RX3041H

User's Manual

Revision 1.3
Aug. 19, 2004

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1 Introduction

Congratulations on becoming the owner of the high-speed router, RX3041H. Your LAN (local area network) will now be able to access the Internet using your broadband connection such as those with ADSL or cable modem.

This User Manual will show you how to set up your router, and how to customize its configuration to get the most out of this product.

1.1 Features

- 10/100Base-T router providing Internet connectivity for all computers on your LAN
- 4-port 10/100Base-T (auto MDI/MDIX, auto speed negotiation) Ethernet switch
- High performance firewall, and NAT (Network Address Translation) to provide secure Internet access for your LAN
- Automatic network address assignment through DHCP Server
- Services including IP route, DNS and DDNS configuration, RIP, and IP performance monitoring
- Configuration program accessible via a web browser, such as Microsoft Internet Explorer 5.5, Netscape 7.0.2 or newer.

1.2 System Requirements

In order to use the RX3041H for Internet access, you must have the following:

- ADSL or cable modem and the corresponding service up and running, with at least one public Internet address assigned to your WAN
- One or more computers each containing an Ethernet 10Base-T/100Base-T network interface card (NIC)
- (Optional) An Ethernet hub/switch, if you are connecting the device to more than four computers on an Ethernet network.
- For system configuration using the supplied web-based program: a web browser such as Internet Explorer v5.5 or newer.

1.3 Using this Document

1.3.1 Notational conventions

- Acronyms are defined the first time they appear in text and in the glossary (Appendix E).
- For brevity, the RX3041H is sometimes referred to as “the router” or “your router”.
- The terms *LAN* and *network* are used interchangeably to refer to a group of Ethernet-connected computers at one site.
- Sequence of mouse actions is denoted by the “➔” character. For instance, **System ➔ System Info** means click the **System** menu and then click the **System Info** submenu.

1.3.2 Typographical conventions

- *Italics* is used to identify terms that are defined in the glossary (Appendix E).
- **Boldface** type text is used for items you select from menus and drop-down lists, and text strings you type when prompted by the program.

1.3.3 Special messages

This document uses the following icons to call your attention to specific instructions or explanations.

Note	*Provides clarification or non-essential information on the current topic.*
Definition	*Explains terms or acronyms that may be unfamiliar to many readers. These terms are also included in the Glossary.*
WARNING	*Provides messages of high importance, including messages relating to personal safety or system integrity.*

2 Getting to Know the RX3041H

2.1 Parts List

In addition to this document, your router should come with the following:

- RX3041H High Speed Router
- AC adapter
- Ethernet cable ("straight-through" type)

2.2 Front Panel

The front panel contains LED indicators that show the status of the unit.

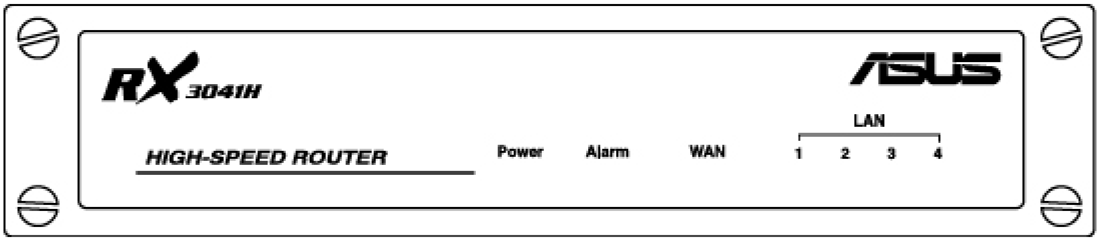


Figure 2.1. Front Panel LEDs

Table 2.1. Front Panel Label and LEDs

LED Label	Color	Status	Indication
POWER	Green	On	Unit is powered on
		Off	Unit is powered off
ALARM	Green	On	System malfunctioned if this LED stays on. Note that the LED is lit during system booting and is turned off afterwards. This LED is also used along w/ reset button during system configuration reset. Please refer to the section 11.6.1.2 "*Reset to Factory Settings Using Reset Button*" for further details.
		Off	System functions normally.
WAN	Green	On	WAN link established and active
		Flashing	Data is transmitted or received via WAN connection
		Off	No WAN link
LAN1 – LAN4	Green	On	LAN link is established
		Flashing	Data is transmitted or received via LAN connection
		Off	No LAN link

2.3 Rear Panel

The rear panel contains the ports for the unit's data and power connections.

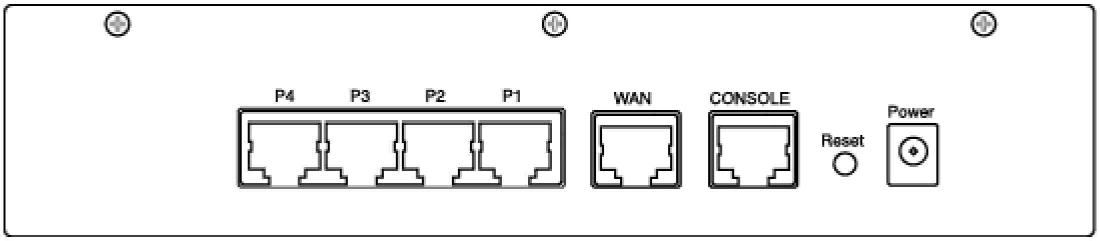


Figure 2.2. Rear Panel Connections

Table 2.2. Rear Panel Labels and LEDs

Label	Function
POWER	**Power Input Jack** Connects to the supplied AC adapter
Reset	**Reset Button** 1. Reboots the device 2. Used for resetting the system configuration to the factory settings. Please refer to the section 11.6.1.2 "*Reset to Factory Settings Using Reset Button*" for further details.
CONSOLE	**Console Port** For ASUSTeK internal use only.
WAN	**WAN Port** Connects to your WAN device, such as an ADSL or a cable modem.
P1 – P4	**LAN Ports** Connects to your PC's Ethernet port, or to the uplink port on the hub or the switch

2.4 Major Features

2.4.1 Firewall and NAT Features

The firewall implemented in your router provides the following features to protect your network from being attacked and to prevent your network from being used as the springboard for attacks.

- Address Sharing and Management
- Packet Filtering
- Stateful Packet Inspection
- Defense against Denial of Service Attacks
- Application Content Filtering
- Log and Alert
- Remote Access

- Keyword based URL Filtering

2.4.1.1 Address Sharing and Management

The RX3041H Firewall provides NAT to share a single high-speed Internet connection and to save the cost of multiple connections required for the hosts on the LAN segments connected to the RX3041H. This feature conceals network address and prevents them from becoming public. It maps unregistered IP addresses of hosts connected to the LAN with valid ones for Internet access. The RX3041H Firewall also provides reverse NAT capability, which enables SOHO users to host various services such as e-mail servers, web servers, etc. The NAT rules drive the translation mechanism at the NAT router. The following types of NAT are supported by the RX3041H.

- Static NAT – Maps an internal host address to a globally valid Internet address (one-to-one). All packets are directly translated with the information contained in the map.
- Dynamic NAT – Maps an internal host address dynamically to a globally valid Internet address (m-to-n). The map usually contains a pool of internal IP addresses (m) and a pool of globally valid Internet IP addresses (n) with m usually greater than n. Each internal IP address is mapped to one external IP address on a first come first serve basis.
- NAPT (Network Address and Port Translation) – Also called IP Masquerading. Maps many internal hosts to only one globally valid Internet address. The map usually contains a pool of network ports to be used for translation. Every packet is translated with the globally valid Internet address; the port number is translated with a free pool from the pool of network ports.
- Reverse Static – This is inbound mapping that maps a globally valid Internet address to an internal host address. All packets coming to that external address are relayed to the internal address. This is useful when hosting services in an internal machine.
- Reverse NAPT – Also called inbound mapping, port mapping, and virtual server. Any packet coming to the router can be relayed to the internal host based on the protocol, port number or IP Address specified in the rule. This is useful when multiple services are hosted on different internal machines.

Note

For a complete listing of all NAT ALGs supported, refer to Appendix A "ALG Configuration" on.

2.4.1.2 ACL (Access Control List)

ACL rule is one of the basic building blocks for network security. Firewall monitors each individual packet, decodes the header information of inbound and outbound traffic and then either blocks the packet from passing or allows it to pass based on the contents of the source address, destination address, source port, destination port, protocol and other criterion, e.g. application filter, time ranges, defined in the ACL rules.

ACL is a very appropriate measure for providing isolation of one subnet from another. It can be used as the first line of defense in the network to block inbound packets of specific types from ever reaching the protected network.

The RX3041H Firewall's ACL methodology supports:

- Filtering based on destination and source IP address, port number and protocol
- Use of the wild card for composing filter rules
- Filter Rule priorities
- Time based filters
- Application specific filters
- User group based filters for remote access

2.4.1.3 Stateful Packet Inspection

The RX3041H Firewall uses "stateful packet inspection" that extracts state-related information required for the security decision from the packet and maintains this information for evaluating subsequent connection attempts. It has awareness of application and creates dynamic sessions that allow dynamic connections so that no ports need to be opened other than the required ones. This provides a solution which is highly secure and that offers scalability and extensibility.

2.4.1.4 Defense against DoS Attacks

The RX3041H Firewall has an Attack Defense Engine that protects internal networks from known types of Internet attacks. It provides automatic protection from Denial of Service (DoS) attacks such as SYN flooding, IP smurfing, LAND, Ping of Death and all re-assembly attacks. It can drop ICMP redirects and IP loose/strict source routing packets. For example, the RX3041H Firewall provides protection from "WinNuke", a widely used program to remotely crash unprotected Windows systems in the Internet. The RX3041H Firewall also provides protection from a variety of common Internet attacks such as IP Spoofing, Ping of Death, Land Attack, Reassembly and SYN flooding.

The type of attack protections provided by the RX3041H are listed in Table 2.3.

Table 2.3. DoS Attacks

Type of Attack	**Name of Attacks**
Re-assembly attacks	Bonk, Boink, Teardrop (New Tear), Overdrop, Opentear, Syndrop, Jolt
ICMP Attacks	Ping of Death, Smurf, Twinge
Flooders	ICMP Flooder, UDP Flooder, SYN Flooder
Port Scans	TCP XMAS Scan, TCP Null Scan TCP SYN Scan, TCP Stealth Scan
TCP Attacks	TCP sequence number prediction, TCP out-of sequence attacks
Protection with PF Rules	Echo-Chargen, Ascend Kill
Miscellaneous Attacks	IP Spoofing, LAND, Targa, Tentacle MIME Flood, Winnuke, FTP Bounce, IP unaligned time stamp attack

2.4.1.5 Application Command Filtering

The RX3041H Firewall allows network administrators to block, monitor, and report on network users access to non-business and objectionable content. This high-performance content access control results in increased productivity, lower bandwidth usage and reduced legal liability.

The RX3041H Firewall has the ability to handle active content filtering on certain application protocols such as HTTP, FTP, SMTP and RPC.

- HTTP – You can define HTTP extension based filtering schemes for blocking
  - ActiveX
  - Java Archive
  - Java Applets
  - Microsoft Archives
  - URLs based on file extensions.
- FTP – allows you to define and enforce the file transfer policy for the site or group of users
- SMTP – allows you to filter operations such as VRFY, EXPN, etc. which reveal excess information about the recipient.
- RPC – allows you to filter programs based on the assigned RPC program numbers.

2.4.1.6 Application Level Gateway (ALG)

Applications such as FTP, games etc., open connections dynamically based on the respective application parameter. To go through the firewall on the RX3041H, packets pertaining to an application, require a corresponding *allow* rule. In the absence of such rules, the packets will be dropped by the RX3041H Firewall. As it is not feasible to create policies for numerous applications dynamically (at the same time without compromising security), intelligence in the form of Application Level Gateways (ALG), is built to parse packets for applications and open dynamic associations. The RX3041H Firewall provides a number of ALGs for popular applications such as FTP, H.323, RTSP, Microsoft Games, SIP, etc.

2.4.1.7 URL Filtering

A set of keywords that should not appear in the URL (Uniform Resource Locator, e.g. www.yahoo.com) can be defined. Any URL containing one or more of these keywords will be blocked. This is a policy independent feature i.e. it cannot be associated to ACL rules. This feature can be independently enabled or disabled, but works only if firewall is enabled.

2.4.1.8 Log and Alerts

Events in the network, that could be attempts to affect its security, are recorded in the RX3041H System log file. Event details are recorded in WELF (WebTrends Enhanced Log Format) format so that statistical tools can be used to generate custom reports. The RX3041H Firewall can also forward Syslog information to a Syslog server on a private network.

The RX3041H Firewall supports:

- Alerts sent to the administrator via e-mail.
- Maintains at a minimum, log details such as, time of packet arrival, description of action taken by Firewall and reason for action.
- Supports the UNIX Syslog format.
- Sends log report e-mails as scheduled by the network administrator or by default when the log file is full.
- All the messages are sent in the WELF format.
- ICMP logging to show code and type.

2.4.1.9 Remote Access

The RX3041H Firewall allows the network administrator to segregate the user community into Access Policies per group. A user can log in using the login page (Refer to “User Login Process” on page 67). After a user is authenticated successfully, the RX3041H Firewall dynamically activates the user-group’s set of access policies.

These policies will subsequently be enforced until the user logs out of the session or until inactivity timeout period has lapsed.

3 Quick Start Guide

This Quick Start Guide provides basic instructions for connecting your router to a computer or a LAN and to the Internet.

- Part 1 provides instructions to set up the hardware.
- Part 2 describes how to configure Internet properties on your computer(s).
- Part 3 shows you how to configure basic settings on the RX3041H to get your LAN connected to the Internet.

After setting up and configuring your router, you can follow the instructions on page 20 to verify that it is working properly.

This Quick Start Guide assumes that you have already established ADSL or cable modem service with your Internet service provider (ISP). These instructions provide a basic configuration that should be compatible with your home or small office network setup. Refer to the subsequent chapters for additional configuration instructions.

3.1 Part 1 — Connecting the Hardware

In Part 1, you connect the device to an ADSL or a cable modem (which in turn is connected to a phone jack or a cable outlet), the power outlet, and your computer or network.

⚠ **WARNING**

Before you begin, turn the power off for all devices. *These include your computer(s), your LAN hub/switch (if applicable), and the router.*

Figure 3.1 illustrates the hardware connections. Please follow the steps that follow for specific instructions.

3.1.1 Step 1. Connect an ADSL or a cable modem.

For the RX3041H: Connect one end of the Ethernet cable to the port labeled WAN on the rear panel of the device. Connect the other end to the Ethernet port on the ADSL or cable modem.

3.1.2 Step 2. Connect computers or a LAN.

If your LAN has no more than 4 computers, you can use an Ethernet cable to connect computers directly to the built-in switch on the device. Note that you should attach one end of the Ethernet cable to any of the port labeled LAN1 – LAN4 on the rear panel of the device and connect the other end to the Ethernet port of a computer.

If your LAN has more than 4 computers, you can attach one end of an Ethernet cable to a hub or a switch (probably an uplink port; please refer to the hub or switch documentations for instructions) and the other to the Ethernet switch port (labeled LAN1 – LAN4) on the RX3041H.

Note that either the crossover or straight-through Ethernet cable can be used to connect the built-in switch and computers, hubs or switches as the built-in switch is smart enough to make connections with either type of cables.

3.1.3 Step 3. Attach the AC adapter.

Connect the AC adapter to the POWER input jack on the rear panel of your router and plug the adapter to a power outlet or a power strip.

3.1.4 Step 4 – Power up devices.

Turn on the RX3041H, the ADSL or cable modem and power up your computers.

Press the Power switch on the rear panel of the RX3041H to the ON position. Turn on your ADSL or cable modem. Turn on and boot up your computer(s) and any LAN devices such as hubs or switches.

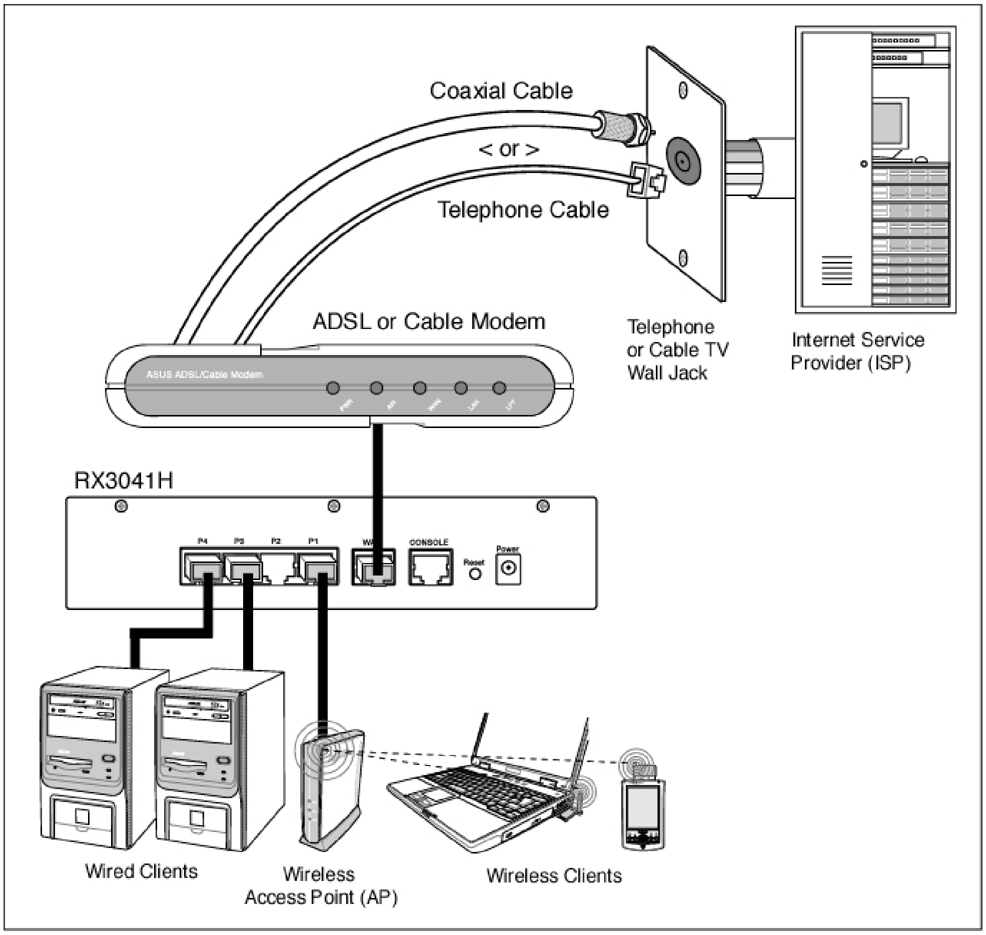


Figure 3.1. Overview of Hardware Connections

You should verify that the LEDs are illuminated as indicated in Table 3.1. If the LEDs illuminate as expected, the RX3041H is working properly.

Table 3.1. LED Indicators

This LED:	...should be:
POWER	Solid green to indicate that the device is turned on. If this light is not on, check if the AC adapter is attached to the RX3041H and if it is plugged into a power source.
LAN1 – LAN4	Solid green to indicate that the device can communicate with your LAN or flashing when the device is sending or receiving data to/from your LAN computer.
WAN	Solid green to indicate that the device has successfully established a connection with your ISP or flashing when the device is sending or receiving data to/from the Internet.

3.2 Part 2 — Configuring Your Computers

Part 2 of the Quick Start Guide provides instructions for configuring the Internet settings on your computers to work with the RX3041H.

3.2.1 Before you begin

By default, the RX3041H automatically assigns all required Internet settings to your PCs. You need only to configure the PCs to accept the information when it is assigned.

Note

> *In some cases, you may want to configure network settings manually to some or all of your computers rather than allow the RX3041H to do so. See "Assigning static IP addresses to your PCs" in page 13 for instructions.*

- If you have connected your PC via Ethernet to the RX3041H, follow the instructions that correspond to the operating system installed on your PC.

3.2.2 Windows[CT6]® XP PCs:

1. In the Windows task bar, click the **<Start>** button, and then click **Control Panel**.
2. Double-click the Network Connections icon.
3. In the LAN or High-Speed Internet window, right-click on icon corresponding to your network interface card (NIC) and select **Properties**. (Often this icon is labeled *Local Area Connection*).

   The Local Area Connection dialog box displays with a list of currently installed network items.
4. Ensure that the check box to the left of the item labeled Internet Protocol TCP/IP is checked, and click **<Properties>** button.
5. In the Internet Protocol (TCP/IP) Properties dialog box, click the radio button labeled **Obtain an IP address automatically**. Also click the radio button labeled **Obtain DNS server address automatically**.
6. Click **<OK>** button twice to confirm your changes, and close the Control Panel.

3.2.3 Windows® 2000 PCs:

First, check for the IP protocol and, if necessary, install it:

1. In the Windows task bar, click the **<Start>** button, point to **Settings**, and then click **Control Panel**.
2. Double-click the **Network and Dial-up Connections** icon.
3. In the Network and Dial-up Connections window, right-click the **Local Area Connection** icon, and then select **Properties**.

   The Local Area Connection Properties dialog box displays a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 10.
4. If Internet Protocol (TCP/IP) does not display as an installed component, click **<Install>** button.
5. In the Select Network Component Type dialog box, select **Protocol**, and then click **<Add>** button.
6. Select **Internet Protocol (TCP/IP)** in the Network Protocols list, and then click **<OK>** button.

   You may be prompted to install files from your Windows 2000 installation CD or other media. Follow the instructions to install the files.

7. If prompted, click **<OK>** button to restart your computer with the new settings.

   Next, configure the PCs to accept IP addresses assigned by the RX3041H:

8. In the Control Panel, double-click the **Network and Dial-up Connections** icon.
9. In Network and Dial-up Connections window, right-click the **Local Area Connection** icon, and then select **Properties**.
10. In the Local Area Connection Properties dialog box, select **Internet Protocol (TCP/IP)**, and then click **<Properties>** button.
11. In the Internet Protocol (TCP/IP) Properties dialog box, click the radio button labeled **Obtain an IP address automatically**. Also click the radio button labeled **Obtain DNS server address automatically**.
12. Click **<OK>** button twice to confirm and save your changes, and then close the Control Panel.

3.2.4 Windows® 95, 98, and Me PCs

1. In the Windows task bar, click the **<Start>** button, point to **Settings**, and then click **Control Panel**.
2. Double-click the **Network** icon.

   In the Network dialog box, look for an entry started w/ "**TCP/IP ->**" and the name of your network adapter, and then click **<Properties>** button. You may have to scroll down the list to find this entry. If the list includes such an entry, then the TCP/IP protocol has already been enabled. Skip to step 8.

3. If Internet Protocol (TCP/IP) does not display as an installed component, click **<Add>** button.
4. In the Select Network Component Type dialog box, select **Protocol**, and then click **<Add>** button.
5. Select **Microsoft** in the Manufacturers list box, and then click **TCP/IP** in the Network Protocols list, box and then click **<OK>** button.

   You may be prompted to install files from your Windows 95, 98 or Me installation CD or other media. Follow the instructions to install the files.

6. If prompted, click **<OK>** button to restart your computer with the new settings.

   Next, configure the PCs to accept IP information assigned by the RX3041H:

7. In the Control Panel, double-click the Network icon.
8. In the Network dialog box, select an entry started with "**TCP/IP ->"** and the name of your network adapter, and then click **<Properties>** button.
9. In the TCP/IP Properties dialog box, click the radio button labeled **Obtain an IP address automatically**.
10. In the TCP/IP Properties dialog box, click the "**Default Gateway**" tab. Enter 192.168.1.1 (the default LAN port IP address of the RX3041H) in the "**New gateway**" address field and click **<Add>** button to add the default gateway entry.
11. Click **<OK>** button twice to confirm and save your changes, and then close the Control Panel.
12. If prompted to restart your computer, click **<OK>** button to do so with the new settings.

3.2.5 Windows® NT 4.0 workstations:

First, check for the IP protocol and, if necessary, install it:

1. In the Windows NT task bar, click the **<Start>** button, point to **Settings**, and then click **Control Panel**.

2. In the Control Panel window, double click the **Network** icon.
3. In the Network dialog box, click the **Protocols** tab.

   The Protocols tab displays a list of currently installed network protocols. If the list includes TCP/IP Protocol, then the protocol has already been enabled. Skip to step 9.
4. If TCP/IP does not display as an installed component, click **<Add>** button.
5. In the Select Network Protocol dialog box, select **TCP/IP**, and then click **<OK>** button.

   You may be prompted to install files from your Windows NT installation CD or other media. Follow the instructions to install the files.

   After all files are installed, a window displays to inform you that a TCP/IP service called DHCP can be set up to dynamically assign IP information.
6. Click **<Yes>** button to continue, and then click **<OK>** button if prompted to restart your computer.

   Next, configure the PCs to accept IP addresses assigned by the RX3041H:
7. Open the Control Panel window, and then double-click the **Network** icon.
8. In the Network dialog box, click the **Protocols** tab.
9. In the Protocols tab, select **TCP/IP**, and then click **<Properties>** button.
10. In the Microsoft TCP/IP Properties dialog box, click the radio button labeled **Obtain an IP address from a DHCP server**.
11. Click **<OK>** button twice to confirm and save your changes, and then close the Control Panel.

3.2.6 Assigning static IP addresses to your PCs

In some cases, you may want to assign IP addresses to some or all of your PCs directly (often called "statically"), rather than allowing the RX3041H to assign them. This option may be desirable (but not required) if:

- You have obtained one or more public IP addresses that you want to always associate with specific computers (for example, if you are using a computer as a public web server).
- You maintain different subnets on your LAN.

However, during the first time configuration of your RX3041H, you must assign an IP address in the 192.168.1.0 network for your PC, say 192.168.1.2, in order to establish connection between the RX3041H and your PC as the default LAN IP on RX3041H is pre-configured as 192.168.1.1. Enter 255.255.255.0 for the subnet mask and 192.168.1.1 for the default gateway. These settings may be changed later to reflect your true network environment.

On each PC to which you want to assign static information, follow the instructions on pages 11 through 12 relating only to checking for and/or installing the IP protocol. Once it is installed, continue to follow the instructions for displaying each of the Internet Protocol (TCP/IP) properties. Instead of enabling dynamic assignment of the IP addresses for the computer, DNS server, and default gateway, click the radio buttons that enable you to enter the information manually.

Note

Your PCs must have IP addresses that place them in the same subnet as the router's LAN port. If you manually assign IP addresses to all your LAN PCs, you can follow the instructions in Chapter 5 to change the router's LAN port IP address accordingly.

3.3 Part 3 — Quick Configuration of Your Router

In Part 3, you log into the Configuration Manager on the router and configure basic settings for your Internet connection. Your ISP should provide you with the necessary information to complete this step. Note the intent here is to quickly get the router up and running, instructions are concise. You may refer to corresponding chapters for more details.

3.3.1 Buttons Used in Setup Wizard

The RX3041H provides a preinstalled software program called Configuration Manager that enables you to configure the RX3041H via your Web browser. The settings that you are most likely to need to change before using the device are grouped onto sequence of configuration pages guided by Setup Wizard. The following table shows the buttons that you'll encounter in Setup Wizard.

Button	***Function***
Next	Click this button to save the information and proceed to the next configuration page.
Back	Click this button to go back to the previous configuration page.

3.3.2 Setting Up the RX3041H

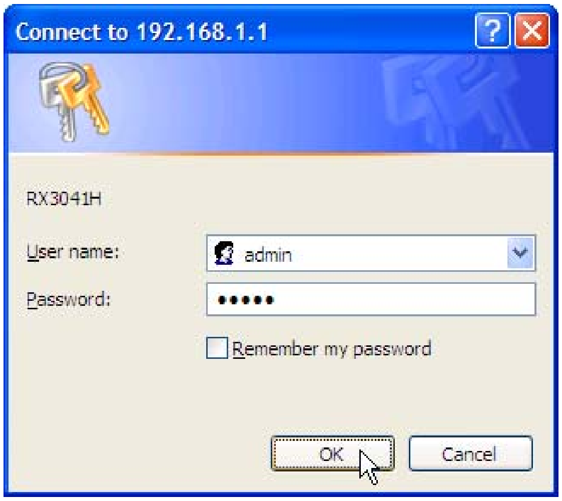
Follow these instructions to setup the RX3041H:

1. Before accessing the Configuration Manager in the RX3041H, make sure that the HTTP proxy setting is disabled in your browser. In IE, click "**Tools**" ➔ "**Internet Options…**" ➔ "**Connections**" tab ➔ "**LAN settings…**" and then uncheck "**Use proxy server for your LAN …**"
2. On any PC connected to one of the four LAN ports on the RX3041H, open your Web browser, and type the following URL in the address/location box, and press **<Enter>**:

   http://192.168.1.1

   This is the predefined IP address for the LAN port on the RX3041H.

   A login screen displays, as shown in Figure 3.2.



Connect to 192.168.1.1

RX3041H

User name: admin

Password: •••••

□ Remember my password

Figure 3.2. Login Screen

   If you have problem connecting to the RX3041H, you may want to check if your PC is configured to accept IP address assignment from the RX3041H. Another method is to set the IP address of your PC to any IP address in the 192.168.1.0 network, such as 192.168.1.2.

3. Enter your user name and password, and then click OK to enter the Configuration Manager. The first time you log into this program, use these defaults:

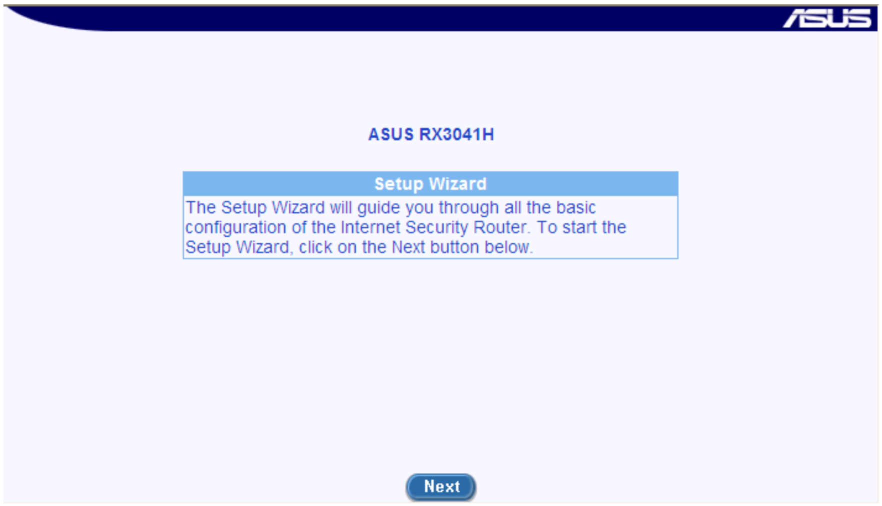
   Default User Name: admin

Default Password: admin

Note

You can change the password at any time (see section 11.2 Change the Login Password on page 93).

The Setup Wizard home page displays each time you log into the Configuration Manager (shown in Figure 3.3 on page 15).

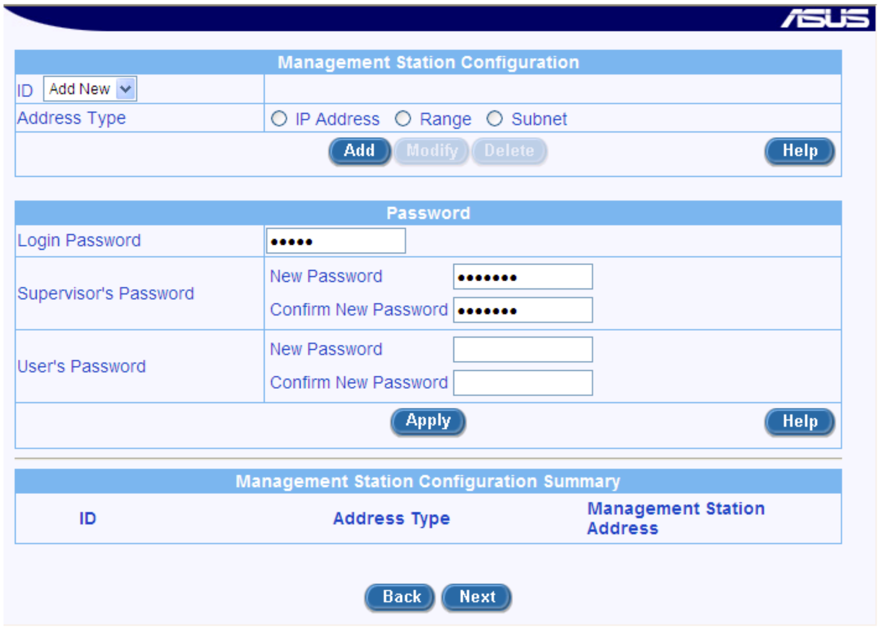


ASUS RX3041H

Setup Wizard

The Setup Wizard will guide you through all the basic configuration of the Internet Security Router. To start the Setup Wizard, click on the Next button below.

Figure 3.3. Setup Wizard Home Page



Management Station Configuration

ID	Add New
Address Type	○ IP Address ○ Range ○ Subnet

Password

Login Password	•••••	
Supervisor's Password	New Password	•••••••
	Confirm New Password	•••••••
User's Password	New Password	
	Confirm New Password	

Management Station Configuration Summary

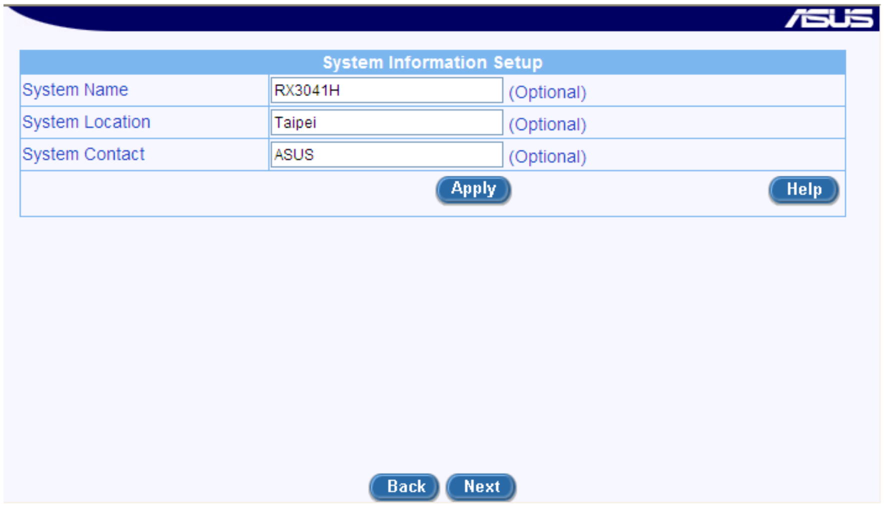
ID	Address Type	Management Station Address

Figure 3.4. Setup Wizard – Password Configuration Page

4. Click on the Next button to enter the password configuration page as shown in Figure 3.4. Change the password in the spaces provided if desired. Otherwise, proceed to the next configuration page by clicking on the Next button.

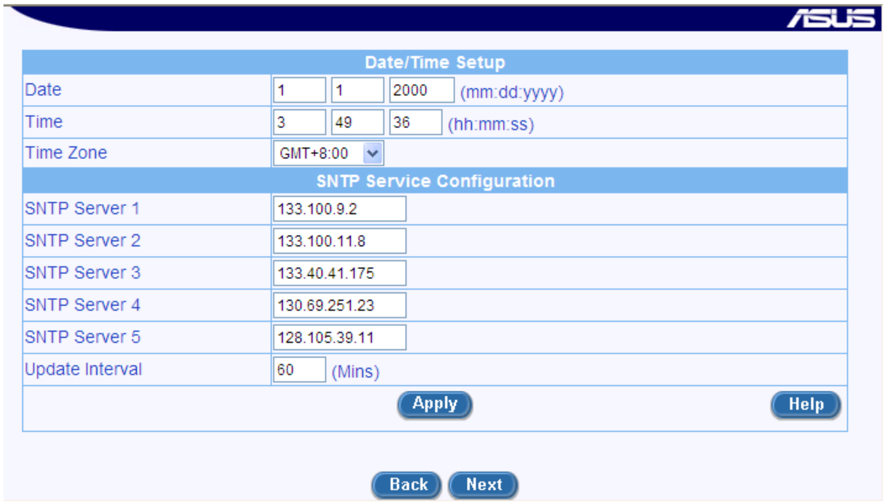
When changing passwords, make sure you enter the existing login password in the Login Password field, make any changes for the passwords and click the Apply button to save the changes.

5. Now we are at the System Information setup page; enter the requested information in the spaces provided and click the Apply button to save the changes. Otherwise, proceed to the next configuration page by clicking on the Next button.



System Information Setup		
System Name	RX3041H	(Optional)
System Location	Taipei	(Optional)
System Contact	ASUS	(Optional)

Figure 3.5. Setup Wizard – System Identity Configuration Page



Date/Time Setup				
Date	1	1	2000	(mm:dd:yyyy)
Time	3	49	36	(hh:mm:ss)
Time Zone	GMT+8:00			

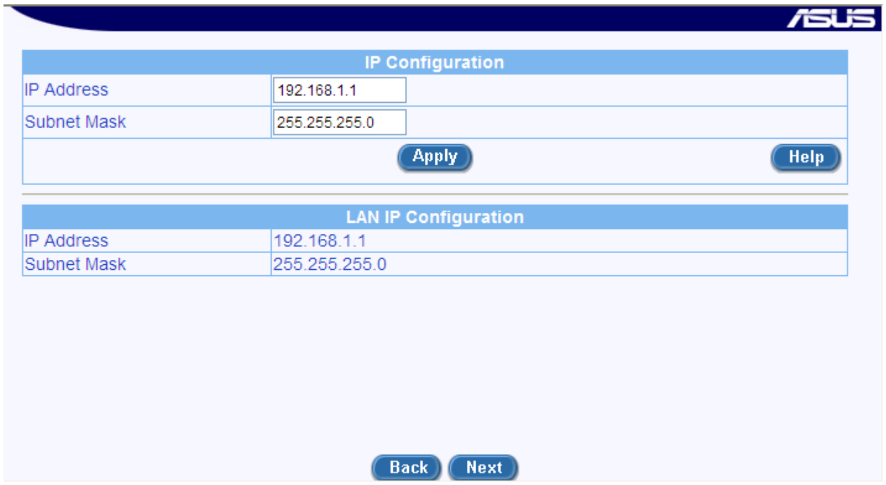
SNTP Service Configuration		
SNTP Server 1	133.100.9.2	
SNTP Server 2	133.100.11.8	
SNTP Server 3	133.40.41.175	
SNTP Server 4	130.69.251.23	
SNTP Server 5	128.105.39.11	
Update Interval	60	(Mins)

Figure 3.6. Setup Wizard – Date/Time Configuration Page

6. Set the time zone for your router by selecting one from the Time Zone drop-down list. Click Apply to save the settings and then click on the Next button to go to the next configuration page.

   There is no real time clock inside the router. The system date and time may be maintained by external time servers. There is no need to set the date and time here unless you don't have access to a time server and you want the router to maintain its own time.

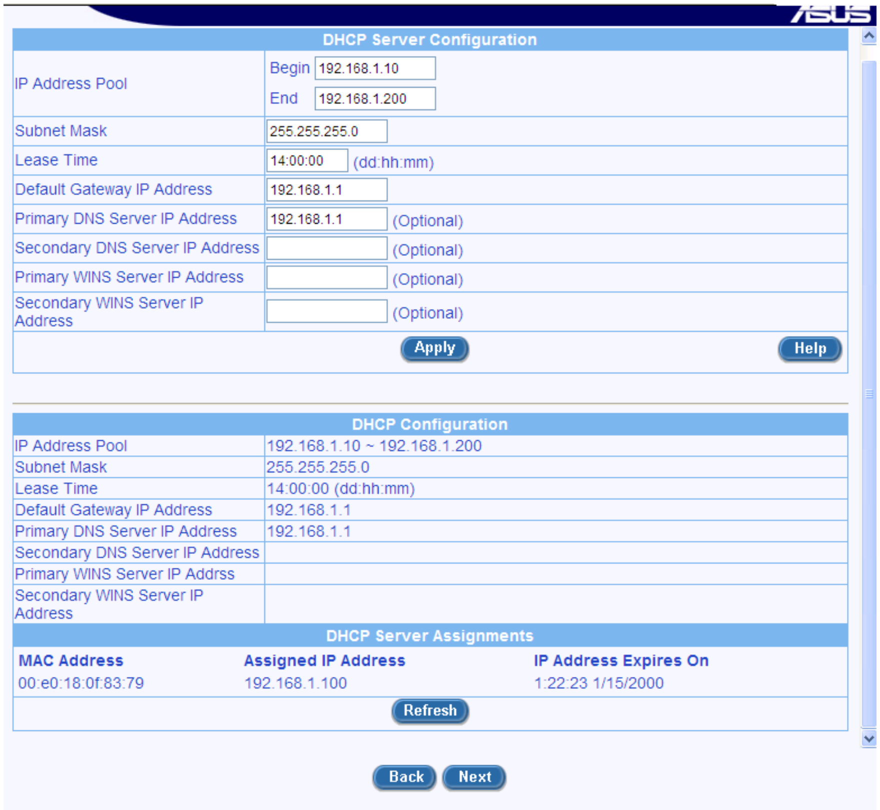
7. It is recommended that you keep the default LAN IP settings for now until after you have completed the rest of the configurations and confirm that your Internet connection is working properly. Click on the Next button to proceed to the next configuration page.



