BCM50a Integrated Router Configuration — Advanced

BCM50a

BCM50a Integrated Router

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Preface

Before you begin

This guide is designed to assist you with advanced configuration of your BCM50a Integrated Router for its various applications.

Note: This guide explains how to use the System Management Terminal (SMT) or the command interpreter interface to configure your BCM50a Integrated Router. See the basic manual for how to use the WebGUI to configure your BCM50a Integrated Router. Not all features can be configured through all interfaces.

The SMT parts of this manual contain background information solely on features not configurable by the WebGUI. The WebGUI parts of the basic manual contain background information on features configurable by the WebGUI and the SMT.

Text conventions

This guide uses the following text conventions:

Enter means for you to type one or more characters and press the [ENTER] key. Select or Choose means for you to use one of the predefined choices.
The SMT menu titles and labels are written in **Bold Times New Roman** font.
Menu choices are written in **Bold Arial** font.

A single keystroke is written in Arial font and enclosed in square brackets, for instance, [ENTER] means the Enter key; [ESC] means the escape key and [SPACE BAR] means the space bar. [UP] and [DOWN] are the up and down arrow keys.
Mouse action sequences are denoted using a comma. For example, “click the **Apple** icon, **Control Panels** and then **Modem**” means first click the **Apple** icon, then point your mouse pointer to **Control Panels** and then click **Modem**.

Related publications

For more information about using the BCM50a Integrated Router, refer to the following publications:

- *BCM50a Integrated Router Configuration - Basics* (N0115790)

  The basic manual covers how to use the WebGUI to configure your BCM50a Integrated Router.

- *WebGUI Online Help*

  Embedded WebGUI help for descriptions of individual screens and supplementary information

Hard-copy technical manuals

You can print selected technical manuals and release notes free, directly from the Internet. Go to www.nortel.com/documentation. Find the product for which you need documentation. Then locate the specific category and model or version for your hardware or software product. Use Adobe Reader to open the manuals and release notes, search for the sections you need, and print them on most standard printers. Go to Adobe Systems at www.adobe.com to download a free copy of the Adobe Reader.

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Web Site:
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India	011-5154-2210
Indonesia	0018-036-1004
Japan	0120-332-533
Malaysia	1800-805-380
New Zealand	0800-449-716
Philippines	1800-1611-0063
Singapore	800-616-2004
South Korea	0079-8611-2001
Taiwan	0800-810-500

Thailand	001-800-611-3007
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Chapter 1
Getting to know your BCM50a Integrated Router

This chapter introduces the main features and applications of the BCM50a Integrated Router.

Introducing the BCM50a Integrated Router

The BCM50a Integrated Router is an ideal secure gateway for all data passing between the Internet and the Local Area Network (LAN).

Your BCM50a Integrated Router integrates high-speed 10/100 Megabits per second (Mb/s) autonegotiating LAN interfaces and a high-speed Asymmetrical Digital Subscriber Line Plus (ADSL2+) port into a single package. The BCM50a Integrated Router is ideal for high-speed Internet browsing and making LAN-to-LAN connections to remote networks. By integrating Digital Subscriber Line (DSL) and Network Address Translation (NAT), the BCM50a Integrated Router provides easy installation and Internet access. By integrating firewall and Virtual Private Network (VPN) capabilities, the BCM50a Integrated Router is a complete security solution that protects your Intranet and efficiently manages data traffic on your network.

Features

This section lists the key features of the BCM50a Integrated Router.

Table 1 Feature specifications

Feature	Specification
Number of static routes	12
Number of NAT sessions	4096

Table 1 Feature specifications

Feature	Specification
Number of SUA (Single User Account) servers	12
Number of address mapping rules	10
Number of configurable VPN rules (gateway policies)	10
Number of configurable IPSec VPN IP policies (network policies)	60
Number of concurrent IKE (Internet Key Exchange) Phase 1 Security Associations: These correspond to the gateway policies.	10
Number of concurrent IPSec VPN tunnels (Phase 2 Security Associations): These correspond to the network policies and are also monitorable and manageable. For example, 5 IKE gateway policies could each use 12 IPSec tunnels for a total of 60 phase 2 IPSec VPN tunnels. This total includes both branch office tunnels and VPN client-termination tunnels.	60
Number of IP pools that can be used to assign IP addresses to remote users for VPN client termination	3
Number of configurable split networks for VPN client termination	16
Number of configurable inverse split networks for VPN client termination	16
Number of configurable subnets per split network for VPN client termination	64

Physical features

High-speed Internet access

Your BCM50a Integrated Router supports ADSL2+ (Asymmetrical Digital Subscriber Line) for high transmission speeds and long connection distances.

ADSL standards

- Multimode standard (ANSI (American National Standards Institute) T1.413, Issue 2; G.dmt (G.992.1 Discrete Multitone Modulation)
- EOC (Embedded Operations Channel) specified in ITU-T (Telecommunication Standardization Sector of the International Telecommunications Union) G.992.1
- ADSL2 G.dmt.bis (G.992.3)
- ADSL2+ (G.992.5)

- Extended-reach ADSL (ER ADSL)
- SRA (Seamless Rate Adaptation)
- Autonegotiating rate adaptation
- ADSL physical connection ATM (Asynchronous Transfer Mode) AAL5 (Adaptation Layer type 5)·
- Multiprotocol over AAL5 (Request For Comments (RFC) 2684/1483)
- Support Point-to-Point-Protocol over ATM AAL5 (PPPoA) (RFC 2364)
- PPP over Ethernet support for DSL (Digital Subscriber Line) connection (RFC 2516)
- Support Virtual Circuit (VC) based and LLC (Logical Link Control) based multiplexing
- Support OAM (Operational, Administration and Maintenance) VC Hunt
- I.610 F4/F5 OAM

Networking compatibility

Your BCM50a Integrated Router is compatible with the major ADSL Digital Subscriber Line Access Multiplexer (DSLAM) providers, making configuration as simple as possible.

Multiplexing

The BCM50a Integrated Router supports VC-based and LLC-based multiplexing.

Encapsulation

The BCM50a Integrated Router supports PPPoA (RFC 2364 - PPP over ATM Adaptation Layer 5), RFC 1483 encapsulation over ATM, MAC (Media Access Control) encapsulated routing (ENET encapsulation) as well as PPP over Ethernet (RFC 2516).

Four-Port switch

A combination of switch and router makes your BCM50a Integrated Router a cost-effective and viable network solution. You can connect up to four computers or phones to the BCM50a Integrated Router without the cost of a switch. Use a switch to add more than four computers or phones to your LAN.

Autonegotiating 10/100 Mb/s Ethernet LAN

The LAN interfaces automatically detect if they are on a 10 or a 100 Mb/s Ethernet.

Autosensing 10/100 Mb/s Ethernet LAN

The LAN interfaces automatically adjust to either a crossover or straight through Ethernet cable.

Time and date

Using the BCM50a Integrated Router, you can get the current time and date from an external server when you turn on your BCM50a Integrated Router. You can also set the time manually.

Reset button

There is a 'Cold Reset Router' button that is accessible from the Element Manager Administration/Utilities/Reset page.Use this button to restore the factory default password to setup and the IP address to 192.168.1.1, subnet mask 255.255.255.0, and DHCP server enabled with a pool of 126 IP addresses starting at 192.168.1.2.

Nonphysical features

IPSec VPN capability

Establish Virtual Private Network (VPN) tunnels to connect home or office computers to your company network using data encryption and the Internet; thus providing secure communications without the expense of leased site-to-site lines. VPN is based on the IPSec standard and is fully interoperable with other IPSec-based VPN products.

Nortel Contivity Client Termination

The BCM50a Integrated Router supports VPN connections from computers using Nortel Contivity VPN Client 3.0, 5.01, 5.11, 6.01, 6.02, or 7.01 software.

Certificates

The BCM50a Integrated Router can use certificates (also called digital IDs) to authenticate users. Certificates are based on public-private key pairs. Certificates provide a way to exchange public keys for use in authentication.

SSH

The BCM50a Integrated Router uses the SSH (Secure Shell) secure communication protocol to provide secure encrypted communication between two hosts over an unsecured network.

HTTPS

HyperText Transfer Protocol over Secure Socket Layer, or HTTP over SSL is a web protocol that encrypts and decrypts web sessions. Use HTTPS for secure WebGUI access to the BCM50a Integrated Router.

Firewall

The BCM50a Integrated Router has a stateful inspection firewall with DoS (Denial of Service) protection. By default, when the firewall is activated, all incoming traffic from the WAN (Wide Area Network) to the LAN is blocked unless it is initiated from the LAN. The BCM50a Integrated Router firewall supports TCP/UDP inspection, DoS detection and protection, real time alerts, reports and logs.

Brute force password guessing protection

The BCM50a Integrated Router has a special protection mechanism to discourage brute force password guessing attacks on the BCM50a Integrated Router management interfaces. You can specify a wait time that must expire before you can enter a fourth password after entering three incorrect passwords.

Content filtering

The BCM50a Integrated Router can block web features such as ActiveX controls, Java applets, and cookies, as well as disable web proxies. The BCM50a Integrated Router can block specific URLs by using the keyword feature. The administrator can also define time periods and days during which content filtering is enabled.

Packet filtering

The packet filtering mechanism blocks unwanted traffic from entering or leaving your network.

Universal Plug and Play (UPnP)

Using the standard TCP/IP protocol, the BCM50a Integrated Router and other UPnP-enabled devices can dynamically join a network, obtain an IP address, and convey its capabilities to other devices on the network.

Call scheduling

Configure call time periods to restrict and allow access for users on remote nodes.

PPPoE

PPPoE facilitates the interaction of a host with an Internet modem to achieve access to high-speed data networks through a familiar dial-up networking user interface.

Dynamic DNS support

With Dynamic DNS (Domain Name System) support, you can have a static host name alias for a dynamic IP address, so the host is more easily accessible from various locations on the Internet. You must register for this service with a Dynamic DNS service provider.

IP Multicast

The BCM50a Integrated Router can use IP multicast to deliver IP packets to a specific group of hosts. IGMP (Internet Group Management Protocol) is the protocol used to support multicast groups. The BCM50a Integrated Router supports versions 1 and 2.

IP Alias

Using IP Alias, you can partition a physical network into logical networks over the same Ethernet interface. The BCM50a Integrated Router supports three logical LAN interfaces through its single physical Ethernet LAN interface with the BCM50a Integrated Router itself as the gateway for each LAN network.

Central Network Management

With Central Network Management (CNM), an enterprise or service provider network administrator can manage your BCM50a Integrated Router. The enterprise or service provider network administrator can configure your BCM50a Integrated Router, perform firmware upgrades, and do troubleshooting for you.

SNMP

SNMP (Simple Network Management Protocol) is a protocol used for exchanging management information between network devices. SNMP is a member of the TCP/IP protocol suite. Your BCM50a Integrated Router supports SNMP agent functionality, which means that a manager station can manage and monitor the BCM50a Integrated Router through the network. The BCM50a Integrated Router supports SNMP versions 1 and 2 (SNMPv1 and SNMPv2).

Network Address Translation (NAT)

NAT (Network Address Translation — NAT, RFC 1631) translate multiple IP addresses used within one network to different IP addresses known within another network.

Traffic Redirect

Traffic Redirect forwards WAN traffic to a backup gateway when the BCM50a Integrated Router cannot connect to the Internet, thus acting as an auxiliary backup when your regular WAN connection fails.

Port Forwarding

Use this feature to forward incoming service requests to a server on your local network. You can enter a single port number or a range of port numbers to be forwarded, and the local IP address of the desired server.

DHCP (Dynamic Host Configuration Protocol)

With DHCP (Dynamic Host Configuration Protocol), individual client computers can obtain the TCP/IP configuration at start-up from a centralized DHCP server. The BCM50a Integrated Router has built in DHCP server capability, enabled by default, which means it can assign IP addresses, an IP default gateway, and DNS servers to all systems that support the DHCP client. The BCM50a Integrated Router can also act as a surrogate DHCP server, where it relays IP address assignment from another DHCP server to the clients.

Full network management

The embedded web configurator is an all platform, web based utility that you can use to easily manage and configure the BCM50a Integrated Router. Most functions of the BCM50a Integrated Router are also software configurable through the SMT (System Management Terminal) interface. The SMT is a menu driven interface that you can access over a Telnet connection.

Logging and tracing

The BCM50a Integrated Router supports the following logging and tracing functions to help with management:

- Built in message logging and packet tracing
- Unix syslog facility support

Upgrade BCM50a Integrated Router Firmware

The firmware of the BCM50a Integrated Router can be upgraded manually through the WebGUI.

Embedded FTP and TFTP Servers

The embedded FTP and TFTP servers enable fast firmware upgrades, as well as configuration file backups and restoration.

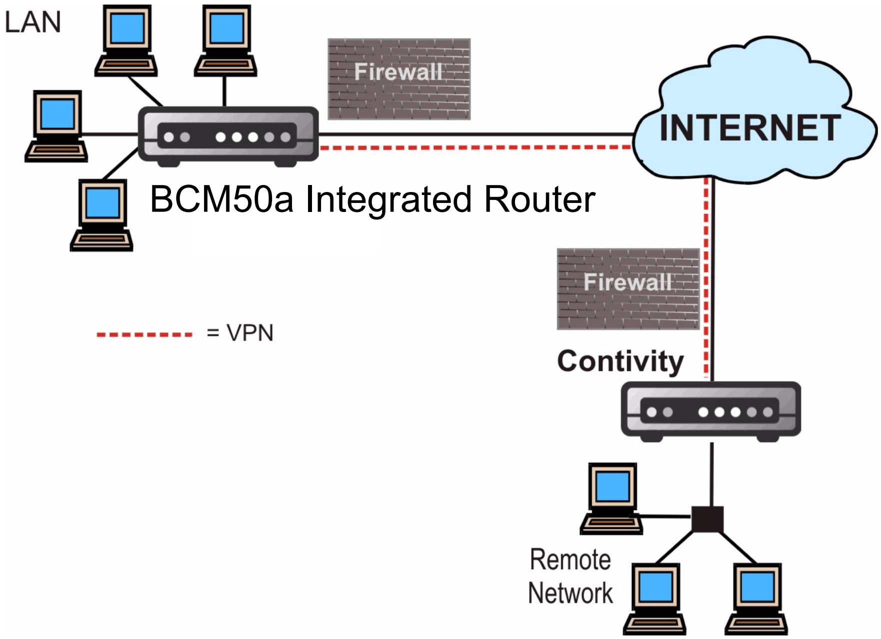
Applications for the BCM50a Integrated Router

Secure broadband internet access and VPN

The BCM50a Integrated Router provides broadband Internet access through ADSL. The BCM50a Integrated Router also provides IP address sharing and a firewall protected local network with traffic management.

The BCM50a Integrated Router VPN is an ideal, cost effective way to connect branch offices and business partners over the Internet without the need (and expense) of leased lines between sites. The LAN computers can share the VPN tunnels for secure connections to remote computers.

Figure 1 Secure Internet Access and VPN Application



Caution: Electro-static Discharge can disrupt the router. Use appropriate handling precautions to avoid ESD. Avoid touching the connectors on the router, particularly when it is in use.

Chapter 2
Introducing the SMT

This chapter explains how to access the System Management Terminal and gives an overview of its menus.

Introduction to the SMT

The BCM50a Integrated Router SMT (System Management Terminal) is a menu-driven interface that you can access over a Telnet connection. This chapter shows you how to navigate the SMT, and how to configure SMT menus.

Initial screen

When you turn on your BCM50a Integrated Router, it performs several internal tests as well as line initialization.

After the tests, the BCM50a Integrated Router asks you to press [ENTER] to continue, as shown in Figure 2.

Figure 2 Initial screen

```
initialize ch =0, ethernet address: 00:A0:C5:22:1A:03
initialize ch =1, ethernet address: 00:A0:C5:22:1A:04
Press ENTER to continue...
```

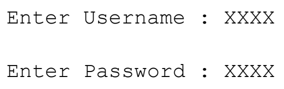
Logging on to the SMT

The logon screen appears after you press [ENTER], prompting you to enter the username, as shown in Figure 3.

Type the username ("nnadmin "is the default) and press [ENTER].

The logon screen prompts you to enter the password.

Figure 3 SMT Login



```
Enter Username : XXXX

Enter Password : XXXX
```

Type the password ("PlsChgMe!" is the default) and press [ENTER]. As you type the password, the screen displays an X for each character you type.

Note that if there is no activity for longer than five minutes after you log on, your BCM50a Integrated Router will automatically log you off and display a blank screen. If you see a blank screen, press [ENTER] to bring up the logon screen again.

Navigating the SMT interface

The SMT is an interface that you use to configure your BCM50a Integrated Router.

Table 2 lists several operations you must be familiar with before attempting to modify the configuration.

Table 2 Main menu commands

Operations	Keystrokes	Descriptions
Move down to another menu	[ENTER]	To move forward to a submenu, type in the number of the desired submenu and press [ENTER].
Move up to a previous menu	[ESC]	Press the [ESC] key to move back to the previous menu.
Move to a "hidden" menu	Press [SPACE BAR] to change **No** to **Yes** then press [ENTER].	Fields beginning with "Edit" lead to hidden menus and have a default setting of **No**. Press [SPACE BAR] to change **No** to **Yes**, and then press [ENTER] to go to a "hidden" menu.

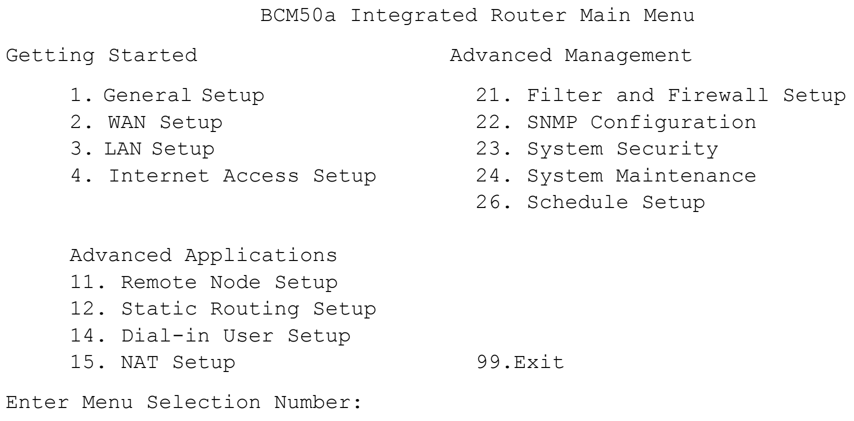
Table 2 Main menu commands

Operations	Keystrokes	Descriptions
Move the cursor	[ENTER] or [UP] or [DOWN] arrow keys	Within a menu, press [ENTER] to move to the next field. You can also use the [UP] or [DOWN] arrow keys to move to the previous or the next fields, respectively. When you are at the top of a menu, press the [UP] arrow key to move to the bottom of a menu.
Entering information	Fill in, or press [SPACE BAR], then press [ENTER] to select from choices.	There are two types of fields. The first requires you to type in the appropriate information. The second allows you to cycle through the available choices by pressing [SPACE BAR].
Required fields	<? >	All fields with the symbol <?> must be filled in order be able to save the new configuration.
N/A fields	<N/A>	Some of the fields in the SMT will show a <N/A>. This symbol refers to an option that is Not Applicable.
Save your configuration	[ENTER]	Save your configuration by pressing [ENTER] at the message “Press ENTER to confirm or ESC to cancel”. Saving the data on the screen will take you, in most cases, to the previous menu. Make sure you save your settings in each screen that you configure.
Exit the SMT	Type 99, then press [ENTER].	Type 99 at the main menu prompt and press [ENTER] to exit the SMT interface.

Main menu

After you enter the password, the SMT displays the BCM50a Integrated Router **Main Menu**, as shown in Figure 4. Not all models have all the features shown.

Figure 4 Main menu



```
                    BCM50a Integrated Router Main Menu

Getting Started                        Advanced Management

     1. General Setup                    21. Filter and Firewall Setup
     2. WAN Setup                        22. SNMP Configuration
     3. LAN Setup                        23. System Security
     4. Internet Access Setup            24. System Maintenance
                                         26. Schedule Setup

     Advanced Applications
     11. Remote Node Setup
     12. Static Routing Setup
     14. Dial-in User Setup
     15. NAT Setup                       99.Exit

Enter Menu Selection Number:
```

Table 3 describes the fields in Figure 4.

Table 3 Main menu summary

No.	Menu Title	Function
1	General Setup	Use this menu to set up dynamic DNS and administrative information.
2	WAN Setup	Use this menu to configure the backup WAN connection.
3	LAN Setup	Use this menu to apply LAN filters, configure LAN DHCP and TCP/IP settings.
4	Internet Access Setup	Configure your Internet Access setup (Internet address, gateway IP address, and logon) with this menu.
11	Remote Node Setup	Use this menu to configure detailed remote node settings (your ISP is also a remote node) as well as apply WAN filters.
12	Static Routing Setup	Configure IP static routes in this menu.
14	Dial-in User Setup	Use this menu to configure the Dial-in User information.
15	NAT Setup	Use this menu to configure Network Address Translation.
21	Filter and Firewall Setup	Configure filters, activate or deactivate the firewall, and view the firewall log.
22	SNMP Configuration	Use this menu to configure SNMP-related parameters.

Table 3 Main menu summary

No.	Menu Title	Function
23	System Security	Use this menu to change your password and enable network user authentication.
24	System Maintenance	From displaying system status to uploading firmware, this menu provides comprehensive system maintenance.
26	Schedule Setup	Use this menu to schedule outgoing calls.
99	Exit	Use this menu to exit (necessary for remote configuration).

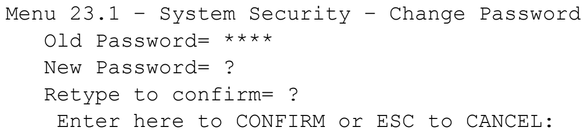
Changing the system password

To change the BCM50a Integrated Router administrator password:.

1 From the main menu, enter 23 to display **Menu 23 – System Security**.

2 Enter 1 to display **Menu 23.1 – System Security – Change Password**.

Figure 5 Menu 23.1 – System Security – Change Password



```
Menu 23.1 - System Security - Change Password
   Old Password= ****
   New Password= ?
   Retype to confirm= ?
    Enter here to CONFIRM or ESC to CANCEL:
```

3 Type your existing system password in the **Old Password** field, and press [ENTER].

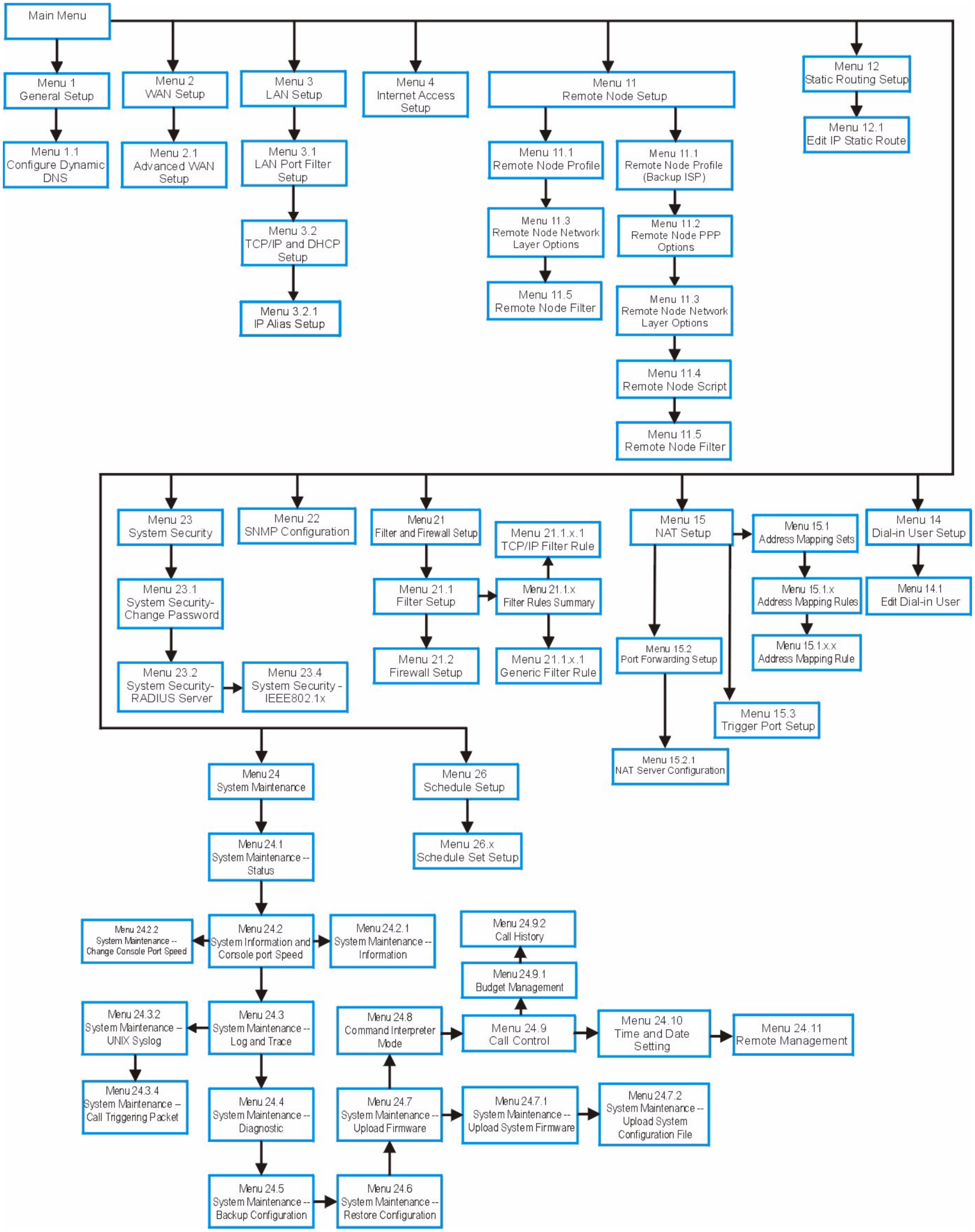
4 Type your new system password in the **New Password** field (up to 30 characters), and press [ENTER].

5 Retype your new system password in the **Retype to confirm** field for confirmation and press [ENTER].

Note that as you type a password, the screen displays an asterisk * for each character you type.

SMT menus at a glance

Figure 6 SMT overview



SMT menu 1 - general setup

Introduction to general setup

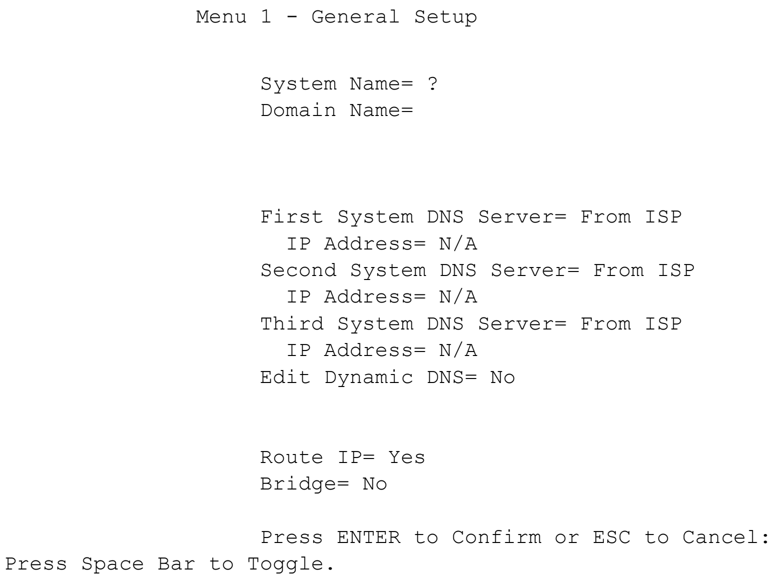
Menu 1 - general setup contains administrative and system-related information.

Configuring general setup

Enter 1 in the main menu to open **Menu 1: general setup**.

The **Menu 1 - General Setup** screen appears, as shown in Figure 7. Fill in the required fields.

Figure 7 Menu 1 – General Setup



```
               Menu 1 - General Setup

                    System Name= ?
                    Domain Name=



                    First System DNS Server= From ISP
                      IP Address= N/A
                    Second System DNS Server= From ISP
                      IP Address= N/A
                    Third System DNS Server= From ISP
                      IP Address= N/A
                    Edit Dynamic DNS= No


                    Route IP= Yes
                    Bridge= No

                    Press ENTER to Confirm or ESC to Cancel:
Press Space Bar to Toggle.
```

Table 4 describes the fields in Figure 7.

Table 4 General setup menu fields

Field	Description	Example
System name	Choose a descriptive name for identification purposes. Nortel recommends you enter your computer name in this field. This name can be up to 30 alphanumeric characters long. Spaces, dashes (-) and underscores (_) are accepted.	BCM50a Integrated Router
Domain name	Enter the domain name (if you know it) here. If you leave this field blank, the ISP assigns a domain name via DHCP. You can go to menu 24.8 and type sys domain name to see the current domain name used by your router. The domain name entered by you is given priority over the ISP-assigned domain name. If you want to clear this field just press [SPACE BAR] and then [ENTER].	nortel.com

Table 4 General setup menu fields

Field	Description	Example
First system DNS server Second system DNS server Third system DNS server	DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa. The DNS server is extremely important because without it, you must know the IP address of a machine before you can access it. The BCM50a Integrated Router uses a system DNS server (in the order you specify here) to resolve domain names for VPN, DDNS and the time server. Press [SPACE BAR] and then [ENTER] to select an option. Select **From ISP** if your ISP dynamically assigns DNS server information (and the BCM50a Integrated Router's WAN IP address). The **IP Address** field below displays the (read-only) DNS server IP address that the ISP assigns. If you chose **From ISP**, but the BCM50a Integrated Router has a fixed WAN IP address, **From ISP** changes to **None** after you save your changes. If you select **From ISP** for the second or third DNS server, but the ISP does not provide a second or third IP address, **From ISP** changes to **None** after you save your changes. Select **User-Defined** if you have the IP address of a DNS server. The IP address can be public or a private address on your local LAN. Enter the DNS server's IP address in the field to the right. A **User-Defined** entry with the IP address set to 0.0.0.0 changes to **None** after you save your changes. A duplicate **User-Defined** entry changes to **None** after you save your changes. Select **None** if you do not want to configure DNS servers. If you do not configure a system DNS server, you must use IP addresses when configuring VPN, DDNS and the time server. Select **Private DNS** if the DNS server has a private IP address and is located behind a VPN peer. Enter the DNS server IP address in the field to the right. With a private DNS server, you must also configure the first DNS server entry in SMT menu 3.1 to use **DNS Relay**.	

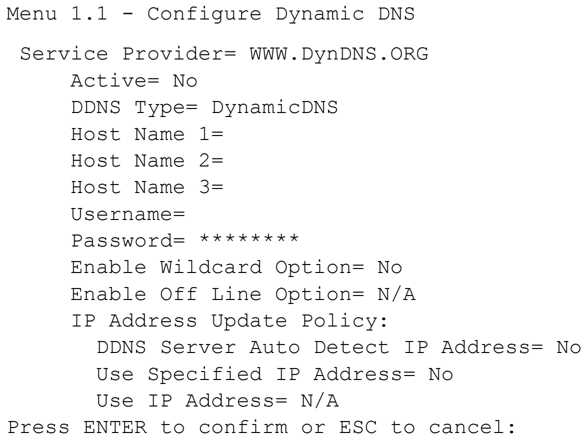
Table 4 General setup menu fields

Field	Description	Example
	You must also configure a VPN branch office rule since the BCM50a Integrated Router uses a VPN tunnel when it relays DNS queries to the private DNS server. One of the rule's IP policies must include the LAN IP address of the BCM50a Integrated Router as a local IP address and the IP address of the DNS server as a remote IP address. A **Private DNS** entry with the IP address set to 0.0.0.0 changes to **None** after you click **Apply**. A duplicate **Private DNS** entry changes to **None** after you save your changes.	
Edit dynamic DNS	Press [SPACE BAR] and then [ENTER] to select **Yes** or **No** (default). Select **Yes** to configure **Menu 1.1: Configure Dynamic DNS,** discussed next.	**No** (default)
	After you complete this menu, press [ENTER] at the prompt "Press ENTER to Confirm…" to save your configuration, or press [ESC] at any time to cancel.	

Configuring dynamic DNS

To configure Dynamic DNS, go to **Menu 1: General Setup** and press [SPACE BAR] to select **Yes** in the **Edit Dynamic DNS** field. Press [ENTER] to display **Menu 1.1— Configure Dynamic DNS** (Figure 8). Not all models have every field shown.

Figure 8 Menu 1.1 – Configure Dynamic DNS



```
Menu 1.1 - Configure Dynamic DNS

 Service Provider= WWW.DynDNS.ORG
     Active= No
     DDNS Type= DynamicDNS
     Host Name 1=
     Host Name 2=
     Host Name 3=
     Username=
     Password= ********
     Enable Wildcard Option= No
     Enable Off Line Option= N/A
     IP Address Update Policy:
       DDNS Server Auto Detect IP Address= No
       Use Specified IP Address= No
       Use IP Address= N/A
Press ENTER to confirm or ESC to cancel:
```

Follow the instructions in Table 5 to configure Dynamic DNS parameters.

Table 5 Configure dynamic DNS menu fields

Field	Description	Example
Service Provider	This is the name of your Dynamic DNS service provider.	www.dyndns.org (default)
Active	Press [SPACE BAR] to select **Yes** and then press [ENTER] to make dynamic DNS active.	Yes
DDNS Type	Press [SPACE BAR] and then [ENTER] to select **DynamicDNS** if you have a dynamic IP addresses. Select **StaticDNS** if you have a static IP addresses. Select **CustomDNS** to have dyns.org provide DNS service for a domain name that you already have from a source other than dyndns.org.	**DynamicDNS** (default)
Host1-3	Enter your host names in the fields provided. You can specify up to two host names separated by a comma in each field.	me.dyndns.org
EMAIL	Enter your e-mail address.	mail@mailserver
User	Enter your username.	
Password	Enter the password assigned to you.	

Table 5 Configure dynamic DNS menu fields

Field	Description	Example
Enable Wildcard	Your BCM50a Integrated Router supports DYNDNS Wildcard. Press [SPACE BAR] and then [ENTER] to select **Yes** or **No** This field is **N/A** when you choose DDNS client as your service provider.	
Offline	This field is only available when **CustomDNS** is selected in the **DDNS Type** field. Press [SPACE BAR] and then [ENTER] to select **Yes**. When **Yes** is selected, http://www.dyndns.org/ traffic is redirected to a URL that you have previously specified (see www.dyndns.org for details).	
IP Address Update Policy:	You can select **Yes** in either the **DDNS Server Auto Detect IP Address** field (recommended) or the **Use Specified IP Address** field, but not both. With the **DDNS Server Auto Detect IP Address** and **Use Specified IP Address** fields both set to **No**, the DDNS server automatically updates the IP address of the host names with the BCM50a Integrated Router's WAN IP address. DDNS does not work with a private IP address. When both fields are set to **No**, the BCM50a Integrated Router must have a public WAN IP address in order for DDNS to work.	
DDNS Server Auto Detect IP Address	Press [SPACE BAR] to select **Yes** and then press [ENTER] to have the DDNS server automatically update the IP address of the host names with the public IP address that the BCM50a Integrated Router uses or is behind. You can set this field to **Yes** whether the IP address is public or private, static or dynamic.	Yes
Use Specified IP Address	Press [SPACE BAR] to select **Yes** and then press [ENTER] to update the IP address of the host names to the IP address specified below. Only select **Yes** if the BCM50a Integrated Router uses or is behind a static public IP address.	No
Use IP Address	Enter the static public IP address if you select **Yes** in the **Use Specified IP Address** field.	N/A
	After you complete this menu, press [ENTER] at the prompt "Press ENTER to Confirm…" to save your configuration, or press [ESC] at any time to cancel.	

The IP address updates when you reconfigure menu 1 or perform DHCP client renewal.

Chapter 3
WAN Setup

This chapter describes how to configure the WAN using Menu 2.

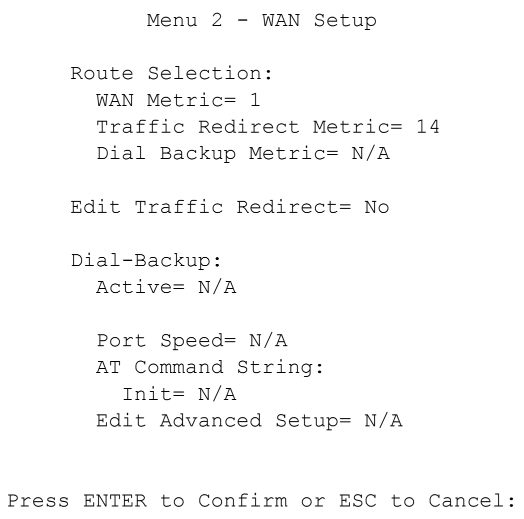
Introduction to WAN setup

This chapter explains how to configure the settings for your WAN port.

WAN setup

From the main menu, enter 2 to open Menu 2.

Figure 9 Menu 2 – WAN Setup



```
                Menu 2 - WAN Setup

          Route Selection:
            WAN Metric= 1
            Traffic Redirect Metric= 14
            Dial Backup Metric= N/A

          Edit Traffic Redirect= No

          Dial-Backup:
            Active= N/A

            Port Speed= N/A
            AT Command String:
              Init= N/A
            Edit Advanced Setup= N/A


     Press ENTER to Confirm or ESC to Cancel:
```

Table 6 describes the fields in Figure 9.

Table 6 Menu 2 WAN setup

Field	**Description**	**Example**
Route Selection:		
WAN Metric Traffic Redirect Metric Dial Backup Metric	The BCM50a Integrated Router uses the connection with the lowest metric value first. The default WAN connection is 1 as your broadband connection through the WAN port must always be your preferred method of accessing the WAN. The default priority of the routes is **WAN**, **Traffic Redirect** and then **Dial Backup** (dial backup does not apply to all BCM50a Integrated Router models): You have two choices for an auxiliary connection, in the event that your regular WAN connection goes down. If **Dial Backup** is preferred to **Traffic Redirect**, then type 14 in the **Dial Backup Metric** field (and leave the **Traffic Redirect Metric** at the default of 15).	1

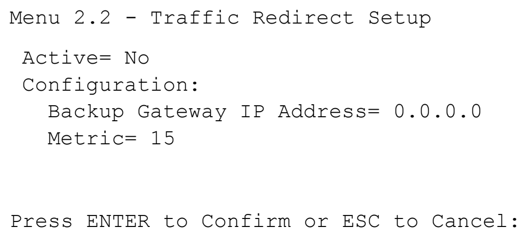
Table 6 Menu 2 WAN setup

Field	**Description**	**Example**
Edit Traffic Redirect	Press [SPACE BAR] to select **Yes** or **No**. Select **No** (default) if you do not want to configure this feature. Select **Yes** and press [ENTER] to configure **Menu 2.2 — Traffic Redirect Setup**.	No
Dial-Backup:	Dial backup does not apply to all BCM50a Integrated Router models.	
Active	Use this field to turn the dial-backup feature on (**Yes**) or off (**No**).	No
Port Speed	Press [SPACE BAR] and then press [ENTER] to select the speed of the connection between the dial backup port and the external device. Available speeds are: **9600**, **19200**, **38400**, **57600**, **115200** or **230400** b/s.	115200
AT Command String:		
Init	Enter the AT command string to initialize the WAN device. Consult the manual of the WAN device connected to your Dial Backup port for specific AT commands.	at&fs0=0
Edit Advanced Setup	To edit the advanced setup for the Dial Backup port, move the cursor to this field; press the [SPACE BAR] to select **Yes** and then press [ENTER] to go to **Menu 2.1 — Advanced Setup**.	Yes
	After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.	

Traffic redirect setup

Configure parameters that determine when the BCM50a Integrated Router forwards WAN traffic to the backup gateway using **Menu 2.2 - Traffic Redirect Setup**.

Figure 10 Menu 2.2 – Traffic Redirect Setup



```
               Menu 2.2 - Traffic Redirect Setup

                Active= No
                Configuration:
                  Backup Gateway IP Address= 0.0.0.0
                  Metric= 15


               Press ENTER to Confirm or ESC to Cancel:
```

Table 7 describes the fields in Figure 10.

Table 7 Menu 2.2 Traffic Redirect Setup

Field	**Description**
Active	Press [SPACE BAR] and select **Yes** (to enable) or **No** (to disable) traffic redirect setup. The default is **No**. If the **Active** field is **Yes**, you must configure every field in this screen unless you are using PPPoE encapsulation (except **Check WAN IP Address** and **Timeout**). If you do not configure these fields and are using PPPoE encapsulation, the BCM50a Integrated Router checks the PPPoE channel to determine if the WAN connection is down.
Configuration:	
Backup Gateway IP Address	Enter the IP address of your backup gateway in dotted decimal notation. The BCM50a Integrated Router automatically forwards traffic to this IP address if the Internet connection of the BCM50a Integrated Router terminates.
Metric	This field sets the priority for this route among the routes the BCM50a Integrated Router uses. The metric represents the cost of transmission. A router determines the best route for transmission by choosing a path with the lowest cost. RIP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. The number must be between 1 and 15; a number greater than 15 means the link is down. The smaller the number, the lower the cost.
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.	

Chapter 4
LAN setup

This chapter describes how to configure the LAN using **Menu 3: LAN Setup**.

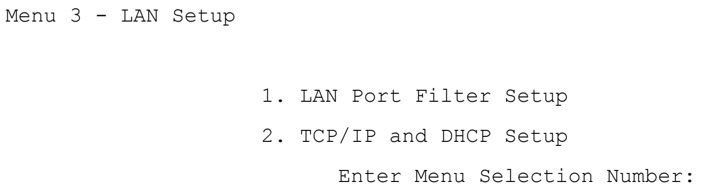
Introduction to LAN setup

This section describes how to configure the BCM50a Integrated Router for LAN connections.

Accessing the LAN menus

From the main menu, enter 3 to open **Menu 3 – LAN setup**

Figure 11 Menu 3 – LAN setup.



```
Menu 3 - LAN Setup


                    1. LAN Port Filter Setup
                    2. TCP/IP and DHCP Setup
                          Enter Menu Selection Number:
```

LAN port filter setup

With Menu 3, you can specify the filter sets that you wish to apply to the LAN traffic. You seldom need to filter the LAN traffic, however, the filter sets are useful to block certain packets, reduce traffic, and prevent security breaches.

Figure 12 Menu 3.1 – LAN Port Filter Setup

```
Menu 3.1 - LAN Port Filter Setup
Input Filter Sets:
  protocol filters=
    device filters=
Output Filter Sets:
  protocol filters=
    device filters=
Press ENTER to Confirm or ESC to Cancel:
```

TCP/IP and DHCP ethernet setup menu

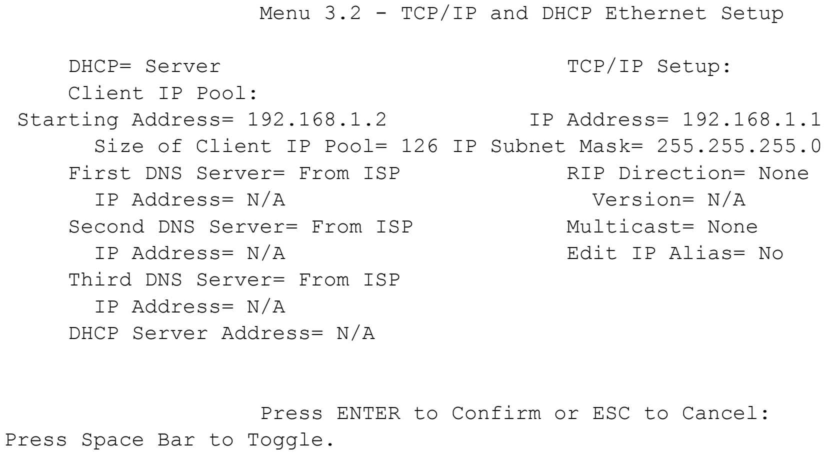
From the main menu, enter 3 to open **Menu 3 - LAN Setup** to configure TCP/IP (RFC 1155) and DHCP Ethernet setup.

Figure 13 Menu 3 – LAN Setup

```
           Menu 3 - LAN Setup


1. LAN Port Filter Setup

2. TCP/IP and DHCP Setup

      Enter Menu Selection Number:
```

From menu 3, select the submenu option **TCP/IP and DHCP Setup** and press [ENTER]. The screen now displays **Menu 3.2: TCP/IP and DHCP Ethernet Setup**, as shown in Figure 14.

Figure 14 Menu 3.2 – TCP/IP and DHCP Ethernet setup



```
                    Menu 3.2 - TCP/IP and DHCP Ethernet Setup

     DHCP= Server                           TCP/IP Setup:
     Client IP Pool:
 Starting Address= 192.168.1.2          IP Address= 192.168.1.1
       Size of Client IP Pool= 126 IP Subnet Mask= 255.255.255.0
     First DNS Server= From ISP             RIP Direction= None
       IP Address= N/A                        Version= N/A
     Second DNS Server= From ISP            Multicast= None
       IP Address= N/A                      Edit IP Alias= No
     Third DNS Server= From ISP
       IP Address= N/A
     DHCP Server Address= N/A


                    Press ENTER to Confirm or ESC to Cancel:
Press Space Bar to Toggle.
```

Follow the instructions in Table 8 to configure the DHCP fields.

Table 8 DHCP Ethernet setup menu fields

Field	**Description**	**Example**
DHCP	This field enables and disables the DHCP server. If set to **Server**, your BCM50a Integrated Router will act as a DHCP server. If set to **None**, the DHCP server will be disabled.	Server
Configuration:		
Client IP Pool Starting Address	This field specifies the first of the contiguous addresses in the IP address pool.	192.168.1.2

Table 8 DHCP Ethernet setup menu fields

Field	Description	Example
Size of Client IP Pool	This field specifies the size or count of the IP address pool.	126
First DNS Server Second DNS Server Third DNS Server	The BCM50a Integrated Router passes a DNS (Domain Name System) server IP address (in the order you specify here) to the DHCP clients. Select **From ISP** if your ISP dynamically assigns DNS server information (and the BCM50a Integrated Router's WAN IP address). The **IP Address** field below displays the (read-only) DNS server IP address that the ISP assigns. If you chose **From ISP**, but the BCM50a Integrated Router has a fixed WAN IP address, **From ISP** changes to **None** after you save your changes. If you chose **From ISP** for the second or third DNS server, but the ISP does not provide a second or third IP address, **From ISP** changes to **None** after you save your changes. Select **User-Defined** if you have the IP address of a DNS server. Enter the DNS server's IP address in the **IP Address** field below. If you chose **User-Defined**, but leave the IP address set to 0.0.0.0, **User-Defined** changes to **None** after you save your changes. If you set a second choice to **User-Defined**, and enter the same IP address, the second **User-Defined** changes to **None** after you save your changes. Select **DNS Relay** to have the BCM50a Integrated Router act as a DNS proxy. The BCM50a Integrated Router's LAN IP address displays in the **IP Address** field below (read-only). The BCM50a Integrated Router tells the DHCP clients on the LAN that the BCM50a Integrated Router itself is the DNS server. When a computer on the LAN sends a DNS query to the BCM50a Integrated Router, the BCM50a Integrated Router forwards the query to the BCM50a Integrated Router's system DNS server (configured in the **SYSTEM General** screen) and relays the response back to the computer. You can only select **DNS Relay** for one of the three servers; if you select DNS Relay for a second or third DNS server, that choice changes to **None** after you save your changes. Select **None** if you do not want to configure DNS servers. If you do not configure a DNS server, you must know the IP address of a machine in order to access it.	

Use the instructions in Table 9 to configure TCP/IP parameters for the LAN port.

Table 9 LAN TCP/IP setup menu fields

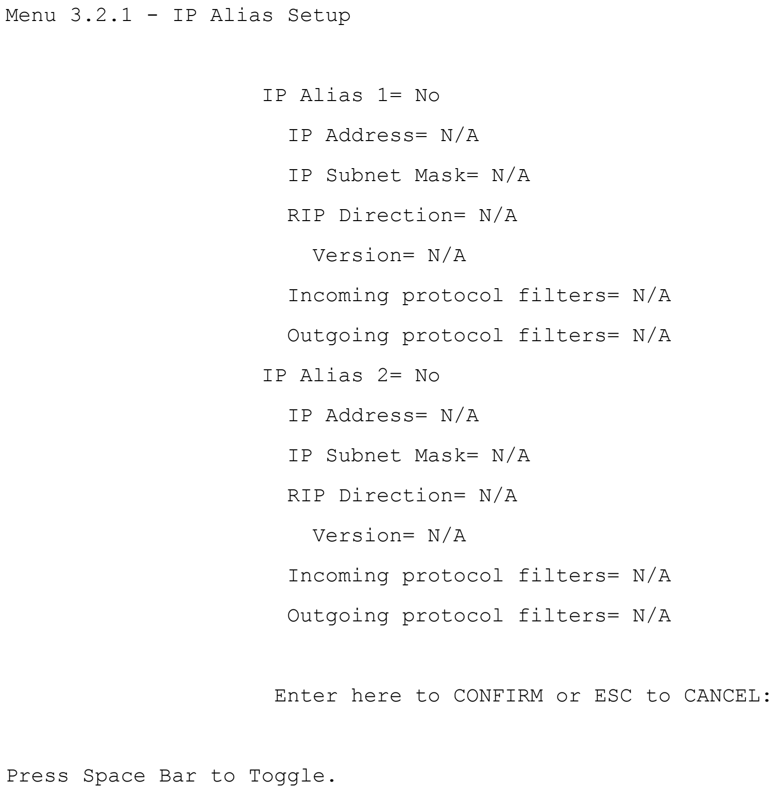
Field	**Description**	**Example**
TCP/IP Setup:		
IP Address	Enter the IP address of your BCM50a Integrated Router in dotted decimal notation.	192.168.1.1 (default)
IP Subnet Mask	Your BCM50a Integrated Router automatically calculates the subnet mask based on the IP address that you assign. Unless you are implementing subnetting, use the subnet mask computed by the BCM50a Integrated Router.	255.255.255.0
RIP Direction	Press [SPACE BAR] and then [ENTER] to select the RIP direction. Options are: **Both**, **In Only**, **Out Only** or **None**.	Both (default)
Version	Press [SPACE BAR] and then [ENTER] to select the RIP version. Options are: **RIP-1**, **RIP-2B** or **RIP-2M**.	**RIP-1** (default)
Multicast	IGMP (Internet Group Multicast Protocol) is a network-layer protocol used to establish membership in a Multicast group. The BCM50a Integrated Router supports both IGMP version 1 (**IGMP-v1**) and version 2 (**IGMP-v2**). Press [SPACE BAR] and then [ENTER] to enable IP Multicasting or select **None** (default) to disable it.	None
Edit IP Alias	The BCM50a Integrated Router supports three logical LAN interfaces via its single physical Ethernet interface with the BCM50a Integrated Router itself as the gateway for each LAN network. Press [SPACE BAR] to select **Yes** and then press [ENTER] to display menu 3.2.1.	Yes

IP Alias Setup

You must use menu 3.2 to configure the first network. Move the cursor to the **Edit IP Alias** field, press [SPACE BAR] to choose **Yes** and press [ENTER] to configure the second and third network.

Press [ENTER] to open **Menu 3.2.1 - IP Alias Setup**, as shown in Figure 15.

Figure 15 Menu 3.2.1 – IP Alias setup



```
Menu 3.2.1 - IP Alias Setup


                    IP Alias 1= No
                      IP Address= N/A
                      IP Subnet Mask= N/A
                      RIP Direction= N/A
                        Version= N/A
                      Incoming protocol filters= N/A
                      Outgoing protocol filters= N/A
                    IP Alias 2= No
                      IP Address= N/A
                      IP Subnet Mask= N/A
                      RIP Direction= N/A
                        Version= N/A
                      Incoming protocol filters= N/A
                      Outgoing protocol filters= N/A

                     Enter here to CONFIRM or ESC to CANCEL:

Press Space Bar to Toggle.
```

Use the instructions in Table 10 to configure IP Alias parameters.s

Table 10 IP Alias setup menu field

Field	**Description**	**Example**
IP Alias	Choose **Yes** to configure the LAN network for the BCM50a Integrated Router.	Yes
IP Address	Enter the IP address of your BCM50a Integrated Router in dotted decimal notation.	192.168.1.1
IP Subnet Mask	Your BCM50a Integrated Router automatically calculates the subnet mask based on the IP address that you assign. Unless you are implementing subnetting, use the subnet mask computed by the BCM50a Integrated Router.	255.255.255.0

Table 10 IP Alias setup menu field

Field	**Description**	**Example**
RIP Direction	Press [SPACE BAR] and then [ENTER] to select the RIP direction. Options are **Both**, **In Only, Out Only** or **None**.	None
Version	Press [SPACE BAR] and then [ENTER] to select the RIP version. Options are **RIP-1**, **RIP-2B** or **RIP-2M**.	RIP-1
Incoming Protocol Filters	Enter the filter sets you wish to apply to the incoming traffic between this node and the BCM50a Integrated Router.	1
Outgoing Protocol Filters	Enter the filter sets you wish to apply to the outgoing traffic between this node and the BCM50a Integrated Router.	2

Chapter 5
Internet access

This chapter shows you how to configure your BCM50a Integrated Router for Internet access.

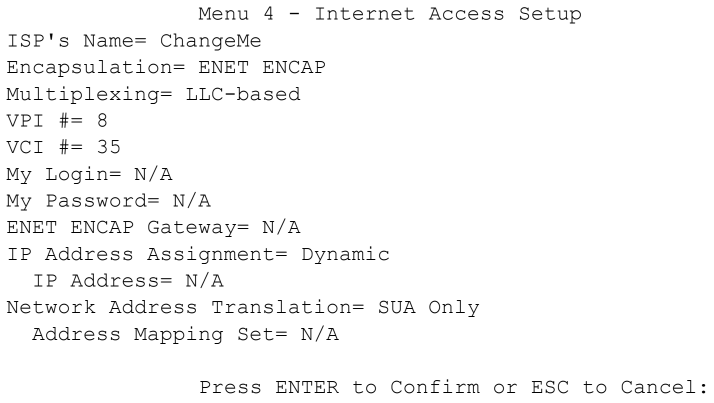
Internet access configuration

Using Menu 4 you can enter the Internet Access information in one screen. Menu 4 is actually a simplified setup for one of the remote nodes that you can access in Menu 11. Before you configure your BCM50a Integrated Router for Internet access, you must collect your Internet account information.

