User Manual

X8821r+

Broadband Gateway

ADSL/ ADSL2+ Bridge/Router

Issue 1.1
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Table of Contents

1 Introduction

This User Guide will show you how to connect your DSL Modem, and how to customize its configuration to get the most out of your new product.

Features{ XE "Device:Features" }

The list below contains the main features of the device and may be useful to users with knowledge of networking protocols. If you are not an experienced user, the chapters throughout this guide will provide you with enough information to get the most out of your device.

The features include:

- High Speed Asymmetrical Data Transmission on Twisted Copper Pair Wire
- Service providers can deploy ADSL rapidly over existing wire infrastructure (POTS or ISDN line)
- Compatible and interoperable with most central office site ADSL DSLAM or Multi-service Access Systems.
- RFC 1483 Bridge and Routing over ATM over ADSL
- PPPoE and PPPoA Routing over ADSL
- Interchangeable between Bridge and Router mode
- Network address translation (NAT) functions to provide security for your LAN
- Network configuration through DHCP Server and DHCP Client
- Services including IP route and DNS configuration, RIP, and IP and DSL performance monitoring
- Support IP QoS for multiple services and bandwidth sensitive applications
- Configuration and management with Telnet through the Ethernet interface, and remote Telnet through ADSL interface
- Firmware upgradeable through TFTP, HTTP
- User-friendly configuration program accessed via a web browser

Device Requirements{ XE "Device:Requirements" }

In order to use the ***X8821e/X8821m*** *or* ***X8824e/X8824m***, you must have the following:

- DSL service up and running on your telephone line
- Instructions from your ISP on what type of Internet access you will be using, and the addresses needed to set up access
- One or more computers, each containing an Ethernet card (10Base-T/100Base-T network interface card (NIC)).
- For system configuration using the supplied web-based program: a web browser such as Internet Explorer v4 or later, or Netscape v4 or later. Note that version 4 of each browser is the minimum version requirement – for optimum display quality, use Internet Explorer v5, or Netscape v6.1


Note

*You do need to use a hub or switch in order to connect more than one Ethernet PC to the DSL device. You may also use the USB port of DSL device connecting to the PC (**X8824e/X8824m** only).*

Using this Document

Notational conventions

- Acronyms are defined the first time they appear in the text and also in the glossary.
- For brevity, the ***X8821e/X8824m/X8824e/X8824m*** is referred to as "**the device**".
- The term LAN refers to a group of Ethernet-connected computers at one site.

Typographical conventions

- Italic text is used for items you select from menus and drop-down lists and the names of displayed web pages.
- Bold text is used for text strings that you type when prompted by the program, and to emphasize important points.

Special messages

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


Note

Provides clarifying or non-essential information on the current topic.


Definition

Explains terms or acronyms that may be unfamiliar to many readers. These terms are also included in the Glossary.


WARNING

Provides messages of high importance, including messages relating to personal safety or system integrity.

2 Getting to know the device

Front Panel

{ XE "Front panel" }The front panel contains lights called Light Emitting Diodes (LEDs) that indicate the status of the unit.

Figure 1: Front Panel and LEDs

Label	Color	Function
Power	green	On: device is powered on Off: device is powered off
ADSL	green	On: DSL link reaches showtime, which means that your device has successfully connected to your ISP's DSL network. Off: DSL link not in showtime, your device has not successfully connected to your ISP's DSL network. Blink: Try to connect to ISP's DSL network
PPP	green	On: PPP SYNC UP Off: NO PPP link Blink: Valid IP packet being transmitted
LAN	green	On: LAN link established and active Off: No LAN link Blink: Data being transmitted
Alarma	red	On: Error occurred Blink: booting up

X8821e/X8821m Rear Panel

{ XE "Connectors:rear panel" }{ XE "Rear Panel" }The rear panel contains the ports for the unit's data and power connections.

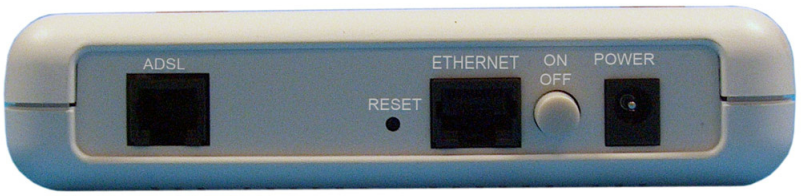


Figure 2: Rear Panel

Label	Function
ADSL	Connects to the ISP DSL network Connects to the supplied power adapter
RESET	A reset button to reset the device or reset to default settings
ETHERNET	Connects the device via Ethernet to your devices (PC or switch) in LAN
POWER	Connects to the supplied power adapter

3 Connecting your device { XE "Device:Connecting" }

This chapter provides basic instructions for connecting the device to a computer or LAN and to the Internet.