IP Configuration	
IP Address	192.168.1.1
Subnet Mask	255.255.255.0

LAN IP Configuration	
IP Address	192.168.1.1
Subnet Mask	255.255.255.0

Figure 3.7. Setup Wizard – LAN IP Configuration Page



DHCP Server Configuration	
IP Address Pool	Begin 192.168.1.10 End 192.168.1.200
Subnet Mask	255.255.255.0
Lease Time	14:00:00 (dd:hh:mm)
Default Gateway IP Address	192.168.1.1
Primary DNS Server IP Address	192.168.1.1 (Optional)
Secondary DNS Server IP Address	(Optional)
Primary WINS Server IP Address	(Optional)
Secondary WINS Server IP Address	(Optional)

DHCP Configuration	
IP Address Pool	192.168.1.10 ~ 192.168.1.200
Subnet Mask	255.255.255.0
Lease Time	14:00:00 (dd:hh:mm)
Default Gateway IP Address	192.168.1.1
Primary DNS Server IP Address	192.168.1.1
Secondary DNS Server IP Address	
Primary WINS Server IP Addrss	
Secondary WINS Server IP Address	

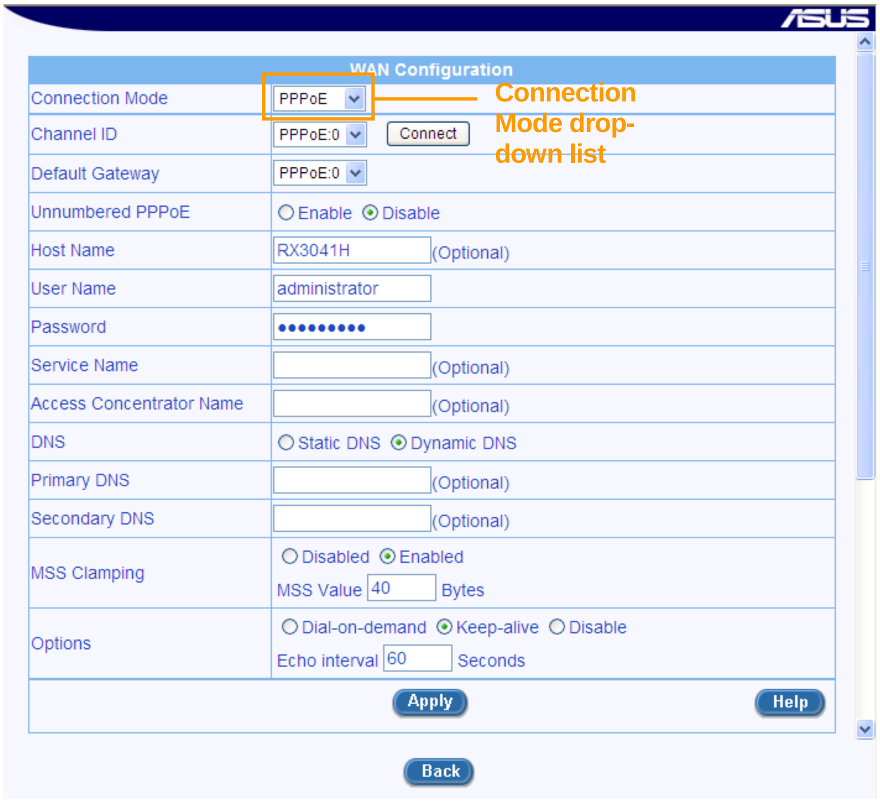
DHCP Server Assignments

MAC Address	Assigned IP Address	IP Address Expires On
00:e0:18:0f:83:79	192.168.1.100	1:22:23 1/15/2000

Figure 3.8. Setup Wizard – LAN DHCP Server Configuration Page

8. It is recommended that you keep the default settings for the DHCP server until after you have completed the rest of the configurations and confirm that your Internet connection is working properly. Click on the Next button to proceed to the next configuration page.

9. Now we are at the last page of the Setup Wizard, which is to configure the WAN settings for the router. Depending on the connection mode required for your ISP, select one from the Connection Mode drop-down list (see Figure 3.9): PPPoE, Dynamic and Static. PPPoE is usually used by ADSL service providers and Dynamic connection mode is used by most cable modem service providers.

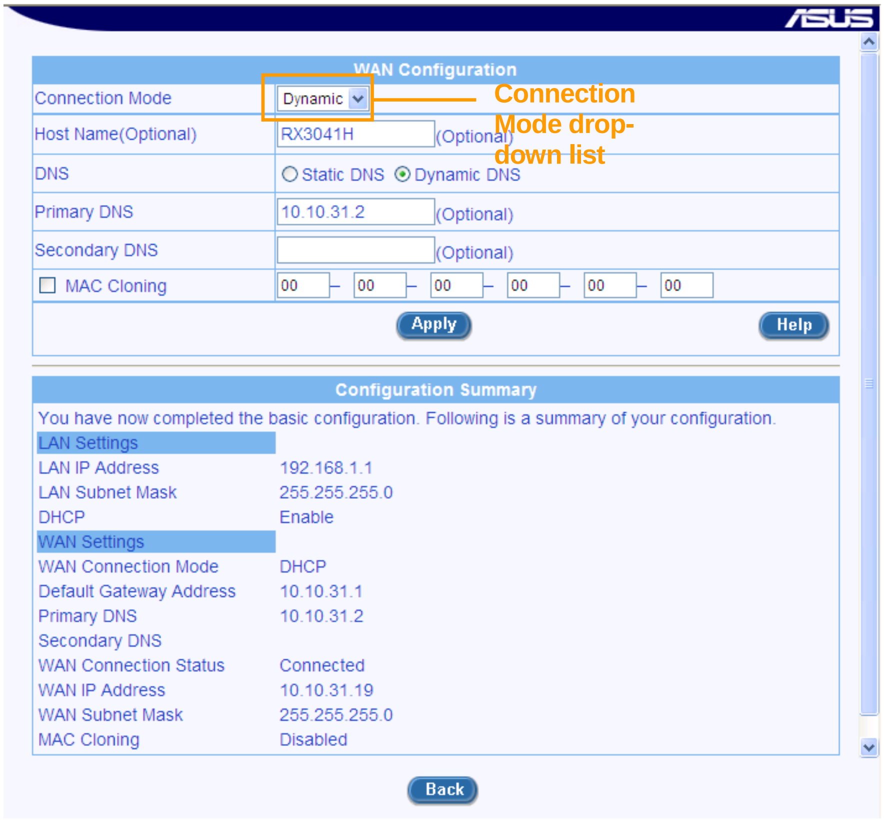


WAN Configuration

Connection Mode	PPPoE
Channel ID	PPPoE:0 Connect
Default Gateway	PPPoE:0
Unnumbered PPPoE	○ Enable ● Disable
Host Name	RX3041H (Optional)
User Name	administrator
Password	●●●●●●●●●
Service Name	(Optional)
Access Concentrator Name	(Optional)
DNS	○ Static DNS ● Dynamic DNS
Primary DNS	(Optional)
Secondary DNS	(Optional)
MSS Clamping	○ Disabled ● Enabled MSS Value 40 Bytes
Options	○ Dial-on-demand ● Keep-alive ○ Disable Echo interval 60 Seconds

Connection Mode drop-down list

Figure 3.9. Setup Wizard – WAN PPPoE Configuration Page



WAN Configuration

Connection Mode	Dynamic
Host Name(Optional)	RX3041H (Optional)
DNS	○ Static DNS ● Dynamic DNS
Primary DNS	10.10.31.2 (Optional)
Secondary DNS	(Optional)
□ MAC Cloning	00 - 00 - 00 - 00 - 00 - 00

Connection Mode drop-down list

Configuration Summary

You have now completed the basic configuration. Following is a summary of your configuration.

LAN Settings	
LAN IP Address	192.168.1.1
LAN Subnet Mask	255.255.255.0
DHCP	Enable
WAN Settings	
WAN Connection Mode	DHCP
Default Gateway Address	10.10.31.1
Primary DNS	10.10.31.2
Secondary DNS	
WAN Connection Status	Connected
WAN IP Address	10.10.31.19
WAN Subnet Mask	255.255.255.0
MAC Cloning	Disabled

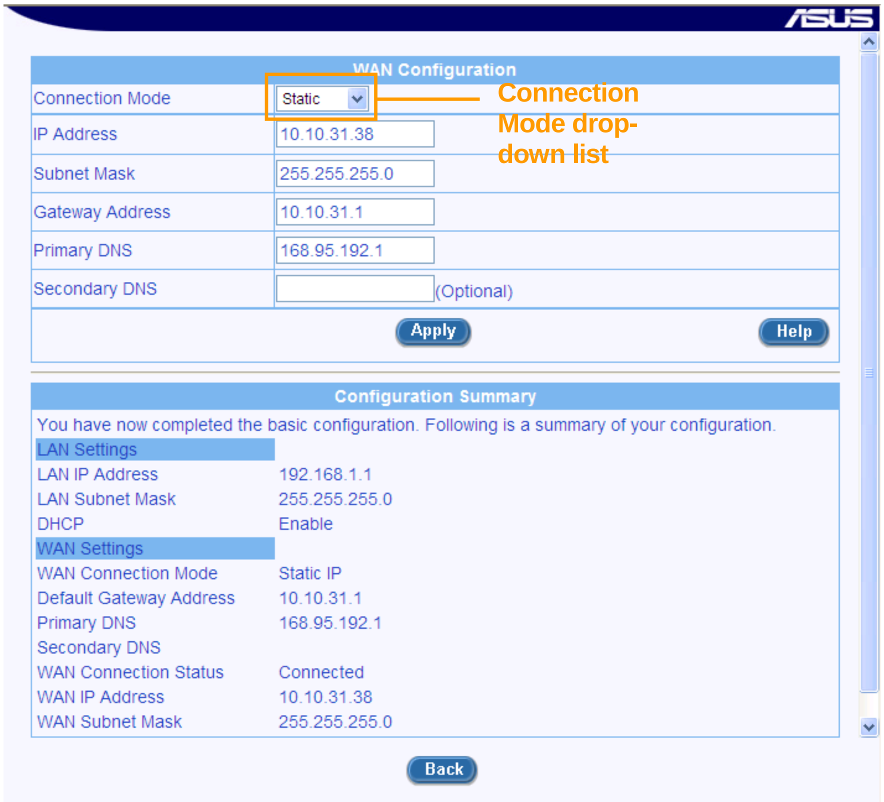
Figure 3.10. Setup Wizard – WAN Dynamic IP Configuration Page

a) PPPoE Connection Mode (see Figure 3.9)

- You don't need to enter primary/secondary DNS IP addresses as PPPoE is able to automatically obtain this information for you from your ISP. However, if you prefer to use your favorite DNS servers, you may enter them in the space provided.
- Host name is optional. You may leave it empty if your ISP did not provide such information.
- Enter the user name and password provided by your ISP.
- Click on Apply button to save the PPPoE settings.

b) Dynamic IP Connection Mode (see Figure 3.10)

- You don't need to enter primary/secondary DNS IP addresses as DHCP client is able to automatically obtain this information for you from your ISP. However, if you prefer to use your favorite DNS servers, you may enter them in the space provided.
- Host name is optional. You may leave it empty if your ISP did not provide such information.
- If you had previously registered a specific MAC address with your ISP for Internet connections, enter the registered MAC address here and make sure you check the MAC cloning check box.
- Click on Apply button to save the dynamic IP settings.



WAN Configuration

Connection Mode	Static
IP Address	10.10.31.38
Subnet Mask	255.255.255.0
Gateway Address	10.10.31.1
Primary DNS	168.95.192.1
Secondary DNS	(Optional)

Connection Mode drop-down list

Configuration Summary

You have now completed the basic configuration. Following is a summary of your configuration.

LAN Settings	
LAN IP Address	192.168.1.1
LAN Subnet Mask	255.255.255.0
DHCP	Enable
WAN Settings	
WAN Connection Mode	Static IP
Default Gateway Address	10.10.31.1
Primary DNS	168.95.192.1
Secondary DNS	
WAN Connection Status	Connected
WAN IP Address	10.10.31.38
WAN Subnet Mask	255.255.255.0

Figure 3.11. Setup Wizard – WAN Static IP Configuration Page

c) Static IP Connection Mode

- Enter WAN IP address in the IP Address field. This information should be provided by your ISP.

- Enter Subnet Mask for the WAN. This information should be provided by your ISP. Typically, it is 255.255.255.0.
- Enter gateway address provided by your ISP in the space provided.
- Enter at lease the primary DNS IP address provided by your ISP. Secondary DNS IP address is optional. Enter it in the space provided if you have such information from your ISP.
- Click Apply to save the static IP settings

You have now completed customizing basic configuration settings. Read the following section to determine if you have access to the Internet.

3.3.3 Testing Your Setup

At this point, the RX3041H should enable any computer on your LAN to use the RX3041H's ADSL or cable modem connection to access the Internet.

To test the Internet connection, open your web browser, and type the URL of any external website (such as http://www.asus.com). The LED labeled WAN should be blinking rapidly and may appear solid as the device connects to the site. You should also be able to browse the web site through your web browser.

If the LEDs do not illuminate as expected or the web page does not display, see Appendix D for troubleshooting suggestions.

3.3.4 Default Router Settings

In addition to handling the DSL connection to your ISP, the router provides a variety of services to your network. The device is pre-configured with default settings for use with a typical home or small office network.

Table 3.2 lists some of the most important default settings; these and other features are described fully in the subsequent chapters. For a complete list of default settings, please refer to the section B.2 "*Default Settings*". If you are familiar with network configuration settings, review the settings in Table 3.2 to verify that they meet the needs of your network. Follow the instructions to change them if necessary. If you are unfamiliar with these settings, try using the device without modification.

Before modifying any settings, review Chapter 4 for general information about accessing and using the Configuration Manager.

Table 3.2. Default Settings Summary

Option	Default Setting	Explanation/Instructions
DHCP (Dynamic Host Configuration Protocol)	DHCP server enabled with the following pool of addresses: 192.168.1.10 through 192.168.1.200	The router maintains a pool of private IP addresses for dynamic assignment to your LAN computers. To use this service, you must have set up your computers to accept IP information dynamically, as described in Part 2 of the Quick Start Guide. See section 5.2 for an explanation of the DHCP service.
LAN Port IP Address	Static IP address: 192.168.1.1 subnet mask: 255.255.255.0	This is the IP address of the LAN port on the RX3041H. The LAN port connects the device to your Ethernet network. Typically, you will not need to change this address. See section 5.1 LAN IP Address for instructions.

4 Getting Started with the Configuration Manager[CT9]

Your router includes a preinstalled program called the *Configuration Manager*, which allows you to customize the device settings to meet the needs of your network. You access the Configuration Manager through a web browser from any PC that has access to the router via network connections.

This chapter describes the general guidelines for using the Configuration Manager.

4.1 Log into the Configuration Manager

To access the Configuration Manager, you need the following:

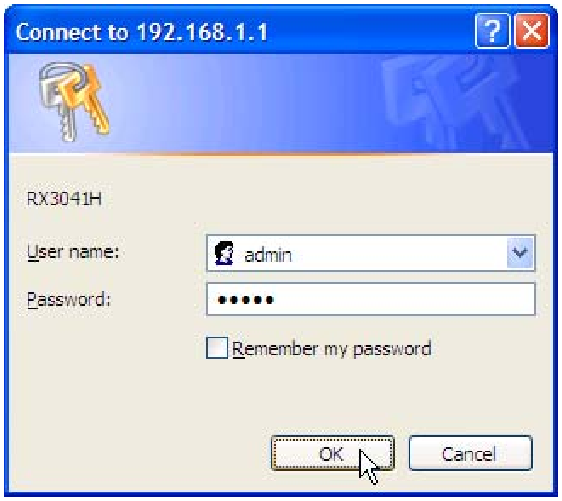
- A computer that has access to the router via network connections as described in the Quick Start Guide chapter.
- A web browser on your computer. Configuration Manager is compatible with Microsoft Internet Explorer® 5.5, Netscape 7.0.2 or newer.

Although you may log into the Configuration Manager from any computer that can reach your router via the LAN or WAN connections, the instructions provided here assumes that your computer is connected to the LAN port of your router.

1. From a LAN computer, open your web browser, type the following in the web address (or location) box, and press **<Enter>**:

   http://192.168.1.1

   This is the predefined IP address for the LAN port of your router. A login screen displays, as shown in Figure 4.1.



Connect to 192.168.1.1

RX3041H

User name: admin

Password: •••••

□ Remember my password

Figure 4.1. Configuration Manager Login Screen

2. Enter your user name and password, and then click OK button.

   The first time you log into the program, use these defaults:

Default User Name:	admin
Default Password:	admin

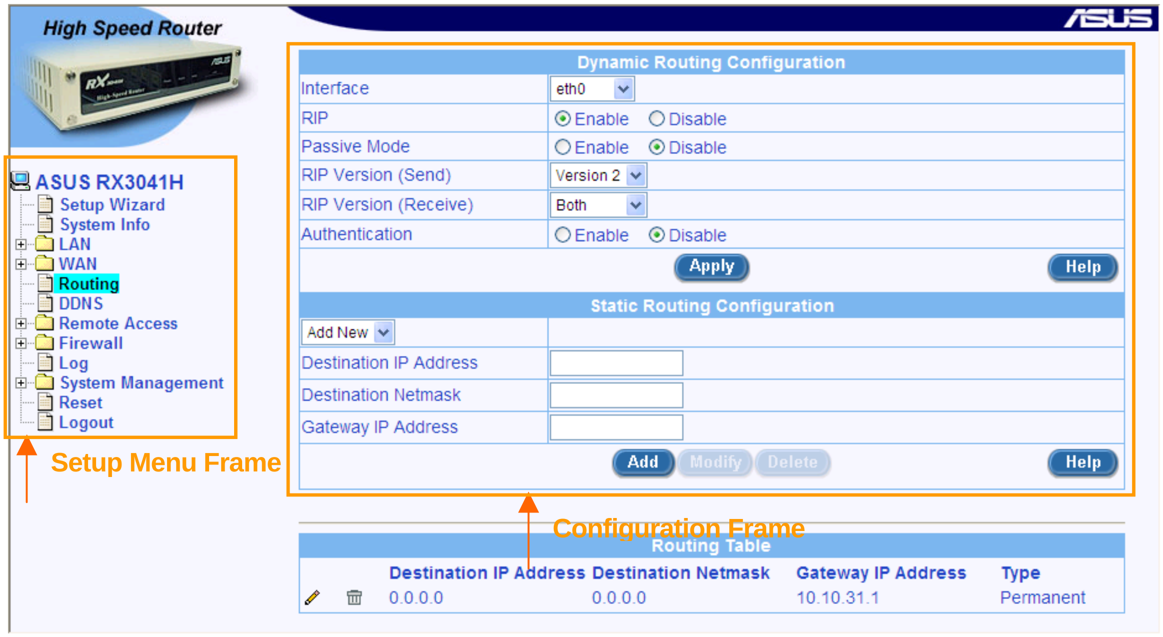
Note

You can change the password at any time (see section 11.2.1 Change the Login Password on page 93).

The Setup Wizard page, as shown in Figure 3.3, displays each time you log into the Configuration Manager.

4.2 Functional Layout

Typical Configuration Manager page consists of two separate frames. The left frame, as shown in Figure 4.2, contains all the menus available for device configuration. Menus are indicated by file icons, 📄, and related menus are grouped into categories, such as LAN, WAN and etc., and indicated by folder icons, 📂 or 📁, depending on whether the group of menus are expanded or not. You can click on any of these to display a specific configuration page.



Dynamic Routing Configuration

Interface	eth0
RIP	● Enable ○ Disable
Passive Mode	○ Enable ● Disable
RIP Version (Send)	Version 2
RIP Version (Receive)	Both
Authentication	○ Enable ● Disable

Static Routing Configuration

Add New	
Destination IP Address	
Destination Netmask	
Gateway IP Address	

Routing Table

	Destination IP Address	Destination Netmask	Gateway IP Address	Type
	0.0.0.0	0.0.0.0	10.10.31.1	Permanent

Figure 4.2. Typical Configuration Manager Page

A separate page displays in the right-hand-side frame for each menu. For example, the configuration page displayed in Figure 4.2 is intended for DHCP configuration.

4.2.1 Setup Menu Navigation Tips

- To expand a group of related menus: click on the + sign next to the corresponding file folder icon, 📁.
- To contract a group of related menus: click on the – sign next to the "opened" file folder icon, 📂.
- To open a specific configuration page, click on the file icons, 📄, next to the desired menu item.

4.2.2 Commonly Used Buttons and Icons

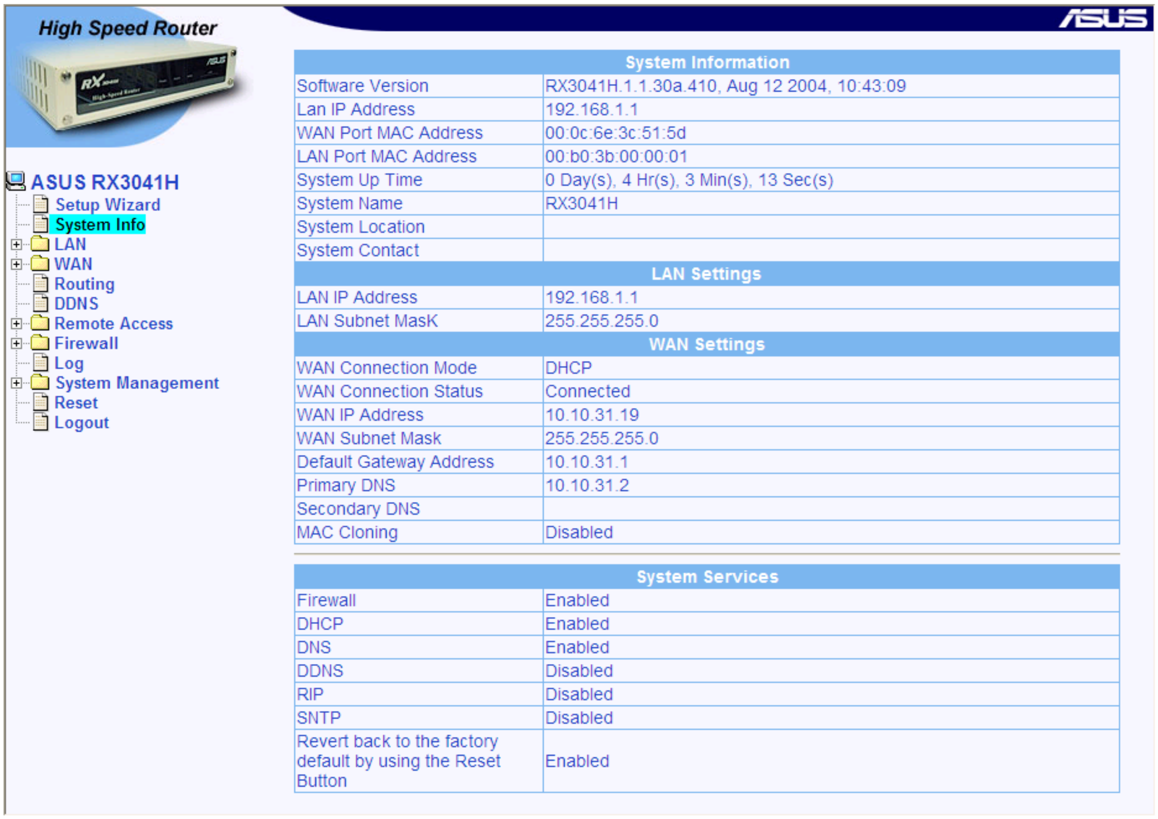
The following buttons or icons are used throughout the application. The following table describes the function for each button or icon.

Table 4.1. Description of Commonly Used Buttons and Icons

Button/Icon	Function
Apply	Stores any changes you have made on the current page.
Add	Adds the existing configuration to the system, e.g. a static route or a firewall ACL rule and etc.
Modify	Modifies the existing configuration in the system, e.g. a static route or a firewall ACL rule and etc.
Delete	Deletes the selected item, e.g. a static route or a firewall ACL rule and etc.
Help	Launches the online help for the current topic in a separate browser window. Help is available from any main topic page.
Refresh	Redisplays the current page with updated statistics or settings.
✎	Selects the item for editing.
🗑	Deletes the selected item.

4.3 Overview of System Configuration

To view the overall system configuration, open the System Info page by clicking the **System Info** menu. Figure 4.3 shows the information available in the System Info page.



System Information	
Software Version	RX3041H.1.1.30a.410, Aug 12 2004, 10:43:09
Lan IP Address	192.168.1.1
WAN Port MAC Address	00:0c:6e:3c:51:5d
LAN Port MAC Address	00:b0:3b:00:00:01
System Up Time	0 Day(s), 4 Hr(s), 3 Min(s), 13 Sec(s)
System Name	RX3041H
System Location	
System Contact	
LAN Settings	
LAN IP Address	192.168.1.1
LAN Subnet MasK	255.255.255.0
WAN Settings	
WAN Connection Mode	DHCP
WAN Connection Status	Connected
WAN IP Address	10.10.31.19
WAN Subnet Mask	255.255.255.0
Default Gateway Address	10.10.31.1
Primary DNS	10.10.31.2
Secondary DNS	
MAC Cloning	Disabled

System Services	
Firewall	Enabled
DHCP	Enabled
DNS	Enabled
DDNS	Disabled
RIP	Disabled
SNTP	Disabled
Revert back to the factory default by using the Reset Button	Enabled

Figure 4.3. System Information Page

5 Configuring LAN Settings

This chapter describes how to configure LAN properties for the LAN interface on the RX3041H that communicates with your LAN computers. You'll learn to configure IP address, DHCP and DNS server for your LAN in this chapter.

5.1 LAN IP Address

If you are using the RX3041H with multiple PCs on your LAN, you must connect the LAN via the Ethernet ports on the built-in Ethernet switch. You must assign a unique IP address to each device residing on your LAN. The LAN IP address identifies the RX3041H as a node on your network must be in the same subnet as the PCs on your LAN. The default LAN IP for the RX3041H is 192.168.1.1.

Definition

> *A **network node** can be thought of as any interface where a device connects to the network, such as the RX3041H's LAN port and the network interface cards on your PCs. See Appendix A for an explanation of subnets.*

You can change the default to reflect the true IP address that you want to use with your network.

Note

> *The RX3041H itself can function as a DHCP server for your LAN computers, as described in section 5.2.2, **but not for its own LAN port**.*

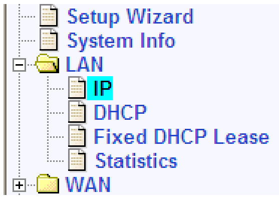
5.1.1 LAN IP Configuration Parameters

Table 5.1describes the configuration parameters available for LAN IP configuration.

Table 5.1. LAN IP Configuration Parameters

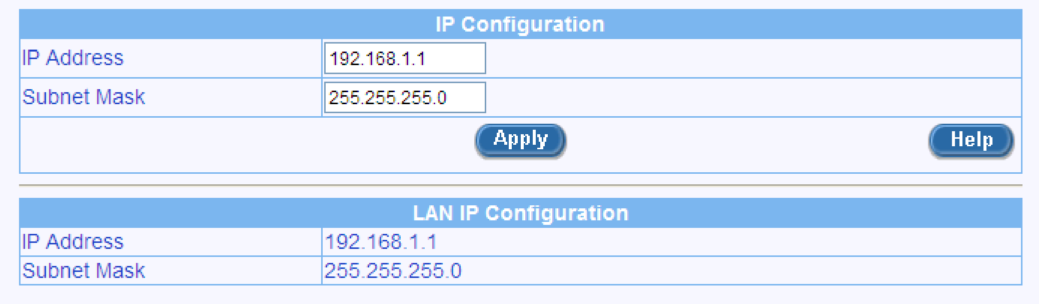
Setting	Description
IP Address	The LAN IP address of the RX3041H. This IP is used by your computers to identify the RX3041H's LAN port. Note that the public IP address assigned to you by your ISP **is not** your LAN IP address. The public IP address identifies the WAN port on the RX3041H to the Internet.
Subnet Mask	The LAN subnet mask identifies which parts of the LAN IP Address refer to your network as a whole and which parts refer specifically to nodes on the network. Your device is preconfigured with a default subnet mask of 255.255.255.0.

5.1.2 Configuring the LAN IP Address



Follow these steps to change the default LAN IP address.

1. Open the LAN configuration page by clicking the **LAN → IP** menu.
2. Enter a LAN IP address and subnet mask for the RX3041H in the **IP Address** and **Subnet Mask** fields as shown in Figure 5.1.



IP Configuration	
IP Address	192.168.1.1
Subnet Mask	255.255.255.0

LAN IP Configuration	
IP Address	192.168.1.1
Subnet Mask	255.255.255.0

Figure 5.1. LAN IP Address Configuration

3. Click. Apply button to save the LAN IP address.

   If you change the LAN IP address, the connection will be terminated.

4. Reconfigure your PCs, if necessary, so that their IP addresses place them in the same subnet as the new IP address of the LAN port. See the Quick Start Guide chapter, "Part 2 — Configuring Your Computers," for instructions.

5. Log into Configuration Manager by typing the new IP address in your Web browser's address/location box.

5.2 DHCP (Dynamic Host Configuration Protocol)

5.2.1 Introduction

5.2.1.1 What is DHCP?

DHCP is a protocol that enables network administrators to centrally manage the assignment and distribution of IP information to computers on a network.

When you enable DHCP on a network, you allow a device — such as the RX3041H — to assign temporary IP addresses to your computers whenever they connect to your network. The assigning device is called a *DHCP server*, and the receiving device is a *DHCP client*.

Note

If you followed the Quick Start Guide instructions, you either configured each LAN PC with an IP address, or you specified that it will receive IP information dynamically (automatically). If you chose to have the information assigned dynamically, then you configured your PCs as DHCP clients that will accept IP addresses assigned from a DCHP server such as the RX3041H.

The DHCP server draws from a defined pool of IP addresses and "leases" them for a specified amount of time to your computers when they request an Internet session. It monitors, collects, and redistributes the addresses as needed.

On a DHCP-enabled network, the IP information is assigned *dynamically* rather than *statically.* A DHCP client can be assigned a different address from the pool each time it reconnects to the network.

5.2.1.2 Why use DHCP?

DHCP allows you to manage and distribute IP addresses throughout your network from the RX3041H. Without DHCP, you would have to configure each computer separately with IP address and related information. DHCP is commonly used with large networks and those that are frequently expanded or otherwise updated.

5.2.2 DHCP Server Configuration

5.2.2.1 DHCP Configuration Parameters

Table 5.2 describes the configuration parameters available for DHCP service.

Table 5.2. DHCP Server Configuration Parameters

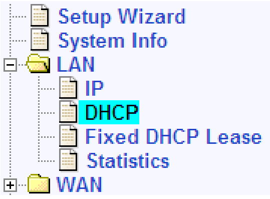
Field	Description
IP Address Pool Begin/End	Specify the lowest and highest addresses in the DHCP address pool.
Subnet Mask	Enter the subnet mask to be used for the DHCP address pool.
Lease Time	The amount of time the assigned address will be used by a device connected on the LAN.
Default Gateway IP Address	The address of the default gateway for computers that receive IP addresses from this pool. The default gateway is the device that the DHCP client computers first contacted to communicate with the Internet. Typically, it is the RX3041H's LAN port IP address.
Primary/Secondary DNS Server IP Address	The IP address of the *Domain Name System* server to be used by computers that receive IP addresses from this pool. The DNS server translates common Internet names that you type into your web browser into their equivalent numeric IP addresses. Typically, the server(s) are located with your ISP. However, you may enter LAN IP address of the RX3041H as it will serve as DNS proxy for the LAN computers and forward the DNS request from the LAN to DNS servers and relay the results back to the LAN computers. Note that both the primary and secondary DNS servers are optional.
Primary/Secondary WINS Server IP Address (optional)	The IP address of the WINS servers to be used by computers that receive IP addresses from the DHCP IP address pool. You don't need to enter this information unless your network has WINS servers.

5.2.2.2 Configuring DHCP Server

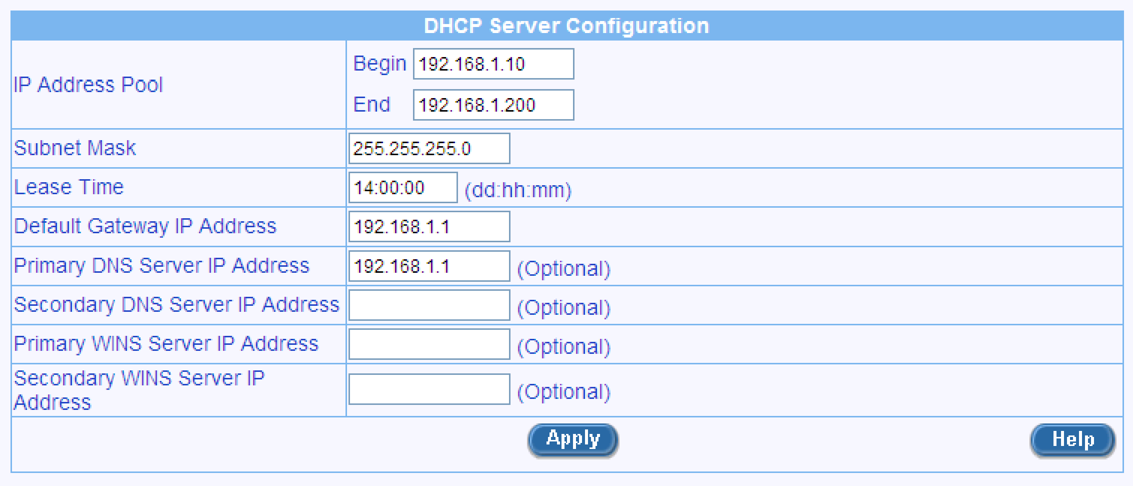
Note

By default, the RX3041H is configured as a DHCP server on the LAN side, with a predefined IP address pool of 192.168.1.10 through 192.168.1.200 (subnet mask 255.255.255.0). To change this range of addresses, follow the procedures described in this section.

First, you must configure your PCs to accept DHCP information assigned by a DHCP server:



1. Open the DHCP server configuration page by clicking the **LAN → DHCP** menu. You will see the existing DHCP server configuration and the IP lease table when you open the page.
2. Enter the information for the **IP Address Pool (Begin/End Address)**, **Subnet Mask**, **Lease Time** and **Default Gateway IP Address** fields; others, such as **Primary/Secondary DNS Server IP Address** and **Primary/Secondary WINS Server IP Address** are optional. However, it is recommended that you enter the primary DNS server IP address in the space provided. You may enter the LAN IP or your ISP's DNS IP address in the primary DNS Server IP Address field. For details of each configuration parameter, please refer to Table 5.2.



DHCP Server Configuration

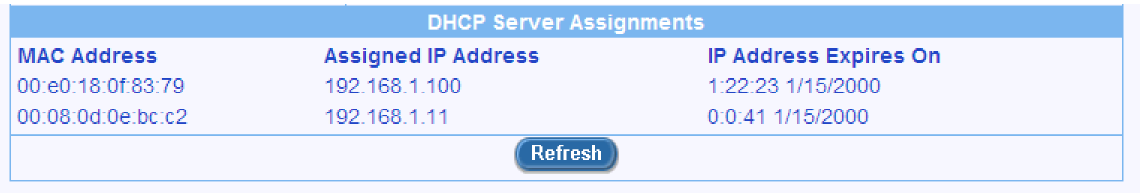
IP Address Pool	Begin	192.168.1.10
	End	192.168.1.200
Subnet Mask	255.255.255.0	
Lease Time	14:00:00	(dd:hh:mm)
Default Gateway IP Address	192.168.1.1	
Primary DNS Server IP Address	192.168.1.1	(Optional)
Secondary DNS Server IP Address		(Optional)
Primary WINS Server IP Address		(Optional)
Secondary WINS Server IP Address		(Optional)

Figure 5.2. DHCP Configuration

3. Click Apply to save the DHCP server configurations.

5.2.2.3 Viewing Existing IP Address Lease

When the RX3041H functions as a DHCP server for your LAN, it keeps a record of all the addresses it has leased to your computers. To view the existing lease table, just open the DHCP Server configuration page by clicking the **LAN ➔ DHCP** menu. A lease table similar to that shown in Figure 5.3 is displayed at the bottom half of the DHCP configuration page.



DHCP Server Assignments

MAC Address	Assigned IP Address	IP Address Expires On
00:e0:18:0f:83:79	192.168.1.100	1:22:23 1/15/2000
00:08:0d:0e:bc:c2	192.168.1.11	0:0:41 1/15/2000

Figure 5.3. Sample DHCP Lease Table

The DHCP Server Lease Table shows all the IP addresses that are currently provided to the LAN devices. Table 5.3 describes the information for each of the parameters shown in the DHCP lease table.

Table 5.3. DHCP Address Assignment Parameters

Field	Description
MAC Address	A hardware ID of the device that leases an IP address from the DHCP server.
Assigned IP Address	The address that has been leased from the pool.
IP Address Expired on	The time when the leased address is to be terminated.

5.2.3 Fixed DHCP Lease

Fixed DHCP lease is used in situation when a fixed IP address is desired for a host that gets IP from the DHCP server. First, you should configure your PCs to accept DHCP information assigned by a DHCP server:

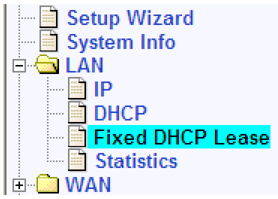
5.2.3.1 Fixed DHCP Lease Configuration Parameters

Table 5.4 describes the configuration parameters available for fixed DHCP lease.

Table 5.4. Fixed DHCP Lease Configuration Parameters

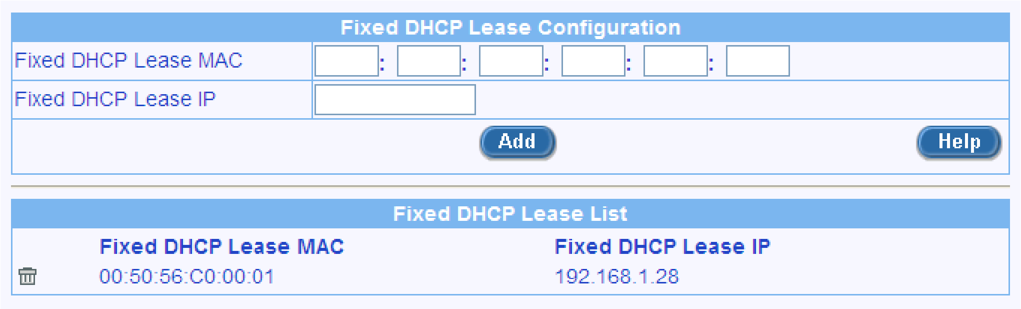
Field	Description
Fixed DHCP Lease MAC	A hardware ID of the device that needs a fixed IP address from the DHCP server.
Fixed DHCP Lease IP	The IP address leased from the DHCP server. Note that it is recommended that this IP address be outside of the DHCP IP pool.

5.2.3.2 Add a Fixed DHCP Lease



To add a fixed DHCP lease, follow the instructions below:

1. Open the Fixed DHCP Lease configuration page by clicking the **LAN ➔ Fixed DHCP Lease** menu.
2. Enter the MAC address and the desired IP address of the host requiring a fixed IP address. For details of each configuration parameter, please refer to Table 5.4.



Fixed DHCP Lease Configuration

Fixed DHCP Lease MAC	: : : : :
Fixed DHCP Lease IP	

Fixed DHCP Lease List

	Fixed DHCP Lease MAC	Fixed DHCP Lease IP
🗑	00:50:56:C0:00:01	192.168.1.28

Figure 5.4. Fixed DHCP Lease Configuration Page

3. Click on the Add button to add the new fixed DHCP lease entry.

5.2.3.3 Delete a Fixed DHCP Lease

To delete a fixed DHCP lease, just click on the 🗑 icon in front of the specific fixed DHCP lease.

5.2.3.4 Viewing Fixed DHCP Lease Table

To see existing fixed DHCP lease, just open the Fixed DHCP Lease configuration page by clicking the **LAN ➔ Fixed DHCP Lease** menu.

5.3 DNS

5.3.1 About DNS

Domain Name System (DNS) servers map the user-friendly domain names that users type into their Web browsers (e.g., "www.yahoo.com") to the equivalent numerical IP addresses that are used for Internet routing.

When a PC user types a domain name into a browser, the PC must first send a request to a DNS server to obtain the equivalent IP address. The DNS server will attempt to look up the domain name in its own database, and will communicate with higher-level DNS servers when the name cannot be found locally. When the address is found, it is sent back to the requesting PC and is referenced in IP packets for the remainder of the communication.

5.3.2 Assigning DNS Addresses

Multiple DNS addresses are useful to provide alternatives when one of the servers is down or is encountering heavy traffic. ISPs typically provide primary and secondary DNS addresses, and may provide additional addresses. Your LAN PCs learn these DNS addresses in one of the following ways:

- **Statically:** If your ISP provides you with their DNS server addresses, you can assign them to each PC by modifying the PCs' IP properties.
- **Dynamically** from a DHCP Server: You can configure the DNS addresses in the DHCP server in the RX3041H and allow the DHCP server to distribute the DNS addresses to the PCs. Please refer to the section 5.2.2.2 for instructions on configuring DHCP server.

In either case, you can specify the actual addresses of the ISP's DNS servers (on the PC or in the DHCP pool), or you can specify the address of the LAN port on the RX3041H (e.g., 192.168.1.1). When you specify the LAN port IP address, the device performs *DNS relay*, as described in the following section.

Note

If you specify the actual DNS addresses on the PCs or in the DHCP pool, the DNS relay feature is not used.

5.3.3 Configuring DNS Relay

When you specify the device's LAN port IP address as the DNS address, then the RX3041H automatically performs “DNS relay”; i.e., because the device itself is not a DNS server, it forwards domain name lookup requests from the LAN PCs to a DNS server at the ISP. It then relays the DNS server’s response to the PC.

When performing DNS relay, the RX3041H must maintain the IP addresses of the DNS servers it contacts. It can learn these addresses in either or both of the following ways:

- **Learned through PPPoE or Dynamic IP Connection:** If the RX3041H uses a PPPoE (see section 6.2.2 “*Configuring PPPoE for WAN*”) or Dynamic IP (see section 6.3.2 “*Configuring Dynamic IP for WAN*”) connection to the ISP, the primary and secondary DNS addresses can be learned via the PPPoE protocol. Using this option provides the advantage that you will not need to reconfigure the PCs or the RX3041H if the ISP changes their DNS addresses.
- **Manually configure on the RX3041H:** You can also specify the ISP's DNS addresses in the WAN configuration page as shown in Figure 6.1. WAN PPPoE Configuration Page, Figure 6.3. WAN Dynamic IP (DHCP client) Configuration, or Figure 6.5. WAN Static IP Configuration.

Follow these steps to configure DNS relay:

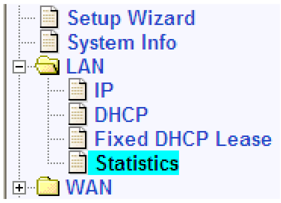
1. Enter LAN IP in the DNS Server IP Address field in DHCP configuration page as shown in Figure 5.2.
2. Configure the LAN PCs to use the IP addresses assigned by the DHCP server on the RX3041H, or enter the RX3041H's LAN IP address as their DNS server address manually for each PC on your LAN.

Note

DNS addresses that are assigned to LAN PCs prior to enabling DNS relay will remain in effect until the PC is rebooted. DNS relay will only take effect when a PC's DNS address is the LAN IP address.

Similarly, if after enabling DNS relay, you specify a DNS address (other than the LAN IP address) in a DHCP pool or statically on a PC, then that address will be used instead of the DNS relay address.