Use your Internet account information from your ISP to fill in this menu. Note that if you are using PPPoA or PPPoE encapsulation, the only ISP information you need is a logon name and password. You only need to know the Ethernet Encapsulation Gateway IP address if you are using ENET ENCAP encapsulation.

From the main menu, type 4 to display **Menu 4 — Internet Access Setup**, as shown in the following figure.

Figure 16 Menu 4 – Internet Access Setup



```
               Menu 4 - Internet Access Setup
ISP's Name= ChangeMe
Encapsulation= ENET ENCAP
Multiplexing= LLC-based
VPI #= 8
VCI #= 35
My Login= N/A
My Password= N/A
ENET ENCAP Gateway= N/A
IP Address Assignment= Dynamic
  IP Address= N/A
Network Address Translation= SUA Only
  Address Mapping Set= N/A

               Press ENTER to Confirm or ESC to Cancel:
```

Table 11 describes the fields in Figure 16.

Table 11 Menu 4 Internet access setup

Field	Description	Example
ISP's Name	Enter the name of your Internet Service Provider. This information is for identification purposes only.	ChangeMe
Encapsulation	Press [SPACE BAR] to select the method of encapsulation used by your ISP. Choices are **PPPoE**, **PPPoA**, **RFC 1483**, or **ENET ENCAP**.	ENET ENCAP
Multiplexing	Press [SPACE BAR] to select the method of multiplexing used by your ISP. Choices are **VC-based** or **LLC-based**.	LLC-based
VPI #	Enter the Virtual Path Identifier (VPI) that the telephone company gives you.	8
VCI #	Enter the Virtual Channel Identifier (VCI) that the telephone company gives you.	35
My Login	Configure the **My Login** and **My Password** fields for PPPoA and PPPoE encapsulation only. Enter the username exactly as your ISP assigned.	N/A
My Password	Enter the password associated with the logon name above.	N/A
ENET ENCAP Gateway	Enter the gateway IP address supplied by your ISP when you are using **ENET ENCAP** encapsulation.	N/A

Table 11 Menu 4 Internet access setup (continued)

Field	Description	Example
Idle Timeout	This value specifies the number of idle seconds that elapse before the BCM50a Integrated Router automatically disconnects the PPPoE session.	0
IP Address Assignment	Press [SPACE BAR] to select **Static** or **Dynamic** address assignment.	Dynamic
IP Address	Enter the IP address supplied by your ISP, if applicable.	N/A
Network Address Translation	Press [SPACE BAR] to select **None**, **SUA Only** or **Full Feature**. For more details about the single user account (SUA) feature, see "SUA (Single User Account) Versus NAT" on page 89.	SUA Only
Address Mapping Set	Type the numbers of mapping sets (1-8) to use with NAT. See the Chapter 9, "Network Address Translation (NAT)," on page 89 for details.	N/A
After you complete this menu, press [ENTER] at the prompt "Press ENTER to Confirm…" to save your configuration, or press [ESC] at any time to cancel.		

Basic setup complete

You have successfully connected, installed, and set up your BCM50a Integrated Router to operate on your network, as well as access the Internet.

If all your settings are correct, your BCM50a Integrated Router can connect automatically to the Internet. If the connection fails, note the error message that you receive on the screen and take the appropriate troubleshooting steps.

Note: If the firewall is activated, the default policy can communicate with the Internet if the communication originates from the LAN, and blocks all traffic to the LAN that originates from the Internet.

You can deactivate the firewall in menu 21.2 or using the embedded WebGUI in the BCM50a Integrated Router. You can also define additional firewall rules or modify existing ones, but exercise extreme caution in doing so. For more information about the firewall, see *BCM50a Integrated Router Configuration - Basics* (N0115790).

Chapter 6
Remote Node setup

This chapter shows you how to configure a remote node.

Introduction to Remote Node setup

This section describes the protocol-independent parameters for a remote node. A remote node is required for placing calls to a remote gateway. A remote node represents both the remote gateway and the network behind it across a WAN connection. When you use menu 4 to set up Internet access, you are configuring one of the remote nodes.

You first choose a remote node in **Menu 11- Remote Node Setup**. You can then edit that node's profile in menu 11.1, as well as configure specific settings in three submenus: edit IP and bridge options in menu 11.3; edit ATM options in menu 11.6; and edit filter sets in menu 11.5.

Outgoing Authentication Protocol

Generally speaking, you should employ the strongest authentication protocol possible, for obvious reasons. However, some vendor's implementation includes a specific authentication protocol in the user profile. It will disconnect if the negotiated protocol is different from that in the user profile, even when the negotiated protocol is stronger than specified. If you encounter a case where the peer disconnects right after a successful authentication, please make sure that you specify the correct authentication protocol when connecting to such an implementation.

Nailed-Up Connection

A nailed-up connection is a dial-up line where the connection is always up regardless of traffic demand. The BCM50a Integrated Router does two things when you specify a nailed-up connection. The first is that idle timeout is disabled. The second is that the BCM50a Integrated Router will try to bring up the connection when turned on and whenever the connection is down. A nailed-up connection can be very expensive for obvious reasons.

Do not specify a nailed-up connection unless your telephone company offers flat-rate service or you need a constant connection and the cost is of no concern.

The following table describes the fields specific to PPPoE encapsulation.

Remote Node setup

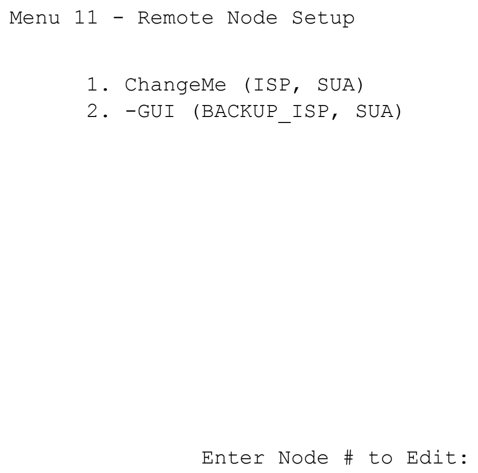
This section describes the protocol-independent parameters for a remote node.

Remote Node profile

To configure a remote node, follow these steps:

1. From the main menu, enter 11 to display **Menu 11 - Remote Node Setup.**
2. When menu 11 appears, as shown in the following figure, type the number of the remote node that you want to configure.

Figure 17 Menu 11 – Remote Node Setup



```
                Menu 11 - Remote Node Setup

                     1. ChangeMe (ISP, SUA)
                     2. -GUI (BACKUP_ISP, SUA)









                                  Enter Node # to Edit:
```

Encapsulation and Multiplexing scenarios

For Internet access you should use the encapsulation and multiplexing methods used by your ISP. Consult your telephone company for information on encapsulation and multiplexing methods for LAN-to-LAN applications, for example between a branch office and corporate headquarters. There must be prior agreement on encapsulation and multiplexing methods because they cannot be automatically determined. What methods you use also depends on how many VCs you have and how many different network protocols you need. The extra overhead that ENET ENCAP encapsulation entails makes it a poor choice in a LAN-to-LAN application. Here are some examples of more suitable combinations in such an application.

- Scenario 1. One VC, Multiple Protocols

  PPPoA (RFC-2364) encapsulation with **VC-based** multiplexing is the best combination because no extra protocol identifying headers are needed. The **PPP** protocol already contains this information.

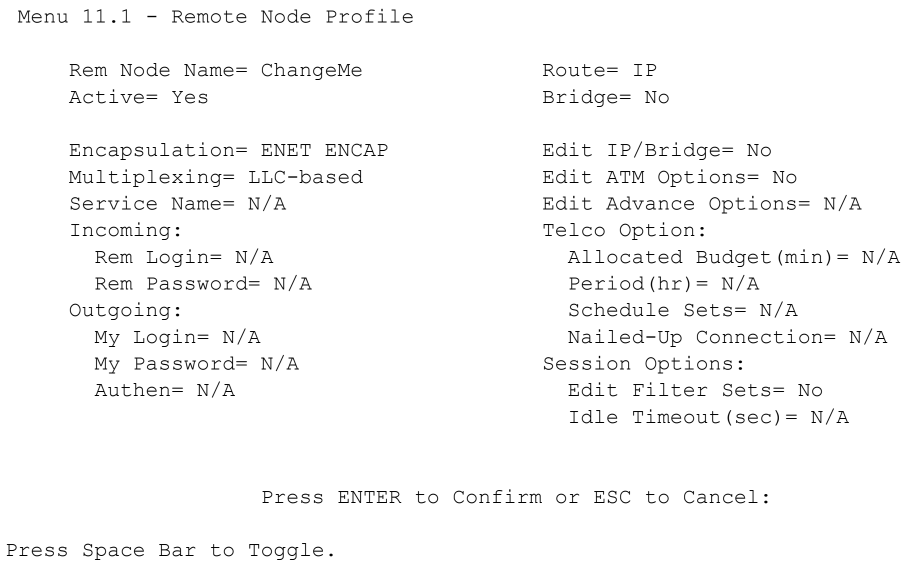
- Scenario 2. One VC, One Protocol (IP)

Selecting **RFC-1483** encapsulation with **VC-based** multiplexing requires the least amount of overhead (0 octets). However, if there is a potential need for multiple protocol support in the future, it may be safer to select **PPPoA** encapsulation instead of **RFC-1483**, so you do not need to reconfigure either computer later.

- Scenario 3.Multiple VCs

  If you have an equal number (or more) of VCs than the number of protocols, then select **RFC-1483** encapsulation and **VC-based** multiplexing.

Figure 18 Menu 11.1 – Remote Node Profile



```
 Menu 11.1 - Remote Node Profile

     Rem Node Name= ChangeMe                     Route= IP
     Active= Yes                                 Bridge= No

     Encapsulation= ENET ENCAP                   Edit IP/Bridge= No
     Multiplexing= LLC-based                     Edit ATM Options= No
     Service Name= N/A                           Edit Advance Options= N/A
     Incoming:                                   Telco Option:
       Rem Login= N/A                              Allocated Budget(min)= N/A
       Rem Password= N/A                           Period(hr)= N/A
     Outgoing:                                     Schedule Sets= N/A
       My Login= N/A                               Nailed-Up Connection= N/A
       My Password= N/A                          Session Options:
       Authen= N/A                                 Edit Filter Sets= No
                                                   Idle Timeout(sec)= N/A


                    Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.
```

Table 12 describes fields in Figure 18**.**

Table 12 Menu 11.1 Remote Node Profile

Field	**Description**	**Example**
Rem Node Name	Type a unique, descriptive name of up to eight characters for this node.	myISP
Active	Press [SPACE BAR] and then [ENTER] to select **Yes** to activate or **No** to deactivate this node. Inactive nodes are displayed with a minus sign “–“ in SMT menu 11.	Yes

Table 12 Menu 11.1 Remote Node Profile (continued)

Field	**Description**	**Example**
Encapsulation	**PPPoA** refers to RFC-2364 (PPP Encapsulation over ATM Adaptation Layer 5). If RFC-1483 (Multiprotocol Encapsulation over ATM Adaptation Layer 5) of **ENET ENCAP** are selected, then the **Rem Login**, **Rem Password**, **My Login**, **My Password** and **Authen** fields are not applicable (**N/A**).	ENET ENCAP
Multiplexing	Press [SPACE BAR] and then [ENTER] to select the method of multiplexing that your ISP uses, either **VC-based** or **LLC-based**.	LLC-based
Service Name	When using **PPPoE** encapsulation, type the name of your PPPoE service here.	N/A
Incoming:		
Rem Login	Type the login name that this remote node will use to call your BCM50a Integrated Router. The login name and the **Rem Password** will be used to authenticate this node.	
Rem Password	Type the password used when this remote node calls your BCM50a Integrated Router.	
Outgoing:		
My Login	Type the login name assigned by your ISP when the BCM50a Integrated Router calls this remote node.	
My Password	Type the password assigned by your ISP when the BCM50a Integrated Router calls this remote node.	
Authen	This field sets the authentication protocol used for outgoing calls. Options for this field are: **CHAP**/**PAP** – Your BCM50a Integrated Router will accept either **CHAP** or **PAP** when requested by this remote node. **CHAP** – accept **CHAP** (Challenge Handshake Authentication Protocol) only. **PAP** – accept PAP (Password Authentication Protocol) only.	
Route	This field determines the protocol used in routing. Options are **IP** and **None.**	IP
Bridge	When bridging is enabled, your BCM50a Integrated Router will forward any packet that it does not route to this remote node; otherwise, the packets are discarded. Select **Yes** to enable and **No** to disable.	No
Edit IP/Bridge	Press [SPACE BAR] to select **Yes** and press [ENTER] to display **Menu 11.3 – Remote Node Network Layer Options**.	No

Table 12 Menu 11.1 Remote Node Profile (continued)

Field	**Description**	**Example**
Edit ATM Options	Press [SPACE BAR] to select **Yes** and press [ENTER] to display **Menu 11.6 – Remote Node ATM Layer Options**.	No
Edit Advance Options	This field is only available when you select **PPPoE** in the **Encapsulation** field. Press [SPACE BAR] to select **Yes** and press [ENTER] to display **Menu 11.8 – Advance Setup Options**. This field is not available on all models.	No
Telco Option		
Allocated Budget (min)	This sets a ceiling for outgoing call time for this remote node. The default for this field is 0 meaning no budget control.	
Period (hr)	This field is the time period that the budget should be reset. For example, if we are allowed to call this remote node for a maximum of 10 minutes every hour, then the **Allocated Budget** is (10 minutes) and the **Period (hr)** is 1 (hour).	
Schedule Sets	This field is only applicable for **PPPoE** and **PPPoA** encapsulation. You can apply up to four schedule sets here. For more details please refer to the Call scheduling chapter.	
Nailed up Connection	This field is only applicable for **PPPoE** and **PPPoA** encapsulation. This field specifies if you want to make the connection to this remote node a nailed-up connection. More details are given earlier in this section.	
Session Options		
Edit Filter Sets	Use [SPACE BAR] to choose **Yes** and press [ENTER] to open menu 11.5 to edit the filter sets. See the Remote Node filter section for more details.	**No** (default)
Idle Timeout (sec)	Type the number of seconds (0-9999) that can elapse when the BCM50a Integrated Router is idle (there is no traffic going to the remote node), before the BCM50a Integrated Router automatically disconnects the remote node. 0 means that the session will not timeout.	
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.		

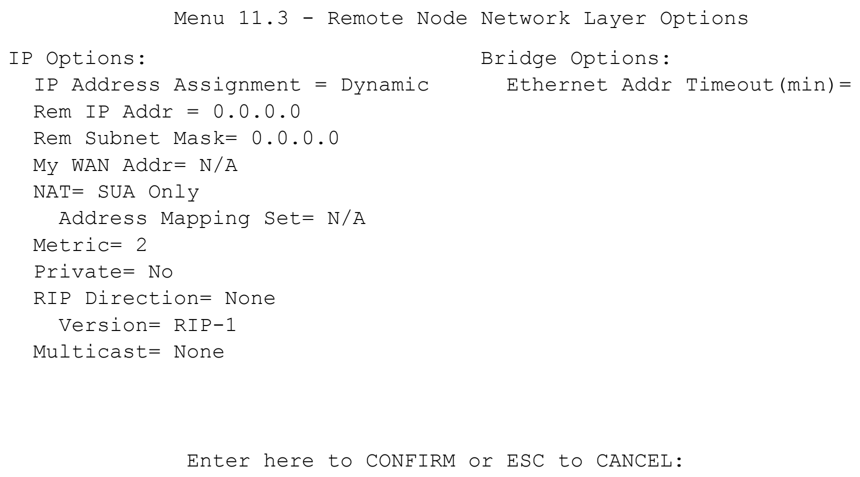
Edit IP/Bridge

1 For the TCP/IP parameters, perform the following steps to edit **Menu 11.3 – Remote Node Network Layer Options** as shown next.

2 In menu 11.1, make sure **IP** is among the protocols in the **Route** field.

3 Move the cursor to the **Edit IP/Bridge** field, press [SPACE BAR] to select **Yes,** then press [ENTER] to display **Menu 11.3 – Remote Node Network Layer Options.**

Figure 19 Menu 11.3 – Remote Node Network Layer Options



```
             Menu 11.3 - Remote Node Network Layer Options

IP Options:                          Bridge Options:
  IP Address Assignment = Dynamic      Ethernet Addr Timeout(min)=
  Rem IP Addr = 0.0.0.0
  Rem Subnet Mask= 0.0.0.0
  My WAN Addr= N/A
  NAT= SUA Only
    Address Mapping Set= N/A
  Metric= 2
  Private= No
  RIP Direction= None
    Version= RIP-1
  Multicast= None



              Enter here to CONFIRM or ESC to CANCEL:
```

Table 13 explains fields in Figure 19.

Table 13 Menu 11.3 Remote Node Network Layer Options

Field	**Description**	**Example**
IP Address Assignment	Press [SPACE BAR] and then [ENTER] to select **Dynamic** if the remote node is using a dynamically assigned IP address or **Static** if it is using a static (fixed) IP address. You will only be able to configure this in the ISP node (also the one you configure in menu 4),all other nodes are set to **Static**.	Dynamic
Rem IP Addr	This is the IP address you entered in the previous menu.	
Rem Subnet Mask	Type the subnet mask assigned to the remote node.	

Table 13 Menu 11.3 Remote Node Network Layer Options (continued)

Field	**Description**	**Example**
My WAN Addr	Some implementations, especially UNIX derivatives, require separate IP network numbers for the WAN and LAN links and each end to have a unique address within the WAN network number. In that case, type the IP address assigned to the WAN port of your BCM50a Integrated Router. NOTE: Refers to local BCM50a Integrated Router address, not the remote router address.	
NAT	Press [SPACE BAR] and then [ENTER] to select **Full Feature** if you have multiple public WAN IP addresses for your BCM50a Integrated Router. Select **SUA Only** if you have just one public WAN IP address for your BCM50a Integrated Router. The SMT uses Address Mapping Set 255 (menu 15.1.255 - see Figure 34). Select **None** to disable NAT.	SUA Only
Address Mapping Set	When **Full Feature** is selected in the **NAT** field, configure address mapping sets in menu 15.1. Select one of the NAT server sets (2-10) in menu 15.2 (see Chapter 9, “Network Address Translation (NAT),” on page 89 for details) and type that number here. When **SUA Only** is selected in the NAT field, the SMT uses NAT server set 1 in menu 15.2 (see Chapter 9, “Network Address Translation (NAT),” on page 89 for details).	2
Metric	The metric represents the “cost” of transmission for routing purposes. IP routing uses hop count as the cost measurement, with a minimum of 1 for directly connected networks. Type a number that approximates the cost for this link. The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number.	2
Private	This determines if the BCM50a Integrated Router will include the route to this remote node in its RIP broadcasts. If set to **Yes**, this route is kept private and not included in RIP broadcast. If **No**, the route to this remote node will be propagated to other hosts through RIP broadcasts.	No
RIP Direction	Press [SPACE BAR] and then [ENTER] to select the RIP Direction. Options are **Both**, **In Only**, **Out Only** or **None**.	None
Version	Press [SPACE BAR] and then [ENTER] to select the RIP version. Options are **RIP-1**, **RIP-2B** or **RIP-2M**.	**RIP-1**

Table 13 Menu 11.3 Remote Node Network Layer Options (continued)

Field	**Description**	**Example**
Multicast	**IGMP-v1** sets IGMP to version 1, **IGMP-v2** sets IGMP to version 2 and **None** disables IGMP.	None
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.		

Remote Node filter

Move the cursor to the field **Edit Filter Sets** in menu 11.1, and then press [SPACE BAR] to set the value to **Yes**. Press [ENTER] to open **Menu 11.1.4- Remote Node Filter**.

Use menu 11.1.4 to specify the filter sets to apply to the incoming and outgoing traffic between this remote node and the BCM50a Integrated Router to prevent certain packets from triggering calls. You can specify up to 4 filter sets separated by commas, for example, 1, 5, 9, 12, in each filter field. Note that spaces are accepted in this field. For more information on defining the filters, please refer to Chapter 11, “Filter configuration. For PPPoE or PPPoA encapsulation, you have the additional option of specifying remote node call filter sets.

Figure 20 Menu 11.1.4 – Remote Node Filter (Ethernet Encapsulation)

```
     Menu 11.1.4 - Remote Node Filter

Input Filter Sets:
  protocol filters=
    device filters=
Output Filter Sets:
  protocol filters=
    device filters=

 Enter here to CONFIRM or ESC to CANCEL:
```

Figure 21 Menu 11.1.4 – Remote Node Filter (PPPoE or PPPoA Encapsulation)

```
    Menu 11.1.4 - Remote Node Filter
        Input Filter Sets:
          protocol filters=
            Device filters=
        Output Filter Sets:
          protocol filters=
            device filters=
        Call Filter Sets:
          protocol filters=
            Device filters=

Enter here to CONFIRM or ESC to CANCEL:
```

To configure the parameters for traffic redirect, see “Traffic redirect setup” on page 55.

Editing ATM Layer Options

Follow the steps shown next to edit **Menu 11.6 – Remote Node ATM Layer Options**.

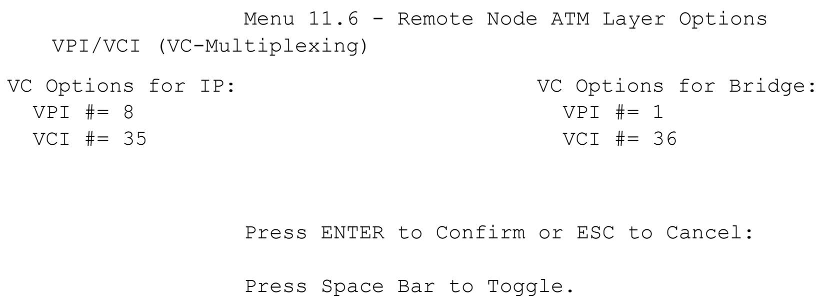
In menu 11.1, move the cursor to the **Edit ATM Options** field and then press [SPACE BAR] to select **Yes**. Press [ENTER] to display **Menu 11.6 – Remote Node ATM Layer Options**.

There are two versions of menu 11.6 for the Contivity 251, depending on whether you chose **VC-based**/**LLC-based** multiplexing and **PPP** encapsulation in menu 11.1.

VC-based Multiplexing (non-PPP Encapsulation)

For **VC-based** multiplexing, by prior agreement, a protocol is assigned a specific virtual circuit, for example, VC1 will carry IP. Separate VPI and VCI numbers must be specified for each protocol.

Figure 22 Menu 11.6 for VC-based Multiplexing

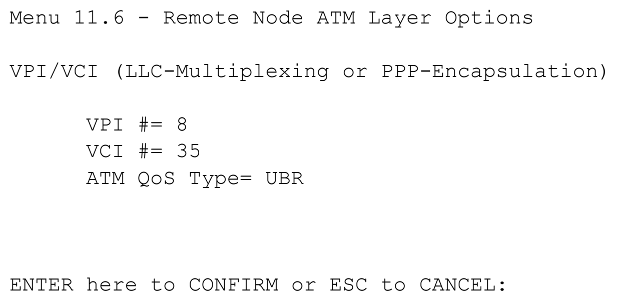


```
               Menu 11.6 - Remote Node ATM Layer Options
   VPI/VCI (VC-Multiplexing)

VC Options for IP:                        VC Options for Bridge:
  VPI #= 8                                  VPI #= 1
  VCI #= 35                                 VCI #= 36



               Press ENTER to Confirm or ESC to Cancel:

               Press Space Bar to Toggle.
```

LLC-based Multiplexing or PPP Encapsulation

For **LLC-based** multiplexing or **PPP** encapsulation, one VC carries multiple protocols with protocol identifying information being contained in each packet header.

Figure 23 Menu 11.6 for LLC-based Multiplexing or PPP Encapsulation



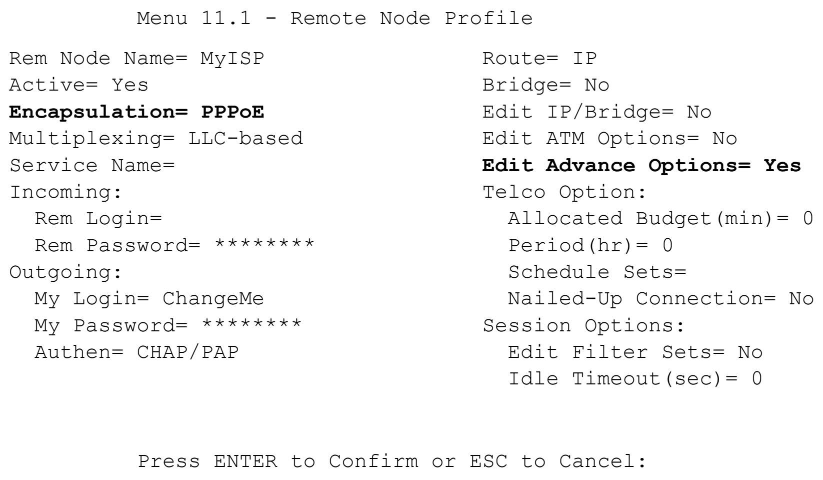
```
Menu 11.6 - Remote Node ATM Layer Options

VPI/VCI (LLC-Multiplexing or PPP-Encapsulation)

      VPI #= 8
      VCI #= 35
      ATM QoS Type= UBR



ENTER here to CONFIRM or ESC to CANCEL:
```

In this case, only one set of VPI and VCI numbers need be specified for all protocols. The valid range for the VPI is 0 to 255 and for the VCI is 32 to 65535 (1 to 31 is reserved for local management of ATM traffic).

Advance Setup Options

In menu 11.1, select **PPPoE** in the **Encapsulation** field.

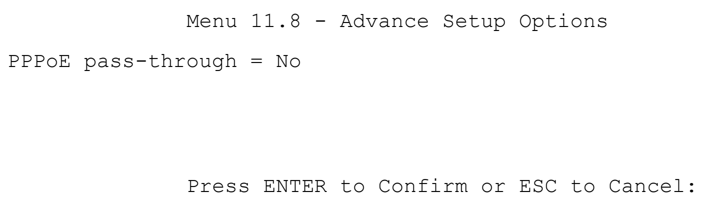
Figure 24 Menu 11.1 – Remote Node Profile



```
          Menu 11.1 - Remote Node Profile

Rem Node Name= MyISP                 Route= IP
Active= Yes                          Bridge= No
Encapsulation= PPPoE                 Edit IP/Bridge= No
Multiplexing= LLC-based              Edit ATM Options= No
Service Name=                        Edit Advance Options= Yes
Incoming:                            Telco Option:
  Rem Login=                           Allocated Budget(min)= 0
  Rem Password= ********               Period(hr)= 0
Outgoing:                              Schedule Sets=
  My Login= ChangeMe                   Nailed-Up Connection= No
  My Password= ********              Session Options:
  Authen= CHAP/PAP                     Edit Filter Sets= No
                                       Idle Timeout(sec)= 0


          Press ENTER to Confirm or ESC to Cancel:
```

Move the cursor to the **Edit Advance Options** field, press [SPACE BAR] to select **Yes**, then press [ENTER] to display **Menu 11.8 – Advance Setup Options**.

Figure 25 Menu 11.8 – Advance Setup Options



```
                Menu 11.8 - Advance Setup Options

PPPoE pass-through = No




                Press ENTER to Confirm or ESC to Cancel:
```

Table 14 describes the fields in Figure 25.

Table 14 Menu 11.8 Advance Setup Options

Field	Description
PPPoE pass-through	Press [SPACE BAR] to select **Yes** and press [ENTER] to enable PPPoE pass through. In addition to the Contivity 251's built-in PPPoE client, you can enable PPPoE pass through to allow up to ten hosts on the LAN to use PPPoE client software on their computers to connect to the ISP via the Contivity 251. Each host can have a separate account and a public WAN IP address. PPPoE pass through is an alternative to NAT for application where NAT is not appropriate. Press [SPACE BAR] to select **No** and press [ENTER] to disable PPPoE pass through if you do not need to allow hosts on the LAN to use PPPoE client software on their computers to connect to the ISP.
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.	

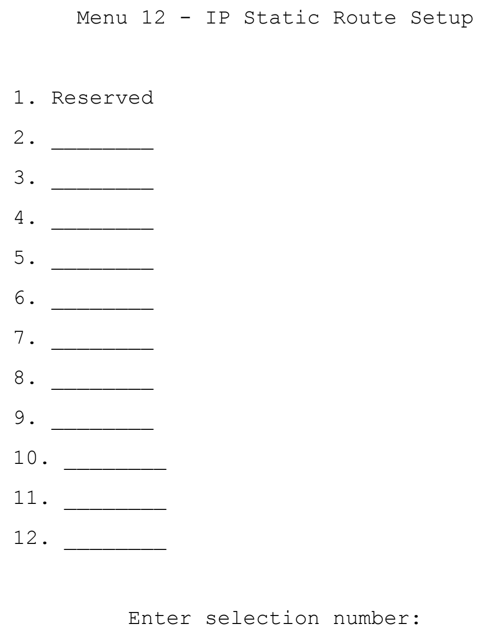
Chapter 7
IP Static Route Setup

This chapter shows you how to configure static routes with your BCM50a Integrated Router.

IP Static Route Setup

Enter 12 from the main menu. Select one of the IP static routes as shown in Figure 26 to configure IP static routes in menu 12. 1.

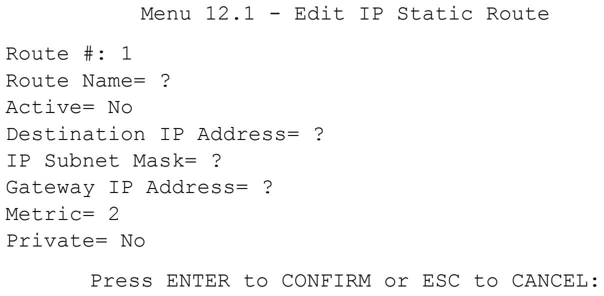
Figure 26 Menu 12 – IP Static Route Setup



```
          Menu 12 - IP Static Route Setup


     1. Reserved
     2. ________
     3. ________
     4. ________
     5. ________
     6. ________
     7. ________
     8. ________
     9. ________
     10. ________
     11. ________
     12. ________


              Enter selection number:
```

Now, enter the index number of the static route that you want to configure. The reserved entry is for the WAN interface and you cannot edit it here.

Figure 27 Menu 12.1 – Edit IP Static Route



```
          Menu 12.1 - Edit IP Static Route

Route #: 1
Route Name= ?
Active= No
Destination IP Address= ?
IP Subnet Mask= ?
Gateway IP Address= ?
Metric= 2
Private= No
       Press ENTER to CONFIRM or ESC to CANCEL:
```

Table 15 describes the fields in Figure 27.

Table 15 IP Static Route Menu Fields

Field	Description
Route #	This is the index number of the static route that you chose in menu 12.
Route Name	Enter a descriptive name for this route. This is for identification purposes only.
Active	This field allows you to activate or deactivate this static route.
Destination IP Address	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.
IP Subnet Mask	Enter the IP subnet mask for this destination.
Gateway IP Address	Enter the IP address of the gateway. The gateway is an immediate neighbor of your BCM50a Integrated Router that forwards the packet to the destination. On the LAN, the gateway must be a router on the same segment as your BCM50a Integrated Router; over the WAN, the gateway must be the IP address of one of the remote nodes.
Metric	Enter a number from 1 to 15 to set the priority for the route among the BCM50a Integrated Router routes. The smaller the number, the higher priority the route has.

Table 15 IP Static Route Menu Fields

Field	**Description**
Private	This parameter determines if the BCM50a Integrated Router includes the route to this remote node in its RIP broadcasts. If set to **Yes**, this route is kept private and not included in RIP broadcast. If **No**, the route to this remote node is propagated to other hosts through RIP broadcasts.
	After you complete filling in this menu, press [ENTER] at the message “Press ENTER to Confirm…” to save your configuration, or press [ESC] to cancel.

Chapter 8
Dial-in User Setup

This chapter shows you how to create user accounts on the BCM50a Integrated Router.

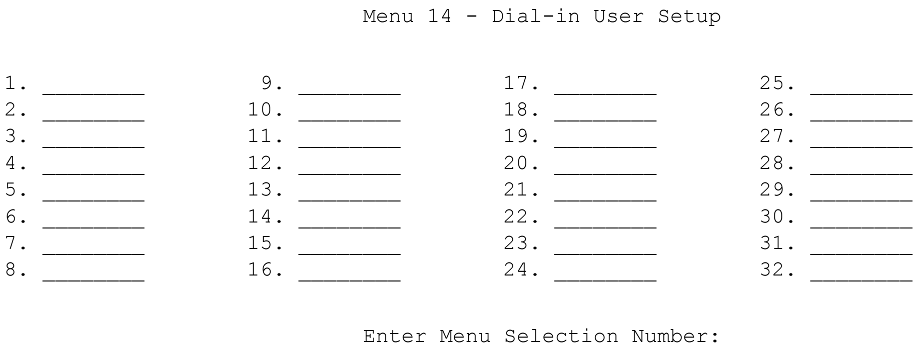
Dial-in User Setup

By storing user profiles locally, your BCM50a Integrated Router can authenticate users without interacting with a network RADIUS server.

Follow the steps below to set up user profiles on your BCM50a Integrated Router.

From the main menu, enter 14 to display **Menu 14 - Dial-in User Setup**.

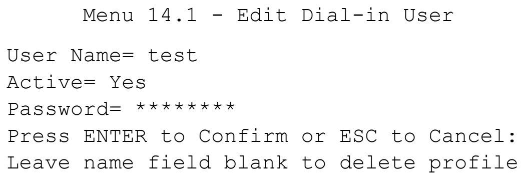
Figure 28 Menu 14 – Dial-in User Setup



```
                         Menu 14 - Dial-in User Setup

 1. ________          9. ________         17. ________         25. ________
 2. ________         10. ________         18. ________         26. ________
 3. ________         11. ________         19. ________         27. ________
 4. ________         12. ________         20. ________         28. ________
 5. ________         13. ________         21. ________         29. ________
 6. ________         14. ________         22. ________         30. ________
 7. ________         15. ________         23. ________         31. ________
 8. ________         16. ________         24. ________         32. ________

                         Enter Menu Selection Number:
```

Type a number and press [ENTER] to edit the user profile.

Figure 29 Menu 14.1 – Edit Dial-in User



```
      Menu 14.1 - Edit Dial-in User

User Name= test
Active= Yes
Password= ********
Press ENTER to Confirm or ESC to Cancel:
Leave name field blank to delete profile
```

Table 16 describes the fields in Figure 29.

Table 16 Menu 14.1- Edit Dial-in User

Field	**Description**
User Name	Enter a username up to 31 alphanumeric characters long for this user profile. This field is case sensitive.
Active	Press [SPACE BAR] to select **Yes** and press [ENTER] to enable the user profile.
Password	Enter a password up to 31 characters long for this user profile.
	After you complete this menu, press [ENTER] at the prompt “Press ENTER to confirm or ESC to cancel” to save your configuration or press [ESC] to cancel and go back to the previous screen.

Chapter 9
Network Address Translation (NAT)

This chapter discusses how to configure NAT on the BCM50a Integrated Router.

Using NAT

Note: You must create a firewall rule in addition to setting up SUA/ NAT, to allow traffic from the WAN to be forwarded through the BCM50a Integrated Router.

SUA (Single User Account) Versus NAT

SUA (Single User Account) is an implementation of a subset of NAT that supports two types of mapping, **Many-to-One** and **Server**. For a detailed description of NAT set for SUA, see"Address Mapping Sets" on page 92. The BCM50a Integrated Router also supports **Full Feature** NAT to map multiple global IP addresses to multiple private LAN IP addresses of clients or servers using mapping types.

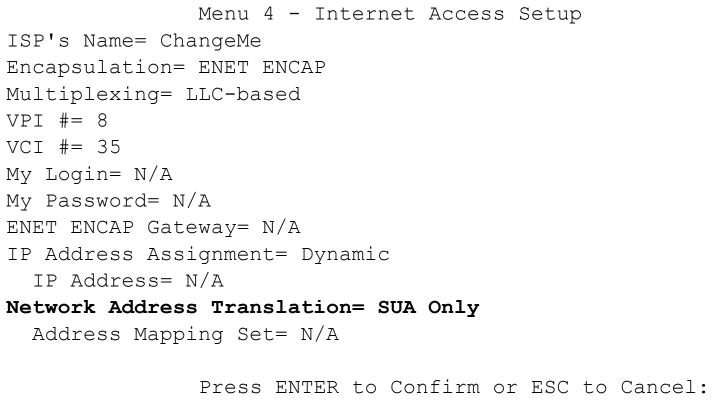
Note: Choose **SUA Only** if you have just one public WAN IP address for your BCM50a Integrated Router.

Choose **Full Feature** if you have multiple public WAN IP addresses for your BCM50a Integrated Router.

Applying NAT

You apply NAT via menus 4 or 11.3 (Figure 31 on page 91). Figure 30 shows you how to apply NAT for Internet access in menu 4. Enter 4 from the main menu to go to **Menu 4 - Internet Access Setup.**

Figure 30 Menu 4 – Applying NAT for Internet Access



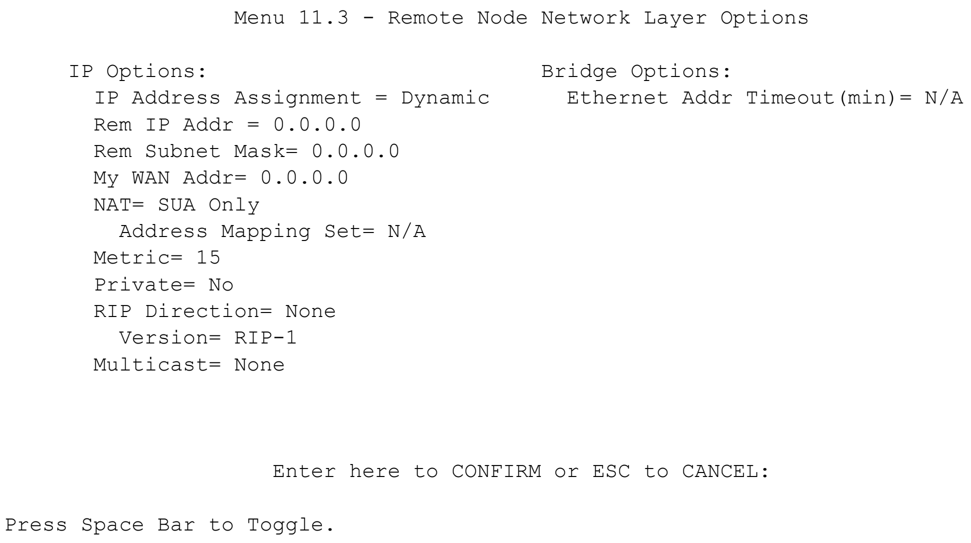
```
               Menu 4 - Internet Access Setup
ISP's Name= ChangeMe
Encapsulation= ENET ENCAP
Multiplexing= LLC-based
VPI #= 8
VCI #= 35
My Login= N/A
My Password= N/A
ENET ENCAP Gateway= N/A
IP Address Assignment= Dynamic
  IP Address= N/A
Network Address Translation= SUA Only
  Address Mapping Set= N/A

               Press ENTER to Confirm or ESC to Cancel:
```

Figure 31 shows how you apply NAT to the remote node in menu 11.1.

Enter 11 from the main menu.

Move the cursor to the **Edit IP/Bridge** field, press [SPACE BAR] to select **Yes** and then press [ENTER] to bring up **Menu 11.3 - Remote Node Network Layer Options.**

Figure 31 Menu 11.3 – Applying NAT to the Remote Node



```
                Menu 11.3 - Remote Node Network Layer Options

     IP Options:                          Bridge Options:
       IP Address Assignment = Dynamic      Ethernet Addr Timeout(min)= N/A
       Rem IP Addr = 0.0.0.0
       Rem Subnet Mask= 0.0.0.0
       My WAN Addr= 0.0.0.0
       NAT= SUA Only
         Address Mapping Set= N/A
       Metric= 15
       Private= No
       RIP Direction= None
         Version= RIP-1
       Multicast= None



                   Enter here to CONFIRM or ESC to CANCEL:

Press Space Bar to Toggle.
```

Table 17 describes the fields in Figure 31.

Table 17 Applying NAT in Menus 4 & 11.3

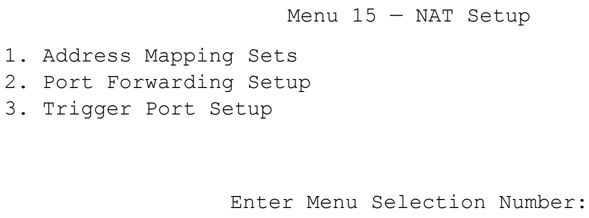
Field	Description	Options
Network Address Translation	When you select this option the SMT uses Address Mapping Set 1 (menu 15.1 - "Address Mapping Sets" on page 92 for further discussion). Choose **Full Feature** if you have multiple public WAN IP addresses for your BCM50a Integrated Router. When you select **Full Feature** you must configure at least one address mapping set!	Full Feature
	NAT is disabled when you select this option.	None
	When you select this option the SMT uses Address Mapping Set 255 (menu 15.1 - "Address Mapping Sets" on page 92). Choose **SUA Only** if you have just one public WAN IP address for your BCM50a Integrated Router.	SUA Only

NAT setup

Use the address mapping sets menus and submenus to create the mapping table used to assign global addresses to computers on the LAN. You can see two NAT address mapping sets in menu 15.1. You can only configure **Set 1**. **Set 255** is used for SUA. When you select **Full Feature** in menu 4 or 11.3, the SMT uses **Set 1**. When you select **SUA Only**, the SMT uses the pre-configured **Set 255** (read only).

The server set is a list of LAN servers mapped to external ports. To use this set, a server rule must be set up inside the NAT address mapping set. To configure NAT, enter 15 from the main menu to bring up the screen shown in Figure 32.

Figure 32 Menu 15 – NAT Setup



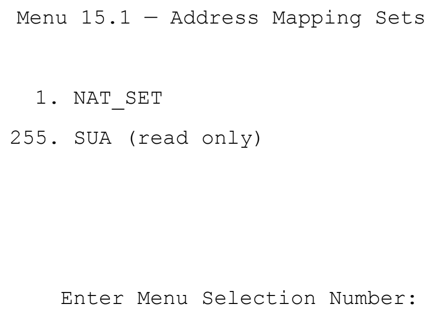
```
                     Menu 15 — NAT Setup

1. Address Mapping Sets
2. Port Forwarding Setup
3. Trigger Port Setup


                 Enter Menu Selection Number:
```

Note: Configure LAN IP addresses in NAT menus 15.1 and 15.2.

Address Mapping Sets

Enter 1 to bring up **Menu 15.1—Address Mapping Sets**.

Figure 33 Menu 15.1 – Address Mapping Sets

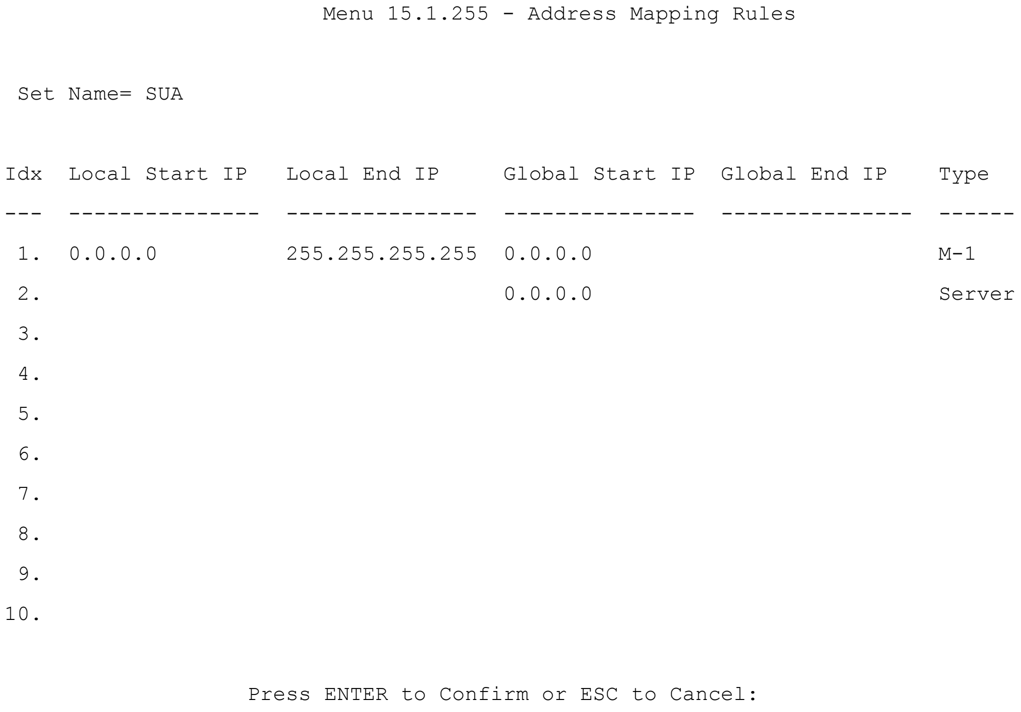


```
 Menu 15.1 — Address Mapping Sets


   1. NAT_SET
 255. SUA (read only)




        Enter Menu Selection Number:
```

SUA Address Mapping Set

Enter 255 to display the screen shown in Figure 34 (see "SUA (Single User Account) Versus NAT" on page 89*)*. The fields in this menu cannot be changed.

Figure 34 Menu 15.1.255 – SUA Address Mapping Rules



```
                        Menu 15.1.255 - Address Mapping Rules


  Set Name= SUA


 Idx  Local Start IP   Local End IP     Global Start IP  Global End IP    Type
 ---  ---------------  ---------------  ---------------  ---------------  ------
  1.  0.0.0.0          255.255.255.255  0.0.0.0                          M-1
  2.                                    0.0.0.0                           Server
  3.
  4.
  5.
  6.
  7.
  8.
  9.
 10.


                  Press ENTER to Confirm or ESC to Cancel:
```

Table 18 explains the fields in Figure 34.

Note: Menu 15.1.255 is read-only.

Table 18 SUA Address Mapping Rules

Field	Description	Example
Set Name	This is the name of the set you selected in menu 15.1 or enter the name of a new set you want to create.	SUA
Idx	This is the index or rule number.	1
Local Start IP	**Local Start IP** is the starting local IP address (ILA).	0.0.0.0

Table 18 SUA Address Mapping Rules

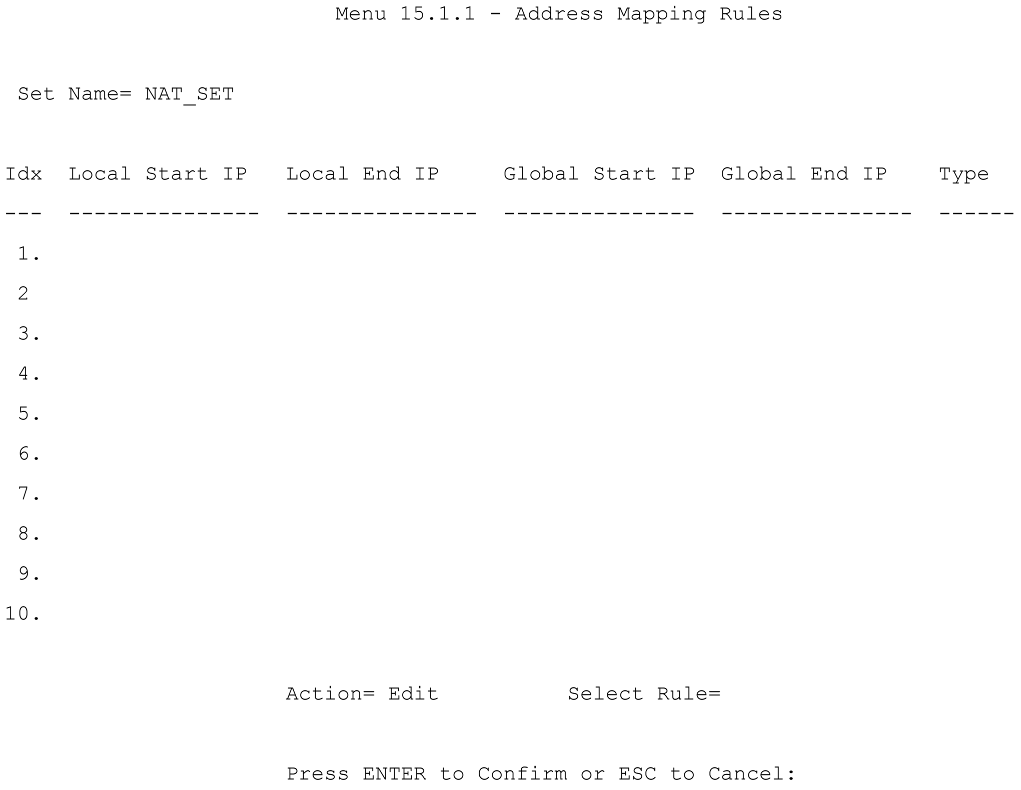
Field	Description	Example
Local End IP	**Local End IP** is the ending local IP address (ILA). If the rule is for all local IPs, then the start IP is 0.0.0.0 and the end IP is 255.255.255.255.	255.255.255.255
Global Start IP	This is the starting global IP address (IGA). If you have a dynamic IP, enter 0.0.0.0 as the **Global Start IP**.	0.0.0.0
Global End IP	This is the ending global IP address (IGA).	
Type	These are the mapping types discussed above. With **Server,** you can specify multiple servers of different types behind NAT to this machine. Examples is found in the section "General NAT examples" on page 103.	Server
	After you configure a rule in this menu, press [ENTER] at the message "Press ENTER to Confirm…" to save your configuration, or press [ESC] to cancel.	

User-Defined Address Mapping Sets

Go to menu 15.1. Enter 1 to bring up the menu shown in figure below. Look at the differences from the previous menu. Note the extra **Action** and **Select Rule** fields means you can configure rules in this screen. Note also that the [?] in the **Set Name** field means that this is a required field and you must enter a name for the set.

Note: The entire set is deleted if you leave the **Set Name** field blank and press [ENTER] at the bottom of the screen.

Figure 35 Menu 15.1.1: First Set



```
                        Menu 15.1.1 - Address Mapping Rules


  Set Name= NAT_SET


 Idx  Local Start IP   Local End IP     Global Start IP  Global End IP    Type
 ---  ---------------  ---------------  ---------------  ---------------  ------
  1.
  2
  3.
  4.
  5.
  6.
  7.
  8.
  9.
 10.


                     Action= Edit           Select Rule=


                     Press ENTER to Confirm or ESC to Cancel:
```

Note: The **Type**, **Local** and **Global Start/End IPs** are configured in menu 15.1.1.1 (described later) and the values are displayed on the screen shown in Figure 36.

Ordering your rules

Ordering your rules is important because the BCM50a Integrated Router applies the rules in the order that you specify. When a rule matches the current packet, the BCM50a Integrated Router takes the corresponding action and the remaining rules are ignored. If there are any empty rules before your new configured rule, your configured rule is pushed up by that number of empty rules. For example, if you have already configured rules 1 to 6 in your current set and now you configure rule number 9. In the set summary screen, the new rule will be rule 7, not 9.

If you delete rule 4, rules 5 to 7 will be pushed up by 1 rule, so as old rule 5 becomes rule 4, old rule 6 becomes rule 5 and old rule 7 becomes rule 6.

Table 19 Fields in menu 15.1.1

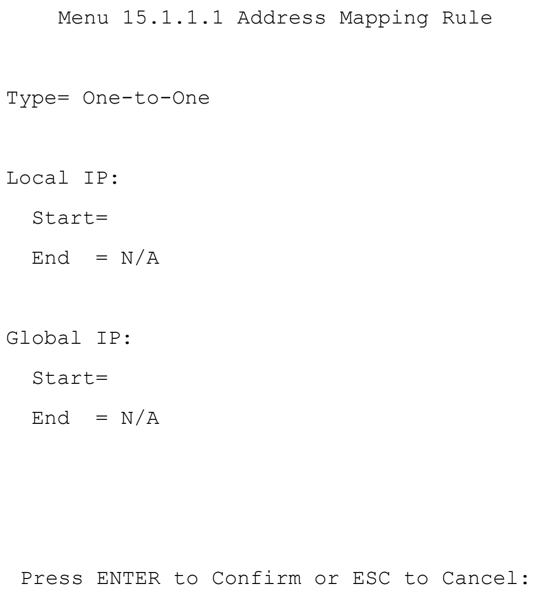
Field	Description	Example
Set Name	Enter a name for this set of rules. This is a required field. If this field is left blank, the entire set is deleted.	NAT_SET
Action	The default is **Edit**. **Edit** means you want to edit a selected rule (see following field). **Insert Before** means to insert a rule before the rule selected. The rules after the selected rule are then moved down by one rule. **Delete** means to delete the selected rule and all the rules after the selected one advance one rule. **None** disables the **Select Rule** item.	Edit
Select Rule	When you choose **Edit**, **Insert Before** or **Delete** in the previous field, the cursor jumps to this field so you can select the rule to apply the action in question.	1

Note: You must press [ENTER] at the bottom of the screen to save the whole set. You must do this again if you make any changes to the set – including deleting a rule. No changes to the set take place until this action is taken.

Selecting **Edit** in the **Action** field and then selecting a rule brings up the menu shown in Figure 36, **Menu 15.1.1.1 - Address Mapping Rule** in which you can edit an individual rule and configure the **Type**, **Local** and **Global Start/End IPs**.

Note: An **IP End** address must be numerically greater than its corresponding **IP Start** address.

Figure 36 Menu 15.1.1.1: Editing or configuring an individual rule in a set



```
    Menu 15.1.1.1 Address Mapping Rule


Type= One-to-One


Local IP:
  Start=
  End   = N/A


Global IP:
  Start=
  End   = N/A




 Press ENTER to Confirm or ESC to Cancel:
```

Table 20 describes the fields in Figure 36.