In addition to configuring the device, you need to configure the Internet properties of your computer(s). For more details, see the following sections in Appendix A:

- Configuring Ethernet PCs section
- Configuring USB PCs section

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

Connecting the Hardware{ XE "Hardware connections" }

This section describes how to connect the device to the power outlet and your computer(s) or network.

WARNING

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

The diagram below illustrates the hardware connections. The layout of the ports on your device may vary from the layout shown. Refer to the steps that follow for specific instructions.

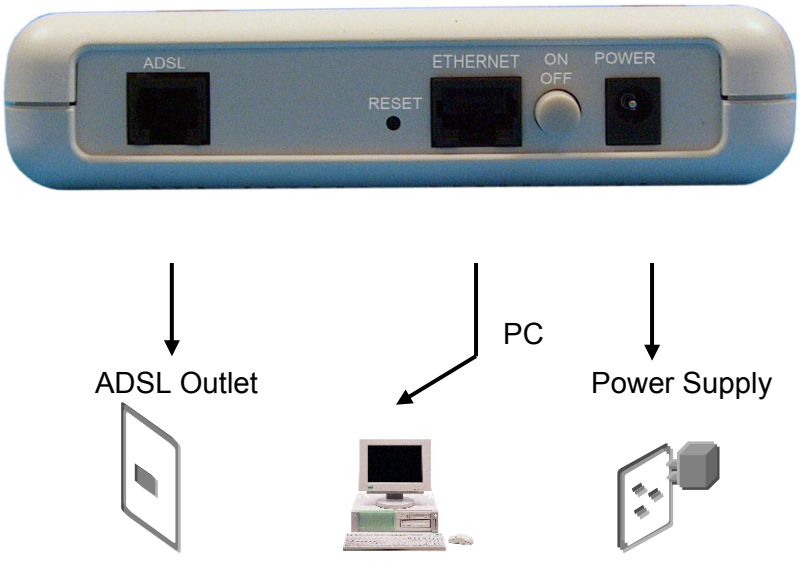


Figure 6: Overview of Hardware Connections for X8824e/X8824m { XE "Hardware connections" }

Step 1. Connect the DSL cable

Connect the DSL cable to the port labeled DSL on the rear panel of the device. Connect the other end to ADSL spliter.

Step 2. Connect the Ethernet cable

Connect to computer or to a HUB/Switch directly to the device via Ethernet cable(s).

Step 3. Attach the power connector

Connect the AC power adapter to the Power connector on the back of the device and plug the adapter into a wall outlet or power strip. Turn on and boot up your computer(s) and any LAN devices such as hubs or switches.

Step 4. Configure your Ethernet PCs

You must also configure the Internet properties on your Ethernet PCs. See *Configuring Ethernet PCs* section.

Step 5. Install an USB driver (for *X8824e*/*X8824m* only)

You can attach a single computer to the device using a USB cable. The USB port is useful if you have an USB-enabled PC that does not have a network interface card for attaching to your Ethernet network.

Before attaching the USB cable, you must install an USB driver on your PC and configure the computer. For complete instructions, see *Configuring an USB PC* section.

Next step

After setting up and configuring the device and PCs, you can log on to the device by following the instructions in "*Getting Started with the Web pages"* on chapter 4. The chapter includes a section called *Testing your Setup*, which enables you to verify that the device is working properly.

4 Getting Started with the Web pages{ XE "Web pages:Getting started" }

The DSL Modem includes a series of Web pages that provide an interface to the software installed on the device. It enables you to configure the device settings to meet the needs of your network. You can access it through a web browser on a PC connected to the device.

Accessing the Web pages{ XE "Web pages:Accessing" }

To access the web pages, you need the following:

A laptop or PC connected to the LAN or WLAN port on the device.

A web browser installed on the PC. The minimum browser version requirement is Internet Explorer v4 or Netscape v4. For the best display quality, use latest version of Internet Explorer, Netscape or Mozilla Firefox from any of the LAN computers, launch your web browser, type the URL, **http://192.168.1.1** in the web address (or location) box, and press [Enter]. Then enter the default username and password: admin/admin to access the configuration web page, if you have not changed the username and password.

