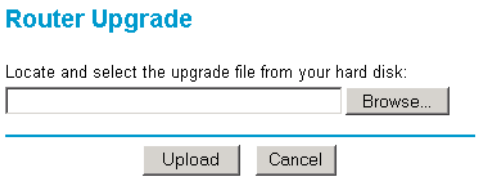


Figure 7-6. Router Upgrade menu

To upload new firmware:

1. Download and unzip the new software file from NETGEAR.
2. In the Router Upgrade menu, click the Browse button and browse to the location of the binary (.BIN) upgrade file
3. Click Upload.

   Note: When uploading software to the firewall, it is important not to interrupt the Web browser by closing the window, clicking a link, or loading a new page. If the browser is interrupted, it may corrupt the software. When the upload is complete, your firewall will automatically restart. The upgrade process will typically take about one minute.

In some cases, you may need to reconfigure the firewall after upgrading.

Chapter 8
Advanced Configuration

This chapter describes how to configure the advanced features of your Model FVS318 Cable/DSL ProSafe VPN Firewall. These features can be found under the Advanced heading in the Main Menu of the browser interface.

Configuring for Port Forwarding to Local Servers

Although the firewall causes your entire local network to appear as a single machine to the Internet, you can make local servers for different services (for example, FTP or HTTP) visible and available to the Internet. This is done using the Ports menu. From the Main Menu of the browser interface, under Advanced, click on Ports to view the port forwarding menu, shown in Figure 8-1

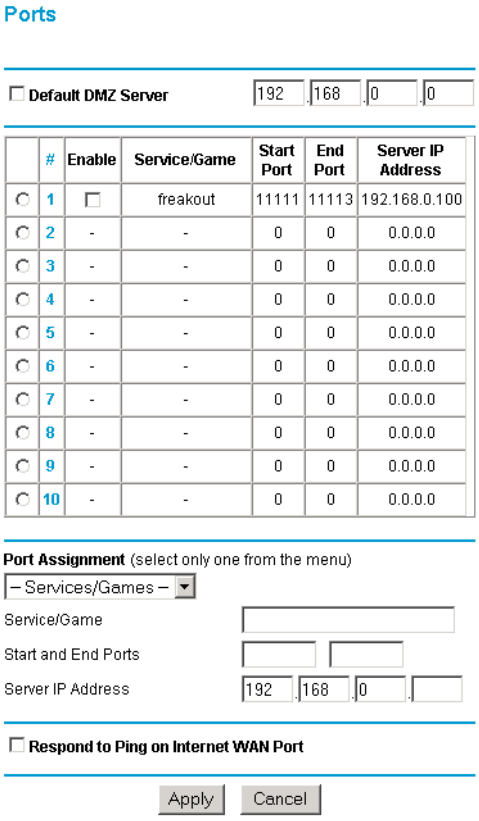


Figure 8-1. Port Forwarding Menu

When a remote computer on the Internet wants to access a service at your IP address, the requested service is identified by a port number in the incoming IP packets. For example, a packet that is sent to the external IP address of your firewall and destined for port number 80 is an HTTP (Web server) request. Many service port numbers are already defined in a Services/Games list in the Ports menu, although you are not limited to these choices. See IETF RFC1700, "Assigned Numbers," for port numbers for common protocols. Use the Ports menu to configure the firewall to forward incoming traffic to IP addresses on your local network based on the port number..

Note: Some residential broadband ISP accounts do not allow you to run any server processes (such as a Web or FTP server) from your location. Your ISP may periodically check for servers and may suspend your account if it discovers any active services at your location. If you are unsure, refer to the Acceptable Use Policy of your ISP.

Remember that port forwarding opens holes in your firewall. Only enable those ports that are necessary for your network.

Default DMZ Server

Incoming traffic from the Internet is normally discarded by the firewall unless the traffic is a response to one of your local computers or a service that you have configured in the Ports menu. Instead of discarding this traffic, you can have it forwarded to one computer on your network. This computer is called the Default DMZ Server.

The Default DMZ Server feature is helpful when using some online games and videoconferencing applications that are incompatible with NAT. The firewall is programmed to recognize some of these applications and to work properly with them, but there are other applications that may not function well. In some cases, one local PC can run the application properly if that PC's IP address is entered as the Default DMZ Server..

Note: For security, you should avoid using the Default DMZ Server feature. When a computer is designated as the Default DMZ Server, it loses much of the protection of the firewall, and is exposed to many exploits from the Internet. If compromised, the computer can be used to attack your network.

To assign a computer or server to be a Default DMZ server:

1. Click Default DMZ Server.
2. Type the IP address for that server.
3. Click Apply.

Supporting Internet Services, Applications, or Games

Before starting, you'll need to determine which type of service, application or game you'll provide and the IP address of the computer that will provide each service. Be sure the computer's IP address never changes. If the computers on your local network are assigned their IP addresses by the firewall (by DHCP), use the Reserved IP address feature in the LAN IP menu to keep the computer's IP address constant.

To set up a computer or server to be accessible to the Internet for an Internet service:

1. Click the button next to an unused port in the table.
2. From the Services/Games list, select the Internet service, application or game you want to host. If the service, application or game does not appear in the Services/Games list, define it by entering a Service/Game name and Start and End Port numbers in the boxes provided.
3. Type the IP address of the computer in the Server IP Address box.
4. Click Apply.

Note: You may forward more than one type of service to a single computer or server.

Clearing a Port Assignment

To eliminate a port assignment entry:

1. Click the button next to that port in the table.
2. Clear the information from the Service/Game, the Start and End Ports and the Server IP Address boxes under the table.
3. Click Apply.

Local Web and FTP Server Example

If a local PC with a private IP address of 192.168.0.33 acts as a Web and FTP server, configure the Ports menu to forward HTTP (port 80) and FTP (port 21) to local address 192.168.0.33

In order for a remote user to access this server from the Internet, the remote user must know the IP address that has been assigned by your ISP. If this address is 172.16.1.23, for example, an Internet user can access your Web server by directing the browser to http://172.16.1.23. The assigned IP address can be found in the Maintenance Status Menu, where it is shown as the WAN IP Address.

Some considerations for this application are:

- If your account's IP address is assigned dynamically by your ISP, the IP address may change periodically as the DHCP lease expires.
- If the IP address of the local PC is assigned by DHCP, it may change when the PC is rebooted. To avoid this, use the Reserved IP address feature in the LAN IP menu to keep the PC's IP address constant.
- Local PCs must access the local server using the PCs' local LAN address (192.168.0.33 in this example). Attempts by local PCs to access the server using the external IP address (172.16.1.23 in this example) will fail.

Tip: Multiple Computers for Half Life, KALI or Quake III

To set up an additional computer to play Half Life, KALI or Quake III:

1. Click the button of an unused port in the table.
2. Select the game again from the Services/Games list.
3. Change the beginning port number in the Start Port box.
   For these games, use the supplied number in the default listing and add +1 for each additional computer. For example, if you've alrealy configured one computer to play Hexen II (using port 26900), the second computer's port number would be 26901, and the third computer would be 26902.
4. Type the same port number in the End Port box that you typed in the Start Port box.
5. Type the IP address of the additional computer in the Server IP Address box.
6. Click Apply.

Respond to Ping on Internet WAN Port

If you want the firewall to respond to a 'ping' from the Internet, click the 'Respond to Ping on Internet WAN Port' check box. This should only be used as a diagnostic tool, since it allows your firewall to be discovered. Don't check this box unless you have a specific reason to do so.