Table 20 Menu 15.1.1.1: Editing or configuring an individual rule in a set

Field	Description	Example
Type	Press [SPACE BAR] and then [ENTER] to select from a total of five types. If you choose **Server**, you can specify multiple servers of different types behind NAT to this computer. See “Example 3: Multiple public IP addresses with inside servers” on page 106 for an example.	**One-to-On e**
Local IP	Only local IP fields are **N/A** for server; Global IP fields must be set for **Server**.	
Start	Enter the starting local IP address (ILA).	0.0.0.0
End	Enter the ending local IP address (ILA). If the rule is for all local IPs, then put the Start IP as 0.0.0.0 and the End IP as 255.255.255.255. This field is **N/A** for One-to-One and Server types.	N/A

Table 20 Menu 15.1.1.1: Editing or configuring an individual rule in a set

Field	Description	Example
Global IP Start	Enter the starting global IP address (IGA). If you have a dynamic IP, enter 0.0.0.0 as the **Global IP Start**. Note that **Global IP Start** can be set to 0.0.0.0 only if the types are **Many-to-One** or **Server**.	0.0.0.0
End	Enter the ending global IP address (IGA). This field is **N/A** for **One-to-One**, **Many-to-One** and **Server types**.	N/A
	After you finish configuring a rule in this menu, press [ENTER] at the message “Press ENTER to Confirm…” to save your configuration, or press [ESC] to cancel.	

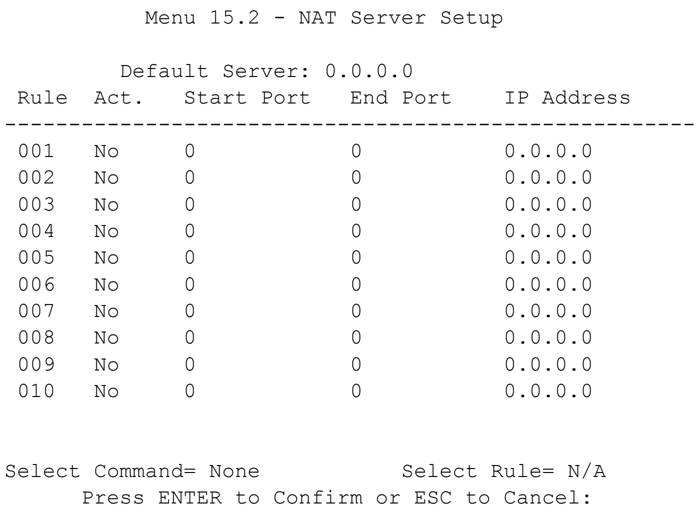
Configuring a server behind NAT

Note: If you do not assign a **Default Server** IP address, the BCM50a Integrated Router discards all packets received for ports that are not specified here or in the remote management setup.

Follow these steps to configure a server behind NAT:

1. Enter 15 in the main menu to go to **Menu 15 - NAT Setup.**
2. Enter 2 to go to **Menu 15.2 - NAT Server Setup**.

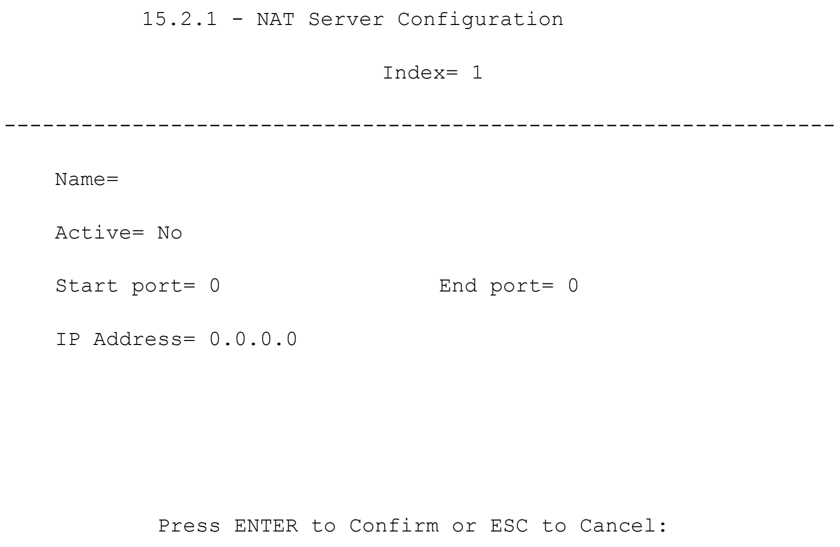
Figure 37 Menu 15.2 – NAT Server Sets



```
          Menu 15.2 - NAT Server Setup

        Default Server: 0.0.0.0
 Rule  Act.   Start Port   End Port    IP Address
------------------------------------------------------
 001   No     0            0           0.0.0.0
 002   No     0            0           0.0.0.0
 003   No     0            0           0.0.0.0
 004   No     0            0           0.0.0.0
 005   No     0            0           0.0.0.0
 006   No     0            0           0.0.0.0
 007   No     0            0           0.0.0.0
 008   No     0            0           0.0.0.0
 009   No     0            0           0.0.0.0
 010   No     0            0           0.0.0.0


Select Command= None           Select Rule= N/A
      Press ENTER to Confirm or ESC to Cancel:
```

3 Select **Edit Rule** in the **Select Command** field; type the index number of the NAT server you want to configure in the **Select Rule** field and press [ENTER] to open **Menu 15.2.1 - NAT Server Configuration** (see the next figure).

Figure 38   15.2.1 – NAT Server Configuration



```
          15.2.1 - NAT Server Configuration

                                Index= 1

----------------------------------------------------------------

      Name=

      Active= No

      Start port= 0                 End port= 0

      IP Address= 0.0.0.0




            Press ENTER to Confirm or ESC to Cancel:
```

The following table describes the fields in this screen.

Table 21   15.2.1: NAT Server Configuration

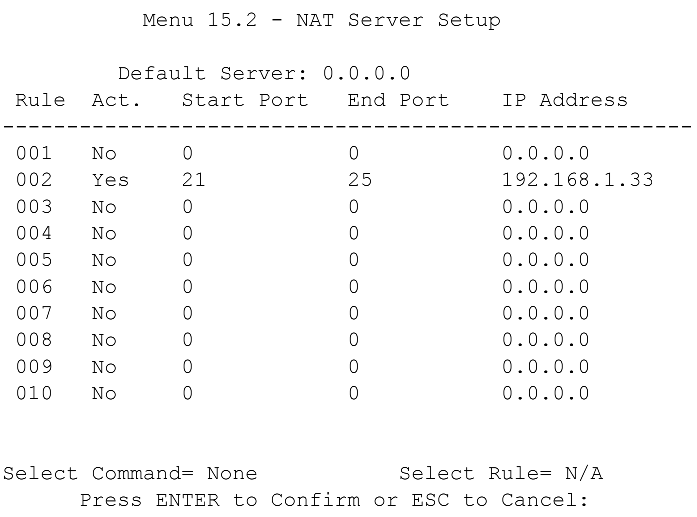
Field	Description
Index	This is the index number of an individual port forwarding server entry.
Name	Enter a name to identify this port-forwarding rule.
Active	Press [SPACE BAR] and then [ENTER] to select **Yes** to enable the NAT server entry.
Start Port	Enter a port number in the **Start Port** field. To forward only one port, enter it again in the **End Port** field. To specify a range of ports, enter the last port to be forwarded in the **End Port** field.
End Port	
IP Address	Enter the inside IP address of the server.
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.	

4 Enter a port number in the **Start Port** field. To forward only one port, enter it again in the **End Port** field. To specify a range of ports, enter the last port to be forwarded in the **End Port** field.

5 Enter the inside IP address of the server in the **IP Address** field. In the following figure, you have a computer acting as an FTP, Telnet and SMTP server (ports 21, 23 and 25) at 192.168.1.33.

6 Press [ENTER] at the "Press ENTER to confirm …" prompt to save your configuration after you define all the servers or press [ESC] at any time to cancel.

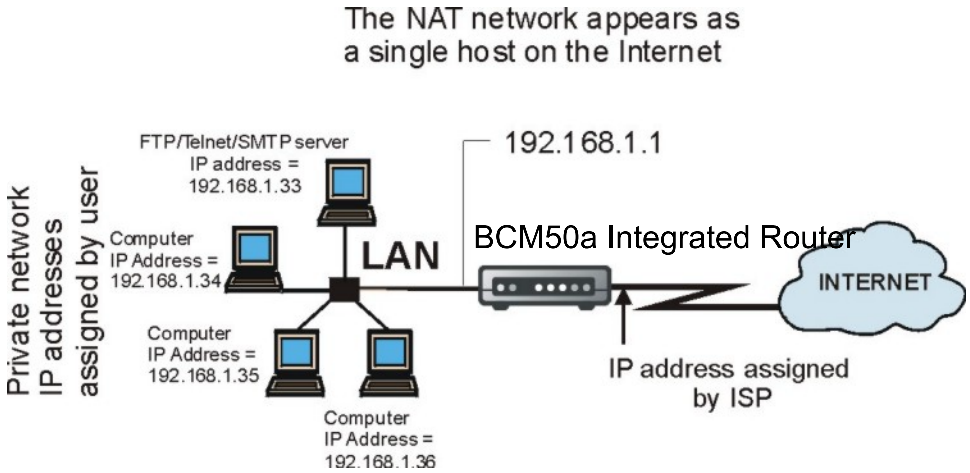
Figure 39 Menu 15.2 – NAT Server Setup



```
           Menu 15.2 - NAT Server Setup

         Default Server: 0.0.0.0
 Rule  Act.   Start Port   End Port    IP Address
------------------------------------------------------
 001   No     0            0           0.0.0.0
 002   Yes    21           25          192.168.1.33
 003   No     0            0           0.0.0.0
 004   No     0            0           0.0.0.0
 005   No     0            0           0.0.0.0
 006   No     0            0           0.0.0.0
 007   No     0            0           0.0.0.0
 008   No     0            0           0.0.0.0
 009   No     0            0           0.0.0.0
 010   No     0            0           0.0.0.0


Select Command= None           Select Rule= N/A
      Press ENTER to Confirm or ESC to Cancel:
```

You assign the private network IP addresses. The NAT network appears as a single host on the Internet. A is the FTP/Telnet/SMTP server.

Figure 40 Multiple servers behind NAT example


The NAT network appears as a single host on the Internet
Private network IP addresses assigned by user
FTP/Telnet/SMTP server IP address = 192.168.1.33
Computer IP Address = 192.168.1.34
Computer IP Address = 192.168.1.35
Computer IP Address = 192.168.1.36
LAN
192.168.1.1
BCM50a Integrated Router
INTERNET
IP address assigned by ISP

General NAT examples

The following are some examples of NAT configuration.

Internet access only

In the Internet access example shown in Figure 41, you only need one rule where all your ILAs (Inside Local addresses) map to one dynamic IGA (Inside Global Address) assigned by your ISP.

Figure 41 NAT Example 1

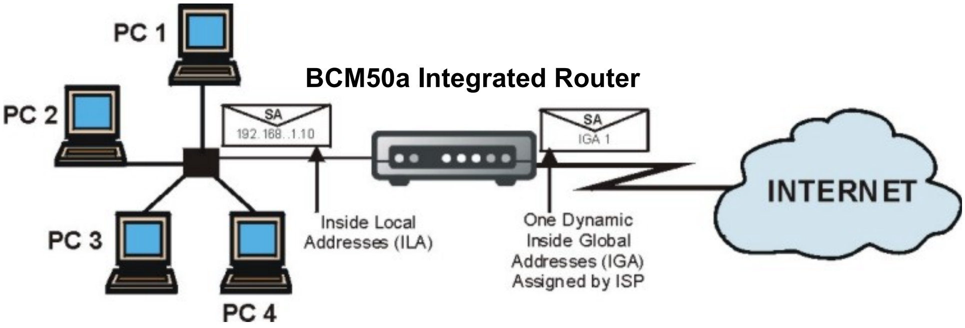


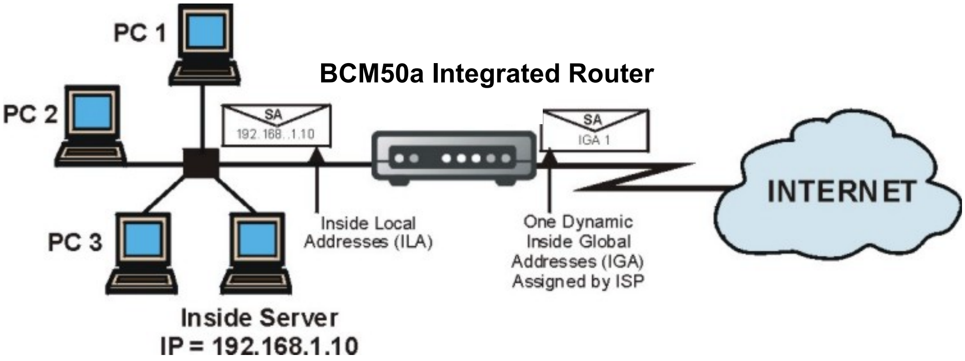
Figure 42 Menu 4: Internet access & NAT example

```
               Menu 4 - Internet Access Setup
ISP's Name= ChangeMe
Encapsulation= ENET ENCAP
Multiplexing= LLC-based
VPI #= 8
VCI #= 35
My Login= N/A
My Password= N/A
ENET ENCAP Gateway= N/A
IP Address Assignment= Dynamic
  IP Address= N/A
Network Address Translation= SUA Only
  Address Mapping Set= N/A

               Press ENTER to Confirm or ESC to Cancel:
```

From menu 4 shown above, simply choose the **SUA Only** option from the **Network Address Translation** field. This is the Many-to-One mapping discussed in section "General NAT examples" on page 103. The **SUA Only** read-only option from the **Network Address Translation** field in menus 4 and 11.3 is specifically preconfigured to handle this case.

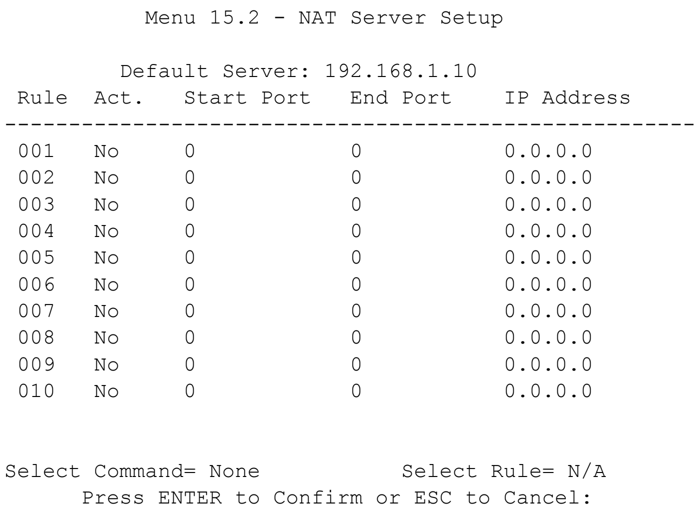
Example 2: Internet access with an inside server

Figure 43 NAT Example 2



In this case, you do exactly as shown in Figure 43 (use the convenient pre-configured **SUA Only** set), and also go to menu 15.2 to specify the Inside Server behind the NAT as shown in Figure 44.

Figure 44 Menu 15.2: Specifying an inside server



```
            Menu 15.2 - NAT Server Setup

          Default Server: 192.168.1.10
 Rule  Act.   Start Port   End Port    IP Address
------------------------------------------------------
 001   No     0            0           0.0.0.0
 002   No     0            0           0.0.0.0
 003   No     0            0           0.0.0.0
 004   No     0            0           0.0.0.0
 005   No     0            0           0.0.0.0
 006   No     0            0           0.0.0.0
 007   No     0            0           0.0.0.0
 008   No     0            0           0.0.0.0
 009   No     0            0           0.0.0.0
 010   No     0            0           0.0.0.0


Select Command= None           Select Rule= N/A
      Press ENTER to Confirm or ESC to Cancel:
```

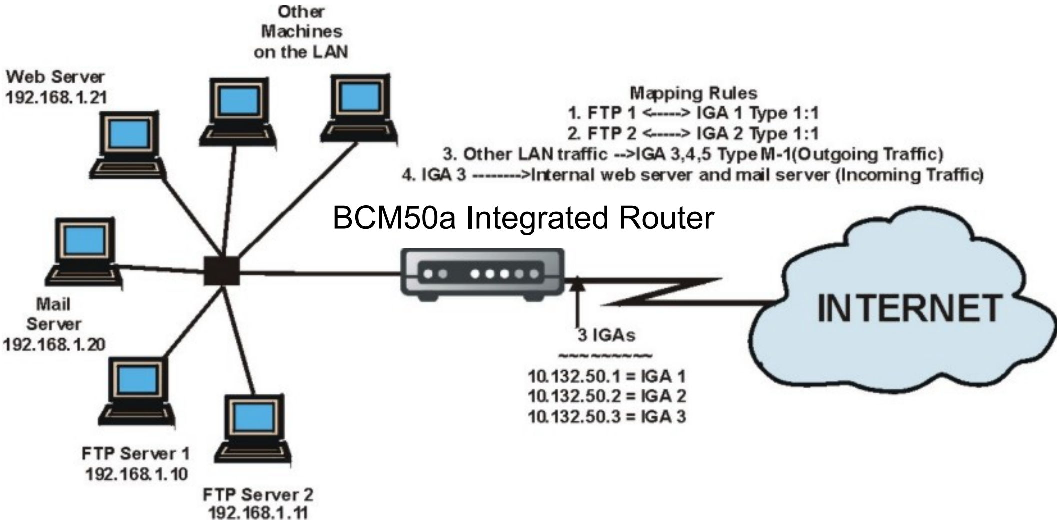
Example 3: Multiple public IP addresses with inside servers

In this example, there are 3 IGAs from our ISP. There are many departments but two have their own FTP server. All departments share the same router. The example reserves one IGA for each department with an FTP server and all departments use the other IGA. Map the FTP servers to the first two IGAs and the other LAN traffic to the remaining IGA. Map the third IGA to an inside web server and mail server. Four rules need to be configured, two bi-directional and two uni-directional, as follows.

1. Map the first IGA to the first inside FTP server for FTP traffic in both directions (**1 : 1** mapping, giving both local and global IP addresses).
2. Map the second IGA to the second internal FTP server for FTP traffic in both directions (**1 : 1** mapping, giving both local and global IP addresses).
3. Map the other outgoing LAN traffic to IGA3 (**Many : 1** mapping).
4. You also map your third IGA to the web server and mail server on the LAN. If you choose type **Server**, you can specify multiple servers, of different types, to other computers behind NAT on the LAN.

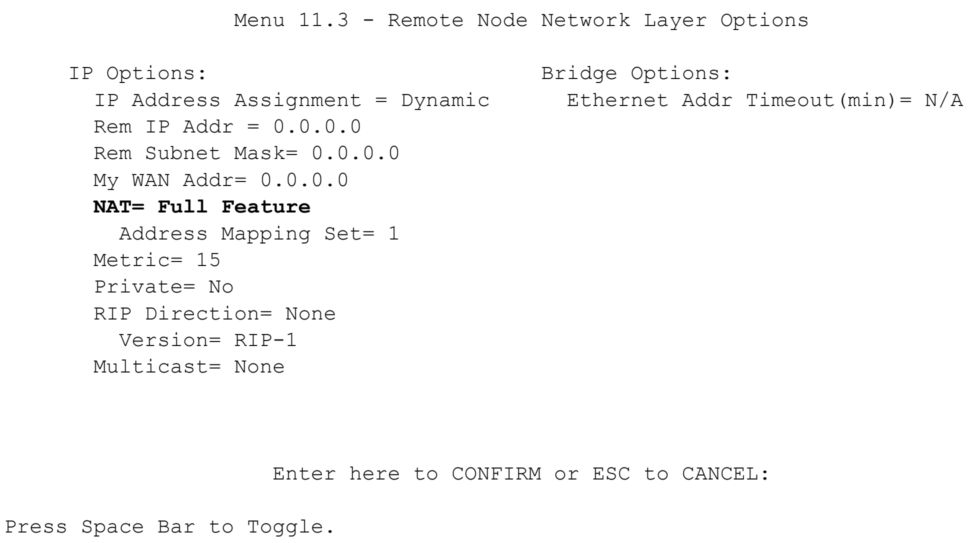
The example situation looks like this:

Figure 45 NAT example 3


Other Machines on the LAN
Web Server 192.168.1.21
Mapping Rules
1. FTP 1 <-----> IGA 1 Type 1:1
2. FTP 2 <-----> IGA 2 Type 1:1
3. Other LAN traffic -->IGA 3,4,5 Type M-1(Outgoing Traffic)
4. IGA 3 -------->Internal web server and mail server (Incoming Traffic)
BCM50a Integrated Router
INTERNET
Mail Server 192.168.1.20
3 IGAs
~~~~~~~~~
10.132.50.1 = IGA 1
10.132.50.2 = IGA 2
10.132.50.3 = IGA 3
FTP Server 1 192.168.1.10
FTP Server 2 192.168.1.11

1. In this case you must configure Address Mapping Set 1 from **Menu 15.1 - Address Mapping Sets.** Therefore, you must choose the **Full Feature** option from the **Network Address Translation** field (in menu 4 or menu 11.3) (see Figure 46).
2. Enter 15 from the main menu.
3. Enter 1 to configure the Address Mapping Sets.
4. Enter 1 to begin configuring this new set. Enter a Set Name, choose the **Edit Action** and then enter 1 for the **Select Rule** field. Press [ENTER] to confirm.
5. Select **Type** as **One-to-One** (direct mapping for packets going both ways), and enter the local **Start IP** as 192.168.1.10 (the IP address of FTP Server 1), the global **Start IP** as 10.132.50.1 (our first IGA). (see Figure 47*)*.
6. Repeat the previous step for rules 2 to 4 as outlined above.
7. When finished, menu 15.1.1 looks like as shown in Figure 48.
~~~~~~~~~

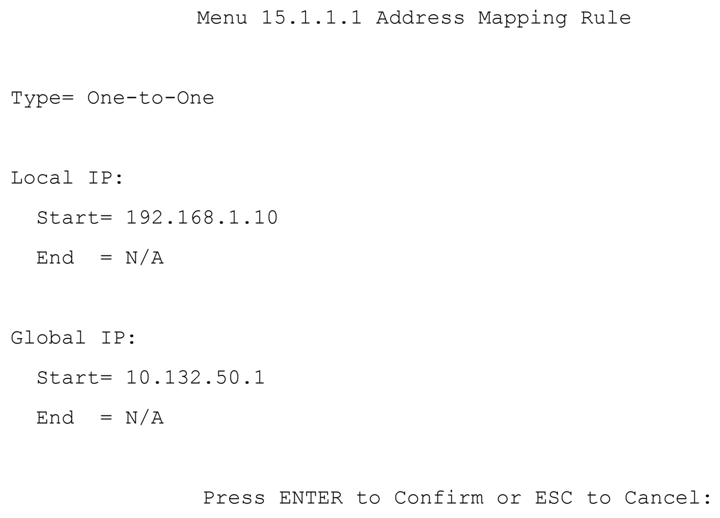
Figure 46 Example 3: Menu 11.3



```
                Menu 11.3 - Remote Node Network Layer Options

     IP Options:                           Bridge Options:
       IP Address Assignment = Dynamic       Ethernet Addr Timeout(min)= N/A
       Rem IP Addr = 0.0.0.0
       Rem Subnet Mask= 0.0.0.0
       My WAN Addr= 0.0.0.0
       NAT= Full Feature
         Address Mapping Set= 1
       Metric= 15
       Private= No
       RIP Direction= None
         Version= RIP-1
       Multicast= None



                   Enter here to CONFIRM or ESC to CANCEL:

Press Space Bar to Toggle.
```

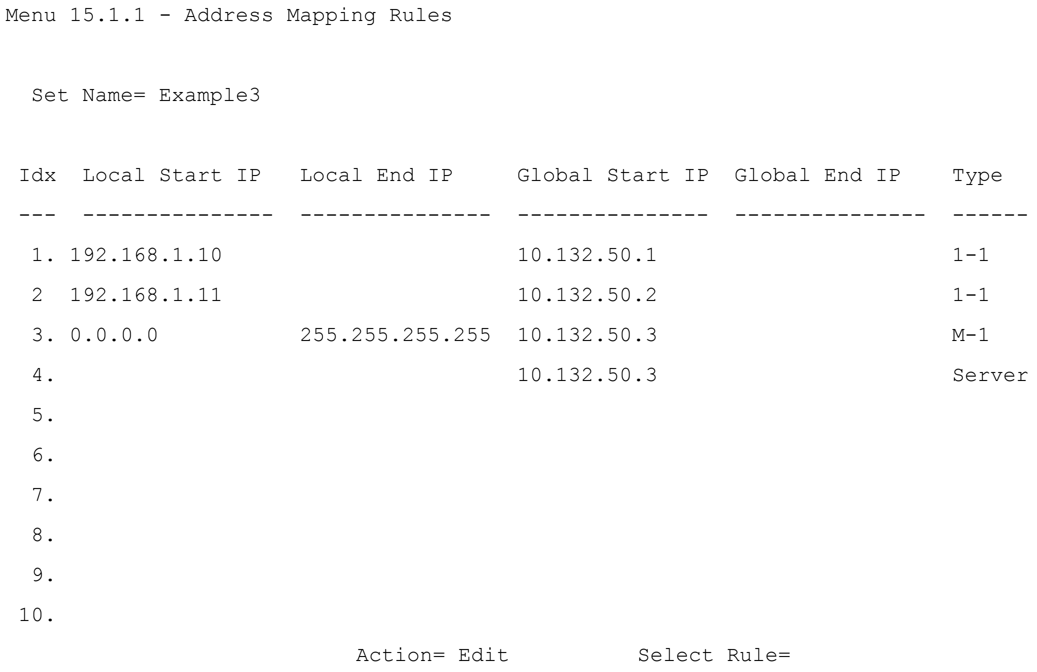
Figure 47 shows how to configure the first rule.

Figure 47   Example 3: Menu 15.1.1.1



```
              Menu 15.1.1.1 Address Mapping Rule


Type= One-to-One


Local IP:
  Start= 192.168.1.10
  End  = N/A


Global IP:
  Start= 10.132.50.1
  End  = N/A


               Press ENTER to Confirm or ESC to Cancel:
```

Figure 48 Example 3: Final Menu 15.1.1



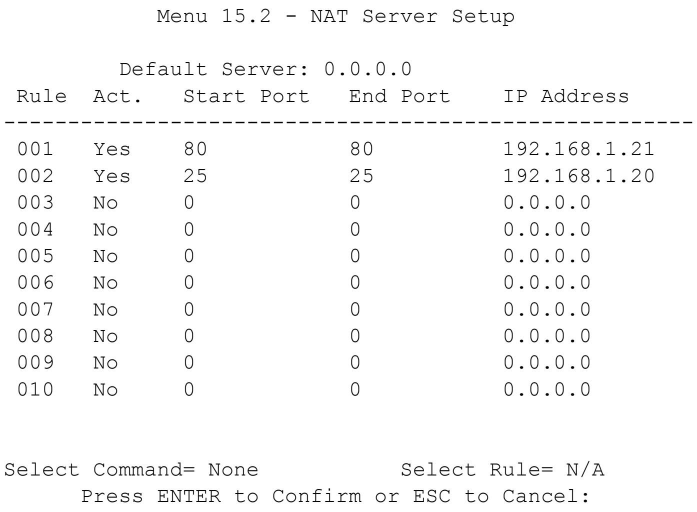
```
Menu 15.1.1 - Address Mapping Rules


  Set Name= Example3


 Idx  Local Start IP   Local End IP     Global Start IP  Global End IP    Type
 ---  ---------------  ---------------  ---------------  ---------------  ------
  1. 192.168.1.10                       10.132.50.1                       1-1
  2  192.168.1.11                       10.132.50.2                       1-1
  3. 0.0.0.0           255.255.255.255  10.132.50.3                       M-1
  4.                                    10.132.50.3                       Server
  5.
  6.
  7.
  8.
  9.
 10.
                           Action= Edit          Select Rule=
```

Now configure the IGA3 to map to our web server and mail server on the LAN.

8 Enter 15 from the main menu.

9 Now enter 2 from this menu and configure it as shown in Example 3: Menu 15.2.

Figure 49 Example 3: Menu 15.2



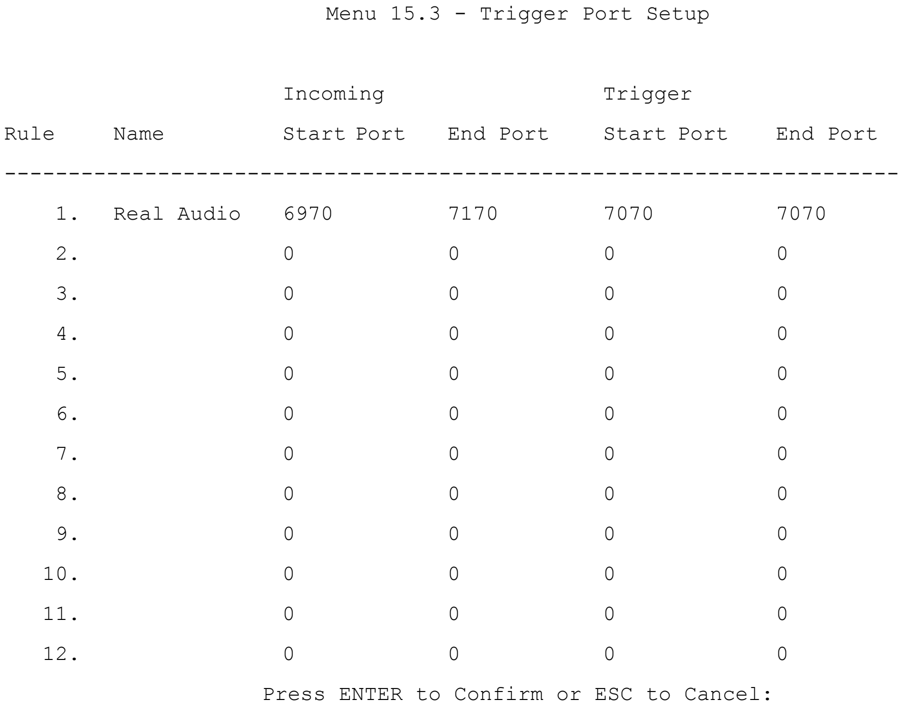
```
            Menu 15.2 - NAT Server Setup

         Default Server: 0.0.0.0
 Rule  Act.   Start Port   End Port    IP Address
------------------------------------------------------
 001   Yes    80           80          192.168.1.21
 002   Yes    25           25          192.168.1.20
 003   No     0            0           0.0.0.0
 004   No     0            0           0.0.0.0
 005   No     0            0           0.0.0.0
 006   No     0            0           0.0.0.0
 007   No     0            0           0.0.0.0
 008   No     0            0           0.0.0.0
 009   No     0            0           0.0.0.0
 010   No     0            0           0.0.0.0


Select Command= None           Select Rule= N/A
      Press ENTER to Confirm or ESC to Cancel:
```

Configuring Trigger Port forwarding

Note: Only one LAN computer can use a trigger port (range) at a time.

Enter 3 in menu 15 to display **Menu 15.3 — Trigger Port Setup**, shown in Figure 50.

Figure 50 Menu 15.3 – Trigger Port Setup



```
                         Menu 15.3 - Trigger Port Setup

                      Incoming                 Trigger
Rule    Name          Start Port   End Port    Start Port    End Port
----------------------------------------------------------------------
    1.  Real Audio    6970         7170        7070          7070
    2.                0            0           0             0
    3.                0            0           0             0
    4.                0            0           0             0
    5.                0            0           0             0
    6.                0            0           0             0
    7.                0            0           0             0
    8.                0            0           0             0
    9.                0            0           0             0
   10.                0            0           0             0
   11.                0            0           0             0
   12.                0            0           0             0
                    Press ENTER to Confirm or ESC to Cancel:
```

Table 22 describes the fields in Figure 50.

Table 22 Menu 15.3: Trigger Port setup description

Field	**Description**	**Example**
Rule	This is the rule index number.	1
Name	Enter a unique name for identification purposes. You can enter up to 15 characters in this field. All characters are permitted - including spaces.	Real Audio
Incoming	Incoming is a port (or a range of ports) that a server on the WAN uses when it sends out a particular service. The BCM50a Integrated Router forwards the traffic with this port (or range of ports) to the client computer on the LAN that requested the service.	
Start Port	Enter a port number or the starting port number in a range of port numbers.	6970
End Port	Enter a port number or the ending port number in a range of port numbers.	7170

Table 22 Menu 15.3: Trigger Port setup description

Field	Description	Example
Trigger	The trigger port is a port (or a range of ports) that causes (or triggers) the BCM50a Integrated Router to record the IP address of the LAN computer that sent the traffic to a server on the WAN.	
Start Port	Enter a port number or the starting port number in a range of port numbers.	7070
End Port	Enter a port number or the ending port number in a range of port numbers.	7070
	Press [ENTER] at the message “Press ENTER to Confirm...” to save your configuration, or press [ESC] at any time to cancel.	

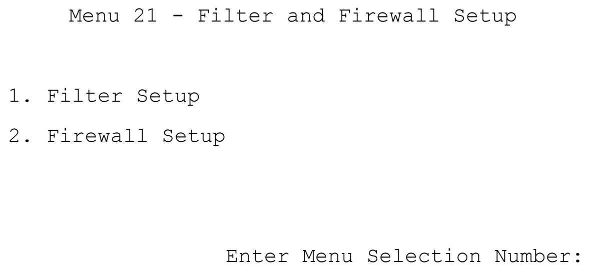
Chapter 10
Introducing the firewall

This chapter shows you how to get started with the firewall.

Using SMT menus

From the main menu enter 21 to go to **Menu 21 - Filter Set and Firewall Configuration** to display the screen shown in Figure 51.

Figure 51 Menu 21– Filter and Firewall Setup

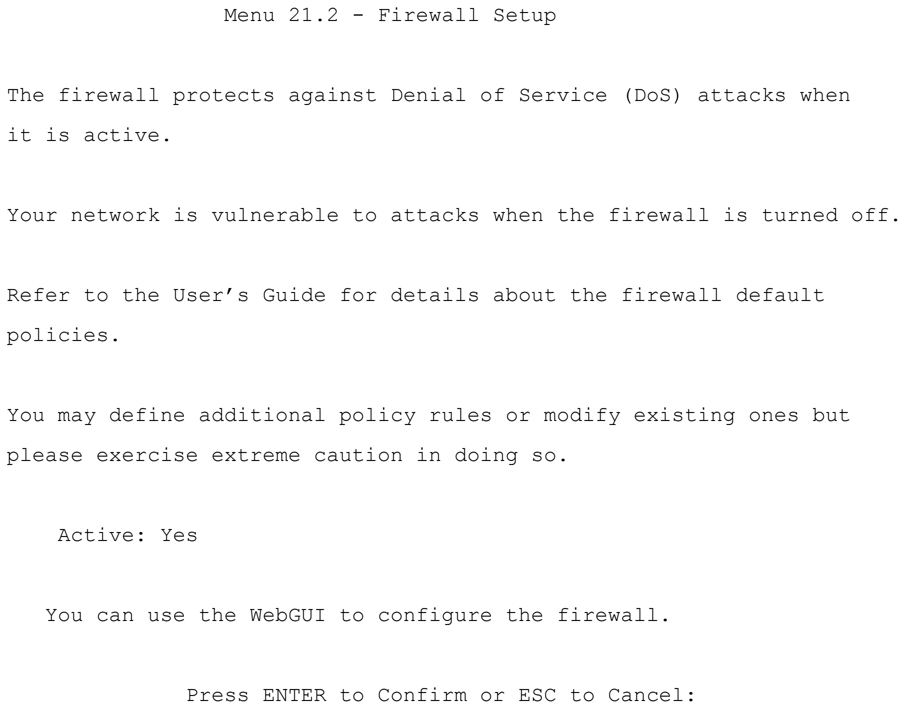


```
              Menu 21 - Filter and Firewall Setup


         1. Filter Setup
         2. Firewall Setup



                             Enter Menu Selection Number:
```

Activating the firewall

Enter option 2 in this menu to bring up the screen shown in Figure 52. Press [SPACE BAR] and then [ENTER] to select **Yes** in the **Active** field to activate the firewall. The firewall must be active to protect against Denial of Service (DoS) attacks. Use the WebGUI to configure firewall rules.

Figure 52 Menu 21.2 – Firewall Setup



```
                 Menu 21.2 - Firewall Setup

The firewall protects against Denial of Service (DoS) attacks when
it is active.

Your network is vulnerable to attacks when the firewall is turned off.

Refer to the User's Guide for details about the firewall default
policies.

You may define additional policy rules or modify existing ones but
please exercise extreme caution in doing so.

    Active: Yes

   You can use the WebGUI to configure the firewall.

              Press ENTER to Confirm or ESC to Cancel:
```

Note: Configure the firewall rules using the WebGUI or CLI commands.

Chapter 11
Filter configuration

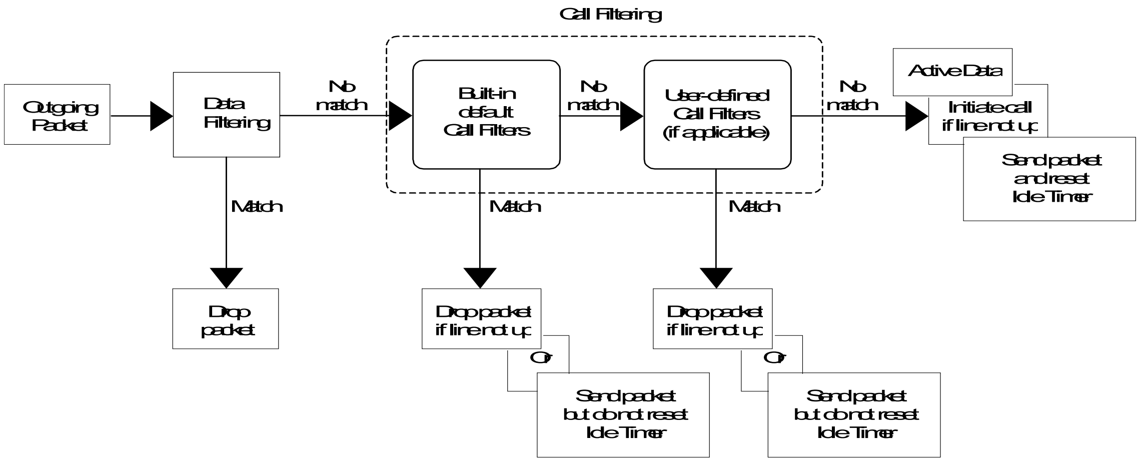
This chapter shows you how to create and apply filters.

Introduction to filters

Your BCM50a Integrated Router uses filters to decide whether to allow passage of a data packet, make a call, or both. There are two types of filter applications: data filtering and call filtering. Filters are subdivided into device and protocol filters.

Data filtering screens the data to determine if the packet is allowed to pass. Data filters are divided into incoming and outgoing filters, depending on the direction of the packet relative to a port. Data filtering can be applied on either the WAN side or the LAN side. Call filtering is used to determine if a packet is allowed to trigger a call. Remote node call filtering is only applicable when using PPPoE encapsulation. Outgoing packets must undergo data filtering before they encounter call filtering as shown in Figure 53.

Figure 53 Outgoing packet filtering process


Call Filtering
Outgoing Packet
Data Filtering
No match
Built-in default Call Filters
No match
User-defined Call Filters (if applicable)
No match
Active Data
Initiate call if line not up
Send packet and reset Idle Timer
Match
Match
Match
Drop packet
Drop packet if line not up
Or
Send packet but do not reset Idle Timer
Drop packet if line not up
Or
Send packet but do not reset Idle Timer

For incoming packets, your BCM50a Integrated Router applies data filters only. Packets are processed depending upon whether a match is found. The following sections describe how to configure filter sets.

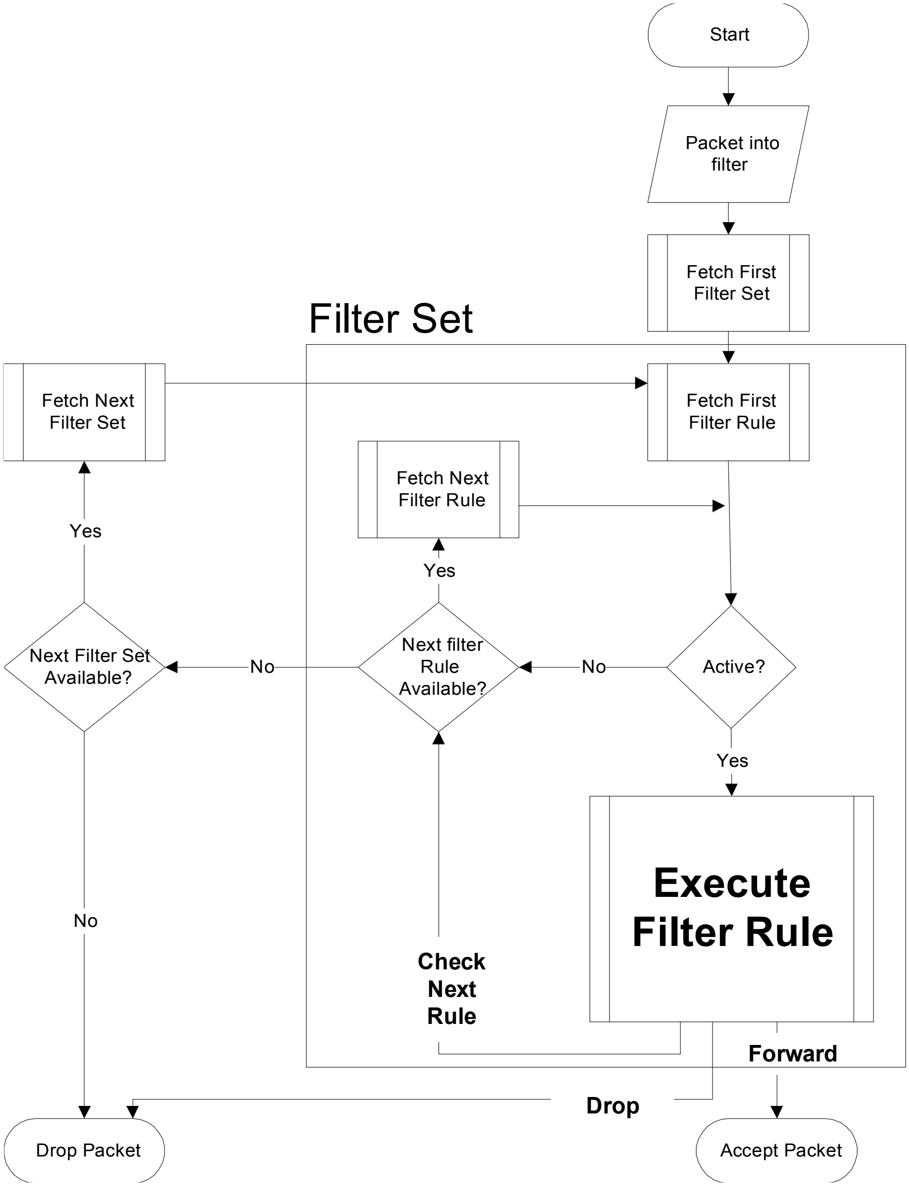
Filter Structure

A filter set consists of one or more filter rules. Usually, you group related rules, for example, all the rules for NetBIOS, into a single set and give it a descriptive name. With the BCM50a Integrated Router, you can configure up to twelve filter sets with six rules in each set, for a total of 72 filter rules in the system. You cannot mix device filter rules and protocol filter rules within the same set. You can apply up to four filter sets to a particular port to block multiple types of packets. With each filter set having up to six rules, you can have a maximum of 24 rules active for a single port.

Sets of factory default filter rules are configured in menu 21 to prevent NetBIOS traffic from triggering calls and to prevent incoming Telnet sessions. A summary of their filter rules is shown in the figures that follow.

Figure 54 illustrates the logic flow when executing a filter rule. Also see Figure 58 for the logic flow when executing an IP filter.

Figure 54 Filter rule process



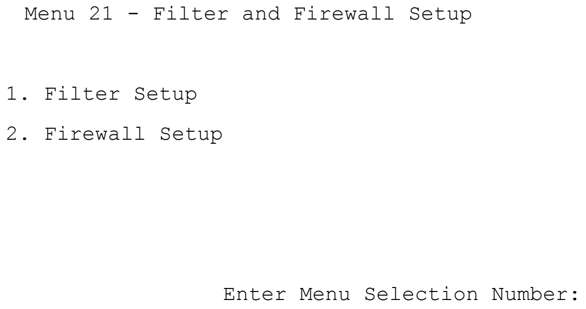
You can apply up to four filter sets to a particular port to block multiple types of packets. With each filter set having up to six rules, you can have a maximum of 24 rules active for a single port.

Configuring a Filter Set

The BCM50a Integrated Router includes filtering for NetBIOS over TCP/IP packets by default. To configure another filter set, follow the procedure below.

1 Enter 21 in the main menu to open menu 21.

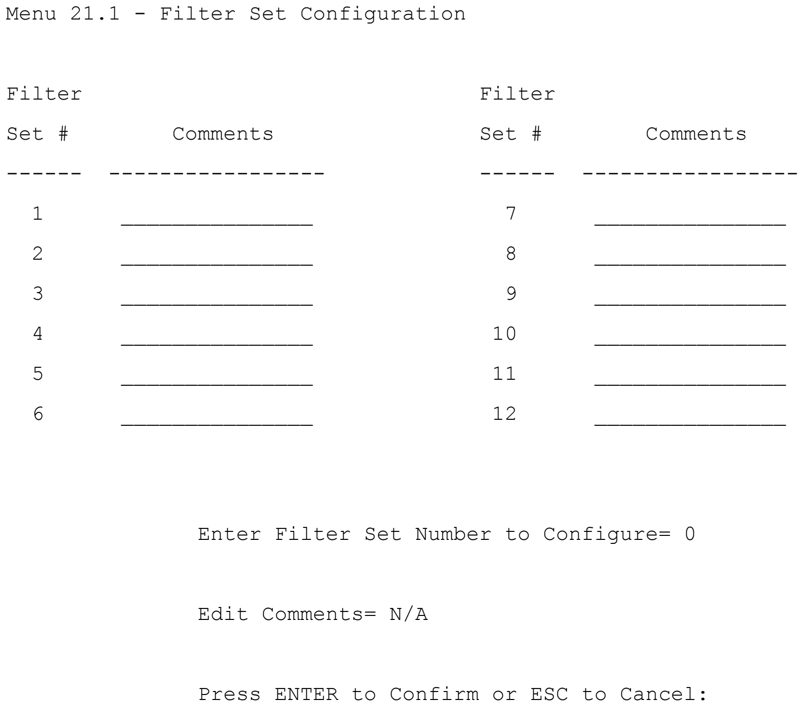
Figure 55 Menu 21 – Filter and Firewall Setup



```
  Menu 21 - Filter and Firewall Setup


1. Filter Setup

2. Firewall Setup






                Enter Menu Selection Number:
```

2 Enter 1 to bring up the menu 21.1.

Figure 56 Menu 21.1– Filter Set Configuration



```
Menu 21.1 - Filter Set Configuration

Filter                               Filter
Set #        Comments                Set #        Comments
------  -----------------            ------  -----------------
  1      _______________               7      _______________
  2      _______________               8      _______________
  3      _______________               9      _______________
  4      _______________              10      _______________
  5      _______________              11      _______________
  6      _______________              12      _______________


               Enter Filter Set Number to Configure= 0

               Edit Comments= N/A

               Press ENTER to Confirm or ESC to Cancel:
```

3 Select the filter set you wish to configure (1-12) and press [ENTER].

4 Enter a descriptive name or comment in the **Edit Comments** field and press [ENTER].

5 Press [ENTER] at the message “Press ENTER to confirm” to open **Menu 21.1.1 - Filter Rules Summary**.

The screen shown in Figure 57 shows the summary of the existing rules in the filter set. Table 23 and Table 24 contain a brief description of the abbreviations used in the previous menus.

Table 23 Abbreviations used in the Filter Rules Summary Menu

Field	Description
#	The filter rule number: 1 to 6.
A	Active: “Y” means the rule is active. “N” means the rule is inactive.
Type	The type of filter rule: “GEN” for Generic, “IP” for TCP/IP.
Filter Rules	These parameters are displayed here.
M	More: “Y” means there are more rules to check which form a rule chain with the present rule. An action cannot be taken until the rule chain is complete. “N” means there are no more rules to check. You can specify an action to be taken for example, forward the packet, drop the packet or check the next rule. For the latter, the next rule is independent of the rule just checked.
m	Action Matched: “F” means to forward the packet immediately and skip checking the remaining rules. “D” means to drop the packet. “N“ means to check the next rule.
n	Action Not Matched: “F” means to forward the packet immediately and skip checking the remaining rules. “D” means to drop the packet. “N” means to check the next rule.

Table 24 Rule abbreviations used

Abbreviation	Description
IP	
Pr	Protocol
SA	Source Address
SP	Source Port number
DA	Destination Address
DP	Destination Port number
GEN	
Off	Offset
Len	Length

The next section provides information on configuring the filter rules.

Configuring a Filter Rule

To configure a filter rule, type its number in **Menu 21.1.1 - Filter Rules Summary** and press [ENTER] to open menu 21.1.1.1 for the rule.

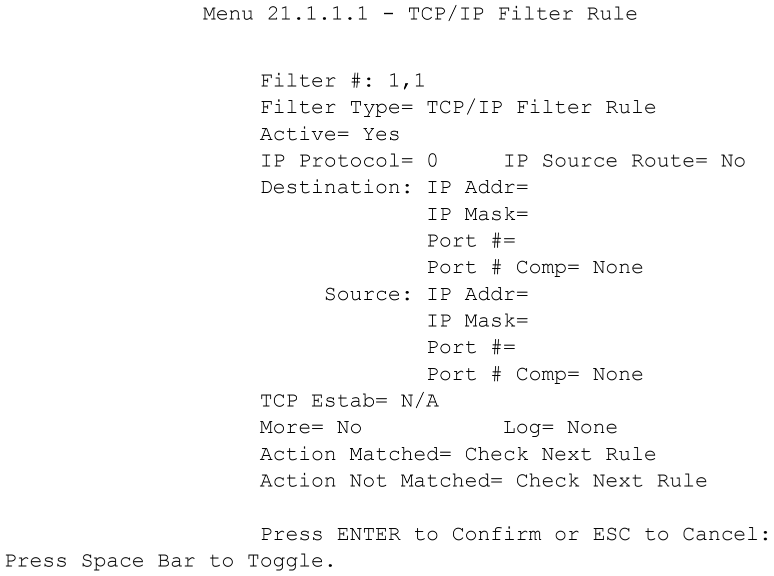
To speed up filtering, all rules in a filter set must be of the same class, for example, protocol filters or generic filters. The class of a filter set is determined by the first rule that you create. When applying the filter sets to a port, separate menu fields are provided for protocol and device filter sets. If you include a protocol filter set in a device filter field or vice versa, the BCM50a Integrated Router warns you and prevents you from saving.

Configuring a TCP/IP Filter Rule

This section shows you how to configure a TCP/IP filter rule. Using TCP/IP rules, you can base the rule on the fields in the IP and the upper layer protocol, for example, UDP and TCP headers.

To configure TCP/IP rules, select **TCP/IP Filter Rule** from the **Filter Type** field and press [ENTER] to open **Menu 21.1.1.1 - TCP/IP Filter Rule**, as shown in Figure 57.

Figure 57 Menu 21.1.1.1 – TCP/IP Filter Rule



```
               Menu 21.1.1.1 - TCP/IP Filter Rule

                    Filter #: 1,1
                    Filter Type= TCP/IP Filter Rule
                    Active= Yes
                    IP Protocol= 0     IP Source Route= No
                    Destination: IP Addr=
                                 IP Mask=
                                 Port #=
                                 Port # Comp= None
                         Source: IP Addr=
                                 IP Mask=
                                 Port #=
                                 Port # Comp= None
                    TCP Estab= N/A
                    More= No           Log= None
                    Action Matched= Check Next Rule
                    Action Not Matched= Check Next Rule

                    Press ENTER to Confirm or ESC to Cancel:
Press Space Bar to Toggle.
```

Table 25 describes how to configure your TCP/IP filter rule.