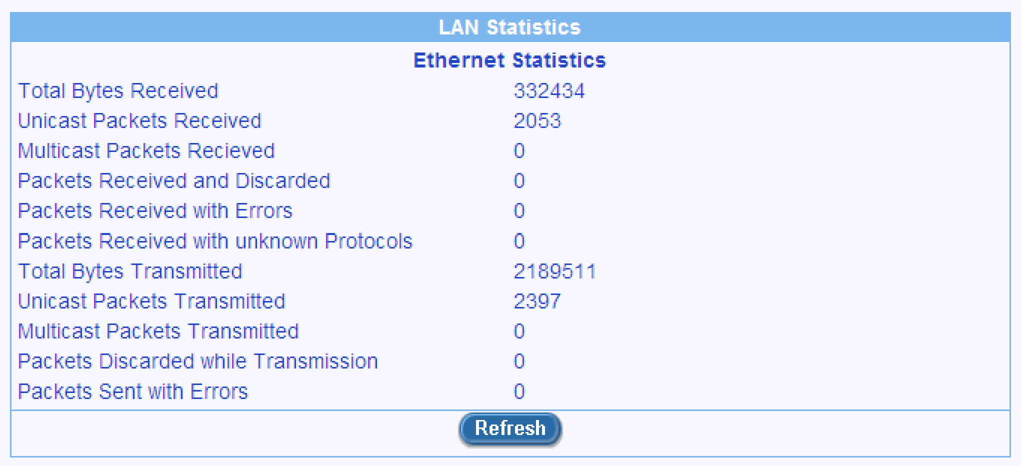
5.4 Viewing LAN Statistics



You will not typically need to view the statistics data for your LAN, but you may find it helpful when working with your ISP to diagnose network and Internet data transmission problems.

To view LAN IP statistics, open the LAN Statistics page by clicking the **LAN ➔ Statistics** menu. Figure 5.5 shows a sample LAN Statistics.

To see the updated statistics, click on the Refresh button.



LAN Statistics

Ethernet Statistics

Total Bytes Received	332434
Unicast Packets Received	2053
Multicast Packets Recieved	0
Packets Received and Discarded	0
Packets Received with Errors	0
Packets Received with unknown Protocols	0
Total Bytes Transmitted	2189511
Unicast Packets Transmitted	2397
Multicast Packets Transmitted	0
Packets Discarded while Transmission	0
Packets Sent with Errors	0

Figure 5.5. LAN Statistics Page

6 Configuring WAN Settings

This chapter describes how to configure WAN settings for the WAN interface on the RX3041H that communicates with your ISP. You'll learn to configure IP address, DHCP and DNS server for your WAN in this chapter.

6.1 WAN Connection Mode

Three modes of WAN connection are supported by the RX3041H – PPPoE, dynamic IP and static IP. The configuration of each connection mode is described in the details in the following sections.

6.2 PPPoE

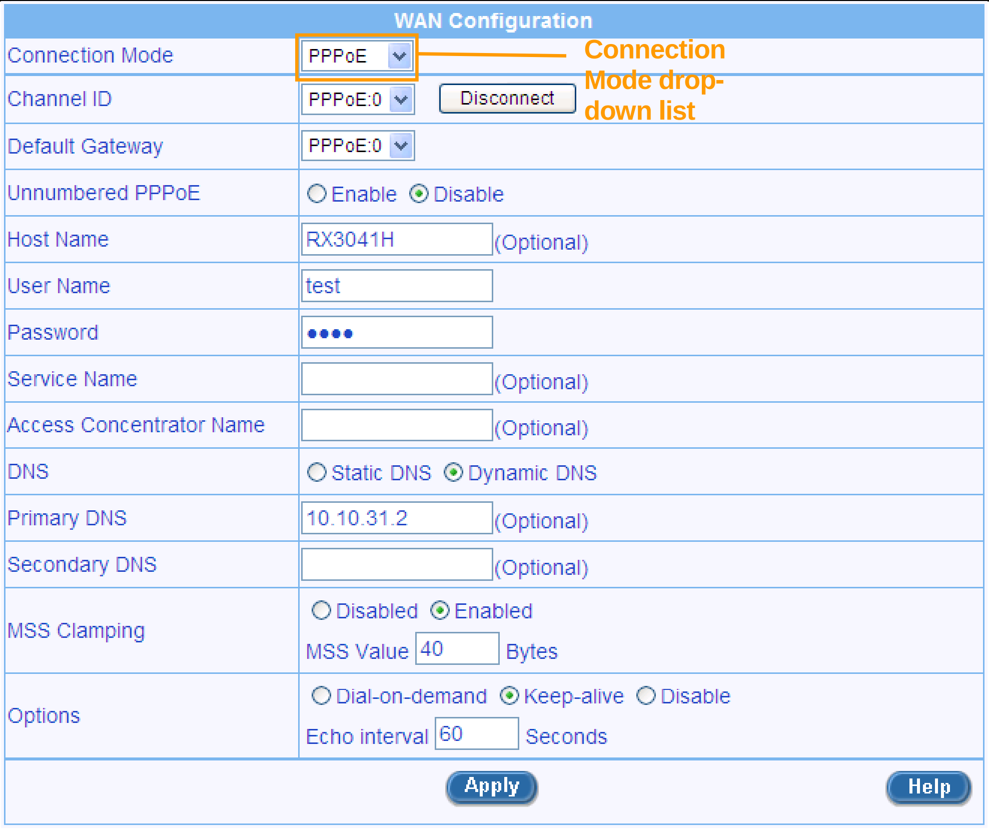
6.2.1 WAN PPPoE Configuration Parameters

Table 6.1describes the configuration parameters available for WAN PPPoE connection mode.

Table 6.1. WAN PPPoE Configuration Parameters

Setting	Description
Channel ID	Select the PPPoE channel for this PPPoE session. Note that only two simultaneous PPPoE channels are supported.
Default Gateway	Since more than one PPPoE session may be active at the same time, a default gateway must be chosen to route packets addressed to networks not explicitly listed in the routing table. Select from the drop down list the interface to be used as the default gateway.
Unnumbered PPPoE	Click on the “Enable” or “Disable” radio button to enable or disable this option. Traditionally, each network interface must have a unique IP address. However, an unnumbered interface does not have to have a unique IP address. This means that when this option is enabled, the WAN and the LAN use the same IP address. Network resources are therefore conserved because fewer network IP addresses are used and routing table is smaller.
Host Name	Enter the host name provided by your ISP. Host name is optional but may be required by some ISP.
User Name and Password	Enter the username and password you use to log into your ISP. (Note: this is different from the information you used to log into Configuration Manager.)
Service Name	Enter the service name provided by your ISP. Service name is optional but may be required by some ISP.
Access Concentrator Name	Enter the access concentrator name provided by your ISP. Access concentrator name is optional but may be required by some ISP.

Setting	Description
Primary/ Secondary DNS	IP address of the primary and/or secondary DNS are optional as PPPoE will automatically detect the DNS IP addresses configured at your ISP. However, if there are other DNS servers you would rather use, enter the IP addresses in the spaces provided.
MSS Clamping	Click on the "Disable" or "Enable" radio button to disable or enable this option. MSS (maximum segment size) clamping is used to tell remote networks not to send packets exceeding the size specified by MTU (maximum transmission unit) and MSS. For example, the MTU of Ethernet is 1500 bytes and if you specify 40 bytes for MSS clamping, then you are telling other networks not to send packets larger than 1460 bytes (i.e. 1500 – 40).
Value	Enter value for MSS clamping if MSS clamping is enabled.
Connection Options	The default setting for this option is "Disable". You can also select either Dial-On-Demand or Keep-Alive if desired.
Dial-On-Demand	Enter the inactivity timeout period at which you want to disconnect the Internet connection when there is no traffic. The minimum value of inactivity timeout is 30 seconds. RIP and SNTP services may interfere with this function if there are activities from these two services. Make sure that the update interval setting of the system date and time (in the System Management / Date/Time Setup configuration page – see 11.4 Setup Date and Time for details) is greater than the inactivity timeout value.
Keep Alive	Enable this option if you wish to keep your Internet connection active, even when there is no traffic. Enter the value for the "Echo Interval" at which you want the RX3041H to send out some data periodically to your ISP. The default value of "Echo Interval" is 60 second.



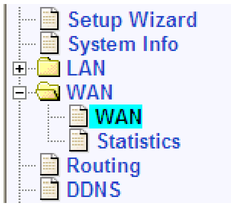
Connection Mode drop-down list

WAN Configuration

Connection Mode	PPPoE
Channel ID	PPPoE:0 Disconnect
Default Gateway	PPPoE:0
Unnumbered PPPoE	○ Enable ● Disable
Host Name	RX3041H (Optional)
User Name	test
Password	••••
Service Name	(Optional)
Access Concentrator Name	(Optional)
DNS	○ Static DNS ● Dynamic DNS
Primary DNS	10.10.31.2 (Optional)
Secondary DNS	(Optional)
MSS Clamping	○ Disabled ● Enabled MSS Value 40 Bytes
Options	○ Dial-on-demand ● Keep-alive ○ Disable Echo interval 60 Seconds

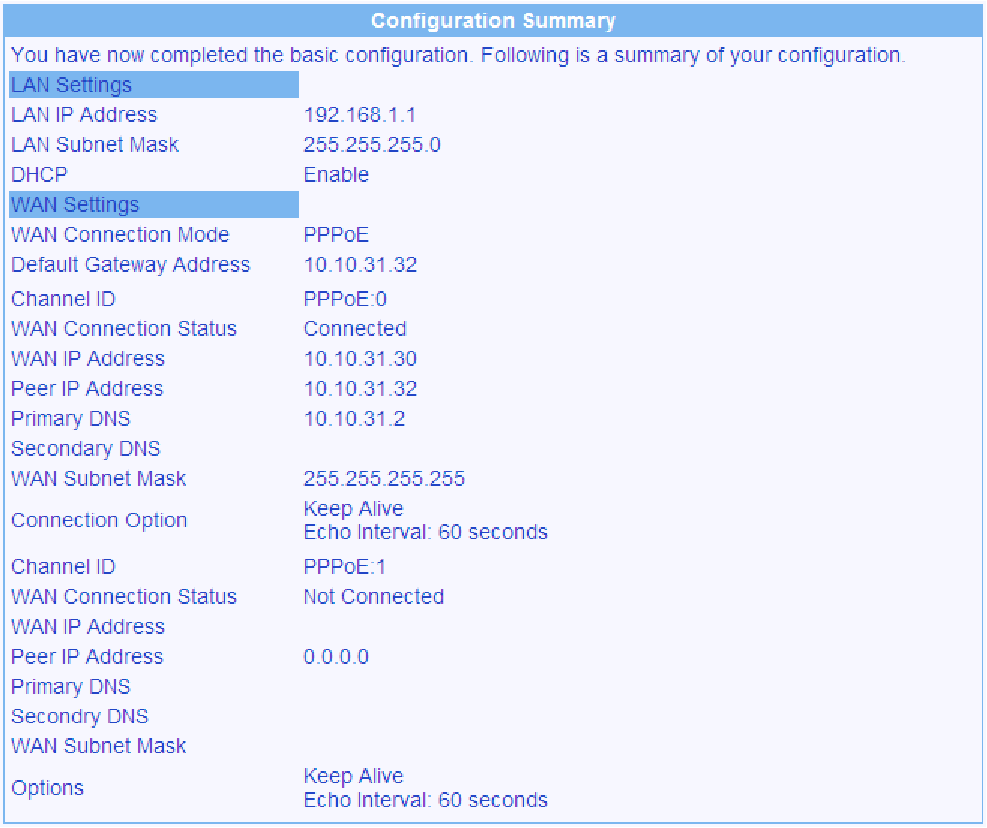
Figure 6.1. WAN PPPoE Configuration Page

6.2.2 Configuring PPPoE for WAN



Follow the instructions below to configure PPPoE settings:

1. Open the WAN configuration page by clicking on the **WAN** menu.
2. Select PPPoE from the Connection Mode drop-down list as shown in Figure 6.1.
3. Select PPPoE channel ID from the drop-down list. Currently, two channels are supported.
4. Select default gateway interface – PPPoE:0 or PPPoE:1.
5. Choose to enable or disable PPPoE unnumbered option. The default setting is "Disable".
6. (Optional) Enter host name in the space provided if required by your ISP.
7. If you are connecting to the Internet using PPPoE, you probably only have to enter User Name and Password in the PPPoE configuration page as shown in Figure 6.1 unless you want to use your preferred DNS servers.
8. (Optional) Enter the service name and/or access concentrator name if required by your ISP.
9. (Optional) Enter the IP addresses for the primary and secondary DNS servers if you want to use your preferred DNS servers; otherwise, skip this step.



Configuration Summary

You have now completed the basic configuration. Following is a summary of your configuration.

LAN Settings	
LAN IP Address	192.168.1.1
LAN Subnet Mask	255.255.255.0
DHCP	Enable
WAN Settings	
WAN Connection Mode	PPPoE
Default Gateway Address	10.10.31.32
Channel ID	PPPoE:0
WAN Connection Status	Connected
WAN IP Address	10.10.31.30
Peer IP Address	10.10.31.32
Primary DNS	10.10.31.2
Secondary DNS	
WAN Subnet Mask	255.255.255.255
Connection Option	Keep Alive Echo Interval: 60 seconds
Channel ID	PPPoE:1
WAN Connection Status	Not Connected
WAN IP Address	
Peer IP Address	0.0.0.0
Primary DNS	
Secondry DNS	
WAN Subnet Mask	
Options	Keep Alive Echo Interval: 60 seconds

Figure 6.2. WAN PPPoE Configuration Summary

10. Choose to enable or disable MSS clamping option. If MSS clamping is enabled, a value of MSS clamping must be entered.

11. Choose a connection option and enter appropriate setting if desired. The default setting is "Disable".
12. Click Apply to save the PPPoE settings when you are done with the configuration. You'll see a summary of the WAN PPPoE configuration at the bottom half of the configuration page. Note that if the default gateway address is not shown immediately, click on the **WAN** menu to open the WAN configuration page again.

6.3 Dynamic IP

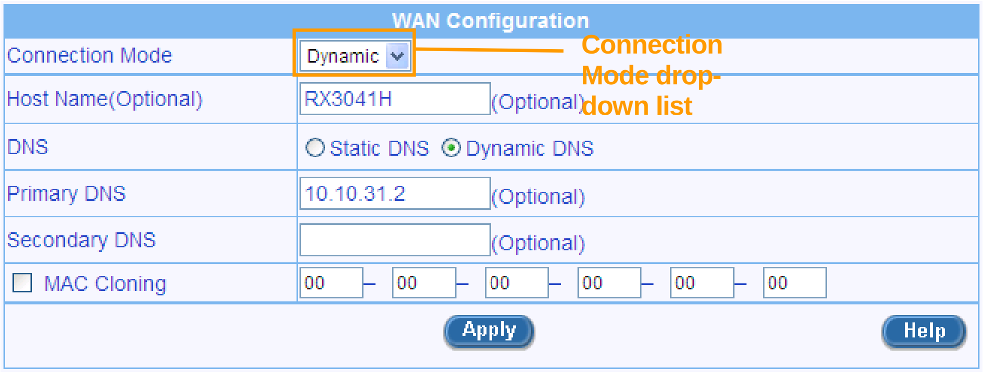
6.3.1 WAN Dynamic IP Configuration Parameters

Table 6.2 describes the configuration parameters available for dynamic IP connection mode.

Table 6.2. WAN Dynamic IP Configuration Parameters

Field	Description
Host Name	Host name is optional but may be required by some ISP.
Primary/ Secondary DNS	IP address of the primary and/or secondary DNS are optional as DHCP client will automatically obtain the DNS IP addresses configured at your ISP. However, if there are other DNS servers you would rather use, enter the IP addresses in the spaces provided.
MAC Cloning	The default is to use the MAC address of the WAN interface. However, if you had registered a MAC address previously with your ISP, you may need to enter that MAC address here.

6.3.2 Configuring Dynamic IP for WAN



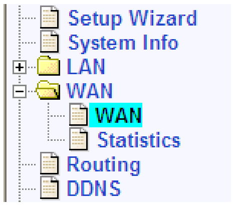
WAN Configuration

Connection Mode	Dynamic
Host Name(Optional)	RX3041H (Optional)
DNS	○ Static DNS ● Dynamic DNS
Primary DNS	10.10.31.2 (Optional)
Secondary DNS	(Optional)
□ MAC Cloning	00 - 00 - 00 - 00 - 00 - 00

Connection Mode drop-down list

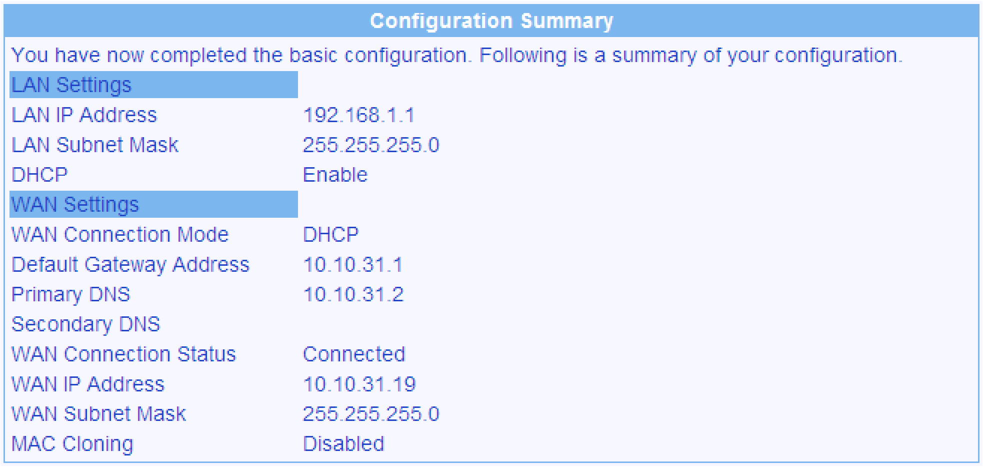
Figure 6.3. WAN Dynamic IP (DHCP client) Configuration

Follow the instructions below to configure dynamic IP settings:



1. Open the WAN configuration page by clicking on the **WAN** menu.
2. Select Dynamic from the Connection Mode drop-down list as shown in Figure 6.3.
3. (Optional) Enter host name in the space provided if required by your ISP.
4. (Optional) Enter the IP addresses for the primary and secondary DNS servers if you want to use your preferred DNS servers; otherwise, skip this step.
5. If you had previously registered a specific MAC address with your ISP for Internet access, enter the registered MAC address here and make sure you check the MAC cloning check box.

6. Click Apply to save the Dynamic IP settings when you are done with the configuration. You'll see a summary of the WAN configuration at the bottom half of the configuration page. Note that if the default gateway address is not shown immediately, click on the WAN menu to open the WAN configuration page again.



Configuration Summary

You have now completed the basic configuration. Following is a summary of your configuration.

LAN Settings	
LAN IP Address	192.168.1.1
LAN Subnet Mask	255.255.255.0
DHCP	Enable
WAN Settings	
WAN Connection Mode	DHCP
Default Gateway Address	10.10.31.1
Primary DNS	10.10.31.2
Secondary DNS	
WAN Connection Status	Connected
WAN IP Address	10.10.31.19
WAN Subnet Mask	255.255.255.0
MAC Cloning	Disabled

Figure 6.4. WAN Dynamic IP (DHCP client) Configuration Summary

6.4 Static IP

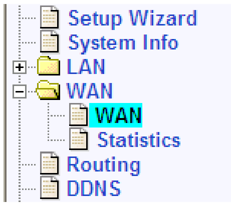
6.4.1 WAN Static IP Configuration Parameters

Table 6.3 describes the configuration parameters available for static IP connection mode.

Table 6.3. WAN Static IP Configuration Parameters

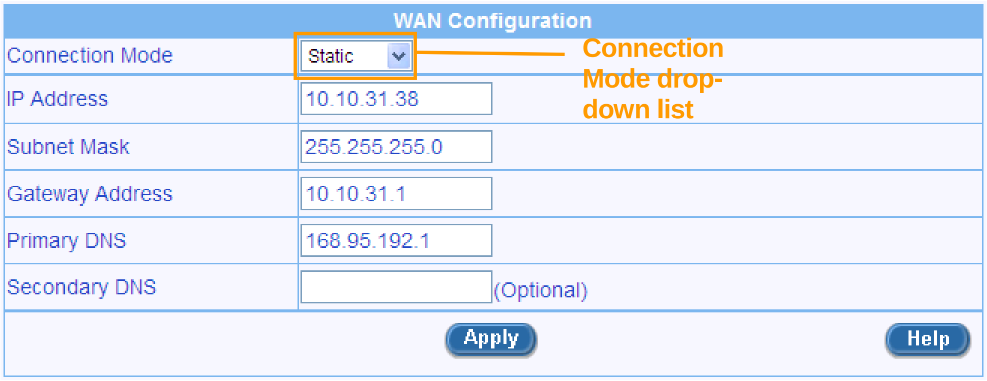
Setting	Description
IP Address	WAN IP address provided by your ISP.
Subnet Mask	WAN subnet mask provided by your ISP. Typically, it is set as 255.255.255.0.
Gateway Address	Gateway IP address provided by your ISP. It must be in the same subnet as the WAN on the RX3041H.
Primary/ Secondary DNS	You must at least enter the IP address of the primary DNS server. Secondary DNS is optional

6.4.2 Configuring Static IP for WAN



Follow the instructions below to configure static IP settings:

1. Open the WAN configuration page by clicking on the **WAN** menu.
2. Select Static from the Connection Mode drop-down list as shown in Figure 6.5.
3. Enter WAN IP address in the IP Address field. This information should be provided by your ISP.
4. Enter Subnet Mask for the WAN. This information should be provided by your ISP. Typically, it is 255.255.255.0.

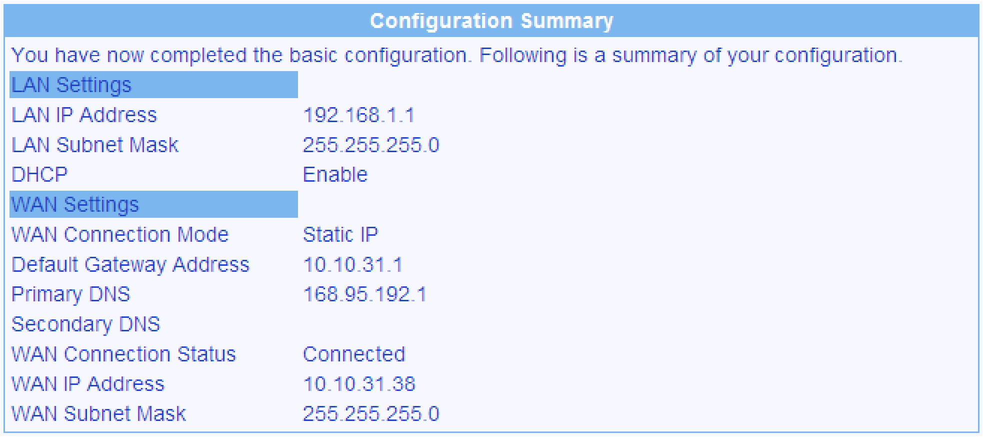


WAN Configuration	
Connection Mode	Static
IP Address	10.10.31.38
Subnet Mask	255.255.255.0
Gateway Address	10.10.31.1
Primary DNS	168.95.192.1
Secondary DNS	(Optional)

Connection Mode drop-down list

Figure 6.5. WAN Static IP Configuration

5. Enter gateway address provided by your ISP in the space provided.
6. Enter the IP address of the primary DNS server. This information should be provided by your ISP. Secondary DNS server is optional.
7. Click **Apply** to save the static IP settings when you are done with the configuration. You'll see a summary of the WAN configuration at the bottom half of the configuration page.



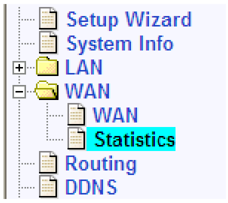
Configuration Summary

You have now completed the basic configuration. Following is a summary of your configuration.

LAN Settings	
LAN IP Address	192.168.1.1
LAN Subnet Mask	255.255.255.0
DHCP	Enable
WAN Settings	
WAN Connection Mode	Static IP
Default Gateway Address	10.10.31.1
Primary DNS	168.95.192.1
Secondary DNS	
WAN Connection Status	Connected
WAN IP Address	10.10.31.38
WAN Subnet Mask	255.255.255.0

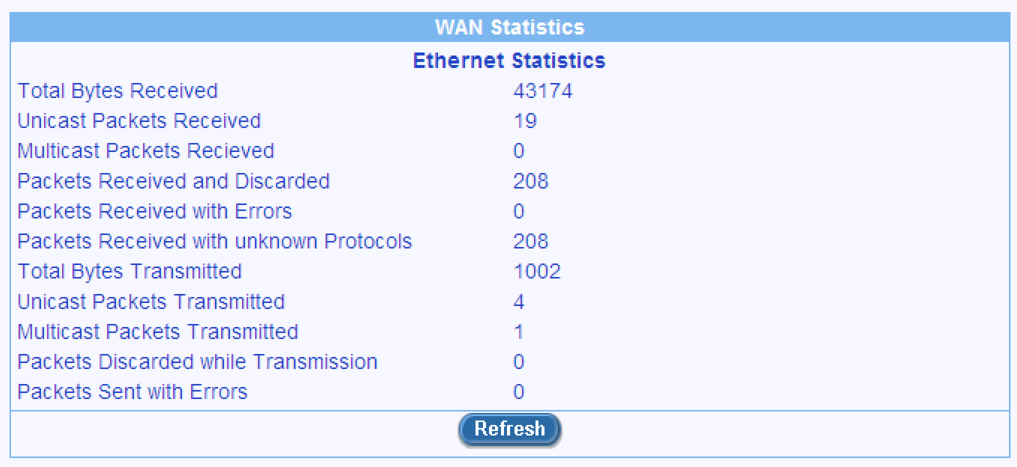
Figure 6.6. WAN Static IP Configuration

6.5 Viewing WAN Statistics



You will not typically need to view this data, but you may find it helpful when working with your ISP to diagnose network and Internet data transmission problems.

To view WAN IP statistics, open the WAN Statistics page by clicking **WAN → Statistics** menu. Figure 6.7 shows a sample WAN Statistics page:



WAN Statistics

Ethernet Statistics

Total Bytes Received	43174
Unicast Packets Received	19
Multicast Packets Recieved	0
Packets Received and Discarded	208
Packets Received with Errors	0
Packets Received with unknown Protocols	208
Total Bytes Transmitted	1002
Unicast Packets Transmitted	4
Multicast Packets Transmitted	1
Packets Discarded while Transmission	0
Packets Sent with Errors	0

Figure 6.7. WAN Statistics Page

To see the updated statistics, click on the Refresh button.

7 Configuring Routes

You can use Configuration Manager to define specific routes for your Internet and network data communication. This chapter describes basic routing concepts and provides instructions for creating routes.

Note that most users do not need to define routes.

7.1 Overview of IP Routes

The essential challenge of a router is: when it receives data intended for a particular destination, which next device should it send that data to? When you define IP routes, you provide the rules that the RX3041H uses to make these decisions.

7.1.1 Do I need to define IP routes?

Most users do not need to define IP routes. On a typical small home or office LAN, the existing routes that set up the default gateways for your LAN computers and for the RX3041H provide the most appropriate path for all your Internet traffic.

- On your LAN computers, a default gateway directs all Internet traffic to the LAN port on the RX3041H. Your LAN computers know their default gateway either because you assigned it to them when you modified their TCP/IP properties, or because you configured them to receive the information dynamically from a server whenever they access the Internet. (Each of these processes is described in the Quick Start Guide instructions, Part 2.)
- On the RX3041H itself, a default gateway is defined to direct all outbound Internet traffic to a router at your ISP. This default gateway is assigned automatically by your ISP whenever the device negotiates an Internet connection. (The process for adding a default route is described in section 7.3.2 Adding a Static Route.)

You may need to define routes if your home setup includes two or more networks or subnets, if you connect to two or more ISP services, or if you connect to a remote corporate LAN.

7.2 Dynamic Routing using RIP (Routing Information Protocol)

RIP enables routing information exchange between routers; thus, routes are updated automatically without human intervention. Please note that RIP service must be enabled first in the System Management / System Services configuration page if you want to use RIP to exchange routing information with other routers.

7.2.1 Dynamic Routing (RIP) Configuration Parameters

The following table defines the available configuration parameters for dynamic routing.

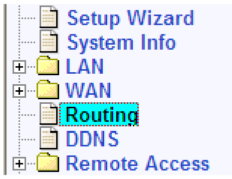
Table 7.1. Dynamic Routing (RIP) Configuration Parameters

Field	Description
Interface	Select the interface through which the routing information exchange is desired. You may configure all or some interfaces to support routing information exchange.
RIP	Click the "Enable" or "Disable" radio button to enable or disable "RIP" for the interface selected. Note that you must enable RIP service first in the System Management / System Services configuration page if you want to enable RIP to exchange routing information. The default setting is “Enable”.

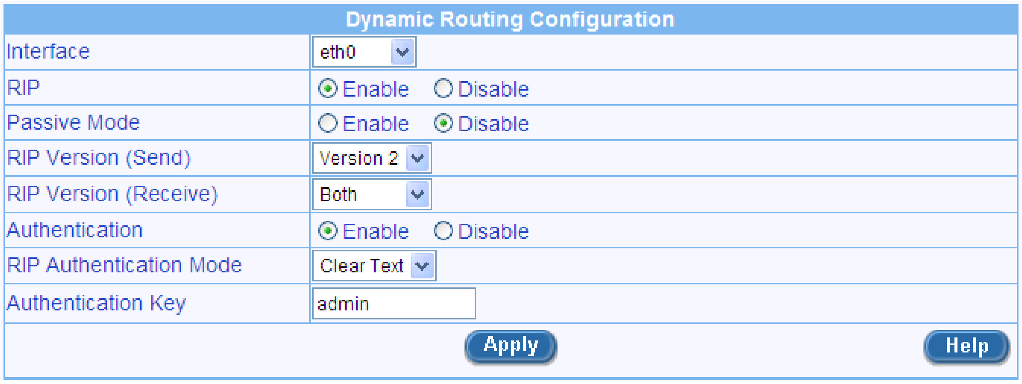
Field	Description
Passive Mode	Enable this mode if RIP configured for this interface will only receive routing information from other routers and not send routing information to other routers. Disable this mode if you want this interface to send and receive routing information to/from other routers. The default setting is "Enable".
RIP Version (Send)	Select the RIP version for sending the routing information. Three options are available: Version 1. Version 2 and Both. The default setting is "Version 2".
RIP Version (Receive)	Select the RIP version for receiving the routing information. Three options are available: Version 1. Version 2 and Both. The default setting is "Both".
Authentication	Click on "Enable" or "Disable" radio button to enable/disable authentication for exchanging the routing information. Note that all the routers exchanging routing information must use the same authentication key. The default setting is "Disable".
RIP Authentication Mode	Select RIP authentication mode from the drop down list. Two modes are available - Clear Text and MD5. The default setting is "Clear Text".
Authentication Key	Enter the authentication key for shared by all the routers exchanging routing information. The default authentication key is "admin".

7.2.2 Configuring RIP

Follow these instructions to configure RIP:



1. Open the routing configuration page by clicking on the **Routing** menu.
2. In the System Services configuration page (as shown in Figure 11.1), click the "Enable" or "Disable" radio button depending on whether you want to enable or disable RIP service. Skip this step, if you have already done so.



Dynamic Routing Configuration

Interface	eth0
RIP	● Enable ○ Disable
Passive Mode	○ Enable ● Disable
RIP Version (Send)	Version 2
RIP Version (Receive)	Both
Authentication	● Enable ○ Disable
RIP Authentication Mode	Clear Text
Authentication Key	admin

Figure 7.1. RIP Configuration

3. Select an interface from the drop-down list via which the routing information is to be exchanged.
4. Enable or disable RIP for the specified interface by clicking on the "Enable" or "Disable" radio button.
5. Enable or disable RIP passive mode by clicking on the "Enable" or "Disable" radio button.
6. Select RIP version for sending and receiving routing information from the respective drop-down list.
7. Enable or disable authentication by clicking on the "Enable" or "Disable" radio button. You must also select the RIP authentication mode and enter authentication key if authentication is enabled.

8. Repeat steps 3 to 7 if you want to configure another interface to support routing information exchange.
9. Click **Apply** to save the RIP configuration.

7.3 Static Routing

7.3.1 Static Route Configuration Parameters

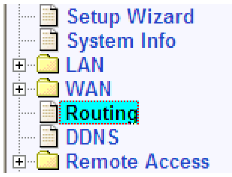
The following table defines the available configuration parameters for static routing configuration.

Table 7.2. Static Route Configuration Parameters

Field	Description
Destination IP Address	Specifies the IP address of the destination computer or an entire destination network. It can also be specified as all zeros to indicate that this route should be used for all destinations for which no other route is defined (this is the route that creates the default gateway). Note that destination IP must be a network ID. The default route uses a destination IP of 0.0.0.0. Refer to Appendix A for an explanation of network ID.
Destination Netmask	Indicates which parts of the destination address refer to the network and which parts refer to a computer on the network. Refer to Appendix A, for an explanation of network masks. The default route uses a netmask of 0.0.0.0.
Gateway IP Address	Gateway IP address

7.3.2 Adding a Static Route

Follow these instructions to add a static route to the routing table.



1. Open the routing configuration page by clicking on the **Routing** menu.
2. Enter static routes information such as destination IP address, destination netmask and gateway IP address in the corresponding fields.

   For a description of these fields, refer to Table 7.2. Static Route Configuration Parameters.

   To create a route that defines the default gateway for your LAN, enter 0.0.0.0 in both the **Destination IP Address** and **Destination Netmask** fields.

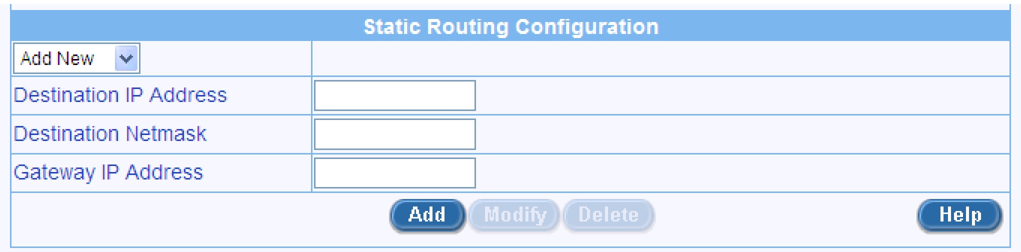


Figure 7.2. Static Route Configuration

3. Click **Add** to add a new route.

7.3.3 Deleting a Static Route

Follow these instructions to delete a static route from the routing table.

1. In the Static Routes configuration page (as shown in Figure 7.2), select the route from the service drop-down list or click on the ✎ icon of the route to be deleted in the Routing Table.
2. Click Delete to delete the selected route.

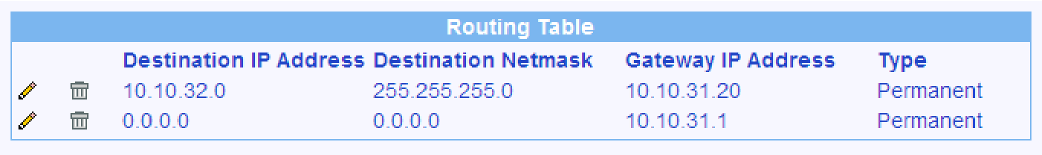
WARNING

Do not remove the route for default gateway unless you know what you are doing. Removing the default route will render the Internet unreachable.

7.3.4 Viewing the Routing Table

All IP-enabled computers and routers maintain a table of IP addresses that are commonly accessed by their users. For each of these *destination IP addresses*, the table lists the IP address of the first hop the data should take. This table is known as the device's *routing table*.

To view the RX3041H's routing table, just open the Routing configuration page by clicking on the **Routing** menu. The Routing Table displays at the bottom half of the Routing configuration page, as shown in Figure 7.3.



Routing Table

		Destination IP Address	Destination Netmask	Gateway IP Address	Type
✎	🗑	10.10.32.0	255.255.255.0	10.10.31.20	Permanent
✎	🗑	0.0.0.0	0.0.0.0	10.10.31.1	Permanent

Figure 7.3. Routing Table

The routing table displays a row for each existing route containing the IP address and the subnet mask of the destination network and the IP address of the gateway that forwards the traffic to the destination network.

8 Configuring DDNS

Dynamic DNS is a service that allows computers to use the same domain name, even when the IP address changes from time to time (during reboot or when the ISP's DHCP server resets IP leases). RX3041H connects to a Dynamic DNS service whenever the WAN IP address changes. It supports setting up the web services such as Web server, FTP server using a domain name instead of the IP address. Dynamic DNS supports the DDNS clients with the following features:

- Update DNS records (addition) when an external interface comes up
- Force DNS update

Dynamic DNS supports two modes, namely RFC-2136 DDNS Client and HTTP DDNS Client.

RFC-2136 DDNS Client

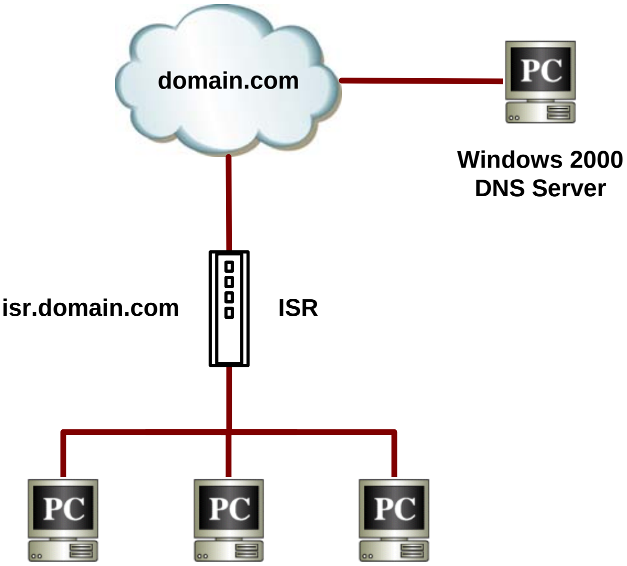


Figure 8.1. Network Diagram for RFC-2136 DDNS

Any interface status change to an external interface sends a DDNS update to the DNS server. When connection to Primary DNS server fails, the RX3041H updates the Secondary DNS server. When a DNS update is forced by the administrator, update is sent to the server for all active external interfaces.

HTTP Dynamic DNS Client

HTTP DDNS client uses the mechanism provided by the popular DDNS service providers for updating the DNS records dynamically. In this case, the service provider updates DNS records in the DNS. RX3041H uses HTTP to trigger this update.

The RX3041H supports HTTP DDNS update with the following service providers:

- www.dyndns.org
- www.zoneedit.com
- www.dns-tokyo.jp

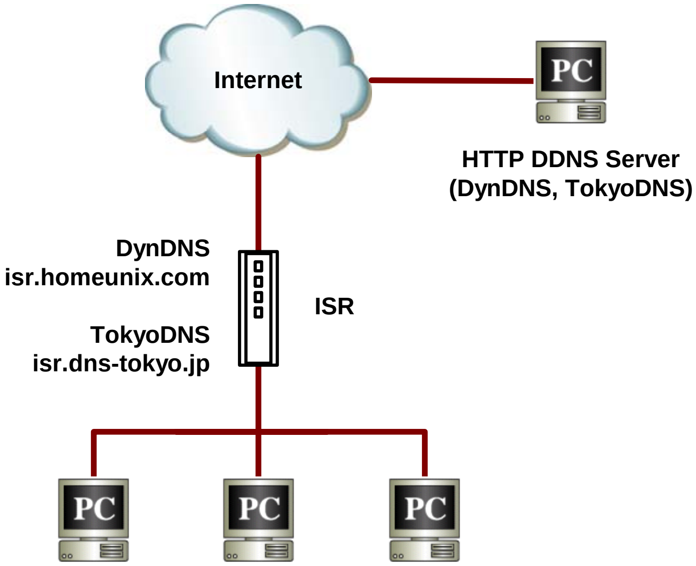


Figure 8.2. Network Diagram for HTTP DDNS

Whenever IP address of the configured DDNS interface changes, DDNS update is sent to the specified DDNS service provider. RX3041H should be configured with the DDNS username and password that are obtained from the DDNS service provider.

8.1 DDNS Configuration Parameters

Table 8.1 describes the configuration parameters available for DDNS service.

Table 8.1. DDNS Configuration Parameters

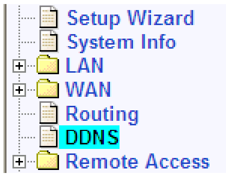
Field	**Description**
DDNS State	
Enable	Click on this radio button to enable the DDNS Service
Disable	Click on this radio button to disable the DDNS Service
DDNS Type – select a DDNS service type: HTTP or RFC-2136 DDNS	
HTTP DDNS	Click this radio button if HTTP DDNS is desired.
RFC-2136 DDNS	Click this radio button if RFC-2136 DDNS is desired.
DNS Zone Name Enter the registered domain name provided by your ISP into this field. (Note: The host name of RX3041H has to be configured in the System Information Setup page properly. For example, If the host name of your RX3041H is “host1” and the DNS Zone Name is “yourdomain.com”, The fully qualify domain name (FQDN) is “host1.yourdomain.com”.)	
RFC-2136 DDNS Specific Settings	
Primary/Secondary DNS Server [For RFC-2136 DDNS only] Enter the IP addresses of the Primary and secondary DNS Servers in these fields. The IP addresses of the primary and secondary DNS servers are inherited from the settings in the WAN configuration page. Unless you want to change these settings for WAN, leave them as they are.	

Field	**Description**
HTTP DDNS Specific Settings	
DDNS Service [For HTTP DDNS only]	
dyndns	Please visit http://www.dyndns.org for more details.
zoneedit	Please visit http://www.zoneedit.com for more details.
dyn-tokyo	Please visit http://www.dns-tokyo.jp for more details.
DDNS Username [For HTTP DDNS only] Enter the username provided by your DDNS service provider in this field.	
DDNS Password [For HTTP DDNS only] Enter the password provided by your DDNS service provider in this field.	

8.2 Configuring RFC-2136 DDNS Client

Follow these instructions to configure the RFC-2136 DDNS:

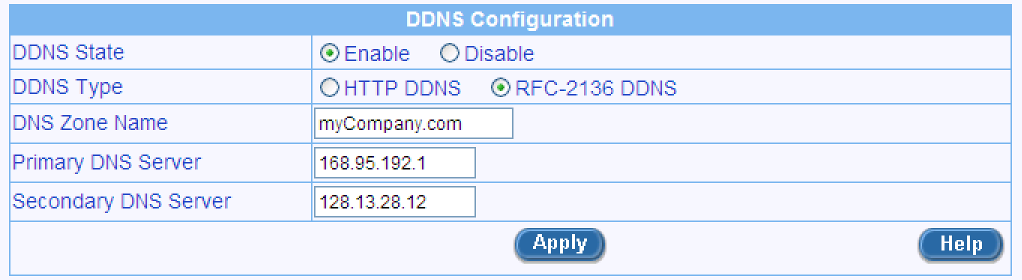
1. First, you need to ask your system administrator to turn on the DNS dynamic update functionality on your DNS server. If you are running Windows 2000/XP/2003 DNS server, Please refer to the Microsoft Knowledge Base article "*Q317590: Configure DNS Dynamic Update in Windows 2000*", for details.