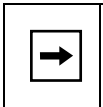
Dynamic DNS

If your network has a permanently assigned IP address, you can register a domain name and have that name linked with your IP address by public Domain Name Servers (DNS). However, if your Internet account uses a dynamically assigned IP address, you will not know in advance what your IP address will be, and the address can change frequently. In this case, you can use a commercial dynamic DNS service, who will allow you to register your domain to their IP address, and will forward traffic directed at your domain to your frequently-changing IP address.

The firewall contains a client that can connect to a dynamic DNS service provider. To use this feature, you must select a service provider and obtain an account with them. After you have configured your account information in the firewall, whenever your ISP-assigned IP address changes, your firewall will automatically contact your dynamic DNS service provider, log in to your account, and register your new IP address.

From the Main Menu of the browser interface, under Advanced, click on Dynamic DNS. To configure Dynamic DNS:

1. Access the website of one of the dynamic DNS service providers whose names appear in the 'Select Service Provider' box, and register for an account.
   For example, for dyndns.org, go to www.dyndns.org.
2. Select the Use a dynamic DNS service check box.
3. Select the name of your dynamic DNS Service Provider.
4. Type the Host Name that your dynamic DNS service provider gave you.
   The dynamic DNS service provider may call this the domain name.
5. Type the User Name for your dynamic DNS account.
6. Type the Password (or key) for your dynamic DNS account.
7. If your dynamic DNS provider allows the use of wildcards in resolving your URL, you may select the Use wildcards check box to activate this feature.
   For example, the wildcard feature will cause *.yourhost.dyndns.org to be aliased to the same IP address as yourhost.dyndns.org
8. Click Apply to save your configuration.



Note: If your ISP assigns a private WAN IP address (such as 192.168.x.x or 10.x.x.x), the dynamic DNS service will not work because private addresses will not be routed on the Internet.

LAN IP Setup

The LAN IP Setup menu allows configuration of LAN IP services such as DHCP and RIP. From the Main Menu of the browser interface, under Advanced, click on LAN IP Setup to view the LAN IP Setup menu, shown in Figure 8-2

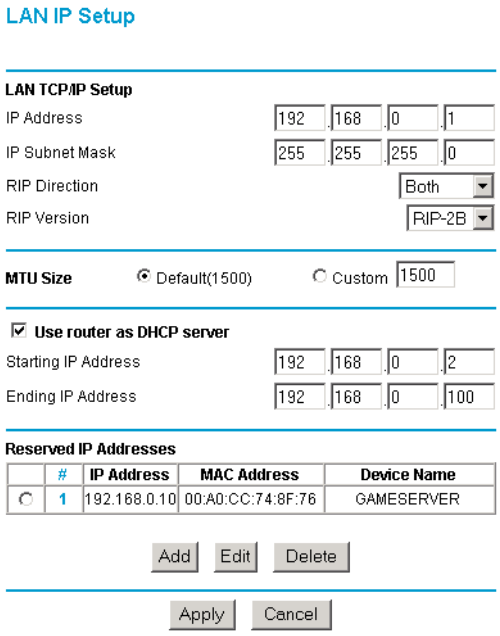


Figure 8-2. LAN IP Setup Menu

LAN TCP/IP Setup

The firewall is shipped preconfigured to use private IP addresses on the LAN side, and to act.as a DHCP server. The firewall's default LAN IP configuration is:

- LAN IP addresses—192.168.0.1
- Subnet mask—255.255.255.0

These addresses are part of the IETF-designated private address range for use in private networks, and should be suitable in most applications. If your network has a requirement to use a different IP addressing scheme, you can make those changes in this menu.

The LAN IP parameters are:

- IP Address
  This is the LAN IP address of the firewall.
- IP Subnet Mask
  This is the LAN Subnet Mask of the firewall. Combined with the IP address, the IP Subnet Mask allows a device to know which other addresses are local to it, and which must be reached through a gateway or router.
- RIP Direction
  RIP (Router Information Protocol) allows a router to exchange routing information with other routers. The RIP Direction selection controls how the firewall sends and receives RIP packets. Both is the default.
  - — When set to Both or Out Only, the firewall will broadcast its routing table periodically.
  - — When set to Both or In Only, it will incorporate the RIP information that it receives.
  - — When set to None, it will not send any RIP packets and will ignore any RIP packets received.
- RIP Version
  This controls the format and the broadcasting method of the RIP packets that the router sends. (It recognizes both formats when receiving.) By default, this is set for RIP-1.
  - — RIP-1 is universally supported. RIP-1 is probably adequate for most networks, unless you have an unusual network setup.
  - — RIP-2 carries more information. Both RIP-2B and RIP-2M send the routing data in RIP-2 format.
    - — RIP-2B uses subnet broadcasting.
    - — RIP-2M uses multicasting...

Note: If you change the LAN IP address of the firewall while connected through the browser, you will be disconnected. You must then open a new connection to the new IP address and log in again.

MTU Size

The normal MTU (Maximum Transmit Unit) value for most Ethernet networks is 1500 Bytes. For some ISPs, particularly some using PPPoE, you may need to reduce the MTU. This is rarely required, and should not be done unless you are sure it is necessary for your ISP connection.

Any packets sent through the firewall that are larger than the configured MTU size will be repackaged into smaller packets to meet the MTU requirement. To change the MTU size:

1. Under MTU Size, select Custom.
2. Enter a new size between 64 and 1500.
3. Click Apply to save the new configuration.

DHCP

By default, the firewall will function as a DHCP (Dynamic Host Configuration Protocol) server, allowing it to assign IP, DNS server, and default gateway addresses to all computers connected to the router's LAN. The assigned default gateway address is the LAN address of the firewall. IP addresses will be assigned to the attached PCs from a pool of addresses specified in this menu. Each pool address is tested before it is assigned to avoid duplicate addresses on the LAN.

For most applications, the default DHCP and TCP/IP settings of the firewall are satisfactory. See "IP Configuration by DHCP" on page B-10 for an explanation of DHCP and information about how to assign IP addresses for your network.

Use router as DHCP server

If another device on your network will be the DHCP server, or if you will manually configure the network settings of all of your computers, clear the 'Use router as DHCP server' check box. Otherwise, leave it checked.

Specify the pool of IP addresses to be assigned by setting the Starting IP Address and Ending IP Address. These addresses should be part of the same IP address subnet as the firewall's LAN IP address. Using the default addressing scheme, you should define a range between 192.168.0.2 and 192.168.0.253, although you may wish to save part of the range for devices with fixed addresses.

The firewall will deliver the following parameters to any LAN device that requests DHCP:

- An IP Address from the range you have defined
- Subnet Mask
- Gateway IP Address (the firewall's LAN IP address)
- Primary DNS Server (if you entered a Primary DNS address in the Basic Settings menu; otherwise, the firewall's LAN IP address)
- Secondary DNS Server (if you entered a Secondary DNS address in the Basic Settings menu

Reserved IP adresses

When you specify a reserved IP address for a PC on the LAN, that PC will always receive the same IP address each time it access the firewall's DHCP server. Reserved IP addresses should be assigned to servers that require permanent IP settings.