Table 25 TCP/IP Filter Rule Menu fields

Field	Description	Options
Active	Press [SPACE BAR] and then [ENTER] to select **Yes** to activate the filter rule or **No** to deactivate it.	Yes No
IP Protocol	Protocol refers to the upper layer protocol, for example, TCP is 6, UDP is 17 and ICMP is 1. Type a value between 0 and 255. A value of 0 matches ANY protocol.	0-255
IP Source Route	Press [SPACE BAR] and then [ENTER] to select **Yes** to apply the rule to packets with an IP source route option. Otherwise the packets must not have a source route option. The majority of IP packets do not have source route.	Yes No
Destination		
IP Address	Enter the destination IP Address of the packet you wish to filter. This field is ignored if it is 0.0.0.0.	0.0.0.0

Table 25 TCP/IP Filter Rule Menu fields

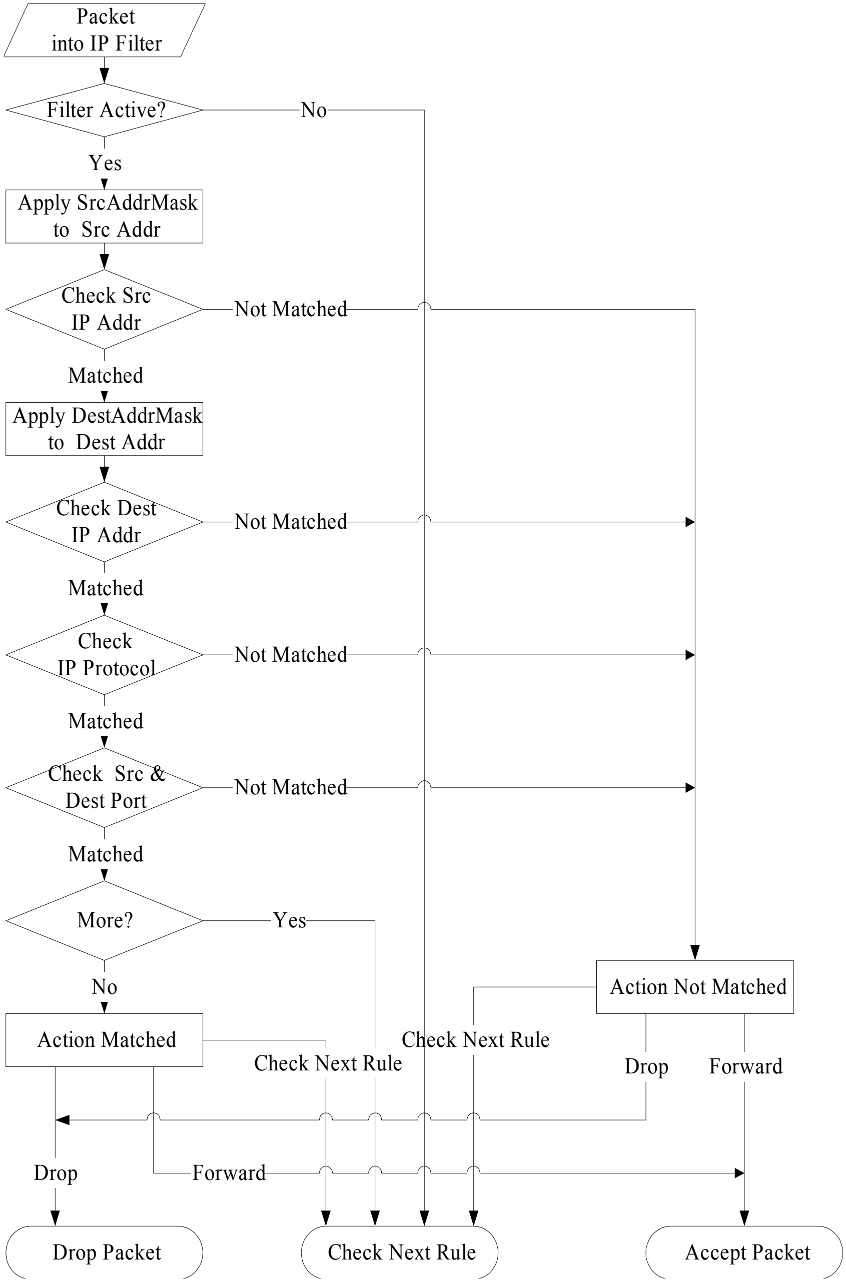
Field	Description	Options
IP Mask	Enter the IP mask to apply to the **Destination: IP Addr**.	0.0.0.0
Port #	Enter the destination port of the packets that you wish to filter. The range of this field is 0 to 65 535. This field is ignored if it is 0.	0-65535
Port # Comp	Press [SPACE BAR] and then [ENTER] to select the comparison to apply to the destination port in the packet against the value given in **Destination: Port #**.	None Less Greater Equal Not Equal
Source		
IP Address	Enter the source IP Address of the packet you wish to filter. This field is ignored if it is 0.0.0.0.	0.0.0.0
IP Mask	Enter the IP mask to apply to the **Source: IP Addr**.	0.0.0.0
Port #	Enter the source port of the packets that you wish to filter. The range of this field is 0 to 65 535. This field is ignored if it is 0.	0-65535
Port # Comp	Press [SPACE BAR] and then [ENTER] to select the comparison to apply to the source port in the packet against the value given in **Source: Port #**.	None Less Greater Equal Not Equal
TCP Estab	This field is applicable only when the IP Protocol field is 6, TCP. Press [SPACE BAR] and then [ENTER] to select **Yes** to have the rule match packets that want to establish a TCP connection (SYN=1 and ACK=0); if **No**, it is ignored.	Yes No
More	Press [SPACE BAR] and then [ENTER] to select **Yes** or **No**. If **Yes**, a matching packet is passed to the next filter rule before an action is taken; if **No**, the packet is disposed of according to the action fields. If **More** is **Yes**, then **Action Matched** and **Action Not Matched** will be **N/A**.	Yes No
Log	Press [SPACE BAR] and then [ENTER] to select a logging option from the following: **None** – No packets are logged. **Action Matched** - Only packets that match the rule parameters are logged. **Action Not Matched** - Only packets that do not match the rule parameters are logged. **Both** – All packets are logged.	None Action Matched Action Not Matched Both

Table 25 TCP/IP Filter Rule Menu fields

Field	Description	Options
Action Matched	Press [SPACE BAR] and then [ENTER] to select the action for a matching packet.	Check Next Rule Forward Drop
Action Not Matched	Press [SPACE BAR] and then [ENTER] to select the action for a packet not matching the rule.	Check Next Rule Forward Drop
	After you configure **Menu 21.1.1.1 - TCP/IP Filter Rule**, press [ENTER] at the message “Press ENTER to Confirm” to save your configuration, or press [ESC] to cancel. This data is displayed on **Menu 21.1.1 - Filter Rules Summary**.	

Figure 58 illustrates the logic flow of an IP filter.

Figure 58 Executing an IP filter



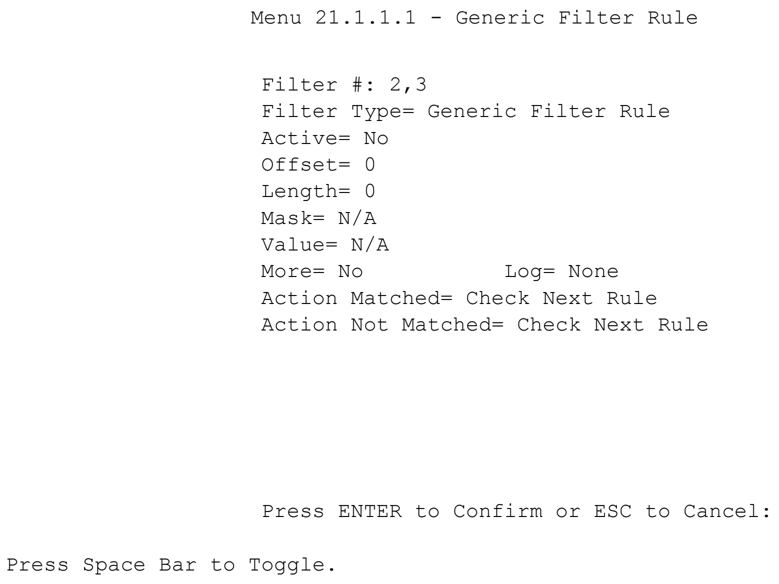
Configuring a Generic Filter Rule

This section shows you how to configure a generic filter rule. With generic rules you can filter non-IP packets. For IP packets, it is generally easier to use the IP rules directly.

For generic rules, the BCM50a Integrated Router treats a packet as a byte stream as opposed to an IP or IPX packet. You specify the portion of the packet to check with the **Offset** (from 0) and the **Length** fields, both in bytes. The BCM50a Integrated Router applies the Mask (using the bit-wise-AND action) to the data portion before comparing the result against the Value to determine a match. The **Mask** and **Value** are specified in hexadecimal numbers. Note that it takes two hexadecimal digits to represent a byte, so if the length is 4, the value in either field will take 8 digits, for example, `FFFFFFFF`.

To configure a generic rule, select **Generic Filter Rule** in the **Filter Type** field in menu 21.1.1.1 and press [ENTER] to open **Generic Filter Rule**, as shown in Figure 59.

Figure 59 Menu 21.1.1.1 – Generic Filter Rule



```
     Menu 21.1.1.1 - Generic Filter Rule


      Filter #: 2,3
      Filter Type= Generic Filter Rule
      Active= No
      Offset= 0
      Length= 0
      Mask= N/A
      Value= N/A
      More= No           Log= None
      Action Matched= Check Next Rule
      Action Not Matched= Check Next Rule






      Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.
```

Table 26 describes the fields in the Generic Filter Rule menu.

Table 26 Generic Filter Rule Menu fields

Field	Description	Options
Filter #	This is the filter set, filter rule coordinates, for example, 2,3 refers to the second filter set and the third rule of that set.	
Filter Type	Use [SPACE BAR] and then [ENTER] to select a rule type. Parameters displayed below each type will be different. TCP/IP filter rules are used to filter IP packets while generic filter rules allow filtering of non-IP packets.	**Generic Filter Rule** **TCP/IP Filter Rule**
Active	Select **Yes** to turn on the filter rule or **No** to turn it off.	Yes / No
Offset	Enter the starting byte of the data portion in the packet that you wish to compare. The range for this field is from 0 to 255.	0-255
Length	Enter the byte count of the data portion in the packet that you wish to compare. The range for this field is 0 to 8.	0-8
Mask	Enter the mask (in Hexadecimal notation) to apply to the data portion before comparison.	

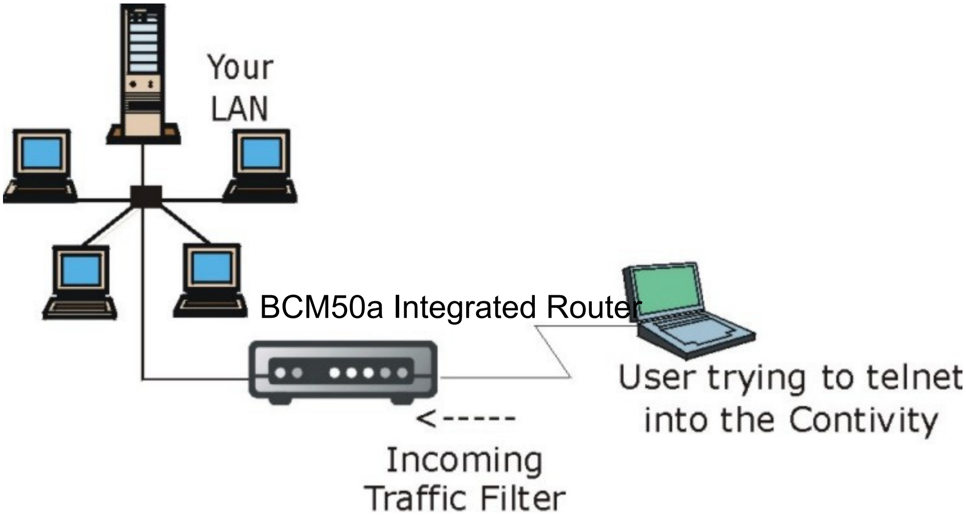
Table 26 Generic Filter Rule Menu fields

Field	**Description**	**Options**
Value	Enter the value (in Hexadecimal notation) to compare with the data portion.	
More	If **Yes**, a matching packet is passed to the next filter rule before an action is taken; or the packet is disposed of according to the action fields. If **More** is **Yes**, then Action Matched and Action Not Matched are **No**.	Yes No
Log	Select the logging option from the following: **None** - No packets are logged. **Action Matched** - Only packets that match the rule parameters are logged. **Action Not Matched** - Only packets that do not match the rule parameters are logged. **Both** – All packets are logged.	None Action Matched Action Not Matched Both
Action Matched	Select the action for a packet matching the rule.	Check Next Rule Forward Drop
Action Not Matched	Select the action for a packet not matching the rule.	Check Next Rule Forward Drop
	After you complete filling in **Menu 21.1.1.1 - Generic Filter Rule**, press [ENTER] at the message “Press ENTER to Confirm” to save your configuration, or press [ESC] to cancel. This data is now be displayed on **Menu 21.1.1 - Filter Rules Summary**.	

Example Filter

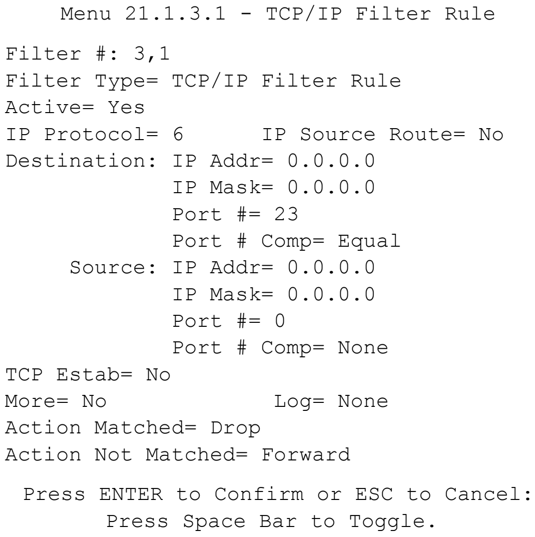
The example shown in Figure 60 is set to block outside users from accessing the BCM50a Integrated Router via Telnet. See the included disk for more Filter Rules example.

Figure 60 Telnet filter Example



1. Enter 21 from the main menu to open **Menu 21 - Filter and Firewall Setup**.
2. Enter 1 to open **Menu 21.1 - Filter Set Configuration**.
3. Enter the index of the filter set you wish to configure (for example 3) and press [ENTER].
4. Enter a descriptive name or comment in the **Edit Comments** field and press [ENTER].
5. Press [ENTER] at the message [Press ENTER to confirm] to open **Menu 21.1.3 - Filter Rules Summary**.
6. Enter 1 to configure the first filter rule (the only filter rule of this set). Make the entries in this menu as shown in Figure 61.

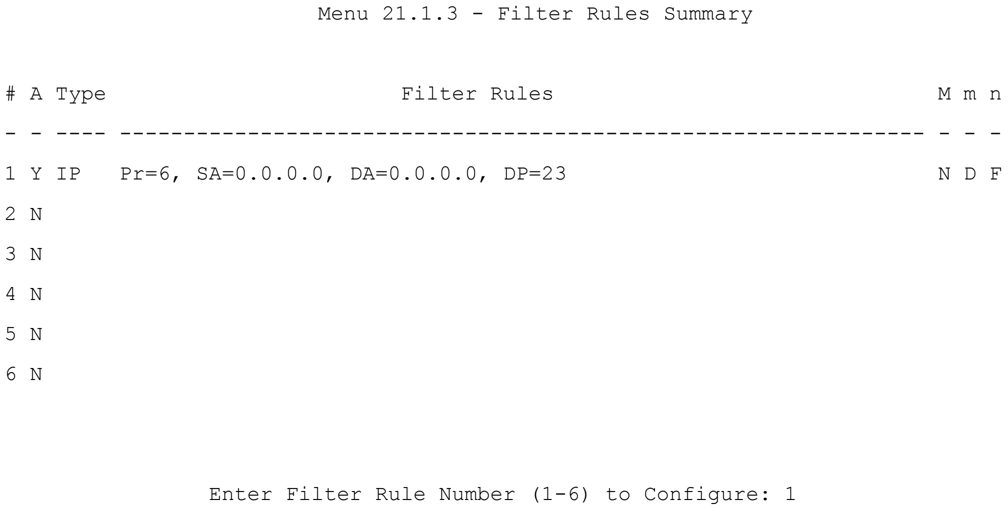
Figure 61 Example Filter: Menu 21.1.3.1



```
    Menu 21.1.3.1 - TCP/IP Filter Rule

Filter #: 3,1
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 6      IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 23
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 0
             Port # Comp= None
TCP Estab= No
More= No             Log= None
Action Matched= Drop
Action Not Matched= Forward

 Press ENTER to Confirm or ESC to Cancel:
        Press Space Bar to Toggle.
```

When you press [ENTER] to confirm, the screen shown in Figure 62 is displayed. Note that there is only one filter rule in this set. The screen shows you that you have configured and activated (**A = Y**) a TCP/IP filter rule (**Type = IP**, **Pr = 6**) for destination Telnet ports (**DP = 23**). **M = N** means an action can be taken immediately. The action is to drop the packet (**m = D**) if the action is matched and to forward the packet immediately (**n = F**) if the action is not matched, whether or not there are more rules to be checked (there are none in this example).

Figure 62 Example Filter Rules Summary: Menu 21.1.3



```
                        Menu 21.1.3 - Filter Rules Summary

# A Type                       Filter Rules                              M m n
- - ---- --------------------------------------------------------------- - - -
1 Y IP   Pr=6, SA=0.0.0.0, DA=0.0.0.0, DP=23                             N D F
2 N
3 N
4 N
5 N
6 N


                Enter Filter Rule Number (1-6) to Configure: 1
```

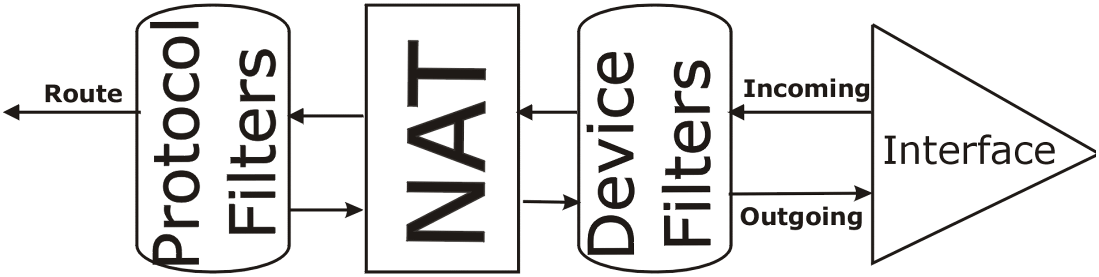
After you have created the filter set, you must apply it.

1. Enter 11 from the main menu to go to menu 11.
2. Then enter **1** to open **Menu 11.1 Remote Node Profile**.
3. Go to the **Edit Filter Sets** field, press [SPACE BAR] to select **Yes** and press [ENTER].
4. This brings you to menu 11.1.4. Apply a filter set (our example is filter set 3) as shown in Figure 65.
5. After you enter the set numbers, press [ENTER] to confirm and leave menu 11.1.4.

Filter Types and NAT

There are two classes of filter rules, **Generic Filter** (Device) rules and protocol filter (**TCP/IP**) rules. Generic filter rules act on the raw data that's going through between LAN and WAN. Protocol filter rules act on the IP packets. Generic and TCP/IP filter rules are discussed in more detail in the next section. When NAT (Network Address Translation) is enabled, the inside IP address and port number are replaced on a connection-by-connection basis, which makes it impossible to know the exact address and port on the wire. Therefore, the BCM50a Integrated Router applies the protocol filters to the native IP address and port number before NAT for outgoing packets and after NAT for incoming packets. On the other hand, the generic, or device filters are applied to the raw packets that appear on the wire. They are applied at the point when the BCM50a Integrated Router is receiving and sending the packets; for example. the interface. The interface can be an Ethernet port or any other hardware port, as illustrated in Figure 63.

Figure 63 Protocol and Device Filter Sets



Firewall Versus Filters

Firewall configuration is discussed in Chapter 10, “Introducing the firewall,” on page 115 chapters of this manual. Further comparisons are also made between filtering, NAT and the firewall.

Applying a Filter

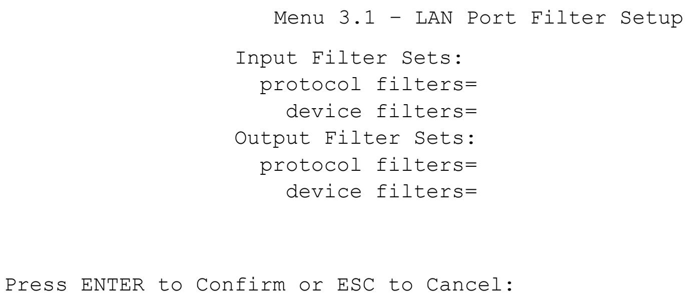
This section shows you where to apply the filters after you design them. The BCM50a Integrated Router already has filters to prevent NetBIOS traffic from triggering calls, and block incoming Telnet, FTP and HTTP connections.

Note: Nortel recommends that you apply filters if you do not activate the firewall.

Applying LAN Filters

LAN traffic filter sets are useful to block certain packets, reduce traffic and prevent security breaches. Go to menu 3.1 (shown next) and enter the numbers of the filter sets that you want to apply, as appropriate. You can choose up to four filter sets (from twelve) by entering their numbers separated by commas, for example., 3, 4, 6, 11. Input filter sets filter incoming traffic to the BCM50a Integrated Router and output filter sets filter outgoing traffic from the BCM50a Integrated Router.

Figure 64 Filtering LAN Traffic

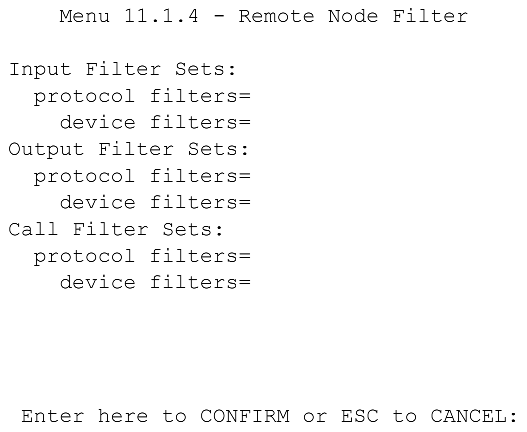


```
                     Menu 3.1 - LAN Port Filter Setup

                  Input Filter Sets:
                    protocol filters=
                      device filters=
                  Output Filter Sets:
                    protocol filters=
                      device filters=


Press ENTER to Confirm or ESC to Cancel:
```

Applying Remote Node Filters

Go to menu 11.1.4 (shown in Figure 65 – note that call filter sets are only present for PPPoE encapsulation) and enter the numbers of the filter sets, as appropriate. You can cascade up to four filter sets by entering their numbers separated by commas. The BCM50a Integrated Router already has filters to prevent NetBIOS traffic from triggering calls, and to block incoming Telnet, FTP and HTTP connections. For PPPoE or PPPoA encapsulation, you have the additional option of specifying remote node call filter sets.

Figure 65 Filtering Remote Node Traffic



```
        Menu 11.1.4 - Remote Node Filter

    Input Filter Sets:
      protocol filters=
        device filters=
    Output Filter Sets:
      protocol filters=
        device filters=
    Call Filter Sets:
      protocol filters=
        device filters=




     Enter here to CONFIRM or ESC to CANCEL:
```

Chapter 12 SNMP Configuration

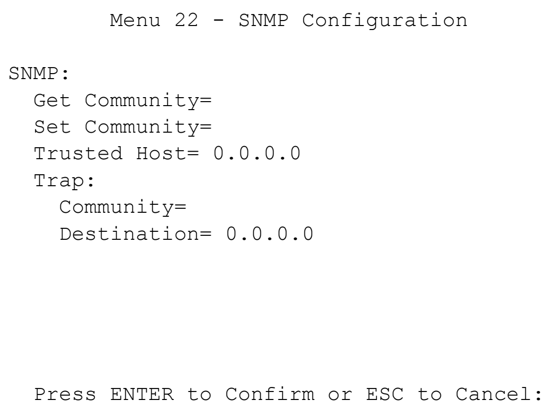
This chapter explains SNMP configuration menu 22.

Note: SNMP is only available if TCP/IP is configured.

SNMP Configuration

To configure SNMP, enter 22 from the main menu to display **Menu 22 - SNMP Configuration** as shown next. The community for **Get**, **Set** and **Trap** fields is SNMP terminology for password.

Figure 66 Menu 22 – SNMP Configuration



```
                Menu 22 - SNMP Configuration

        SNMP:
          Get Community=
          Set Community=
          Trusted Host= 0.0.0.0
          Trap:
            Community=
            Destination= 0.0.0.0




          Press ENTER to Confirm or ESC to Cancel:
```

Table 27 describes the SNMP configuration parameters.

Table 27 SNMP Configuration Menu Fields

Field	Description	Example
Get Community	Type the Get community, which is the password for the incoming Get- and GetNext requests from the management station.	(this is blank by default)
Set Community	Type the Set community, which is the password for incoming Set requests from the management station.	(this is blank by default)
Trusted Host	If you enter a trusted host, your BCM50a Integrated Router will only respond to SNMP messages from this address. A blank (default) field means your BCM50a Integrated Router will respond to all SNMP messages it receives, regardless of source.	0.0.0.0
Trap Community	Type the Trap community, which is the password sent with each trap to the SNMP manager.	Public
Destination	Type the IP address of the station to send your SNMP traps to.	0.0.0.0
	After you complete this menu, press [ENTER] at the prompt “Press [ENTER] to confirm or [ESC] to cancel” to save your configuration or press [ESC] to cancel and go back to the previous screen.	

SNMP Traps

The BCM50a Integrated Router will sends traps to the SNMP manager when any one of the following events occurs:

Table 28 SNMP Traps

Trap #	Trap Name	Description
0	coldStart (defined in *RFC-1215*)	A trap is sent after booting (power on).
1	warmStart (defined in *RFC-1215*)	A trap is sent after booting (software reboot).
4	authenticationFailure (defined in *RFC-1215*)	A trap is sent to the manager when receiving any SNMP get or set requirements with the wrong community (password).
6	whyReboot (defined in MIB)	A trap is sent with the reason of restart before rebooting when the system is going to restart (warm start).
6a	For intentional reboot:	A trap is sent with the message "System reboot by user!" if reboot is done intentionally, (for example, download new files, CI command sys reboot, and others).
6b	For fatal error:	A trap is sent with the message of the fatal code if the system reboots because of fatal errors.

Chapter 13
System security

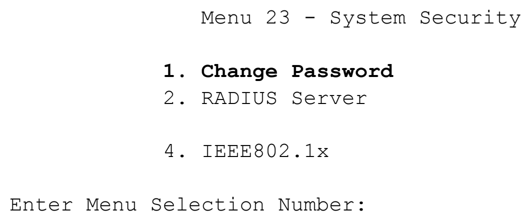
This chapter describes how to configure the system security on the BCM50a Integrated Router.

System security

You can configure the system password, an external RADIUS server and 802.1x in this menu.

System password

Figure 67 Menu 23 – System security



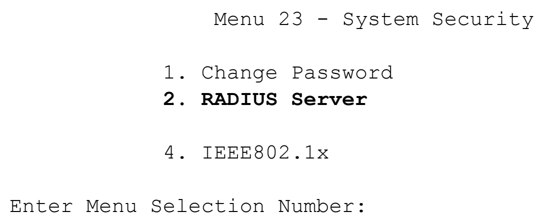
```
                    Menu 23 - System Security

                 1. Change Password
                 2. RADIUS Server

                 4. IEEE802.1x

       Enter Menu Selection Number:
```

Nortel recommends you change the default password. If you forget your password, you have to restore the default configuration file. For more information, see “Restoring the factory-default configuration settings” in *BCM50a Integrated Router Configuration - Basics* (N0115790).

Configuring external RADIUS server

Enter 23 in the main menu to display **Menu 23 – System security**.

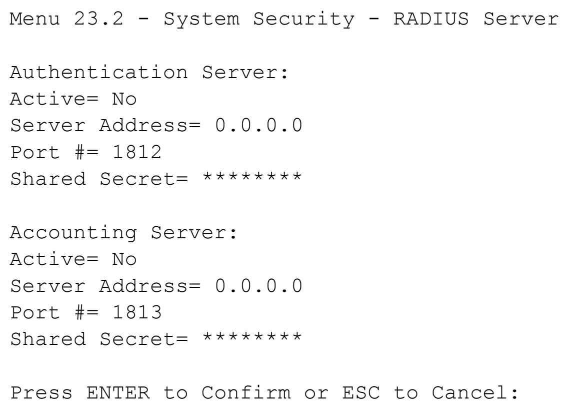
Figure 68 Menu 23 – System Security



```
                Menu 23 - System Security

            1. Change Password
            2. RADIUS Server

            4. IEEE802.1x

Enter Menu Selection Number:
```

From **Menu 23- System Security**, enter 2 to display **Menu 23.2 – System Security – RADIUS Server,** as shown in Figure 69.

Figure 69 Menu 23.2 – System Security – RADIUS server



```
Menu 23.2 - System Security - RADIUS Server

Authentication Server:
Active= No
Server Address= 0.0.0.0
Port #= 1812
Shared Secret= ********

Accounting Server:
Active= No
Server Address= 0.0.0.0
Port #= 1813
Shared Secret= ********

Press ENTER to Confirm or ESC to Cancel:
```

Table 29 describes the fields in Figure 69.

Table 29 Menu 23.2 System Security: RADIUS Server

Field	Description
Authentication Server	
Active	Press [SPACE BAR] to select **Yes** and press [ENTER] to enable user authentication through an external authentication server.
Server Address	Enter the IP address of the external authentication server in dotted decimal notation.
Port #	The default port of the RADIUS server for authentication is **1812**. You need not change this value unless your network administrator instructs you to do so with additional information.
Shared Secret	Specify a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the BCM50a Integrated Router. The key is not sent over the network. This key must be the same on the external authentication server and BCM50a Integrated Router.
Accounting Server	
Active	Press [SPACE BAR] to select **Yes** and press [ENTER] to enable user authentication through an external accounting server.
Server Address	Enter the IP address of the external accounting server in dotted decimal notation.
Port #	The default port of the RADIUS server for accounting is **1813**. You need not change this value unless your network administrator instructs you to do so with additional information.
Shared Secret	Specify a password (up to 31 alphanumeric characters) as the key to be shared between the external accounting server and the BCM50a Integrated Router. The key is not sent over the network. This key must be the same on the external accounting server and BCM50a Integrated Router.
After you complete this menu, press [ENTER] at the prompt "Press ENTER to confirm or ESC to cancel" to save your configuration or press [ESC] to cancel and go back to the previous screen.	

Chapter 14
System information and diagnosis

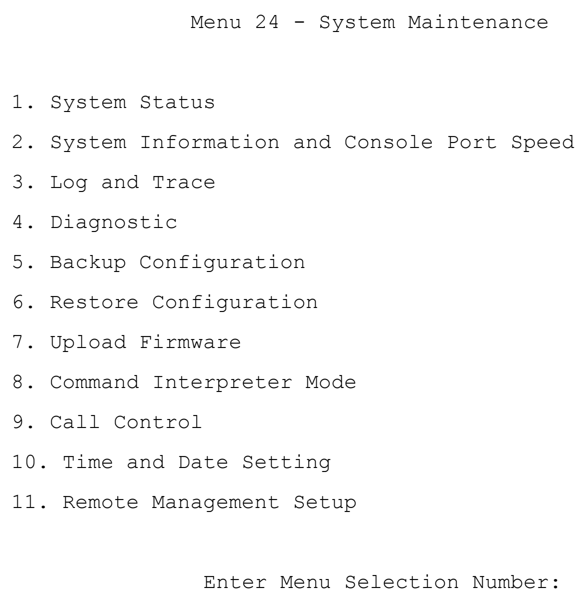
This chapter covers SMT menus 24.1 to 24.4.

Introduction to System Status

This chapter covers the diagnostic tools that help you to maintain your BCM50a Integrated Router. These tools include updates on system status, port status and log and trace capabilities.

Select menu 24 in the main menu to open **Menu 24 - System Maintenance**, as shown in Figure 70.

Figure 70 Menu 24 – System Maintenance



```
                Menu 24 - System Maintenance

 1. System Status
 2. System Information and Console Port Speed
 3. Log and Trace
 4. Diagnostic
 5. Backup Configuration
 6. Restore Configuration
 7. Upload Firmware
 8. Command Interpreter Mode
 9. Call Control
 10. Time and Date Setting
 11. Remote Management Setup

                 Enter Menu Selection Number:
```

System Status

The first selection, System Status, gives you information on the version of your system firmware and the status and statistics of the ports, as shown in the next figure. System Status is a tool that can be used to monitor your BCM50a Integrated Router. Specifically, it gives you information on your system firmware version, number of packets sent, and number of packets received.

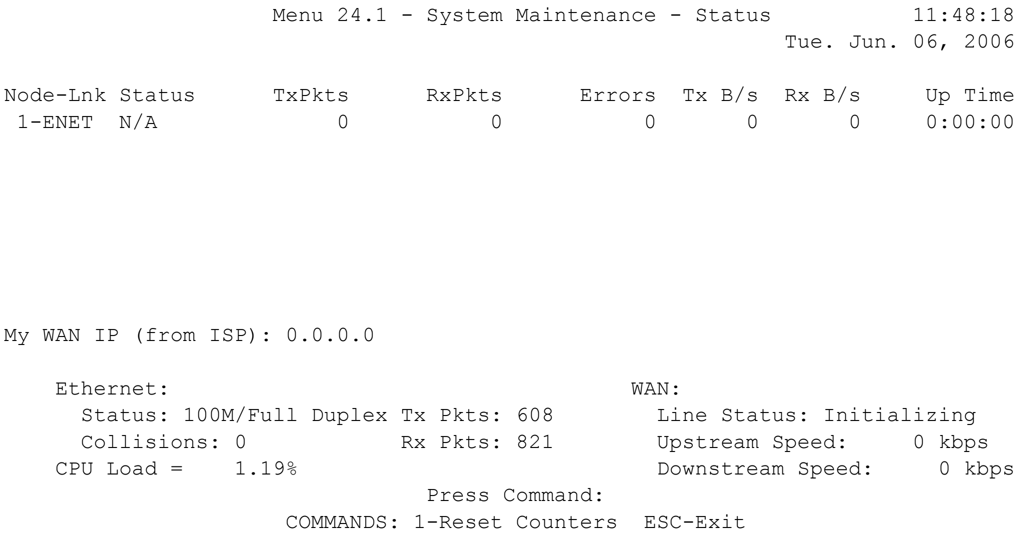
To get to the System Status:

1 Enter number 24 to go to **Menu 24 - System Maintenance**.

2 In this menu, enter 1 to open System Maintenance - Status.

3 There are three commands in **Menu 24.1 - System Maintenance - Status**. Entering 1 drops the WAN connection, 9 resets the counters and [ESC] takes you back to the previous screen.

Figure 71 Menu 24.1 – System Maintenance – Status



```
                  Menu 24.1 - System Maintenance - Status           11:48:18
                                                            Tue. Jun. 06, 2006

Node-Lnk Status       TxPkts       RxPkts       Errors  Tx B/s  Rx B/s     Up Time
 1-ENET  N/A               0            0            0       0       0     0:00:00







My WAN IP (from ISP): 0.0.0.0

    Ethernet:                                           WAN:
      Status: 100M/Full Duplex Tx Pkts: 608               Line Status: Initializing
      Collisions: 0            Rx Pkts: 821               Upstream Speed:     0 kbps
    CPU Load =    1.19%                                   Downstream Speed:     0 kbps
                              Press Command:
                   COMMANDS: 1-Reset Counters  ESC-Exit
```

Table 30 describes the fields present in **Menu 24.1 - System Maintenance - Status**. These fields are read-only and meant for diagnostic purposes. The upper right corner of the screen shows the time and date according to the format you set in menu 24.10.

Table 30 Menu 24.1 System Maintenance: Status

Field	Description
Node-Lnk	This is the node index number and link type. Link types are: PPP, ENET, 1483.
Status	This shows the status of the remote node.
TxPkts	The number of transmitted packets to this remote node.
RxPkts	The number of received packets from this remote node.
Errors	The number of error packets on this connection.
Tx B/s	This shows the transmission rate in bytes per second.
Rx B/s	This shows the receiving rate in bytes per second.

Table 30 Menu 24.1 System Maintenance: Status (continued)

Field	**Description**
Up Time	This is the time this channel has been connected to the current remote node.
My WAN IP (from ISP)	This is the IP address of the ISP remote node.
Ethernet	This shows statistics for the LAN.
Status	This shows the current status of the LAN.
Tx Pkts	This is the number of transmitted packets to the LAN.
Rx Pkts	This is the number of received packets from the LAN.
Collision	This is the number of collisions.
WAN	This shows statistics for the WAN.
Line Status	This shows the current status of the xDSL line which can be Up or Down.
Upstream Speed	This shows the upstream transfer rate in kbps.
Downstream Speed	This shows the downstream transfer rate in kbps.
CPU Load	This specifies the percentage of CPU utilization.

System information and console port speed

With your system you can choose different console port speeds. To get to the System Information and Console Port Speed.

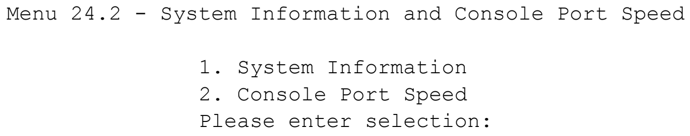
Note: The console port is not available.

1 Enter 24 to go to **Menu 24 – System Maintenance**.

2 Enter 2 to open **Menu 24.2 - System Information and Console Port Speed**.

3 From this menu you have two choices, as shown in Figure 72:

Figure 72 System Information and Console Port Speed

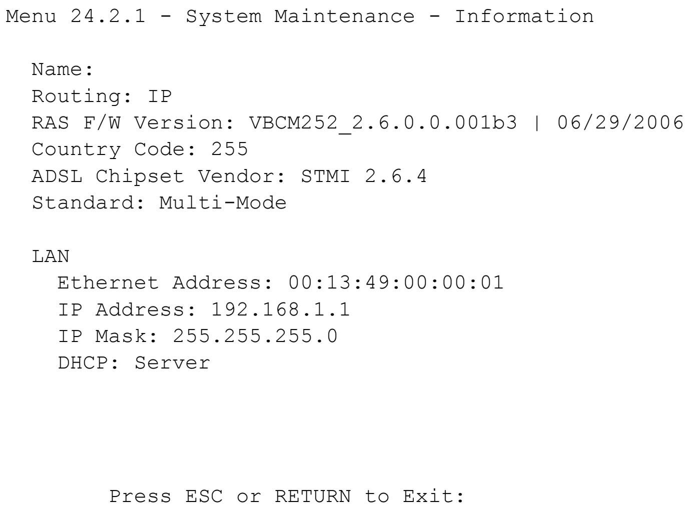


```
Menu 24.2 - System Information and Console Port Speed

            1. System Information
            2. Console Port Speed
            Please enter selection:
```

System Information

System Information gives you information about your system, as shown in Figure 73. More specifically, it gives you information on your routing protocol, Ethernet address and IP address.

Figure 73 Menu 24.2.1 – System Maintenance – Information



```
Menu 24.2.1 - System Maintenance - Information

  Name:
  Routing: IP
  RAS F/W Version: VBCM252_2.6.0.0.001b3 | 06/29/2006
  Country Code: 255
  ADSL Chipset Vendor: STMI 2.6.4
  Standard: Multi-Mode

  LAN
    Ethernet Address: 00:13:49:00:00:01
    IP Address: 192.168.1.1
    IP Mask: 255.255.255.0
    DHCP: Server




        Press ESC or RETURN to Exit:
```

Table 31 Menu 24.2.1 System Maintenance: Information

Field	**Description**
Name	Displays the system name of your BCM50a Integrated Router. This information can be changed in **Menu 1 – General Setup**.
Routing	Refers to the routing protocol used.
Firmware Version	Refers to the system firmware version.
ADSL Chipset Vendor	Displays the vendor of the ADSL chipset and DSL version.
Standard	This refers to the operational protocol the BCM50a Integrated Router and the DSLAM (Digital Subscriber Line Access Multiplexer) are using.
LAN	
Ethernet Address	Refers to the Ethernet MAC (Media Access Control) of your BCM50a Integrated Router.
IP Address	This is the IP address of the BCM50a Integrated Router in dotted decimal notation.
IP Mask	This shows the subnet mask of the BCM50a Integrated Router.

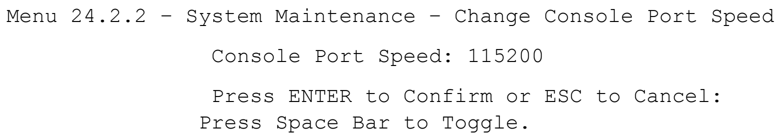
Table 31 Menu 24.2.1 System Maintenance: Information (continued)

Field	Description
DHCP	This field shows the DHCP setting (None, Relay or Server) of the BCM50a Integrated Router.
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.	

Console port speed

You can change the speed of the console port through **Menu 24.2.2 – Console Port Speed**. Your BCM50a Integrated Router supports 9 600 (default), 19 200, 38 400, 57 600, and 115 200 b/s for the console port. Press [SPACE BAR] and then [ENTER] to select the desired speed in menu 24.2.2, as shown in Figure 74.

Figure 74 Menu 24.2.2 – System Maintenance – Change Console Port Speed

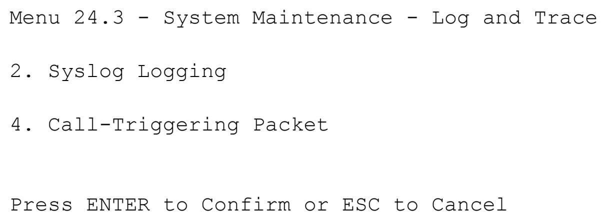


```
Menu 24.2.2 - System Maintenance - Change Console Port Speed

                Console Port Speed: 115200

                Press ENTER to Confirm or ESC to Cancel:
               Press Space Bar to Toggle.
```

Log and trace

The BCM50a Integrated Router has a syslog facility for message logging, and a trace function for viewing call-triggering packets.

Figure 75 Menu 24.3 – System Maintenance: Log and Trace

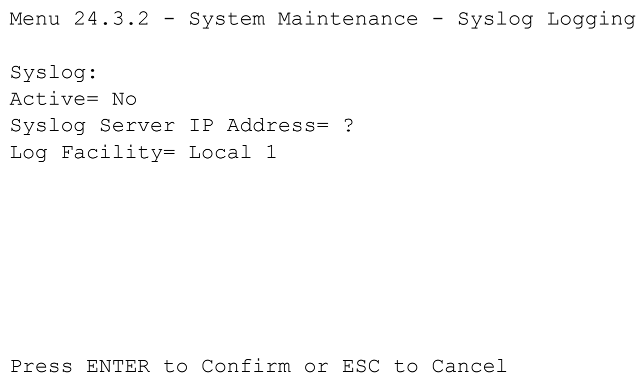


```
Menu 24.3 - System Maintenance - Log and Trace

2. Syslog Logging

4. Call-Triggering Packet


Press ENTER to Confirm or ESC to Cancel
```

Syslog logging

The BCM50a Integrated Router uses the syslog facility to log the CDR (Call Detail Record) and system messages to a syslog server. Syslog and accounting can be configured in **Menu 24.3.2 - System Maintenance - Syslog Logging**, as shown in Figure 76.

Figure 76 Menu 24.3.2 – System Maintenance: Syslog Logging



```
Menu 24.3.2 - System Maintenance - Syslog Logging

Syslog:
Active= No
Syslog Server IP Address= ?
Log Facility= Local 1






Press ENTER to Confirm or ESC to Cancel
```

Configure the syslog parameters described in Table 32 to activate syslog, and then choose what you want to log.

Table 32 System Maintenance Menu Syslog Parameters

Parameter	Description
Syslog:	
Active	Press [SPACE BAR] and then [ENTER] to turn syslog on or off.

Table 32 System Maintenance Menu Syslog Parameters

Parameter	Description
Syslog Server IP Address	Enter the IP Address of the server that logs the CDR (Call Detail Record) and system messages. For example, the syslog server.
Log Facility	Press [SPACE BAR] and then [ENTER] to select a Local option. Using the log facility, you can log the message to different files in the server. Refer to the documentation of your syslog program for more details.
After you finish configuring this screen, press [ENTER] to confirm or [ESC] to cancel.	

Your BCM50a Integrated Router sends five types of syslog messages. Some examples of these syslog messages with their message formats are shown next:

CDR

CDR Message Format

```
 SdcmdSyslogSend( SYSLOG_CDR, SYSLOG_INFO, String );

 String = board xx line xx channel xx, call xx, str

 board = the hardware board ID

 line = the WAN ID in a board

 Channel = channel ID within the WAN

 call = the call reference number which starts from 1 and increments by 1
for each new call

 str = C01 Outgoing Call dev xx ch xx (dev:device No. ch:channel No.)

 L02 Tunnel Connected(L2TP)

 C02 OutCall Connected xxxx (means connected speed) xxxxx (means Remote
Call Number)

 L02 Call Terminated

 C02 Call Terminated
Jul 19 11:19:27 192.168.102.2 RAS: board 0 line 0 channel 0, call 1, C01 Outgoing Call dev=2 ch=0
40002
Jul 19 11:19:32 192.168.102.2 RAS: board 0 line 0 channel 0, call 1, C02
OutCall Connected 64000 40002
Jul 19 11:20:06 192.168.102.2 RAS: board 0 line 0 channel 0, call 1, C02 Call Terminated
```

Packet triggered

Packet triggered Message Format

SdcmdSyslogSend(SYSLOG_PKTTRI, SYSLOG_NOTICE, String);
String = Packet trigger: Protocol=xx Data=xxxxxxxxxx…..x
Protocol: (1:IP 2:IPX 3:IPXHC 4:BPDU 5:ATALK 6:IPNG)
Data: We will send forty-eight Hex characters to the server
Jul 19 11:28:39 192.168.102.2 RAS: Packet Trigger: Protocol=1,
Data=4500003c100100001f010004c0a86614ca849a7b08004a5c020001006162636465666768696a6b6c6d6e6f7071727374
Jul 19 11:28:56 192.168.102.2 RAS: Packet Trigger: Protocol=1,
Data=4500002c1b0140001f06b50ec0a86614ca849a7b0427001700195b3e00000000600220008cd40000020405b4
Jul 19 11:29:06 192.168.102.2 RAS: Packet Trigger: Protocol=1,
Data=450000282401400001f06ac12c0a86614ca849a7b0427001700195b451d1430135004000077600000

Filter log

Filter log Message Format
SdcmdSyslogSend(SYSLOG_FILLOG, SYSLOG_NOTICE, String); String = IP[Src=xx.xx.xx.xx Dst=xx.xx.xx.xx prot spo=xxxx dpo=xxxx] S04>R01mD IP[…] is the packet header and S04>R01mD means filter set 4 (S) and rule 1 (R), match (m) drop (D). Src: Source Address Dst: Destination Address prot: Protocol (“TCP”,”UDP”,”ICMP”)

```
spo: Source port

dpo: Destination port
Mar 03 10:39:43 202.132.155.97 RAS:
GEN[fffffffffffnordff0080] }S05>R01mF
Mar 03 10:41:29 202.132.155.97 RAS:
GEN[00a0c5f502fnord010080] }S05>R01mF
Mar 03 10:41:34 202.132.155.97 RAS:
IP[Src=192.168.1.33 Dst=202.132.155.93 ICMP]}S04>R01mF
Mar 03 11:59:20 202.132.155.97 RAS:
GEN[00a0c5f502fnord010080] }S05>R01mF
Mar 03 12:00:52 202.132.155.97 RAS:
GEN[ffffffffffff0080] }S05>R01mF
Mar 03 12:00:57 202.132.155.97 RAS:
GEN[00a0c5f502010080] }S05>R01mF
Mar 03 12:01:06 202.132.155.97 RAS:
IP[Src=192.168.1.33 Dst=202.132.155.93 TCP spo=01170 dpo=00021]}S04>R01mF
```

PPP log

PPP Log Message Format

```
SdcmdSyslogSend( SYSLOG_PPPLOG, SYSLOG_NOTICE, String );

String = ppp:Proto Starting / ppp:Proto Opening / ppp:Proto Closing /
ppp:Proto Shutdown

Proto = LCP / ATCP / BACP / BCP / CBCP / CCP / CHAP/ PAP / IPCP /

IPXCP
Jul 19 11:42:44 192.168.102.2 RAS: ppp:LCP Closing
Jul 19 11:42:49 192.168.102.2 RAS: ppp:IPCP Closing
Jul 19 11:42:54 192.168.102.2 RAS: ppp:CCP Closing
```

Firewall log

```
Firewall Log Message Format

SdcmdSyslogSend(SYSLOG_FIREWALL, SYSLOG_NOTICE, buf);

buf = IP[Src=xx.xx.xx.xx : spo=xxxx Dst=xx.xx.xx.xx : dpo=xxxx | prot |
rule | action]

Src: Source Address

spo: Source port (empty means no source port information)

Dst: Destination Address

dpo: Destination port (empty means no destination port information)

prot: Protocol (“TCP”,”UDP”,”ICMP”, ”IGMP”, ”GRE”, ”ESP”)

rule: <a,b> where a means "set" number; b means "rule" number.

Action: nothing(N) block (B) forward (F)
08-01-2000 11:48:41 Local1.Notice 192.168.10.10 RAS: FW 172.21.1.80 :137
->172.21.1.80 :137 |UDP|default permit:<2,0>|B
08-01-2000 11:48:41 Local1.Notice 192.168.10.10 RAS: FW 192.168.77.88
:520 ->192.168.77.88 :520 |UDP|default permit:<2,0>|B
08-01-2000 11:48:39 Local1.Notice 192.168.10.10 RAS: FW 172.21.1.50
->172.21.1.50 |IGMP<2>|default permit:<2,0>|B
08-01-2000 11:48:39 Local1.Notice 192.168.10.10 RAS: FW 172.21.1.25
->172.21.1.25 |IGMP<2>|default permit:<2,0>|B
```

Call-Triggering packet

Call-Triggering Packet displays information about the packet that triggered a dial-out call in an easily readable format. Equivalent information is available in menu 24.1 in hex format. An example is shown in Figure 77.

Figure 77 Call-Triggering packet example

```
IP Frame: ENET0-RECV Size: 44/ 44 Time: 17:02:44.262
 Frame Type:


 IP Header:
 IP Version = 4
 Header Length = 20
 Type of Service = 0x00 (0)
 Total Length = 0x002C (44)
 Identification = 0x0002 (2)
 Flags = 0x00
 Fragment Offset = 0x00
 Time to Live = 0xFE (254)
 Protocol = 0x06 (TCP)
 Header Checksum = 0xFB20 (64288)
 Source IP = 0xC0A80101 (192.168.1.1)
 Destination IP = 0x00000000 (0.0.0.0)

 TCP Header:
 Source Port = 0x0401 (1025)
 Destination Port = 0x000D (13)
 Sequence Number = 0x05B8D000 (95997952)
 Ack Number = 0x00000000 (0)
 Header Length = 24
 Flags = 0x02 (....S.)
 Window Size = 0x2000 (8192)
 Checksum = 0xE06A (57450)
 Urgent Ptr = 0x0000 (0)
 Options =
 0000: 02 04 02 00

 RAW DATA:
 0000: 45 00 00 2C 00 02 00 00-FE 06 FB 20 C0 A8 01 01 E.......... ....
 0010: 00 00 00 00 04 01 00 0D-05 B8 D0 00 00 00 00 00 ................
 0020: 60 02 20 00 E0 6A 00 00-02 04 02 00
Press any key to continue...
```

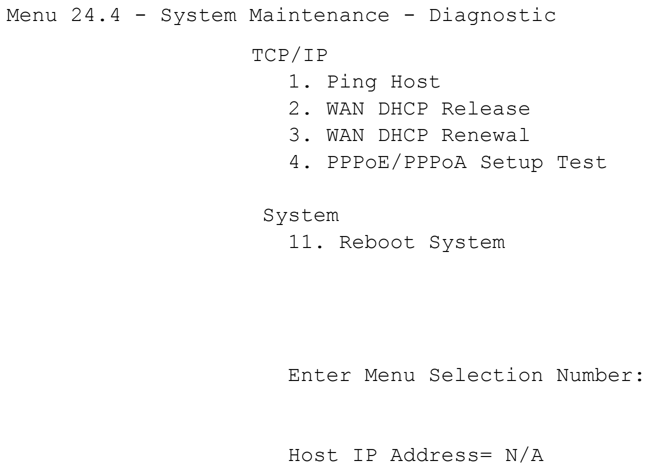
With the diagnostic facility, you can test the different aspects of your BCM50a Integrated Router to determine if it is working properly. In Menu 24.4, you can choose among various types of diagnostic tests to evaluate your system, as shown in Figure 78.

Follow the procedure below to get to **Menu 24.4 - System Maintenance – Diagnostic.**

1 From the main menu, select option 24 to open **Menu 24 - System Maintenance**.

2 From this menu, select option 4. Diagnostic. This opens **Menu 24.4 - System Maintenance - Diagnostic**.

Figure 78 Menu 24.4 – System Maintenance: Diagnostic



```
Menu 24.4 - System Maintenance - Diagnostic

                   TCP/IP
                      1. Ping Host
                      2. WAN DHCP Release
                      3. WAN DHCP Renewal
                      4. PPPoE/PPPoA Setup Test

                    System
                      11. Reboot System




                      Enter Menu Selection Number:


                      Host IP Address= N/A
```

WAN DHCP

DHCP functionality can be enabled on the LAN or WAN as shown in WAN & LAN DHCP. LAN DHCP is discussed in *BCM50a Integrated Router Configuration - Basics* (N0115790). The BCM50a Integrated Router can act either as a WAN DHCP client (IP Address Assignment field in menu 4 or menu 11.3 is Dynamic and the Encapsulation field in menu 4 or menu 11 is Ethernet) or None, (when you have a static IP). Using the WAN Release and Renewal fields in menu 24.4, you can release or renew the assigned WAN IP address, subnet mask and default gateway, or do both. This is similar to using the file winipcfg.

Figure 79 WAN & LAN DHCP

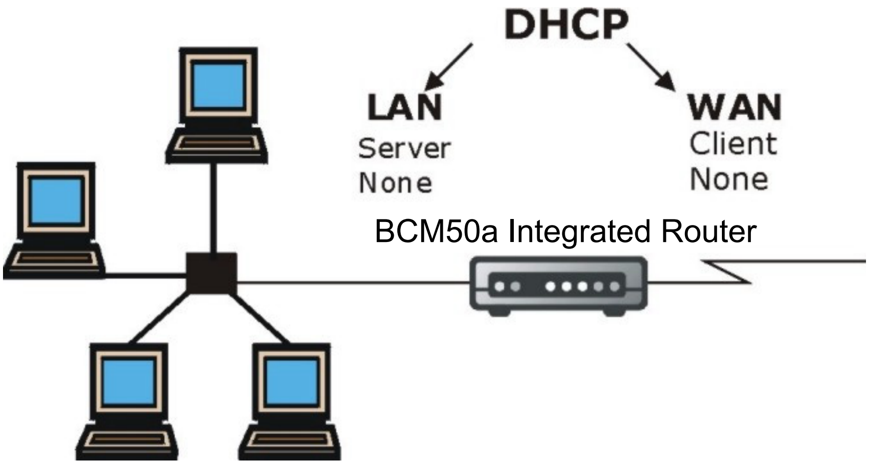


Table 33 describes the diagnostic tests available in menu 24.4 for your BCM50a Integrated Router and associated connections.