The home page opens displaying the overview of device:

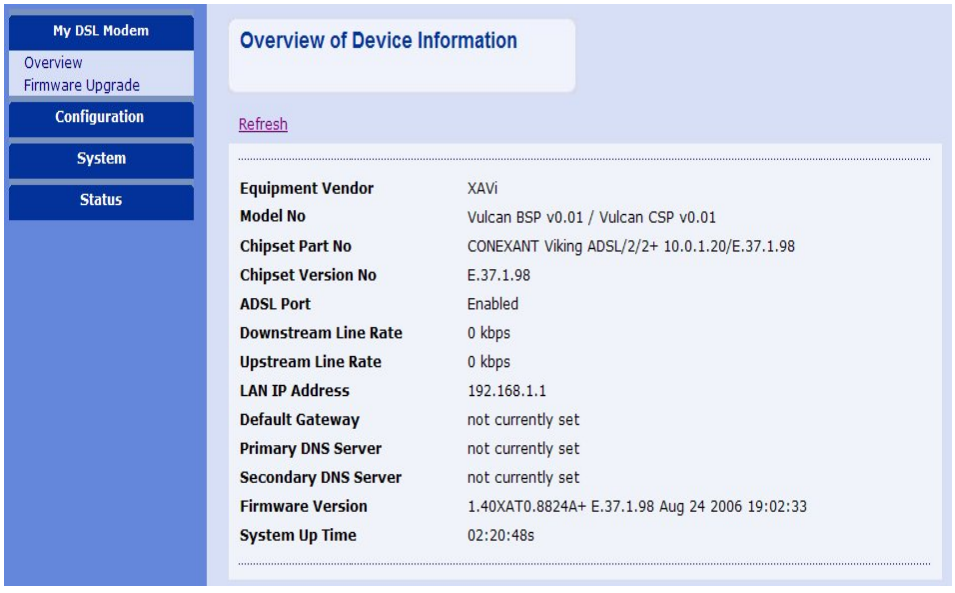
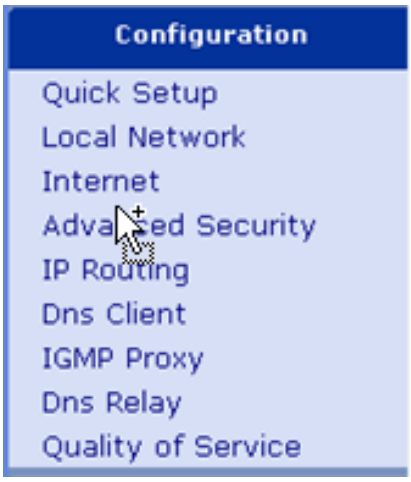


Figure 7: Overview –Home

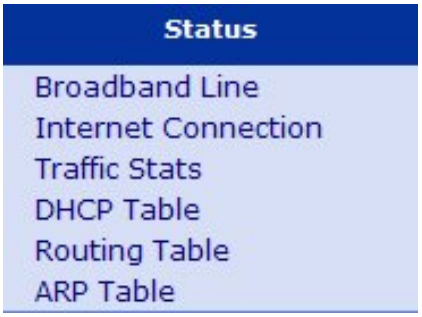
The Menu comprises:

Configuration: provides information about the current configuration of various system features with options to change the configuration. It includes the sub menus Quick Setup, Local Network, Internet, Security, Advanced Security, IP Routing, Dns Client, IGMP Proxy, Dns Relay, SNTP and Quality of Service.



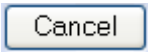
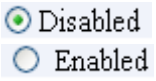
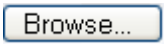
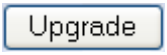
System: provides the administration utilities (sub menus) such as change password, Reset & Restart, Backup configuration profile, and Remote Access.

Status: provides the current status of the devices. It includes Broadband Line, Internet Connection, Traffic Stats, DHCP Table, Routing Table, and ARP Table.



Commonly used buttons{ XE "Web page menu:Commonly used buttons" }

The following buttons are used throughout the web pages:

Button	Function
	You may need to configure the default settings on more than one Web page. Click on this button once you have changed the configuration on your current page and are ready to move on to the next.
	This button appears on every configuration page. Click on this button if at any time you decide that you do not want to change the existing settings.
	Radio buttons – these appear on many configuration pages. You will be asked to select one radio button from the selection of two or more available. You cannot select more than one radio button at a time.
	This button appears on every configuration page. Click on this button once you are through with the changes and decide to apply the made changes.
	You may need to browse to find a file which needs to be uploaded for new configuration.
	This button allows you to upgrade to the new configuration file attached using the Browse button.

The following terms are used throughout this guide in association with these buttons:

Click – point the mouse arrow over the button, menu entry or link on the screen and click the left mouse button. This performs an action, such as displaying a new page or performing the action specific to the button on which left mouse button is clicked.