To reserve an IP address:

1. Click the Add button.
2. In the IP Address box, type the IP address to assign to the PC or server.
   (choose an IP address from the router's LAN subnet, such as 192.168.0.X)
3. Type the MAC Address of the PC or server.
   (Tip: If the PC is already present on your network, you can copy its MAC address from the Attached Devices menu and paste it here.)
4. Click Apply to enter the reserved address into the table.

Note: The reserved address will not be assigned until the next time the PC contacts the router's DHCP server. Reboot the PC or access its IP configuration and force a DHCP release and renew.

To edit or delete a reserved address entry:

1. Click the button next to the reserved address you want to edit or delete.
2. Click Edit or Delete.

Static Routes

Static Routes provide additional routing information to your firewall. Under normal circumstances, the firewall has adequate routing information after it has been configured for Internet access, and you do not need to configure additional static routes. You must configure static routes only for unusual cases such as multiple routers or multiple IP subnets located on your network.

From the Main Menu of the browser interface, under Advanced, click on Static Routes to view the Static Routes menu, shown in Figure 8-3.

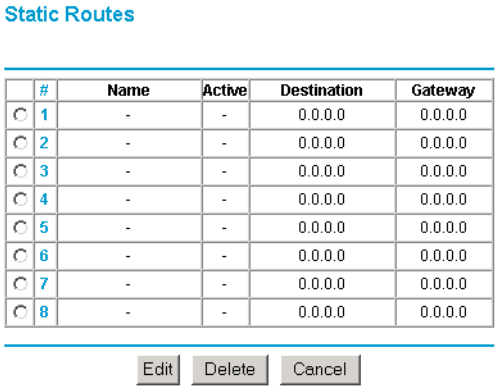


Figure 8-3. Static Routes Summary Table

To add or edit a Static Route:

1. Select a number and click the Edit button to open the Edit Menu, shown in Figure 8-4.

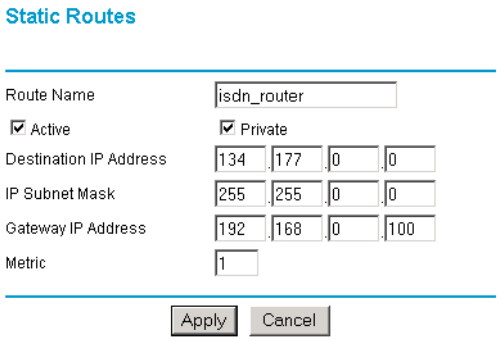


Figure 8-4. Static Route Entry and Edit Menu

2. Type a route name for this static route in the Route Name box under the table. (This is for identification purpose only.)
3. Select Active to make this route effective.
4. Select Private if you want to limit access to the LAN only. The static route will not be reported in RIP.

5. Type the Destination IP Address of the final destination.
6. Type the IP Subnet Mask for this destination.
   If the destination is a single host, type 255.255.255.255.
7. Type the Gateway IP Address, which must be a router on the same LAN segment as the firewall.
8. Type a number between 1 and 15 as the Metric value.
   This represents the number of routers between your network and the destination. Usually, a setting of 2 or 3 works, but if this is a direct connection, set it to 1.
9. Click Apply to have the static route entered into the table.

Static Route Example

As an example of when a static route is needed, consider the following case:

- Your primary Internet access is through a cable modem to an ISP.
- You have an ISDN router on your home network for connecting to the company where you are employed. This router's address on your LAN is 192.168.0.100.
- Your company's network is 134.177.0.0.

When you first configured your firewall, two implicit static routes were created. A default route was created with your ISP as the gateway, and a second static route was created to your local network for all 192.168.0.x addresses. With this configuration, if you attempt to access a device on the 134.177.0.0 network, your firewall will forward your request to the ISP. The ISP forwards your request to the company where you are employed, and the request will likely be denied by the company's firewall.

In this case you must define a static route, telling your firewall that 134.177.0.0 should be accessed through the ISDN router at 192.168.0.100. The static route would look like Figure 8-4.

In this example:

- The Destination IP Address and IP Subnet Mask fields specify that this static route applies to all 134.177.x.x addresses.
- The Gateway IP Address fields specifies that all traffic for these addresses should be forwarded to the ISDN router at 192.168.0.100.
- A Metric value of 1 will work since the ISDN router is on the LAN.
- Private is selected only as a precautionary security measure in case RIP is activated.

Remote Management

Using the Remote Management page, you can allow a user or users on the Internet to configure, upgrade and check the status of your NETGEAR Cable/DSL ProSafe VPN Firewall.

Note: Be sure to change the router's default password to a very secure password. The ideal password should contain no dictionary words from any language, and should be a mixture of letters (both upper and lower case), numbers, and symbols. Your password can be up to 30 characters.

To configure your firewall for Remote Management:

1. Select the Allow Remote Management check box.
2. Specify what external addresses will be allowed to access the firewall's remote management.

   For security, NETGEAR recommends that you restrict access to as few external IP addresses as practical.

   a. To allow access from any IP address on the Internet, select Everyone.

   b. To allow access from a range of IP addresses on the Internet, select IP address range. Enter a beginning and ending IP address to define the allowed range.

   c. To allow access from a single IP address on the Internet, select Only this PC. Enter the IP address that will be allowed access.
3. Specify the Port Number that will be used for accessing the management interface.

   Web browser access normally uses the standard HTTP service port 80. For greater security, you can change the remote management web interface to a custom port by entering that number in the box provided. Choose a number between 1024 and 65535, but do not use the number of any common service port. The default is 8080, which is a common alternate for HTTP.
4. Click Apply to have your changes take effect.

When accessing your router from the Internet, you will type your router's WAN IP address into your browser's Address (in IE) or Location (in Netscape) box, followed by a colon (:) and the custom port number. For example, if your external address is 134.177.0.123 and you use port number 8080, enter in your browser:

```
http://134.177.0.123:8080
```

Chapter 9
Troubleshooting

This chapter gives information about troubleshooting your Model FVS318 Cable/DSL ProSafe VPN Firewall. For the common problems listed, go to the section indicated.

Is the firewall on?
Have I connected the firewall correctly?

Go to “Basic Functioning“ on page 9-1.

I can’t access the firewall’s configuration with my browser.

Go to “Troubleshooting the Web Configuration Interface“ on page 9-4.

I’ve configured the firewall but I can’t access the Internet.

Go to “Troubleshooting the ISP Connection“ on page 9-5.

I can’t remember the firewall’s configuration password.
I want to clear the configuration and start over again.

Go to “Restoring the Default Configuration and Password“ on page 9-8.

I can’t get a working VPN connection.

Go to “Troubleshooting the VPN Connection“ on page 9-10.

Basic Functioning

After you turn on power to the firewall, the following sequence of events should occur:

1. When power is first applied, verify that the Power LED is on.
2. Verify that the Test LED lights within a few seconds, indicating that the self-test procedure is running.

3. After approximately 10 seconds, verify that:

   a. The Test LED is not lit.

   b. The Local port LEDs are lit for any local ports that are connected.

   c. The Internet port LED is lit.

   If a port's LED is lit, a link has been established to the connected device. If a Local port is connected to a 100 Mbps device, verify that the port's LED is green. If the port is 10 Mbps, the LED will be amber.

If any of these conditions does not occur, refer to the appropriate following section.

Power LED Not On

If the Power and other LEDs are off when your firewall is turned on:

- Make sure that the power cord is properly connected to your firewall and that the power supply adapter is properly connected to a functioning power outlet.
- Check that you are using the 12VDC power adapter supplied by NETGEAR for this product.