Table 33 System Maintenance menu diagnostic

Field	**Description**
Ping Host	Enter 1 to ping any machine (with an IP address) on your LAN or WAN. Enter its IP address in the **Host IP Address** field below.
WAN DHCP Release	Enter 2 to release your WAN DHCP settings.
WAN DHCP Renewal	Enter 3 to renew your WAN DHCP settings.
PPPoE/PPPoA Setup Test	This feature is only available for dial-up connections using PPPoE or PPPoA encapsulation. Enter 4 to test the Internet setup. You can also test the Internet setup in **Menu 4 - Internet Access**. Refer to Chapter 5, “Internet access,” on page 65 for more details.
Reboot System	Enter 11 to reboot the BCM50a Integrated Router.
Host IP Address=	If you entered 1 in **Ping Host**, enter the IP address of the computer you want to ping in this field.
	Enter the number of the selection you want to perform or press [ESC] to cancel.

Chapter 15
Firmware and configuration file maintenance

This chapter tells you how to backup and restore your configuration file, as well as upload new firmware and configuration files.

Filename conventions

The configuration file (often called the romfile or rom-0) contains the factory default settings in the menus such as password, DHCP Setup and TCP/IP Setup. It comes with a rom filename extension. Once you have customized the BCM50a Integrated Router settings, they can be saved back to your computer under a filename of your choosing.

The system firmware (sometimes referred to as the ras file) has a bin filename extension. With many FTP and TFTP clients, the filenames are similar to those seen next.

Note: Only use firmware for your BCM50a Integrated Router specific model. Refer to the label on the bottom of your BCM50a Integrated Router.

```
ftp> put firmware.bin ras
```

This is a sample FTP session showing the transfer of the computer file firmware.bin to the BCM50a Integrated Router.

```
ftp> get rom-0 config.cfg
```

This is a sample FTP session saving the current configuration to the computer file config.cfg.

If your (T)FTP client does not allow you to have a destination filename different than the source, you must rename the firmware and config file names as the BCM50a Integrated Router only recognizes rom-0 and ras. Be sure you keep unaltered copies of both files for later use.

Table 34 is a summary. Note that the internal filename refers to the filename on the BCM50a Integrated Router and the external filename refers to the filename not on the BCM50a Integrated Router, that is, on your computer, local network or FTP site and so the name (but not the extension) can vary. After uploading new firmware, see the F/W version field in **Menu 24.2.1 – System Maintenance – Information** to confirm that you have uploaded the correct firmware version. The AT command is the command you enter after you press y when prompted in the SMT menu to go into debug mode.

Table 34 Filename Conventions

File Type	Internal Name	External Name	Description
Configuration File	Rom-0	This is the configuration filename on the BCM50a Integrated Router. Uploading the rom-0 file replaces the entire ROM file system, including your BCM50a Integrated Router configurations, system-related data (including the default password), the error log and the trace log.	*.rom
Firmware	Ras	This is the name for the firmware on the Contivity.	*.bin

Backup configuration

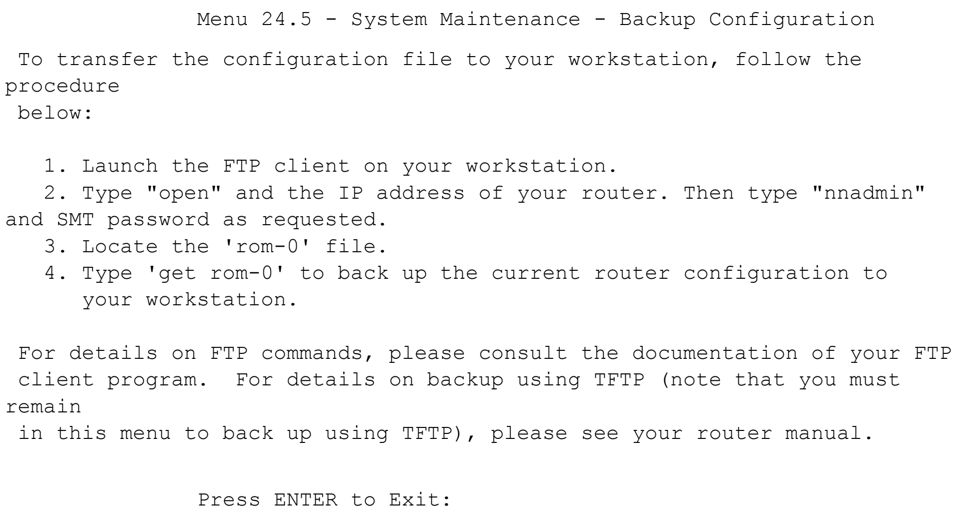
Using Option 5 from **Menu 24 – System Maintenance,** you can back up the current BCM50a Integrated Router configuration to your computer. Backup is highly recommended once your BCM50a Integrated Router is functioning properly. FTP is the preferred method for backing up your current configuration to your computer since it is faster.

Note that terms download and upload are relative to the computer. Download means to transfer from the BCM50a Integrated Router to the computer, while upload is a transfer from your computer to the BCM50a Integrated Router.

Backup configuration

Follow the instructions as shown in **Menu 24.5** (Figure 80).

Figure 80 Menu 24.5 – System Maintenance – Backup Configuration



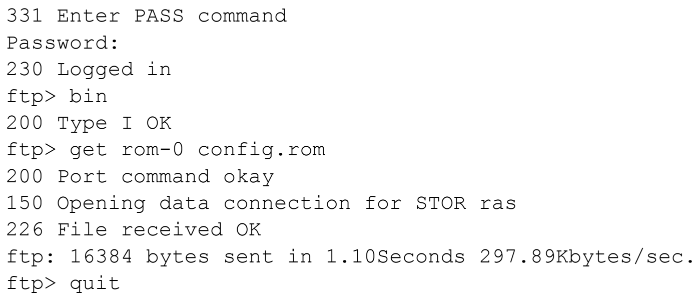
```
               Menu 24.5 - System Maintenance - Backup Configuration

 To transfer the configuration file to your workstation, follow the
procedure
 below:

   1. Launch the FTP client on your workstation.
   2. Type "open" and the IP address of your router. Then type "nnadmin"
and SMT password as requested.
   3. Locate the 'rom-0' file.
   4. Type 'get rom-0' to back up the current router configuration to
      your workstation.

 For details on FTP commands, please consult the documentation of your FTP
 client program.  For details on backup using TFTP (note that you must
remain
 in this menu to back up using TFTP), please see your router manual.


               Press ENTER to Exit:
```

Using the FTP command from the command line

1. Launch the FTP client on your computer.
2. Enter open, followed by a space and the IP address of your BCM50a Integrated Router.
3. Press [ENTER] when prompted for a username.
4. Enter your password as requested (the default password is PlsChgMe!).
5. Enter **bin** to set transfer mode to binary.
6. Use **get** to transfer files from the BCM50a Integrated Router to the computer, for example, **get rom-0 config.rom** transfers the configuration file on the BCM50a Integrated Router to your computer and renames it **config.rom**. See earlier in this chapter for more information on filename conventions.
7. Enter **quit** to exit the ftp prompt.

Example of FTP commands from the command line

Figure 81 FTP Session Example



```
331 Enter PASS command
Password:
230 Logged in
ftp> bin
200 Type I OK
ftp> get rom-0 config.rom
200 Port command okay
150 Opening data connection for STOR ras
226 File received OK
ftp: 16384 bytes sent in 1.10Seconds 297.89Kbytes/sec.
ftp> quit
```

GUI-based FTP clients

Table 35 describes some of the commands that you can see in GUI-based FTP clients.

Table 35 General commands for GUI-based FTP clients

Command	Description
Host Address	Enter the address of the host server.
Logon Type	Anonymous. This is when a user ID and password is automatically supplied to the server for anonymous access. Anonymous logons will work only if your ISP or service administrator has enabled this option. Normal. The server requires a unique User ID and Password to log on.
Transfer Type	Transfer files in either ASCII (plain text format) or in binary mode.
Initial Remote Directory	Specify the default remote directory (path).
Initial Local Directory	Specify the default local directory (path).

TFTP and FTP over WAN Management Limitations

TFTP, FTP and Telnet over WAN do not work when:

- You disable Telnet service in menu 24.11.
- You apply a filter in menu 3.1 (LAN) or in menu 11.1.4 (WAN) to block Telnet service.
- The IP address in the **Secured Client IP** field in menu 24.11 does not match the client IP. If it does not match, the BCM50a Integrated Router disconnects the Telnet session immediately.

Backup configuration using TFTP

The BCM50a Integrated Router supports the uploading and downloading of the firmware and the configuration file using TFTP (Trivial File Transfer Protocol) over LAN. Nortel does not recommend using TFTP over WAN, although it can work.

To use TFTP, your computer must have both Telnet and TFTP clients. To back up the configuration file, follow the procedure shown next.

1. Use Telnet from your computer to connect to the BCM50a Integrated Router and log on. Because TFTP does not have any security checks, the BCM50a Integrated Router records the IP address of the Telnet client and accepts TFTP requests only from this address.
2. Put the SMT in command interpreter (CI) mode by entering 8 in **Menu 24 – System Maintenance**.
3. Enter command “sys stdio 0” to disable the SMT timeout, so the TFTP transfer is not interrupted. Enter command “sys stdio 5” to restore the five-minute SMT timeout (default) after the file transfer is complete.
4. Launch the TFTP client on your computer and connect to the BCM50a Integrated Router. Set the transfer mode to binary before starting data transfer.

5 Use the TFTP client (see the example below) to transfer files between the BCM50a Integrated Router and the computer. The file name for the configuration file is “rom-0” (rom-zero, not capital o).

➡ **Note:** Telnet connection must be active and the SMT must be in CI mode before and during the TFTP transfer. For details on TFTP commands (see “TFTP command example” on page 166), consult the documentation of your TFTP client program. For UNIX, use “get” to transfer from the BCM50a Integrated Router to the computer and “binary” to set binary transfer mode.

TFTP command example

The following is an example TFTP command:

```
tftp [-i] host get rom-0 config.rom
```

where “i” specifies binary image transfer mode (use this mode when transferring binary files), “host” is the BCM50a Integrated Router IP address, “get” transfers the file source on the BCM50a Integrated Router (rom-0, name of the configuration file on the BCM50a Integrated Router) to the file destination on the computer and renames it config.rom.

GUI-based TFTP clients

Table 36 describes some of the fields that appear in GUI-based TFTP clients.

Table 36 General commands for GUI-based TFTP clients

Command	Description
Host	Enter the IP address of the BCM50a Integrated Router. 192.168.1.1 is the BCM50a Integrated Router’s default IP address when shipped.
Send/Fetch	Use Send to upload the file to the BCM50a Integrated Router and Fetch to back up the file on your computer.
Local File	Enter the path and name of the firmware file (*.bin extension) or configuration file (*.rom extension) on your computer.
Remote File	This is the filename on the BCM50a Integrated Router. The filename for the firmware is “ras” and for the configuration file, is “rom-0”.

Table 36 General commands for GUI-based TFTP clients

Command	Description
Binary	Transfer the file in binary mode.
Abort	Stop transfer of the file.

Refer to Chapter 17, “Remote Management,” on page 185 for information about configurations that disallow TFTP and FTP over WAN.

Restore configuration

This section shows you how to restore a previously saved configuration. Note that this function erases the current configuration before restoring a previous back up configuration; do not attempt to restore unless you have a backup configuration file stored on disk.

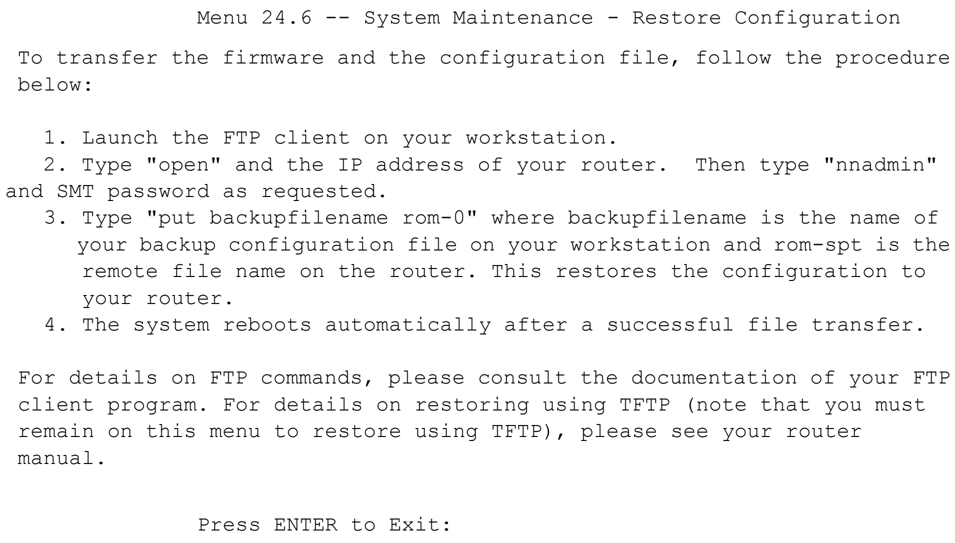
FTP is the preferred method for restoring your current computer configuration to your BCM50a Integrated Router since FTP is faster. note that you must wait for the system to automatically restart after the file transfer is complete.

⚠ **Warning:** Do not interrupt the file transfer process as this can permanently damage your BCM50a Integrated Router.

Restore Using FTP

For details about back up using FTP and TFTP, refer to “Backup configuration” on page 162.

Figure 82 Telnet into Menu 24.6



```
              Menu 24.6 -- System Maintenance - Restore Configuration

 To transfer the firmware and the configuration file, follow the procedure
 below:

   1. Launch the FTP client on your workstation.
   2. Type "open" and the IP address of your router.  Then type "nnadmin"
and SMT password as requested.
   3. Type "put backupfilename rom-0" where backupfilename is the name of
      your backup configuration file on your workstation and rom-spt is the
      remote file name on the router. This restores the configuration to
      your router.
   4. The system reboots automatically after a successful file transfer.

 For details on FTP commands, please consult the documentation of your FTP
 client program. For details on restoring using TFTP (note that you must
 remain on this menu to restore using TFTP), please see your router
 manual.

              Press ENTER to Exit:
```

1. Launch the FTP client on your computer.
2. Enter **open**, followed by a space and the IP address of your BCM50a Integrated Router.
3. Press [ENTER] when prompted for a username.
4. Enter your password as requested (the default is “PlsChgMe!”).
5. Enter **bin** to set transfer mode to binary.
6. Find the rom file (on your computer) that you want to restore to your BCM50a Integrated Router.
7. Use **put** to transfer files from the BCM50a Integrated Router to the computer, for example, “put config.rom rom-0” transfers the configuration file config.rom on your computer to the BCM50a Integrated Router. See “Filename conventions” on page 161 for more information about filename conventions.
8. Enter quit to exit the ftp prompt. The BCM50a Integrated Router automatically restarts after a successful restore process.

Restore using FTP session example

Figure 83 Restore using FTP session example

```
ftp> put config.rom rom-0
200 Port command okay
150 Opening data connection for STOR rom-0
226 File received OK
221 Goodbye for writing flash
ftp: 16384 bytes sent in 0.06Seconds 273.07Kbytes/sec.
ftp>quit
```

Refer to Chapter 17, “Remote Management,” on page 185 to read about configurations that disallow TFTP and FTP over WAN.

Uploading Firmware and Configuration Files

This section shows you how to upload firmware and configuration files. You can upload configuration files by following the procedure “Restore configuration” on page 167, or by following the instructions in **Menu 24.7.2 – System Maintenance – Upload System Configuration File**.

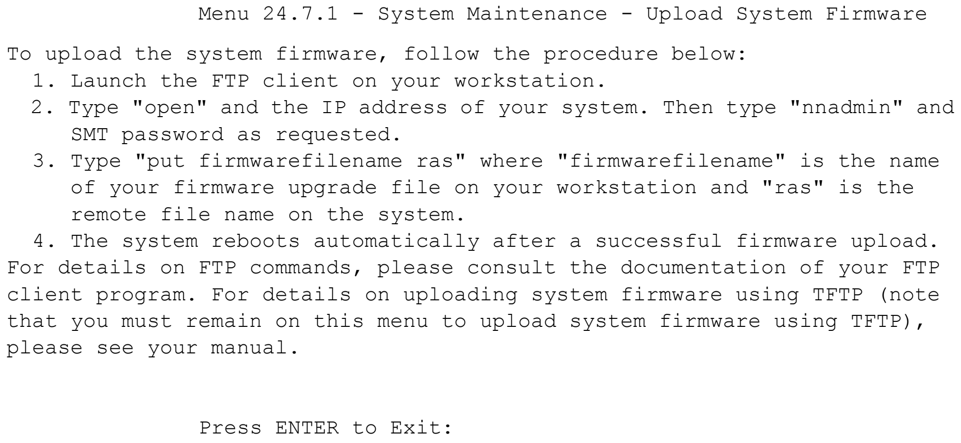
Warning: Do not interrupt the file transfer process as this can permanently damage your BCM50a Integrated Router.

Firmware file upload

FTP is the preferred method for uploading the firmware and configuration. To use this feature, your computer must have an FTP client.

When you use Telnet to access the BCM50a Integrated Router, the screens for uploading firmware and the configuration file using FTP appear.

Figure 84 Telnet Into Menu 24.7.1 Upload System Firmware

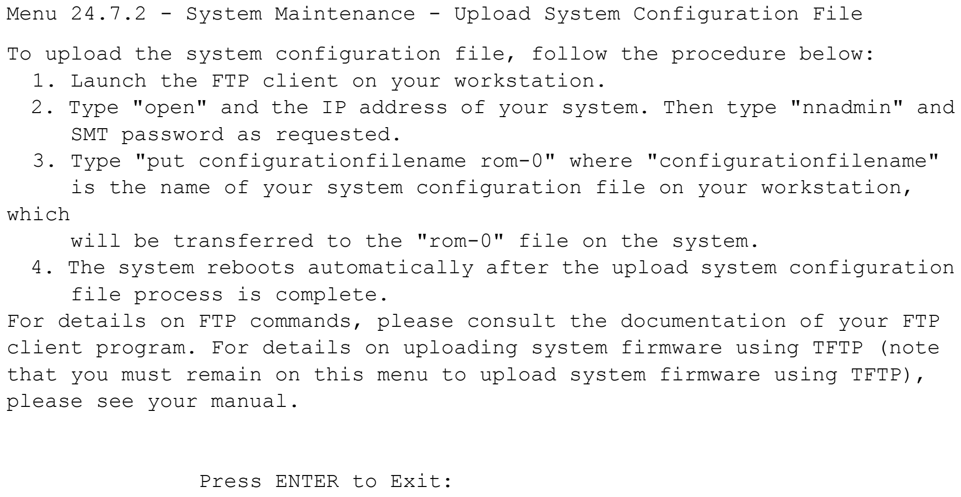


```
               Menu 24.7.1 - System Maintenance - Upload System Firmware

To upload the system firmware, follow the procedure below:
  1. Launch the FTP client on your workstation.
  2. Type "open" and the IP address of your system. Then type "nnadmin" and
     SMT password as requested.
  3. Type "put firmwarefilename ras" where "firmwarefilename" is the name
     of your firmware upgrade file on your workstation and "ras" is the
     remote file name on the system.
  4. The system reboots automatically after a successful firmware upload.
For details on FTP commands, please consult the documentation of your FTP
client program. For details on uploading system firmware using TFTP (note
that you must remain on this menu to upload system firmware using TFTP),
please see your manual.


               Press ENTER to Exit:
```

Configuration file upload

The screen shown in Figure 85 appears when you access menu 24.7.2 via Telnet.

Figure 85 Telnet Into Menu 24.7.2 System Maintenance



```
Menu 24.7.2 - System Maintenance - Upload System Configuration File

To upload the system configuration file, follow the procedure below:
  1. Launch the FTP client on your workstation.
  2. Type "open" and the IP address of your system. Then type "nnadmin" and
     SMT password as requested.
  3. Type "put configurationfilename rom-0" where "configurationfilename"
     is the name of your system configuration file on your workstation,
which
     will be transferred to the "rom-0" file on the system.
  4. The system reboots automatically after the upload system configuration
     file process is complete.
For details on FTP commands, please consult the documentation of your FTP
client program. For details on uploading system firmware using TFTP (note
that you must remain on this menu to upload system firmware using TFTP),
please see your manual.


               Press ENTER to Exit:
```

To upload the firmware and the configuration files, follow the examples in the rest of this chapter:

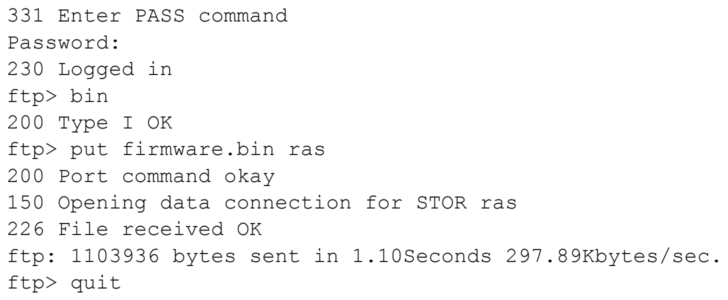
FTP file upload command from the DOS prompt example

1. Launch the FTP client on your computer.
2. Enter “open”, followed by a space and the IP address of your BCM50a Integrated Router.
3. Press [ENTER] when prompted for a username.
4. Enter your password as requested (the default is “PlsChgMe!”).
5. Enter “bin” to set transfer mode to binary.
6. Use “put” to transfer files from the computer to the BCM50a Integrated Router, for example, “put firmware.bin ras” transfers the firmware on your computer (firmware.bin) to the BCM50a Integrated Router and renames it “ras”. Similarly, “put config.rom rom-0” transfers the configuration file on your computer (config.rom) to the BCM50a Integrated Router and renames it rom-0. Likewise get rom-0 config.rom transfers the configuration file on the BCM50a Integrated Router to your computer and renames it “config.rom.” See “Filename conventions” on page 161 for more information about filename conventions.
7. Enter “quit” to exit the ftp prompt.

➡ **Note:** The BCM50a Integrated Router automatically restarts after a successful file upload.

FTP Session Example of Firmware File Upload

Figure 86 FTP Session Example of Firmware File Upload



```
331 Enter PASS command
Password:
230 Logged in
ftp> bin
200 Type I OK
ftp> put firmware.bin ras
200 Port command okay
150 Opening data connection for STOR ras
226 File received OK
ftp: 1103936 bytes sent in 1.10Seconds 297.89Kbytes/sec.
ftp> quit
```

More commands (found in GUI-based FTP clients) are listed earlier in this chapter.

Refer to the “Remote Management” on page 185 section to read about configurations that disallow TFTP and FTP over WAN.

TFTP file upload

The BCM50a Integrated Router also supports the uploading of firmware files using TFTP (Trivial File Transfer Protocol) over LAN. Although TFTP also works over WAN, Nortel does not recommend doing this.

1 To use TFTP, your computer must have both Telnet and TFTP clients. To transfer the firmware and the configuration file, follow the procedure shown next.

2 Use Telnet from your computer to connect to the BCM50a Integrated Router and log on. Because TFTP does not have any security checks, the BCM50a Integrated Router records the IP address of the Telnet client and accepts TFTP requests only from this address.

3 Put the SMT in command interpreter (CI) mode by entering 8 in **Menu 24 – System Maintenance**.

4 Enter the command sys stdio 0 to disable the management timeout, so the TFTP transfer is not interrupted. Enter command sys stdio 5 to restore the five-minute management timeout (default) when the file transfer is complete.

5 Launch the TFTP client on your computer and connect to the BCM50a Integrated Router. Set the transfer mode to binary before starting data transfer.

6 Use the TFTP client (see the example below) to transfer files between the BCM50a Integrated Router and the computer. The file name for the firmware is ras.

Note that the telnet connection must be active and the BCM50a Integrated Router must be in CI mode before and during the TFTP transfer. For details about TFTP commands (see "TFTP upload command example" on page 173), consult the documentation of your TFTP client program. For UNIX, use get to transfer from the BCM50a Integrated Router to the computer, put to transfer from the computer to the BCM50a Integrated Router, and binary to set binary transfer mode.

TFTP upload command example

The following is an example TFTP command:

```
tftp [-i] host put firmware.bin ras
```

where "i" specifies binary image transfer mode (use this mode when transferring binary files), "host" is the BCM50a Integrated Router's IP address and "put" transfers the file source on the computer (firmware.bin – name of the firmware on the computer) to the file destination on the remote host (ras - name of the firmware on the BCM50a Integrated Router).

Commands that appear in GUI-based TFTP clients are listed earlier in this chapter.

Chapter 16
System Maintenance menus 8 to 10

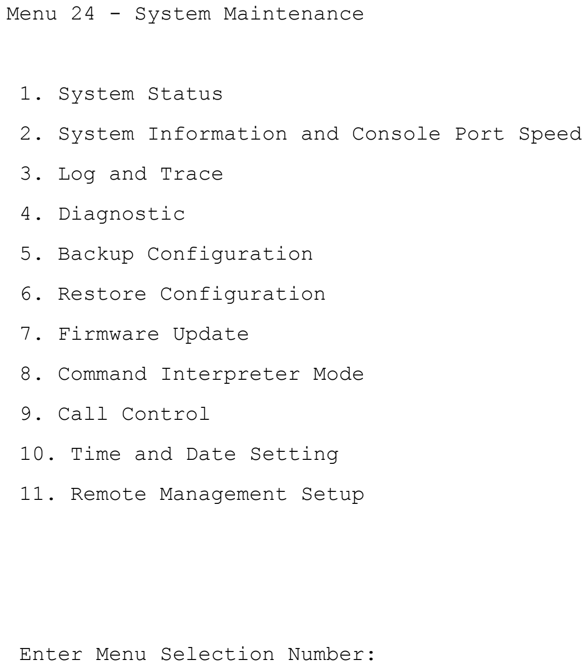
This chapter leads you through SMT menus 24.8 to 24.10.

Command Interpreter mode

The Command Interpreter (CI) is a part of the main router firmware. The CI provides much of the same functionality as the SMT, while adding some low-level setup and diagnostic functions. Enter the CI from the SMT by selecting menu 24.8. Access can be by Telnet connection, although some commands are only available with a serial connection. See the included disk or www.nortel.com for more detailed information about CI commands. Enter 8 from **Menu 24 - System Maintenance**.

Note: Use of undocumented commands or misconfiguration can damage the unit and possibly render it unusable.

Figure 87 Command mode in Menu 24



```
 Menu 24 - System Maintenance


  1. System Status
  2. System Information and Console Port Speed
  3. Log and Trace
  4. Diagnostic
  5. Backup Configuration
  6. Restore Configuration
  7. Firmware Update
  8. Command Interpreter Mode
  9. Call Control
  10. Time and Date Setting
  11. Remote Management Setup




  Enter Menu Selection Number:
```

Command syntax

The command keywords are in Courier New font.

Enter the command keywords exactly as shown, do not abbreviate.

The required fields in a command are enclosed in angle brackets <>.

The optional fields in a command are enclosed in square brackets [].

The | symbol means “or”.

For example,

```
sys filter netbios config <type> <on|off>
```

means that you must specify the type of netbios filter and whether to turn it on or off.

Command usage

A list of commands can be found by typing “help” or “?” at the command prompt. Always type the full command. Type “exit” to return to the SMT main menu when finished. See Appendix G, “Command Interpreter,” on page 241 for details on the commands.

Call control support

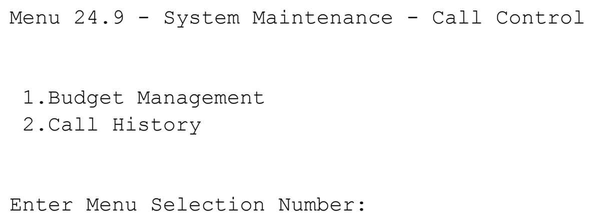
The BCM50a Integrated Router provides two call control functions: budget management and call history. Note that this menu is only applicable when **Encapsulation** is set to **PPPoE** or **PPPoA** in menu 4 or menu 11.1.

With the budget management function, you can set a limit on the total outgoing call time of the BCM50a Integrated Router within certain times. When the total outgoing call time exceeds the limit, the current call is dropped and any future outgoing calls are blocked.

Call history chronicles preceding incoming and outgoing calls.

To access the call control menu, select option 9 in menu 24 to go to **Menu 24.9 - System Maintenance - Call Control**, as shown in Figure 88.

Figure 88 Call Control

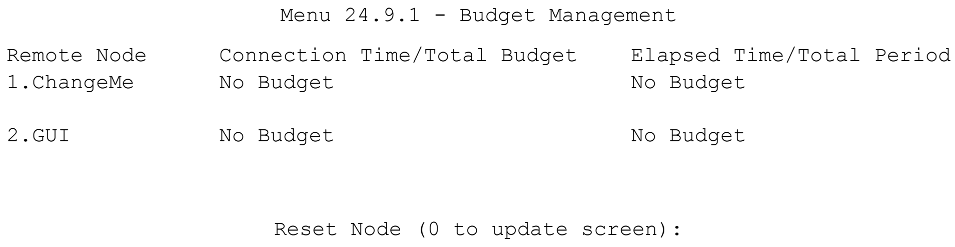


```
Menu 24.9 - System Maintenance - Call Control


 1.Budget Management
 2.Call History


Enter Menu Selection Number:
```

Budget management

Menu 24.9.1 shows the budget management statistics for outgoing calls. Enter 1 from **Menu 24.9 - System Maintenance - Call Control** to bring up the Budget Management menu (Figure 89).

Figure 89 Budget Management



```
                       Menu 24.9.1 - Budget Management

Remote Node      Connection Time/Total Budget    Elapsed Time/Total Period
1.ChangeMe       No Budget                       No Budget

2.GUI            No Budget                       No Budget


                      Reset Node (0 to update screen):
```

The total budget is the time limit on the accumulated time for outgoing calls to a remote node. When this limit is reached, the call is dropped and further outgoing calls to that remote node is blocked. After each period, the total budget is reset. The default for the total budget is 0 minutes and the period is 0 hours, meaning no budget control. You can reset the accumulated connection time in this menu by entering the index of a remote node. Enter 0 to update the screen. The budget and the reset period can be configured in menu 11.1 for the remote node.

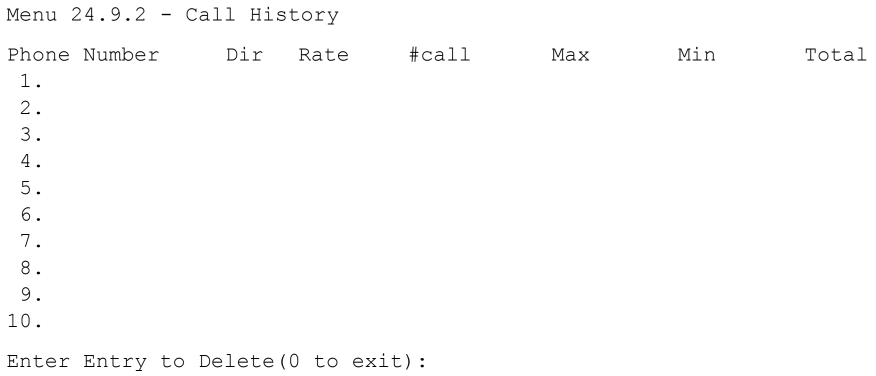
Table 37 Budget management

Field	Description	Example
Remote Node	Enter the index number of the remote node you want to reset (just one in this case)	1
Connection Time/ Total Budget	This is the total connection time that has gone by (within the allocated budget that you set in menu 11.1).	5/10 means that 5 minutes out of a total allocation of 10 minutes have lapsed.
Elapsed Time/Total Period	The period is the time cycle in hours that the allocation budget is reset (see menu 11.1.) The elapsed time is the time used up within this period.	0.5/1 means that 30 minutes out of the 1-hour time period has lapsed.
	Enter “0” to update the screen or press [ESC] to return to the previous screen.	

Call History

This is the second option in **Menu 24.9 - System Maintenance - Call Control**. It displays information about past incoming and outgoing calls. Enter 2 from **Menu 24.9 - System Maintenance - Call Control**.

Figure 90 Call History



```
Menu 24.9.2 - Call History

Phone Number      Dir   Rate     #call      Max       Min       Total
 1.
 2.
 3.
 4.
 5.
 6.
 7.
 8.
 9.
10.

Enter Entry to Delete(0 to exit):
```

Table 38 describes the fields in Figure 90.

Table 38 Call History Fields

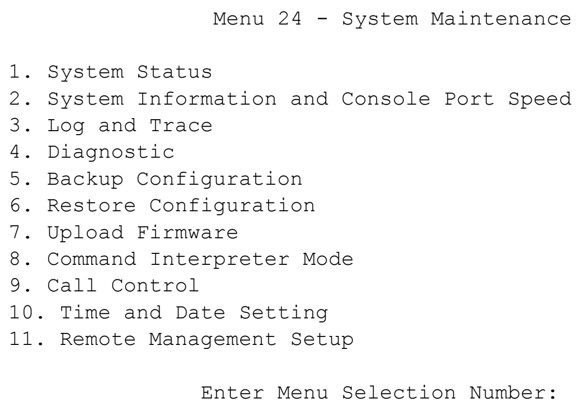
Field	Description
Phone Number	The PPPoE service names are shown here.
Dir	This shows whether the call is incoming or outgoing.
Rate	This is the transfer rate of the call.
#call	This is the number of calls made to or received from that telephone number.
Max	This is the length of time of the longest telephone call.
Min	This is the length of time of the shortest telephone call.
Total	This is the total length of time of all the telephone calls to and from that telephone number.
	Enter an entry number to delete it or 0 to exit.

Time and Date setting

There is a software mechanism to set the time manually or get the current time and date from an external server when you turn on your BCM50a Integrated Router. With Menu 24.10, you can update the time and date settings of your BCM50a Integrated Router. The real time is then displayed in the BCM50a Integrated Router error logs and firewall logs.

Select menu 24 in the main menu to open **Menu 24 - System Maintenance**.

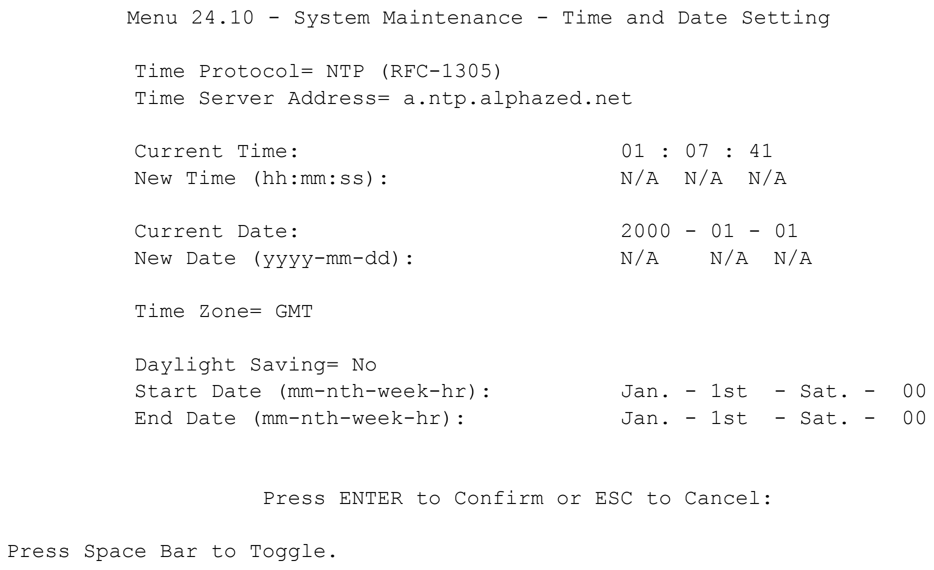
Figure 91 Menu 24 – System Maintenance



```
                Menu 24 - System Maintenance

1. System Status
2. System Information and Console Port Speed
3. Log and Trace
4. Diagnostic
5. Backup Configuration
6. Restore Configuration
7. Upload Firmware
8. Command Interpreter Mode
9. Call Control
10. Time and Date Setting
11. Remote Management Setup

               Enter Menu Selection Number:
```

Enter 10 to go to **Menu 24.10 - System Maintenance - Time and Date Setting** to update the time and date settings of your BCM50a Integrated Router, as shown in Figure 92.

Figure 92 Menu 24.10 System Maintenance: Time and Date Setting



```
               Menu 24.10 - System Maintenance - Time and Date Setting

                Time Protocol= NTP (RFC-1305)
                Time Server Address= a.ntp.alphazed.net

                Current Time:                           01 : 07 : 41
                New Time (hh:mm:ss):                    N/A  N/A  N/A

                Current Date:                           2000 - 01 - 01
                New Date (yyyy-mm-dd):                  N/A    N/A  N/A

                Time Zone= GMT

                Daylight Saving= No
                Start Date (mm-nth-week-hr):            Jan. - 1st  - Sat. -  00
                End Date (mm-nth-week-hr):              Jan. - 1st  - Sat. -  00


                          Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.
```

Table 39 describes the fields in Figure 92.

Table 39 Time and Date Setting Fields

Field	**Description**
Time Protocol	Enter the time service protocol that your time server uses. Not all time servers support all protocols, so check with your ISP or network administrator or use trial and error to find a protocol that works. The main differences between the time protocols are the format. **Daytime (RFC 867)** format is the day/month/year/time zone of the server. **Time (RFC-868)** format displays a 4-byte integer giving the total number of seconds since 1970/1/1 at 0:0:0. The default, **NTP (RFC-1305)**, is similar to **Time (RFC-868)**. Select **Manual** to enter the new time and new date manually.
Time Server Address	Enter the IP address or domain name of your timeserver. Check with your ISP or network administrator if you are unsure of this information. The default is a.ntp.alphazed.net.
Current Time	This field displays an updated time only when you reenter this menu.
New Time	Enter the new time in hour, minute and second format. This field is available when you select **Manual** in the **Time Protocol** field.

Table 39 Time and Date Setting Fields

Field	**Description**
Current Date	This field displays an updated date only when you reenter this menu.
New Date	Enter the new date in year, month and day format. This field is available when you select **Manual** in the **Time Protocol** field.
Time Zone	Press [SPACE BAR] and then [ENTER] to set the time difference between your time zone and Greenwich Mean Time (GMT).
Daylight Saving Time	Daylight Saving Time is a period from late spring to early fall when many countries set their clocks ahead of normal local time by one hour to give more daylight time in the evenings. If you use daylight savings time, then choose **Yes**.
Start Date (mm-nth-week-hr)	Configure the day and time when Daylight Saving Time starts if you select **Yes** in the **Daylight Saving** field. The **hr** field uses the 24-hour format. Here are a couple of examples: Daylight Saving Time starts in most parts of the United States on the first Sunday of April. Each time zone in the United States starts using Daylight Saving Time at 2 a.m. local time. So, in the United States, select **Apr.**, **1st**, **Sun.** and type 02 in the **hr** field. Daylight Saving Time starts in the European Union on the last Sunday of March. All of the time zones in the European Union start using Daylight Saving Time at the same moment (1 a.m. GMT or UTC). So, in the European Union, select **Mar.**, **Last**, **Sun.** The time you type in the **hr** field depends on your time zone. In Germany, for instance, type 02 because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
End Date (mm-nth-week-hr)	Configure the day and time when Daylight Saving Time ends if you select **Yes** in the **Daylight Saving** field. The **hr** field uses the 24 hour format. Here are a couple of examples: Daylight Saving Time ends in the United States on the last Sunday of October. Each time zone in the United States stops using Daylight Saving Time at 2 a.m. local time. So, in the United States, select **Oct.**, **Last**, **Sun.** and type 02 in the **hr** field. Daylight Saving Time ends in the European Union on the last Sunday of October. All of the time zones in the European Union stop using Daylight Saving Time at the same moment (1 a.m. GMT or UTC). So, in the European Union, select **Oct.**, **Last**, **Sun.** The time you type in the **hr** field depends on your time zone. In Germany, for instance, type 02 because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
After you fill in this menu, press [ENTER] at the message “Press ENTER to Confirm or ESC to Cancel“ to save your configuration, or press [ESC] to cancel.	

Resetting the Time

The BCM50a Integrated Router resets the time in three instances:

- After you make changes to and leave menu 24.10
- After starting up the BCM50a Integrated Router starts up, if a time server configured in menu 24.10
- After starting the BCM50a Integrated Router, in 24-hour intervals

Chapter 17
Remote Management

This chapter covers remote management found in SMT menu 24.11.

Remote Management

With remote management, you can determine which services and protocols can access which BCM50a Integrated Router interface (if any) from which computers.

You can manage your BCM50a Integrated Router from a remote location via:

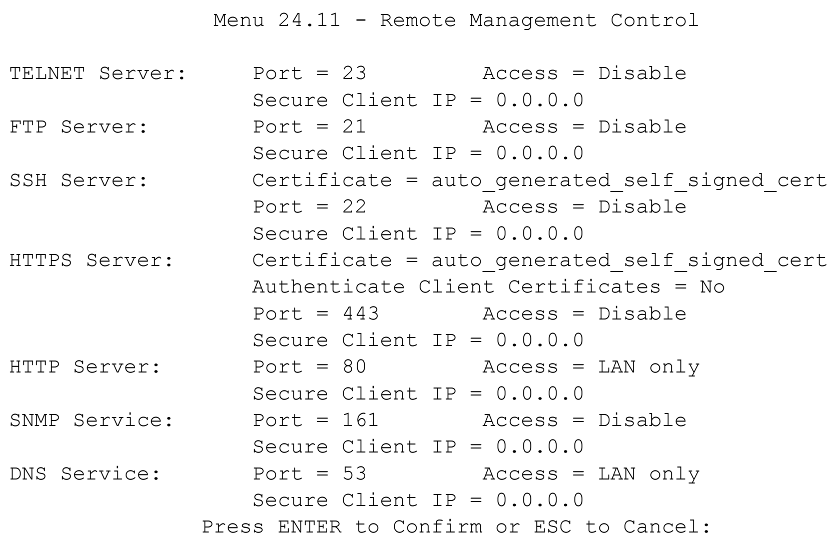
- Internet (WAN only)
- ALL (LAN and WAN)
- LAN only
- Neither (Disable)

Note: When you Choose WAN only or ALL (LAN & WAN), you still need to configure a firewall rule to allow access.

To disable remote management of a service, select **Disable** in the corresponding **Server Access** field.

Enter 11 from menu 24 to bring up **Menu 24.11 – Remote Management Control**.

Figure 93 Menu 24.11 – Remote Management Control



```
                Menu 24.11 - Remote Management Control

TELNET Server:     Port = 23         Access = Disable
                   Secure Client IP = 0.0.0.0
FTP Server:        Port = 21         Access = Disable
                   Secure Client IP = 0.0.0.0
SSH Server:        Certificate = auto_generated_self_signed_cert
                   Port = 22         Access = Disable
                   Secure Client IP = 0.0.0.0
HTTPS Server:      Certificate = auto_generated_self_signed_cert
                   Authenticate Client Certificates = No
                   Port = 443        Access = Disable
                   Secure Client IP = 0.0.0.0
HTTP Server:       Port = 80         Access = LAN only
                   Secure Client IP = 0.0.0.0
SNMP Service:      Port = 161        Access = Disable
                   Secure Client IP = 0.0.0.0
DNS Service:       Port = 53         Access = LAN only
                   Secure Client IP = 0.0.0.0
               Press ENTER to Confirm or ESC to Cancel:
```

Table 40 describes the fields in Figure 93.

Table 40 Menu 24.11 – Remote Management control

Field	**Description**
Telnet Server FTP Server SSH Server HTTPS Server HTTP Server SNMP Service DNS Service	Each of these read-only labels denotes a service that you can use to remotely manage the BCM50a Integrated Router.
Port	This field shows the port number for the service or protocol. You can change the port number if needed, but you must use the same port number to access the BCM50a Integrated Router.
Access	Select the access interface (if any) by pressing [SPACE BAR], then [ENTER] to choose from: **LAN only**, **WAN only**, **ALL** or **Disable**.
Secure Client IP	The default 0.0.0.0 allows any client to use this service to remotely manage the BCM50a Integrated Router. Enter an IP address to restrict access to a client with a matching IP address.

Table 40 Menu 24.11 – Remote Management control

Field	Description
Certificate	Press [SPACE BAR] and then [ENTER] to select the certificate that the BCM50a Integrated Router uses to identify itself. The BCM50a Integrated Router is the SSL server and must always authenticate itself to the SSL client (the computer that requests the HTTPS connection with the BCM50a Integrated Router).
Authenticate Client Certificates	Select **Yes** by pressing [SPACE BAR], then [ENTER] to require the SSL client to authenticate itself to the BCM50a Integrated Router by sending the BCM50a Integrated Router a certificate. To do that, the SSL client must have a CA-signed certificate from a CA that has been imported as a trusted CA on the BCM50a Integrated Router (see Appendix C, "Importing certificates," on page 209 for details).
After you fill this menu, press [ENTER] at the message "Press ENTER to Confirm or ESC to Cancel" to save your configuration, or press [ESC] to cancel.	

Remote Management Limitations

Remote management over LAN or WAN does not work when:

1. A filter in menu 3.1 (LAN) or in menu 11.1.4 (WAN) is applied to block a Telnet, FTP, or Web service.
2. You disable that service in menu 24.11.
3. The IP address in the **Secured Client IP** field (menu 24.11) does not match the client IP address. If it does not match, the BCM50a Integrated Router disconnects the session immediately.
4. There is already another remote management session of the same type (web, FTP or Telnet) running. Only one remote management session of the same type can run at one time.
5. There is a web remote management session running with a Telnet session. A Telnet session is disconnected if you begin a web session; it does not begin if a Web session is already running.
6. There is a firewall rule that blocks remote management.

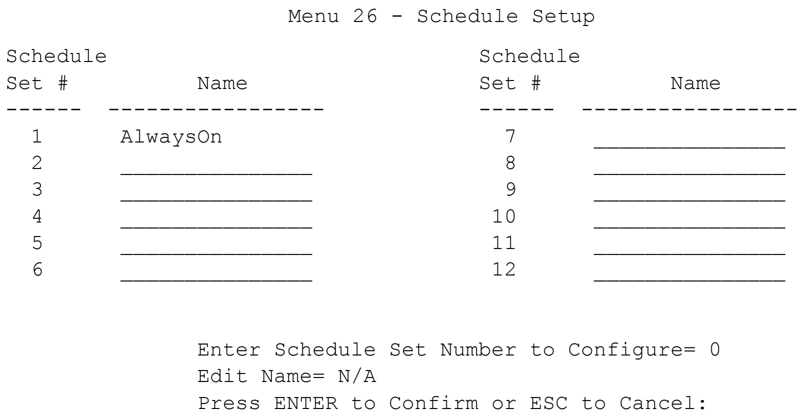
Chapter 18
Call scheduling

Using call scheduling (applicable only for PPPoA or PPPoE encapsulation), you can dictate when a remote node is called and for how long.

Introduction

Using the call scheduling feature, the BCM50a Integrated Router can manage a remote node and dictate when a remote node is called and for how long. This feature is similar to the scheduler in a video cassette recorder (you can specify a time period for the VCR to record). You can apply up to 4 schedule sets in **Menu 11.1 — Remote Node Profile**. From the main menu, enter 26 to access **Menu 26 — Schedule Setup** as shown in Figure 94.

Figure 94 Menu 26 – Schedule Setup



```
                       Menu 26 - Schedule Setup

Schedule                                 Schedule
Set #          Name                      Set #          Name
------  ------------------               ------  ------------------
  1       AlwaysOn                         7       ________________
  2       ________________                 8       ________________
  3       ________________                 9       ________________
  4       ________________                10       ________________
  5       ________________                11       ________________
  6       ________________                12       ________________


               Enter Schedule Set Number to Configure= 0
               Edit Name= N/A
               Press ENTER to Confirm or ESC to Cancel:
```

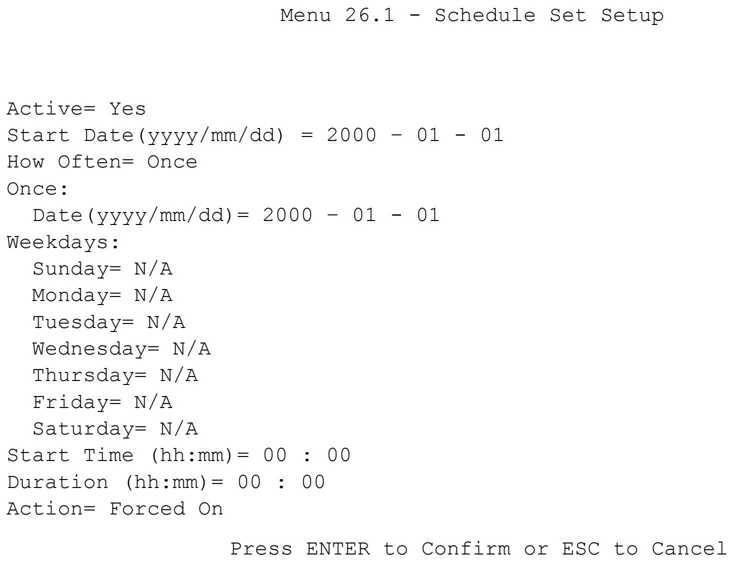
Lower numbered sets take precedence over higher numbered sets, thereby avoiding scheduling conflicts. For example, if sets 1, 2, 3, and 4 are applied in the remote node then set 1 takes precedence over sets 2, 3, and 4 as the BCM50a Integrated Router, by default, applies the lowest numbered set first. Set 2 takes precedence over sets 3 and 4, and so on.

You can design up to 12 schedule sets, but you can only apply up to four schedule sets for a remote node.

Note: To delete a schedule set, enter the set number and press [SPACE BAR] and then [ENTER] (or delete) in the Edit Name field.

To set up a schedule set, select the schedule set you want to setup from menu 26 (1-12) and press [ENTER] to see **Menu 26.1 — Schedule Set Setup** as shown in Figure 95.

Figure 95 Menu 26.1 – Schedule Set Setup



```
                      Menu 26.1 - Schedule Set Setup


Active= Yes
Start Date(yyyy/mm/dd) = 2000 - 01 - 01
How Often= Once
Once:
  Date(yyyy/mm/dd)= 2000 - 01 - 01
Weekdays:
  Sunday= N/A
  Monday= N/A
  Tuesday= N/A
  Wednesday= N/A
  Thursday= N/A
  Friday= N/A
  Saturday= N/A
Start Time (hh:mm)= 00 : 00
Duration (hh:mm)= 00 : 00
Action= Forced On
                  Press ENTER to Confirm or ESC to Cancel
```

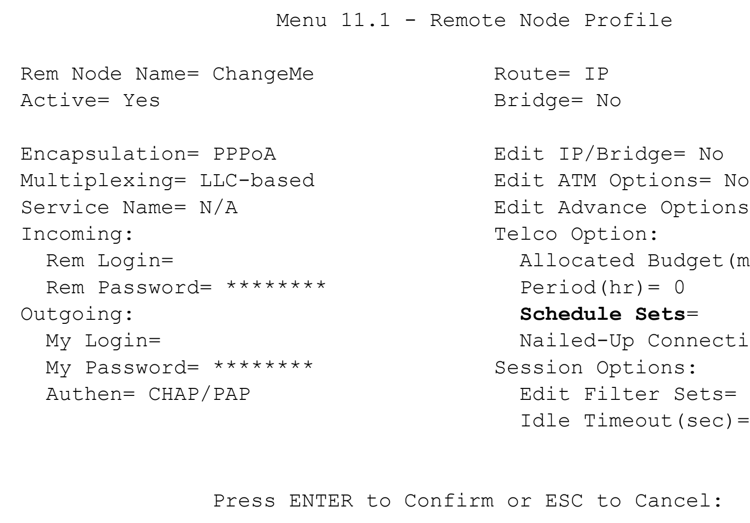
If a connection is already established, your BCM50a Integrated Router does not drop it. After the connection is dropped manually or it times out, then that remote node cannot be triggered until the end of the **Duration**.

Table 41 Menu 26.1 Schedule Set Setup

Field	**Description**	**Example**
Active	Press [SPACE BAR] to select **Yes** or **No**. Choose **Yes** and press [ENTER] to activate the schedule set.	Yes
Start Date	Enter the start date when you wish the set to take effect in year-month-date format. Valid dates are from the present to 2036-February-5.	2000-01-01
How Often	Press the [SPACE BAR] and then [ENTER] to select **Once** or **Weekly**. Both these options are mutually exclusive. If **Once** is selected, then all weekday settings are **N/A**. After **Once** is selected, the schedule rule deletes automatically after the scheduled time elapses.	Once
Once: Date	If you selected **Once** in the **How Often** field above, enter the date the set should activate here in year-month-date format.	2000-01-01
Weekday: Day	If you selected **Weekly** in the **How Often** field above, select the days when the set should activate (and recur) by going to that days and pressing [SPACE BAR] to select **Yes**. After you complete this menu, press [ENTER] to exit.	Yes No N/A
Start Time	Enter the start time when you wish the schedule set to take effect in hour-minute format.	09:00
Duration	Enter the maximum length of time this connection is allowed, in hour-minute format.	08:00
Action	**Forced On** means that the connection is maintained whether or not there is a demand call on the line and persists for the time period specified in the **Duration** field. **Forced Down** means that the connection is blocked whether or not there is a demand call on the line. **Enable Dial-On-Demand** means that this schedule permits a demand call on the line. **Disable Dial-On-Demand** means that this schedule prevents a demand call on the line.	**Forced On**
After you complete this menu, press [ENTER] at the prompt “Press ENTER to Confirm…” to save your configuration, or press [ESC] at any time to cancel.		

After you configure your schedule sets, you must apply them to the desired remote nodes. Enter 11 from the **Main Menu** and then enter the target remote node index. Using [SPACE BAR], select **PPPoE** or **PPPoA** in the **Encapsulation** field and then press [ENTER] to make the schedule sets field available, as shown in Figure 96.