2. Make sure that you have a host name configured for the RX3041H; otherwise, open the **System Identity** configuration page to configure one. Please refer to the section 11.3 "*Configure System Identity*" for more details.

3. Open the DDNS configuration page by clicking on the **DDNS** menu.

4. Select "Enable" for the DDNS State and "RFC-2136 DDNS" for the DDNS Type.



DDNS Configuration

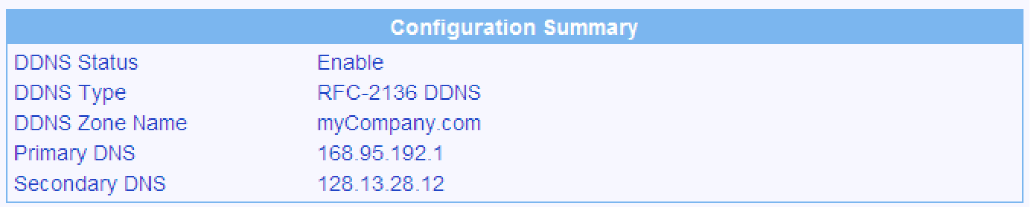
DDNS State	● Enable ○ Disable
DDNS Type	○ HTTP DDNS ● RFC-2136 DDNS
DNS Zone Name	myCompany.com
Primary DNS Server	168.95.192.1
Secondary DNS Server	128.13.28.12

Figure 8.3. RFC-2136 DDNS Configuration

5. Enter the domain name in the **DNS Zone Name** field.

6. There is no need to change the settings for the primary and secondary DNS servers as they are inherited from the settings in the WAN configuration page. Unless you want to change these settings for WAN, leave them as they are.

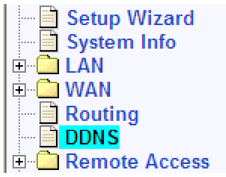
7. Click on Apply button to send a DNS update request to the DNS server(s) as specified in the Primary DNS and Secondary DNS fields. Note that DNS update request will also be sent to the DNS Server automatically whenever the WAN port status is changed.



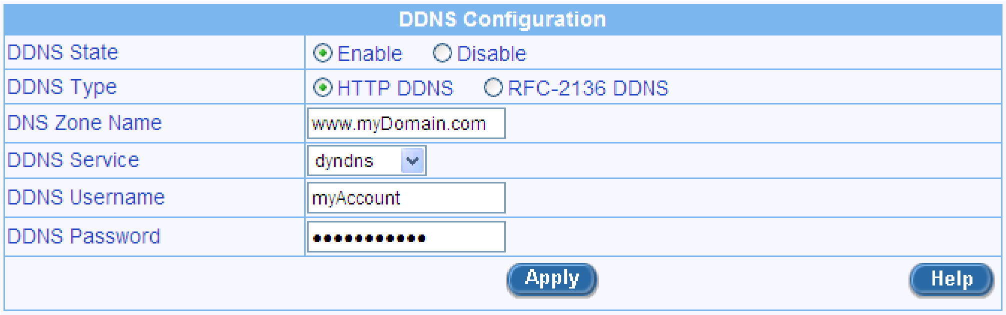
Configuration Summary	
DDNS Status	Enable
DDNS Type	RFC-2136 DDNS
DDNS Zone Name	myCompany.com
Primary DNS	168.95.192.1
Secondary DNS	128.13.28.12

8.3 Configuring HTTP DDNS Client

Follow these instructions to configure the HTTP DDNS:



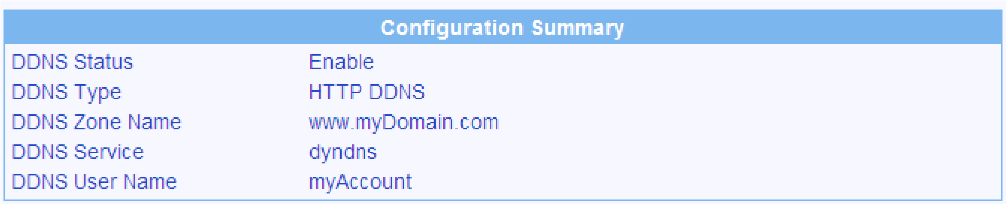
1. First, you should have already registered a domain name to the DDNS service provider. If you have not done so, please visit www.dns-tokyo.jp or www.dyndns.org for more details.
2. Make sure that you have a host name configured for the RX3041H; otherwise, open the **System Identity** configuration page to configure one. Please refer to the section 11.3 "*Configure System Identity*" for more details.
3. Open the DDNS configuration page by clicking on the **DDNS** menu.
4. In the DDNS configuration page, select "Enable" for the DDNS State and "HTTP DDNS" for the DDNS Type.



DDNS Configuration	
DDNS State	● Enable ○ Disable
DDNS Type	● HTTP DDNS ○ RFC-2136 DDNS
DNS Zone Name	www.myDomain.com
DDNS Service	dyndns
DDNS Username	myAccount
DDNS Password	●●●●●●●●●●●

Figure 8.4. HTTP DDNS Configuration

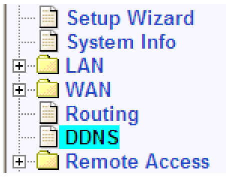
5. Enter the domain name in the DNS Zone Name field.
6. Select a DDNS service from the DDNS Service drop-down list.
7. Enter the username and password provided by your DDNS service providers.
8. Click on Apply button to send a DNS update request to your DDNS service provider. Note that DNS update request will also be sent to your DDNS Service provider automatically whenever the WAN port status is changed.



Configuration Summary	
DDNS Status	Enable
DDNS Type	HTTP DDNS
DDNS Zone Name	www.myDomain.com
DDNS Service	dyndns
DDNS User Name	myAccount

8.4 Configuring Local Host Table

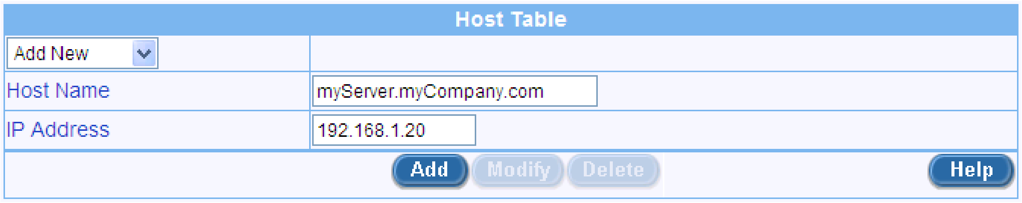
This is the local host table used by the router to map the host name to its IP address. This table may be used for the servers deployed inside your LAN. For example, you may create a host entry in this table for your servers to allow the LAN hosts to access the server using the host name, e.g. telnet myServer.myCompany.com.



8.4.1.1 Add a Host Table Entry

To add a host table entry, follow the instructions below:

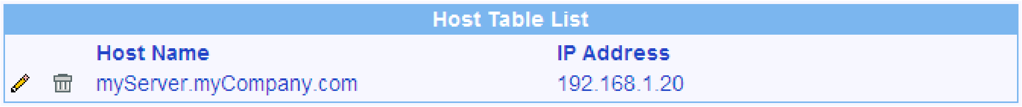
1. Open the DDNS configuration page by clicking on the **DDNS** menu.
2. Select "**Add New**" from the Host Table drop-down list.
3. Enter the host name and the corresponding IP address in the respective fields. Figure 8.5 displays the screen with entries to add a new host table entry to map the host name, myServer.myCompany.com to an IP address, 192.168.1.20.



Host Table	
Add New	
Host Name	myServer.myCompany.com
IP Address	192.168.1.20

Figure 8.5. Host Table Configuration

4. Click on the Add button to create the new host table entry. The new entry will then be displayed in the host table at the bottom half of the DDNS configuration page as shown below.



Host Table List

		Host Name	IP Address
✏	🗑	myServer.myCompany.com	192.168.1.20

Figure 8.6. Host Table

8.4.1.2 Modify a Host Table Entry

To modify a host table entry, follow the instructions below:

1. Open the DDNS configuration page by clicking on the **DDNS** menu.
2. Click on the ✏ icon of the host table entry to be modified in the host table or select the host table entry from the host table drop-down list.
3. You may then make desired changes to the host name and/or the IP address.
4. Click on the Modify button to save the changes. The new settings for this host table entry will then be displayed in the host table located at the bottom half of the DDNS configuration page.

8.4.1.3 Delete a Host Table Entry

To delete a host table entry, click on the 🗑 icon of the entry to be deleted or follow the instruction below:

1. Open the DDNS configuration page by clicking on the **DDNS** menu.
2. Click on the ✏ icon of the host table entry to be deleted in the host table or select the host table entry from the host table drop-down list.
3. Click on the Delete button to delete the entry. Note that the entry deleted will be removed from the host table located at the bottom half of the DDNS configuration page.

8.4.1.4 View the Host Table

To see existing host table, just open the DDNS configuration page by clicking on the **DDNS** menu.

9 Configuring Firewall/NAT Settings

The RX3041H provides built-in firewall/NAT functions, enabling you to protect the system against denial of service (DoS) attacks and other types of malicious accesses to your LAN while providing Internet access sharing at the same time. You can also specify how to monitor attempted attacks, and who should be automatically notified.

This chapter describes how to create/modify/delete ACL (Access Control List) rules to control the data passing through your network. You will use firewall configuration pages to:

- Create, modify, delete and view inbound/outbound ACL rules.
- Create, modify and delete pre-defined services, IP pools, NAT pools, application filters and time ranges to be used in inbound/outbound ACL configurations.
- View firewall statistics.

Note: *When you define an ACL rule, you instruct the RX3041H to examine each data packet it receives to determine whether it meets criteria set forth in the rule. The criteria can include the network or internet protocol it is carrying, the direction in which it is traveling (for example, from the LAN to the Internet or vice versa), the IP address of the sending computer, the destination IP address, and other characteristics of the packet data.*

If the packet matches the criteria established in a rule, the packet can either be accepted (forwarded towards its destination), or denied (discarded), depending on the action specified in the rule.

9.1 Firewall Overview

9.1.1 Stateful Packet Inspection

The stateful packet inspection engine in the RX3041H maintains a state table that is used to keep track of connection states of all the packets passing through the firewall. The firewall will open a “hole” to allow the packet to pass through if the state of the packet that belongs to an already established connection matches the state maintained by the stateful packet inspection engine. Otherwise, the packet will be dropped. This “hole” will be closed when the connection session terminates. No configuration is required for stateful packet inspection; it is enabled by default when the firewall is enabled. Please refer to section 11.1 Configure System Services to enable or disable firewall service on the RX3041H.

9.1.2 DoS (Denial of Service) Protection

Both DoS protection and stateful packet inspection provide first line of defense for your network. No configuration is required for both protections on your network as long as firewall is enabled for the RX3041H. By default, the firewall is enabled at the factory. Please refer to section 11.1 Configure System Services to enable or disable firewall service on the RX3041H.

9.1.3 Firewall and Access Control List (ACL)

9.1.3.1 Priority Order of ACL Rule

All ACL rules have a rule ID assigned – the smaller the rule ID, the higher the priority. Firewall monitors the traffic by extracting header information from the packet and then either drops or forwards the packet by looking for a match in the ACL rule table based on the header information. Note that the ACL rule checking starts from the rule with the smallest rule ID until a match is found or all the ACL rules are examined. If no match is found, the packet is dropped; otherwise, the packet is either dropped or forwarded based on the action defined in the matched ACL rule.

9.1.3.2 Tracking Connection State

The stateful inspection engine in the firewall keeps track of the state, or progress, of a network connection. By storing information about each connection in a state table, RX3041H is able to quickly determine if a packet passing through the firewall belongs to an already established connection. If it does, it is passed through the firewall without going through ACL rule evaluation.

For example, an ACL rule allows outbound ICMP packet from 192.168.1.1 to 192.168.2.1. When 192.168.1.1 send an ICMP echo request (i.e. a ping packet) to 192.168.2.1, 192.168.2.1 will send an ICMP echo reply to 192.168.1.1. In the RX3041H, you don't need to create another inbound ACL rule because stateful packet inspection engine will remember the connection state and allows the ICMP echo reply to pass through the firewall.

9.1.4 Default ACL Rules

The RX3041H supports three types of default access rules:

- Inbound Access Rules: for controlling incoming access to computers on your LAN.
- Outbound Access Rules: for controlling outbound access to external networks for hosts on your LAN.
- Self Access Rules: for controlling access to the RX3041H itself.

Default Inbound Access Rules

No default inbound access rule is configured. That is, all traffic from external hosts to the internal hosts is denied.

Default Outbound Access Rules

The default outbound access rule allows all the traffic originated from your LAN to be forwarded to the external network using NAT.

WARNING

It is not necessary to remove the default ACL rule from the ACL rule table! It is better to create higher priority ACL rules to override the default rule.

9.2 NAT Overview

Network Address Translation allows use of a single device, such as the RX3041H, to act as an agent between the Internet (public network) and a local (private) network. This means that a NAT IP address can represent an entire group of computers to any entity outside a network. Network Address Translation (NAT) is a mechanism for conserving registered IP addresses in large networks and simplifying IP addressing management tasks. Because of the translation of IP addresses, NAT also conceals true network address from privy eyes and provide a certain degree security to the local network.

The NAT modes supported are static NAT, dynamic NAT, NAPT, reverse static NAT and reverse NAPT.

9.2.1 Static (One to One) NAT

Static NAT maps an internal host address to a globally valid Internet address (one-to-one). The IP address in each packet is directly translated with a globally valid IP contained in the mapping. Figure 9.1 illustrates the IP address mapping relationship between the four private IP addresses and the four globally valid IP addresses. Note that this mapping is static, i.e. the mapping will not change over time until this mapping is manually changed by the administrator. This means that a host will always use the same global valid IP address for all its outgoing traffic.

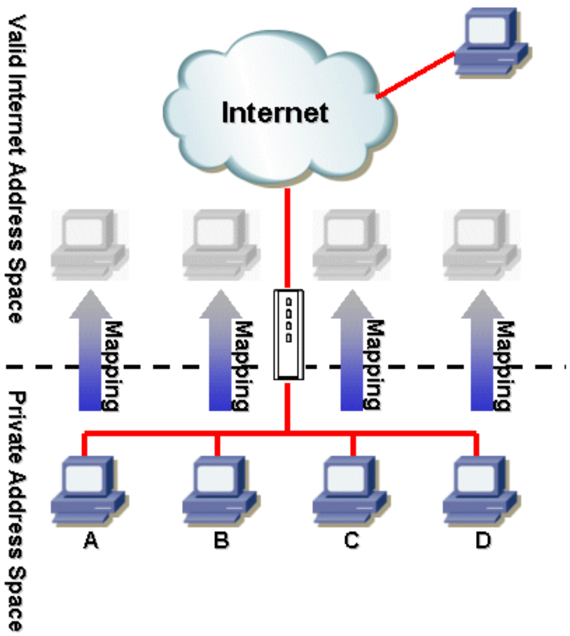


Figure 9.1 Static NAT – Mapping Four Private IP Addresses to Four Globally Valid IP Addresses

9.2.2 Dynamic NAT

Dynamic NAT maps an internal host dynamically to a globally valid Internet address (m-to-n). The mapping usually contains a pool of internal IP addresses (m) and a pool of globally valid Internet IP addresses (n) with m usually greater than n. Each internal IP address is mapped to one external IP address on a first come first serve basis. Figure 9.2 shows that PC B, C and D are mapped to a globally valid IP address respectively, while PC A does not map to any globally valid IP address. If PC A wants to go to the Internet, PC A must wait until a global valid IP address is available. For example, in Figure 9.3, PC B must disconnect from the Internet first to allow PC A to access Internet.

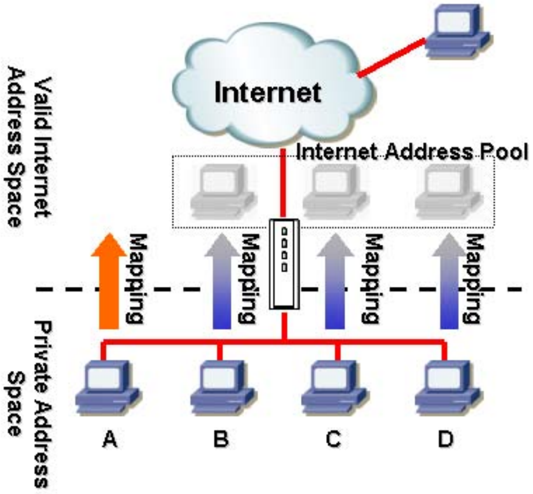


Figure 9.2 Dynamic NAT – Four Private IP addresses Mapped to Three Valid IP Addresses

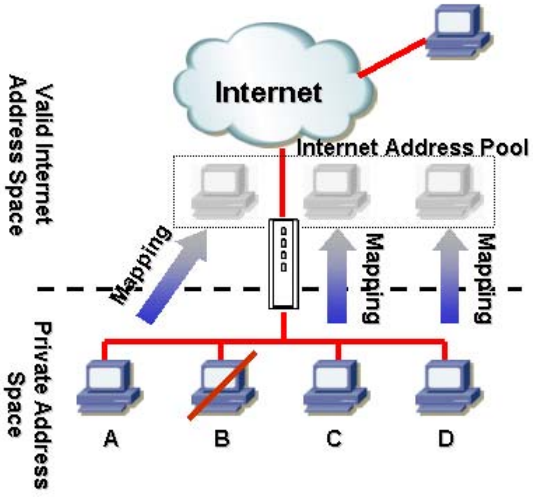


Figure 9.3 Dynamic NAT – PC-A can get an NAT association after PC-B is disconnected

9.2.3 NAPT (Network Address and Port Translation) or PAT (Port Address Translation)

Also called IP Masquerading, this feature maps many internal hosts to one globally valid Internet address. The mapping contains a pool of network ports to be used for translation. Every packet is translated with the globally valid Internet address and the port number is translated with an un-used port from the pool of network ports. Figure 9.4 shows that all the hosts on the local network gain access to the Internet by mapping to only one globally valid IP address and different port numbers from a free pool of network ports.

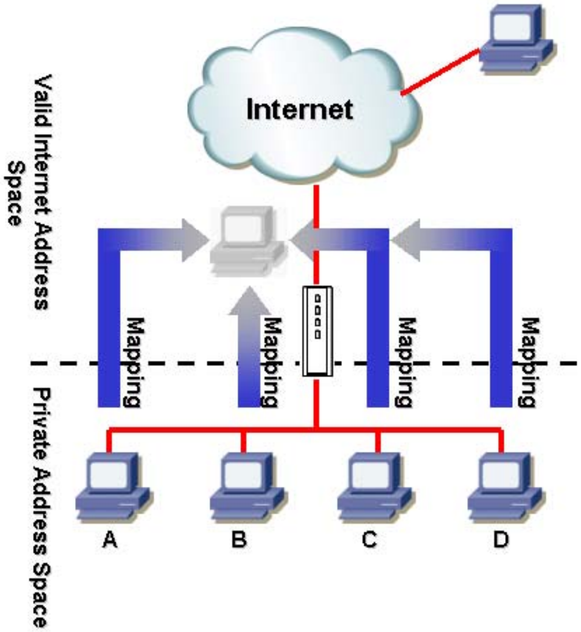
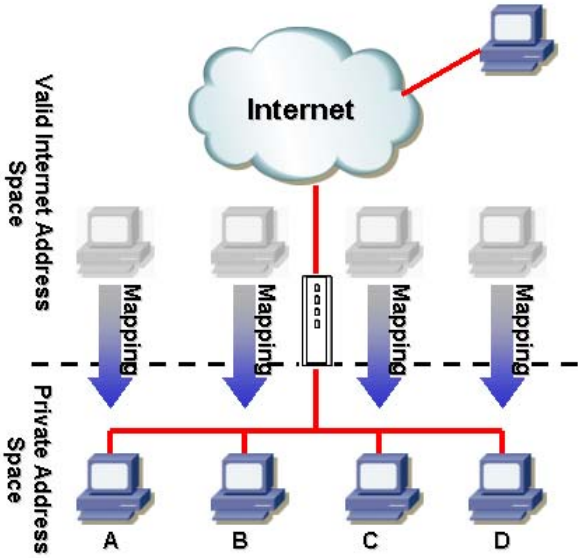


Figure 9.4 NAPT – Map Any Internal PCs to a Single Global IP Address



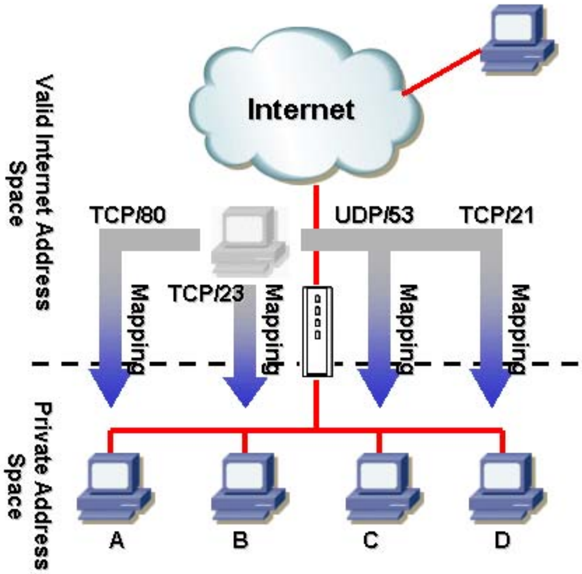


Figure 9.5 Reverse Static NAT – Map a Global IP Address to An Internal PC

Figure 9.6 Reverse NAPT – Relayed Incoming Packets to the Internal Host Base on the Protocol, Port Number or IP Address

9.2.4 Reverse Static NAT

Reverse static NAT maps a globally valid IP address to an internal host address for the inbound traffic. All packets coming to that globally valid IP address are relayed to the Internal address. This is useful when hosting services in an internal machine. Figure 9.5 shows that four globally valid IP addresses are mapped to four hosts on the internal network and each can be used to host some services for inbound traffic, e.g. FTP server.

9.2.5 Reverse NAPT / Virtual Server

Reverse NAPT is also called inbound mapping, port mapping, or virtual server. Any packet coming to the RX3041H can be relayed to the internal host based on the protocol, port number and/or IP address specified in the ACL rule. This is useful when multiple services are hosted on different internal machines. Figure 9.6 shows that web server (TCP/80) is hosted on PC A, telnet server (TCP/23) on PC B, DNS server (UDP/53) on PC C and FTP server (TCP/21) on PC D. This means that the inbound traffic of these four services will be directed to respective host hosting these services.

9.3 ACL Rule Configuration Parameters

Table 9.1 describes the configuration parameters available for firewall ACL rules.

Table 9.1. ACL Rule Configuration Parameters

Field	**Description**
ID	
Add New	Click on this option to add a new ACL rule.
Rule Number	Select a rule from the drop-down list, to modify its attributes.
Action	
Allow	Select this button to configure the rule as an **allow** rule. This rule when bound to the Firewall will allow matching packets to pass through.
Deny	Select this button to configure the rule as a **deny** rule. This rule when bound to the Firewall will **not allow** matching packets to pass through.
Mave to This option allows you to set a priority for this rule. The RX3041H Firewall acts on packets based on the priority of the rules. Set a priority by specifying a number for its position in the list of rules:	
1 (First)	This number marks the highest priority.
Other numbers	Select other numbers to indicate the priority you wish to assign to the rule.
Source IP This option allows you to set the **source network** to which this rule should apply. Use the drop-down list to select one of the following options:	
Any	This option allows you to apply this rule to all the computers in the source network, such as those on the Internet for inbound ACL rules and those on the LAN for outbound ACL rules.
IP Address	This option allows you to specify an IP address on which this rule will be applied.

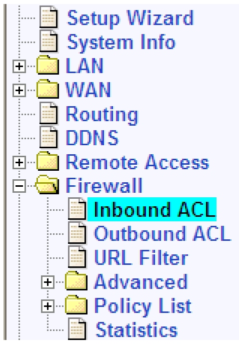
Field	**Description**
IP Address	Specify the appropriate network address
Subnet	This option allows you to include all the computers that are connected in an IP subnet. When this option is selected, the following fields become available for entry:
Address	Enter the appropriate IP address.
Mask	Enter the corresponding subnet mask.
Range	This option allows you to include a range of IP addresses for applying this rule. The following fields become available for entry when this option is selected:
Begin	Enter the starting IP address of the range
End	Enter the ending IP address of the range
IP Pool	This option allows you to associate a pre-configured IP pool with this rule. The available IP pool can be selected from the IP pool drop-down list.
Destination IP This option allows you to set the **destination network** to which this rule should apply. Use the drop-down list to select one of the following options:	
Any	This option allows you to apply this rule to all the computers in the destination network such as those on the LAN for inbound ACL rules and those on the Internet for outbound ACL rules.
IP Address, Subnet, Range and IP Pool	Select any of these options and enter details as described in the **Source IP** section above.
Source Port This option allows you to set the source port to which this rule should apply. Use the drop-down list to select one of the following options:	
Any	Select this option if you want this rule to apply to all applications with an arbitrary source port number.
Single	This option allows you to apply this rule to an application with a specific source port number.
Port Number	Enter the source port number
Range	Select this option if you want this rule to apply to applications with this port range. The following fields become available for entry when this option is selected.
Begin	Enter the starting port number of the range
End	Enter the ending port number of the range
Destination Port This option allows you to set the destination port to which this rule should apply. Use the drop-down list to select one of the following options:	
Any	Select this option if you want this rule to apply to all applications with an arbitrary destination port number.
Single, Range	Select any of these and enter details as described in the **Source Port** section above.

Field	Description
Service	This option allows you to select any of the pre-configured services (selectable from the drop-down list) instead of the destination port. The following are examples of services: BATTLE-NET, PC-ANYWHERE, FINGER, DIABLO-II, L2TP, H323GK, CUSEEME, MSN-ZONE, ILS, ICQ_2002, ICQ_2000, MSN, AOL, RPC, RTSP7070, RTSP554, QUAKE, N2P, PPTP, MSG2, MSG1, IRC, IKE, H323, IMAP4, HTTPS, DNS, SNMP, NNTP, POP3, SMTP, HTTP, FTP, TELNET. **Note:** service is a combination of protocol and port number. They appear here after you add them in the "Firewall Service" configuration page.
Protocol This option allows you to select protocol type from a drop-down list. Available settings are All, TCP, UDP, ICMP, AH and ESP. Note that if you select "service" for the destination port, this option will not be available.	
NAT This option allows you to select the type of NAT for the traffic.	
None	Select this option if you don't intend to use NAT in this ACL rule.
IP Address	**For inbound ACL rules:** select this option to specify the IP address of the computer (usually a server in your LAN) that you want the incoming traffic to be directed. Note this option is called reverse NAPT or virtual server. **For outbound ACL rules:** Select this option to specify the IP address that you want the outbound traffic to use. Note this option is called NAPT or overload.
NAT Pool	Select this option to associate a pre-configured NAT pool to the rule. **For inbound ACL rules,** only reverse static NAT and reverse NAPT pool can be used. **For outbound ACL rules,** only static, dynamic and overload NAT pool can be used.
Interface (Outbound ACL only)	**This option is available for outbound ACL rules only.** Select this option to use the WAN interface IP address for the outbound traffic. Note that WAN IP must be configured prior to selecting this option. Three options are available: eth0, pppoe0 and pppoe1. Select eth0 if your WAN interface type is static or dynamic; pppoe0 if WAN interface is PPPoE0, and pppoe1 if WAN interface is PPPoE1.
Time Ranges Select a pre-configured time range during which the rule is active. Select "Always" to make the rule active at all times.	
Application Filtering This option allows you to select pre-configured FTP, HTTP, RPC and/or SMTP application filters from the drop-down list.	
Log Click on the "Enable" or "Disable" radio button to enable or disable logging for this ACL rule.	

9.4 Configuring Inbound ACL Rules

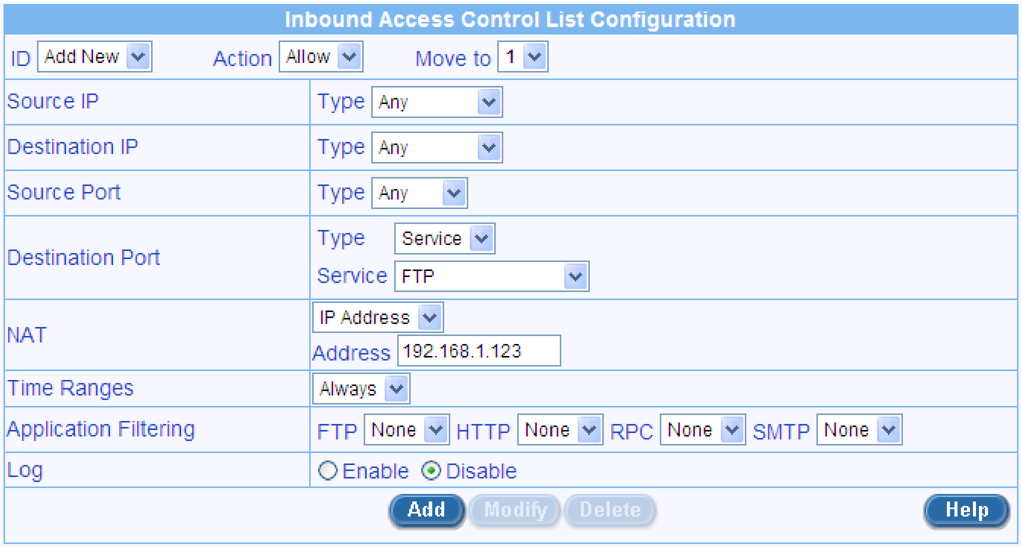
Inbound ACL rules are used to control (allow or deny) access to the local network.

9.4.1 Add an Inbound ACL Rule



To add an inbound ACL rule, follow the instructions below:

1. Open the Inbound ACL Rule Configuration Page by clicking on the **Firewall ➔ Inbound ACL** menu.
2. Select "**Add New**" from the "**ID**" drop-down list.
3. Set desired action (Allow or Deny) from the "**Action**" drop-down list.
4. Make changes to any or all of the following fields: **Source/Destination IP**, **Source/Destination Port**, **Protocol**, **NAT**, **Time Ranges**, **Application Filtering**, and **Log**. Please see Table 9.1 for explanation of these fields. Figure 9.7 illustrates how to create an ACL rule to allow inbound FTP service for any host on the Internet to access to FTP server in the local network w/ IP address 192.168.1.123.



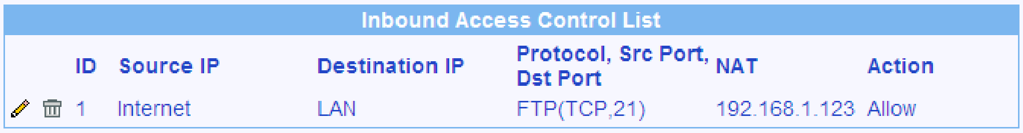
Inbound Access Control List Configuration

ID: Add New   Action: Allow   Move to: 1

Source IP	Type: Any
Destination IP	Type: Any
Source Port	Type: Any
Destination Port	Type: Service Service: FTP
NAT	IP Address Address: 192.168.1.123
Time Ranges	Always
Application Filtering	FTP: None HTTP: None RPC: None SMTP: None
Log	○ Enable ● Disable

Figure 9.7. Inbound ACL configuration Example

5. Assign a priority for this rule by selecting a number from the "**Move to**" drop-down list. Note that the number indicates the priority of the rule with 1 being the highest. Higher priority rules will be examined prior to the lower priority rules by the firewall.
6. Click on the Add button to create the new ACL rule. You may verify the new ACL rule in the inbound access control list table displayed at the bottom half of the Inbound ACL configuration page as shown in Figure 9.8.



Inbound Access Control List

	ID	Source IP	Destination IP	Protocol, Src Port, Dst Port	NAT	Action
✎ 🗑	1	Internet	LAN	FTP(TCP,21)	192.168.1.123	Allow

Figure 9.8. Inbound ACL List

9.4.2 Modify an Inbound ACL Rule

To modify an inbound ACL rule, follow the instructions below:

1. Open the Inbound ACL Rule Configuration Page by clicking on the **Firewall ➔ Inbound ACL** menu.

2. Click on the ✏ icon of the rule to be modified in the inbound ACL table or select the rule number from the "**ID**" drop-down list.
3. Make desired changes to any or all of the following fields: action, source/destination IP, source/destination port, protocol, port mapping, time ranges, application filtering, and log. Please see Table 9.1 for explanation of these fields.
4. Click on the Add button to modify this ACL rule. The new settings for this ACL rule will then be displayed in the inbound access control list table at the bottom half of the Inbound ACL configuration page.

9.4.3 Delete an Inbound ACL Rule

To delete an inbound ACL rule, click on the 🗑 in front of the rule to be deleted or follow the instructions below:

1. Open the Inbound ACL Rule Configuration Page by clicking on the **Firewall → Inbound ACL** menu.
2. Click on the ✏ icon of the rule to be deleted in the inbound ACL table or select the rule number from the "**ID**" drop-down list.
3. Click on the Delete button to delete this ACL rule. Note that the ACL rule deleted will be removed from the ACL rule table located at the bottom half of the same configuration page.

9.4.4 Display Existing Inbound ACL Rules

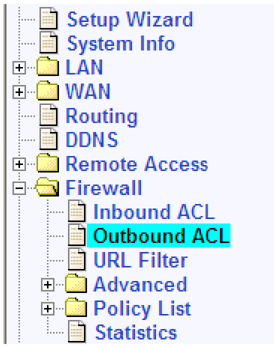
To see existing inbound ACL rules, just open the Inbound ACL Rule configuration page by clicking on the **Firewall → Inbound ACL** menu.

9.5 Configuring Outbound ACL Rules

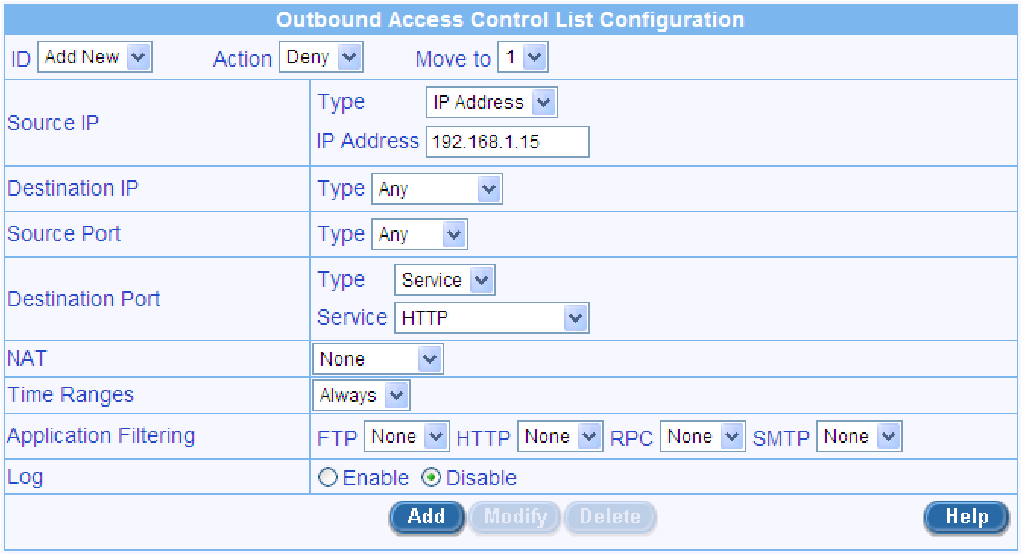
Outbound ACL rules allow you to control (allow or deny) Internet or external network access for computers on your LAN.

9.5.1 Add an Outbound ACL Rule

To add an outbound ACL rule, follow the instructions below:



1. Open the Outbound ACL Rule configuration page by clicking on the **Firewall → Outbound ACL** menu.
2. Select "**Add New**" from the "**ID**" drop-down list.
3. Set desired action (Allow or Deny) from the "**Action**" drop-down list.
4. Make changes to any or all of the following fields: source/destination IP, source/destination port, protocol, NAT, time ranges, application filtering, and log. Please see Table 9.1 for explanation of these fields. Figure 9.9 illustrates how to create a rule to deny outbound HTTP traffic for a host w/ IP address 192.168.1.15.



Outbound Access Control List Configuration

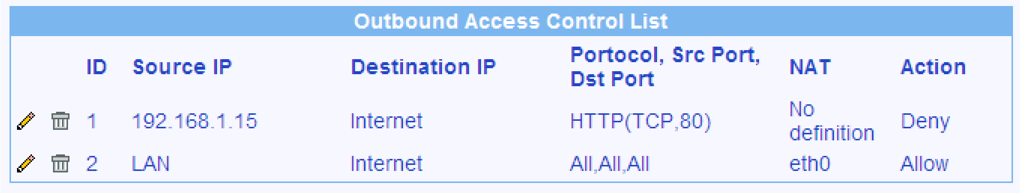
ID: Add New | Action: Deny | Move to: 1

Source IP	Type: IP Address IP Address: 192.168.1.15
Destination IP	Type: Any
Source Port	Type: Any
Destination Port	Type: Service Service: HTTP
NAT	None
Time Ranges	Always
Application Filtering	FTP: None HTTP: None RPC: None SMTP: None
Log	○ Enable ● Disable

Figure 9.9. Outbound ACL Configuration Example

5. Assign a priority for this rule by selecting a number from the "**Move to**" drop-down list. Note that the number indicates the priority of the rule with 1 being the highest. Higher priority rules will be examined prior to the lower priority rules by the firewall.

6. Click on the Add button to create the new ACL rule. The new ACL rule will then be displayed in the outbound access control list table at the bottom half of the Outbound ACL configuration page.



Outbound Access Control List

		ID	Source IP	Destination IP	Portocol, Src Port, Dst Port	NAT	Action
✎	🗑	1	192.168.1.15	Internet	HTTP(TCP,80)	No definition	Deny
✎	🗑	2	LAN	Internet	All,All,All	eth0	Allow

Figure 9.10. Outbound ACL List

9.5.2 Modify an Outbound ACL Rule

To modify an outbound ACL rule, follow the instructions below:

1. Open the Outbound ACL Rule configuration page by clicking on the **Firewall → Outbound ACL** menu.

2. Click on the ✎ icon of the rule to be modified in the outbound ACL table or select the rule number from the "**ID**" drop-down list.

3. Make desired changes to any or all of the following fields: action, source/destination IP, source/destination port, protocol, NAT, time ranges, application filtering, and log. Please see Table 9.1 for explanation of these fields.

4. Click on the Modify button to modify this ACL rule. The new settings for this ACL rule will then be displayed in the outbound access control list table at the bottom half of the Outbound ACL configuration page.

9.5.3 Delete an Outbound ACL Rule

To delete an outbound ACL rule, just click on the 🗑 in front of the rule to be deleted or follow the instructions below:

1. Open the Outbound ACL Rule Configuration Page by clicking on the **Firewall ➔ Outbound ACL** menu.
2. Click on the ✎ icon of the rule to be deleted in the outbound ACL table or select the rule number from the "**ID**" drop-down list.
3. Click on the Delete button to delete this ACL rule. Note that the ACL rule deleted will be removed from the ACL rule table located at the bottom half of the same configuration page.

9.5.4 Display Existing Outbound ACL Rules

To see existing outbound ACL rules, just open the Outbound ACL Rule configuration page by clicking on the **Firewall ➔ Outbound ACL** menu.

9.6 Configuring URL Filters

Keyword based URL (Uniform Resource Locator, e.g. www.yahoo.com) filtering allows you to define one or more keywords that should not appear in URL's. Any URL containing one or more of these keywords will be blocked. This is a policy independent feature i.e. it cannot be associated to ACL rules. This feature can be independently enabled/disabled, but works only if firewall is enabled.

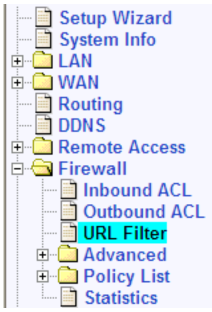
9.6.1 URL Filter Configuration Parameters

Table 9.2 describes the configuration parameters available for an URL filter rule.

Table 9.2. URL Filter Configuration Parameters

Field	Description
URL Filter State	Click on "Enable" or "Disable" radio button to enable or disable URL filtering.
Proxy Server Port	Enter the proxy server (web server) port number configured for your web browser. Note that the proxy server port change requires you to disable and enable the firewall to take effect.
ID	
Add New	Click on this option to add a new URL filter rule.
Rule Number	Select a rule from the drop-down list to modify its attributes.
Keyword	Define a keyword that should not appear in the URL.

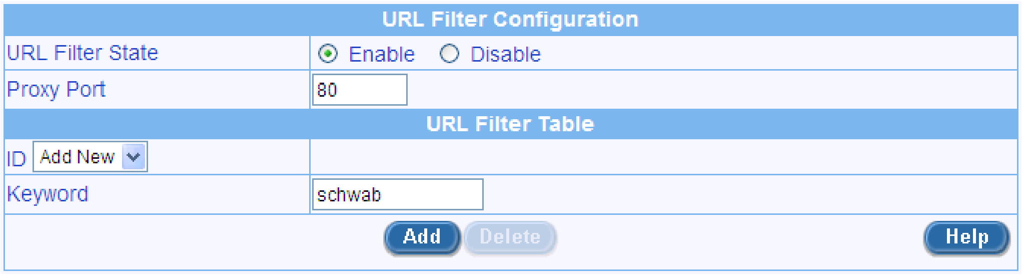
9.6.2 Add an URL Filter Rule



To add an URL Filter, follow the instructions below:

1. Open the URL Filter configuration page by clicking on the **Firewall ➔ URL Filter** menu.
2. Select "**Add New**" from the "**ID**" drop-down list.
3. Enter a keyword to the Keyword field. Figure 9.11 shows an URL filter rule example. It demonstrates:
   a) How to add the keyword "schwab". Any URL containing this keyword will be blocked.