If the error persists, you have a hardware problem and should contact technical support.

Test LED Never Turns On or Test LED Stays On

When the firewall is turned on, the Test LED turns on for about 10 seconds and then turns off. If the Test LED does not turn on, or if it stays on, there is a fault within the firewall.

If you experience problems with the Test LED:

- Cycle the power to see if the firewall recovers and the LED blinks for the correct amount of time.

If all LEDs including the Test LED are still on one minute after power up:

- Cycle the power to see if the firewall recovers.
- Clear the firewall's configuration to factory defaults. This will set the firewall's IP address to 192.168.0.1. This procedure is explained in "Using the Default Reset button" on page 9-8.

If the error persists, you might have a hardware problem and should contact technical support.

LAN or WAN Port LEDs Not On

If either the LAN LEDs or WAN LED do not light when the Ethernet connection is made, check the following:

- Make sure that the Ethernet cable connections are secure at the firewall and at the hub or workstation.
- Make sure that power is turned on to the connected hub or workstation.
- Be sure you are using the correct cable:
  - When connecting the firewall's WAN port to a cable or DSL modem, use the cable that was supplied with the cable or DSL modem. This cable could be a standard straight-through Ethernet cable or an Ethernet crossover cable.

Troubleshooting the Web Configuration Interface

If you are unable to access the firewall's Web Configuration interface from a PC on your local network, check the following:

- Check the Ethernet connection between the PC and the firewall as described in the previous section.
- Make sure your PC's IP address is on the same subnet as the firewall. If you are using the recommended addressing scheme, your PC's address should be in the range of 192.168.0.2 to 192.168.0.254. Refer to "Verifying TCP/IP Properties" on page 3-5 or "Verifying TCP/IP Properties (Macintosh)" on page 3-8 to find your PC's IP address. Follow the instructions in Chapter 3 to configure your PC.

  Note: If your PC's IP address is shown as 169.254.x.x:
  Recent versions of Windows and MacOS will generate and assign an IP address if the computer cannot reach a DHCP server. These auto-generated addresses are in the range of 169.254.x.x. If your IP address is in this range, check the connection from the PC to the firewall and reboot your PC.
- If your firewall's IP address has been changed and you don't know the current IP address, clear the firewall's configuration to factory defaults. This will set the firewall's IP address to 192.168.0.1. This procedure is explained in "Using the Default Reset button" on page 9-8.
- Make sure your browser has Java, JavaScript, or ActiveX enabled. If you are using Internet Explorer, click Refresh to be sure the Java applet is loaded.
- Try quitting the browser and launching it again.
- Make sure you are using the correct login information. The factory default login name is **admin** and the password is **password**. Make sure that CAPS LOCK is off when entering this information.

If the firewall does not save changes you have made in the Web Configuration Interface, check the following:

- When entering configuration settings, be sure to click the APPLY button before moving to another menu or tab, or your changes are lost.
- Click the Refresh or Reload button in the Web browser. The changes may have occurred, but the Web browser may be caching the old configuration.

Troubleshooting the ISP Connection

If your firewall is unable to access the Internet, you should first determine whether the firewall is able to obtain a WAN IP address from the ISP. Unless you have been assigned a static IP address, your firewall must request an IP address from the ISP. You can determine whether the request was successful using the Web Configuration Manager.

To check the WAN IP address:

1. Launch your browser and select an external site such as www.netgear.com
2. Access the Main Menu of the firewall's configuration at http://192.168.0.1
3. Under the Maintenance heading, select Router Status
4. Check that an IP address is shown for the WAN Port
   If 0.0.0.0 is shown, your firewall has not obtained an IP address from your ISP.

If your firewall is unable to obtain an IP address from the ISP, you may need to force your cable or DSL modem to recognize your new firewall by performing the following procedure:

1. Turn off power to the cable or DSL modem.
2. Turn off power to your firewall.
3. Wait five minutes and reapply power to the cable or DSL modem.
4. When the modem's LEDs indicate that it has reacquired sync with the ISP, reapply power to your firewall.

If your firewall is still unable to obtain an IP address from the ISP, the problem may be one of the following:

- Your ISP may require a login program.
  Ask your ISP whether they require PPP over Ethernet (PPPoE) or some other type of login.
- If your ISP requires a login, you may have incorrectly set the login name and password.
- Your ISP may check for your PC's host name.
  Assign the PC Host Name of your ISP account as the Account Name in the Basic Settings menu.
- Your ISP only allows one Ethernet MAC address to connect to Internet, and may check for your PC's MAC address. In this case:

  Inform your ISP that you have bought a new network device, and ask them to use the firewall's MAC address.

OR

Configure your firewall to spoof your PC's MAC address. This can be done in the Basic Settings menu. Refer to "Manual Configuration" on page 4-8.

If your firewall can obtain an IP address, but your PC is unable to load any web pages from the Internet:

- Your PC may not recognize any DNS server addresses.

  A DNS server is a host on the Internet that translates Internet names (such as www addresses) to numeric IP addresses. Typically your ISP will provide the addresses of one or two DNS servers for your use. If you entered a DNS address during the firewall's configuration, reboot your PC and verify the DNS address as described in "Verifying TCP/IP Properties" on page 3-5. Alternatively, you may configure your PC manually with DNS addresses, as explained in your operating system documentation.

- Your PC may not have the firewall configured as its TCP/IP gateway.

  If your PC obtains its information from the firewall by DHCP, reboot the PC and verify the gateway address as described in "Verifying TCP/IP Properties" on page 3-5.

Troubleshooting a TCP/IP Network Using a Ping Utility

Most TCP/IP terminal devices and routers contain a ping utility that sends an echo request packet to the designated device. The device then responds with an echo reply. Troubleshooting a TCP/IP network is made very easy by using the ping utility in in your PC or workstation.

Testing the LAN Path to Your Firewall

You can ping the firewall from your PC to verify that the LAN path to your firewall is set up correctly.

To ping the firewall from a PC running Windows 95 or later:

1. From the Windows toolbar, click on the Start button and select Run.
2. In the field provided, type Ping followed by the IP address of the firewall, as in this example:

   ```
   ping 192.168.0.1
   ```

3. Click on OK.

   You should see a message like this one:

Pinging <IP address> with 32 bytes of data

If the path is working, you see this message:

Reply from < IP address >: bytes=32 time=NN ms TTL=xxx

If the path is not working, you see this message:

Request timed out

If the path is not functioning correctly, you could have one of the following problems:

- Wrong physical connections
  - Make sure the LAN port LED is on. If the LED is off, follow the instructions in "LAN or WAN Port LEDs Not On" on page 9-3.
  - Check that the corresponding Link LEDs are on for your network interface card and for the hub ports (if any) that are connected to your workstation and firewall.
- Wrong network configuration
  - Verify that the Ethernet card driver software and TCP/IP software are both installed and configured on your PC or workstation.
  - Verify that the IP address for your firewall and your workstation are correct and that the addresses are on the same subnet.

Testing the Path from Your PC to a Remote Device

After verifying that the LAN path works correctly, test the path from your PC to a remote device. From the Windows run menu, type:

PING -n 10 *<IP address>*

where <*IP address*> is the IP address of a remote device such as your ISP's DNS server.