Figure 96 Applying Schedule Sets to a Remote Node (PPPoE)



```
                        Menu 11.1 - Remote Node Profile

   Rem Node Name= ChangeMe                  Route= IP
   Active= Yes                              Bridge= No

   Encapsulation= PPPoA                     Edit IP/Bridge= No
   Multiplexing= LLC-based                  Edit ATM Options= No
   Service Name= N/A                        Edit Advance Options= N/A
   Incoming:                                Telco Option:
     Rem Login=                               Allocated Budget(min)= 0
     Rem Password= ********                   Period(hr)= 0
   Outgoing:                                  Schedule Sets=
     My Login=                                Nailed-Up Connection= No
     My Password= ********                  Session Options:
     Authen= CHAP/PAP                         Edit Filter Sets= No
                                              Idle Timeout(sec)= 100


                     Press ENTER to Confirm or ESC to Cancel:
```

You can apply up to four schedule sets, separated by commas, for one remote node. Change the schedule set numbers to your preferences.

Appendix A
Setting up your computer IP address

All computers must have a 10M or 100M Ethernet adapter card and TCP/IP installed.

Windows 95/98/Me/NT/2000/XP, and Macintosh OS 7 and later operating systems and all versions of UNIX/LINUX include the software components you need to install and use TCP/IP on your computer. Windows 3.1 requires the purchase of a third-party TCP/IP application package.

TCP/IP is already installed on computers using Windows NT/2000/XP, or Macintosh OS 7 and later operating systems.

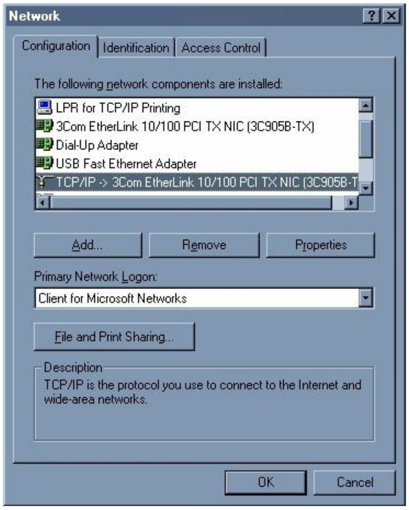
After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to communicate with your network.

If you manually assign IP information instead of using dynamic assignment, make sure that your computers have IP addresses that place them in the same subnet as the BCM50a Integrated Router LAN port.

Windows 95/98/Me

Click **Start**, **Settings**, **Control Panel** and double-click the **Network** icon to open the **Network** window

Figure 97 WIndows 95/98/Me: network: configuration



The following network components are installed:

- LPR for TCP/IP Printing
- 3Com EtherLink 10/100 PCI TX NIC (3C905B-TX)
- Dial-Up Adapter
- USB Fast Ethernet Adapter
- TCP/IP -> 3Com EtherLink 10/100 PCI TX NIC (3C905B-T

Primary Network Logon:
Client for Microsoft Networks

Description
TCP/IP is the protocol you use to connect to the Internet and wide-area networks.

Installing components

The **Network** window **Configuration** tab displays a list of installed components. You need a network adapter, the TCP/IP protocol and Client for Microsoft Networks.

If you need the adapter:

a In the **Network** window, click **Add**.

b Select **Adapter** and click **Add**.

c Select the manufacturer and model of your network adapter and click **OK**.

If you need TCP/IP:

a In the **Network** window, click **Add**.

b Select **Protocol** and click **Add**.

c Select **Microsoft** from the list of **manufacturers**.

d Select **TCP/IP** from the list of network protocols and click **OK**.

If you need Client for Microsoft Networks:

a Click **Add**.

b Select **Client** and click **Add**.

c Select **Microsoft** from the list of manufacturers.

d Select **Client for Microsoft Networks** from the list of network clients and click **OK**.

e Restart your computer so your changes take effect.

Configuring

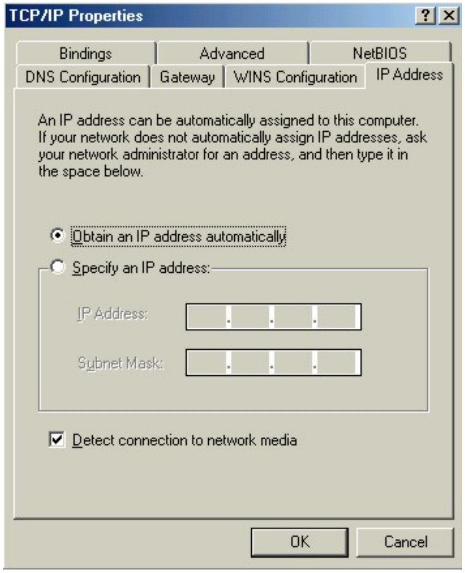
1 In the **Network** window **Configuration** tab, select your network adapter's TCP/IP entry and click **Properties**

2 Click the **IP Address** tab.

— If your IP address is dynamic, select **Obtain an IP address automatically**.

— If you have a static IP address, select **Specify an IP address** and type your information into the **IP Address** and **Subnet Mask** fields.

Figure 98 Windows 95/98/Me: TCP/IP properties: IP address



An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.

● Obtain an IP address automatically

○ Specify an IP address:

IP Address: . . .

Subnet Mask: . . .

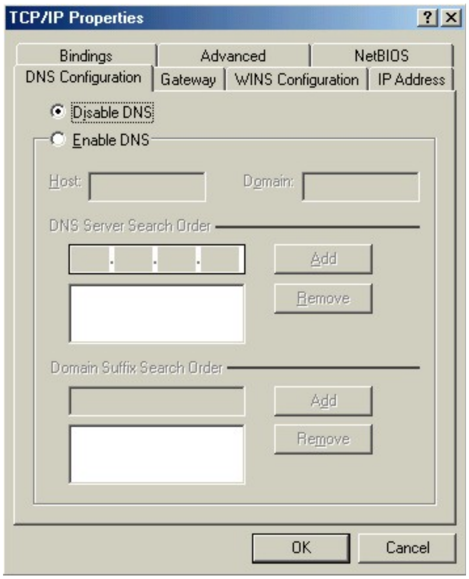
☑ Detect connection to network media

3 Click the **DNS** Configuration tab.

— If you do not know your DNS information, select **Disable DNS**.

— If you know your DNS information, select **Enable DNS** and type the information in the fields below (you do not need to fill them all in).

Figure 99 Windows 95/98/Me: TCP/IP Properties: DNS configuration



● Disable DNS
○ Enable DNS

4 Click the **Gateway** tab.

— If you do not know your gateway's IP address, remove previously installed gateways.

— If you have a gateway IP address, type it in the **New gateway field** and click **Add**.

5 Click **OK** to save and close the **TCP/IP Properties** window.

6 Click **OK** to close the **Network** window. Insert the Windows CD if prompted.

7 Turn on your BCM50a Integrated Router and restart your computer when prompted.

Verifying Settings

1 Click **Start** and then **Run**.

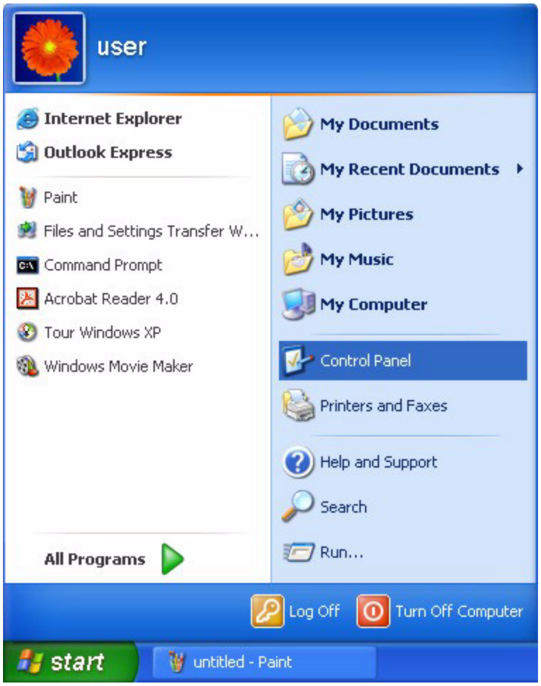
2 In the **Run** window, type winipcfg and click **OK** to open the **IP Configuration** window.

3 Select your network adapter. Your computer IP address, subnet mask, and default gateway will be displayed.

Windows 2000/NT/XP

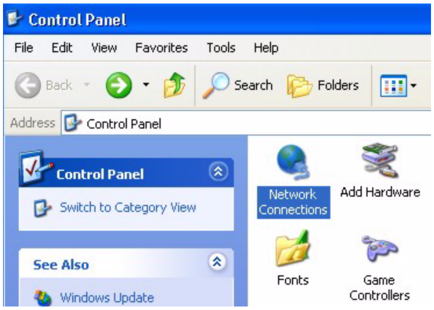
1 For Windows XP, click **Start**, **Control Panel**. In Windows 2000/NT, click **Start**, **Settings**, **Control Panel**.

Figure 100 Windows XP: Start menu



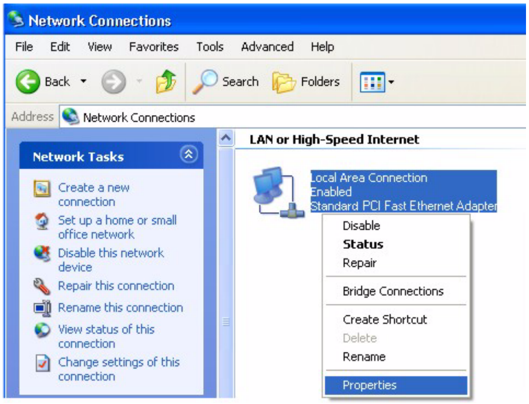
2 For Windows XP, click **Network Connections**. For Windows 2000/NT, click **Network and Dial-up Connections**.

Figure 101 Windows XP: Control Panel



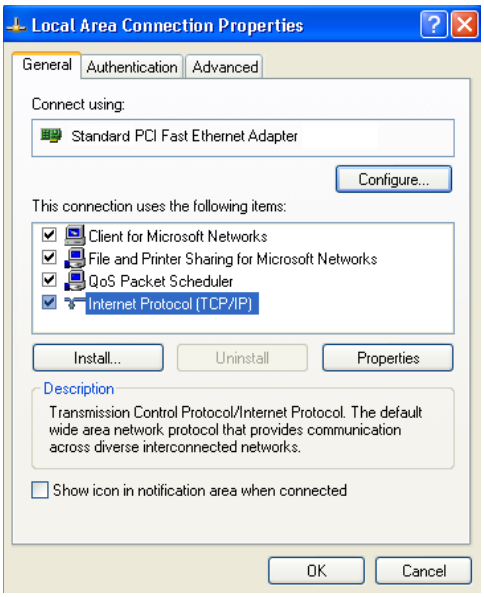
3 Right-click **Local Area Connection** and then click **Properties**.

Figure 102 Windows XP: Control Panel: Network Connections: Properties


Network Connections
File Edit View Favorites Tools Advanced Help
Back
Search
Folders
Address Network Connections
Network Tasks
Create a new connection
Set up a home or small office network
Disable this network device
Repair this connection
Rename this connection
View status of this connection
Change settings of this connection
LAN or High-Speed Internet
Local Area Connection
Enabled
Standard PCI Fast Ethernet Adapter
Disable
Status
Repair
Bridge Connections
Create Shortcut
Delete
Rename
Properties

4 Select **Internet Protocol (TCP/IP)** (under the **General** tab in Win XP) and click **Properties**.

Figure 103 Windows XP: Local Area Connection Properties



Connect using:

Standard PCI Fast Ethernet Adapter

This connection uses the following items:

☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ QoS Packet Scheduler
☑ Internet Protocol (TCP/IP)

Description

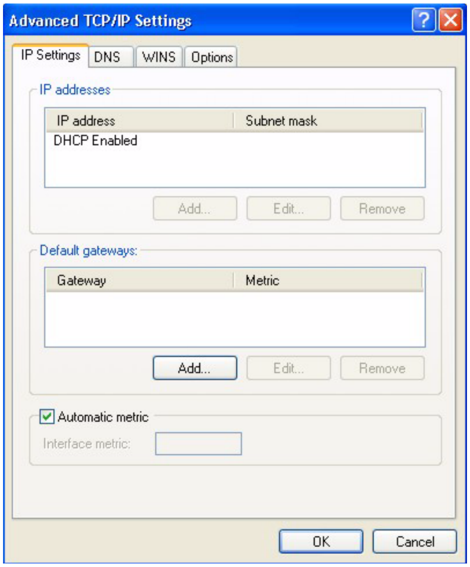
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

□ Show icon in notification area when connected

5 The **Internet Protocol TCP/IP Properties** window appears (the **General tab** in Windows XP).

- If you have a dynamic IP address, click **Obtain an IP address automatically**.
- If you have a static IP address, click **Use the following IP Address** and fill in the **IP address**, **Subnet mask**, and **Default gateway** fields. Click **Advanced**.

Figure 104 Windows XP: Advanced TCP/IP settings



IP address	Subnet mask
DHCP Enabled	

Gateway	Metric

☑ Automatic metric

Interface metric:

6 If you do not know your gateway IP address, remove any previously installed gateways in the **IP Settin**gs tab and click **OK**.

Ë Do one or more of the following if you want to configure additional IP addresses:

- In the **IP Settings** tab, in IP addresses, click **Add**.
- In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.
- Repeat the above two steps for each IP address you want to add.
- Configure additional default gateways in the **IP Settings** tab by clicking **Add** in **Default gateways**.

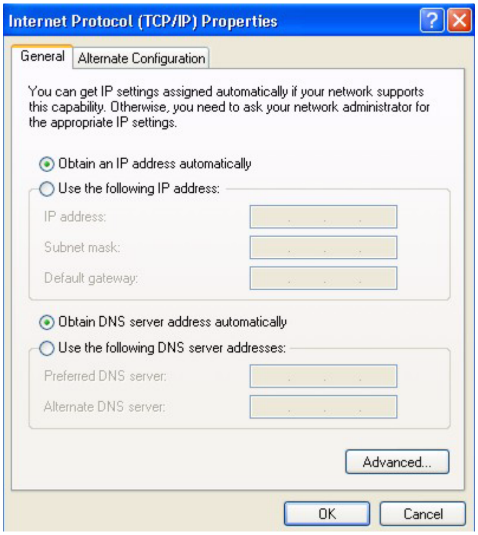
- In **TCP/IP Gateway Address**, type the IP address of the default gateway in **Gateway**. To manually configure a default metric (the number of transmission hops), clear the **Automatic metric** check box and type a metric in **Metric**.
- Click **Add**.
- Repeat the previous three steps for each default gateway you want to add.
- Click **OK** when finished.

7 In the **Internet Protocol TCP/IP Properties** window (the **General tab** in Windows XP):

- Click **Obtain DNS server address automatically** if you do not know your DNS server IP addresses.
- If you know your DNS server IP addresses, click **Use the following DNS server addresses**, and type them in the **Preferred DNS server** and **Alternate DNS server** fields.

  If you have previously configured DNS servers, click **Advanced** and then the **DNS** tab to order them.

Figure 105 Windows XP: Internet Protocol (TCP/IP) properties



Internet Protocol (TCP/IP) Properties

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

● Obtain an IP address automatically

○ Use the following IP address:

● Obtain DNS server address automatically

○ Use the following DNS server addresses:

8 Click **OK** to close the **Internet Protocol (TCP/IP) Properties** window.

9 Click **OK** to close the **Local Area Connection Properties** window.

10 Turn on your BCM50a Integrated Router and restart your computer (if prompted).

Verifying Settings

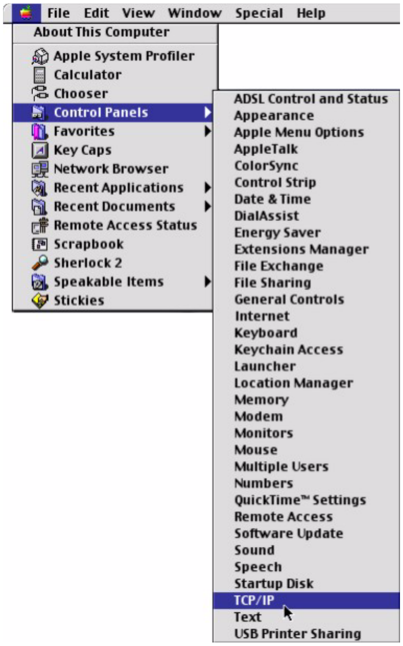
1 Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

2 In the **Command Prompt** window, type ipconfig and press [ENTER]. You can also open **Network Connections**, right-click a network connection, click **Status** and then click the **Support** tab.

Macintosh OS 8/9

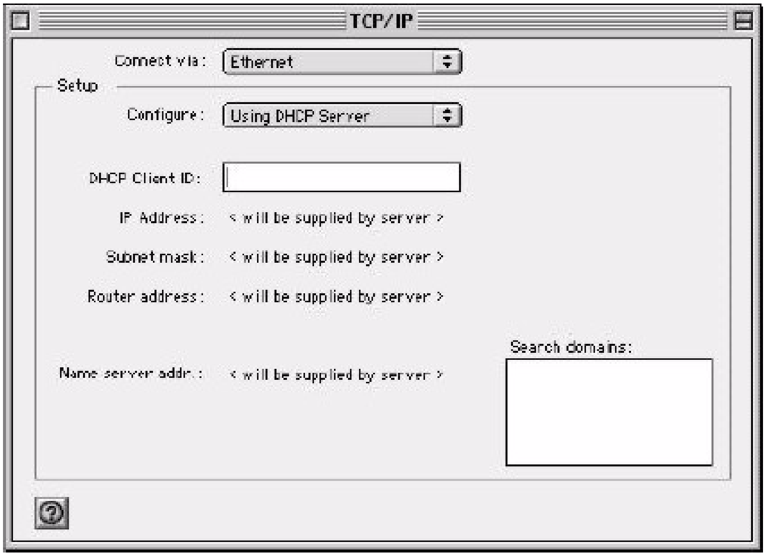
1 Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.

Figure 106 Macintosh OS 8/9: Apple Menu



2 Select **Ethernet built-in** from the **Connect via** list.

Figure 107 Macintosh OS 8/9: TCP/IP



TCP/IP

Connect via: Ethernet

Setup

Configure: Using DHCP Server

DHCP Client ID:

IP Address: < will be supplied by server >

Subnet mask: < will be supplied by server >

Router address: < will be supplied by server >

Name server addr.: < will be supplied by server >

Search domains:

3 For dynamically assigned settings, select **Using DHCP Server** from the **Configure:** list.

4 For statically assigned settings, do the following:

— From the **Configure** box, select **Manually**.

— Type your IP address in the **IP Address** box.

— Type your subnet mask in the **Subnet mask** box.

— Type the IP address of your BCM50a Integrated Router in the **Router address** box.

5 Close the **TCP/IP Control Panel**.

6 Click **Save** if prompted, to save changes to your configuration.

7 Turn on your BCM50a Integrated Router and restart your computer (if prompted).

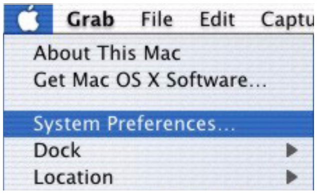
Verifying Settings

Check your TCP/IP properties in the **TCP/IP Control Panel** window.

Macintosh OS X

1 Click the **Apple** menu, and click **System Preferences** to open the **System Preferences** window.

Figure 108 Macintosh OS X: Apple menu



2 Click **Network** in the icon bar.

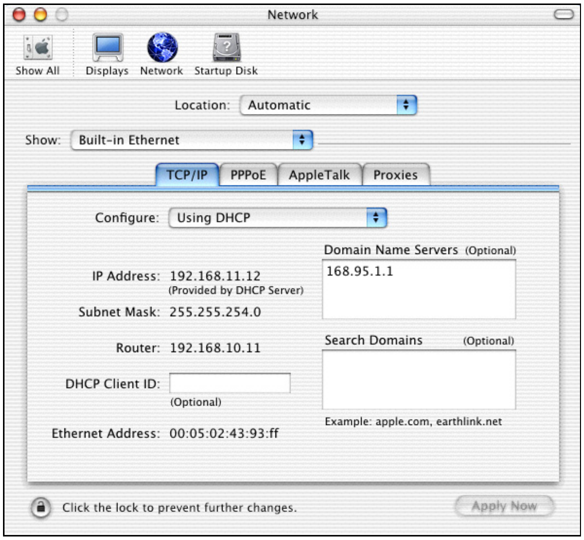
— Select **Automatic** from the **Location** list.

— Select **Built-in Ethernet** from the **Show** list.

— Click the **TCP/IP** tab.

3 For dynamically assigned settings, select **Using DHCP** from the **Configure** list.

Figure 109 Macintosh OS X: Network



Location: Automatic

Show: Built-in Ethernet

Configure: Using DHCP

IP Address: 192.168.11.12
(Provided by DHCP Server)

Subnet Mask: 255.255.254.0

Router: 192.168.10.11

DHCP Client ID:
(Optional)

Ethernet Address: 00:05:02:43:93:ff

Domain Name Servers (Optional)
168.95.1.1

Search Domains (Optional)

Example: apple.com, earthlink.net

4 For statically assigned settings, do the following:

- From the **Configure** box, select **Manually**.
- Type your IP address in the **IP Address** box.
- Type your subnet mask in the **Subnet mask** box.
- Type the IP address of your BCM50a Integrated Router in the **Router address** box.

5 Click **Apply Now** and close the window.

6 Turn on your BCM50a Integrated Router and restart your computer (if prompted).

Verifying settings

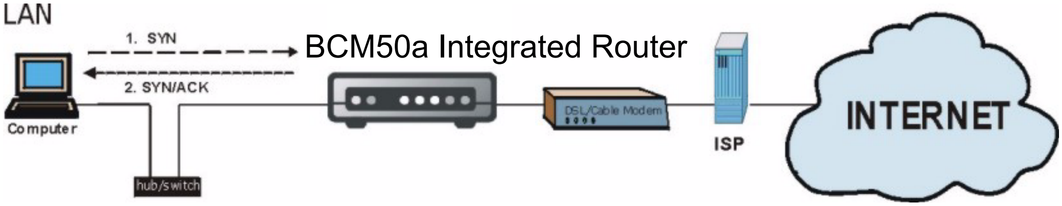
Check your TCP/IP properties in the **Network** window.

Appendix B
Triangle Route

The Ideal Setup

When the firewall is on, your BCM50a Integrated Router acts as a secure gateway between your LAN and the Internet. In an ideal network topology, all incoming and outgoing network traffic passes through the BCM50a Integrated Router to protect your LAN against attacks.

Figure 110 Ideal Setup



The Triangle Route Problem

You can have more than one connection to the Internet (through one or more ISPs). If an alternate gateway is on the LAN (and its IP address is in the same subnet as the BCM50a Integrated Router LAN IP address), the triangle route (also called asymmetrical route) problem can occur. The steps below describe the triangle route problem.

A traffic route is a path for sending or receiving data packets between two Ethernet devices. Some companies have more than one alternate route to one or more ISPs. If the LAN and ISPs are in the same subnet, the triangle route problem can occur. The steps below describe the triangle route problem.

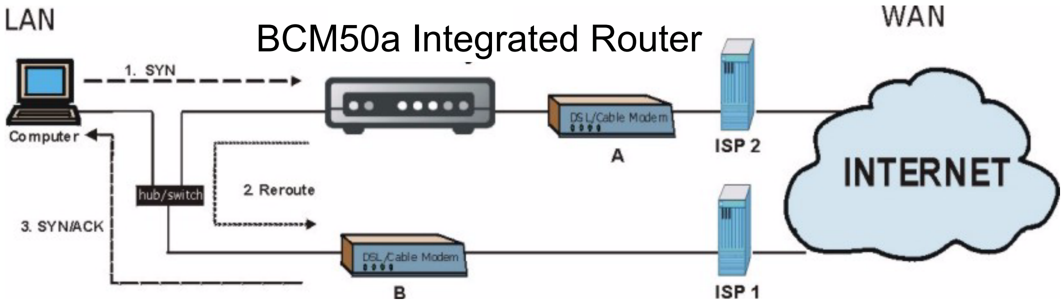
1 A computer on the LAN initiates a connection by sending out a SYN packet to a receiving server on the WAN.

2 The BCM50a Integrated Router reroutes the SYN packet through Gateway **B** on the LAN to the WAN.

3 The reply from the WAN goes directly to the computer on the LAN without going through the BCM50a Integrated Router.

As a result, the BCM50a Integrated Router resets the connection, as the connection is not acknowledged.

Figure 111 Triangle Route Problem



The Triangle Route Solutions

IP aliasing

Using IP alias, you can partition your network into logical sections over the same Ethernet interface. Your BCM50a Integrated Router supports up to three logical LAN interfaces with the BCM50a Integrated Router being the gateway for each logical network. By putting your LAN and Gateway **B** in different subnets, all returning network traffic must pass through the BCM50a Integrated Router to your LAN. The following steps describe such a scenario.

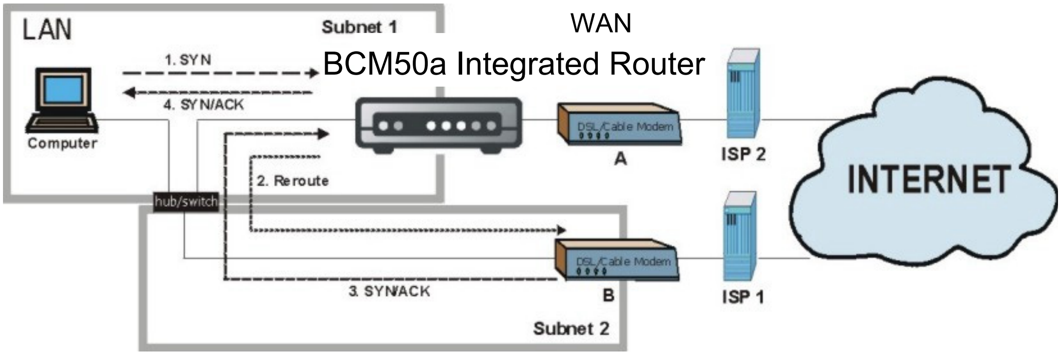
1 A computer on the LAN initiates a connection by sending a SYN packet to a receiving server on the WAN.

2 The BCM50a Integrated Router reroutes the packet to Gateway B, which is in Subnet 2.

3 The reply from WAN goes to the BCM50a Integrated Router.

4 The BCM50a Integrated Router ends the response to the computer in Subnet 1.

Figure 112 IP Alias



Appendix C
Importing certificates

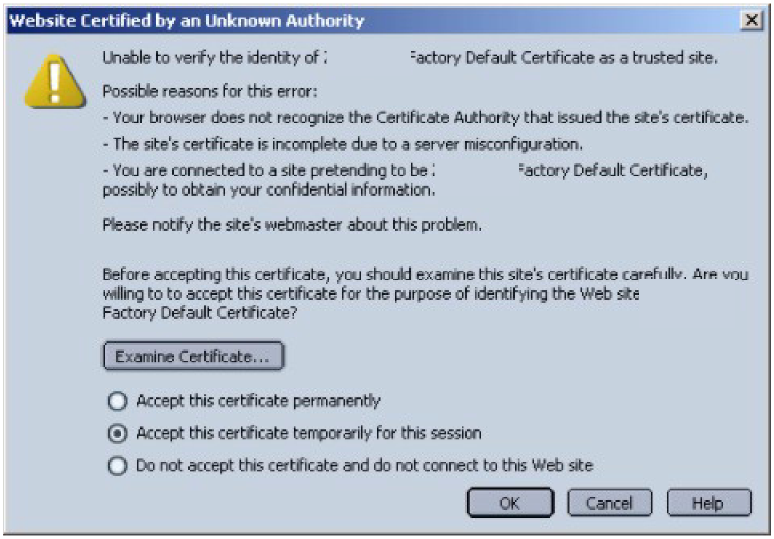
This appendix shows examples for importing certificates.

Import BCM50a Integrated Router certificates into Netscape Navigator

In Netscape Navigator, you can permanently trust the BCM50a Integrated Router server certificate by importing it into your operating system as a trusted certification authority.

Select **Accept This Certificate Permanently** in Figure 113 to do this.

Figure 113 Security Certificate



Website Certified by an Unknown Authority

Unable to verify the identity of : Factory Default Certificate as a trusted site.

Possible reasons for this error:

- Your browser does not recognize the Certificate Authority that issued the site's certificate.

- The site's certificate is incomplete due to a server misconfiguration.

- You are connected to a site pretending to be : Factory Default Certificate, possibly to obtain your confidential information.

Please notify the site's webmaster about this problem.

Before accepting this certificate, you should examine this site's certificate carefully. Are you willing to to accept this certificate for the purpose of identifying the Web site Factory Default Certificate?

○ Accept this certificate permanently

● Accept this certificate temporarily for this session

○ Do not accept this certificate and do not connect to this Web site

Importing the BCM50a Integrated Router Certificate into Internet Explorer

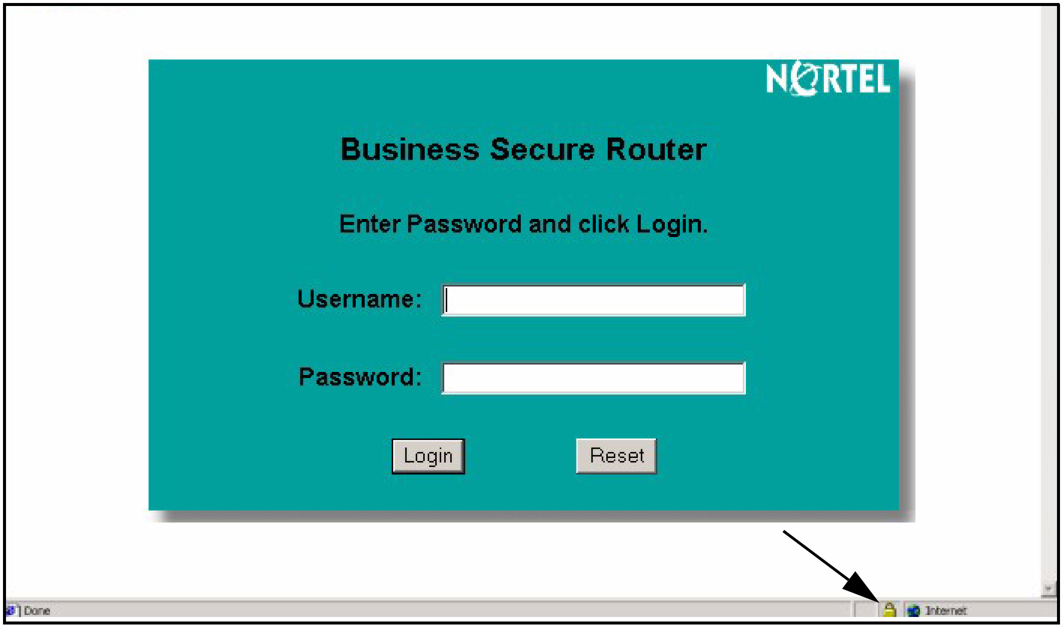
For Internet Explorer to trust a self-signed certificate from the BCM50a Integrated Router, simply import the self-signed certificate into your operating system as a trusted certification authority.

To have Internet Explorer trust a BCM50a Integrated Router certificate issued by a certificate authority, import the certificate authority's certificate into your operating system as a trusted certification authority.

The following example procedure shows how to import the BCM50a Integrated Router's (self-signed) server certificate into your operating system as a trusted certification authority.

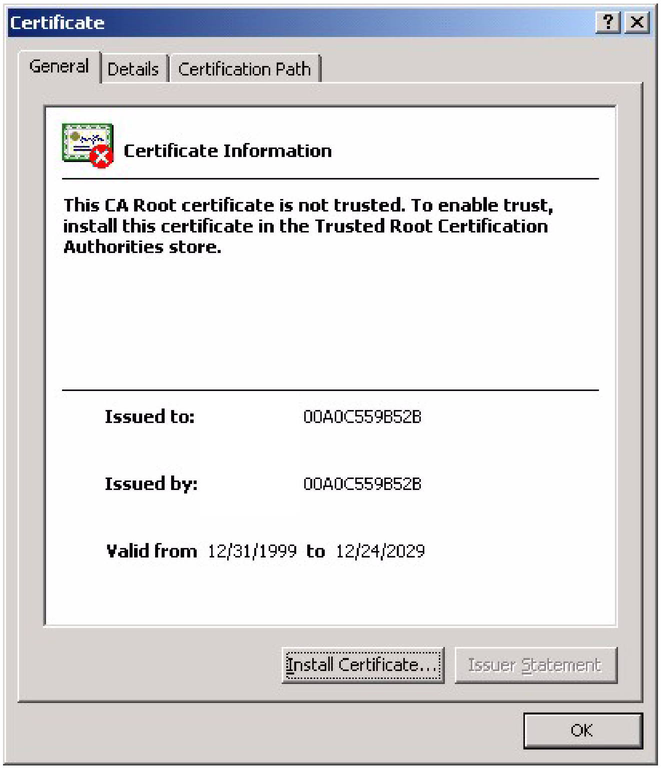
1 In Internet Explorer, double click the lock shown in Figure 114.

Figure 114 Login Screen



2 Click **Install Certificate** to open the **Install Certificate** wizard.

Figure 115 Certificate General Information before Import



This CA Root certificate is not trusted. To enable trust, install this certificate in the Trusted Root Certification Authorities store.

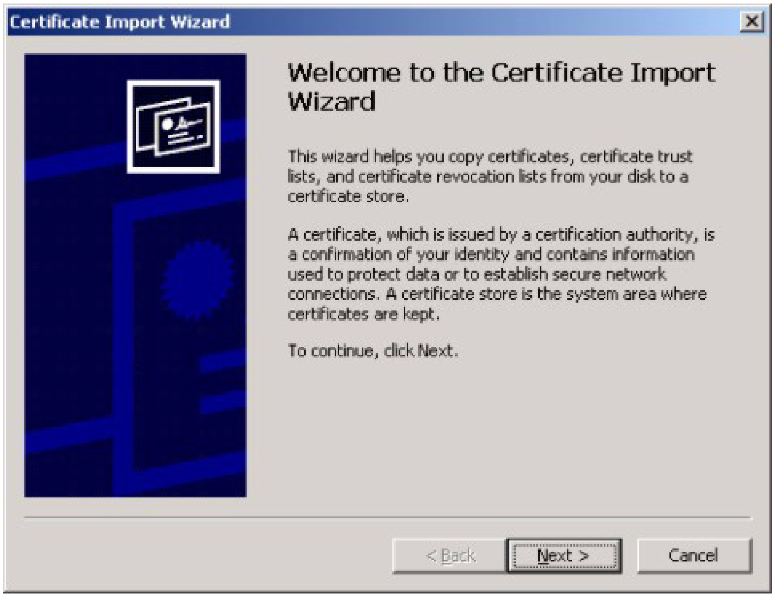
Issued to: 00A0C559B52B

Issued by: 00A0C559B52B

Valid from 12/31/1999 to 12/24/2029

3 Click **Next** to begin the **Install Certificate** wizard.

Figure 116 Certificate Import Wizard 1



Welcome to the Certificate Import Wizard

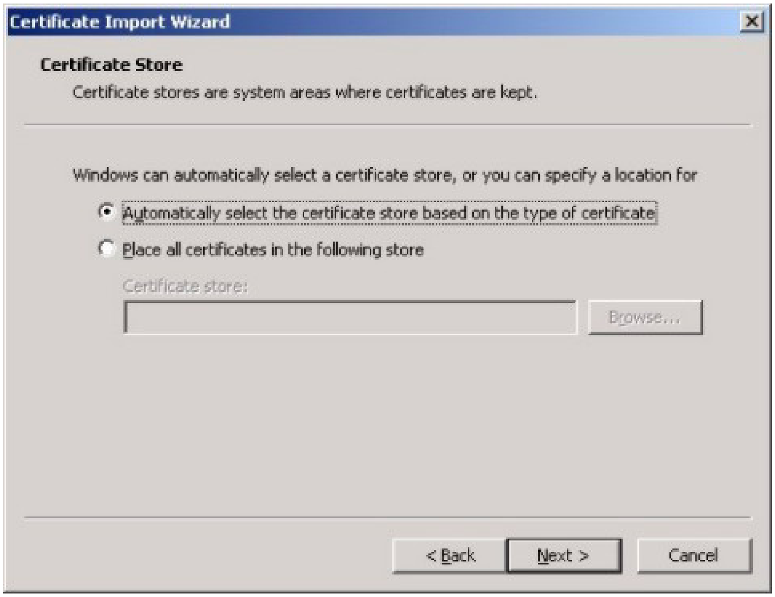
This wizard helps you copy certificates, certificate trust lists, and certificate revocation lists from your disk to a certificate store.

A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

4 Select where you want to store the certificate and click **Next**.

Figure 117 Certificate Import Wizard 2



Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for

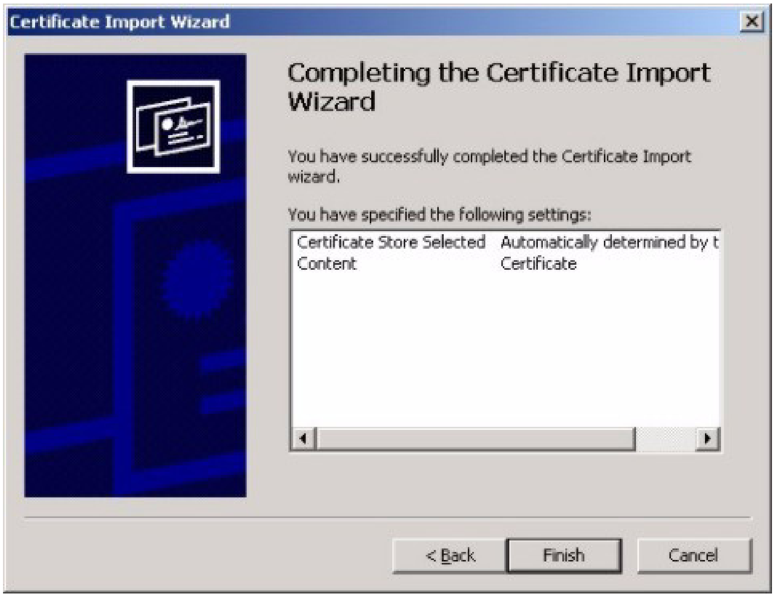
● Automatically select the certificate store based on the type of certificate

○ Place all certificates in the following store

Certificate store:

5 Click **Finish** to complete the **Import Certificate** wizard.

Figure 118 Certificate Import Wizard 3



Completing the Certificate Import Wizard

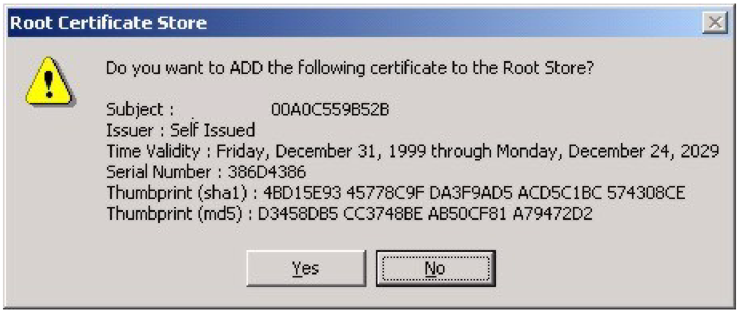
You have successfully completed the Certificate Import wizard.

You have specified the following settings:

Certificate Store Selected	Automatically determined by t
Content	Certificate

6 Click **Yes** to add the BCM50a Integrated Router certificate to the root store.

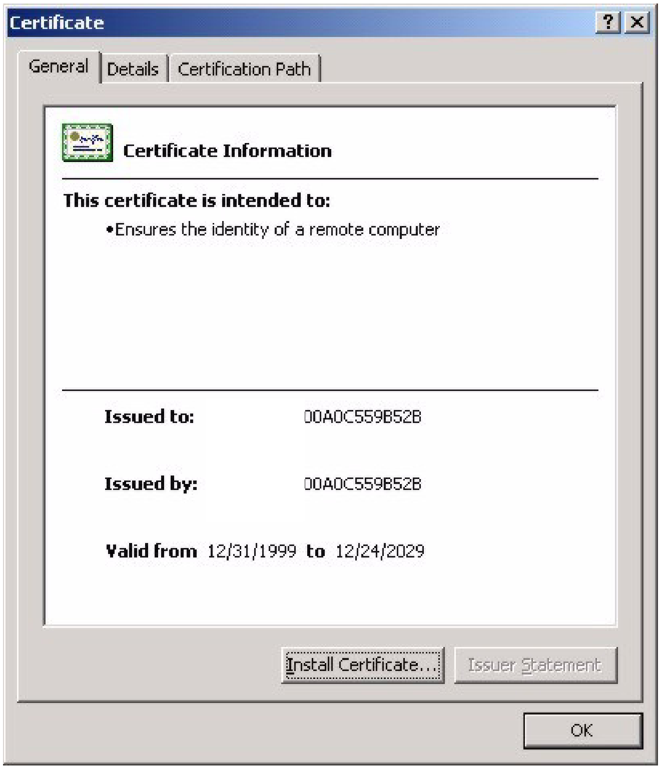
Figure 119 Root Certificate Store



Do you want to ADD the following certificate to the Root Store?

Subject : 00A0C559B52B
Issuer : Self Issued
Time Validity : Friday, December 31, 1999 through Monday, December 24, 2029
Serial Number : 386D4386
Thumbprint (sha1) : 4BD15E93 45778C9F DA3F9AD5 ACD5C1BC 574308CE
Thumbprint (md5) : D3458DB5 CC3748BE AB50CF81 A79472D2

Figure 120 Certificate General Information after Import



Certificate Information

This certificate is intended to:

- Ensures the identity of a remote computer

Issued to: 00A0C559B52B

Issued by: 00A0C559B52B

Valid from 12/31/1999 to 12/24/2029

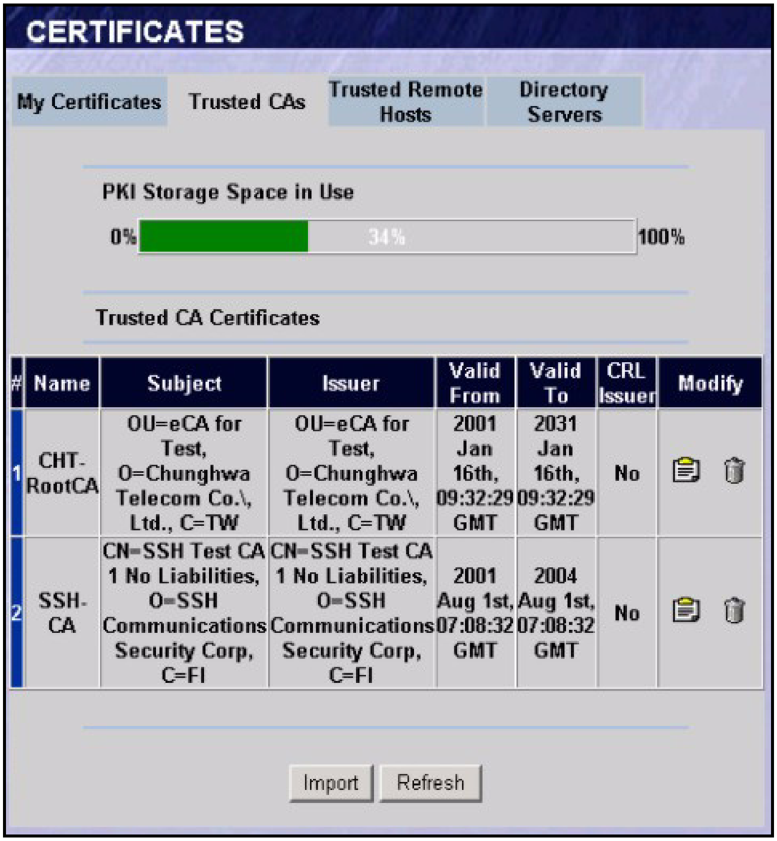
Enrolling and Importing SSL Client Certificates

The SSL client needs a certificate if **Authenticate Client Certificates** is selected on the BCM50a Integrated Router.

You must have imported at least one trusted CA to the BCM50a Integrated Router in order for the **Authenticate Client Certificates** to be active (see “Certificates” in *BCM50a Integrated Router Configuration - Basics* (N0115790) for details).

Apply for a certificate from a Certification Authority (CA) that is trusted by the BCM50a Integrated Router (see the BCM50a Integrated Router’s **Trusted CA** WebGUI screen—Figure 121).

Figure 121 BCM50a Integrated Router Trusted CA screen



PKI Storage Space in Use

Trusted CA Certificates

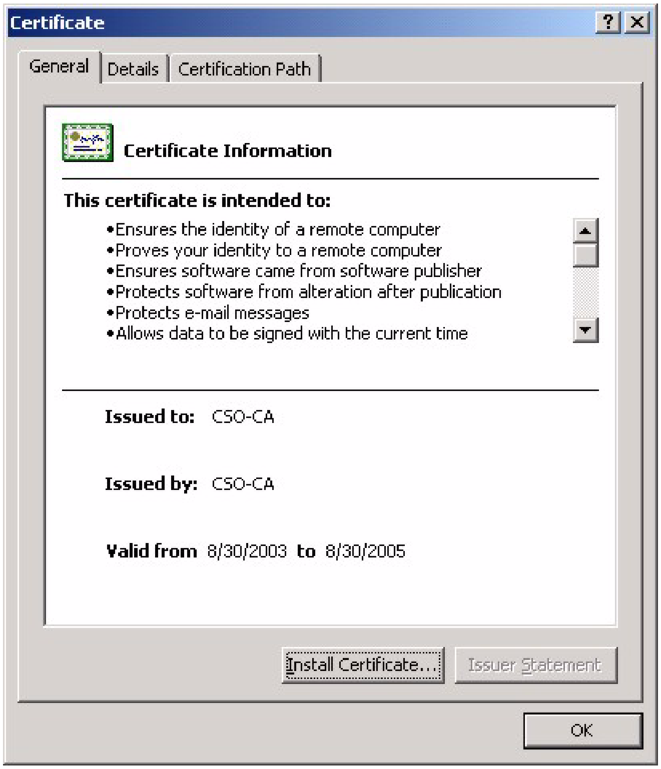
#	Name	Subject	Issuer	Valid From	Valid To	CRL Issuer	Modify
1	CHT-RootCA	OU=eCA for Test, O=Chunghwa Telecom Co.\, Ltd., C=TW	OU=eCA for Test, O=Chunghwa Telecom Co.\, Ltd., C=TW	2001 Jan 16th, 09:32:29 GMT	2031 Jan 16th, 09:32:29 GMT	No	📋 🗑
2	SSH-CA	CN=SSH Test CA 1 No Liabilities, O=SSH Communications Security Corp, C=FI	CN=SSH Test CA 1 No Liabilities, O=SSH Communications Security Corp, C=FI	2001 Aug 1st, 07:08:32 GMT	2004 Aug 1st, 07:08:32 GMT	No	📋 🗑

The CA sends you a package containing the CA's trusted certificates, your personal certificates and a password to install the personal certificates.

Installing the CA's certificate

1 Double click the CA's trusted certificate to produce a screen similar to the one shown in Figure 122.

Figure 122 CA certificate example



Certificate

General | Details | Certification Path

Certificate Information

This certificate is intended to:

- Ensures the identity of a remote computer
- Proves your identity to a remote computer
- Ensures software came from software publisher
- Protects software from alteration after publication
- Protects e-mail messages
- Allows data to be signed with the current time

Issued to: CSO-CA

Issued by: CSO-CA

Valid from 8/30/2003 to 8/30/2005

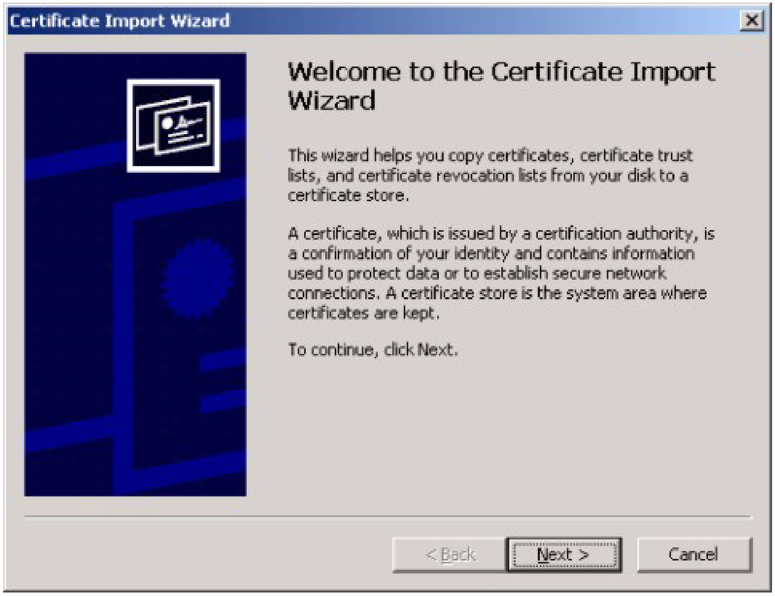
2 Click **Install Certificate** and follow the wizard as shown earlier in this appendix.

Installing your personal certificates

You need a password in advance. The CA can issue the password or you can specify it during the enrollment. Double-click the personal certificate given to you by the CA to produce a screen similar to Figure 123

1 Click **Next** to begin the wizard.

Figure 123 Personal certificate import wizard 1



Certificate Import Wizard

Welcome to the Certificate Import Wizard

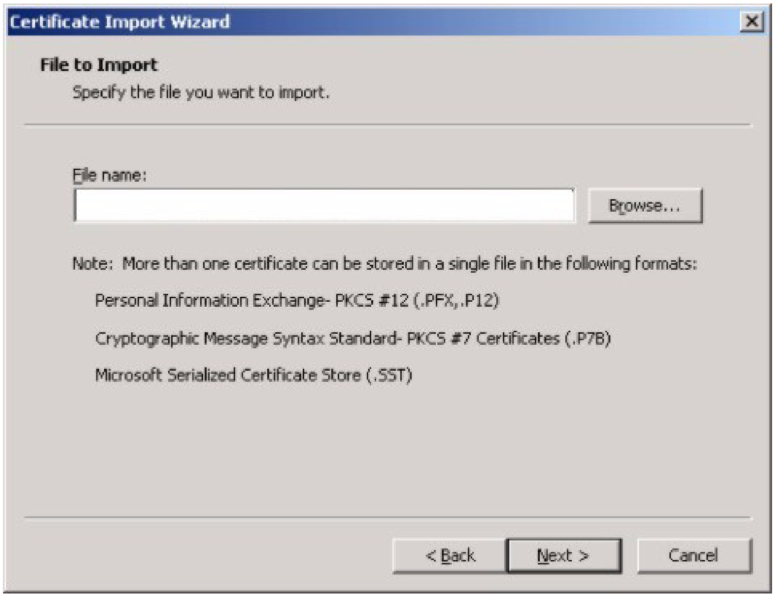
This wizard helps you copy certificates, certificate trust lists, and certificate revocation lists from your disk to a certificate store.

A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

2 The file name and path of the certificate you double-clicked automatically appears in the **File name** text box. Click **Browse** if you wish to import a different certificate.

Figure 124 Personal certificate import wizard 2



Certificate Import Wizard

File to Import

Specify the file you want to import.

File name:

Note: More than one certificate can be stored in a single file in the following formats:

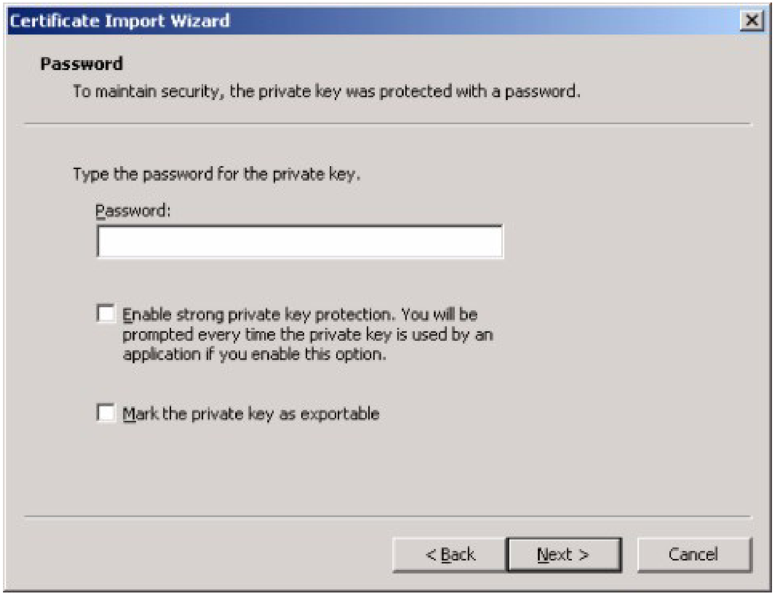
Personal Information Exchange- PKCS #12 (.PFX,.P12)

Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)

Microsoft Serialized Certificate Store (.SST)

3 Enter the password given to you by the CA.

Figure 125 Personal certificate import wizard 3



Certificate Import Wizard

Password

To maintain security, the private key was protected with a password.

Type the password for the private key.

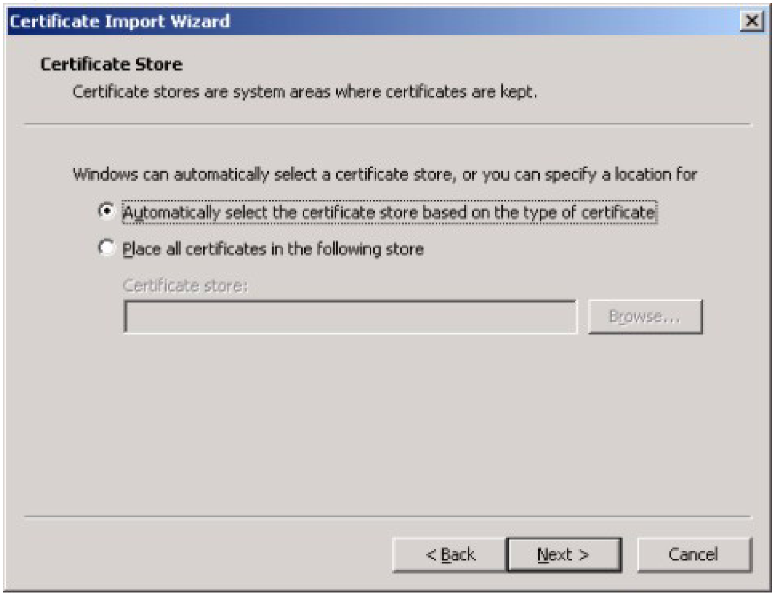
Password:

□ Enable strong private key protection. You will be prompted every time the private key is used by an application if you enable this option.