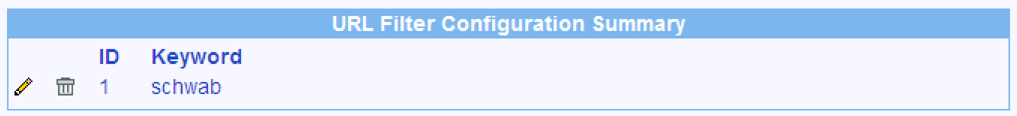
   b) Set the proxy web server port number to 80 (you may use a different port number for your proxy server). This means that this URL filter rule will be applied over the proxy server port 80 in case a proxy web server is used. If you don't use a proxy server for your browser, this setting will be ignored. Note that you must disable and then enable the firewall for this change to take effect. Please refer to section 11.1 Configure System Services on details of enabling and disabling firewall services.



URL Filter Configuration	
URL Filter State	● Enable ○ Disable
Proxy Port	80
URL Filter Table	
ID Add New	
Keyword	schwab

Figure 9.11. URL Filter Configuration Example

4. Click on the Add button to create the URL Filter rule. The new rule will then be displayed in the URL Filter Configuration Summary table.



URL Filter Configuration Summary

		ID	Keyword
✎	🗑	1	schwab

Figure 9.12. URL Filter List

9.6.3 Modify an URL Filter Rule

To modify an URL Filter rule, you must first delete the existing URL filter rule (see Section 9.6.4) and then add a new one (see Section 9.6.2 Add an URL Filter Rule).

9.6.4 Delete an URL Filter Rule

To delete an URL Filter rule, just click on the 🗑 in front of the rule to be deleted or follow the instructions below:

1. Open the URL Filter configuration page by clicking on the **Firewall ➔ URL Filter** menu.
2. Click on the ✎ icon of the rule to be deleted in the URL Filter Configuration Summary table or select the rule number from the "**ID**" drop-down list.
3. Click on the Delete button to delete this rule.

9.6.5 View Existing URL Filter Rules

To see existing URL filter rules, just open the URL Filter configuration page by clicking on the **Firewall ➔ URL Filter** menu.

9.7 Configuring Advanced Firewall Features – (Firewall ➔ Advanced)

This option sequence brings up the screen with the following sub-options for setting advanced firewall features:

- Self Access – This option allows you to configure rules for controlling packets targeting the RX3041H itself.
- Services – Use this option to configure services (applications using specified port numbers). Each service record contains the name of service record, the IP protocol value and its corresponding port number.
- DoS – Use this option to configure DoS – Denial of Service – parameters. This option lists the default set of DoS attacks against which the RX3041H firewall provides protection.

The following sections describe usage of these options

9.7.1 Configuring Self Access Rules

Self access rules are used to control access to the router itself.

9.7.1.1 Self Access Configuration Parameters

Table 9.3 describes the configuration parameters available in the Self Access configuration page.

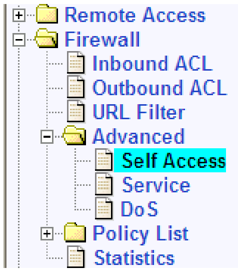
Table 9.3. Self Access Configuration Parameters

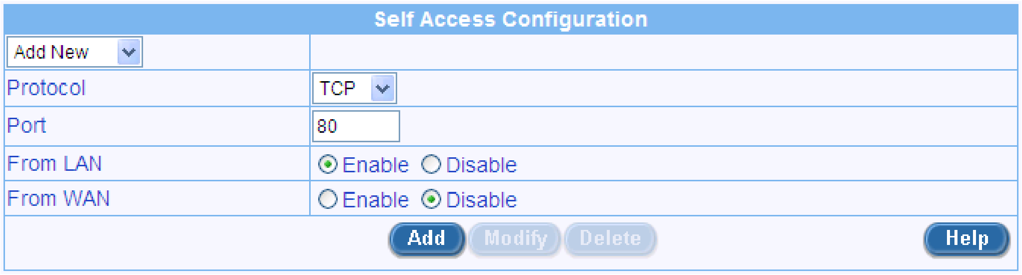
Field	Description
Protocol	Select protocol from drop down list - TCP/ UDP/ICMP
Port	Enter the Port Number.
Direction Select the direction from which the traffic will be allowed.	
From LAN	Select Enable or Disable to allow or deny traffic from the LAN (internal network) to the RX3041H.
From WAN	Select Enable or Disable to allow or deny traffic from WAN (external network) to the RX3041H.

9.7.1.2 Add a Self Access Rule

To add a Self Access rule, follow the instructions below:

1. Open the Self Access Rule configuration page by clicking on the **Firewall ➔ Advanced ➔ Self Access** menu.
2. Select "**Add New**" from the Self Access rule drop-down list.
3. Select a protocol from the Protocol drop-down list. If you select TCP or UDP protocol, you will need to enter port number as well.



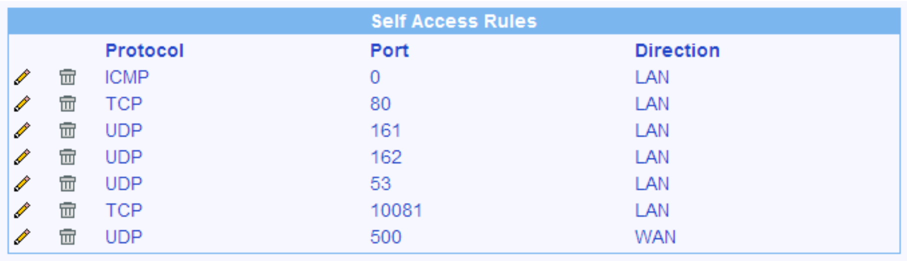


Self Access Configuration

Add New ▾	
Protocol	TCP ▾
Port	80
From LAN	● Enable ○ Disable
From WAN	○ Enable ● Disable

Figure 9.13. Self Access Rule Configuration Example

4. Click on the Add button to create the new Self Access rule. The new rule will then be displayed in the Self Access Rule list table at the bottom half of the Self Access Rule configuration page.



Self Access Rules

		Protocol	Port	Direction
✎	🗑	ICMP	0	LAN
✎	🗑	TCP	80	LAN
✎	🗑	UDP	161	LAN
✎	🗑	UDP	162	LAN
✎	🗑	UDP	53	LAN
✎	🗑	TCP	10081	LAN
✎	🗑	UDP	500	WAN

Example

Figure 9.13 displays the screen with entries to:

- Add a new Self Access rule to:
  - Allow TCP port 80 traffic (i.e. HTTP traffic) from the LAN and deny the HTTP traffic from the WAN port (i.e. from the external network) to the RX3041H.

9.7.1.3 Modify a Self Access Rule

To modify a Self Access rule, follow the instructions below:

1. Open the Self Access Rule configuration page by clicking on the **Firewall ➔ Advanced ➔ Self Access** menu.
2. Click on the ✎ icon of the Self Access rule to be modified in the Self Access rule table or select the Self Access rule from the Self Access rule drop-down list.
3. You may then disable or enable the traffic from LAN or WAN or both. Note that port number cannot be changed if TCP or UCP protocol is selected. To modify the port number, you must first delete the existing Self Access rule and add a new rule instead.
4. Click on the Modify button to save the changes. The new settings for this Self Access rule will then be displayed in the Self Access rule table located at the bottom half of the Self Access Rule configuration page.

9.7.1.4 Delete a Self Access Rule

To delete a Self Access rule, click on the 🗑 icon of the rule to be deleted or follow the instruction below:

1. Open the Self Access Rule configuration page by clicking on the **Firewall ➔ Advanced ➔ Self Access** menu.
2. Click on the ✎ icon of the Self Access rule to be deleted in the Self Access rule table or select the Self Access rule from the Self Access rule drop-down list.
3. Click on the Delete button to delete the rule. Note that the rule deleted will be removed from the Self Access rule table located at the bottom half of the same configuration page.

9.7.1.5 View Configured Self Access Rules

To see existing Self Access Rules, just open the Self Access Rule configuration page by clicking on the **Firewall ➔ Advanced ➔ Self Access** menu.

9.7.2 Configuring Service List

Services are a combination of Protocol and Port number. It is used in inbound and outbound ACL rule configuration.

9.7.2.1 Service List Configuration Parameters

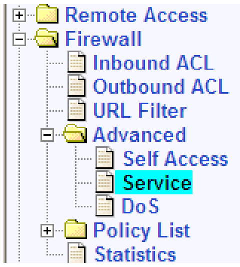
Table 9.4 describes the available configuration parameters for firewall service list.

Table 9.4. Service List configuration parameters

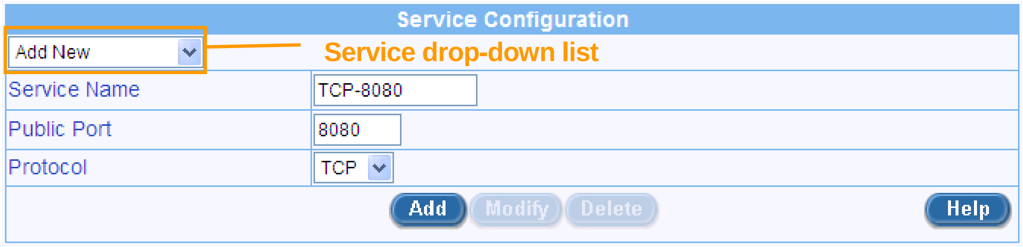
Field	Description
Service Name	Enter the name of the Service to be added. Note that only alphanumeric characters are allowed in a name.
Protocol	Enter the type of protocol the service uses.
Port	Enter the port number that is set for this service.

9.7.2.2 Add a Service

To add a service, follow the instructions below:



1. Open the Service List configuration page by clicking the **Firewall ➔ Advanced ➔ Service**.
2. Select "**Add New**" from the service drop-down list.
3. Enter a desired name, preferably a meaningful name that signifies the nature of the service, in the "**Service Name**" field. Note that only alphanumeric characters are allowed in a name.
4. Make changes to any or all of the following fields: public port and protocol. Please see Table 9.4 for explanation of these fields.



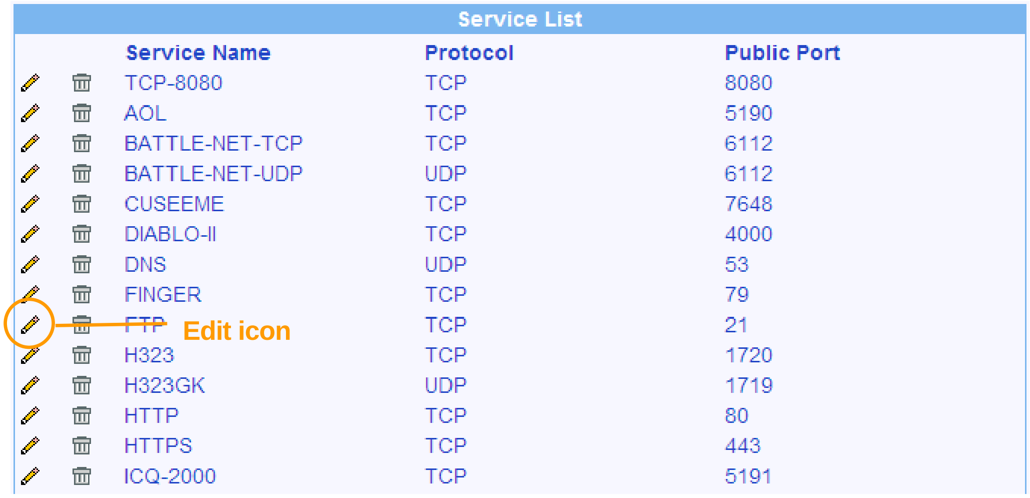
Service Configuration

Add New — Service drop-down list

Service Name	TCP-8080
Public Port	8080
Protocol	TCP

Figure 9.14. Service List Configuration

5. Click on the Add button to create the new service. The new service will then be displayed in the service list table at the bottom half of the Service configuration page.



Service List

		Service Name	Protocol	Public Port
✎	🗑	TCP-8080	TCP	8080
✎	🗑	AOL	TCP	5190
✎	🗑	BATTLE-NET-TCP	TCP	6112
✎	🗑	BATTLE-NET-UDP	UDP	6112
✎	🗑	CUSEEME	TCP	7648
✎	🗑	DIABLO-II	TCP	4000
✎	🗑	DNS	UDP	53
✎	🗑	FINGER	TCP	79
✎	🗑	FTP	TCP	21
✎	🗑	H323	TCP	1720
✎	🗑	H323GK	UDP	1719
✎	🗑	HTTP	TCP	80
✎	🗑	HTTPS	TCP	443
✎	🗑	ICQ-2000	TCP	5191

Edit icon

Figure 9.15. Service List

9.7.2.3 Modify a Service

To modify a service, follow the instructions below:

1. Open the Service List configuration page by clicking the **Firewall ➔ Advanced ➔ Service**.
2. Select the service from the service drop-down list or click on the ✎ icon of the service to be modified in the service list table.
3. Make desired changes to any or all of the following fields: service name, public port and protocol. Please see Table 9.4 for explanation of these fields.

4. Click on the Modify button to modify this service. The new settings for this service will then be displayed in the service list table at the bottom half of the Service configuration page.

9.7.2.4 Delete a Service

To delete a service, follow the instructions below:

1. Open the Service List configuration page by clicking the **Firewall ➔ Advanced ➔ Service**.
2. Select the service from the service drop-down list or click on the ✏ icon of the service to be modified in the service list table.
3. Click on the Delete button to delete this service. Note that the service deleted will be removed from the service list table located at the bottom half of the same configuration page.

9.7.2.5 View Configured Services

To see a list of existing services, follow the instructions below:

1. Open the Service List configuration page by clicking the **Firewall ➔ Advanced ➔ Service**.
2. The service list table located at the bottom half of the Service configuration page shows all the configured services.

9.7.3 Configuring DoS Settings

The RX3041H has a proprietary Attack Defense Engine that protects internal networks from Denial of Service (DoS) attacks such as SYN flooding, IP smurfing, LAND, Ping of Death and all re-assembly attacks. It can drop ICMP redirects and IP loose/strict source routing packets. For example, a security device with the RX3041H Firewall provides protection from “WinNuke”, a widely used program to remotely crash unprotected Windows systems in the Internet. The RX3041H Firewall also provides protection from a variety of common Internet attacks such as IP Spoofing, Ping of Death, Land Attack, Reassembly and SYN flooding. For a complete list of DoS protection provided by the RX3041H, please see Table 2.3.

9.7.3.1 DoS Protection Configuration Parameters

Table 9.5 describes the configuration parameters available for DoS Protection.

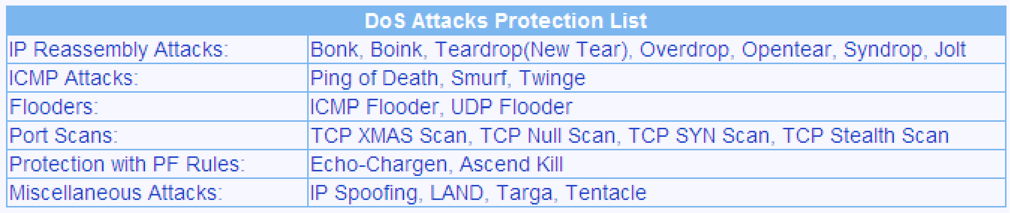
Table 9.5. DoS Protection Configuration Parameters

Field	Description
SYN Flooding	Check or un-check this option to enable or disable protection against SYN Flood attacks. This attack involves sending connection requests to a server, but never fully completing the connections. This will cause some computers to get into a "stuck state" where they cannot accept connections from legitimate users. ("SYN" is short for "SYNchronize"; this is the first step in opening an Internet connection). You can select this box if you wish to protect the network from TCP SYN flooding. By default, SYN Flood protection is enabled.
Winnuke	Check or un-check this option to enable or disable protection against Winnuke attacks. Some older versions of the Microsoft Windows OS are vulnerable to this attack. If the computers in the LAN are not updated with recent versions/patches, you are advised to enable this protection by checking this check box.
MIME Flood	Check or un-check this option to enable or disable protection against MIME attacks. You can select this box to protect the mail server in your network against MIME flooding.
FTP Bounce	Check or un-check this option to enable or disable protection against FTP bounce attack. In its simplest terms, the attack is based on the misuse of the

Field	Description
	PORT command in the FTP protocol. An attacker can establish a connection between the FTP server machine and an arbitrary port on another system. This connection may be used to bypass access controls that would otherwise apply.
IP Unaligned Time Stamp	Check or un-check this option to enable or disable protection against unaligned IP time stamp attack. Certain operating systems will crash if they receive a frame with the IP timestamp option that isn't aligned on a 32-bit boundary.
Sequence Number Prediction Check	Check or un-check this option to enable or disable protection against TCP sequence number prediction attacks. For TCP packets, sequence number is used to guard against accidental receipt of unintended data and malicious use by the attackers if the ISN (Initial Sequence Number) is generated randomly. Forged packets w/ valid sequence numbers can be used to gain trust from the receiving host. Attackers can then gain access to the compromised system. Note that this attack affects only the TCP packets originated or terminated at the RX3041H.
Sequence Number Out of Range Check	Check or un-check this option to enable or disable protection against TCP out of range sequence number attacks. An attacker can send a TCP packet to cause an intrusion detection system (IDS) to become unsynchronized with the data in a connection. Subsequent frames sent in that connection may then be ignored by the IDS. This may indicate an unsuccessful attempt to hijack a TCP session.
ICMP Verbose	Check or un-check this option to enable or disable protection against ICMP error message attacks. ICMP messages can be used to flood your network w/ undesired traffic. By default, this option is enabled.
Maximum IP Fragment Count	Enter the maximum number of fragments the Firewall should allow for every IP packet. This option is required if your connection to the ISP is through PPPoE. This data is used during transmission or reception of IP fragments. When large sized packets are sent via the RX3041H, the packets are chopped into fragments as large as MTU (Maximum Transmission Unit). By default, this number is set to 45. If MTU of the interface is 1500 (default for Ethernet), then there can be a maximum of 45 fragments per IP packet. If the MTU is less, then there can be more number of fragments and this number should be increased.
Minimum IP Fragment Size	Enter the Minimum size of IP fragments to be allowed through Firewall. This limit will not be enforced on the last fragment of the packet. If the Internet traffic is such that it generates many small sized fragments, this value can be decreased. This can be found if there are lots of packet loss, degradation in speed and if the following log message is generated very often:"fragment of size less than configured minimum fragment size detected".

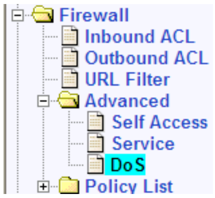
9.7.3.2 Configuring DoS Settings

By default, your network is protected against the attacks listed in the DoS Attack Protection List table, as shown in Figure 9.16. You may check or uncheck individual option to enable or disable additional protection against specific type of attack.



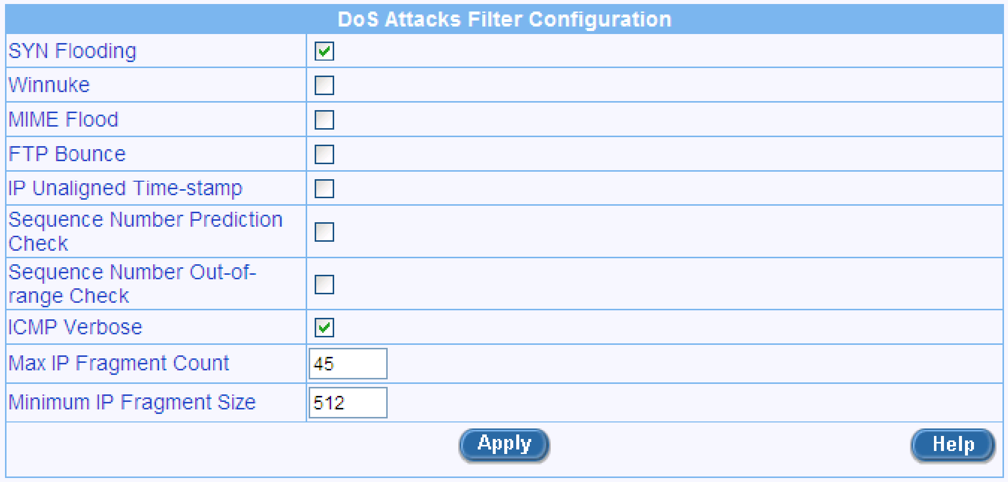
DoS Attacks Protection List	
IP Reassembly Attacks:	Bonk, Boink, Teardrop(New Tear), Overdrop, Opentear, Syndrop, Jolt
ICMP Attacks:	Ping of Death, Smurf, Twinge
Flooders:	ICMP Flooder, UDP Flooder
Port Scans:	TCP XMAS Scan, TCP Null Scan, TCP SYN Scan, TCP Stealth Scan
Protection with PF Rules:	Echo-Chargen, Ascend Kill
Miscellaneous Attacks:	IP Spoofing, LAND, Targa, Tentacle

Figure 9.16. DoS Attack Protection List



To configure DoS settings, follow the instructions below:

1. Open the DoS configuration page by clicking on the **Firewall ➔ Advanced ➔ DoS** menu.
2. Check or uncheck individual option to enable or disable additional protection against specific type of attack. Note that SYN flooding and ICMP verbose attack protection are enabled by default. For information regarding specific type of attack, please refer to Table 9.5 for details.
3. Click the Apply button to save the DoS settings.



DoS Attacks Filter Configuration	
SYN Flooding	☑
Winnuke	□
MIME Flood	□
FTP Bounce	□
IP Unaligned Time-stamp	□
Sequence Number Prediction Check	□
Sequence Number Out-of-range Check	□
ICMP Verbose	☑
Max IP Fragment Count	45
Minimum IP Fragment Size	512

Figure 9.17. DoS Configuration Page

9.8 Firewall Policy List – (Firewall ➔ Policy List)

Firewall policy list provides a convenient way to manage firewall ACL rules (inbound/outbound ACL rules, and group ACL rules).

- Application Filters – This option allows you to configure Command Filters for FTP, HTTP, RPC and SMTP applications. Configure filters here before attaching them to policies.
- IP Pools – This option allows you to configure logical names for IP Pools and set appropriate IP addresses. Each record contains the name of the IP record and the types of IP address (single IP address or a range of IP address or a subnet address).
- NAT Pools – This option allows you to configure NAT Pools that will ensure mapping of the internal IP address to public IP address. Configure NAT Pools here before attaching them to policies.
- Time Ranges – This option allows you to configure time-windows for user-access to the networks across the RX3041H.

9.8.1 Configuring Application Filter

Application filter allows network administrator to block, monitor, and report on network users' access to non-business and objectionable content. This high-performance content access control results in increased productivity, lower bandwidth usage and reduced legal liability.

The RX3041H has the ability to handle active content filtering on certain application protocols such as HTTP, FTP, SMTP and RPC.

- HTTP – You can define HTTP extension based filtering schemes for blocking
  ActiveX – *.ocx
  Java Archive – *.jar
  Java Applets – *.class
  Microsoft Archives – *.msar
  Other URLs based on file extensions.
- FTP – allows you to define and enforce the file transfer policy for the site or group of users
- SMTP – allows you to filter operations such as VRFY, EXPN, etc. which reveal excess information about the recipient.
- RPC – allows you to filter programs based on the assigned RPC program numbers.

9.8.1.1 Application Filter Configuration Parameters

Table 9.6 describes the configuration parameters available for application filter.

Table 9.6. Application Filter Configuration Parameters

Field	Description
Filter Type	Select the type of filter: FTP, HTTP, RPC and SMTP.
Filter Name	Enter a name for the filter.
Protocol	Select the protocol that Application Filter uses (TCP/UDP).
Port	Enter the port number that the Application Filter uses.
Log This option includes buttons to enable and disable logging for this Application Filter.	
Enable	Select this option to enable logging for this application filter.
Disable	Select this option to disable logging for this application filter.
Action	
Allow	Select this option to configure the rule as an "allow" rule. This rule when bound to the Firewall will allow matching packets to pass through.
Deny	Select this option to configure the rule as a "deny" rule. This rule when bound to the Firewall will not allow matching packets to pass through.
Filter Commands This section allows you to enter a command for the respective application. The list of supported commands per application is as follows:	
FTP Commands	Add the following command to an FTP filter to:
CWD	Allow or deny of change directory.
LIST	Allow or deny of Listing of files/directory.
MKD	Allow or deny of Creating a directory.
NLST	Allow Short listing of directory contents.

Field	Description
PASV	Allow initiation of a passive data connection.
PORT	Allow or deny Port Number to participate in an active data connection.
RETR	Allow or deny getting a file from the FTP server.
RMD	Allow Removing a directory.
RNFR	Allow Rename from.
RNTO	Allow Rename to.
DELE	Allow Deletion of a file.
SITE	Allow Site parameters (Specific services provided by the FTP server).
STOR	Allow or deny of putting a file to the FTP server.
SMTP Commands	Add the following command to an SMTP filter to:
MAIL	Allow or deny initiating a mail transaction.
RCPT	Allow or deny identifying an individual recipient of the mail data.
DATA	Allow or deny mail data.
VRFY	Allow or deny verifying the existence of the user.
EXPN	Allow or deny identification for a mailing list.
TURN	Allow or deny the switching roles of the client and server, to send mail in the reverse direction.
SEND	Allow or deny initiating a mail transaction.
HTTP (Deny Following Files)	Add the following command to an HTTP filter to:
Java Applet	Deny all *.class files.
Java-archive	Deny all *.jar files.
MS Archive	Deny all *.msar files.
ActiveX	Deny all *.ocx files.
RPC Numbers	
RPC numbers	Add this command to an RPC filter to allow or deny RPC program numbers.

9.8.1.2 Add an Application Filter

The application filter configuration is best explained with a few examples. Note that the configuration for RPC and SMTP is similar to that for FTP and will not be presented here.

9.8.1.2.1 FTP Example: Add a FTP Filter Rule to Block FTP DELETE Command

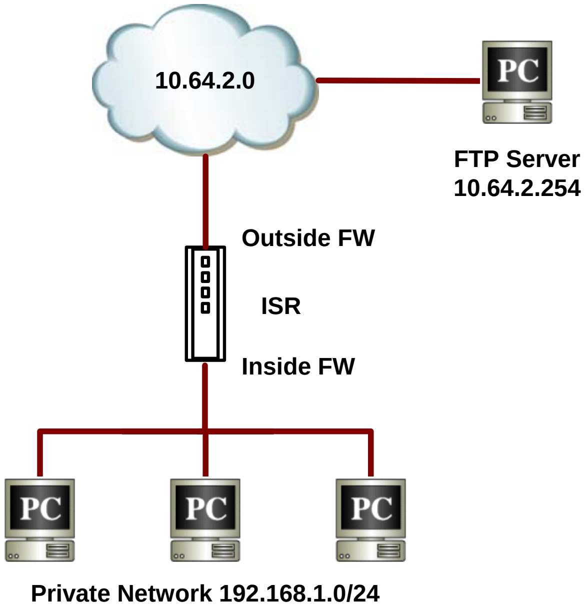
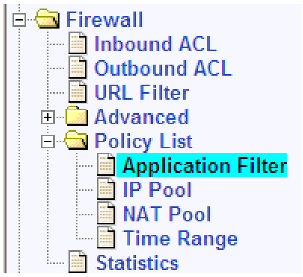
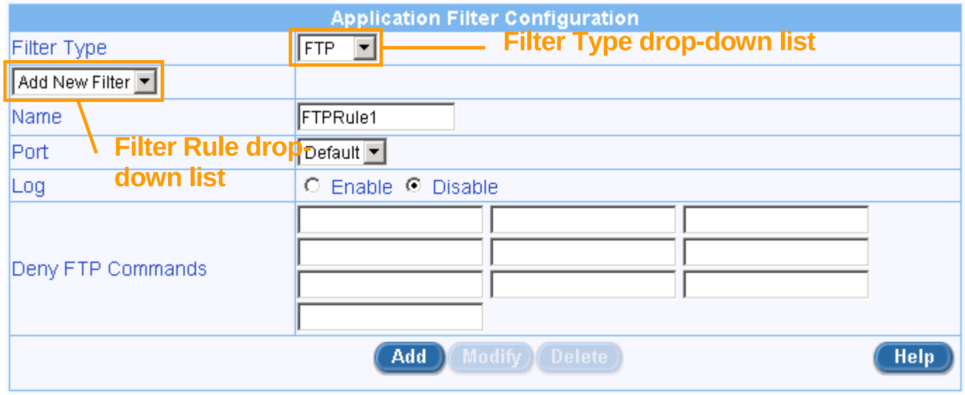


Figure 9.18 Network Diagram for FTP Filter Example – Blocking FTP Delete Command

1. Open the Application Filer configuration page by clicking the **Firewall ➔ Policy List ➔ Application Filter** menu.
2. Select FTP from the Filter Type drop-down list.
3. Select "Add New Filter" from the Filter Rule drop-down list.
4. Enter a name for this rule – in this example, FTPRule1.
5. Change the port number if necessary. However, it is recommended that you keep the "Default" setting.



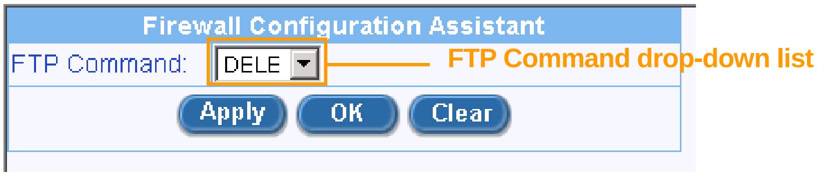


Application Filter Configuration

Filter Type	FTP
Add New Filter	
Name	FTPRule1
Port	Default
Log	○ Enable ● Disable
Deny FTP Commands	

Figure 9.19. FTP Filter Example – Configuring FTP Filter Rule

6. Choose to enable to disable the logging option. The default setting is to keep the logging for this rule disabled.
7. Click on the first FTP commands field, a Firewall Configuration Assistant page is displayed.



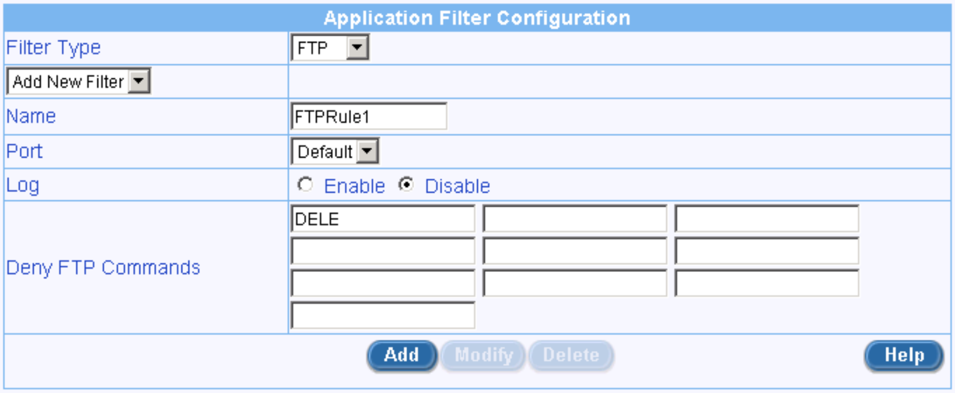
Firewall Configuration Assistant

FTP Command:	DELE

FTP Command drop-down list

Figure 9.20 FTP Filter Example – Firewall Configuration Assistant

8. Select the desired FTP command from the FTP Command drop-down list and then click on the OK button. The selected FTP command will be added into the selected Deny FTP Commands field.



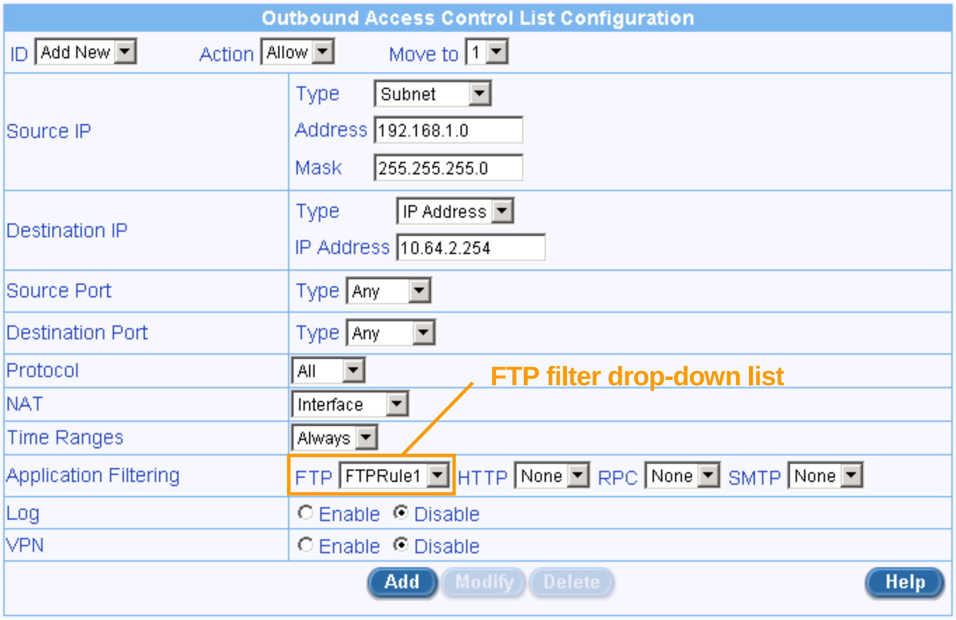
Application Filter Configuration

Filter Type	FTP
Add New Filter	
Name	FTPRule1
Port	Default
Log	○ Enable ● Disable
Deny FTP Commands	DELE

Figure 9.21 FTP Filter Example – Add an FTP Filter to Deny FTP Delete Command

9. Repeat step 8 if more commands are to be added; otherwise, proceed to the next step.

10. Click on Add button to create this FTP application filter rule.



Outbound Access Control List Configuration

ID Add New Action Allow Move to 1

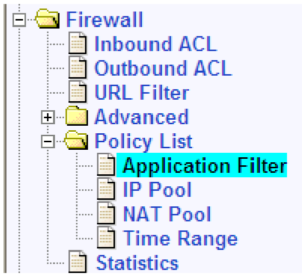
Source IP	Type Subnet Address 192.168.1.0 Mask 255.255.255.0
Destination IP	Type IP Address IP Address 10.64.2.254
Source Port	Type Any
Destination Port	Type Any
Protocol	All
NAT	Interface
Time Ranges	Always
Application Filtering	FTP FTPRule1 HTTP None RPC None SMTP None
Log	○ Enable ● Disable
VPN	○ Enable ● Disable

FTP filter drop-down list

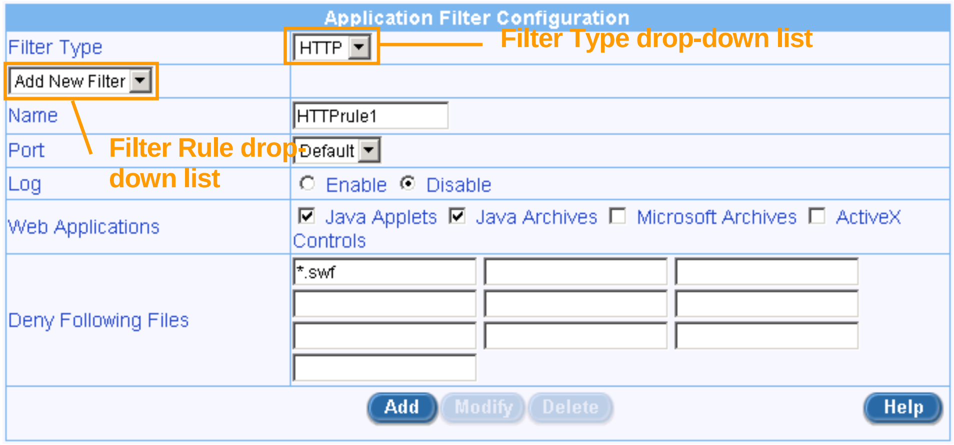
Figure 9.22. FTP Filter Example – Associate FTP Filter Rule to an ACL Rule

11. Associate the newly added FTP application filter rule to a firewall ACL rule (inbound, outbound or group ACL) by selecting a FTP filter from the FTP filter drop-down list (see Figure 9.22) and then click on Add or Modify button to save the settings.

9.8.1.2.2 HTTP Example: Add a HTTP Filter Rule to Block JAVA Applets and Java Archives



1. Open the Application Filer configuration page by clicking the **Firewall ➔ Policy List ➔ Application Filter** menu.
2. Select HTTP from the Filter Type drop-down list.
3. Select “Add New Filter” from the Filter Rule drop-down list.
4. Enter a name for this rule – in this example, HTTPrule1.
5. Change the port number if necessary. However, it is recommended that you keep the “Default” setting.

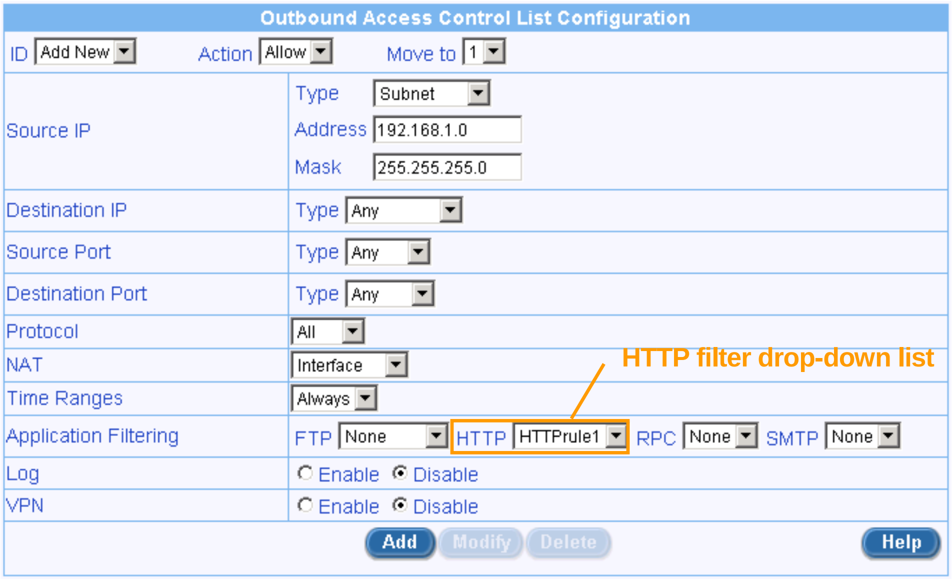


Application Filter Configuration

Filter Type	HTTP
Add New Filter	
Name	HTTPrule1
Port	Default
Log	○ Enable ● Disable
Web Applications	☑ Java Applets ☑ Java Archives □ Microsoft Archives □ ActiveX Controls
Deny Following Files	*.swf

Figure 9.23. HTTP Filter Example – Configuring HTTP Filter Rule

6. Choose to enable to disable the logging option. The default setting is to keep the logging for this rule disabled.
7. Check the web application files to block – in this example, Java Applets and Java Archives
8. Enter additional web application files to block. Enter the file extension in the “Deny Following Files” fields if desired. Figure 9.23 shows that flash files (file extension is *.swf) are to be blocked in addition to Java applet and archive files.
9. Click on Add button to create this HTTP application filter rule.
10. Associate the newly created HTTP application filter rule to a firewall ACL rule (inbound, outbound or group ACL) by selecting a HTTP filter from the HTTP filter drop-down list (see Figure 9.24) and then click on Add or Modify button to save the settings.



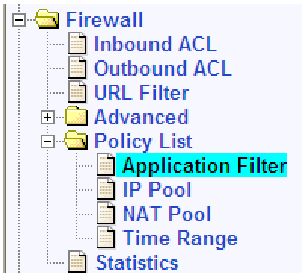
Outbound Access Control List Configuration

ID Add New ▼	Action Allow ▼ Move to 1 ▼
Source IP	Type Subnet ▼ Address 192.168.1.0 Mask 255.255.255.0
Destination IP	Type Any ▼
Source Port	Type Any ▼
Destination Port	Type Any ▼
Protocol	All ▼
NAT	Interface ▼
Time Ranges	Always ▼
Application Filtering	FTP None ▼ HTTP HTTPrule1 ▼ RPC None ▼ SMTP None ▼
Log	○ Enable ● Disable
VPN	○ Enable ● Disable

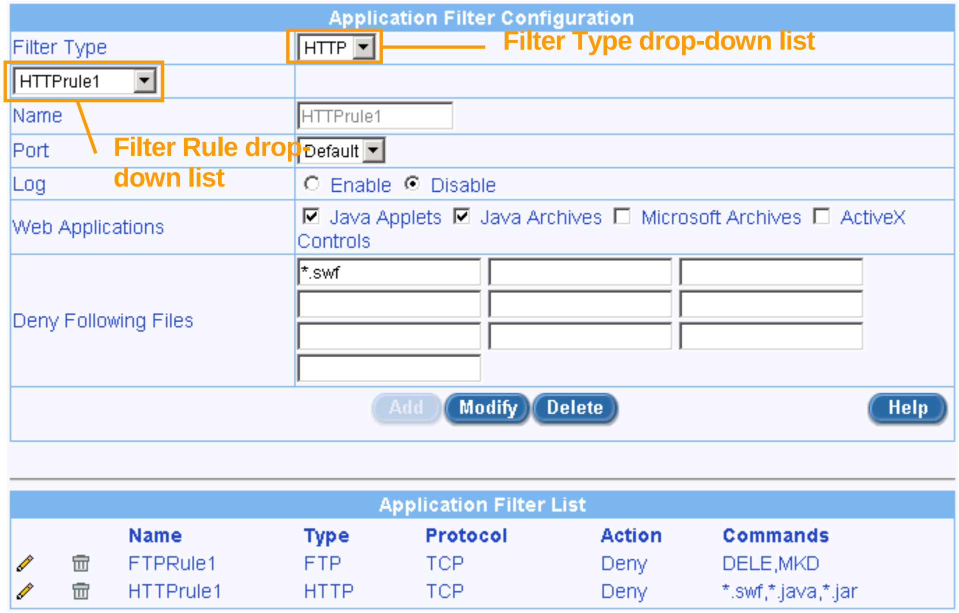
Figure 9.24. HTTP Filter Example – Associate HTTP Filter Rule to an ACL Rule

9.8.1.3 Modify an Application Filter

To modify an IP Pool, follow the instructions below:



1. Open the Application Filer configuration page by clicking the **Firewall ➔ Policy List ➔ Application Filter** menu.
2. Select the application filter to modify. Click on the ✎ icon of the application filter to be modified in the Application Filter List table or select the filter type from the Filter Type drop-down list and then select the filter rule from the Filter Rule drop-down.
3. Make desired changes to any or all of the following fields: Port number, logging option, etc.