If the path is functioning correctly, replies as in the previous section are displayed. If you do not receive replies:

- Check that your PC has the IP address of your firewall listed as the default gateway. If the IP configuration of your PC is assigned by DHCP, this information will not be visible in your PC's Network Control Panel. Verify that the IP address of the firewall is listed as the default gateway as described in "Verifying TCP/IP Properties" on page 3-5.
- Check to see that the network address of your PC (the portion of the IP address specified by the netmask) is different from the network address of the remote device.
- Check that your cable or DSL modem is connected and functioning.

— If your ISP assigned a host name to your PC, enter that host name as the Account Name in the Basic Settings menu.

— Your ISP could be rejecting the Ethernet MAC addresses of all but one of your PCs. Many broadband ISPs restrict access by only allowing traffic from the MAC address of your broadband modem, but some ISPs additionally restrict access to the MAC address of a single PC connected to that modem. If this is the case, you must configure your firewall to "clone" or "spoof" the MAC address from the authorized PC. Refer to "Manual Configuration" on page 4-8.

Restoring the Default Configuration and Password

This section explains how to restore the factory default configuration settings, changing the firewall's administration password to **password** and the IP address to 192.168.0.1. You can erase the current configuration and restore factory defaults in two ways:

- Use the Erase function of the Web Configuration Manager (see "Erase the Configuration" on page 6-5).
- Use the Default Reset button on the rear panel of the firewall. Use this method for cases when the administration password or IP address is not known.

Using the Default Reset button

To restore the factory default configuration settings without knowing the administration password or IP address, you must use the Default Reset button on the rear panel of the firewall.

1. Press and hold the Default Reset button until the Test LED turns on (about 10 seconds).
2. Release the Default Reset button and wait for the firewall to reboot.

Problems with Date and Time

The E-Mail menu in the Content Filtering section displays the current date and time of day. The FVS318 VPN Firewall uses the Network Time Protocol (NTP) to obtain the current time from one of several Network Time Servers on the Internet. Each entry in the log is stamped with the date and time of day. Problems with the date and time function can include:

- Date shown is January 1, 2000
  Cause: The firewall has not yet successfully reached a Network Time Server. Check that your Internet access settings are configured correctly. If you have just completed configuring the firewall, wait at least five minutes and check the date and time again.
- Time is off by one hour
  Cause: The firewall does not automatically sense Daylight Savings Time. In the E-Mail menu, check or uncheck the box marked “Adjust for Daylight Savings Time”.

Troubleshooting the VPN Connection

Note: The FVS318 VPN Firewall uses industry standard VPN protocols. However, due to variations in how manufacturers interpret these standards, many VPN products are not interoperable. NETGEAR provides support for connections between two FVS318 VPN Firewalls, and between an FVS318 VPN Firewall and the SafeNet Secure VPN Client for Windows. Although the FVS318 can interoperate with many other VPN products, it is not possible for NETGEAR to provide specific technical support for every other interconnection.

Common problems with VPN configurations include:

- Same LAN address range on both sides.
  Check that the LAN IP address range at each side is different. For example, if both ends are using 192.168.0.x addresses, the firewall or VPN client will not attempt to connect. This is indicated by a lack of log entries.
- Incorrect Subnet Mask when connecting to a single PC.
  When configuring a Security Association for a connection to a single PC, set the Subnet Mask to 255.255.255.255 in the FVS318 VPN Settings menu.
- Mismatch of encryption setting.
  Check that both ends are configured to use the same method: DES, 3DES, or none.
- Mismatch of PreShared Key.
  If the key is complex, it may be best to copy and paste to be sure the key is entered identically on both ends.
- Interference between personal firewall software and VPN client software.
  Try disabling personal firewall software on client PC. If this works, determine how to configure personal firewall software to allow VPN traffic.
- Dynamic IP address on WAN.
  Only one end of the tunnel may have a dynamically assigned IP address, and that side must always be the tunnel initiator. Also, the dynamically assigned IP address must not be a private address from one of the following ranges:

```
10.0.0.0 - 10.255.255.255
172.16.0.0 - 172.31.255.255
192.168.0.0 - 192.168.255.255
```

Appendix A
Technical Specifications

This appendix provides technical specifications for the Model FVS318 Cable/DSL ProSafe VPN Firewall.

Network Protocol and Standards Compatibility	
Data and Routing Protocols:	TCP/IP, RIP-1, RIP-2, DHCP PPP over Ethernet (PPPoE)
VPN Protocols	IKE, IPSec, DES, 3DES, MD5, SHA-1
Power Adapter	
North America:	120V, 60 Hz, input
United Kingdom, Australia:	240V, 50 Hz, input
Europe:	230V, 50 Hz, input
Japan:	100V, 50/60 Hz, input
All regions (output):	12 V DC @ 1.2A output, 30W maximum
Physical Specifications	
Dimensions:	253 by 181 by 35 mm 9.95 by 7.1 by 1.4 in.

Weight:	1.2 kg 2.6 lb.
Environmental Specifications	
Operating temperature:	0° to 40° C
Operating humidity:	90% maximum relative humidity, noncondensing
Electromagnetic Emissions	
Meets requirements of:	FCC Part 15 Class B
	VCCI Class B
	EN 55 022 (CISPR 22), Class B
Interface Specifications	
LAN:	10BASE-T or 100BASE-Tx, RJ-45
WAN:	10BASE-T, RJ-45

Appendix B
Networks, Routing, and Firewall Basics

This chapter provides an overview of IP networks, routing, and firewalls.

Basic Router Concepts

Large amounts of bandwidth can be provided easily and relatively inexpensively in a local area network (LAN). However, providing high bandwidth between a local network and the Internet can be very expensive. Because of this expense, Internet access is usually provided by a slower-speed wide-area network (WAN) link such as a cable or DSL modem. In order to make the best use of the slower WAN link, a mechanism must be in place for selecting and transmitting only the data traffic meant for the Internet. The function of selecting and forwarding this data is performed by a router.

What is a Router?

A router is a device that forwards traffic between networks based on network layer information in the data and on routing tables maintained by the router. In these routing tables, a router builds up a logical picture of the overall network by gathering and exchanging information with other routers in the network. Using this information, the router chooses the best path for forwarding network traffic.

Routers vary in performance and scale, number of routing protocols supported, and types of physical WAN connection they support. The Model FVS318 Cable/DSL ProSafe VPN Firewall is a small office router that routes the IP protocol over a single-user broadband connection.

Routing Information Protocol

One of the protocols used by a router to build and maintain a picture of the network is the Routing Information Protocol (RIP). Using RIP, routers periodically update one another and check for changes to add to the routing table.

The FVS318 VPN Firewall supports both the older RIP-1 and the newer RIP-2 protocols. Among other improvements, RIP-2 supports subnet and multicast protocols. RIP is not required for most home applications.

IP Addresses and the Internet

Because TCP/IP networks are interconnected across the world, every machine on the Internet must have a unique address to make sure that transmitted data reaches the correct destination. Blocks of addresses are assigned to organizations by the Internet Assigned Numbers Authority (IANA). Individual users and small organizations may obtain their addresses either from the IANA or from an Internet service provider (ISP). You can contact IANA at www.iana.org.

The Internet Protocol (IP) uses a 32-bit address structure. The address is usually written in dot notation (also called dotted-decimal notation), in which each group of eight bits is written in decimal form, separated by decimal points.

For example, the following binary address:

```
11000011  00100010  00001100  00000111
```

is normally written as:

```
195.34.12.7
```

The latter version is easier to remember and easier to enter into your computer.