Select – usually used when describing which radio button to select from a list, or which entry to select from a drop-down list. Point the mouse arrow over the entry and left-click to select it. This does not perform an action – you will also be required to click on a button, menu entry or link in order to proceed.

Help information{ XE "Accessing Help" }

To view the help, click the desired menu or submenu. The related help information appears in the screen.

Testing your Setup

Once you have connected your hardware and configured your PCs, any computer on your LAN should be able to use the device's DSL connection to access the Internet.

To test the connection, turn on the device, wait for 30 seconds and then verify that the LEDs are illuminated as follows:

LED	Behavior
Power	Solid green to indicate that the device is turned on. If this light is not on, check the power cable attachment.
LAN	Solid green to indicate that the device can communicate with your LAN.
WAN (ADSL)	Flashing on/off while trying to SYNC UP with ISP CO site. Solid green to indicate that the device has successfully established a connection with your ISP.
PPP (Internet)	When it turns solid ON that means the device establish a PPP link with ISP.

If the LEDs illuminate as expected, test your Internet connection from a LAN computer. To do this, open your web browser, and type the URL of any external website (such as *http://www.yahoo.com*).

If the LEDs do not illuminate as expected, you may need to configure your Internet access settings using the information provided by your ISP. If the LEDs still do not illuminate as expected or the web page is not displayed, see *Troubleshooting* section or contact your ISP for assistance.

Default device settings{ XE "Device:Default settings" }

{ XE "Default configuration" **}**In addition to handling the DSL connection to your ISP, the DSL Modem can provide a variety of services to your network. The device is preconfigured with default settings for use with a typical home or small office network.

The table below lists some of the most important default settings; these and other features are described fully in the subsequent chapters. If you are familiar with network configuration, review these settings to verify that they meet the needs of your network. Follow the instructions to change them if necessary. If you are unfamiliar with these settings, try using the device without modification, or contact your ISP for assistance.

WARNING

We strongly recommend that you contact your ISP prior to changing the default configuration.

Option	Default Setting	Explanation/Instructions
User/Password	admin/admin	User name and password to access the device
DSL Port IP Address	Unnumbered interface: 192.168.1.1 Subnet mask: 255.255.255.255	This is the temporary public IP address of the WAN port on the device. It is an unnumbered interface that is replaced as soon as your ISP assigns a 'real' IP address. See *Quick Setup* section.
LAN Port IP Address{ XE "Eth-0 interface:defined" }	Assigned static IP address: 192.168.1.1 Subnet mask: 255.255.255.0	This is the IP address of the LAN port on the device. The LAN port connects the device to your Ethernet network. Typically, you will not need to change this address. See *Local Network* section.
DHCP (Dynamic Host Configuration Protocol)	DHCP server enabled with the following pool of addresses: 192.168.1.2 through 192.168.1.21 (Please be noted that the default DHCP IP address pool may be different in each firmware version.)	The device maintains a pool of private IP addresses for dynamic assignment to your LAN computers. To use this service, you must have set up your computers to accept IP information dynamically, as described in *Local Network -> DHCP Server* section.

5 Home{ XE "Home page:Overview" }

The Home web page menu includes the following submenus:

- Overview
- Firmware Upgrade

Overview Page

The overview of the device contains most of the basic information like

System information (equipment vendor, model number, chipset part number, chipset version number),

Internet information (ADSL port, downstream rate, upstream rate, Gateway, Primary DNS Server, Secondary DNS server),

Device information (LAN IP address, firmware version, release date, system up time).

Basic Overview

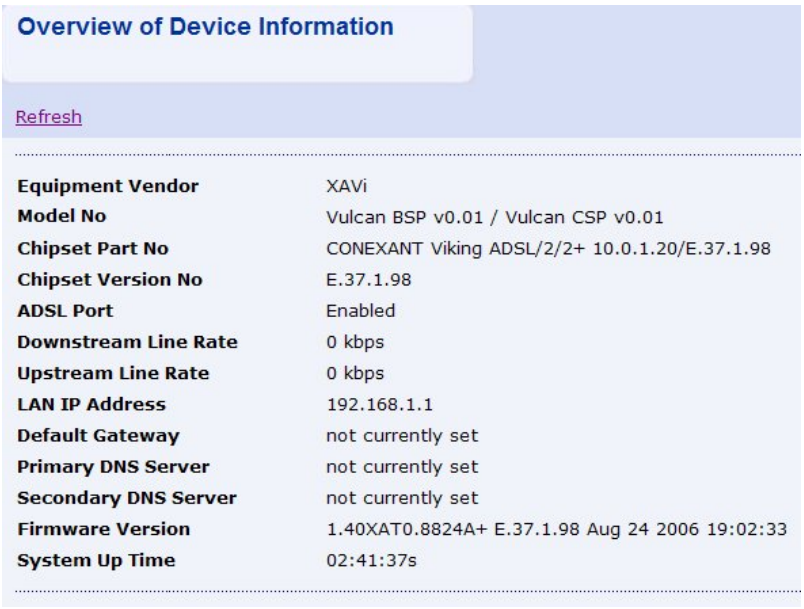


Figure 8: Overview - basic

- Click the *Refresh* to get the latest information from the device.