Application Filter Configuration

Filter Type	HTTP ▼
HTTPrule1 ▼	
Name	HTTPrule1
Port	Default ▼
Log	○ Enable ● Disable
Web Applications	☑ Java Applets ☑ Java Archives ☐ Microsoft Archives ☐ ActiveX Controls
Deny Following Files	*.swf

Application Filter List

		Name	Type	Protocol	Action	Commands
✎	🗑	FTPRule1	FTP	TCP	Deny	DELE,MKD
✎	🗑	HTTPrule1	HTTP	TCP	Deny	*.swf,*.java,*.jar

Figure 9.25. Modify an Application Filter

4. Click on the Modify button to save the new settings. The new settings for this application filter will then be displayed in the Application Filter List table.

9.8.1.4 Delete an Application Filter

To delete an Application Filter, click on the 🗑 icon of the filter to be deleted or follow the instruction below:

1. Open the Application Filer configuration page by clicking the **Firewall ➔ Policy List ➔ Application Filter** menu.
2. Select the application filter to delete. Click on the ✎ icon of the application filter to be deleted in the Application Filter List table or select the filter type from the Filter Type drop-down list and then select the filter rule from the Filter Rule drop-down.
3. Click on the Delete button to delete this filter.

9.8.2 Configuring IP Pool

9.8.2.1 IP Pool Configuration Parameters

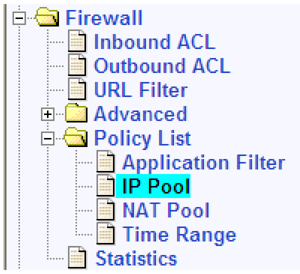
Table 9.7 describes the configuration parameters available for an IP pool.

Table 9.7. IP Pool Configuration Parameters

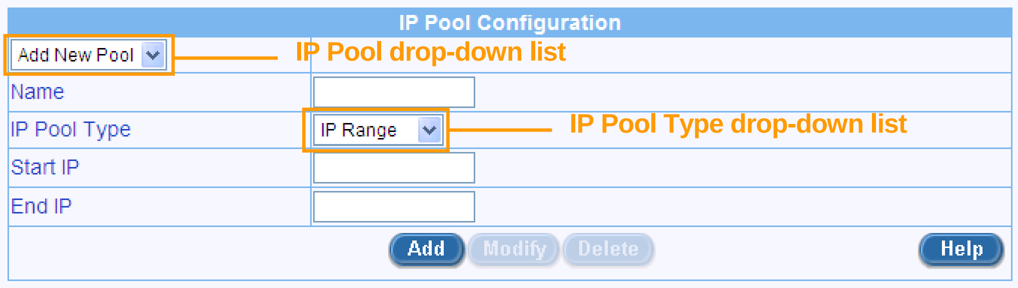
Field	**Description**
IP Pool Name	Enter the name of the local IP
IP Pool Type	Select the type of IP Pool.
IP Range	This option allows you to configure the range of IP addresses.
Start IP	Enter the starting IP address of the range.
End IP	Enter the ending IP address of the range.
Subnet	This option allows you to include all the computers that are connected in an IP subnet.
Subnet Address	Enter the appropriate IP address.
Subnet Mask	Enter the corresponding mask.
IP Address	This option allows you to configure single IP address.
IP Address	Enter the IP Address.

9.8.2.2 Add an IP Pool

To add an IP Pool, follow the instructions below:



1. Open the IP Pool configuration page by clicking the **Firewall ➔ Policy List ➔ IP Pool** menu.
2. Select "**Add New Pool**" from the IP Pool drop-down list.
3. Enter a pool name into the Name field.
4. Select a pool type from the IP Pool Type drop-down list.
5. If "IP Range" pool type is selected, enter start IP address and end IP address. If "Subnet" pool type is selected, enter subnet address and subnet mask. If "IP Address" pool type is selected, enter an IP adderss.



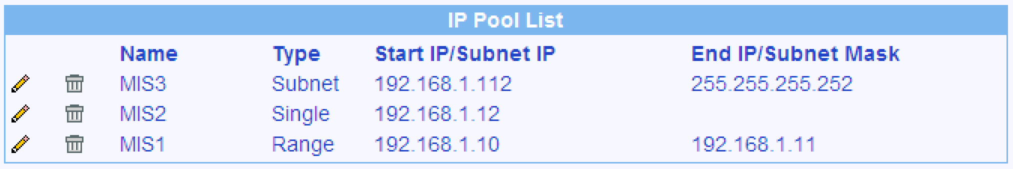
Name	
IP Pool Type	IP Range
Start IP	
End IP	

IP Pool drop-down list

IP Pool Type drop-down list

Figure 9.26 IP Pool Configuration

6. Click on the **Add** button to create the new IP Pool. The new IP Pool will then be displayed in the IP Pool list table.



		Name	Type	Start IP/Subnet IP	End IP/Subnet Mask
✎	🗑	MIS3	Subnet	192.168.1.112	255.255.255.252
✎	🗑	MIS2	Single	192.168.1.12	
✎	🗑	MIS1	Range	192.168.1.10	192.168.1.11

9.8.2.3 Modify an IP Pool

To modify an IP Pool, follow the instructions below:

1. Open the IP Pool configuration page by clicking the **Firewall ➔ Policy List ➔ IP Pool** menu.
2. Click on the ✎ icon of the IP pool to be modified in the IP Pool List table or select the IP pool from the IP Pool drop-down list.
3. Make desired changes to any or all of the following fields: Pool name, Pool type and IP address.
4. Click on the **Modify** button to save the new settings. The new settings for this pool will then be displayed in the IP Pool list table.

9.8.2.4 Delete an IP Pool

To delete an IP Pool, click on the 🗑 icon of the IP pool to be deleted or follow the instruction below:

1. Open the IP Pool configuration page by clicking the **Firewall ➔ Policy List ➔ IP Pool** menu.
2. Click on the ✎ icon of the IP pool to be deleted in the IP Pool List table or select the IP pool from the IP Pool drop-down list.
3. Click on the **Delete** button to delete this IP pool.

9.8.2.5 IP Pool Example

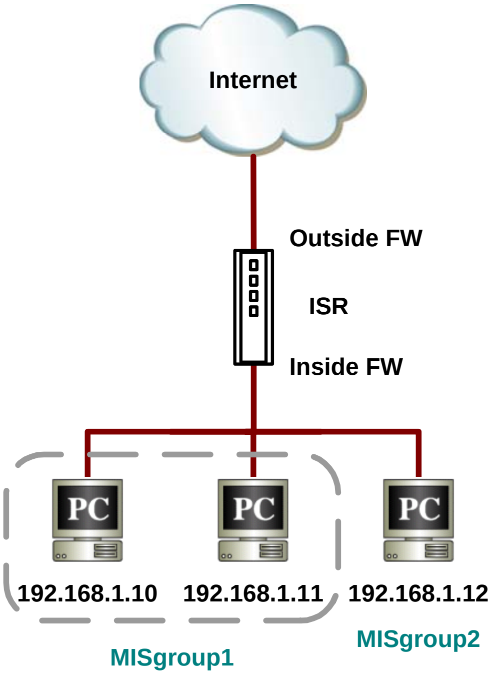
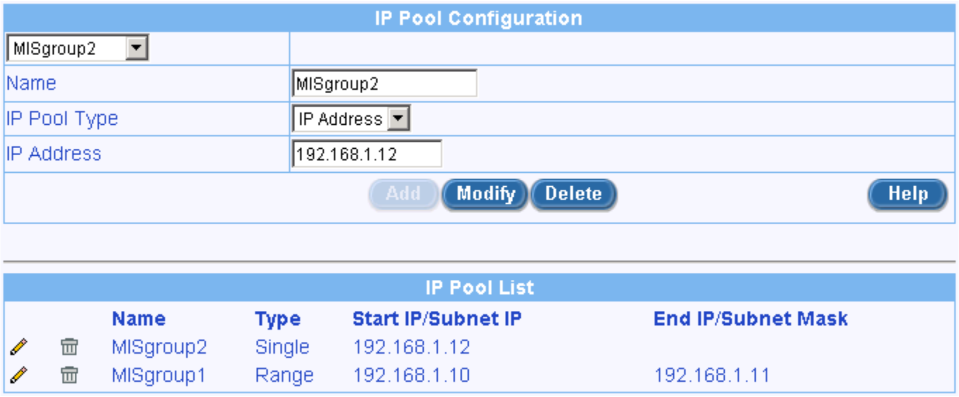


Figure 9.27. Network Diagram for IP Pool Configuration

1. Open the IP Pool configuration page to create two IP groups – see Figure 9.28.



IP Pool Configuration

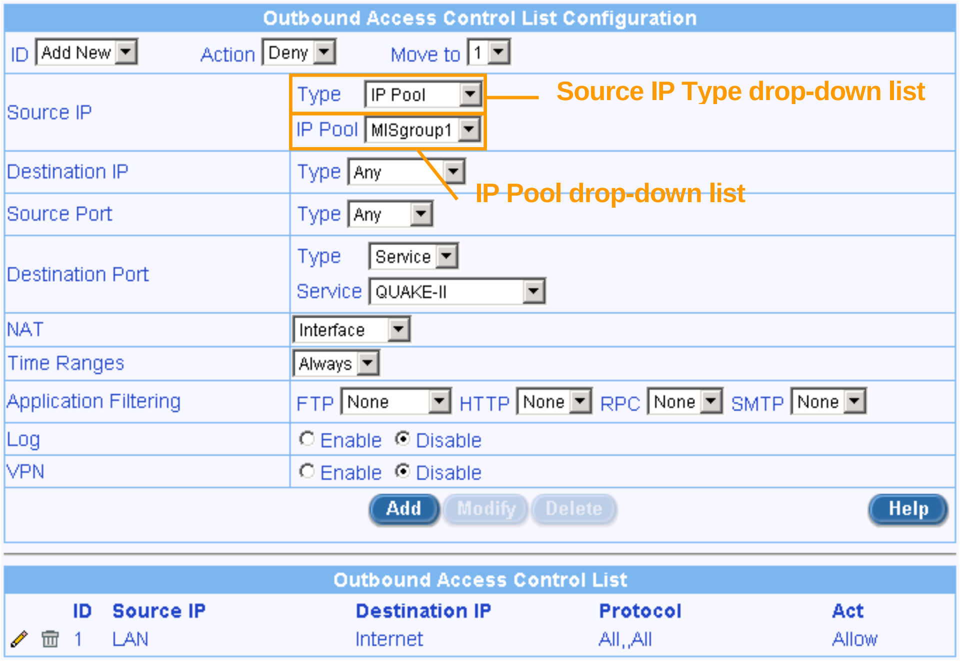
MISgroup2 ▾	
Name	MISgroup2
IP Pool Type	IP Address ▾
IP Address	192.168.1.12

IP Pool List

		Name	Type	Start IP/Subnet IP	End IP/Subnet Mask
✎	🗑	MISgroup2	Single	192.168.1.12	
✎	🗑	MISgroup1	Range	192.168.1.10	192.168.1.11

Figure 9.28. IP Pool Example – Add Two IP Pools – MISgroup1 and MISgroup2

2. Associate an IP pool to firewall ACL rules – inbound, outbound or group ACL by selecting "IP Pool" from the Source IP Type drop-down list and then choose an IP pool from the IP pool drop-down list. In this example, IP pool is used to associate to source IP; however, it can be used to associate to destination IP as well. As shown in Figure 9.29, MISgroup1 is not allow to play networked game, Quake-II at all times.



Outbound Access Control List Configuration

ID	Add New ▾ Action Deny ▾ Move to 1 ▾
Source IP	Type IP Pool ▾ IP Pool MISgroup1 ▾
Destination IP	Type Any ▾
Source Port	Type Any ▾
Destination Port	Type Service ▾ Service QUAKE-II ▾
NAT	Interface ▾
Time Ranges	Always ▾
Application Filtering	FTP None ▾ HTTP None ▾ RPC None ▾ SMTP None ▾
Log	○ Enable ● Disable
VPN	○ Enable ● Disable

Source IP Type drop-down list

IP Pool drop-down list

Outbound Access Control List

ID	Source IP	Destination IP	Protocol	Act
1	LAN	Internet	All,,All	Allow

Figure 9.29. IP Pool Example – Deny QUAKE-II Connection for MISgroup1

9.8.3 Configuring NAT Pool

9.8.3.1 NAT Pool Configuration Parameters

Table 9.8 describes the configuration parameters available for a NAT pool.

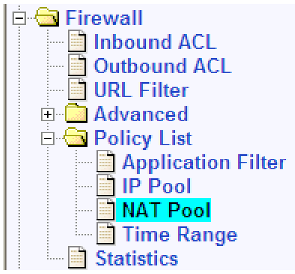
Table 9.8. NAT Pool Configuration Parameters

Field	Description
NAT Pool Name	Enter a name for the NAT Pool.
NAT Pool Type	Select the type of NAT Pool and make appropriate IP Address entries.
Static Select this type of NAT to set a one-to-one Mapping between the Internal Address and the External Address.	
LAN IP range	For the Internal Address
Start IP	Enter the starting IP address.
End IP	Enter the ending IP address.
Internet IP Range	For the External Address
Start IP	Enter the starting IP address.
End IP	Enter the ending IP address.
Dynamic Select this type of NAT to map a set of internal (corporate) machines to a set of public IP addresses. Make entries for the LAN IP Range and the Internet IP Range as described above.	
Overload Select this type of NAT to use a single public IP address to connect multiple internal (corporate LAN) machines to external (Internet) network.	
NAT IP Address	Enter NAT IP address, for the overload.

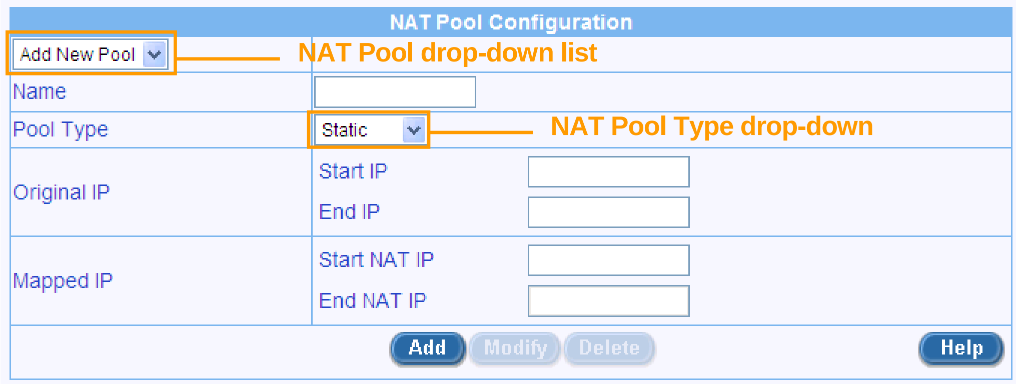
Field	Description
Interface Select this type of NAT to specify the Dynamic Interface whose IP address should be used for subjecting traffic to NAT.	

9.8.3.2 Add a NAT Pool

To add a NAT Pool, follow the instructions below:



1. Open the NAT Pool configuration page by clicking the **Firewall ➔ Policy List ➔ NAT Pool** menu.
2. Select "**Add New Pool**" from the NAT Pool drop-down list.
3. Enter a pool name into the Name field.
4. Select a pool type from the Type drop-down list.
5. If "Static" or "Dynamic" pool type is selected, enter the original IP addresses (start IP Address, and end IP Address), and mapped IP addresses (start NAT IP Address and end NAT IP Address). If "Overload" pool type is selected, enter the NAT IP address. If you want to use the IP address assigned for the WAN port as the NAT IP address, select the Interface pool type.


NAT Pool Configuration

Add New Pool — NAT Pool drop-down list

Name

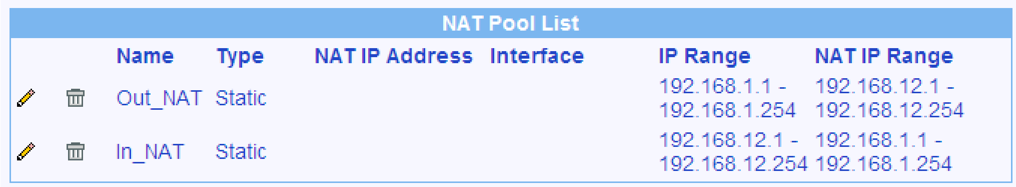
Pool Type: Static — NAT Pool Type drop-down

Original IP: Start IP, End IP

Mapped IP: Start NAT IP, End NAT IP

Figure 9.30. NAT Pool configuration

6. Click on the Add button to create the new NAT pool. The new NAT pool will then be displayed in the NAT Pool List table.


NAT Pool List

		Name	Type	NAT IP Address	Interface	IP Range	NAT IP Range
✎	🗑	Out_NAT	Static			192.168.1.1 - 192.168.1.254	192.168.12.1 - 192.168.12.254
✎	🗑	In_NAT	Static			192.168.12.1 - 192.168.12.254	192.168.1.1 - 192.168.1.254

9.8.3.3 Modify a NAT Pool

To modify a NAT Pool, follow the instructions below:

1. Open the NAT Pool configuration page by clicking the **Firewall ➔ Policy List ➔ NAT Pool** menu.
2. Click on the ✎ icon of the NAT pool to be modified in the NAT Pool List table or select the NAT pool from the NAT Pool drop-down list.
3. Make desired changes to any or all of the following fields: Pool name, Pool type and IP address.

4. Click on the Modify button to save the new settings. The new settings for this pool will then be displayed in the NAT Pool List table.

9.8.3.4 Delete a NAT Pool

To delete a NAT Pool, click on the 🗑 icon of the NAT pool to be deleted or follow the instruction below:

1. Open the NAT Pool configuration page by clicking the **Firewall ➔ Policy List ➔ NAT Pool** menu.
2. Click on the ✎ icon of the NAT pool to be deleted in the NAT Pool List table or select the NAT pool from the NAT Pool drop-down list.
3. Click on the Delete button to delete this NAT pool.

9.8.3.5 NAT Pool Example

Figure 9.31 shows the network diagram for this NAT pool example.

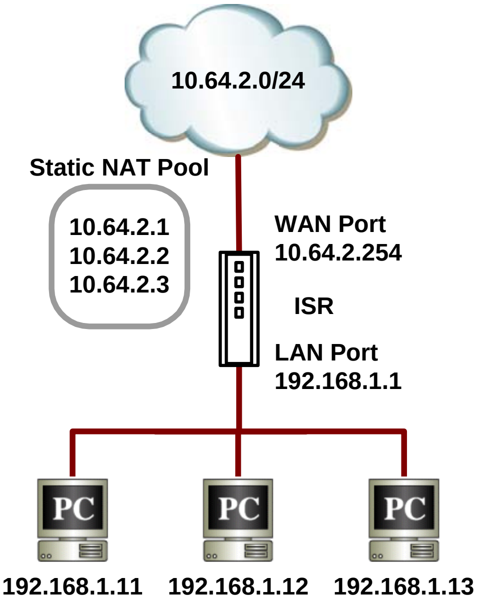
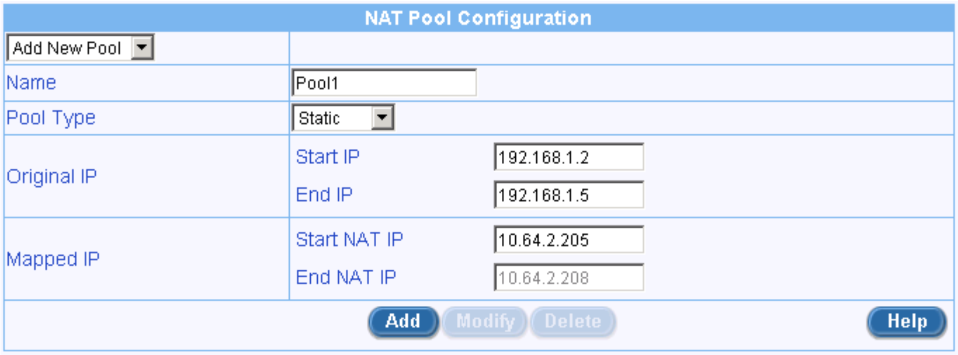


Figure 9.31. Network Diagram for NAT Pool Example

1. Create a NAT pool for static NAT – see Figure 9.32.

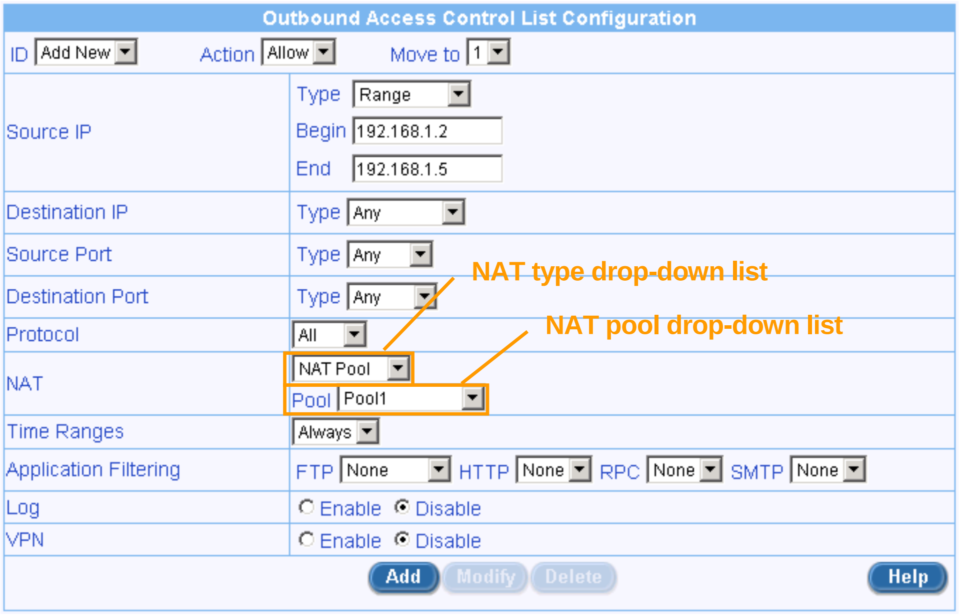


NAT Pool Configuration

Add New Pool ▾		
Name	Pool1	
Pool Type	Static ▾	
Original IP	Start IP	192.168.1.2
	End IP	192.168.1.5
Mapped IP	Start NAT IP	10.64.2.205
	End NAT IP	10.64.2.208

Figure 9.32. NAT Pool Example – Create a Static NAT Pool

2. Associate the NAT pool to an outbound ACL rule by selecting “NAT Pool” from the NAT type drop-down list and then choose an existing NAT pool from the NAT pool drop-down list.



Outbound Access Control List Configuration

ID: Add New | Action: Allow | Move to: 1

Source IP	Type: Range Begin: 192.168.1.2 End: 192.168.1.5
Destination IP	Type: Any
Source Port	Type: Any
Destination Port	Type: Any
Protocol	All
NAT	NAT Pool Pool: Pool1
Time Ranges	Always
Application Filtering	FTP: None HTTP: None RPC: None SMTP: None
Log	○ Enable ● Disable
VPN	○ Enable ● Disable

NAT type drop-down list

NAT pool drop-down list

Figure 9.33. NAT Pool Example – Associate a NAT Pool to an ACL Rule

9.8.4 Configuring Time Range

With this option you can configure access time range records for eventual association with ACL rules. ACL rules associated with a time range record will be active only during the scheduled period. If the ACL rule denies HTTP access during 10:00hrs to 18:00hrs, then before 10:00hrs and after 18:00hrs the HTTP traffic will be permitted to pass through. One time range record can contain up to three time periods. For example:

Office hours on weekdays (Mon-Fri) can have the following periods:

- Pre-lunch period between 9:00 and 13:00 Hrs
- Post-lunch period between 14:00 and 18:30 Hrs

Office hours on weekends (Saturday-Sunday) can have the following periods:

- 9:00 to 12:00 Hrs

Such varying time periods can be configured into a single time range record. Access rules can be activated based on these time periods.

9.8.4.1 Time Range Configuration Parameters

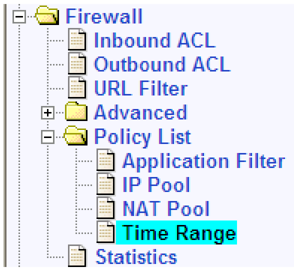
Table 9.9 describes the configuration parameters available for a time range.

Table 9.9. Time Range Configuration Parameters

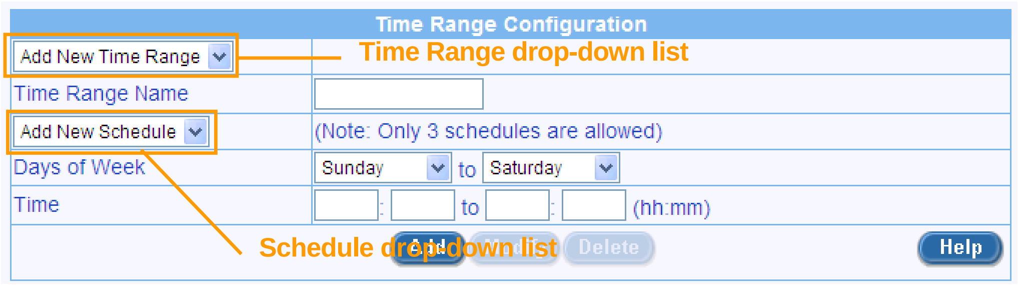
Field	Description
Time Range drop-down list	Select "Add New Time Range" to add a new time range or select an existing time range from the drop-down list.
Time Range Name	Enter a name for the Time Range.
Schedule drop-down list	Select "Add New Schedule" to add a new schedule or select an existing schedule from the drop-down list.
Days of Week	Set the days for the schedule.
Time (hh:mm)	Set the time windows for the schedule in hh:mm format.

9.8.4.2 Add a Time Range

To add a Time Range, follow the instructions below:



1. Open the Time Range configuration page by clicking the **Firewall ➔ Policy List ➔ Time Range** menu.
2. Select "**Add New Time Range**" from the Time Range drop-down list.
3. Enter a name into the Time Range Name field.
4. Select "**Add New Schedule**" from the Schedule drop-down list.
5. Select Days of Week. For example, from Sunday to Saturday.
6. Enter day hours, For example, from 08:00 to 18:00.



Time Range Configuration

Add New Time Range	Time Range drop-down list
Time Range Name	
Add New Schedule	(Note: Only 3 schedules are allowed)
Days of Week	Sunday to Saturday
Time	: to : (hh:mm)

Schedule drop-down list

Figure 9.34. Time Range Configuration

7. Click on the Add button to create the new schedule.

Time Range List			
Name	Schedule1	Schedule2	Schedule3

9.8.4.3 Modify a Time Range

To modify a Time Range, follow the instructions below:

1. Open the Time Range configuration page by clicking the **Firewall ➔ Policy List ➔ Time Range** menu.
2. Click on the ✏ icon of the Time Range to be modified in the Time Range list table or select the Time Range from the Time Range drop-down list.
3. Select the Schedule from the schedule drop-down list.
4. Make desired changes to any or all of the following fields: Days of week and hours.
5. Click on the Modify button to save the new settings.

9.8.4.4 Delete a Time Range

To delete a Time Range, click on the 🗑 icon of the Time Range to be deleted.

9.8.4.5 Delete a Schedule in a Time Range

To delete a schedule in a Time Range, follow the instructions below:

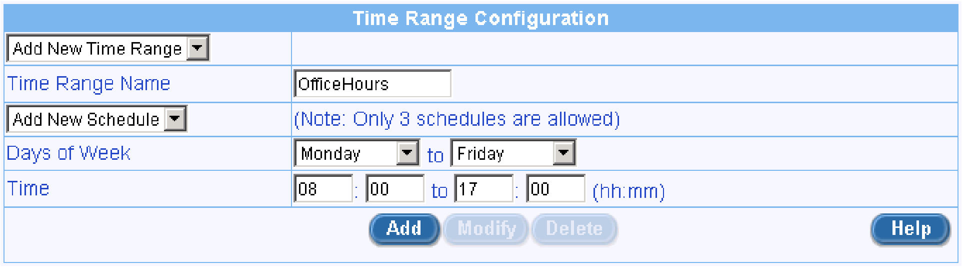
1. Open the Time Range configuration page by clicking the **Firewall ➔ Policy List ➔ Time Range** menu.
2. Click on the ✏ icon of the Time Range to be deleted in the Time Range list table or select the Time Range from the Time Range drop-down list.

3. Select the Schedule from the drop-down list.

4. Click on the Delete button to delete this schedule.

9.8.4.6 Time Range Example

1. Create a time range – see Figure 9.32.

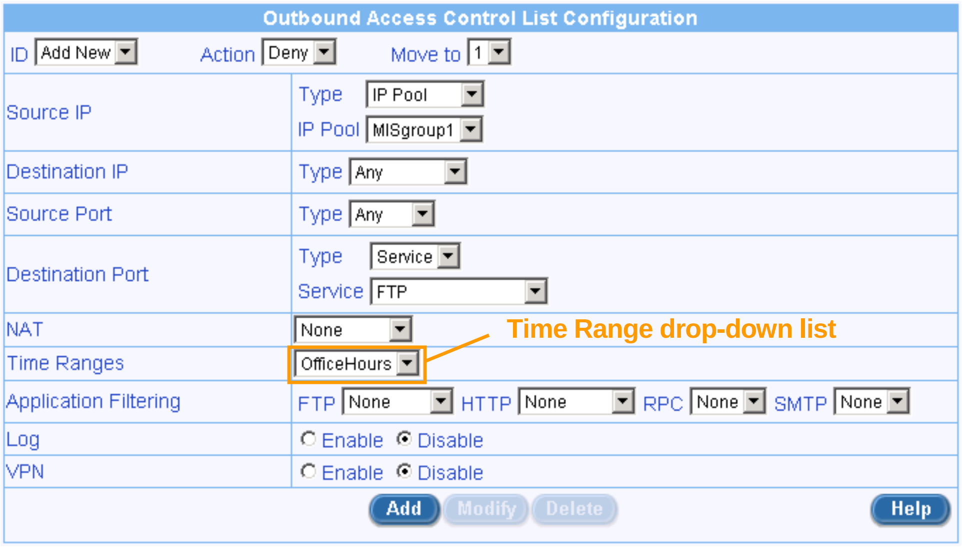


Time Range Configuration

Add New Time Range ▾	
Time Range Name	OfficeHours
Add New Schedule ▾	(Note: Only 3 schedules are allowed)
Days of Week	Monday ▾ to Friday ▾
Time	08 : 00 to 17 : 00 (hh:mm)

Figure 9.35. Time Range Example – Create a Time Range

2. Associate the time range to an outbound ACL rule by selecting an existing time range from the Time Range drop-down list. Figure 9.36 shows that MISgroup1 is denied FTP access during office hours.



Outbound Access Control List Configuration

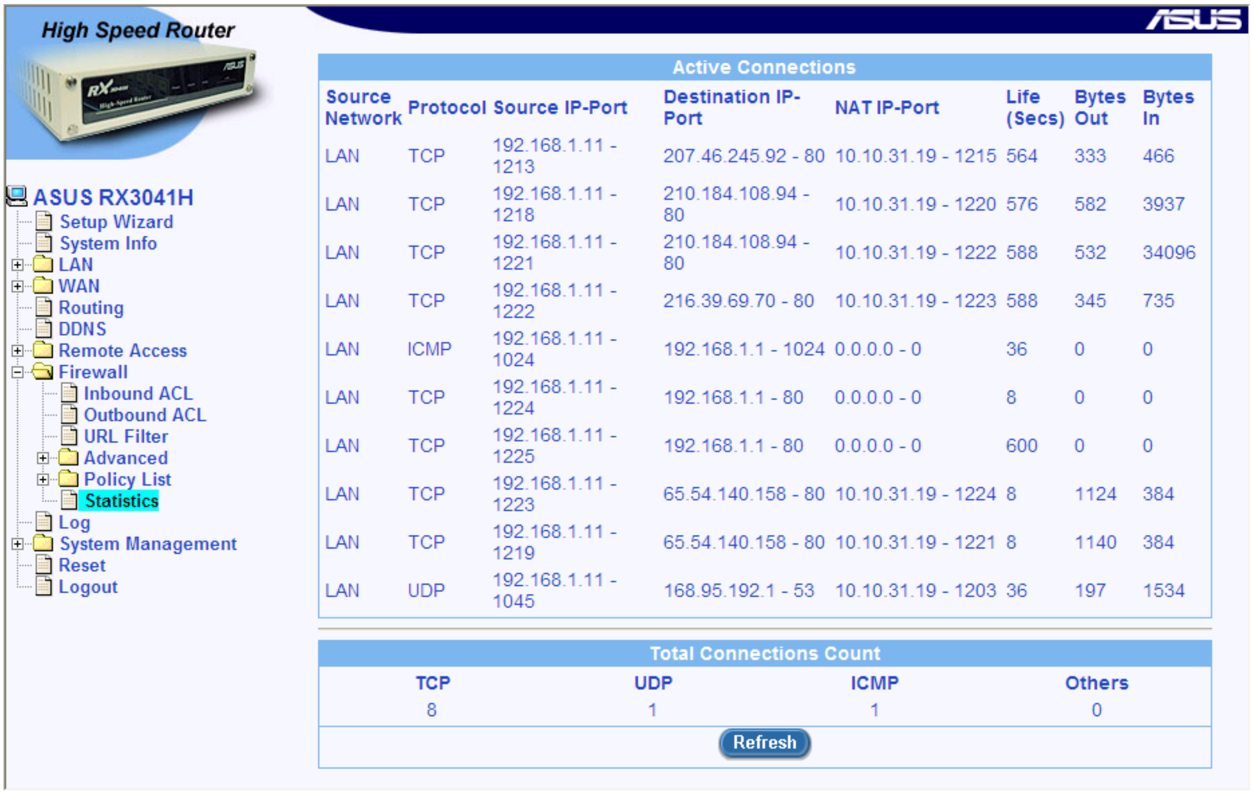
ID Add New ▾	Action Deny ▾ Move to 1 ▾
Source IP	Type IP Pool ▾ IP Pool MISgroup1 ▾
Destination IP	Type Any ▾
Source Port	Type Any ▾
Destination Port	Type Service ▾ Service FTP ▾
NAT	None ▾
Time Ranges	OfficeHours ▾
Application Filtering	FTP None ▾ HTTP None ▾ RPC None ▾ SMTP None ▾
Log	○ Enable ● Disable
VPN	○ Enable ● Disable

Time Range drop-down list

Figure 9.36. Time Range Example – Deny FTP Access for MISgroup1 During OfficeHours

9.9 Firewall Statistics – Firewall ➔ Statistics

The Firewall Statistics page displays details regarding the active connections. Figure 9.37 shows a sample firewall statistics for active connections. To see an updated statistics, click on Refresh button.



Active Connections

Source Network	Protocol	Source IP-Port	Destination IP-Port	NAT IP-Port	Life (Secs)	Bytes Out	Bytes In
LAN	TCP	192.168.1.11 - 1213	207.46.245.92 - 80	10.10.31.19 - 1215	564	333	466
LAN	TCP	192.168.1.11 - 1218	210.184.108.94 - 80	10.10.31.19 - 1220	576	582	3937
LAN	TCP	192.168.1.11 - 1221	210.184.108.94 - 80	10.10.31.19 - 1222	588	532	34096
LAN	TCP	192.168.1.11 - 1222	216.39.69.70 - 80	10.10.31.19 - 1223	588	345	735
LAN	ICMP	192.168.1.11 - 1024	192.168.1.1 - 1024	0.0.0.0 - 0	36	0	0
LAN	TCP	192.168.1.11 - 1224	192.168.1.1 - 80	0.0.0.0 - 0	8	0	0
LAN	TCP	192.168.1.11 - 1225	192.168.1.1 - 80	0.0.0.0 - 0	600	0	0
LAN	TCP	192.168.1.11 - 1223	65.54.140.158 - 80	10.10.31.19 - 1224	8	1124	384
LAN	TCP	192.168.1.11 - 1219	65.54.140.158 - 80	10.10.31.19 - 1221	8	1140	384
LAN	UDP	192.168.1.11 - 1045	168.95.192.1 - 53	10.10.31.19 - 1203	36	197	1534

Total Connections Count

TCP	UDP	ICMP	Others
8	1	1	0

Figure 9.37. Firewall Statistics

10 Configuring Remote Access

10.1 Remote Access

The RX3041H firewall allows telecommuters to securely access their corporate network using the Remote Access mechanism based on the notions of groups, users and access policies. Each group is associated with a set of access policies that are activated when a user belonging to that group logs in. The RX3041H maintains details about the access policies defined for the remote access groups. These access lists define the resources the remote users are allowed to access and the inactivity time-out applicable to all the users in the group.

When a user belonging to a group logs in via the Internet or through the local network, the RX3041H Firewall activates the policies associated with the group and creates dynamic policies associated with the user. These dynamic policies are referred to for every connection from the user. They are deleted once the user logs out of the RX3041H or in case of inactivity time-out.

A typical configuration for remote access involves the following actions:

- Add/modify/delete a new user group and user information (including user name, password and etc) to the group.
- Add/modify/delete group access policies.

10.2 Manage User Groups and Users

The Remote Access option allows you to configure users and groups.

10.2.1 User Group Configuration Parameters

Table 10.1 describes the configuration parameters available for remote access user group and users.

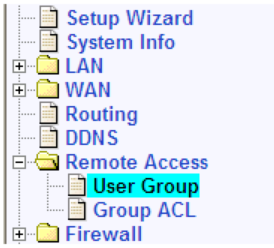
Table 10.1. User Group Configuration Parameters

Field	Description
User Group	
User Group Drop-down list	Select "Add New User Group" to add a new group or select an existing group from the drop-down list.
User Group Name	Enter a unique User group name for the group that you would like to add.
Group State	Click on the Enable or Disable radio button to enable or disable the group. Disabling the group will force all the users to be disconnected in that group who have already logged in. Further login of all the users in that group will be disabled. Enabling the group will allow all the enabled-users in the group to log in.
Inactivity Timeout	Enter the timeout period, which is used to delete the User related sessions when there is no traffic across this connection.
User	
User Drop-down list	Select "Add New User" to add a new user or select an existing user from the drop-down list.
User Name	Enter a unique User name for the user that you would like to add.

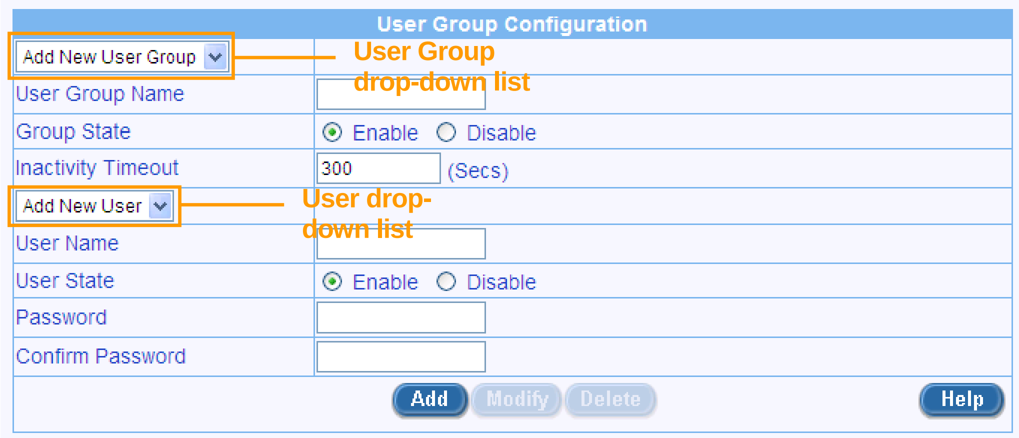
Field	Description
User State	Click on the Enable or Disable radio button to enable or disable the user. Disabling the user will force the user to be disconnected. Further login from that specific user will be disabled. Enabling the user will allow the specific user to log in.
Password	Enter the User's password.
Confirm Password	Enter the User's password again for confirmation. Make sure that you enter the same password as what you entered in the "Password" field.

10.2.2 Add a User Group and/or a User

To add a user group and a new user, follow the instructions below:



1. Open the User Group configuration page by clicking the **Remote Access ➔ User Group** menu.
2. Select "Add New User Group" from the user group drop-down list.
3. Enter a name into the User Group Name field. Make sure that this name is unique among the existing groups. Note that the group name is case sensitive. For example, Group1 and group1 are treated as separate groups.
4. Click on the "Enable" or "Disable" radio button in the Group State field to enable or disable this group.
5. Enter inactivity timeout period. Default is 300 seconds.
6. If you want to add a user to this newly created group, continue with the following steps; otherwise, jump to step 12 to complete the configuration.
7. Select "Add New User" from the user drop-down list.
8. Enter a unique user name in the User Name field.
9. Click on the "Enable" or "Disable" radio in the User State field to enable or disable this user.
10. Enter the password in the Password field for this user.
11. Confirm the password by entering again the password in the Confirm Password field.



User Group Configuration

Add New User Group	
User Group Name	
Group State	● Enable ○ Disable
Inactivity Timeout	300 (Secs)
Add New User	
User Name	
User State	● Enable ○ Disable
Password	
Confirm Password	

User Group drop-down list

User drop-down list

Figure 10.1. User Group Configuration

12. Click on the Add button to create the new group and/or the new user.

To add a new user, follow the instructions below:

1. Open the User Group configuration page by clicking the **Remote Access ➔ User Group** menu.
2. Select an existing group from the user group drop-down list.
3. Select "Add New User" from the user drop-down list.
4. Enter a unique user name in the User Name field.
5. Click on the "Enable" or "Disable" radio button in the User State field to enable or disable this user.
6. Enter the password in the Password field for this user.
7. Confirm the password by entering again the password in the Confirm Password field.
8. Click on the Add button to add the new user.

10.2.3 Modify a User Group or a User

To modify a user group and/or a user, follow the instructions below:

1. Open the User Group configuration page by clicking the **Remote Access ➔ User Group** menu.
2. Select an existing user group from the user group drop-down list. If you just want to modify the attributes of an existing user, please skip to step 4.
3. Make desired changes in the Group State and/or Inactivity Timeout fields. If you don't intend to modify attributes of existing users in the group, please skip to step 6. Note that the group name cannot be changed. To change the group name, you must first delete the existing group and then create a new group with the desired name.
4. Select an existing user from the user drop-down list.
5. Make desired changes in the User State, Password and Confirm Password fields. Note that the user name cannot be changed. To change the user name, you must delete the existing user and then create a new user with the desired name.
6. Click on the Modify button to save the new settings.