In addition, the 32 bits of the address are subdivided into two parts. The first part of the address identifies the network, and the second part identifies the host node or station on the network. The dividing point may vary depending on the address range and the application.

There are five standard classes of IP addresses. These address classes have different ways of determining the network and host sections of the address, allowing for different numbers of hosts on a network. Each address type begins with a unique bit pattern, which is used by the TCP/IP software to identify the address class. After the address class has been determined, the software can correctly identify the host section of the address. The follow figure shows the three main address classes, including network and host sections of the address for each address type.

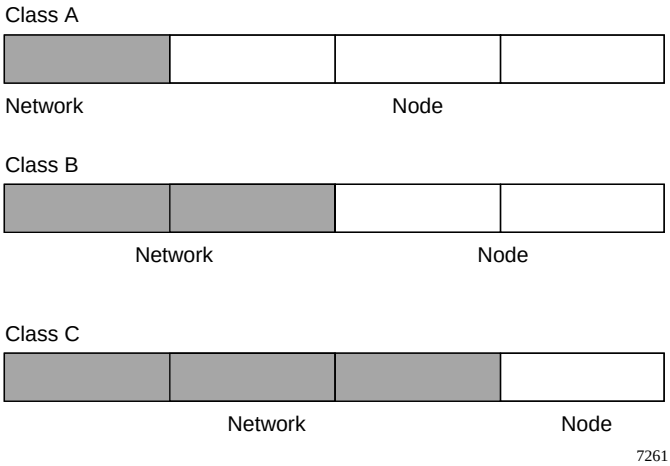


Figure B-1. Three Main Address Classes

The five address classes are:

- Class A
  Class A addresses can have up to 16,777,214 hosts on a single network. They use an eight-bit network number and a 24-bit node number. Class A addresses are in this range:

  `1.x.x.x to 126.x.x.x.`

- Class B
  Class B addresses can have up to 65,354 hosts on a network. A Class B address uses a 16-bit network number and a 16-bit node number. Class B addresses are in this range:

  `128.1.x.x to 191.254.x.x.`

- Class C
  Class C addresses can have 254 hosts on a network. Class C addresses use 24 bits for the network address and eight bits for the node. They are in this range:

  `192.0.1.x to 223.255.254.x.`

- Class D
  Class D addresses are used for multicasts (messages sent to many hosts). Class D addresses are in this range:

  `224.0.0.0 to 239.255.255.255.`

- Class E
  Class E addresses are for experimental use.

This addressing structure allows IP addresses to uniquely identify each physical network and each node on each physical network.

For each unique value of the network portion of the address, the base address of the range (host address of all zeros) is known as the network address and is not usually assigned to a host. Also, the top address of the range (host address of all ones) is not assigned, but is used as the broadcast address for simultaneously sending a packet to all hosts with the same network address.

Netmask

In each of the address classes previously described, the size of the two parts (network address and host address) is implied by the class. This partitioning scheme can also be expressed by a netmask associated with the IP address. A netmask is a 32-bit quantity that, when logically combined (using an AND operator) with an IP address, yields the network address. For instance, the netmasks for Class A, B, and C addresses are 255.0.0.0, 255.255.0.0, and 255.255.255.0, respectively.

For example, the address 192.168.170.237 is a Class C IP address whose network portion is the upper 24 bits. When combined (using an AND operator) with the Class C netmask, as shown here, only the network portion of the address remains:

```
11000000  10101000  10101010  11101101 (192.168.170.237)
```

combined with:

```
11111111  11111111  11111111  00000000 (255.255.255.0)
```

Equals:

```
11000000  10101000  10101010  00000000 (192.168.170.0)
```

As a shorter alternative to dotted-decimal notation, the netmask may also be expressed in terms of the number of ones from the left. This number is appended to the IP address, following a backward slash (/), as “/n.” In the example, the address could be written as 192.168.170.237/24, indicating that the netmask is 24 ones followed by 8 zeros.

Subnet Addressing

By looking at the addressing structures, you can see that even with a Class C address, there are a large number of hosts per network. Such a structure is an inefficient use of addresses if each end of a routed link requires a different network number. It is unlikely that the smaller office LANs would have that many devices. You can resolve this problem by using a technique known as subnet addressing.

Subnet addressing allows us to split one IP network address into smaller multiple physical networks known as subnetworks. Some of the node numbers are used as a subnet number instead. A Class B address gives us 16 bits of node numbers translating to 64,000 nodes. Most organizations do not use 64,000 nodes, so there are free bits that can be reassigned. Subnet addressing makes use of those bits that are free, as shown below.

Figure B-2. Example of Subnetting a Class B Address

A Class B address can be effectively translated into multiple Class C addresses. For example, the IP address of 172.16.0.0 is assigned, but node addresses are limited to 255 maximum, allowing eight extra bits to use as a subnet address. The IP address of 172.16.97.235 would be interpreted as IP network address 172.16, subnet number 97, and node number 235. In addition to extending the number of addresses available, subnet addressing provides other benefits. Subnet addressing allows a network manager to construct an address scheme for the network by using different subnets for other geographical locations in the network or for other departments in the organization.

Although the preceding example uses the entire third octet for a subnet address, note that you are not restricted to octet boundaries in subnetting. To create more network numbers, you need only shift some bits from the host address to the network address. For instance, to partition a Class C network number (192.68.135.0) into two, you shift one bit from the host address to the network address. The new netmask (or subnet mask) is 255.255.255.128. The first subnet has network number 192.68.135.0 with hosts 192.68.135.1 to 129.68.135.126, and the second subnet has network number 192.68.135.128 with hosts 192.68.135.129 to 192.68.135.254.

Note: The number 192.68.135.127 is not assigned because it is the broadcast address of the first subnet. The number 192.68.135.128 is not assigned because it is the network address of the second subnet.

The following table lists the additional subnet mask bits in dotted-decimal notation. To use the table, write down the original class netmask and replace the 0 value octets with the dotted-decimal value of the additional subnet bits. For example, to partition your Class C network with subnet mask 255.255.255.0 into 16 subnets (4 bits), the new subnet mask becomes 255.255.255.240.

Table B-1. Netmask Notation Translation Table for One Octet

Number of Bits	Dotted-Decimal Value
1	128
2	192
3	224
4	240
5	248
6	252
7	254
8	255

The following table displays several common netmask values in both the dotted-decimal and the masklength formats.

Table B-2. Netmask Formats

Dotted-Decimal	Masklength
255.0.0.0	/8
255.255.0.0	/16
255.255.255.0	/24
255.255.255.128	/25
255.255.255.192	/26
255.255.255.224	/27
255.255.255.240	/28
255.255.255.248	/29

Table B-2. Netmask Formats

255.255.255.252	/30
255.255.255.254	/31
255.255.255.255	/32

NETGEAR strongly recommends that you configure all hosts on a LAN segment to use the same netmask for the following reasons:

- So that hosts recognize local IP broadcast packets

  When a device broadcasts to its segment neighbors, it uses a destination address of the local network address with all ones for the host address. In order for this scheme to work, all devices on the segment must agree on which bits comprise the host address.

- So that a local router or bridge recognizes which addresses are local and which are remote

Private IP Addresses

If your local network is isolated from the Internet (for example, when using NAT), you can assign any IP addresses to the hosts without problems. However, the IANA has reserved the following three blocks of IP addresses specifically for private networks:

```
10.0.0.0 - 10.255.255.255
172.16.0.0 - 172.31.255.255
192.168.0.0 - 192.168.255.255
```

NETGEAR recommends that you choose your private network number from this range. The DHCP server of the FVS318 VPN Firewall is preconfigured to automatically assign private addresses.