□ Mark the private key as exportable

4 Have the wizard determine where the certificate should be saved on your computer or select **Place all certificates in the following store** and choose a different location.

Figure 126 Personal certificate import wizard 4



Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for

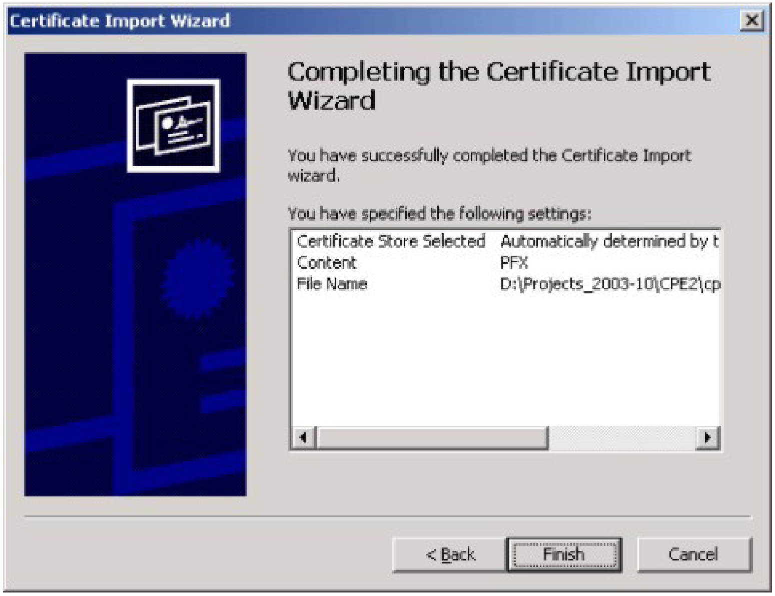
● Automatically select the certificate store based on the type of certificate

○ Place all certificates in the following store

Certificate store:

5 Click **Finish** to complete the wizard and begin the import process.

Figure 127 Personal certificate import wizard 5



Certificate Import Wizard

Completing the Certificate Import Wizard

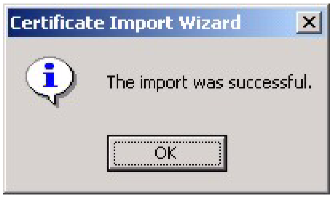
You have successfully completed the Certificate Import wizard.

You have specified the following settings:

Certificate Store Selected	Automatically determined by t
Content	PFX
File Name	D:\Projects_2003-10\CPE2\cp

6 Figure 128 shows the screen that appears when the certificate is correctly installed on your computer.

Figure 128 Personal certificate import wizard 6



Certificate Import Wizard

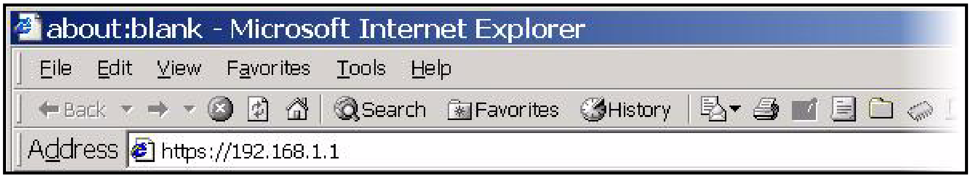
The import was successful.

Using a certificate when accessing the BCM50a Integrated Router example

Use the following procedure to access the BCM50a Integrated Router via HTTPS.

1 Enter https://BCM50a Integrated Router IP Address/ in your browser's web address field.

Figure 129 Access the BCM50a Integrated Router via HTTPS

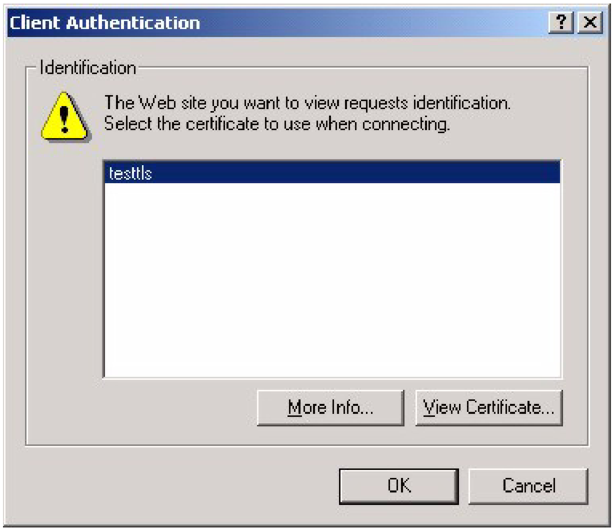


about:blank - Microsoft Internet Explorer

Address https://192.168.1.1

2 When **Authenticate Client Certificates** is selected on the BCM50a Integrated Router, you are asked to select a personal certificate to send to the BCM50a Integrated Router. This screen displays even if you only have a single certificate, as shown in Figure 130.

Figure 130 SSL client authentication



Client Authentication

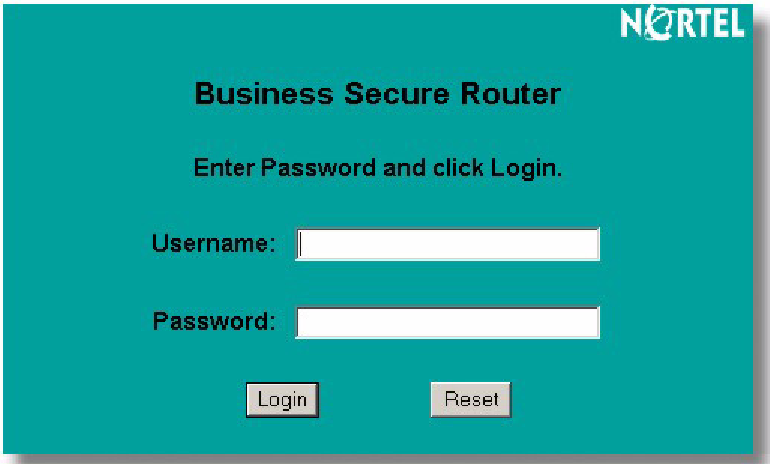
Identification

The Web site you want to view requests identification.
Select the certificate to use when connecting.

testtls

3 The BCM50a Integrated Router login screen appears.

Figure 131 BCM50a Integrated Router secure login screen



NORTEL

Business Secure Router

Enter Password and click Login.

Username:

Password:

Appendix D
PPPoE

PPPoE in action

An ADSL modem bridges a PPP session over Ethernet (PPP over Ethernet, RFC 2516) from your PC to an ATM PVC (Permanent Virtual Circuit), which connects to a DSL Access Concentrator where the PPP session terminates (see Figure 132). One PVC can support any number of PPP sessions from your LAN. PPPoE provides access control and billing functionality in a manner similar to dial-up services using PPP.

Benefits of PPPoE

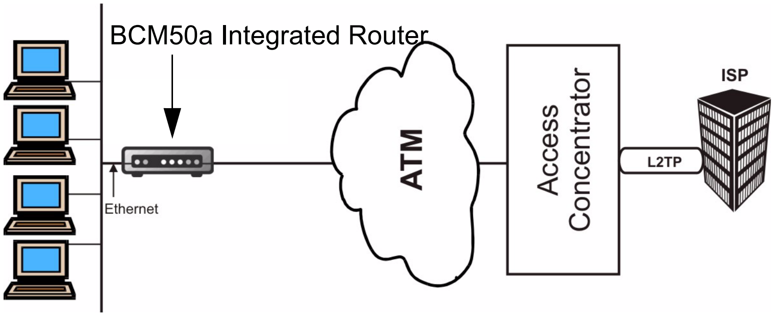
PPPoE offers the following benefits:

- It provides you with a familiar dial-up networking (DUN) user interface.
- It lessens the burden on the carriers of provisioning virtual circuits all the way to the ISP on multiple switches for thousands of users. For GSTN (PSTN and ISDN), the switching fabric is already in place.
- It allows the ISP to use the existing dial-up model to authenticate and (optionally) to provide differentiated services.

Traditional dial-up scenario

Figure 132 depicts a typical hardware configuration in which the PCs use traditional dial-up networking.

Figure 132 Single-PC per router hardware configuration



How PPPoE works

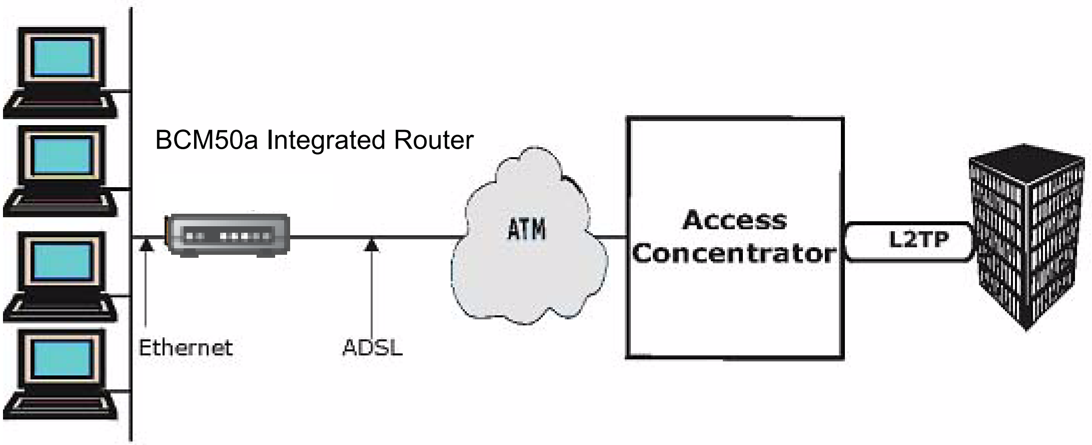
The PPPoE driver makes the Ethernet appear as a serial link to the PC and the PC runs PPP over the Ethernet, while the modem bridges the Ethernet frames to the Access Concentrator (AC). Between the AC and an ISP, the AC acts as an L2TP (Layer 2 Tunneling Protocol) LAC (L2TP Access Concentrator) and tunnels the PPP frames to the ISP. The L2TP tunnel is capable of carrying multiple PPP sessions.

With PPPoE, the VC (Virtual Circuit) is equivalent to the dial-up connection and runs between the modem and the AC, as opposed to all the way to the ISP. However, the PPP negotiation is between the PC and the ISP.

BCM50a Integrated Router as a PPPoE client

When using the BCM50a Integrated Router as a PPPoE client, the PCs on the LAN see only the Ethernet and are not aware of the PPPoE. This alleviates the administrator from having to manage the PPPoE clients on the individual PCs.

Figure 133 BCM50a Integrated Router as a PPPoE Client



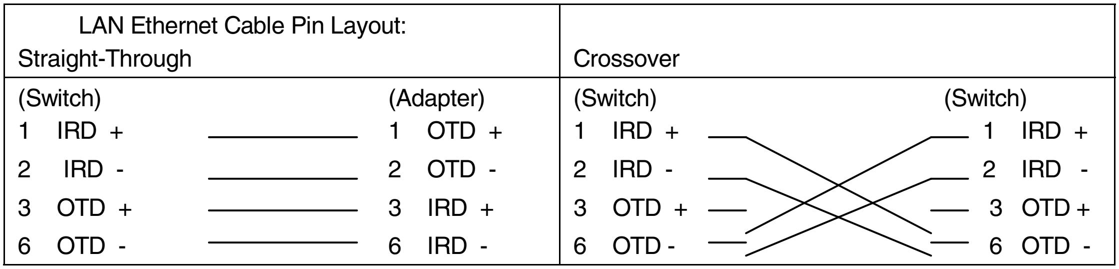
Appendix E
Hardware specifications

Table 42 General specifications

Power Specification	I/P AC 100~240V 50/60Hz; O/P DC 18V 1.1A
MTBF	266997 hrs (Mean Time Between Failures)
Operation Temperature	0º C ~ 40º C
ADSL Specification for WAN	ADSL/ADSL2/ADSL2+ with TR-067 compliance
Ethernet Specification for LAN/ VPN Ports	10/100Mb/s Half / Full autonegotiation, autosensing

Cable pin assignments

Figure 134 Ethernet cable pin assignments



LAN Ethernet Cable Pin Layout: Straight-Through		Crossover	
(Switch)	(Adapter)	(Switch)	(Switch)
1 IRD +	1 OTD +	1 IRD +	1 IRD +
2 IRD -	2 OTD -	2 IRD -	2 IRD -
3 OTD +	3 IRD +	3 OTD +	3 OTD +
6 OTD -	6 IRD -	6 OTD -	6 OTD -

Appendix F
IP subnetting

IP addressing

Routers route based on the network number. The router that delivers the data packet to the correct destination host uses the host ID.

IP classes

An IP address is made up of four octets (eight bits), written in dotted decimal notation, for example, 192.168.1.1. IP addresses are categorized into different classes. The class of an address depends on the value of its first octet.

- Class A addresses have a 0 in the left-most bit. In a class A address, the first octet is the network number and the remaining three octets make up the host ID.
- Class B addresses have a 1 in the left-most bit and a 0 in the next left most bit. In a class B address, the first two octets make up the network number and the two remaining octets make up the host ID.
- Class C addresses begin (starting from the left) with 1 1 0. In a class C address, the first three octets make up the network number and the last octet is the host ID.
- Class D addresses begin with 1 1 1 0. Class D addresses are used for multicasting. (There is also a class "E" address, which is reserved for future use.)

Table 43 Classes of IP addresses

IP Address:		Octet 1	Octet 2	Octet 3	Octet 4
Class A	0	Network number	Host ID	Host ID	Host ID
Class B	10	Network number	Network number	Host ID	Host ID
Class C	110	Network number	Network number	Network number	Host ID

Note: Host IDs of all zeros or all ones are not allowed.

Therefore:

A class C network (8 host bits) can have 2^8 –2 or 254 hosts.

A class B address (16 host bits) can have 2^{16} –2 or 65 534 hosts.

A class A address (24 host bits) can have 2^{24} –2 hosts (approximately 16 million hosts).

Since the first octet of a class A IP address must contain a 0, the first octet of a class A address can have a value of 0 to 127.

Similarly the first octet of a class B must begin with 10, therefore the first octet of a class B address has a valid range of 128 to 191. The first octet of a class C address begins with 110, and therefore has a range of 192 to 223.

Table 44 Allowed IP address range By class

Class	Allowed Range of First Octet (Binary)	Allowed Range of First Octet (decimal)
Class A	**0**0000000 to **0**1111111	0 to 127
Class B	**10**000000 to **10**111111	128 to 191
Class C	**110**00000 to **110**11111	192 to 223
Class D	**1110**0000 to **1110**1111	224 to 239

Subnet masks

A subnet mask is used to determine which bits are part of the network number, and which bits are part of the host ID (using a logical AND operation). A subnet mask contains 32 bits. If there is a 1 in the bit, then the corresponding bit of the IP address is part of the network number. If a bit in the subnet mask is 0 then the corresponding bit in the IP address is part of the host ID.

Subnet masks are expressed in dotted decimal notation just as IP addresses are. The natural masks for class A, B, and C IP addresses are as follows.

Table 45 Natural Masks

Class	Natural mask
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0

Subnetting

With subnetting, the class arrangement of an IP address is ignored. For example, a class C address no longer has to have 24 bits of network number and 8 bits of host ID. With subnetting, some of the host ID bits are converted into network number bits. By convention, subnet masks always consist of a continuous sequence of ones beginning from the left most bit of the mask, followed by a continuous sequence of zeros, for a total number of 32 bits.

Since the mask is always a continuous number of ones beginning from the left, followed by a continuous number of zeros for the remainder of the 32-bit mask, you can simply specify the number of ones instead of writing the value of each octet. This is usually specified by writing a / followed by the number of bits in the mask after the address.

For example, 192.1.1.0 /25 is equivalent to saying 192.1.1.0 with mask 255.255.255.128.

Table 46 shows all possible subnet masks for a class C address using both notations.

Table 46 Alternative Subnet Mask Notation

Subnet mask IP address	Subnet mask 1 Bits	Last octet bit value
255.255.255.0	/24	0000 0000
255.255.255.128	/25	1000 0000
255.255.255.192	/26	1100 0000
255.255.255.224	/27	1110 0000
255.255.255.240	/28	1111 0000
255.255.255.248	/29	1111 1000
255.255.255.252	/30	1111 1100

The first mask shown is the class C natural mask. Normally, if no mask is specified, it is understood that the natural mask is being used.

Example: two subnets

As an example, you have a class C address 192.168.1.0 with subnet mask of 255.255.255.0.

	Network number	Host ID
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	00000000
Subnet Mask	255.255.255.	0
Subnet Mask (Binary)	11111111.11111111.11111111.	00000000

The first three octets of the address make up the network number (class C). You want to have two separate networks.

Divide the network 192.168.1.0 into two separate subnets by converting one of the host ID bits of the IP address to a network number bit. The borrowed host ID bit can be either 0 or 1, thus giving two subnets; 192.168.1.0 with mask 255.255.255.128 and 192.168.1.128 with mask 255.255.255.128.

Note: In the following charts, shaded or bolded last-octet bit values indicate host ID bits borrowed to form network ID bits. The number of borrowed host ID bits determines the number of subnets you can have. The remaining number of host ID bits (after borrowing) determines the number of hosts you can have on each subnet.

Table 47 Subnet 1

	Network number	**Last Octet bit value**
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	**0**0000000
Subnet Mask	255.255.255.	128
Subnet Mask (Binary)	11111111.11111111.11111111.	**1**0000000
Subnet Address: 192.168.1.0	Lowest Host ID: 192.168.1.1	
Broadcast Address: 192.168.1.127	Highest Host ID: 192.168.1.126	

Table 48 Subnet 2

	Network number	**Last octet bit value**
IP Address	192.168.1.	128
IP Address (Binary)	11000000.10101000.00000001.	**1**0000000
Subnet Mask	255.255.255.	128
Subnet Mask (Binary)	11111111.11111111.11111111.	**1**0000000
Subnet Address: 192.168.1.128	Lowest Host ID: 192.168.1.129	
Broadcast Address: 192.168.1.255	Highest Host ID: 192.168.1.254	

The remaining 7 bits determine the number of hosts each subnet can have. Host IDs of all zeros represent the subnet itself and host IDs of all ones are the broadcast address for that subnet, so the actual number of hosts available on each subnet in the example above is $2^7 – 2$ or 126 hosts for each subnet.

192.168.1.0 with mask 255.255.255.128 is the subnet itself, and 192.168.1.127 with mask 255.255.255.128 is the directed broadcast address for the first subnet. Therefore, the lowest IP address that can be assigned to an actual host for the first subnet is 192.168.1.1 and the highest is 192.168.1.126. Similarly the host ID range for the second subnet is 192.168.1.129 to 192.168.1.254.

Example: four subnets

The above example illustrated using a 25-bit subnet mask to divide a class C address space into two subnets. Similarly to divide a class C address into four subnets, you need to borrow two host ID bits to give four possible combinations of 00, 01, 10 and 11. The subnet mask is 26 bits (11111111.11111111.11111111.**11**000000) or 255.255.255.192. Each subnet contains 6 host ID bits, giving 2^6-2 or 62 hosts for each subnet (all 0s is the subnet itself, all 1s is the broadcast address on the subnet).

Table 49 Subnet 1

	Network number	**Last octet bit value**
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	**00**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.0	Lowest Host ID: 192.168.1.1	
Broadcast Address: 192.168.1.63	Highest Host ID: 192.168.1.62	

Table 50 Subnet 2

	Network number	**Last octet bit value**
IP Address	192.168.1.	64
IP Address (Binary)	11000000.10101000.00000001.	**01**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.64	Lowest Host ID: 192.168.1.65	
Broadcast Address: 192.168.1.127	Highest Host ID: 192.168.1.126	

Table 51 Subnet 3

	Network number	Last Octet Bit Value
IP Address	192.168.1.	128
IP Address (Binary)	11000000.10101000.00000001.	**10**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.128	Lowest Host ID: 192.168.1.129	
Broadcast Address: 192.168.1.191	Highest Host ID: 192.168.1.190	

Table 52 Subnet 4

	Network number	Last Octet Bit Value
IP Address	192.168.1.	192
IP Address (Binary)	11000000.10101000.00000001.	**11**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.192	Lowest Host ID: 192.168.1.193	
Broadcast Address: 192.168.1.255	Highest Host ID: 192.168.1.254	

Example: eight subnets

Similarly, use a 27-bit mask to create 8 subnets (001, 010, 011, 100, 101, 110).

Table 53 shows class C IP address last-octet values for each subnet.

Table 53 Eight subnets

Subnet	Subnet Address	First Address	Last Address	Broadcast Address
1	0	1	30	31
2	32	33	62	63
3	64	65	94	95
4	96	97	126	127
5	128	129	158	159
6	160	161	190	191

Table 53 Eight subnets

Subnet	Subnet Address	First Address	Last Address	Broadcast Address
7	192	193	222	223
8	224	225	254	255

Table 54 is a summary for class C subnet planning.

Table 54 Class C subnet planning

No. Borrowed Host Bits	Subnet Mask	No. Subnets	No. Hosts per Subnet
1	255.255.255.128 (/25)	2	126
2	255.255.255.192 (/26)	4	62
3	255.255.255.224 (/27)	8	30
4	255.255.255.240 (/28)	16	14
5	255.255.255.248 (/29)	32	6
6	255.255.255.252 (/30)	64	2
7	255.255.255.254 (/31)	128	1

Subnetting with Class A and Class B networks.

For class A and class B addresses the subnet mask also determines which bits are part of the network number and which are part of the host ID.

A class B address has two host ID octets available for subnetting and a class A address has three host ID octets (see Table 43) available for subnetting.

Table 55 is a summary for class B subnet planning.

Table 55 Class B subnet planning

No. “Borrowed” Host Bits	Subnet Mask	No. Subnets	No. Hosts per Subnet
1	255.255.128.0 (/17)	2	32 766
2	255.255.192.0 (/18)	4	16 382
3	255.255.224.0 (/19)	8	8 190
4	255.255.240.0 (/20)	16	4 094

Table 55 Class B subnet planning

No. “Borrowed” Host Bits	Subnet Mask	No. Subnets	No. Hosts per Subnet
5	255.255.248.0 (/21)	32	2 046
6	255.255.252.0 (/22)	64	1 022
7	255.255.254.0 (/23)	128	510
8	255.255.255.0 (/24)	256	254
9	255.255.255.128 (/25)	512	126
10	255.255.255.192 (/26)	1 024	62
11	255.255.255.224 (/27)	2 048	30
12	255.255.255.240 (/28)	4 096	14
13	255.255.255.248 (/29)	8 192	6
14	255.255.255.252 (/30)	16 384	2
15	255.255.255.254 (/31)	32 768	1

Appendix G
Command Interpreter

The following describes how to use the command interpreter. Enter 24 in the main menu to bring up the system maintenance menu. Enter 8 to go to **Menu 24.8 - Command Interpreter Mode**. See the included disk or www.nortel.com for more detailed information on these commands.

➡ **Note:** Use of undocumented commands or misconfiguration can damage the unit and possibly render it unusable.

Command Syntax

- The command keywords are in `Courier New` font.
- Enter the command keywords exactly as shown. Do not abbreviate.
- The required fields in a command are enclosed in angle brackets <>.
- The optional fields in a command are enclosed in square brackets `[]`.
- The `|` symbol means or.

  For example,

  ```
  sys filter netbios config <type> <on|off>
  ```

  means that you must specify the type of netbios filter and whether to turn it on or off.

Command usage

A list of valid commands can be found by typing `help` or `?` at the command prompt. Always type the full command. Type `exit` to return to the SMT main menu when you are finished.

Sys commands

Table 56 lists and describes the system commands. Each of these commands must be preceded by `sys`. For example, type `sys stdio 60` to set the management session inactivity timeout to 60 minutes.

Table 56 Sys commands

Command			Description
atsh			Displays the MRD field.
callhist			
	display		Displays the call history.
	remove	<index>	Removes an entry from the call history.
client			
	name	[name]	Sets or displays the client logon name.
	password	[password]	Sets or displays the client logon password.
countrycode		[countrycode]	Sets or displays the country code.
datetime			
	date	[year month date]	Sets or displays the system's current date.
	time	[hour [min [sec]]]	Sets or displays the system time.
	period	[day]	Sets how often the BCM50a Integrated Router gets the date and time from the time server.
	sync		Gets the date and time from the time server.
domainname			Displays the domain name that the device sends to the LAN DHCP clients.
edit		<filename>	Edits the system preset text files such as autoexec.net.
feature			Displays a list of the device's major features.
firmware			Displays the ISDN firmware type.
firewall			See "Sys firewall commands" on page 268 for information about the system firewall commands.
hostname		[hostname]	Sets or displays the system name.

Table 56 Sys commands

Command			Description
logs			
	category		
		8021x	Records logs for IEEE 802.1X.
		access [0:none/1:log/2:alert/3:both]	Records, sends alerts, or both for access control logs.
		attack [0:none/1:log/2:alert/3:both]	Records, sends alerts, or both for firewall attack logs.
		cdr [0:none/1:log]	Records Call Detail Record logs.
		display	Displays the category settings.
		error [0:none/1:log/2:alert/3:both]	Records, sends alerts, or both for system error logs.
		icmp [0:none/1:log]	Records ICMP logs.
		ike [0:none/1:log/2:alert/3:both]	Records, sends alerts or both for access control logs.
		ipsec [0:none/1:log/2:alert/3:both]	Records the access control logs
		javablocked [0:none/1:log]	Records the java blocked logs.
		mten [0:none/1:log]	Records the system maintenance logs.
		packetfilter [0:none/1:log]	Records the packet filter logs.
		ppp [0:none/1:log]	Records the PPP logs.
		remote [0:none/1:log]	Records the remote management logs.
		tcpreset [0:none/1:log]	Records the TCP reset logs.
		upnp [0:none/1:log]	Records the UPnP logs.
		urlblocked [0:none/1:log/2:alert/3:both]	Records and/or sends alerts for web access blocked logs.
		urlforward [0:none/1:log]	Records web access forward logs.
	clear		Clears the log.
	display	[access|attack|error|ike|ipsec|javablocked|mten|packetfilter|pki|tcpreset|tls|upnp|urlblocked|urlforward]	Displays all logs or specifies a category of logs.
	errlog		
		clear	Clears the error log.

Table 56 Sys commands

Command			Description
		`disp`	Displays the error log.
		`online`	Turns the error log online display on or off.
	`load`		Loads the log settings buffer. Use this command before you configure the log settings. Use `sys logs save` after you configure the log settings.
	`mail`		
		`alertAddr [mail address]`	Sends alerts to this e-mail address.
		`clearLog [0:no/1:yes]`	Enables the switch to clear the log after sending logs via e-mail.
		`display`	Displays the logs and alerts mail settings.
		`logAddr [mail address]`	Sends logs to this e-mail address.
		`schedule display`	Displays the mail schedule.
		`schedule hour [0-23]`	Sets the hour to send logs.
		`schedule minute [0-59]`	Sets the minute to send the logs.
		`schedule policy [0:full/1:hourly/2:daily/3:weekly/4:none]`	Sets the mail schedule policy.
		`schedule week [0:sun/1:mon/2:tue/3:wed/4:thu/5:fri/6:sat]`	Sets the day of the week to send weekly logs.
		`server [domainName/IP]`	Sets the domain name or IP address of the mail server to which the logs are sent.
		`subject [mail subject]`	Sets the log e-mail’s subject.
		`auth`	Enables or disables SMTP authentication.
		`user`	Sets the SMTP authentication username.
		`passwd`	Sets the SMTP authentication password.
	`save`		Saves the log settings from the buffer.
	`syslog`		
		`active [0:no/1:yes]`	Enables or disables syslog logging.

Table 56 Sys commands

Command			Description
		display	Displays the syslog settings.
		facility [Local ID(1-7)]	Specifies the file to which the device logs the syslog messages.
		server [domainName/IP]	Specifies the IP address of the syslog server the syslogs are sent.
	consolidate		
		switch <0:on|1:off>	Turns log consolidation on or off.
		period	Sets the consolidation period (in seconds).
		msglist	Displays the consolidated messages.
	updateSvrIP	<minute>	Sets how often to resolve the mail and syslog server domain name to an IP address.
	switch		
		bmlog <0:no|1:yes>	Turns the broadcast or multicast log on or off.
		display	Displays switch settings.
		trilog <0:no|1:yes>	Turns triangle route logging on or off.
reboot		[0:cold boot/1: immediate reboot/2: bootModule debug mode]	Restarts the device.
stdio		[minute]	Sets or displays the management terminal idle timeout value.
tos			
	display		Shows all runtime Temporarily Open Sessions.
	debug		Turns TOS debug message on or off.
	listPerHost		Displays all hosts session counts.
	sessPerHost		Sets the session per host limit.
	timeout		
		display	Displays all TOS (Temporarily Open Session) timeout information.
		icmp	Sets the ICMP session idle timeout value.

Table 56 Sys commands

Command			Description
		igmp	Sets the IGMP session idle timeout value.
		tcpsyn	Sets the SYN TCP session idle timeout value.
		tcp	Sets the TCP session idle timeout value.
		tcpfin	Sets the TCP FIN session idle timeout value.
		udp	Sets the UDP-session idle-timeout value.
		gre	Sets the GRE-session idle-timeout value.
		esp	Sets the ESP-session idle-timeout value.
		ah	Sets the AH-session idle-timeout value.
		others	Sets the idle-timeout value for other sessions.
trcdisp		parse, brief, disp	Sets the level of detail that should be displayed. “parse” displays the most detail and “disp” displays the least.
trclog			
	switch	[on|off]	Enables or disables the system trace log or displays the current setting.
	online	[on|off]	Enables or disables the trace log onscreen display (for example, in the Telnet management window).
	level	[level]	Sets the level (1-10) of trace logs (1 shows the least) to display.
	type	<bitmap>	Uses hexadecimal characters to set the type of trace logs to record.
	disp		Shows the trace log.
	clear		Erases the trace log.
	call		Shows call events.
	encapmask	[mask]	Shows which type of encapsulation the trace log records, or sets the encapsulation if you specify the encapsulation’s hexadecimal character.

Table 56 Sys commands

Command			Description
trcpacket			Uses trace packets to capture parts of packets in order to see the packet flow from one interface to another.
	create	<entry> <size>	Creates a packet trace buffer.
	destroy		Removes the packet trace buffer.
	channel	<name> [none|incoming|outgoing|bothway]	Sets the packet trace direction for a given channel.
	string	[on|off]	Enables or disables the sending of a log to the trace packet buffer when configuration changes are made or displays the current setting if neither on/off is specified.
	switch	[on|off]	Enables or disables packet trace or displays the current setting if neither on nor off is specified.
	disp		Displays the trace packets.
	udp		Sends the trace packets to another system using UDP.
	udp switch	[on|off]	Enables or disables the sending of the trace packets to another system using UDP or displays the current setting.
	udp addr	<addr>	Sets the target IP address for sending trace packets using UDP.
	udp port	<port>	Sets the UDP port (should match that of the target IP address) for sending trace packets using UDP.
	parse	[[start_idx], end_idx]	Displays detailed packet details of the packet range specified.
	brief		Displays a brief listing of packet contents.
version			Displays the RAS code and driver versions.
view		<filename>	Displays the specified text file.
wdog			
	switch	[on|off]	Turns the watchdog firmware protection feature on or off.
	cnt	[value]	Sets (0-34 463) or displays the current watchdog count (in 1.6 sec units).

Table 56 Sys commands

Command			Description
romreset			Restores the factory default configuration file.
	server		Use these commands to configure remote server management.
		access <telnet|ftp|web|icmp|snmp|dns> <value>	Sets the server access type.
		load	Loads server information.
		disp	Displays server information.
		port <telnet|ftp|web|snmp> <port>	Sets the server port.
		save	Saves server information.
		secureip <telnet|ftp|web|icmp|snmp|dns> <ip>	Sets server secure IP address.
pwderrtm		[minute]	Sets or displays the password error blocking timeout value.
upnp			
	active	[0:no/1:yes]	Activates or deactivates the saved UPnP settings.
	config	[0:deny/1:permit]	Allows users to make configuration changes through UPnP.
	display		Displays UPnP information
	firewall	[0:deny/1:pass]	Allows UPnP to pass through the firewall.
	load		Saves UPnP information.
	reserve	[0:deny/1:permit]	
	save		Saves UPnP information.
m50Enable	[yes|no]		Turns Nortel's proprietary DHCP enhancement feature on or off.
socket			Displays the system socket's ID #, type, control block address (PCB), IP address and port number of peer device connected to the socket (Remote Socket) and task control block (Owner).
filter			
	netbios		

Table 56 Sys commands

Command			Description
		disp	Displays the current NetBIOS filter modes.
		config <0:Between LAN and WAN/ 3: IPSec Pass through/ 4: Trigger Dial> <on|off>	Sets NetBIOS filters.
ddns			
	debug	<level>	Enables or disables DDNS service.
	display	<iface name>	Displays DDNS information.
	restart		Restarts DDNS.
	logout		This command has no effect.
cpu			
	display		Displays the CPU utilization.

Exit Command

Table 57 Exit Command

Command	Description
exit	Ends the command interpreter session.

Ethernet Commands

Table 58 lists and describes the Ethernet commands. Each of these commands must be preceded by `ether`. For example, type `ether config` to display information on the LAN configuration.

Table 58 Ether Commands

Command			Description
config			Displays LAN configuration information.
driver			
	cnt		

Table 58 Ether Commands

Command			Description
		`disp <name>`	Displays the Ethernet driver counters.
	`status`	`<ch_name>`	Shows the LAN status.
`version`			Displays the Ethernet device type.
`edit`			
	`load`	`<1:LAN>`	Loads Ethernet (1:LAN) data from the System Parameters Table.
	`mtu`	`<value>`	Sets the Ethernet data Maximum Transmission Unit.
	`accessblock`	`<0:disable 1:enable>`	Blocks Internet access.
	`speed`	`<auto|10/half|10/full|100/half|100/full>`	Sets the Ethernet data speed and duplex.
	`save`		Saves Ethernet data to the System Parameters Table.
`dynamic Port`			
	`dump`		Displays the relationship between physical port and channel.
	`set`	`<port> <type>`	Sets physical port to a specific channel.
	`spt`		Displays channel setting stored in SPT.

IP commands

Table 59 lists and describes the IP commands. Each of these commands must be preceded by `ip`. For example, type `ip address` to display the host IP address.

Table 59 IP commands

Command			Description
`address`		`[addr]`	Displays the host IP address.
`alias`		`<iface>`	Sets an alias for the specified interface.
`aliasdis`		`<0|1>`	Disables or enables the alias for the specified interface.
`arp`			

Table 59   IP commands

Command			Description
	status	<iface>	Displays an interface's IP Address Resolution Protocol status.
	attpret	<on|off>	Allows or disallows the device to receive ARP from a different network or not.
	force	<on|off>	Enables or disables the ARP timeout function.
dhcp		<iface>	
	client		
		release	Releases the DHCP client IP address.
		renew	Renews the DHCP client IP address.
	status	[option]	Displays the DHCP status.
dns			
	query	address <ip address>	Displays the domain name of an IP address.
		name <host name>	Displays the IP address of a domain name.
	system		Configures the system DNS server settings.
		display	Shows the system DNS server settings.
		edit <0: first|1: second|2: third> <0:from ISP|1:usr-def|2:none> [IP address if choosing 1]	Configures the system DNS server settings.
	lan	edit <0: first|1: second|2: third> <0:from ISP|1:usr-def|2:DNS Relay|3: none> [IP address if choosing 1]	Configures the LAN DNS server settings.
		display	Shows the LAN DNS server settings.
httpd		debug [on|off]	Enables or disables the HTTP debug flag. This command currently does not work.
icmp			
	status		Displays the ICMP statistics counter.
	discovery	<iface> [on|off]	Sets the ICMP router discovery flag.

Table 59 IP commands

Command			Description
ifconfig		[iface] [ipaddr] [broadcast <addr> |mtu <value>|dynamic]	Configures a network interface.
ping		<hostid>	Pings a remote host.
route			
	status	[if]	Displays the routing table.
	add	<dest_addr|default>[/<bits>] <gateway> [<metric>]	Adds a route.
	addiface	<dest_addr|default>[/<bits>] <gateway> [<metric>]	Adds an entry to the routing table for the specified interface.
	addprivate	<dest_addr|default>[/<bits>] <gateway> [<metric>]	Adds a private route.
	drop	<host addr> [/ <bits>]	Drops a route.
status			Displays IP statistic counters.
udp			
	status		Displays the UDP status.
rip			These are the Routing Information Protocol commands.
	accept	<gateway>	Drops an entry from the RIP refuse list.
	activate		Enables RIP.
	merge	[on|off]	Sets the RIP merge flag.
	refuse	<gateway>	Adds an entry to the RIP refuse list.
	request	<addr> [port]	Sends a RIP request to the specified address and port.
	reverse	[on|off]	RIP Poisoned Reverse.
	status		Displays RIP statistic counters.
	trace		Enables the RIP debug trace.
	mode		

Table 59 IP commands

Command			Description
		`<iface> in [mode]`	Sets the BCM50a Integrated Router to use the RIP information it receives.
		`<iface> out [mode]`	Sets the BCM50a Integrated Router to broadcast its routing table.
	`dialin_user`	`[show|in|out|both |none]`	Shows the dial-in user RIP direction.
`tcp`	`status`		Displays the TCP statistic counters.
`telnet`		`<host> [port]`	Creates a Telnet connection to the specified host.
`tftp`			
	`support`		Displays whether or not TFTP is supported.
	`stats`		Displays the TFTP statistics.
`traceroute`		`<host> [ttl] [wait] [queries]`	Sends ICMP packets to trace the route of a remote host.
`xparent`	`join`	`<iface1> [<iface2>]`	Add iface2 to the iface1's group.
	`break`	`<iface>`	Remove the specified interface from the ipxparent group.
`urlfilter`			
	`enable`	`[0:no/1:yes]`	Enables or disables content filtering.
	`exemptZone`		
		`display`	Displays content filtering exempt zone information.
		`actionFlags [type(1-3)][enable/disable]`	Enables or disables content filtering exempt zone action flags that determine to which IP addresses content filtering applies.
		`add [ip1] [ip2]`	Sets a range of IP addresses to be in the exempt zone.
		`delete [ip1] [ip2]`	Removes a range of IP addresses from the exempt zone.
		`reset`	Returns the exempt zone settings to the previous configuration.
	`customize`		Uses the customize commands to configure content filtering for trusted Web sites, forbidden Web sites and keyword blocking.
		`display`	Displays the content filtering customize action flags.

Table 59 IP commands

Command			Description
		actionFlags [act(1-7)] [enable/disable]	Sets the content filtering customize action flags.
		logFlags [type(1-3)][enable/disable]	Sets the content filtering customize log flags.
		add [string] [trust/untrust/ keyword]	Adds a trusted Web site, forbidden Web site or keyword blocking string.
		delete [string] [trust/untrust/ keyword]	Deletes a trusted Web site, forbidden Web site or keyword blocking string.
		reset	Returns to the default configuration.
tredir			
	failcount	<count>	Sets the number of times that the device can ping the target without a response before forwarding traffic to the backup gateway.
	partner	<ipaddr>	Sets the traffic redirect backup gateway IP address.
	target	<ipaddr>	Sets the IP address that the device uses to test WAN accessibility.
	timeout	<timeout>	Sets the number of seconds the device waits for a response from the target.
	checktime	<period>	Sets the number of seconds the device waits between attempts to connect to the target.
	active	<on|off>	Enables or disables traffic redirect.
	save		Saves traffic redirect configuration.
	disp		Displays the traffic redirect configuration.
	debug	<value>	Sets the traffic redirect debug value.
rpt			
	active	[1:yes|0:no]	Enables or disables the reports.
	start		Starts recording reports data.
	stop		Stops recording reports data.
	url		Records the most visited Web sites.
	ip		Records the LAN IP addresses that sent and received the most traffic.

Table 59 IP commands

Command			Description
	srv		Records the most heavily used protocols or service ports.
stroute			
	display	[rule # | buf]	Displays the list of static routes or detailed information on a specified rule.
	load	<rule #>	Loads the specified static route rule into the buffer.
	save		Saves a rule from the buffer to the System Parameters Table.
	config		
		name <site name>	Sets the name for a static route.
		destination <dest addr>[/<bits>] <gateway> [<metric>]	Sets a static route’s destination IP address and gateway.
		mask <IP subnet mask>	Sets a static route’s subnet mask.
		gateway <IP address>	Sets a static route’s gateway IP address.
		metric <metric #>	Sets a static route’s metric number.
		private <yes|no>	Turns private mode on or off.
		active <yes|no>	Enables or disables a static route rule.
dropIcmp		[0|1]	Sets whether or not the device allows ICMP fragment packets.
igmp			
	debug	[level]	Sets IGMP debug level.
	forwardall	[on|off]	Activates or deactivates IGMP forwarding to all interfaces flag.
	querier	[on|off]	Turns on or off IGMP stop query flag.
	iface		
		<iface> grouptm <timeout>	Sets IGMP group timeout for the specified interface.
		<iface> interval <interval>	Sets IGMP query interval for the specified interface.
		<iface> join <group>	Adds an interface to a group.

Table 59 IP commands

Command			Description
		<iface> leave <group>	Removes an interface from a group.
		<iface> query	Sends an IGMP query on the specified interface.
		<iface> rsptime [time]	Sets the IGMP response time.
		<iface> start	Turns on IGMP on the specified interface.
		<iface> stop	Turns off IGMP on the specified interface.
		<iface> ttl <threshold>	Sets the IGMP Time To Live threshold.
		<iface> v1compat [on|off]	Turns on or off IGMP version 1 compatibility on the specified interface.
	robustness	<num>	Sets the IGMP robustness variable.
	status		Displays the IGMP status.
alg			
	display		Shows whether the Application Layer Gateway is enabled or disabled.
	siptimeout	<timeout in second> or 0 for no timeout	Sets the SIP timeout period.
	enable	<ALG_FTP|ALG_H323 |ALG_SIP>	Turns on the ALG.
	disable	<ALG_FTP|ALG_H323 |ALG_SIP>	Turns off the ALG.

IPSec commands

Table 60 lists and describes the IP Sec commands. Each of these commands must be preceded by `ipsec`. For example, type `ipsec display 3` to display the third IPSec rule, if you have it configured.

Table 60 IPSec commands

<table>
<tr><th colspan="3">Command</th><th>Description</th></tr>
<tr><td>debug</td><td>type</td><td><0:Disable | 1:Original on|off | 2:IKE on|off | 3: IPSec [SPI]|on|off | 4:XAUTHon|off | 5:CERT on|off | 6: All></td><td>Turns the trace for IPsec debug information on or off.</td></tr>
<tr><td></td><td>level</td><td><0:None | 1:User | 2:Low | 3:High></td><td>Sets the debug level. The higher the number, the more detailed.</td></tr>
<tr><td></td><td>display</td><td></td><td>Shows debugging information, including type and level.</td></tr>
<tr><td>switch</td><td><on|off></td><td></td><td>As long as there is one active IPSec rule, all packets go into the IPSec process to check against the SPD. When this switch is turned on, packets are not be put through the IPSec process, even if there are active IPSec rules.</td></tr>
<tr><td>timer</td><td></td><td></td><td></td></tr>
<tr><td></td><td>chk_conn.</td><td><0~255></td><td>Sets the idle timeout for IPSec connections. The system disconnects an IPSec connection with no traffic for the timeout period. The interval is in minutes (2 default) and 0 means the connection never times out.</td></tr>
<tr><td></td><td>dpdTime</td><td><minutes></td><td>Sets the idle timeout for IPSec connections where the BCM50a Integrated Router is waiting for a response from the peer.</td></tr>
<tr><td></td><td>update_peer</td><td><0~255></td><td>Sets the autotimer for updating IPSec rules that use a domain name as the secure gateway IP address. The interval is in minutes (30 default) and 0 means it never updates.</td></tr>
</table>

Table 60 IPSec commands

Command			Description
	chk_input	<0~255>	Adjusts autotimer to check if any inbound IPsec traffic has passed during the specified period. If not, the BCM50a Integrated Router disconnects the tunnel.
show_runtime	sa		Displays runtime phase 1 and phase 2 SA information.
	spd		When a dynamic rule accepts a request and a tunnel is established, a runtime SPD is created according to the peer's local IP address. This command displays these runtime SPDs.
updatePeerIp			Forces the system to immediately update IPSec rules that use a domain name as the secure gateway IP address.
display	<rule index>		Displays the specified IPSec rule.
policyDisplay	<rule index>		Displays the specified IPSec rule's IP policies.
dial	<rule index>	<policy index>	Triggers the specified phase two connection.
route	lan	<on|off>	After IPSec processes a packet and sends it to the LAN side, this switch controls whether or not IPSec can be applied to the packet again.
	wan	<on|off>	After IPSec processes a packet and sends it to the WAN side, this switch controls whether or not IPSec can be applied to the packet again.
load	<rule index>		Edit an IPSec branch office rule with the specified rule number.
save			Saves the IPSec branch office rule.
config			Uses these commands to configure the IPSec rule.
	name	<name>	Sets the name of the rule.
	active	<Yes|No>	Turns the rule on or off.
	negotiationMode	<0:Main | 1:Aggressive>	Sets the negotiation mode.
	natTraversal	<Yes|No>	Turns NAT traversal on or off.
	p1MultiPro	<Yes|No>	Turns phase 1 multiple proposal on or off.

Table 60 IPSec commands

Command			Description
	lcIdType	<0:IP | 1:DNS | 2:Email>	Sets the local ID type.
	lcIdContent	<content>	Sets the local ID content.
	myIpAddr	<IP address>	Sets the My IP Address.
	peerIdType	<0:IP | 1:DNS | 2:Email>	Sets the peer ID type.
	peerIdContent	<content>	Sets the peer ID content.
	secureGwAddr	<IP address | Domain name>	Sets the secure gateway address.
	authMethod	<0:PreSharedKey |1: RSASignature>	Sets the authentication method.
	certificate	<certificate name>	Specifies the certificate to use for authentication.
	preShareKey	<ASCII | 0xHEX>	Types 8 to 32 case-sensitive ASCII characters or 16 to 62 hexadecimal (0-9, A-F) characters (preceded by 0x (zero x), which is not counted as part of the 16 to 62 characters).
	p1EncryAlgo	<0:DES | 1:3DES | 2:AES>	Sets the phase 1 encryption algorithm.
	p1AuthAlgo	<0:MD5 | 1:SHA1>	Sets the phase 1 authentication algorithm.
	p1SaLifeTime	<seconds>	Sets the phase 1 SA lifetime.
	keyGroup	<0:DH1 | 1:DH2>	Sets the key group for phase 1 IKE setup.
	nailUp	<Yes|No>	Turns nailed up feature on or off.
	activeProtocol	<0:AH | 1:ESP>	Sets the protocol.
	p2MultiPro	<Yes|No>	Turns phase 2 multiple proposal on or off.
	p2EncryAlgo	<0:Null | 1:DES | 2:3DES | 3:AES>	Sets the phase 2 encryption algorithm.
	p2EncryKeyLen	<0:128 | 1:192 | 2:256>	Sets the phase 2 encryption key length (with AES encryption).
	p2AuthAlgo	<0:MD5 | 1:SHA1>	Sets the phase 2 authentication algorithm.
	p2SaLifeTime	<seconds>	Sets the phase 2 SA lifetime.

Table 60 IPSec commands

Command			Description
	encap	<0:Tunnel | 1:Transport>	Sets the encapsulation mode.
	pfs	<0:None | 1:DH1 | 2:DH2>	Sets Perfect Forward Secrecy.
	antiReplay	<Yes | No>	Turns replay detection on or off.
	connType	<0:Branch Office | 1:Contivity Client>	Specifies whether the rule is for a branch office or Contivity Client VPN connection.
	authOptions	<0:Username Password | 1:Group ID & Password	Sets the BCM50a Integrated Router to either send just the username and password to the remote Contivity IPSec router, or a group ID and password as well.
	onDemand	<on | off>	Sets whether or not outgoing packets can automatically trigger a VPN connection to the remote Contivity IPSec router.
	ODService	[netbios] [ntp] [none]...	Sets which specific services can automatically trigger a VPN connection to the remote Contivity IPSec router.
	groupID	<group ID>	Sets the Contivity Client tunnel's user's group ID.
	groupPasswd	<group password>	Sets the Contivity Client tunnel's user's group password.
	username	<name>	Sets the Contivity Client tunnel's user's username.
	password	<password>	Sets the Contivity Client tunnel's user's password.
	exUseMode	[enable|disable]	Turns the exclusive use mode for the Contivity Client tunnel on or off.
	exUseMac	[MAC address]	Specifies which MAC address is allowed to use the Contivity Client tunnel with exclusive use mode.
	clientFailOver	<IP address> <IP address> <IP address>	Sets the Contivity Client fail over IP addresses (of back up remote Contivity IPSec routers).
	keepAlive	<Yes|No>	Turns the Keep Alive feature on or off.
ikeList			Displays a summary of the IKE (phase 1) rules.

Table 60 IPSec commands

Command			Description
ikeDelete	<rule index>		Deletes the specified IPSec rule.
policyEdit	<rule index>		Edits the specified IP policy.
policySave			Saves the IP policy.
ipsecList			Displays a summary of the IPSec (phase 2) rules.
policyList			Displays the IP policies.
policyDelete	<rule index>		Deletes the specified IP policy.
policyConfig			Uses these commands to configure an IP policy for an IPSec office tunnel rule.
	saIndex	<rule index>	Binds the IP policy to an IPSec rule.
	active	<Yes|No>	Turns the IP policy on or off.
	lcAddrStart	<IP>	Sets the local starting IP address.
	protocol	<1:ICMP | 6:TCP | 17:UDP>	Sets the IP policy's protocol.
	controlPing	<Yes|No>	Turns control ping on or off.
	controlPingAddr	<IP>	Sets the control ping IP address.
	lcAddrType	<0:single | 1:range | 2:subnet>	Sets the local address type.
	lcAddrEndMask	<IP>	Sets the local ending IP address or subnet mask.
	lcPortStart	<port>	Sets the local starting port number.
	lcPortEnd	<port>	Sets the local ending port number.
	rmAddrType	<0:single | 1:range | 2:subnet>	Sets the remote address type.
	rmAddrStart	<IP>	Sets the remote starting IP address.
	rmAddrEndMask	<IP>	Sets the remote ending IP address or subnet mask.
	rmPortStart	<port>	Sets the remote starting port number.
	rmPortEnd	<port>	Sets the remote ending port number.
	btNatActive	<Yes | No>	Turns branch tunnel NAT address mapping on or off.

Table 60 IPSec commands

Command			Description
	btNatType	<0:single | 1:range | 2:all>	Sets the type of NAT address mapping.
	btNatAddrStart	<IP address>	Sets the branch tunnel NAT starting IP address.
	btNatArEnd	<IP address>	Sets the branch tunnel NAT ending IP address or subnet mask.
swSkipOverlapIP	<on|off>		Turn this option on to have the device allow rules with overlapping source and destination IP addresses.
adjTcpMss	<off|auto|user defined value>		Sets the adjust TCP Maximum Segment Size.
contivityDial			Initiates the Contivity Client VPN connection.
contivityDrop			Ends the Contivity Client VPN connection.
contivityState			Displays information about the Contivity Client VPN connection.
contivitySplit			
contivityTimecnt	<0~65535>		Sets the Contivity Client keep-alive interval (in seconds).
exemptHost			Uses the exemptHost commands to configure specific IP addresses that are not to be part of a VPN tunnel.
	display		Displays the exempt host settings.
	load <index>		Loads an exempt host.
	active <Yes|No>		Enables or disables an exempt host.
	sourceStart		Sets the exempt host’s source start IP address.
	sourceEnd		Sets the exempt host’s source end IP address.
	destStart	<IP address>	Sets the exempt host’s destination start IP address.
	destEnd	<IP address>	Sets the exempt host’s destination end IP address.
	save		Saves an exempt host.
btNatList			Displays the branch tunnel NAT entries.

Table 60 IPSec commands

Command			Description
clientTerm			
	load		Loads client termination configuration from ROM to working buffer, you must execute this command before configuring client termination.
	active	<yes | no>	Enables or disables client termination.
	display	[user | cfg]	Displays configuration and/or remote user logon status of client termination, unless a parameter is specified, displays all.
	save		Saves any client termination configuration changes to ROM.
	auth	local <on | off>	Enables or disables Local User Database authentication method.
		local psk <on | off>	Enables or disables the Pre-Shared Key authentication method for the Local User Database.
		radius <on | off>	Enables or disables the RADIUS Server authentication method.
		radius groupId	Configures Group ID fields for RADIUS Server authentication method.
		radius groupPwd	Configures Group Password fields for RADIUS Server authentication method.
		radius psk <on | off>	Enables or disables Pre-Shared Key authentication type for RADIUS Server.
	encr	<128AES_SHA1 | 3DES_SHA1 | 3DES_MD5 | DES_SHA1 | DES_MD5 | AH_SHA1 | AH_MD5> <on | off>	Enables or disables the specified encryption algorithm.
	DHG	<DES_DH1 | 3DES_DH2 | 128AES_DH5 > <on | off>	Enables or disables the specified Diffie-Hellman encryption level.
	aci	static <on | off>	Enables or disables the Use Static Address option.

Table 60 IPSec commands

Command			Description
		ipPool <index>	Select which IP pool, index is based on 1, and inactive IP pool cannot be selected.
	ipPool	load <index>	Before you configure an IP pool for client termination, you must load the specified IP pool. Currently 3 IP pools are supported, so the valid index is: 1~3
		save	After changing the IP pool configuration, use the save command to save the modification to the ROM.
		active	Enables or disables the loaded IP pool.
		poolName	Sets the IP pool’s name.
		startAddr	Sets the IP pool’s starting IP address.
		subnet	Sets the IP pool’s subnet.
		size	Sets the number of IP addresses in the IP pool.
		status	Displays the current runtime IP pool status of Client Termination.
	natt	active <yes | no>	Enables or disables NAT Traversal.
		portSwitch <enable | disable>	Enables or disables Client IKE Source Port Switching.
		portNum	Sets the NAT Traversal UDP port, valid UDP port: 1025 ~ 65535.
	failover	<1 | 2 | 3> <IP>	Sets the client failover IP address.
	keepalive	active <yes | no>	Enables or disables client failover tuning (keep-alive).
		interval <hh:mm:ss>	Sets the keep-alive interval, valid interval 00:00:10 ~ 23:59:59.
		maxRetrans	Sets the keep-alive max retransmissions, valid range 0~255
	pfs	<enable | disable>	Enables or disables Perfect Forward Secrecy.
	idleTo	<hh:mm:ss>	Sets the Idle Timeout, the valid value is: 00:00:00~23:59:59, 00:00:00 means no idle timeout.
	aicp	<on | off>	Enable or disables Accept Initial Contact Payload.