10.2.4 Delete a User Group or a User

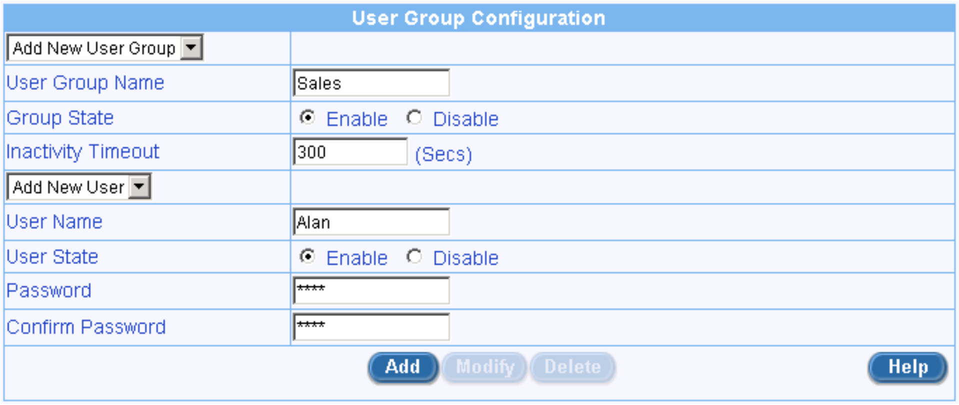
To delete a user group, follow the instructions below:

1. Open the User Group configuration page by clicking the **Remote Access ➔ User Group** menu.
2. Select an existing user group from the user group drop-down list.
3. Click on the Delete button to delete this user group. Note that a user group cannot be deleted unless all the users belong to the group are deleted first.

To delete a user, simply click on the 🗑 icon of the user in the Remote User List table in the User Group configuration page or follow the instruction below:

1. Open the User Group configuration page by clicking the **Remote Access ➔ User Group** menu.
2. Click on the ✎ icon of the user to be deleted in the Remote User List table or select the user from the User drop-down list.
3. Click on the Delete button to delete this user.

10.2.5 User Group and Users Configuration Example



User Group Configuration

Add New User Group	
User Group Name	Sales
Group State	● Enable ○ Disable
Inactivity Timeout	300 (Secs)
Add New User	
User Name	Alan
User State	● Enable ○ Disable
Password	****
Confirm Password	****

Figure 10.2. User Group and Users Configuration Example

Example

Figure 10.2 displays the screen with entries to:

- Add a new user group and a new user
  - Group "Sales"
  - User "Alan"

10.3 Configure Group ACL Rules

Group ACL is used to control access privileges for remote or local user groups. Its configuration is similar to that for firewall inbound/outbound ACL rules, except two additional fields – rule type and group name (see Table 10.2). For procedures to configure group ACL rules, please refer to section 9.3 or 9.5 for details.

10.3.1 Group ACL Specific Configuration Parameters

Table 10.2 describes the group ACL specific configuration parameters. The rest of the configuration parameters are the same as those for firewall inbound/outbound ACL rules. Please refer to Table 9.1 for details on common configuration parameters.

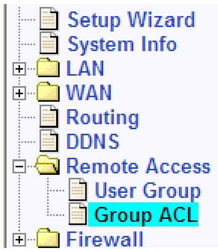
Table 10.2. Group ACL Specific Configuration Parameters

Field	Description
Type Select the type of traffic to which this rule should apply.	
Inbound	Select this if this rule is for inbound traffic.
Outbound	Select this if this rule is for outbound traffic.
Group Select from the group drop-down list to which this rule should apply. Note that to configure a group ACL rule, a user group must be configured first. Please refer to 10.2 for the configuration of user groups.	

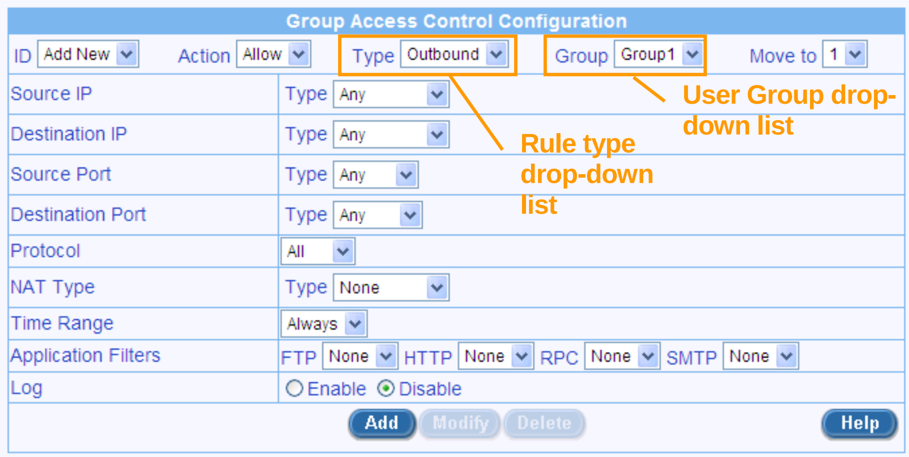
10.3.2 Add a Group ACL Rule

To add a group ACL rule, follow the instructions below:

1. Open the Time Range configuration page by clicking the **Firewall ➔ Remote Access ➔ Group ACL** menu.



2. Select "**Add New**" from the "**ID**" drop-down list.
3. Set desired action (Allow or Deny) from the "**Action**" drop-down list.
4. Select Outbound or Inbound from the rule Type drop-down list.
5. Select a group from the Group drop-down list.
6. Make changes to any or all of the following fields: source/destination IP, source/destination port, protocol, NAT, time ranges, application filtering, and log. Please see Table 9.1 for explanation of these fields. Figure 9.9 illustrates how to create a rule to deny outbound HTTP traffic for a host w/ IP address 192.168.1.15.



Group Access Control Configuration

ID: Add New | Action: Allow | Type: Outbound | Group: Group1 | Move to: 1

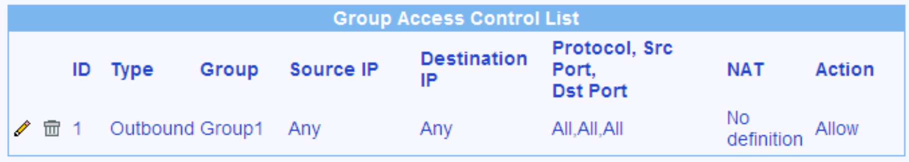
Source IP	Type: Any
Destination IP	Type: Any
Source Port	Type: Any
Destination Port	Type: Any
Protocol	All
NAT Type	Type: None
Time Range	Always
Application Filters	FTP: None HTTP: None RPC: None SMTP: None
Log	○ Enable ● Disable

User Group drop-down list

Rule type drop-down list

Figure 10.3. Group ACL Configuration Example

7. Assign a priority for this rule by selecting a number from the "**Move to**" drop-down list. Note that the number indicates the priority of the rule with 1 being the highest. Higher priority rules will be examined prior to the lower priority rules by the firewall.
8. Click on the Add button to create the new ACL rule. The new ACL rule will then be displayed in the group ACL table at the bottom half of the Group ACL configuration page.



Group Access Control List

	ID	Type	Group	Source IP	Destination IP	Protocol, Src Port, Dst Port	NAT	Action
✎ 🗑	1	Outbound	Group1	Any	Any	All,All,All	No definition	Allow

Figure 10.4. Group ACL List

10.3.3 Modify a Group ACL Rule

To modify a group ACL rule, follow the instructions below:

1. Open the Time Range configuration page by clicking the **Firewall ➔ Remote Access ➔ Group ACL** menu. Manually
2. Click on the ✎ icon of the rule to be modified in the group ACL list table or select the rule number from the "**ID**" drop-down list.
3. Make desired changes to any or all of the following fields: action, rule type, group, source/destination IP, source/destination port, protocol, NAT, time ranges, application filtering, and log. Please see Table 9.1 and Table 10.2 for explanation of these fields.
4. Click on the Modify button to modify this ACL rule. The new settings for this ACL rule will then be displayed in the group ACL list table at the bottom half of the Group ACL configuration page.

10.3.4 Delete a Group ACL Rule

To delete an group ACL rule, just click on the 🗑 in front of the rule to be deleted or follow the instructions below:

1. Open the Time Range configuration page by clicking the **Firewall → Remote Access → Group ACL** menu.
2. Click on the ✎ icon of the rule to be deleted in the group ACL list table or select the rule number from the "**ID**" drop-down list.
3. Click on the Delete button to delete this ACL rule. Note that the ACL rule deleted will be removed from the group ACL list table located at the bottom half of the configuration page.

10.3.5 Display Existing Group ACL Rules

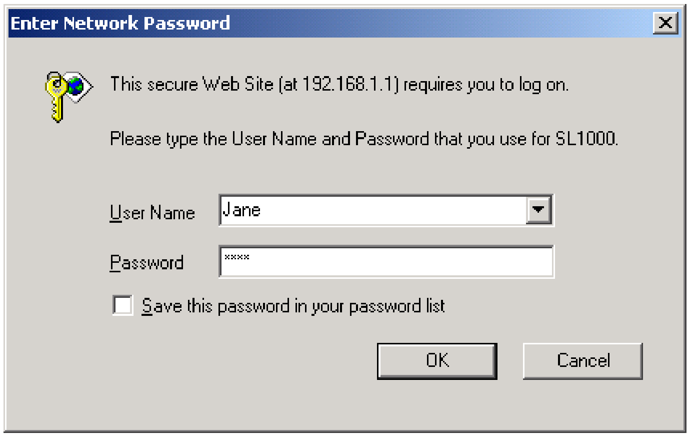
To see existing group ACL rules, just open the Group ACL Rule configuration page by clicking on the **Firewall → Remote Access → Group ACL** menu.

10.4 Remote User Login Process

For a user belonging to a user group to connect to the Internet Access Router, he or she must do a special login first to activate user group based policies; otherwise, the RX3041H will drop all the connection requests from the user. Users in a user group can enter the following URL in the browser in order to login to the RX3041H and activate associated access policies.

http://<IP Address>/login

The Login Console appears as illustrated in Figure 10.5



This secure Web Site (at 192.168.1.1) requires you to log on.

Please type the User Name and Password that you use for SL1000.

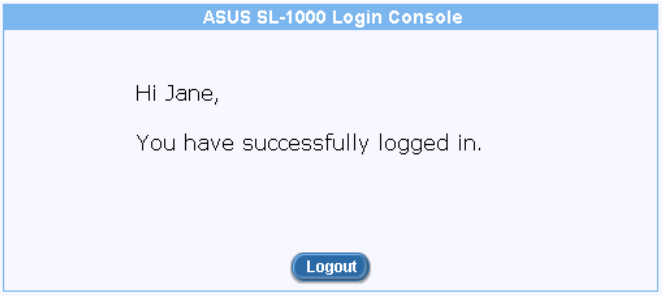
User Name: Jane

Password: ****

□ Save this password in your password list

Figure 10.5. Login Console

After a successful login, the screen appears as in Figure 10.6.



Hi Jane,

You have successfully logged in.

Figure 10.6. Login Status Screen

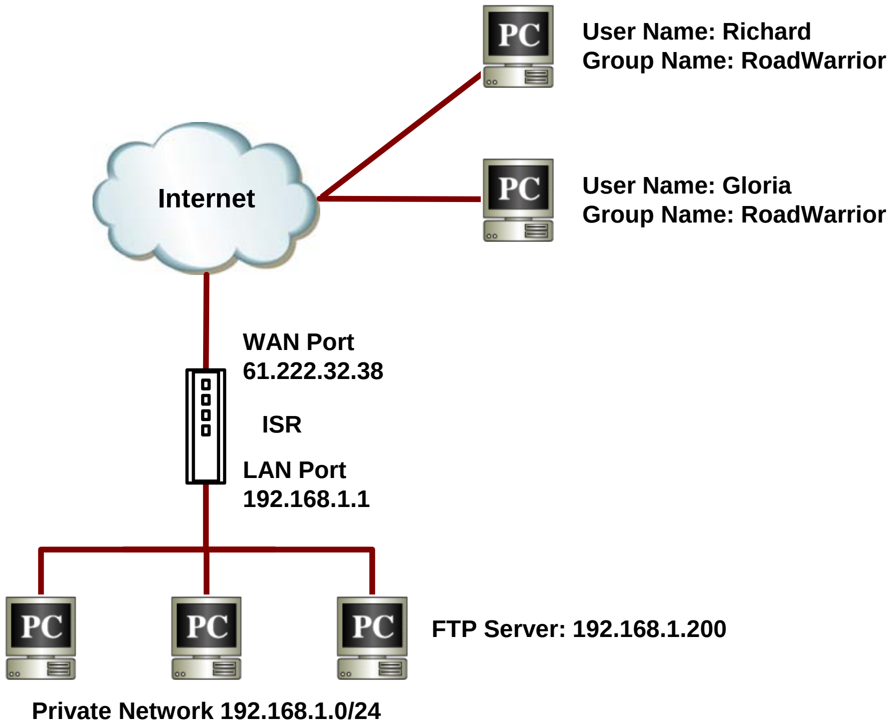
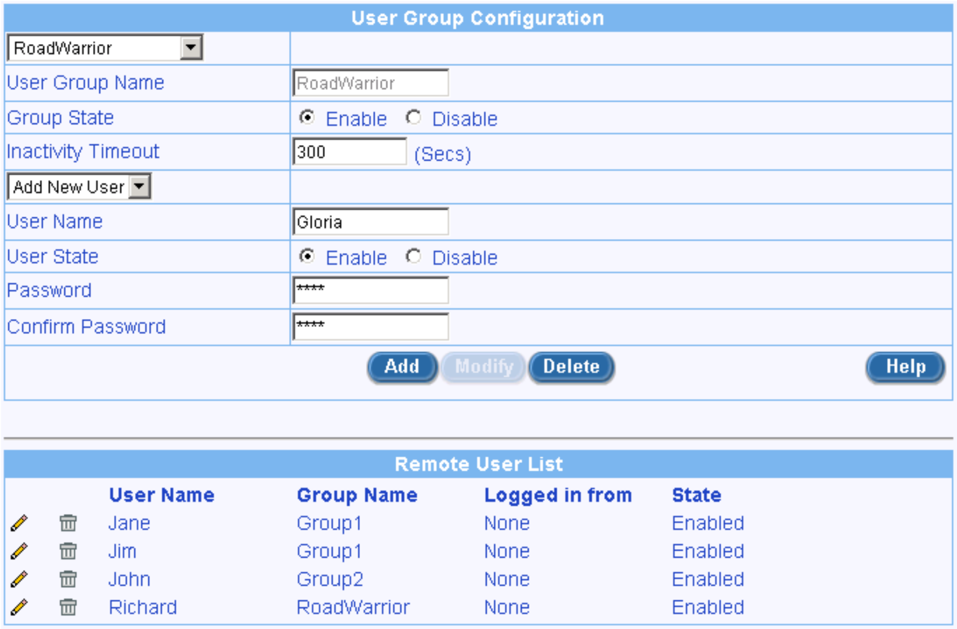


Figure 10.7. Network Diagram for Inbound Remote Access

10.5 Configure Firewall for Remote Access

Remote Access is usually used to support mobile users of a company to access their corporate network without compromising on security. The steps required for configuring the RX3041H for remote access is best explained with an example. The following shows the steps required to configure the RX3041H for the remote users, Richard and Gloria, to access the FTP server located in the protected network, i.e. corporate LAN. Figure 10.7 shows the network diagram for this example.

1. Create remote access users and groups if necessary. Figure 10.8 illustrates the creation of a new user, Gloria. For details on how to add new users and/or new user group for remote access, please refer to section 10.2 Manage User Groups and Users.



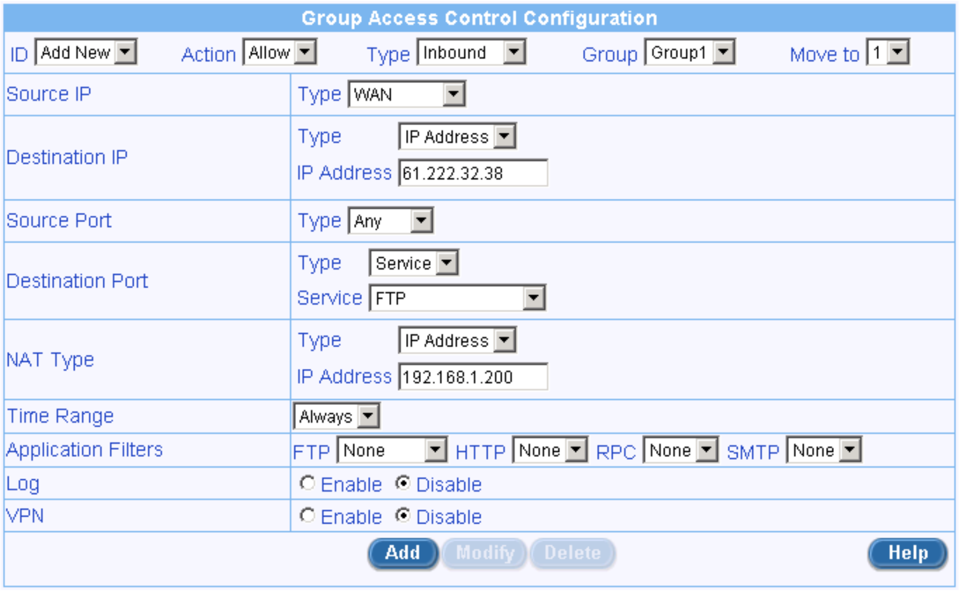
User Group Configuration

RoadWarrior	
User Group Name	RoadWarrior
Group State	● Enable ○ Disable
Inactivity Timeout	300 (Secs)
Add New User	
User Name	Gloria
User State	● Enable ○ Disable
Password	****
Confirm Password	****

Remote User List

		User Name	Group Name	Logged in from	State
✎	🗑	Jane	Group1	None	Enabled
✎	🗑	Jim	Group1	None	Enabled
✎	🗑	John	Group2	None	Enabled
✎	🗑	Richard	RoadWarrior	None	Enabled

Figure 10.8. User and User Group Configuration Example



Group Access Control Configuration

ID Add New   Action Allow   Type Inbound   Group Group1   Move to 1

Source IP	Type WAN
Destination IP	Type IP Address IP Address 61.222.32.38
Source Port	Type Any
Destination Port	Type Service Service FTP
NAT Type	Type IP Address IP Address 192.168.1.200
Time Range	Always
Application Filters	FTP None HTTP None RPC None SMTP None
Log	○ Enable ● Disable
VPN	○ Enable ● Disable

Figure 10.9. Group ACL Configuration Example

2. Create an inbound group ACL rule (see Figure 10.9) to allow remote access users, Richard and Gloria, to access FTP server in the corporate network.

3. Remote users, Richard and Gloria, can then login into the RX3041H to access the FTP server by entering the following URL in the browser:

http://61.222.32.38/login

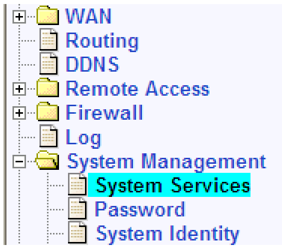
11 System Management

This chapter describes the following administrative tasks that you can perform using the Configuration Manager:

- Configure system services
- Modify password and add management hosts
- Modify system specific information
- Modify system date and time
- Reset, backup and restore system configuration
- Update firmware
- Log out of the Configuration Manager

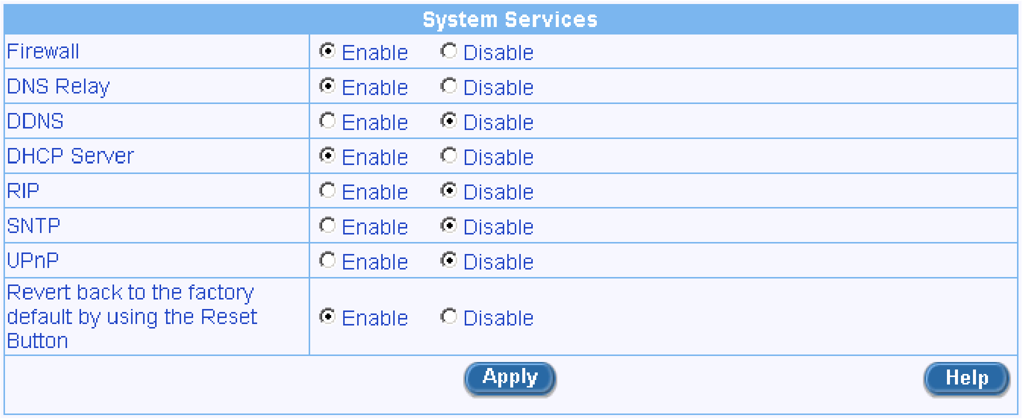
You can access these tasks from the System Management menu.

11.1 Configure System Services



As shown in Figure 11.1, you can use the System Services configuration page to enable or disable services supported by the router. All services, except DDNS, RIP, SNTP and uPnP, are all enabled at the factory. To disable or enable individual service, follow the steps below:

1. Open the System Services configuration page by clicking the **System Management ➔ System Services** menu.
2. Click on the "Enable" or "Disable" radio button for individual service to enable or disable the desired service.



System Services	
Firewall	● Enable ○ Disable
DNS Relay	● Enable ○ Disable
DDNS	○ Enable ● Disable
DHCP Server	● Enable ○ Disable
RIP	○ Enable ● Disable
SNTP	○ Enable ● Disable
UPnP	○ Enable ● Disable
Revert back to the factory default by using the Reset Button	● Enable ○ Disable

Figure 11.1. System Services Configuration

3. Click on Apply button to save the settings.

11.2 Change the Login Password and Management Station IP Addresses

11.2.1 Change the Login Password

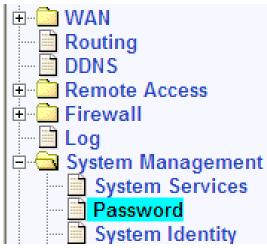
The first time you log into the Configuration Manager, you use the default username and password: *admin* and *admin*. The system allows two types of users – administrator (username: admin) and guest (username: guest).

Administrator has the privilege to modify the system settings while guest can only view the system settings. Passwords of both the admin and guest accounts can be changed by the administrator.

Note

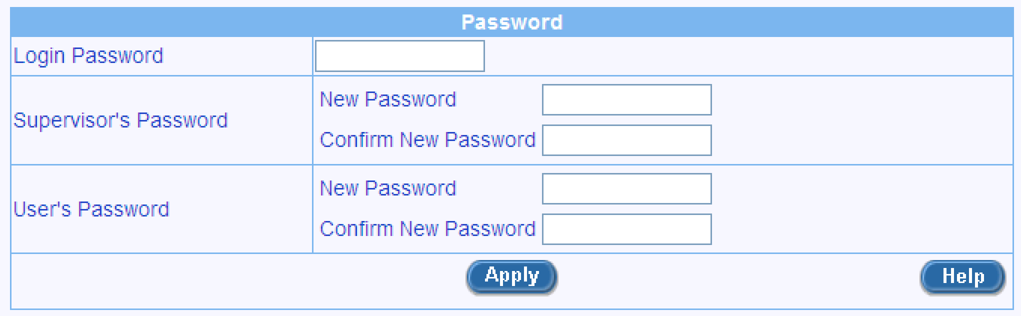
> *This username and password is only used for logging into the Configuration Manager; it is not the same login password that you use to connect to your ISP.*

Follow the instructions below to change password:



1. Open the Password configuration page by clicking the **System Management ➔ Password** menu.
2. Enter existing password in the **Login Password** field.
3. Type the new password in the **New Password** field and again in the **Confirm New Password** field.

   The password can have up to 16 characters long. When logging in, you must type the new password in the same upper and lower case characters that you enter here.



Password		
Login Password		
Supervisor's Password	New Password	
	Confirm New Password	
User's Password	New Password	
	Confirm New Password	

Figure 11.2. Password Configuration

4. Click on Apply button to save the new password. Note that the new password will take effect only after all the fields are entered correctly.

11.2.2 Configure Management Stations

At times, you may want to limit the hosts that can be used to configure the router. The default setting allows the system administrator to login from any computers as long as the username and password are correctly entered. This may provide opportunities for unauthorized users to gain access to the Configuration Manager of the router as long as he or she possesses the knowledge of the correct username and password. You may configure up to 8 groups of management stations in this configuration page using options such as single IP address, IP address range or network address and subnet mask.

WARNING

> *If no management station group is configured, administrator can login from anywhere to the router. However, if one or more management station groups are configured, only those computers specified in the management groups can configure the router. If you forget the configuration of the management group, you will not be able to gain access to the router's Configuration Manager unless the router is reset to the factory settings using the reset button.*

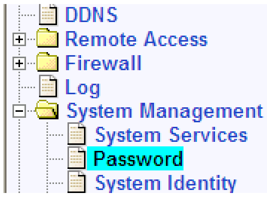
11.2.2.1 Management Station Configuration Parameters

Table 11.1 describes the configuration parameters available for management station configuration.

Table 11.1. Management Station Configuration Parameters

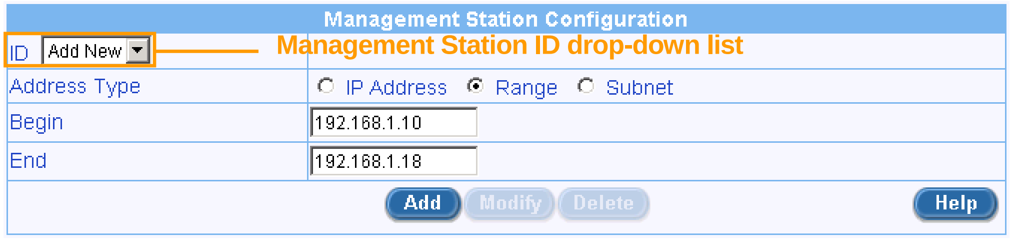
Field	Description
ID	
Add New	Click on this option to add a new management group.
Number	Select a management group from the drop-down list to modify its configuration.
Address Type This option allows you to select how you want to specify the IP addresses for the management station group. Three options are available: IP address, range and subnet.	
IP Address	This option allows you to specify an IP address for a management station.
Address	Specify the an appropriate IP address
Range	This option allows you to specify a range of IP addresses for the management station group. The following fields become available for entry when this option is selected:
Begin	Enter the starting IP address of the range
End	Enter the ending IP address of the range
Subnet	This option allows you to specify all the computers that are connected in an IP subnet to become the management station group. When this option is selected, the following fields become available for entry:
Network Address	Enter the appropriate IP address.
Subnet Mask	Enter the corresponding subnet mask.

11.2.2.2 Add a Management Station Group



To add a management station group, follow the instructions below:

1. Open the Password configuration page by clicking the **System Management ➔ Password** menu.
2. Select "**Add New**" from the "**ID**" drop-down list.
3. Select "Address Type" from among the three options – **IP Address**, **Range** and **Subnet** and then enter the desired IP address information.



Management Station Configuration

ID: Add New

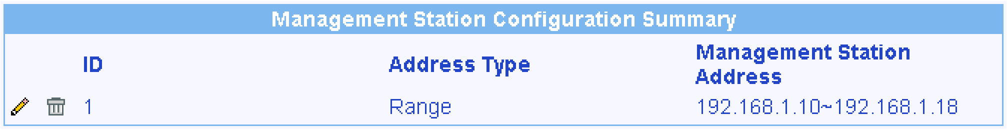
Address Type: ○ IP Address ● Range ○ Subnet

Begin: 192.168.1.10

End: 192.168.1.18

Figure 11.3. Management Station Configuration

4. Click on the Add button to add the new management station group. You will see the newly added management station displayed in the management station summary in the same configuration page.



Management Station Configuration Summary

	ID	Address Type	Management Station Address
✎ 🗑	1	Range	192.168.1.10~192.168.1.18

Figure 11.4. Management Station Summary

11.2.2.3 Modify a Management Station Group

To modify a management station group, follow the instructions below:

1. Open the Password configuration page by clicking the **System Management ➔ Password** menu.
2. Select a management group from the **ID** drop-down list.
3. Make desired changes to the "**Address Type**" and the corresponding IP address information.
4. Click on the Modify button to modify the settings.

11.2.2.4 Delete a Management Station Group

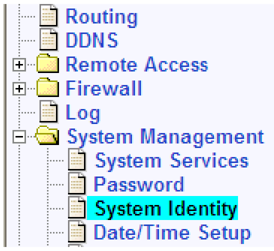
To delete a management station group, just click on the 🗑 in front of the management station group (in the management station summary table) to be deleted or follow the instructions below:

1. Open the Password configuration page by clicking the **System Management ➔ Password** menu.
2. Select a management group number from the "**ID**" drop-down list.
3. Click on the Delete button to delete the management station group.

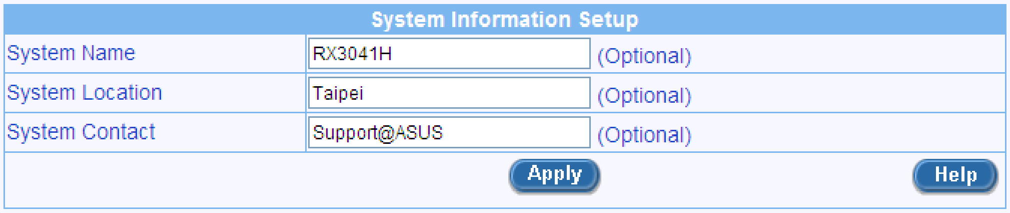
11.3 Configure System Identity

System specific information such as system name (unique name for this device), system location (where this device is located), and contact person information for this device can be modified in the System Identity configuration page.

Follow the instructions below to modify system specific information:



1. Open the System Identity configuration page by clicking the **System Management ➔ System Identity** menu.
2. Change the system name, system location and contact to the desired settings. Note that you may use any alphanumeric characters for these fields.
3. Click on Apply button to save the settings.



System Information Setup

System Name	RX3041H	(Optional)
System Location	Taipei	(Optional)
System Contact	Support@ASUS	(Optional)

Figure 11.5. System Identiy Configuration

11.4 Setup Date and Time

The router keeps a record of the current date and time, which it uses to calculate and report various performance data.

Note

Changing the date and time on the router does not affect the date and time on your PCs.

There is no real time clock inside the router; however, the correct date and time can be obtained from external time servers. You may configure up to 5 time servers. Note that SNTP service must be enabled in the **System Services** configuration page for the router to access external time servers.

11.4.1 Date/Time Configuration Parameters

The following table describes the available configuration parameters for date and time setup.

Table 11.2. Date/Time Configuration Parameters

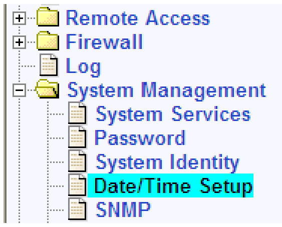
Field	Description
Date	The date is reset to 1/1/2000 whenever the router reboots and no SNTP servers are accessible. Correct date will display in this field if SNTP service is enabled and the configured SNTP servers are accessible.
Time	The time is reset to 00:00:00 after the router reboots and no SNTP servers are accessible. Correct time will display in this field if SNTP service is enabled and the configured SNTP servers are accessible.
Time Zone	Enter the time zone for your region.
SNTP Server 1 – 5	Enter the IP address of the SNTP servers. Up to 5 SNTP servers can be configured for the router to obtain correct date and time.
Update Interval	Enter the update interval in minutes for the router to get the update date and time from the time servers. The default setting is 60 minutes.

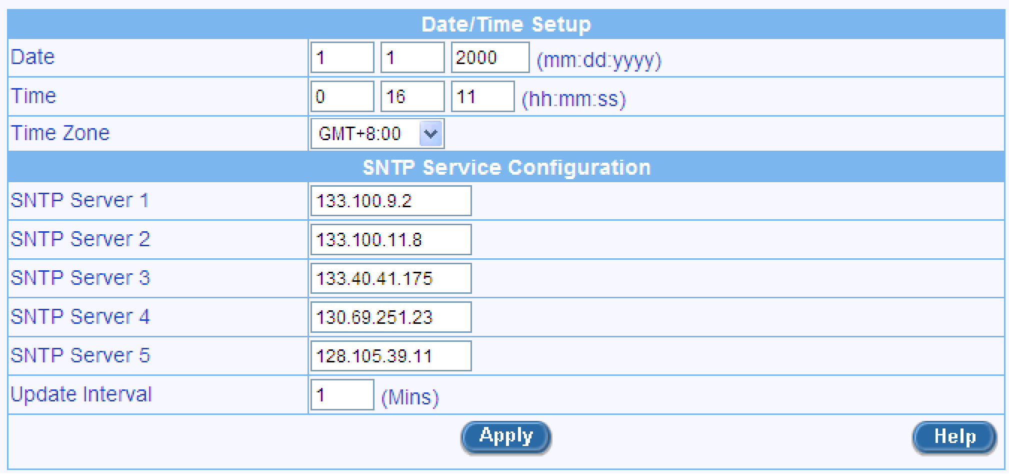
11.4.2 Maintain Date and Time

Date and time can be maintained by the router itself by entering correct date and time in the **Date** and **Time** fields respectively. Note that you must manually set the date and time again each time the RX3041H reboots.

It is recommended that you use external time servers to help maintain the date and time for your router. Follow the instructions below to configure SNTP servers to maintain date and time for your router:

1. Open the Date/Time configuration page by clicking the **System Management ➔ Date/Time** menu.
2. Select a time zone setting from the "**Time Zone**" drop down list for your region.
3. Enter up to 5 SNTP server IP addresses accessible for your region.
4. Enter the time update interval in the "**Update Interval**" field. The default update interval is 60 minutes.





Date/Time Setup	
Date	1 1 2000 (mm:dd:yyyy)
Time	0 16 11 (hh:mm:ss)
Time Zone	GMT+8:00
SNTP Service Configuration	
SNTP Server 1	133.100.9.2
SNTP Server 2	133.100.11.8
SNTP Server 3	133.40.41.175
SNTP Server 4	130.69.251.23
SNTP Server 5	128.105.39.11
Update Interval	1 (Mins)

Figure 11.6. Date and Time Configuration Page

5. Click on Apply button to save the settings.

11.4.3 View the System Date and Time

To view the system date and time, open the Date/Time configuration page by clicking the **System Management ➔ Date/Time** menu.

11.5 SNMP Setup

SNMP (Simple Network Management Protocol) as its name suggests is used for network management. You may use the SNMP configuration page to enable or disable the SNMP support.

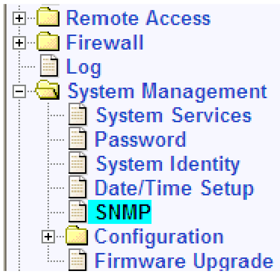
11.5.1 SNMP Configuration Parameters

Table 11.3 describes the configuration parameters available for SNMP setup.

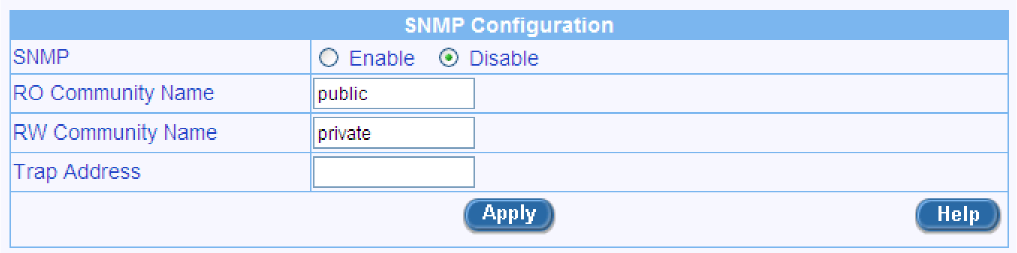
Table 11.3. Fixed DHCP Lease Configuration Parameters

Field	Description
SNMP	Click on the "Enable" or "Disable" radio button to enable or disable the SNMP support.
RO Community Name	Community string is a clear text string that is used as password between the SNMP management station and the RX3041H. This "Read Only" community name is used by the SNMP management station to read the settings in the RX3041H.
RW Community Name	Community string is a clear text string that is used as password between the SNMP management station and the RX3041H. This "Read and Write" community name is used by the SNMP management station to read and configure the settings in the RX3041H.
Trap Address	Trap message is sent by the RX3041H to tell the SNMP management station that something has happened on the RX3041H. This field is used to enter the IP address of the SNMP management station that is supposed to receive trap messages from the RX3041H.

11.5.2 Configuring SNMP



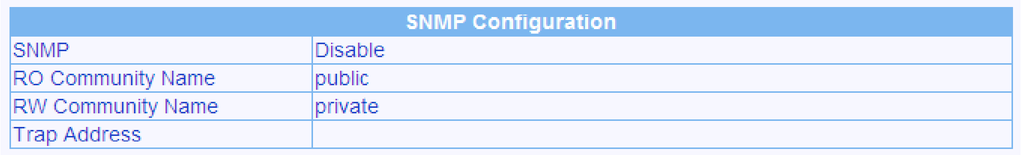
1. Open the SNMP configuration page by clicking the **System Management ➔ SNMP** menu.
2. Click on the "Enable" or "Disable" radio button to enable or disable the SNMP support.
3. Enter the RO (Read Only) and RW (Read and Write) community names.
4. Enter the IP address of the SNMP management station that receives trap messages from the RX3041H.



SNMP Configuration	
SNMP	○ Enable ● Disable
RO Community Name	public
RW Community Name	private
Trap Address	

Figure 11.7. SNMP Configuration

5. Click on Apply button to save the configuration. You can verify your settings in the existing SNMP configuration table displayed at the bottom of the configuration page.



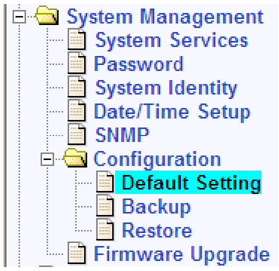
SNMP Configuration	
SNMP	Disable
RO Community Name	public
RW Community Name	private
Trap Address	

Figure 11.8. Existing SNMP Configuration

11.6 System Configuration Management

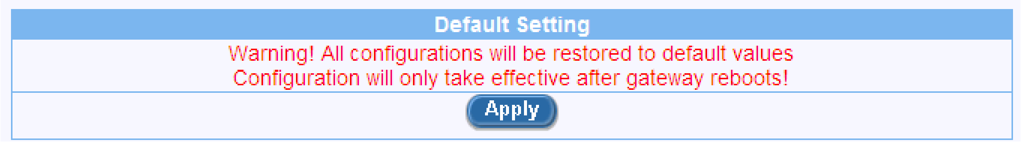
11.6.1 Reset to Factory Settings

11.6.1.1 Reset to Factory Settings Using Configuration Manager



At times, you may want to revert to the factory default settings to eliminate problems resulted from incorrect system configuration. Follow the steps below to reset system configuration:

1. Open the Default Setting configuration page by clicking the **System Management ➔ Configuration ➔ Default Setting** menu.
2. Click on Apply button to set the system configuration back to the factory default settings. Note that the RX3041H will reboot to make the factory default configuration in effect.

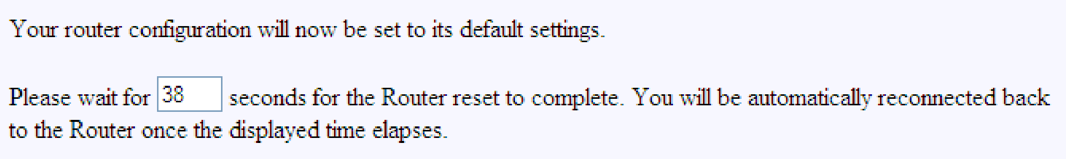


Default Setting

Warning! All configurations will be restored to default values
Configuration will only take effective after gateway reboots!

Figure 11.9. Default Setting Configuration

3. A count down timer will popup as shown below.

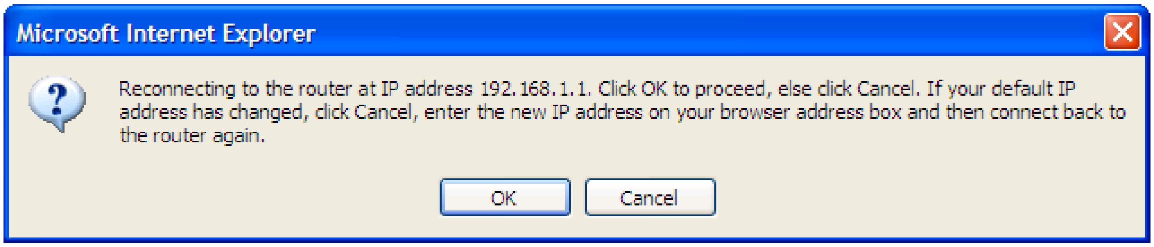


Your router configuration will now be set to its default settings.

Please wait for 38 seconds for the Router reset to complete. You will be automatically reconnected back to the Router once the displayed time elapses.

Figure 11.10. Counter Timer for Default Setting Configuration

4. When the count down timer elapses, a dialog window, as shown below, will pop up. Click on the OK button to reconnect to the router.



Microsoft Internet Explorer

Reconnecting to the router at IP address 192.168.1.1. Click OK to proceed, else click Cancel. If your default IP address has changed, click Cancel, enter the new IP address on your browser address box and then connect back to the router again.

11.6.1.2 Reset to Factory Settings Using Reset Button

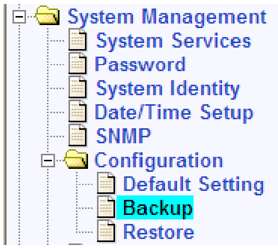
Sometimes, you may find that you have no way to access your router, e.g. you forget your password or you forget the LAN IP address of your router. The only way out in this scenario is to reset the system configuration to the factory settings by following the procedures below using the reset button located on the rear panel:

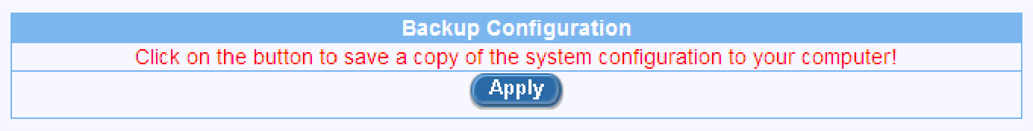
1. Power off the router and wait for at least 5 seconds.
2. Power on the router and wait around 5 seconds, press the reset button (first time).
3. After the ALARM LED flashes once, press the reset button again. You will then see the Alarm LED flash twice in about 5 seconds. This indicates that the RX3041H is about to revert to the factory default settings. If you change your mind, you may press the reset button again or turn the power off to cancel the action. If the system configuration failed to reset to the factory settings, repeat this procedure from step 1.

11.6.2 Backup System Configuration

Follow the steps below to backup system configuration:

1. Open the Backup configuration page by clicking the **System Management ➔ Configuration ➔ Backup** menu.
2. Click on Apply button to backup the system configuration.





Backup Configuration

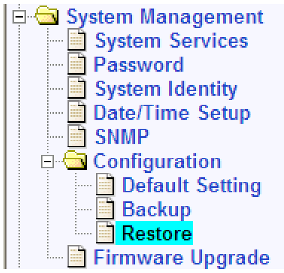
Click on the button to save a copy of the system configuration to your computer!