Regardless of your particular situation, do not create an arbitrary IP address; always follow the guidelines explained here. For more information about address assignment, refer to RFC 1597, *Address Allocation for Private Internets,* and RFC 1466, *Guidelines for Management of IP Address Space*. The Internet Engineering Task Force (IETF) publishes RFCs on its Web site at www.ietf.org.

Single IP Address Operation Using NAT

In the past, if multiple PCs on a LAN needed to access the Internet simultaneously, you had to obtain a range of IP addresses from the ISP. This type of Internet account is more costly than a single-address account typically used by a single user with a modem, rather than a router. The FVS318 VPN Firewall employs an address-sharing method called Network Address Translation (NAT). This method allows several networked PCs to share an Internet account using only a single IP address, which may be statically or dynamically assigned by your ISP.

The router accomplishes this address sharing by translating the internal LAN IP addresses to a single address that is globally unique on the Internet. The internal LAN IP addresses can be either private addresses or registered addresses. For more information about IP address translation, refer to RFC 1631, *The IP Network Address Translator (NAT)*.

The following figure illustrates a single IP address operation.

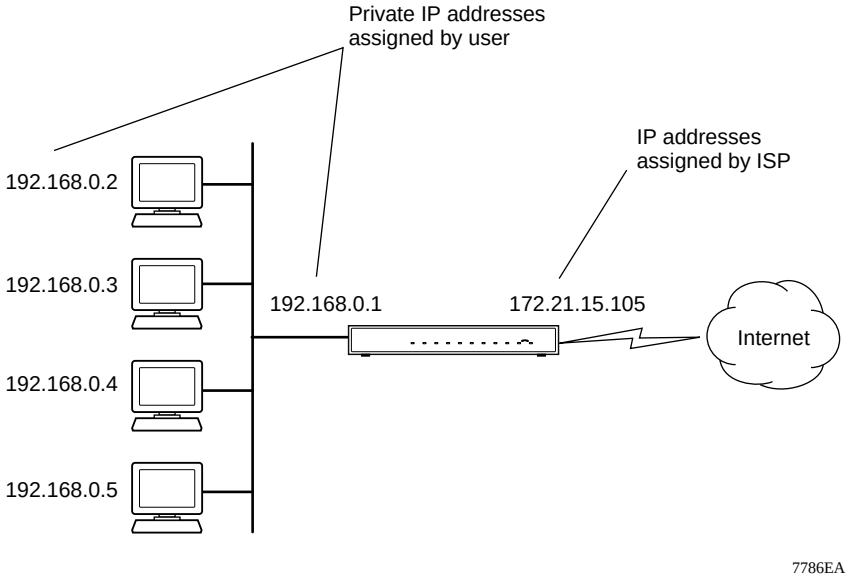


Figure B-3. Single IP Address Operation Using NAT

This scheme offers the additional benefit of firewall-like protection because the internal LAN addresses are not available to the Internet through the translated connection. All incoming inquiries are filtered out by the router. This filtering can prevent intruders from probing your system. However, using port forwarding, you can allow one PC (for example, a Web server) on your local network to be accessible to outside users.

MAC Addresses and Address Resolution Protocol

An IP address alone cannot be used to deliver data from one LAN device to another. To send data between LAN devices, you must convert the IP address of the destination device to its media access control (MAC) address. Each device on an Ethernet network has a unique MAC address, which is a 48-bit number assigned to each device by the manufacturer. The technique that associates the IP address with a MAC address is known as address resolution. Internet Protocol uses the Address Resolution Protocol (ARP) to resolve MAC addresses.

If a device sends data to another station on the network and the destination MAC address is not yet recorded, ARP is used. An ARP request is broadcast onto the network. All stations on the network receive and read the request. The destination IP address for the chosen station is included as part of the message so that only the station with this IP address responds to the ARP request. All other stations discard the request.

The station with the correct IP address responds with its own MAC address directly to the sending device. The receiving station provides the transmitting station with the required destination MAC address. The IP address data and MAC address data for each station are held in an ARP table. The next time data is sent, the address can be obtained from the address information in the table.

Domain Name Server

Many of the resources on the Internet can be addressed by simple descriptive names such as *www.NETGEAR.com*. This addressing is very helpful at the application level, but the descriptive name must be translated to an IP address in order for a user to actually contact the resource. Just as a telephone directory maps names to phone numbers, or as an ARP table maps IP addresses to MAC addresses, a domain name system (DNS) server maps descriptive names of network resources to IP addresses.

When a PC accesses a resource by its descriptive name, it first contacts a DNS server to obtain the IP address of the resource. The PC sends the desired message using the IP address. Many large organizations, such as ISPs, maintain their own DNS servers and allow their customers to use the servers to look up addresses.

IP Configuration by DHCP

When an IP-based local area network is installed, each PC must be configured with an IP address. If the PCs need to access the Internet, they should also be configured with a gateway address and one or more DNS server addresses. As an alternative to manual configuration, there is a method by which each PC on the network can automatically obtain this configuration information. A device on the network may act as a Dynamic Host Configuration Protocol (DHCP) server. The DHCP server stores a list or pool of IP addresses, along with other information (such as gateway and DNS addresses) that it may assign to the other devices on the network. The FVS318 VPN Firewall has the capacity to act as a DHCP server.

The FVS318 VPN Firewall also functions as a DHCP client when connecting to the ISP. The router can automatically obtain an IP address, subnet mask, DNS server addresses, and a gateway address if the ISP provides this information by DHCP.

Ethernet Cabling

Although Ethernet networks originally used thick or thin coaxial cable, most installations currently use unshielded twisted pair (UTP) cabling. The UTP cable contains eight conductors, arranged in four twisted pairs, and terminated with an RJ45 type connector. A normal "straight-through" UTP Ethernet cable follows the EIA568B standard wiring as described in Table B-3.

Table B-3. UTP Ethernet cable wiring, straight-through

Pin	Wire color	Signal
1	Orange/White	Transmit (Tx) +
2	Orange	Transmit (Tx) -
3	Green/White	Receive (Rx) +
4	Blue	
5	Blue/White	
6	Green	Receive (Rx) -
7	Brown/White	
8	Brown	

Uplink Switches and Crossover Cables

In the wiring table, the concept of transmit and receive are from the perspective of the PC. For example, the PC transmits on pins 1 and 2. At the hub, the perspective is reversed, and the hub receives on pins 1 and 2. When connecting a PC to a PC, or a hub port to another hub port, the transmit pair must be exchanged with the receive pair. This exchange is done by one of two mechanisms. Most hubs provide an Uplink switch which will exchange the pairs on one port, allowing that port to be connected to another hub using a normal Ethernet cable. The second method is to use a crossover cable, which is a special cable in which the transmit and receive pairs are exchanged at one of the two cable connectors. Crossover cables are often unmarked as such, and must be identified by comparing the two connectors. Since the cable connectors are clear plastic, it is easy to place them side by side and view the order of the wire colors on each. On a straight-through cable, the color order will be the same on both connectors. On a crossover cable, the orange and blue pairs will be exchanged from one connector to the other.