Table 60 IPSec commands

Command			Description
	rekeyTo	<hh:mm:ss>	Sets the lifetime of a single key used for data encryption.
	rekeyDc		Sets how much data you expect to transmit via the tunnel with a single key. A setting of 0 kb disables the Rekey Data Count, rekey data count must be more than 5.
	domain		Sets the domain name for client termination.
	dns	<primary | secondary> <IP>	Sets primary or secondary DNS server IP addresses to be assigned to remote users.
	wins	<primary | secondary> <IP>	Sets primary or secondary WINS server IP addresses to be assigned to remote users.
	banner	<on | off> [banner text]	Sets whether or not the banner appears when a remote user logs on to the gateway. Also sets the banner text if specified (up to 256 characters).
	password	clientStorage <on | off>	Sets whether or not the Contivity VPN clients can save their logon passwords instead of always having to manually enter them.
		manage <on | off>	Enables or disables the password management facilities, including maximum password age, minimum password length, and allow alpha-numeric passwords only.
		anpr <on | off>	Enables or disables the requirement of a alpha-numeric password.
		age <days>	Sets the maximum password age after which the login password expires, valid value: 0~180 days, and 0 means no expiration.
		minLen	Sets the minimum password length.

WAN Commands

The following chart lists and describes the `wan` commands. Each of these commands must be preceded by `wan` when you use them.

Table 61 WAN Commands

Command				Description
wan				
	adsl	bert		Displays ADSL ber.
		cellcnt		Displays the ADSL cell counter.
		chandata		Displays the ADSL operational mode (standard) and ADSL channel data, line rate.
		close		Closes the ADSL line.
		defbitmap		Displays ADSL defect bitmap status.
		dyinggasp		Sends ADSL dyinggasp.
		linedata	far	Shows ADSL far end noise margin and carrier load information.
			near	Shows ADSL near end noise margin and carrier load information.
		open		Opens the ADSL line.
		opencmd		Opens ADSL line with a specific standard.
		opmode		Shows the ADSL operational mode (standard).
		perfdata		Shows performance information such as the CRC,FEC, error seconds.
		reset		Resets the ADSL modem, and must reload the modem code again.
		status		Displays ADSL status (ex: up, down or wait for init).
		version		Shows the ADSL firmware version.
	atm			
		vchunt		

Table 61 WAN Commands (continued)

Command				Description
			`Add <remoteNodeIndex> <vpi> <vci>`	Adds an entry to the hunting pool. <remote node> : input the remote node index 1-8 <vpi> : vpi value <vci> : vci value Need to save after this command.
			`Remove <removeNodeId> <vpi> <vci>`	Sets remote node ID and VPI, VCI value to remove the specific entry. System will save automatically.
			`Active <yes|no>`	Enables/disables VC auto hunting feature.
			`display`	Displays the hunt pool.
			`Clear`	Clears the configuration.
			`Save`	Saves current setting to the ROM file.
			`timer`	Sets the waiting time before checking the hunting table result.
			`Send`	Sends VC hunt pattern again.
	`hwsar`			Displays hwsar packets incoming/outgoing information.
		`driver`		
			`Oamloopback [VPI] [VCI] [F5] [endToEnd] [funcType]`	Oam loopback function.

Sys firewall commands

Table 62 lists and describes the system firewall commands. Each of these commands must be preceded by `sys firewall`. For example, type `sys firewall active yes` to turn on the firewall.

Table 62 Sys firewall commands

Command		Description
acl		
	disp	Displays ACLs or a specific ACL set # and rule #.
active	<yes|no>	Activates or deactivates firewall Enables or disables the firewall.
cnt		
	disp	Displays the firewall log type and count.
	clear	Clears the firewall log count.
dynamicrule	display	Displays the firewall's dynamic rules.
tcprst		
	rst	Turns TCP reset sending on or off.
	rst113	Turns TCP reset sending for port 113 on or off.
	display	Displays the TCP reset sending settings.
dos		
	smtp	Enables or disables the SMTP DoS defender.
	display	Displays the SMTP DoS defender setting.
	ignore	Sets if the firewall ignores DoS attacks on the LAN or WAN.
ignore		
	dos	Sets if the firewall ignores DoS attacks on the LAN or WAN.
	logBroadcast	Displays the status of the broadcast log.
	triangle	Sets if the firewall ignores triangle route packets on the LAN or WAN.

Bandwidth management commands

Table 63 lists and describes the bandwidth management commands. Each of these commands must be preceded by bm. For example, type bm show lan to display the LAN port’s bandwidth management settings.

Table 63 Bandwidth management commands

Command					Description
interface	lan	enable	<bandwidth xxx>		Enables bandwidth management (BWM) for traffic going out the LAN interface. You can also specify the b/s of bandwidth.
			<wrr|prr>		Sets the queueing mechanism to fairness-based (WRR) or priority-based (PRR).
			<efficient>		Turns on the work-conserving feature.
		disable			Disables bandwidth management for traffic going out the LAN interface.
	wan	enable	<bandwidth xxx>		Enables bandwidth management for traffic going out the WAN interface. You can also specify the b/s of bandwidth.
			<wrr|prr>		Sets the queueing mechanism to fairness-based (WRR) or priority-based (PRR).
			<efficient>		Turns on the work-conserving feature.
		disable			Disables bandwidth management for traffic going out the WAN interface.
class	lan	add #	bandwidth xxx	<name xxx>	Adds a class with bandwidth xxx b/s in LAN. The name is for your information.
				<priority x>	Sets the class priority. The range is between 0 (the lowest) to 7 (the highest).

Table 63 Bandwidth management commands

Command					Description
				<borrow on|off>	The class can borrow bandwidth from its parent class when borrowing is turned on, and vice versa.
		del #			Deletes the class # and its filter and all its children classes and their filters in LAN.
		mod #	<bandwidth xxx>		Modifies the parameters of the class in the LAN. A bandwidth value is optional.
			<name xxx>		Sets the class name.
			<priority x>		Sets the class priority. The range is between 0 (the lowest) to 7 (the highest). The priority is unchanged if you do not set a new value.
			<borrow on|off>		The class can borrow bandwidth from its parent class when borrowing is turned on, and vice versa.
	wan	add #	bandwidth xxx	<name xxx>	Adds a class with bandwidth xxx b/s in WAN. The name is for your information.
				<priority x>	Sets the class priority. The range is between 0 (the lowest) to 7 (the highest).
				<borrow on|off>	The class can borrow bandwidth from its parent class when borrowing is turned on, and vice versa.
		del #			Deletes the class # and its filter and all its children class and their filters in WAN.
		mod #	<bandwidth xxx>		Modifies the parameters of the class in the WAN. A bandwidth value is optional.
			<name xxx>		Sets the class name.
			<priority x>		Sets the class priority. The range is between 0 (the lowest) to 7 (the highest).

Table 63 Bandwidth management commands

Command					Description
			`<borrow on|off>`		The class can borrow bandwidth from its parent class when borrowing is turned on, and vice versa.
`filter`	`lan`	`add #`	`Daddr <mask Dmask> Dport Saddr <mask Smask> Sport protocol`		Adds a filter for class # in LAN. The filter contains destination address (netmask), destination port, source address (netmask), source port and protocol. Use 0 for items that you do not want the filter to include.
		`del #`			Deletes the LAN filter that belongs to the specified LAN class.
	`wan`	`add #`	`Daddr <mask Dmask> Dport Saddr <mask Smask> Sport protocol`		Adds a filter for class # in WAN. The filter contains destination address (netmask), destination port, source address (netmask), source port and protocol. Use 0 for items that you do not want the filter to include.
		`del #`			Deletes the LAN filter that belongs to the specified WAN class.
`show`	`interface`	`lan`			Displays the LAN interface settings.
		`wan`			Displays the WAN interface settings.
	`class`	`lan`			Displays the LAN classes.
		`wan`			Displays the WAN classes.
	`filter`	`lan`			Displays the LAN filter settings.
		`wan`			Displays the WAN filter settings.
	`statistics`	`lan`			Displays the statistics of the LAN classes.
		`wan`			Displays the statistics of the LAN classes.

Table 63 Bandwidth management commands

Command					Description
monitor	lan	<#>			Displays the bandwidth usage of the specified LAN class (or all of the LAN classes if you do not specify one). The first time you use the command turns it on; the second time turns it off, and so on.
	wan	<#>			Displays the bandwidth usage of the specified WAN class (or all of the WAN classes if you do not specify one). The first time you use the command turns it on; the second time turns it off, and so on.
moveFilter	< channName>	<from>	<to>		Changes the filter order. <channName>: LAN, WAN <from>: filter index number <to>: filter index number
config	save				Saves the BWM configuration.
	load				Loads the BWM configuration.
	clear				Clears the BWM configuration.

Certificates commands

Table 64 describes the certificate commands. Each of these commands must be preceded by `certificates` (or `cert` for short). For example, type `cert my_cert list` to display all of your certificate names and basic information.

All of these commands start with `certificates`.

Table 64 Certificates commands

Command		Description
my_cert		
	create	

Table 64 Certificates commands

Command			Description
	create	selfsigned <name> <subject> [key size]	Creates a self-signed local host certificate. <name> specifies a descriptive name for the generated certificate. <subject> specifies a subject name (required) and alternative name (required). The format is “subject-name-dn;{ip,dns,email}=value". If the name contains spaces, put it in quotes. [key size] specifies the key size. It has to be an integer from 512 to 2 048. The default is 1 024 bits.
	create	request <name> <subject> [key size]	Creates a certificate request and saves it to the router for later manual enrollment. <name> specifies a descriptive name for the generated certification request. <subject> specifies a subject name (required) and alternative name (required). The format is "subject-name-dn;{ip,dns,email}=value". If the name contains spaces, put it in quotes. [key size] specifies the key size. It has to be an integer from 512 to 2 048. The default is 1 024 bits.
	create	scep_enroll <name> <CA addr> <CA cert> <auth key> <subject> [key size]	Creates a certificate request and enrolls for a certificate immediately online using SCEP protocol. <name> specifies a descriptive name for the enrolled certificate. <CA addr> specifies the CA server address. <CA cert> specifies the name of the CA certificate. <auth key> specifies the key used for user authentication. If the key contains spaces, put it in quotes. To leave it blank, type "". <subject> specifies a subject name (required) and alternative name (required). The format is "subject-name-dn;{ip,dns,email}=value". If the name contains spaces, put it in quotes. [key size] specifies the key size. It has to be an integer from 512 to 2 048. The default is 1 024 bits.

Table 64 Certificates commands

Command			Description
	create	cmp_enroll <name> <CA addr> <CA cert> <auth key> <subject> [key size]	Creates a certificate request and enrolls for a certificate immediately online using CMP protocol. <name> specifies a descriptive name for the enrolled certificate. <CA addr> specifies the CA server address. <CA cert> specifies the name of the CA certificate. <auth key> specifies the id and key used for user authentication. The format is "id:key". To leave the id and key blank, type ":". <subject> specifies a subject name (required) and alternative name (required). The format is "subject-name-dn;{ip,dns,email}=value". If the name contains spaces, put it in quotes. [key size] specifies the key size. It has to be an integer from 512 to 2 048. The default is 1 024 bits.
	import	[name]	Imports the PEM-encoded certificate from stdin. [name] specifies the descriptive name (optional) the imported certificate is saved as. For my certificate importation to be successful, a certification request corresponding to the imported certificate must already exist on BCM50a Integrated Router. After the importation, the certification request is automatically deleted. If a descriptive name is not specified for the imported certificate, the certificate adopts the descriptive name of the certification request.
	export	<name>	Exports the PEM-encoded certificate to stdout for theuser to copy and paste. <name> specifies the name of the certificate to be exported.
	view	<name>	Views the information of the specified local host certificate. <name> specifies the name of the certificate to be viewed.
	verify	<name> [timeout]	Verifies the certification path of the specified local host certificate. <name> specifies the name of the certificate to be verified. [timeout] specifies the timeout value in seconds (optional). The default timeout value is 20 seconds.
	delete	<name>	Deletes the specified local host certificate. <name> specifies the name of the certificate to be deleted.
	list		Lists all my certificate names and basic information.

Table 64 Certificates commands

Command			Description
	rename	<old name> <new name>	Renames the specified certificate. <old name> specifies the name of the certificate to be renamed. <new name> specifies the new name the certificate is saved as.
	def_self_signed	[name]	Sets the specified self-signed certificate as the default self-signed certificate. [name] specifies the name of the certificate to be set as the default self-signed certificate. If [name] is not specified, the name of the current self-signed certificate is displayed.
	replace_factory		Creates a certificate using your device MAC address that is specific to this device. The factory default certificate is a common default certificate for all BCM50a Integrated Router models.
ca_trusted			
	import	<name>	Imports the PEM-encoded certificate from stdin. <name> specifies the name the imported CA certificate is saved as.
	export	<name>	Exports the PEM-encoded certificate to stdout for the user to copy and paste. <name> specifies the name of the certificate to be exported.
	view	<name>	Views the information of the specified trusted CA certificate. <name> specifies the name of the certificate to be viewed.
	verify	<name> [timeout]	Verifies the certification path of the specified trusted CA certificate. <name> specifies the name of the certificate to be verified. [timeout] specifies the timeout value in seconds (optional). The default timeout value is 20 seconds.
	delete	<name>	Deletes the specified trusted CA certificate. <name> specifies the name of the certificate to be deleted.
	list		Lists all trusted CA certificate names and basic information.
	rename	<old name> <new name>	Renames the specified trusted CA certificate. <old name> specifies the name of the certificate to be renamed. <new name> specifies the new name the certificate is saved as.

Table 64 Certificates commands

Command			Description
	crl_issuer	<name> [on|off]	Specifies whether or not the specified CA issues CRL. <name> specifies the name of the CA certificate. [on|off] specifies whether or not the CA issues CRL. If [on|off] is not specified, the current crl_issuer status of the CA is used.
remote_trusted			
	import	<name>	Imports the PEM-encoded certificate from stdin. <name> specifies the name the imported remote host certificate is saved as.
	export	<name>	Exports the PEM-encoded certificate to stdout for the user to copy and paste. <name> specifies the name of the certificate to be exported.
	view	<name>	Views the information of the specified trusted remote host certificate. <name> specifies the name of the certificate to be viewed.
	verify	<name> [timeout]	Verifies the certification path of the specified trusted remote host certificate. <name> specifies the name of the certificate to be verified. [timeout] specifies the timeout value in seconds (optional). The default timeout value is 20 seconds.
	delete	<name>	Deletes the specified trusted remote host certificate. <name> specifies the name of the certificate to be deleted.
	list		Lists all trusted remote host certificate names and basic information.
	rename	<old name> <new name>	Renames the specified trusted remote host certificate. <old name> specifies the name of the certificate to be renamed. <new name> specifies the new name the certificate is saved as.
dir_server			

Table 64 Certificates commands

Command			Description
	add	<name> <addr[:port]> [login:pswd]	Adds a new directory service. <name> specifies a descriptive name for the directory server. <addr[:port]> specifies the server address (required) and port (optional). The format is "server-address[:port]". The default port is 389. [login:pswd] specifies the logon name and password, if required. The format is "[login:password]".
	delete	<name>	Deletes the specified directory service. <name> specifies the name of the directory server to be deleted.
	view	<name>	Views the specified directory service. <name> specifies the name of the directory server to be viewed.
	list		Lists all directory service names and basic information.
	rename	<old name> <new name>	Renames the specified directory service. <old name> specifies the name of the directory server to be renamed. <new name> specifies the new name the directory server is saved as.
	edit	<name> <addr[:port]> [login:pswd]	Edits the specified directory service. <name> specifies the name of the directory server to be edited. <addr[:port]> specifies the server address (required) and port (optional). The format is "server-address[:port]". The default port is 389. [login:pswd] specifies the logon name and password, if required. The format is "[login:password]".

Appendix H
NetBIOS filter commands

The following describes the NetBIOS packet filter commands.

Introduction

NetBIOS (Network Basic Input/Output System) are TCP or UDP packets that enable a computer to connect to and communicate with a LAN.

For some dial-up services, such as PPPoE or PPPoA, NetBIOS packets cause unwanted calls.

You can configure NetBIOS filters to do the following:

- Allow or disallow the sending of NetBIOS packets from the LAN to the WAN and from the WAN to the LAN.
- Allow or disallow the sending of NetBIOS packets through VPN connections.
- Allow or disallow NetBIOS packets to initiate calls.

Display NetBIOS filter settings

Figure 135 NetBIOS Display Filter Settings Command Example

```
============== NetBIOS Filter Status ===============
        Between LAN and WAN: Block
        IPSec Packets: Forward
        Trigger Dial: Disabled
```

Syntax:

```
sys filter netbios disp
```

This command gives a read-only list of the current NetBIOS filter modes.

The filter types and their default settings are as follows:

Table 65 NetBIOS filter default settings

Name	Description	Example
`Between LAN and WAN`	This field displays whether NetBIOS packets are blocked or forwarded from the LAN to the WAN or from the WAN to the LAN.	Forward
`IPSec Packets`	This field displays whether NetBIOS packets sent through a VPN connection are blocked or forwarded.	Forward
`Trigger dial`	This field displays whether NetBIOS packets are allowed to initiate calls. Disabled means that NetBIOS packets are blocked from initiating calls.	Disabled

NetBIOS filter configuration

Syntax:

```
sys filter netbios config <type> <on|off>
```

where

<type> identifies which NetBIOS filter (numbered 0-3) to configure.

- 0 = LAN to WAN and WAN to LAN
- 3 = IPSec packet pass through

<on|off> is a switch to enable or disable the filter.

- For type 0, use on to enable the filter and block NetBIOS packets. Use off to disable the filter and forward NetBIOS packets.
- For type 3, use on to block NetBIOS packets from being sent through a VPN connection. Use off to allow NetBIOS packets to be sent through a VPN connection.

Example commands

Command:

```
sys filter netbios config 0 on
```

This command blocks LAN to WAN and WAN to LAN NetBIOS packets

Command:

```
sys filter netbios config 1 off
```

This command forwards WAN to LAN and WAN to LAN NetBIOS packets

Command:

```
sys filter netbios config 3 on
```

This command blocks IPSec NetBIOS packets

Command:

```
sys filter netbios config 4 off
```

This command stops NetBIOS commands from initiating calls.

Appendix I
Enhanced DHCP option commands

The following describes the DHCP option commands.

Enhanced DHCP option commands introduction

The enhanced DHCP feature allows you to use DHCP option commands to add site-specific options to the DHCP server's offer messages.

Specifying the Nortel BCM50 IP address

Syntax:

```
ip dhcp <interface> server m50ipreserve [ [ip <IP address>] | [index <index
of pool>] ]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN interface (enif0).
`[ip <IP address>]`	This is the IP address that you want to assign to the Nortel BCM50.
`[index <index of pool>]`	This is the number of an IP address in the BCM50a Integrated Router's DHCP server address pool (like one or five) that you want to assign to the Nortel BCM50. For example, you would type "2" to assign the second IP address of the DHCP server pool to the Nortel BCM50.

Use this command to specify the IP address that the BCM50a Integrated Router is to assign to the BCM50.

The following example sets the BCM50a Integrated Router to assign an IP address of 11.12.13.10 to the Nortel BCM50.

ip dhcp <interface> server m50ipreserve ip 11.12.13.10

Nortel BCM50 DHCP server options

Use these commands to add site-specific options to the DHCP server's offer messages that it sends to the BCM50.

BCM50 DHCP server settings

Syntax:

```
ip dhcp <interface> server m50dhcpmode [0:disable | 1:IP phones only | 2:All
devices | 3:automatic] [<range start>-<range end>]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN interface (enif0).

`[0:disable | 1:IP phones only | 2:All devices | 3:automatic]`	This is the Nortel BCM50 DHCP server setting. “0” disables the DHCP server. “1” enables the DHCP server for IP phones. “2” enables the DHCP server for all devices that send DHCP requests. “3” enables the DHCP server. The BCM50 automatically determines whether to assign IP addresses to IP phones or any device that sends a DHCP request.
`[<range start>-<range end>]`	This is the range of IP addresses that the DHCP server will assign when enabled. You can type the full IP addresses or just the last parts. If you type part of an IP address, the BCM50a Integrated Router combines it with the IP address assigned to the BCM50 customer LAN interface to form a range of IP addresses that are on the same subnet as the BCM50 customer LAN interface. For example, the BCM50a Integrated Router assigns the BCM50 an IP address of 11.12.13.1 with 255.255.0.0 as the subnet mask. If you want to have the BCM50 assign IP addresses to IP phones from an IP address pool of 11.12.13.10 to 11.12.13.20, you could type the command as follows: ip dhcp enif0 server m50dhcpmode 1 11.12.13.10-11.12.13.20 or abbreviate the IP addresses like one of the following: ip dhcp enif0 server m50dhcpmode 1 12.13.10-12.13.20 ip dhcp enif0 server m50dhcpmode 1 13.10-13.20 ip dhcp enif0 server m50dhcpmode 1 10-20

Use this command to configure the Nortel BCM50 DHCP server’s settings.

BCM50 IP sets override setting

Syntax:

```
ip dhcp <interface> server overrideipsetinfo [0|1]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN interface (enif0).
`[0|1]`	Use “1” to have the Nortel BCM50 assign VoIP server (DHCP option 128) and VLAN (DHCP option 191) settings to Nortel’s IP Telephone 2004. Use “0” to not have the Nortel BCM50 assign VoIP server and VLAN settings to Nortel’s IP Telephone 2004.

Use this command to set the Nortel BCM50 DHCP to assign VoIP server and VLAN settings to Nortel’s IP Telephone 2004. You must also configure the VoIP server and VLAN settings assignment, see the “Nortel i2004 IP phone options section.

This command sets DHCP option 192.

Nortel i2004 IP phone options

Use these commands to add site-specific options to the DHCP server’s offer messages that it sends to Nortel’s i2004 IP telephone.

VoIP server settings assignment

Syntax:

```
ip dhcp <interface> server voipserver [id: 1|2] [server IP] [port (1~65535)]
[retry count (0~255)]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN interface (enif0).
`[id: 1|2]`	This identifies whether this configuration is for assigning information about the first or second VoIP server.
`[server IP]`	This is the IP address of the VoIP server in dotted decimal format.

`[port (1~65535)]`	This is the VoIP server's listening port (1~65535).
`[retry count (0~255)]`	This sets the number of times (0-255) the i2004 can attempt to connect to this VoIP server (without a response), before trying to connect to the other server.

Use this command to assign VoIP server information to Nortel's i2004 VoIP telephones.

This command sets DHCP option 128.

The following example commands set the BCM50a Integrated Router to assign information for two VoIP servers. The first command sets it to assign the first VoIP server's IP address (11.12.13.7), port number (7001) and retry count (three) to Nortel's i2004 VoIP telephones.

ip dhcp enif0 server voipserver 1 11.12.13.7 7001 3

This next command sets the BCM50a Integrated Router to assign the second VoIP server's IP address (11.12.13.8), port number (7002) and retry count (2) to Nortel's i2004 VoIP telephones.

ip dhcp enif0 server voipserver 2 11.12.13.8 7002 2

The BCM50a Integrated Router sends the VoIP server information for both servers when it receives a DHCP request from Nortel's i2004 VoIP telephones.

VLAN ID assignment

Syntax:

```
ip dhcp <interface> server vlanid [none | <vlan id1> [<vlan id2> <vlan
id10>]]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN Ethernet interface (enif0).
`[none	<vlan id1> [<vlan id2> <vlan id10>]]`	Virtual LANs use identifiers called VLAN IDs. This specifies the VLAN IDs (if any) to assign to the VoIP telephones. You can specify up to 10 VLAN IDs. Each VLAN ID must be a number from 0 to 4095. Use "none" if you do not want the DHCP server to automatically assign VLAN IDs to the VoIP telephones.

Use this command to assign VLAN IDs to IP Telephone 2004.

This command sets DHCP option 191.

The following example sets the BCM50a Integrated Router to assign a VLAN ID of five to VoIP telephones.

ip dhcp enif0 server vlanid 5

Nortel WLAN handsets 2210 & 2211 phone options

Nortel's WLAN Handsets 2210 & 2211 phones require the same options as the IP Phone 2004. In addition, use the commands in this section to add other site-specific options to the to the DHCP server's offer messages that it sends to Nortel WLAN Handsets 2210 & 2211.

TFTP server IP address assignment

Syntax:

```
ip dhcp <interface> server tftpserver [none | <serverIP>]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN interface (enif0).
`none | <serverIP>`	Specify the address of a TFTP server for the Nortel WLAN Handsets 2210 & 2211. Use “none” if you do not want the DHCP server to automatically assign the IP address of a TFTP server for the Nortel WLAN Handsets 2210 & 2211.

Use this command to assign a TFTP server IP address to Nortel WLAN Handsets 2210 & 2211s.

The following example sets the BCM50a Integrated Router to assign a TFTP server IP address of 11.12.13.15 to WLAN Handsets 2210 & 2211.

```
ip dhcp <interface> server tftpserver 11.12.13.15
```

WLAN IP Telephony Manager IP Address Assignment

Syntax:

```
ip dhcp <interface> server wlantelmanager [none |<serverIP>]
```

where:

`<interface>`	Specify an interface on the device. Currently you can use this command with the LAN interface (enif0).
`none | <serverIP>`	Specify the address of a WLAN Telephony Manager 2245 for the Nortel WLAN Handsets 2210 & 2211. Use “none” if you do not want the DHCP server to automatically assign the IP address of a WLAN Telephony Manager 2245 for the Nortel WLAN Handsets 2210 & 2211.

Use this command to assign a WLAN Telephony Manager 2245 IP address to WLAN Handsets 2210 & 2211.

This command sets DHCP option 151.

The following example sets the BCM50a Integrated Router to assign a WLAN Telephony Manager 2245 IP address of 11.12.13.16 to WLAN Handsets 2210 & 2211.

```
ip dhcp <interface> server wlantelmanager 11.12.13.16
```

Appendix J
Log descriptions

This appendix provides descriptions of log messages.

Table 66 System error logs

Log Message	Description
`%s exceeds the max. number of session per host!`	This attempt to create a SUA/NAT session exceeds the maximum number of SUA/NAT session table entries allowed to be created per host.

Table 67 System maintenance logs

Log Message	Description
`Time calibration is successful`	The router has adjusted its time based on information from the time server.
`Time calibration failed`	The router failed to get information from the time server.
`DHCP client gets %s`	A DHCP client got a new IP address from the DHCP server.
`DHCP client IP expired`	A DHCP client's IP address has expired.
`DHCP server assigns %s`	The DHCP server assigned an IP address to a client.
`SMT Login Successfully`	Someone has logged on to the router's SMT interface.
`SMT Login Fail`	Someone has failed to log on to the router's SMT interface.
`WEB Login Successfully`	Someone has logged on to the router's WebGUI interface.
`WEB Login Fail`	Someone has failed to log on to the router's WebGUI interface.
`TELNET Login Successfully`	Someone has logged on to the router via Telnet.

Table 67 System maintenance logs

Log Message	Description
`TELNET Login Fail`	Someone has failed to log on to the router via Telnet.
`FTP Login Successfully`	Someone has logged on to the router via FTP.
`FTP Login Fail`	Someone has failed to log on to the router via FTP.
`NAT Session Table is Full!`	The maximum number of SUA/NAT session table entries has been exceeded and the table is full.

Table 68 UPnP logs

Log Message	Description
`UPnP pass through Firewall`	UPnP packets can pass through the firewall.

Table 69 Content filtering logs

Category	Log Message	Description
`URLFOR`	`IP/Domain Name`	The BCM50a Integrated Router allows access to this IP address or domain name and forwards traffic to the IP address or domain name.
`URLBLK`	`IP/Domain Name`	The BCM50a Integrated Router blocked access to this IP address or domain name due to a forbidden keyword. All web traffic is disabled except for trusted domains, untrusted domains, or the cybernot list.
`JAVBLK`	`IP/Domain Name`	The BCM50a Integrated Router blocked access to this IP address or domain name because of a forbidden service, such as: ActiveX, a Java applet, a cookie, or a proxy.

Table 70 Attack logs

Log Message	Description
`attack TCP`	The firewall detected a TCP attack.
`attack UDP`	The firewall detected an UDP attack.
`attack IGMP`	The firewall detected an IGMP attack.
`attack ESP`	The firewall detected an ESP attack.
`attack GRE`	The firewall detected a GRE attack.
`attack OSPF`	The firewall detected an OSPF attack.
`attack ICMP (type:%d, code:%d)`	The firewall detected an ICMP attack; see the section on ICMP messages for type and code details.
`land TCP`	The firewall detected a TCP land attack.
`land UDP`	The firewall detected an UDP land attack.
`land IGMP`	The firewall detected an IGMP land attack.
`land ESP`	The firewall detected an ESP land attack.
`land GRE`	The firewall detected a GRE land attack.
`land OSPF`	The firewall detected an OSPF land attack.
`land ICMP (type:%d, code:%d)`	The firewall detected an ICMP land attack; see the section on ICMP messages for type and code details.
`ip spoofing - WAN TCP`	The firewall detected a TCP IP spoofing attack on the WAN port.
`ip spoofing - WAN UDP`	The firewall detected an UDP IP spoofing attack on the WAN port.
`ip spoofing - WAN IGMP`	The firewall detected an IGMP IP spoofing attack on the WAN port.
`ip spoofing - WAN ESP`	The firewall detected an ESP IP spoofing attack on the WAN port.
`ip spoofing - WAN GRE`	The firewall detected a GRE IP spoofing attack on the WAN port.
`ip spoofing - WAN OSPF`	The firewall detected an OSPF IP spoofing attack on the WAN port.
`ip spoofing - WAN ICMP (type:%d, code:%d)`	The firewall detected an ICMP IP spoofing attack on the WAN port.
`icmp echo ICMP (type:%d, code:%d)`	The firewall detected an ICMP echo attack.
`syn flood TCP`	The firewall detected a TCP syn flood attack.
`ports scan TCP`	The firewall detected a TCP port scan attack.

Table 70 Attack logs

Log Message	Description
`teardrop TCP`	The firewall detected a TCP teardrop attack.
`teardrop UDP`	The firewall detected an UDP teardrop attack.
`teardrop ICMP (type:%d, code:%d)`	The firewall detected an ICMP teardrop attack.
`illegal command TCP`	The firewall detected a TCP illegal command attack.
`NetBIOS TCP`	The firewall detected a TCP NetBIOS attack.
`ip spoofing - no routing entry TCP`	The firewall detected a TCP IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`ip spoofing - no routing entry UDP`	The firewall detected an UDP IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`ip spoofing - no routing entry IGMP`	The firewall detected an IGMP IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`ip spoofing - no routing entry ESP`	The firewall detected an ESP IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`ip spoofing - no routing entry GRE`	The firewall detected a GRE IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`ip spoofing - no routing entry OSPF`	The firewall detected an OSPF IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`ip spoofing - no routing entry ICMP (type:%d, code:%d)`	The firewall detected an ICMP IP spoofing attack while the BCM50a Integrated Router did not have a default route.
`vulnerability ICMP (type:%d, code:%d)`	The firewall detected an ICMP vulnerability attack.
`traceroute ICMP (type:%d, code:%d)`	The firewall detected an ICMP traceroute attack.

See Table 73 for type and code details.

Table 71 Access logs

Log Message	Description
`Firewall default policy: TCP (set:%d)`	TCP access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: UDP (set:%d)`	UDP access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: ICMP (set:%d, type:%d, code:%d)`	ICMP access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: IGMP (set:%d)`	IGMP access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: ESP (set:%d)`	ESP access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: GRE (set:%d)`	GRE access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: OSPF (set:%d)`	OSPF access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall default policy: (set:%d)`	Access matched the default policy of the listed ACL set and the BCM50a Integrated Router blocked or forwarded it according to the ACL set’s configuration.
`Firewall rule match: TCP (set:%d, rule:%d)`	TCP access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule match: UDP (set:%d, rule:%d)`	UDP access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule match: ICMP (set:%d, rule:%d, type:%d, code:%d)`	ICMP access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule match: IGMP (set:%d, rule:%d)`	IGMP access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule match: ESP (set:%d, rule:%d)`	ESP access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.

Table 71 Access logs

Log Message	Description
`Firewall rule match: GRE (set:%d, rule:%d)`	GRE access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule match: OSPF (set:%d, rule:%d)`	OSPF access matched the listed a firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule match: (set:%d, rule:%d)`	Access matched the listed firewall rule and the BCM50a Integrated Router blocked or forwarded it according to the rule’s configuration.
`Firewall rule NOT match: TCP  (set:%d, rule:%d)`	TCP access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: UDP (set:%d, rule:%d)`	UDP access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: ICMP (set:%d, rule:%d, type:%d, code:%d)`	ICMP access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: IGMP (set:%d, rule:%d)`	IGMP access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: ESP (set:%d, rule:%d)`	ESP access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: GRE (set:%d, rule:%d)`	GRE ac access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: OSPF (set:%d, rule:%d)`	OSPF access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Firewall rule NOT match: (set:%d, rule:%d)`	Access did not match the listed firewall rule and the BCM50a Integrated Router logged it.
`Filter default policy DROP!`	IP address or protocol matched a default filter policy and the BCM50a Integrated Router dropped the packet to block access.
`Filter default policy FORWARD!`	IP address or protocol matched a default filter policy. Access was allowed and the router forwarded the packet.
`Filter match DROP <set %d/rule %d>`	IP address or protocol matched the listed filter rule and the BCM50a Integrated Router dropped the packet to block access.
`Filter match FORWARD <set %d/rule %d>`	IP address or protocol matched the listed filter rule. Access was allowed and the router forwarded the packet.

Table 71 Access logs

Log Message	Description
`(set:%d)`	With firewall messages, this is the number of the ACL policy set and denotes the packet's direction (see Table 72). With filter messages, this is the number of the filter set.
`(rule:%d)`	With firewall messages, the firewall rule number denotes the number of a firewall rule within an ACL policy set.With filter messages, this is the number of an individual filter rule.
`Router sent blocked web site message`	
`Triangle route packet forwarded`	The firewall allowed a triangle route session to pass through.
`Firewall sent TCP packet in response to DoS attack`	The firewall detected a DoS attack and sent a TCP packet in response.
`Firewall sent TCP reset packets`	The firewall sent out TCP reset packets.
`Packet without a NAT table entry blocked`	The router blocked a packet that did not have a corresponding SUA/NAT table entry.
`Out of order TCP handshake packet blocked`	The router blocked a TCP handshake packet that came out of the proper order.
`Drop unsupported/out-of-order ICMP`	The BCM50a Integrated Router generates this log after it drops an ICMP packet due to one of the following two reasons: 1. The BCM50a Integrated Router does not support the ICMP packet's protocol. 2. The ICMP packet is an echo reply for which there was no corresponding echo request.
`Router sent ICMP response packet (type:%d, code:%d)`	The router sent an ICMP response packet. This packet automatically bypasses the firewall.

See Table 73 for type and code details.

Table 72 ACL setting notes

ACL Set Number	Direction	Description
1	LAN to WAN	ACL set 1 for packets traveling from the LAN to the WAN.
2	WAN to LAN	ACL set 2 for packets traveling from the WAN to the LAN.
7	LAN to LAN/BCM50a Integrated Router	ACL set 7 for packets traveling from the LAN to the LAN or the BCM50a Integrated Router.
8	WAN to WAN/BCM50a Integrated Router	ACL set 8 for packets traveling from the WAN to the WAN or the BCM50a Integrated Router.

Table 73 ICMP notes

Type	Code	Description
0		Echo Reply
	0	Echo reply message
3		Destination Unreachable
	0	Net unreachable
	1	Host unreachable
	2	Protocol unreachable
	3	Port unreachable
	4	A packet that needed fragmentation was dropped because it was set to Don't Fragment (DF)
	5	Source route failed
4		Source Quench
	0	A gateway can discard internet datagrams if it does not have the buffer space needed to queue the datagrams for output to the next network on the route to the destination network.
5		Redirect
	0	Redirect datagrams for the Network
	1	Redirect datagrams for the Host
	2	Redirect datagrams for the Type of Service and Network
	3	Redirect datagrams for the Type of Service and Host
8		Echo

Table 73 ICMP notes

Type	Code	Description
	0	Echo message
11		Time Exceeded
	0	Time to live exceeded in transit
	1	Fragment reassembly time exceeded
12		Parameter Problem
	0	Pointer indicates the error
13		Timestamp
	0	Timestamp request message
14		Timestamp Reply
	0	Timestamp reply message
15		Information Request
	0	Information request message
16		Information Reply
	0	Information reply message

Table 74 Sys log

LOG MESSAGE	DESCRIPTION
Mon dd hr:mm:ss hostname src="<srcIP:srcPort>" dst="<dstIP:dstPort>" msg="<msg>" note="<note>	This message is sent by the "RAS" when this syslog is generated. The messages and notes are defined in this appendix’s other charts.

VPN/IPSec logs

To view the IPSec and IKE connection log, type 3 in menu 27 and press [ENTER] to display the IPSec log as shown next. Figure 136 shows a typical log from the initiator of a VPN connection.

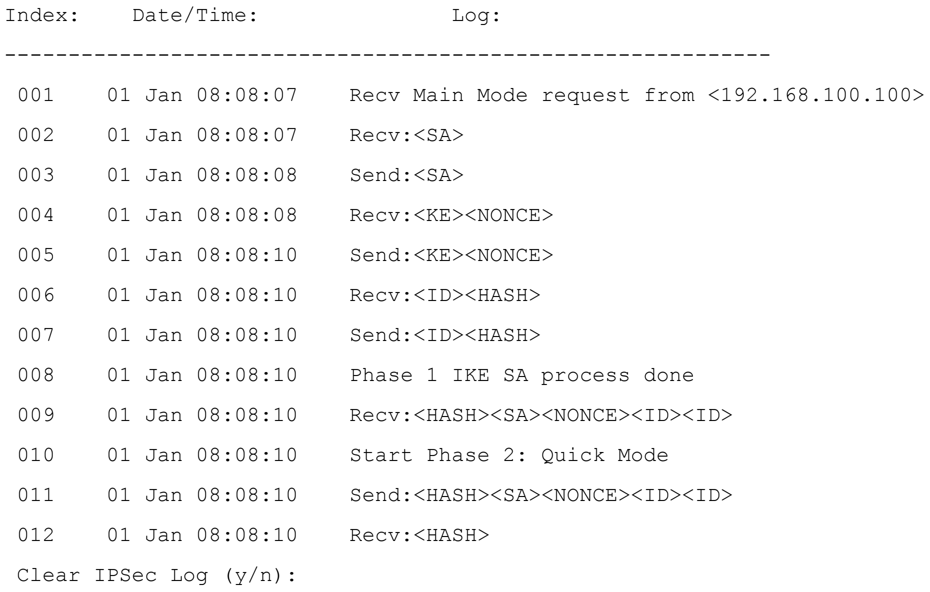
Figure 136 Example VPN initiator IPSec log

```
Index:    Date/Time:              Log:
------------------------------------------------------------
 001    01 Jan 08:02:22    Send Main Mode request to <192.168.100.101>
 002    01 Jan 08:02:22    Send:<SA>
 003    01 Jan 08:02:22    Recv:<SA>
 004    01 Jan 08:02:24    Send:<KE><NONCE>
 005    01 Jan 08:02:24    Recv:<KE><NONCE>
 006    01 Jan 08:02:26    Send:<ID><HASH>
 007    01 Jan 08:02:26    Recv:<ID><HASH>
 008    01 Jan 08:02:26    Phase 1 IKE SA process done
 009    01 Jan 08:02:26    Start Phase 2: Quick Mode
 010    01 Jan 08:02:26    Send:<HASH><SA><NONCE><ID><ID>
 011    01 Jan 08:02:26    Recv:<HASH><SA><NONCE><ID><ID>
 012    01 Jan 08:02:26    Send:<HASH>
 Clear IPSec Log (y/n):
```

VPN responder IPSec log

Figure 137 shows a typical log from the VPN connection peer.

Figure 137 Example VPN responder IPSec log



```
Index:    Date/Time:               Log:
------------------------------------------------------------
 001     01 Jan 08:08:07     Recv Main Mode request from <192.168.100.100>
 002     01 Jan 08:08:07     Recv:<SA>
 003     01 Jan 08:08:08     Send:<SA>
 004     01 Jan 08:08:08     Recv:<KE><NONCE>
 005     01 Jan 08:08:10     Send:<KE><NONCE>
 006     01 Jan 08:08:10     Recv:<ID><HASH>
 007     01 Jan 08:08:10     Send:<ID><HASH>
 008     01 Jan 08:08:10     Phase 1 IKE SA process done
 009     01 Jan 08:08:10     Recv:<HASH><SA><NONCE><ID><ID>
 010     01 Jan 08:08:10     Start Phase 2: Quick Mode
 011     01 Jan 08:08:10     Send:<HASH><SA><NONCE><ID><ID>
 012     01 Jan 08:08:10     Recv:<HASH>
 Clear IPSec Log (y/n):
```

This menu is useful for troubleshooting. A log index number, the date and time the log was created, and a log message are displayed.

Note: Double exclamation marks (!!) denote an error or warning message.

Table 75 shows sample log messages during IKE key exchange.

Note: A PYLD_MALFORMED packet usually means that the two ends of the VPN tunnel are not using the same pre-shared key.

Table 75 Sample IKE key exchange logs

Log Message	Description
`Send <Symbol> Mode request to <IP>Send <Symbol> Mode request to <IP>`	The BCM50a Integrated Router has started negotiation with the peer.
`Recv <Symbol> Mode request from <IP>Recv <Symbol> Mode request from <IP>`	The BCM50a Integrated Router has received an IKE negotiation request from the peer.
`Recv:<Symbol>`	IKE uses the ISAKMP protocol (refer to RFC2408 – ISAKMP) to transmit data. Each ISAKMP packet contains payloads of different types that show in the log (see Table 77).
`Phase 1 IKE SA process done`	Phase 1 negotiation is finished.
`Start Phase 2: Quick Mode`	Phase 2 negotiation is beginning using Quick Mode.
`!! IKE Negotiation is in process`	The BCM50a Integrated Router has begun negotiation with the peer for the connection already, but the IKE key exchange is not finished yet.
`!! Duplicate requests with the same cookie`	The BCM50a Integrated Router has received multiple requests from the same peer but it is still processing the first IKE packet from that peer.
`!! No proposal chosen`	The parameters configured for Phase 1 or Phase 2 negotiations do not match. Check all protocols and settings for these phases. For example, one party is using 3DES encryption, but the other party is using DES encryption, so the connection fails.
`!! Verifying Local ID failed!! Verifying Remote ID failed`	During IKE Phase 2 negotiation, both parties exchange policy details, including local and remote IP address ranges. If these ranges differ, the connection fails.
`!! Local / remote IPs of incoming request conflict with rule <#d>`	If the security gateway is 0.0.0.0, the BCM50a Integrated Router uses the peer Local Addr as its Remote Addr. If this IP (range) conflicts with a previously configured rule then the connection is not allowed.
`!! Invalid IP <IP start>/<IP end>`	The Local IP Addr range for the peer is invalid.
`!! Remote IP <IP start> / <IP end> conflicts`	If the security gateway is 0.0.0.0, the BCM50a Integrated Router uses Local Addr for the peer as its Remote Addr. If a peer Local Addr range conflicts with other connections, the BCM50a Integrated Router does not accept VPN connection requests from this peer.

Table 75 Sample IKE key exchange logs

Log Message	Description
`!! Active connection allowed exceeded`	The BCM50a Integrated Router limits the number of simultaneous Phase 2 SA negotiations. The IKE key exchange process fails if this limit is exceeded.
`!! IKE Packet Retransmit`	The BCM50a Integrated Router did not receive a response from the peer and so retransmits the last packet sent.
`!! Failed to send IKE Packet`	The BCM50a Integrated Router cannot send IKE packets due to a network error.
`!! Too many errors! Deleting SA`	The BCM50a Integrated Router deletes an SA when too many errors occur.
`!! Phase 1 ID type mismatch`	The ID type of an incoming packet does not match the local's peer ID type.
`!! Phase 1 ID content mismatch`	The ID content of an incoming packet does not match the local's peer ID content.
`!! No known phase 1 ID type found`	The ID type of an incoming packet does not match any known ID type.
`Peer ID: IP address type <IP address>`	The IP address type or IP address of an incoming packet does not match the peer IP address type or IP address configured on the local router. The log displays the IP address type and IP address of the incoming packet.
`vs. My Remote <IP address>`	The IP address type or IP address of an incoming packet does not match the peer IP address type or IP address configured on the local router. The log displays this router’s configured remote IP address type or IP address that the incoming packet did not match.
`vs. My Local <IP address>`	The IP address type or IP address of an incoming packet does not match the peer IP address type or IP address configured on the local router. The log displays the configured local IP address type of the router or IP address that the incoming packet did not match.
`    -> <symbol>`	The router sent a payload type of IKE packet.
`Error ID Info`	The parameters configured for Phase 1 ID content do not match or the parameters configured for the Phase 2 ID (IP address of single, range or subnet) do not match. Check all protocols and settings for these phases.

Table 76 shows sample log messages during packet transmission.

Table 76 Sample IPSec logs during packet transmission

LOG MESSAGE	DESCRIPTION
`!! WAN IP changed to <IP>`	If the BCM50a Integrated Router's WAN IP changes, all configured "My IP Addr" are changed to "0.0.0.0". If this field is configured as 0.0.0.0, the BCM50a Integrated Router uses the current BCM50a Integrated Router WAN IP address (static or dynamic) to set up the VPN tunnel.
`!! Cannot find IPSec SA`	The BCM50a Integrated Router cannot find a phase 2 SA that corresponds with the SPI of an inbound packet (from the peer); the packet is dropped.
`!! Cannot find outbound SA for rule <%d>`	The packet matches the rule index number (#d), but Phase 1 or Phase 2 negotiation for outbound (from the VPN initiator) traffic is not finished yet.
`!! Discard REPLAY packet`	If the BCM50a Integrated Router receives a packet with the wrong sequence number it discards it.
`!! Inbound packet authentication failed`	The authentication configuration settings are incorrect. Check them.
`!! Inbound packet decryption failed`	The decryption configuration settings are incorrect. Check them.
`Rule <#d> idle time out, disconnect`	If an SA has no packets transmitted for a period of time (configurable via CI command), the BCM50a Integrated Router drops the connection.

Table 77 shows RFC-2408 ISAKMP payload types that the log displays. Refer to the RFC for detailed information on each type.

Table 77 RFC-2408 ISAKMP payload types

Log Display	Payload Type
SA	Security Association
PROP	Proposal
TRANS	Transform
KE	Key Exchange
ID	Identification

Table 77 RFC-2408 ISAKMP payload types

CER	Certificate
CER_REQ	Certificate Request
HASH	Hash
SIG	Signature
NONCE	Nonce
NOTFY	Notification
DEL	Delete
VID	Vendor ID

Table 78 PKI logs

Log Message	Description
`Enrollment successful`	The SCEP online certificate enrollment was successful. The Destination field records the certification authority server IP address and port.
`Enrollment failed`	The SCEP online certificate enrollment failed. The Destination field records the certification authority server's IP address and port.
`Failed to resolve <SCEP CA server url>`	The SCEP online certificate enrollment failed because the certification authority server's address cannot be resolved.
`Enrollment successful`	The CMP online certificate enrollment was successful. The Destination field records the certification authority server's IP address and port.
`Enrollment failed`	The CMP online certificate enrollment failed. The Destination field records the certification authority server's IP address and port.
`Failed to resolve <CMP CA server url>`	The CMP online certificate enrollment failed because the certification authority server's IP address cannot be resolved.
`Rcvd ca cert: <subject name>`	The router received a certification authority certificate, with subject name as recorded, from the LDAP server whose IP address and port are recorded in the Source field.
`Rcvd user cert: <subject name>`	The router received a user certificate, with subject name as recorded, from the LDAP server whose IP address and port are recorded in the Source field.
`Rcvd CRL <size>: <issuer name>`	The router received a CRL (Certificate Revocation List), with size and issuer name as recorded, from the LDAP server whose IP address and port are recorded in the Source field.

Table 78 PKI logs

Log Message	Description
`Rcvd ARL <size>: <issuer name>`	The router received an ARL (Authority Revocation List), with size and issuer name as recorded, from the LDAP server whose address and port are recorded in the Source field.
`Failed to decode the received ca cert`	The router received a corrupted certification authority certificate from the LDAP server whose address and port are recorded in the Source field.
`Failed to decode the received user cert`	The router received a corrupted user certificate from the LDAP server whose address and port are recorded in the Source field.
`Failed to decode the received CRL`	The router received a corrupted CRL (Certificate Revocation List) from the LDAP server whose address and port are recorded in the Source field.
`Failed to decode the received ARL`	The router received a corrupted ARL (Authority Revocation List) from the LDAP server whose address and port are recorded in the Source field.
`Rcvd data <size> too large! Max size allowed: <max size>`	The router received directory data that was too large (the size is listed) from the LDAP server whose address and port are recorded in the Source field. The maximum size of directory data that the router allows is also recorded.
`Cert trusted: <subject name>`	The router has verified the path of the certificate with the listed subject name.
`Due to <reason codes>, cert not trusted: <subject name>`	Due to the reasons listed, the certificate with the listed subject name has not passed the path verification. The recorded reason codes are only approximate reasons for not trusting the certificate. See Table 79 for the corresponding descriptions of the codes.

Table 79 Certificate path verification failure reason codes

Code	Description
1	Algorithm mismatch between the certificate and the search constraints.
2	Key usage mismatch between the certificate and the search constraints.
3	Certificate was not valid in the time interval.
4	(Not used)
5	Certificate is not valid.
6	Certificate signature was not verified correctly.
7	Certificate was revoked by a CRL.
8	Certificate was not added to the cache.

Table 79 Certificate path verification failure reason codes

Code	Description
9	Certificate decoding failed.
10	Certificate was not found (anywhere).
11	Certificate chain looped (did not find trusted root).
12	Certificate contains critical extension that was not handled.
13	Certificate issuer was not valid (CA specific information missing).
14	(Not used)
15	CRL is too old.
16	CRL is not valid.
17	CRL signature was not verified correctly.
18	CRL was not found (anywhere).
19	CRL was not added to the cache.
20	CRL decoding failed.
21	CRL is not currently valid, but in the future.
22	CRL contains duplicate serial numbers.
23	Time interval is not continuous.
24	Time information not available.
25	Database method failed due to timeout.
26	Database method failed.
27	Path was not verified.
28	Maximum path length reached.

Log commands

Go to the command interpreter interface (see Appendix G, “Command Interpreter” on page 241 for information on how to access and use the commands).

Configuring what you want the BCM50a Integrated Router to log

Use the sys logs load command to load the log setting buffer that is used to configure which logs the BCM50a Integrated Router is to record.

Use sys logs category followed by a log category and a parameter to decide what to record.

Table 80 Log categories and available settings

Log Categories	**Available Parameters**
access	0, 1, 2, 3
attack	0, 1, 2, 3
error	0, 1, 2, 3
ike	0, 1, 2, 3
ipsec	0, 1, 2, 3
javablocked	0, 1, 2, 3
mten	0, 1
upnp	0, 1
urlblocked	0, 1, 2, 3
urlforward	0, 1
	Use 0 to not record logs for that category, 1 to record only logs for that category, 2 to record only alerts for that category, and 3 to record both logs and alerts for that category.

Use the sys logs save command to store the settings in the BCM50a Integrated Router (you must do this in order to record logs).

Displaying logs

Use the sys logs display command to show all of the logs in the BCM50a Integrated Router's log.

Use the sys logs category display command to show the log settings for all of the log categories.

Use the sys logs display [log category] command to show the logs in an individual BCM50a Integrated Router log category.

Use the sys logs clear command to erase all of the BCM50a Integrated Router’s logs.

Log command example

This example shows how to set the BCM50a Integrated Router to record the access logs and alerts and then view the results.

```
ras> sys logs load
ras> sys logs category access 3
ras> sys logs save
ras> sys logs display access

#  .time                 source                 destination            notes
    message
  0|11/11/2002 15:10:12 |172.22.3.80:137       |172.22.255.255:137    |ACCESS BLOCK
    Firewall default policy: UDP(set:8)
  1|11/11/2002 15:10:12 |172.21.4.17:138       |172.21.255.255:138    |ACCESS BLOCK
    Firewall default policy: UDP(set:8)
  2|11/11/2002 15:10:11 |172.17.2.1            |224.0.1.60            |ACCESS BLOCK
    Firewall default policy: IGMP(set:8)
  3|11/11/2002 15:10:11 |172.22.3.80:137       |172.22.255.255:137    |ACCESS BLOCK
    Firewall default policy: UDP(set:8)
  4|11/11/2002 15:10:10 |192.168.10.1:520      |192.168.10.255:520    |ACCESS BLOCK
    Firewall default policy: UDP(set:8)
  5|11/11/2002 15:10:10 |172.21.4.67:137       |172.21.255.255:137    |ACCESS BLOCK
```

Appendix K
Brute force password guessing protection

Table 81 describes the commands for enabling, disabling and configuring the brute force password guessing protection mechanism for the password.

Table 81 Brute force password guessing protection commands

Command	Description
`sys pwderrtm`	This command displays the brute-force guessing password protection settings.
`sys pwderrtm 0`	This command turns off the password's protection from brute-force guessing. The brute-force password guessing protection is turned off by default.
`sys pwderrtm N`	This command sets the password protection to block all access attempts for N (a number from 1 to 60) minutes after the third time an incorrect password is entered.

Example

```
sys pwderrtm 5
```

This command sets the password protection to block all access attempts for five minutes after the third time an incorrect password is entered.

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