Figure 11.11. Backup System Configuration

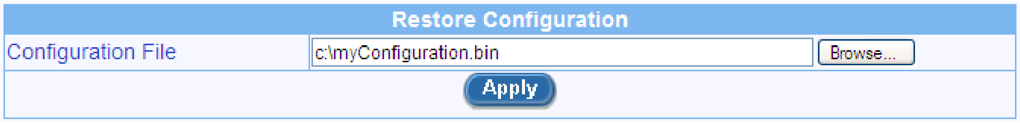
11.6.3 Restore System Configuration

Follow the steps below to backup system configuration:

1. Open the Restore configuration page by clicking the **System Management ➔ Configuration ➔ Restore** menu.



2. Enter the path and name of the system configuration file that you want to restore in the "Configuration File" text field.

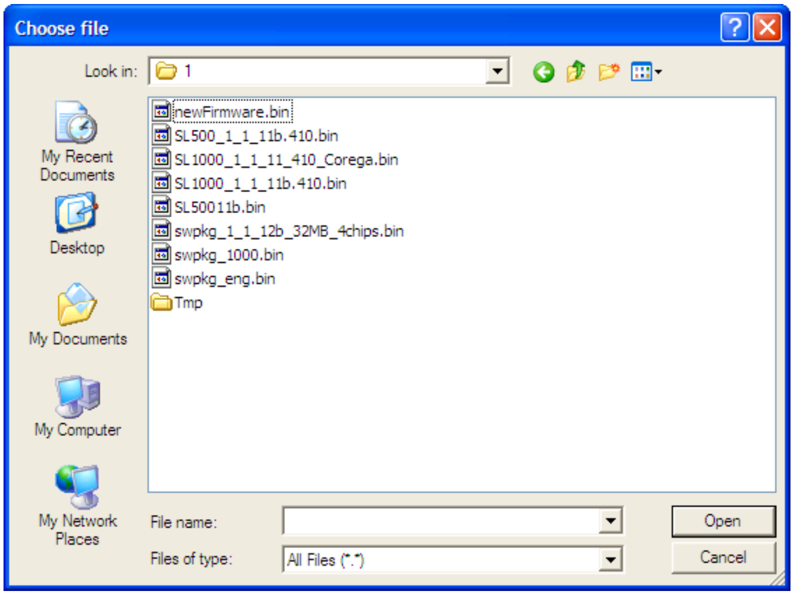


Restore Configuration

Configuration File: c:\myConfiguration.bin

Figure 11.12. Restore System Configuration

Alternatively, you may click on the Browse... button to search for the system configuration file on your hard drive. A window similar to the one shown in Figure 11.13 will pop up for you to select the configuration file to restore.



Choose file

Look in: 1

newFirmware.bin
SL500_1_1_11b.410.bin
SL1000_1_1_11_410_Corega.bin
SL1000_1_1_11b.410.bin
SL50011b.bin
swpkg_1_1_12b_32MB_4chips.bin
swpkg_1000.bin
swpkg_eng.bin
Tmp

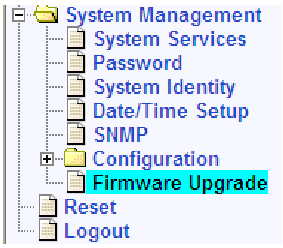
File name:

Files of type: All Files (*.*)

Figure 11.13. Windows File Browser

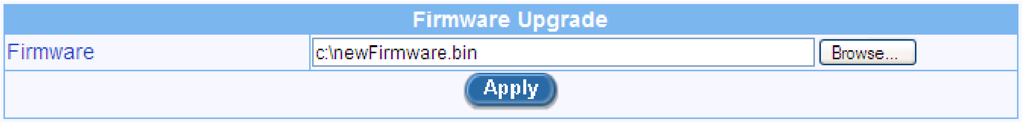
3. Click on Apply button to restore the system configuration. Note that the RX3041H will reboot to make the new system configuration in effect.

11.7 Upgrade Firmware



ASUSTeK may from time to time provide you with an update to the firmware running on the RX3041H. All system software is contained in a single file, called an *image*. Configuration Manager provides an easy way to upload the new firmware image. To upgrade the image, follow this procedure:

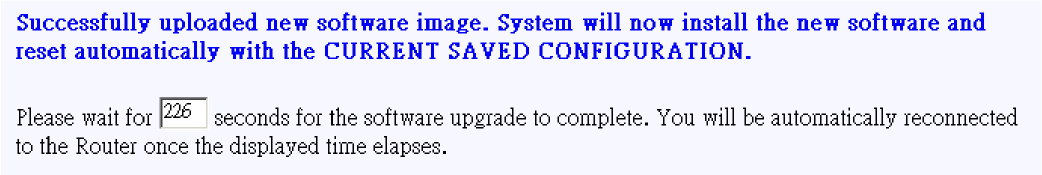
1. Open the Firmware Upgrade page by clicking the **System Management ➔ Firmware Upgrade** menu.
2. In the Firmware text box, enter the path and name of the firmware image file. Alternatively, you may click on Browse... button to search for it on your hard drive. A window similar to the one shown in Figure 11.13 will pop up for you to select the firmware image file.


Firmware Upgrade

Firmware c:\newFirmware.bin

Figure 11.14. Firmware Upgrade Page

3. Click on Apply button to update the firmware; a count down counter will display as illustrated in Figure 11.15. You can reconnect to the RX3041H when the count down timer elapses. If you don't see this counter, the new firmware is not transferred properly to the RX3041H. You'll have to manually reset the RX3041H by pressing the reset button to start all over again. Note: the firmware update process may take up to 3 minutes to complete.


Successfully uploaded new software image. System will now install the new software and reset automatically with the CURRENT SAVED CONFIGURATION.

Please wait for 226 seconds for the software upgrade to complete. You will be automatically reconnected to the Router once the displayed time elapses.

Figure 11.15. Counter Down Counter for Firmware Update

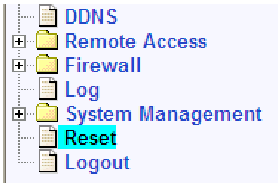
4. When you reconnect to the Configuration Manager, click on the **"System Info"** menu to check if the new firmware is properly upgraded. Note that you may need to clear the cache of your web browser to see the new System Info page. Following is the procedure to clear the browser cache for Microsoft Internet Explorer:

   a) Click on "Tools" menu

   b) Click on "Internet Options…" menu

   c) Click on "Delete Files…" button to clear the browser cache.

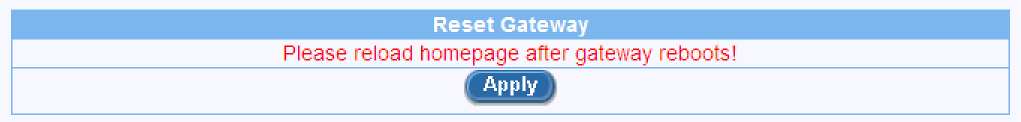
11.8 Reset the RX3041H



Follow the steps below to reboot RX3041H:

1. Open the Router Reset page by clicking the **Reset** menu

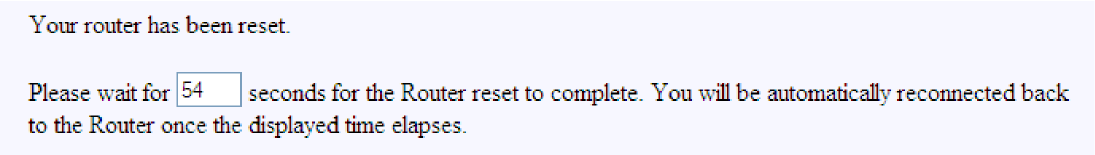
2. Click on the Apply button in the Router Reset page.


Reset Gateway

Please reload homepage after gateway reboots!

Figure 11.16. Router Reset Page

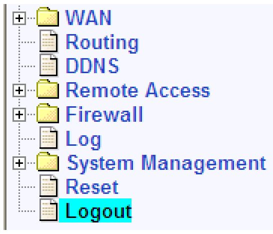
3. Wait for the count down timer, as shown below, to elapse before connecting back to the Configuration Manager


Your router has been reset.

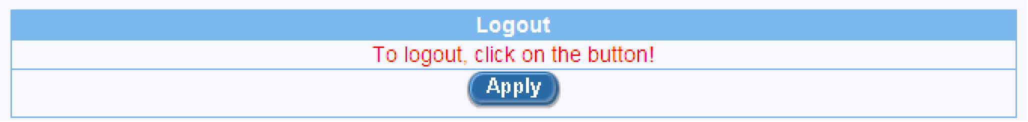
Please wait for 54 seconds for the Router reset to complete. You will be automatically reconnected back to the Router once the displayed time elapses.

Figure 11.17. Count Down Counter for Router Reset

11.9 Logout Configuration Manager



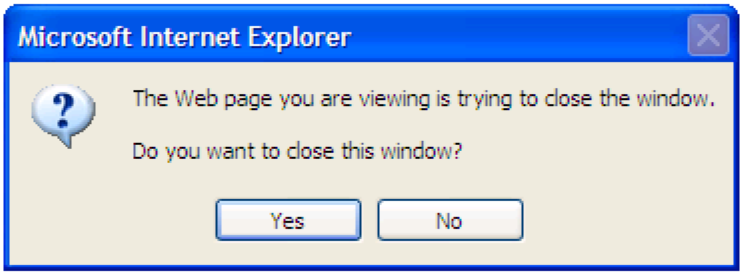
To logout of Configuration Manager, open the Logout page by clicking the **Logout** menu and then click on the Apply button in the Logout page. If you are using IE, a window similar to the one shown in Figure 11.19 will pop up for logout confirmation before closing your browser window.



Logout

To logout, click on the button!

Figure 11.18. Logout Page



Microsoft Internet Explorer

The Web page you are viewing is trying to close the window.

Do you want to close this window?

Figure 11.19. Confirmation for Closing Browser (IE)

.

A ALG Configuration

Table A.1 lists all the supported ALGs (Application Layer Gateway).

Table A.1. Supported ALG

ALG/Application Name	Protocol and Port	Predefined Service Name	Tested Software Version
PC Anywhere	UDP/22	PC-ANYWHERE	pcAnywhere 9.0.0
RTSP-554	TCP/554	RTSP554	RealPlayer 8 Plus QuickTime Version 6
	UDP/53	DNS	
	TCP/80	HTTP	
RTSP-7070	TCP/7070	RTSP7070	RealPlayer 8 Plus
	UDP/53	DNS	QuickTime Version 6
	TCP/80	HTTP	
Net2Phone	UDP/6801	N2P	Net2Phone CommCenter Release 1.5.0
	TCP/80	HTTP	
	TCP/443	HTTPS	
	UDP/53	DNS	
CUSeeMe	TCP/7648	CUSEEME	CUSeeMe Version 5.0.0.043
	TCP/80	HTTP	
	UDP/53	DNS	
Netmeeting	TCP/1720	H323	
	UDP/53	DNS	
Netmeeting with ILS	TCP/1720	H323	Windows Netmeeting Version 3.01 Opengk Version 1.2.0
	TCP/389	ILS	
	UDP/53	DNS	
Netmeeting with GK	TCP/1720	H323	
	UDP/1719	H323GK	
	UDP/53	DNS	
SIP	UDP/5060	SIP	SIP User Agent 2.0
Intel Video Phone	TCP/1720	H323	Intel Video Phone Version 5.0
	UDP/53	DNS	
FTP	TCP/21	FTP	WFTPD version 2.03 Redhat Linux 7.3
	UDP/53	DNS	
Security ALGs			

ALG/Application Name	Protocol and Port	Predefined Service Name	Tested Software Version
L2TP	UDP/1701	L2TP	Windows 2000 Server built-in
	UDP/53	DNS	
PPTP	TCP/1723	PPTP	Windows 2000 Server built-in
	UDP/53	DNS	
IPSec (Only Tunnel Mode with ESP)	UDP/500	IKE	Windows 2000 Server built-in
	ESP		
	UDP/53	DNS	
Chats			
AOL Chat	TCP/ 5190	AOL	AOL Instant Messenger Version 5.0.2938
	TCP/80	HTTP	
	UDP/53	DNS	
ICQ Chat NB: Application should be configured to use TCP/5191	TCP /5191	ICQ_2000	ICQ 2000b
	TCP/80	HTTP	
	UDP/53	DNS	
IRC	TCP/ 6667	IRC	MIRC v6.02
	TCP/80	HTTP	
	UDP/53	DNS	
MSIM	TCP/1863	MSN	MSN Messenger Service Version 3.6.0039
	TCP/80	HTTP	
	UDP/53	DNS	
Games			
Flight Simulator 2002 (Gaming Zone)	TCP/47624	MSG1	Flight Simulator 2002, Professional Edition
	TCP/28801	MSN-ZONE	
	TCP/443	HTTPS	
	TCP/80	HTTP	
	UDP/53	DNS	
Quake II (Gaming Zone)	UDP/ 27910	QUAKE	Quake II
	TCP/28801	MSN-ZONE	
	TCP/443	HTTPS	
	TCP/80	HTTP	
	UDP/53	DNS	
Age Of Empires (Gaming Zone)	TCP/47624	MSG1	Age of Empires, Gold Edition
	TCP/28801	MSN-ZONE	

ALG/Application Name	Protocol and Port	Predefined Service Name	Tested Software Version
	TCP/443	HTTPS	
	TCP/80	HTTP	
	UDP/53	DNS	
Diablo II (BATTLE-NET-TCP, BATTLE-NET-UDP)	TCP/4000	DIABLO-II	Diablo II
	TCP/ 6112	BATTLE-NET-TCP, BATTLE-NET-UDP	
	UDP/53	DNS	
	UDP/6112	Diablo II	
Other common Applications			
POP3	TCP/110	POP3	Outlook Express 5
	UDP/53	DNS	
IMAP	TCP/143	IMAP4	Outlook Express 5
	UDP/53	DNS	
SMTP	TCP/25	SMTP	Outlook Express 5
	UDP/53	DNS	
HTTPS / TLS / SSL	TCP/443	HTTPS	Internet Explorer 5
	TCP/80	HTTP	
	UDP/53	DNS	
LDAP	TCP/389	ILS	Openldap 2.0.25
	UDP/53	DNS	
NNTP	TCP/119	NNTP	Outlook Express 5
	UDP/53	DNS	
Finger	TCP/79	FINGER	Redhat Linux 7.3
	UDP/53	DNS	

B System Specifications

B.1 Hardware Specification

Table B.1. Hardware Specification

AC Adapter	Input	Varied w/ regions. Note your AC adapter only works w/ your region.
	Output	15VAC, 700mA
Memory	Flash	4MB
	SDRM	16MB
Ports	WAN	1 – 10/100Mbps, auto speed negotiation
	LAN	4 – 10/100Mbps, auto MDI/MDIX, auto speed negotiation
	Reset button	For use on system reboot and reset to factory settings
	Console port	For use by ASUS only
Environmental Specification	Operation	Temperature: 0°C ~ 40°C (32°F ~ 105°F)
		Humidity: 10% ~ 90%, non-condensing
	Storage	Temperature: -20°C ~ 65°C (-4°F ~ 149°F)
		Humidity: 10% ~ 90%, non-condensing

B.2 Default Settings

Table B.2 lists the default settings for your router. Parameters not listed in this table do not have default settings.

Table B.2. System Default Settings

LAN		
IP	IP Address	192.168.1.1
	Subnet Mask	255.255.255.0
DHCP Server	IP Address Pool	192.168.1.10 ~ 192.168.1.200
	Subnet Mask	255.255.255.0
	Lease Time	14 days
	Default Gateway	192.168.1.1
	Primary DNS	192.168.1.1
WAN		
Default Connection Mode		PPPoE
PPPoE	Unnumbered PPPoE	Disable

(PPPoE:0, PPPoE:1)	Host Name	RX3041H
	Obtain DNS	Automatically
	MSS Clamping	Enabled, MSS Value – 40 bytes
	Options	Keep Alive, Echo Interval – 60 seconds
Dynamic (DHCP Client)	Host Name	RX3041H
	Obtain DNS	Automatically
	MAC Cloning	Disable
Routing		
Dynamic Routing	RIP	Enable
	Passive Mode	Disable
	RIP Version (Send)	Version 2
	RIP Version (Receive)	Both
	Authentication	Disable
	RIP Authentication Mode	Clear Text
	Authentication Key	admin
Remote Access		
User Group	Inactivity Timeout	300 seconds
Firewall		
Inbound ACL		Deny all inbound traffic
Outbound ACL		Allow all outbound traffic, NAT – WAN interface, Time Ranges – always, Application Filtering – none, Log - disable
URL Filter		Enable
	Proxy Port	80
Advanced ➔ Self Access		From LAN: ICMP; TCP 23, 80, 10081; UDP 161, 162, 53
Advanced ➔ DoS	Enable	SYN Flooding, ICMP Verbose, Max IP Fragment Count – 45, Min IP Fragment Size – 512 bytes
	Disable	Winnuke, MIME Flood, FTP Bounce, IP Unaligned Time-stamp, Sequence Number Prediction Check, Sequence Number Out-of-range Check, ICMP Verbose
Log		
	File	Enable for Access, System and Firewall
	Log File Backup via Email	Disable
	Email	Disable
	Syslog Server	Disable

System Management		
System Services	Enable	Firewall, DNS Relay, DHCP Server, Revert back to the factory default by using the Reset button
	Disable	DDNS, RIP, SNTP, UPnP
Password	Administrator	Username: admin (cannot be changed)
		Password: admin
	Guest	Username: guest (cannot be changed)
		Password: guest
System Identity	System Name	RX3041H
Date/Time	Date	1/1/2000 (moth/day/year)
	Time	00:00:00 (hour:min:sec)
	Time Zone	GMT+8:00
	SNTP Update Interval	60 minutes
SNMP		Disable
	RO (Read-Only) Community Name	public
	RW (Read-and-Write) Community Name	private

C IP Addresses, Network Masks, and Subnets

C.1 IP Addresses

Note

> *This section pertains only to IP addresses for IPv4 (version 4 of the Internet Protocol). IPv6 addresses are not covered.*
>
> *This section assumes basic knowledge of binary numbers, bits, and bytes. For details on this subject, see Appendix A.*

IP addresses, the Internet's version of telephone numbers, are used to identify individual nodes (computers or devices) on the Internet. Every IP address contains four numbers, each from 0 to 255 and separated by dots (periods), e.g. 20.56.0.211. These numbers are called, from left to right, field1, field2, field3, and field4.

This style of writing IP addresses as decimal numbers separated by dots is called *dotted decimal notation*. The IP address 20.56.0.211 is read "twenty dot fifty-six dot zero dot two-eleven."

C.1.1 Structure of an IP address

IP addresses have a hierarchical design similar to that of telephone numbers. For example, a 7-digit telephone number starts with a 3-digit prefix that identifies a group of thousands of telephone lines, and ends with four digits that identify one specific line in that group.

Similarly, IP addresses contain two kinds of information.

- *Network ID*
  Identifies a particular network within the Internet or Intranet
- *Host ID*
  Identifies a particular computer or device on the network

The first part of every IP address contains the network ID, and the rest of the address contains the host ID. The length of the network ID depends on the network's *class* (see following section). Table C.1 shows the structure of an IP address.

Table C.1. IP Address structure

	Field1	**Field2**	**Field3**	**Field4**
Class A	Network ID	Host ID		
Class B	Network ID		Host ID	
Class C	Network ID			Host ID

Here are some examples of valid IP addresses:

Class A: 10.30.6.125 (network = 10, host = 30.6.125)
Class B: 129.88.16.49 (network = 129.88, host = 16.49)
Class C: 192.60.201.11 (network = 192.60.201, host = 11)

C.2 Network classes

The three commonly used network classes are A, B, and C. (There is also a class D but it has a special use beyond the scope of this discussion.) These classes have different uses and characteristics.

Class A networks are the Internet's largest networks, each with room for over 16 million hosts. Up to 126 of these huge networks can exist, for a total of over 2 billion hosts. Because of their huge size, these networks are used for WANs and by organizations at the infrastructure level of the Internet, such as your ISP.

Class B networks are smaller but still quite large, each able to hold over 65,000 hosts. There can be up to 16,384 class B networks in existence. A class B network might be appropriate for a large organization such as a business or government agency.

Class C networks are the smallest, only able to hold 254 hosts at most, but the total possible number of class C networks exceeds 2 million (2,097,152 to be exact). LANs connected to the Internet are usually class C networks.

Some important notes regarding IP addresses:

- The class can be determined easily from field1:

field1 = 1-126:	Class A
field1 = 128-191:	Class B
field1 = 192-223:	Class C

  (field1 values not shown are reserved for special uses)

- A host ID can have any value except all fields set to 0 or all fields set to 255, as those values are reserved for special uses.

C.3 Subnet masks

Definition
mask

A mask *looks like a regular IP address, but contains a pattern of bits that tells what parts of an IP address are the network ID and what parts are the host ID: bits set to 1 mean "this bit is part of the network ID" and bits set to 0 mean "this bit is part of the host ID."*

Subnet masks are used to define *subnets* (what you get after dividing a network into smaller pieces). A subnet's network ID is created by "borrowing" one or more bits from the host ID portion of the address. The subnet mask identifies these host ID bits.

For example, consider a class C network 192.168.1. To split this into two subnets, you would use the subnet mask:

255.255.255.128

It's easier to see what's happening if we write this in binary:

11111111. 11111111. 11111111.10000000

As with any class C address, all of the bits in field1 through field 3 are part of the network ID, but note how the mask specifies that the first bit in field 4 is also included. Since this extra bit has only two values (0 and 1), this means there are two subnets. Each subnet uses the remaining 7 bits in field4 for its host IDs, which range from 0 to 127 (instead of the usual 0 to 255 for a class C address).

Similarly, to split a class C network into four subnets, the mask is:

255.255.255.192 or 11111111. 11111111. 11111111.11000000

The two extra bits in field4 can have four values (00, 01, 10, 11), so there are four subnets. Each subnet uses the remaining six bits in field4 for its host IDs, ranging from 0 to 63.

Note

Sometimes a subnet mask does not specify any additional network ID bits, and thus no subnets. Such a mask is called a default subnet mask*. These masks are:*

Class A:	*255.0.0.0*
Class B:	*255.255.0.0*

Class C: 255.255.255.0

These are called default *because they are used when a network is initially configured, at which time it has no subnets.*

D Troubleshooting

This appendix suggests solutions for problems you may encounter in installing or using the RX3041H, and provides instructions for using several IP utilities to diagnose problems.

Contact Customer Support if these suggestions do not resolve the problem.

Problem	Troubleshooting Suggestion
LEDs	
Power LED does not illuminate after product is turned on.	Verify that you are using the AC adapter provided with your router and that it is securely connected to your router and a power outlet or a power strip.
LINK WAN LED does not illuminate after Ethernet cable is attached.	Verify that an Ethernet cable like the one provided is securely connected to the Ethernet port of your ADSL or cable modem and the WAN port of the router. Make sure that your ADSL or cable modem is powered on. Wait around 30 seconds to allow the router to negotiate a connection with your broadband modem.
LINK LAN LED does not illuminate after Ethernet cable is attached.	Verify that the Ethernet cable is securely connected to your LAN hub or PC and to the RX3041H. Make sure the PC and/or hub is turned on. Verify that your cable is sufficient for your network requirements. A 100 Mbit/sec network (100BaseTx) should use cables labeled Cat 5. 10Mbit/sec cables may tolerate lower quality cables.
Internet Access	
PC cannot access Internet	Use the ping utility, discussed in the following section, to check whether your PC can communicate with the router (by default, the LAN IP address of the router is 192.168.1.1). If it cannot, check the Ethernet cabling. If your PC can communicate with the router, verify the following: • Check that the gateway IP address configured on your computer is the router's LAN IP address (see the Quick Start Guide chapter, Part 2 for instructions on viewing the IP information.) If it is not, correct the default gateway IP address or configure your PC to receive the default gateway IP address automatically from the router. • Verify with your ISP that the DNS server configured on the router is valid. Correct the DNS server IP address if necessary and configure your PC to receive this information automatically from the router. Alternatively, you may also configure a valid DNS server IP address on your PC. • Verify that a Network Address Translation rule has been defined on the router to translate the private address to a

Problem	Troubleshooting Suggestion
	public IP address (usually this public IP address is the WAN IP address). Your PC's IP address must be within the IP range specified in the NAT rules. The default firewall outbound ACL rule includes a NAT rule for all hosts on the LAN.
Configuration Manager Program	
Forget your Configuration Manager user ID or password.	If you have not changed the password from the default, try using "admin" as the user ID and "admin" for the password. Otherwise, you can reset the device to the default configuration by following the instructions provided in section 11.6.1.2 "*Reset to Factory Settings Using Reset Button*". **WARNING:** Resetting to the factory settings removes any custom settings.
Cannot access the Configuration Manager from your browser*.*	Use the ping utility, discussed in the following section, to check whether your PC can communicate with the router (by default, the LAN IP address of your router is 192.168.1.1). If it cannot, check the Ethernet cabling. Verify that you are using Internet Explorer v5.5, Netscape 7.0.2 or later. Support for Javascript® must be enabled in your browser. Support for Java® may also be required. Verify that the PC's IP address is assigned as being on the same subnet as the IP address assigned to the LAN port of the router.
Changes to Configuration *Manager are not being retained.*	Be sure to click on Apply button to save changes.

D.1 Diagnosing Problem using IP Utilities

D.1.1 Ping

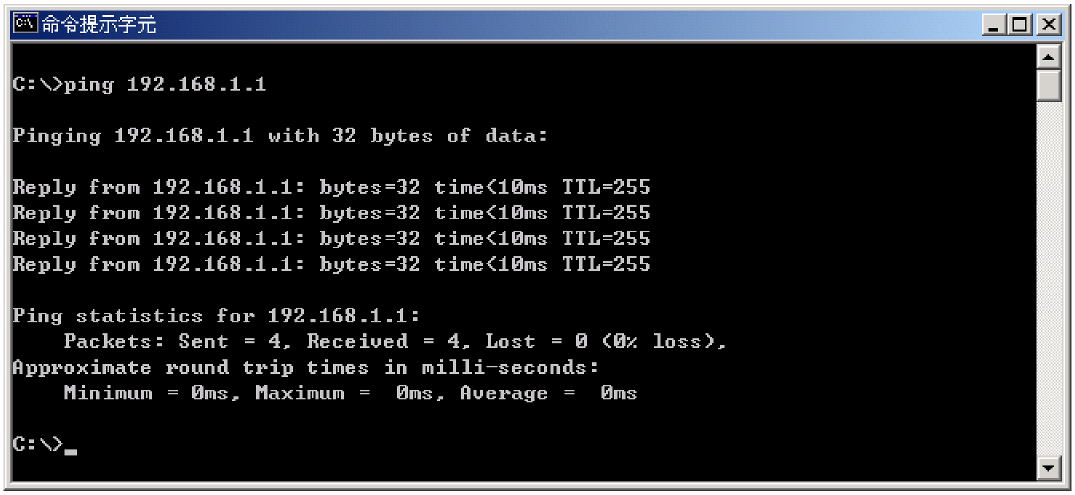
Ping is a command you can use to check whether your PC can recognize other computers on your network and the Internet. A ping command sends a message to the computer you specify. If the computer receives the message, it sends messages in reply. To use it, you must know the IP address of the computer with which you are trying to communicate.

On Windows-based computers, you can execute a ping command from the Start menu. Click the Start button, and then click Run. In the Open text box, type a statement such as the following:

```
ping 192.168.1.1
```

Click OK. You can substitute any private IP address on your LAN or a public IP address for an Internet site, if known.

If the target computer receives the message, a Command Prompt window displays like that shown in Figure D.1.



```
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<10ms TTL=255
Reply from 192.168.1.1: bytes=32 time<10ms TTL=255
Reply from 192.168.1.1: bytes=32 time<10ms TTL=255
Reply from 192.168.1.1: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms

C:\>_
```

Figure D.1. Using the ping Utility

If the target computer cannot be located, you will receive the message "Request timed out."

Using the ping command, you can test whether the path to the RX3041H is working (using the preconfigured default LAN IP address 192.168.1.1) or another address you assigned.

You can also test whether access to the Internet is working by typing an external address, such as that for www.yahoo.com (216.115.108.243). If you do not know the IP address of a particular Internet location, you can use the nslookup command, as explained in the following section.

From most other IP-enabled operating systems, you can execute the same command at a command prompt or through a system administration utility.

D.1.2 Nslookup

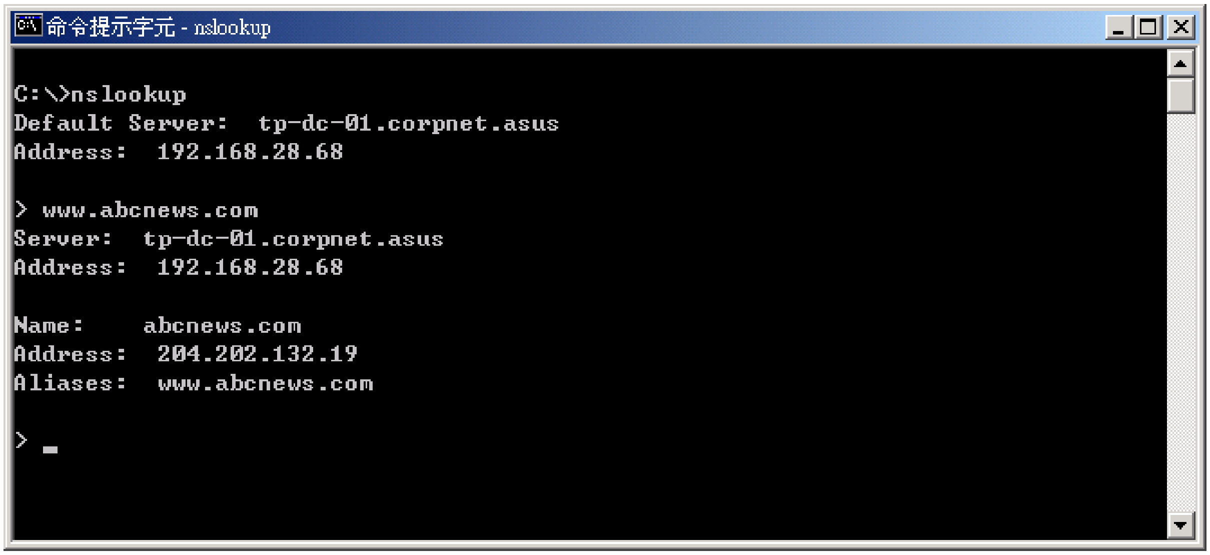
You can use the nslookup command to determine the IP address associated with an Internet site name. You specify the common name, and the nslookup command looks up the name on your DNS server (usually located with your ISP). If that name is not an entry in your ISP's DNS table, the request is then referred to another higher-level server, and so on, until the entry is found. The server then returns the associated IP address.

On Windows-based computers, you can execute the nslookup command from the Start menu. Click the Start button, and then click Run. In the Open text box, type the following:

nslookup

Click OK. A Command Prompt window displays with a bracket prompt (>). At the prompt, type the name of the Internet address you are interested in, such as www.absnews.com.

The window will display the associate IP address, if known, as shown in Figure D.2.



```
C:\>nslookup
Default Server:  tp-dc-01.corpnet.asus
Address:  192.168.28.68

> www.abcnews.com
Server:  tp-dc-01.corpnet.asus
Address:  192.168.28.68

Name:    abcnews.com
Address:  204.202.132.19
Aliases:  www.abcnews.com

> _
```

Figure D.2. Using the nslookup Utility

There may be several addresses associated with an Internet name. This is common for web sites that receive heavy traffic; they use multiple, redundant servers to carry the same information.

To exit from the nslookup utility, type **exit** and press **<Enter>** at the command prompt.

E Glossary

10BASE-T A designation for the type of wiring used by Ethernet networks with a data rate of 10 Mbps. Also known as Category 3 (CAT 3) wiring. *See also data rate, Ethernet*.

100BASE-T A designation for the type of wiring used by Ethernet networks with a data rate of 100 Mbps. Also known as Category 5 (CAT 5) wiring. *See also data rate, Ethernet*.

ADSL Asymmetric Digital Subscriber Line
The most commonly deployed "flavor" of DSL for home users. The term asymmetrical refers to its unequal data rates for downloading and uploading (the download rate is higher than the upload rate). The asymmetrical rates benefit home users because they typically download much more data from the Internet than they upload.

authenticate To verify user's identity, such as by prompting for a password.

binary The "base two" system of numbers, that uses only two digits, 0 and 1, to represent all numbers. In binary, the number 1 is written as 1, 2 as 10, 3 as 11, 4 as 100, etc. Although expressed as decimal numbers for convenience, IP addresses in actual use are binary numbers; e.g., the IP address 209.191.4.240 is 11010001.10111111.00000100.11110000 in binary. *See also bit, IP address, network mask*.

bit Short for "binary digit," a bit is a number that can have two values, 0 or 1. *See also binary*.

bps bits per second

broadband A telecommunications technology that can send different types of data over the same medium. DSL is a broadband technology.

broadcast To send data to all computers on a network.

DHCP Dynamic Host Configuration Protocol
DHCP automates address assignment and management. When a computer connects to the LAN, DHCP assigns it an IP address from a shared pool of IP addresses; after a specified time limit, DHCP returns the address to the pool.

DHCP relay Dynamic Host Configuration Protocol relay
A DHCP relay is a computer that forwards DHCP data between computers that request IP addresses and the DHCP server that assigns the addresses. Each of the RX3041H's interfaces can be configured as a DHCP relay. *See DHCP*.

DHCP server Dynamic Host Configuration Protocol server
A DHCP server is a computer that is responsible for assigning IP addresses to the computers on a LAN. *See DHCP*.

DNS Domain Name System
The DNS maps domain names into IP addresses. DNS information is distributed hierarchically throughout the Internet among computers called DNS servers. When you start to access a web site, a DNS server looks up the requested domain name to find its corresponding IP address. If the DNS server cannot find the IP address, it communicates with higher-level DNS servers to determine the IP address. *See also domain name.*

domain name A domain name is a user-friendly name used in place of its associated IP address. For example, www.hinet.net is the domain name associated with IP address 168.95.1.88. Domain names must be unique; their assignment is controlled by the Internet Corporation for Assigned Names and Numbers (ICANN). Domain names are a key element of URLs, which identify a specific file at a web site, e.g., http://www.asus.com. *See also DNS.*

download To transfer data in the downstream direction, i.e., from the Internet to the user.

DSL Digital Subscriber Line
A technology that allows both digital data and analog voice signals to travel over existing copper telephone lines.

Ethernet The most commonly installed computer network technology, usually using twisted pair wiring. Ethernet data rates are 10 Mbps and 100 Mbps. *See also 10BASE-T, 100BASE-T, twisted pair*.

filtering To screen out selected types of data, based on filtering rules. Filtering can be applied in one direction (upstream or downstream), or in both directions.

filtering rule A rule that specifies what kinds of data the a routing device will accept and/or reject. Filtering rules are defined to operate on an interface (or multiple interfaces) and in a particular direction (upstream, downstream, or both).

firewall Any method of protecting a computer or LAN connected to the Internet from intrusion or attack from the outside. Some firewall protection can be provided by packet filtering and Network Address Translation services.

FTP File Transfer Protocol
A program used to transfer files between computers connected to the Internet. Common uses include uploading new or updated files to a web server, and downloading files from a web server.

hop When you send data through the Internet, it is sent first from your computer to a router, and then from one router to another until it finally reaches a router that is directly connected to the recipient. Each individual "leg" of the data's journey is called a hop.

hop count The number of hops that data has taken on its route to its destination. Alternatively, the maximum number of hops that a packet is allowed to take before being discarded (*see also TTL*).

host A device (usually a computer) connected to a network.

HTTP Hyper-Text Transfer Protocol
HTTP is the main protocol used to transfer data from web sites so that it can be displayed by web browsers. *See also web browser, web site*.

ICMP Internet Control Message Protocol
An Internet protocol used to report errors and other network-related information. The ping command makes use of ICMP.

IGMP Internet Group Management Protocol
An Internet protocol that enables a computer to share information about its membership in multicast groups with adjacent routers. A multicast group of computers is one whose members have designated as interested in receiving specific content from the others. Multicasting to an IGMP group can be used to simultaneously update the address books of a group of mobile computer users or to send company newsletters to a distribution list.

Internet The global collection of interconnected networks used for both private and business communications.

intranet A private, company-internal network that looks like part of the Internet (users access information using web browsers), but is accessible only by employees.

IP *See TCP/IP*.

IP address Internet Protocol address
The address of a host (computer) on the Internet, consisting of four numbers, each

from 0 to 255, separated by periods, e.g., 209.191.4.240. An IP address consists of a *network ID* that identifies the particular network the host belongs to, and a *host ID* uniquely identifying the host itself on that network. A network mask is used to define the network ID and the host ID. Because IP addresses are difficult to remember, they usually have an associated domain name that can be specified instead. *See also domain name, network mask*.

ISP Internet **S**ervice **P**rovider
A company that provides Internet access to its customers, usually for a fee.

LAN **L**ocal **A**rea **N**etwork
A network limited to a small geographic area, such as a home, office, or small building.

LED Light Emitting Diode
An electronic light-emitting device. The indicator lights on the front of the RX3041H are LEDs.

MAC address Media Access Control address
The permanent hardware address of a device, assigned by its manufacturer. MAC addresses are expressed as six pairs of characters.

mask *See network mask*.

Mbps Abbreviation for Megabits per second, or one million bits per second. Network data rates are often expressed in Mbps.

NAT Network Address Translation
A service performed by many routers that translates your network's publicly known IP address into a *private* IP address for each computer on your LAN. Only your router and your LAN know these addresses; the outside world sees only the public IP address when talking to a computer on your LAN.

NAT rule A defined method for translating between public and private IP addresses on your LAN.

network A group of computers that are connected together, allowing them to communicate with each other and share resources, such as software, files, etc. A network can be small, such as a *LAN*, or very large, such as the *Internet*.

network mask A network mask is a sequence of bits applied to an IP address to select the network ID while ignoring the host ID. Bits set to 1 mean "select this bit" while bits set to 0 mean "ignore this bit." For example, if the network mask 255.255.255.0 is applied to the IP address 100.10.50.1, the network ID is 100.10.50, and the host ID is 1. *See also binary, IP address, subnet, "IP Addresses Explained" section*.

NIC Network Interface Card
An adapter card that plugs into your computer and provides the physical interface to your network cabling, which for Ethernet NICs is typically an RJ-45 connector. *See Ethernet, RJ-45*.

packet Data transmitted on a network consists of units called packets. Each packet contains a payload (the data), plus overhead information such as where it came from (source address) and where it should go (destination address).

ping Packet Internet (or Inter-Network) Groper
A program used to verify whether the host associated with an IP address is online. It can also be used to reveal the IP address for a given domain name.

port A physical access point to a device such as a computer or router, through which data flows into and out of the device.

PPP Point-to-Point Protocol
A protocol for serial data transmission that is used to carry IP (and other protocol) data

between your ISP and your computer. The WAN interface on the RX3041H uses two forms of PPP called PPPoA and PPPoE. *See also PPPoA, PPPoE*.

PPPoE Point-to-Point Protocol over Ethernet
One of the two types of PPP interfaces you can define for a Virtual Circuit (VC), the other type being PPPoA. You can define one or more PPPoE interfaces per VC.

protocol A set of rules governing the transmission of data. In order for a data transmission to work, both ends of the connection have to follow the rules of the protocol.

remote In a physically separate location. For example, an employee away on travel who logs in to the company's intranet is a remote user.

RIP Routing Information Protocol
The original TCP/IP routing protocol. There are two versions of RIP: version I and version II.

RJ-45 Registered Jack Standard-45
The 8-pin plug used in transmitting data over phone lines. Ethernet cabling usually uses this type of connector.

routing Forwarding data between your network and the Internet on the most efficient route, based on the data's destination IP address and current network conditions. A device that performs routing is called a router.

rule *See filtering rule, NAT rule*.

SDNS Secondary Domain Name System (server)
A DNS server that can be used if the primary DSN server is not available. *See DNS*.

SNMP Simple Network Management Protocol
The TCP/IP protocol used for network management.

subnet A subnet is a portion of a network. The subnet is distinguished from the larger network by a *subnet mask* which selects some of the computers of the network and excludes all others. The subnet's computers remain physically connected to the rest of the parent network, but they are treated as though they were on a separate network. *See also network mask*.

subnet mask A mask that defines a subnet. *See also network mask*.

TCP *See TCP/IP*.

TCP/IP Transmission Control Protocol/Internet Protocol
The basic protocols used on the Internet. TCP is responsible for dividing data up into packets for delivery and reassembling them at the destination, while IP is responsible for delivering the packets from source to destination. When TCP and IP are bundled with higher-level applications such as HTTP, FTP, Telnet, etc., TCP/IP refers to this whole suite of protocols.

Telnet An interactive, character-based program used to access a remote computer. While HTTP (the web protocol) and FTP only allow you to download files from a remote computer, Telnet allows you to log into and use a computer from a remote location.

TFTP Trivial File Transfer Protocol
A protocol for file transfers, TFTP is easier to use than File Transfer Protocol (FTP) but not as capable or secure.

TTL Time To Live
A field in an IP packet that limits the life span of that packet. Originally meant as a time duration, the TTL is usually represented instead as a maximum hop count; each router that receives a packet decrements this field by one. When the TTL reaches zero, the packet is discarded.

twisted pair The ordinary copper telephone wiring long used by telephone companies. It contains one or more wire pairs twisted together to reduce inductance and noise. Each telephone line uses one pair. In homes, it is most often installed with two pairs. For Ethernet LANs, a higher grade called Category 3 (CAT 3) is used for 10BASE-T networks, and an even higher grade called Category 5 (CAT 5) is used for 100BASE-T networks. *See also 10BASE-T, 100BASE-T, Ethernet*.

upstream The direction of data transmission from the user to the Internet.

WAN Wide Area Network
Any network spread over a large geographical area, such as a country or continent. With respect to the RX3041H, WAN refers to the Internet.

Web browser A software program that uses Hyper-Text Transfer Protocol (HTTP) to download information from (and upload to) web sites, and displays the information, which may consist of text, graphic images, audio, or video, to the user. Web browsers use Hyper-Text Transfer Protocol (HTTP). Popular web browsers include Netscape Navigator and Microsoft Internet Explorer. *See also HTTP, web site, WWW*.

Web page A web site file typically containing text, graphics and hyperlinks (cross-references) to the other pages on that web site, as well as to pages on other web sites. When a user accesses a web site, the first page that is displayed is called the *home page*. *See also hyperlink, web site*.

Web site A computer on the Internet that distributes information to (and gets information from) remote users through web browsers. A web site typically consists of web pages that contain text, graphics, and hyperlinks. *See also hyperlink, web page*.

WWW World Wide Web
Also called *(the) Web.* Collective term for all web sites anywhere in the world that can be accessed via the Internet

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