Cable Quality

A twisted pair Ethernet network operating at 10 Mbits/second (10BASE-T) will often tolerate low quality cables, but at 100 Mbits/second (10BASE-Tx) the cable must be rated as Category 5, or "Cat 5", by the Electronic Industry Association (EIA). This rating will be printed on the cable jacket. A Category 5 cable will meet specified requirements regarding loss and crosstalk. In addition, there are restrictions on maximum cable length for both 10 and 100 Mbits/second networks.

Internet Security and Firewalls

When your LAN connects to the Internet through a router, an opportunity is created for outsiders to access or disrupt your network. A NAT router provides some protection because by the very nature of the Network Address Translation (NAT) process, the network behind the NAT router is shielded from access by outsiders on the Internet. However, there are methods by which a determined hacker can possibly obtain information about your network or at the least can disrupt your Internet access. A greater degree of protection is provided by a firewall router.

What is a Firewall?

A firewall is a device that protects one network from another, while allowing communication between the two. A firewall incorporates the functions of the NAT router, while adding features for dealing with a hacker intrusion or attack. Several known types of intrusion or attack can be recognized when they occur. When an incident is detected, the firewall can log details of the attempt, and can optionally send email to an administrator notifying them of the incident. Using information from the log, the administrator can take action with the ISP of the hacker. In some types of intrusions, the firewall can fend off the hacker by discarding all further packets from the hacker's IP address for a period of time.

Stateful Packet Inspection

Unlike simple Internet sharing routers, a firewall uses a process called stateful packet inspection to ensure secure firewall filtering to protect your network from attacks and intrusions. Since user-level applications such as FTP and Web browsers can create complex patterns of network traffic, it is necessary for the firewall to analyze groups of network connection "states". Using Stateful Packet Inspection, an incoming packet is intercepted at the network layer and then analyzed for state-related information associated with all network connections. A central cache within the firewall keeps track of the state information associated with all network connections. All traffic passing through the firewall is analyzed against the state of these connections in order to determine whether or not it will be allowed to pass through or rejected.

Denial of Service Attack

A hacker may be able to prevent your network from operating or communicating by launching a Denial of Service (DoS) attack. The method used for such an attack can be as simple as merely flooding your site with more requests than it can handle. A more sophisticated attack may attempt to exploit some weakness in the operating system used by your router or gateway. Some operating systems can be disrupted by simply sending a packet with incorrect length information.

Glossary

10BASE-T	IEEE 802.3 specification for 10 Mbps Ethernet over twisted pair wiring.
100BASE-Tx	IEEE 802.3 specification for 100 Mbps Ethernet over twisted pair wiring.
802.11b	IEEE specification for wireless networking at 11 Mbps using direct-sequence spread-spectrum (DSSS) technology and operating in the unlicensed radio spectrum at 2.5GHz.
Denial of Service attack	DoS. A hacker attack designed to prevent your computer or network from operating or communicating.
DHCP	*See* Dynamic Host Configuration Protocol.
DNS	*See* Domain Name Server.
domain name	A descriptive name for an address or group of addresses on the Internet. Domain names are of the form of a registered entity name plus one of a number of predefined top level suffixes such as .com, .edu, .uk, etc. For example, in the address mail.NETGEAR.com, mail is a server name and NETGEAR.com is the domain.
Domain Name Server	A Domain Name Server (DNS) resolves descriptive names of network resources (such as www.NETGEAR.com) to numeric IP addresses.
Dynamic Host Configuration Protocol	DHCP. An Ethernet protocol specifying how a centralized DHCP server can assign network configuration information to multiple DHCP clients. The assigned information includes IP addresses, DNS addresses, and gateway (router) addresses.
ESSID	The Extended Service Set Identification (ESS ID) is a thirty-two character (maximum) alphanumeric key identifying the wireless local area network.
Gateway	A local device, usually a router, that connects hosts on a local network to other networks.

IKE	Internet Key Exchange. An automated method for exchanging and managing encryption keys between two VPN devices.
IP	Internet Protocol. The main internetworking protocol used in the Internet. Used in conjunction with the Transfer Control Protocol (TCP) to form TCP/IP.
IP Address	A four-byte number uniquely defining each host on the Internet. Ranges of addresses are assigned by Internic, an organization formed for this purpose. Usually written in dotted-decimal notation with periods separating the bytes (for example, 134.177.244.57).
IPSec	Internet Protocol Security. IPSec is a series of guidelines for securing private information transmitted over public networks. IPSec is a VPN method providing a higher level of security than PPTP.
ISP	Internet service provider.
LAN	*See* local area network.
local area network	LAN. A communications network serving users within a limited area, such as one floor of a building. A LAN typically connects multiple personal computers and shared network devices such as storage and printers. Although many technologies exist to implement a LAN, Ethernet is the most common for connecting personal computers.
MAC address	Media Access Control address. A unique 48-bit hardware address assigned to every Ethernet node. Usually written in the form 01:23:45:67:89:ab.
Mbps	Megabits per second.
MSB	*See* Most Significant Bit or Most Significant Byte.
MRU	*See* Maximum Receive Unit.
Maximum Receive Unit	The size in bytes of the largest packet that can be sent or received.
Most Significant Bit or Most Significant Byte	The portion of a number, address, or field that is farthest left when written as a single number in conventional hexadecimal ordinary notation. The part of the number having the most value.
NAT	*See* Network Address Translation.

netmask	A number that explains which part of an IP address comprises the network address and which part is the host address on that network. It can be expressed in dotted-decimal notation or as a number appended to the IP address. For example, a 28-bit mask starting from the MSB can be shown as 255.255.255.192 or as /28 appended to the IP address.
Network Address Translation	A technique by which several hosts share a single IP address for access to the Internet.
packet	A block of information sent over a network. A packet typically contains a source and destination network address, some protocol and length information, a block of data, and a checksum.
PPP	*See* Point-to-Point Protocol.
PPP over Ethernet	PPPoE. PPP over Ethernet is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.
PPTP	Point-to-Point Tunneling Protocol. A method for establishing a virtual private network (VPN) by embedding Microsoft's network protocol into Internet packets.
PSTN	Public Switched Telephone Network.
Point-to-Point Protocol	PPP. A protocol allowing a computer using TCP/IP to connect directly to the Internet.
RFC	Request For Comment. Refers to documents published by the Internet Engineering Task Force (IETF) proposing standard protocols and procedures for the Internet. RFCs can be found at www.ietf.org.
RIP	*See* Routing Information Protocol.
router	A device that forwards data between networks. An IP router forwards data based on IP source and destination addresses.
Routing Information Protocol	A protocol in which routers periodically exchange information with one another so that they can determine minimum distance paths between sources and destinations.
subnet mask	*See* netmask.
UTP	Unshielded twisted pair. The cable used by 10BASE-T and 100BASE-Tx Ethernet networks.

VPN	Virtual Private Network. A method for securely transporting data between two private networks by using a public network such as the Internet as a connection.
WAN	*See* wide area network.
WEP	Wired Equivalent Privacy. WEP is a data encryption protocol for 802.11b wireless networks. All wireless nodes and access points on the network are configured with a 64-bit or 128-bit Shared Key for data encryption.
wide area network	WAN. A long distance link used to extend or connect remotely located local area networks. The Internet is a large WAN.
Windows Internet Naming Service	WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses. If a remote network contains a WINS server, your Windows PCs can gather information from that WINS server about its local hosts. This allows your PCs to browse that remote network using Network Neighborhood.
WINS	*See* Windows Internet Naming Service.

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