Firmware Upgrade{ XE "System log" }

This page displays the current version of the firmware and lets you upgrade to the latest version.

Upgrading the firmware

Figure 9: Upgrading firmware

To upgrade the firmware, you have two options:

- Automatically check for the updates – Click *Check for Updates* button to pick up the latest updates.
- Specify the location of firmware file – Click *Browse* to specify the path where the firmware files are located and click *Upgrade*.

6 Configuration

The Configuration web page menu comprises:

- Local Network
- Internet
- Advanced Security
- IP Routing
- Dns Client
- IGMP Proxy
- Dns Relay
- Quality of Service

Local Network (LAN) Page{ XE "Configuring:Local network" }

This page allows you to setup the Local Network (LAN) connection. The following are the types of settings allowed:

- IP Address
- DHCP Server

Click on *Local Network* under Configuration from the left-hand side pane. The following page opens:

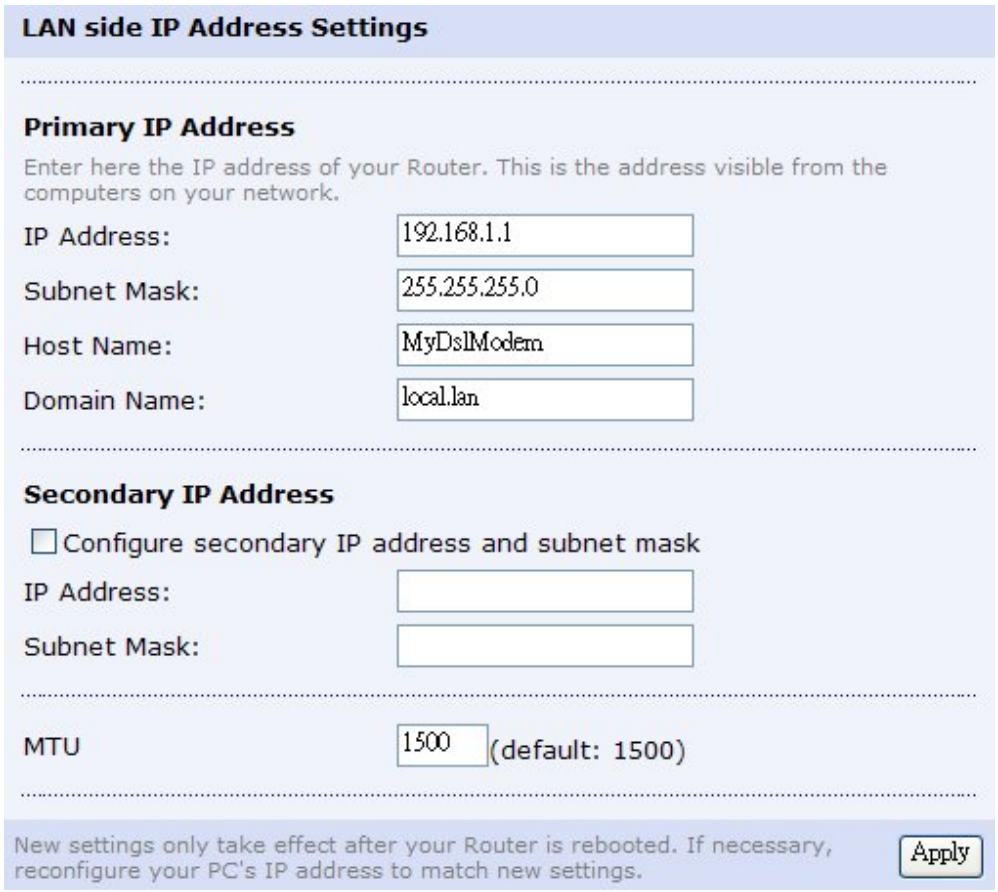


Figure 18: Local network configuration - IP address

IP Address

This page displays the local network configuration allowing you to configure:

- IP Address
- Subnet Mask
- Host Name
- Domain Name
- Secondary IP Address
- MTU

DHCP server

This page displays the DHCP server configuration allowing you to configure:

- Enable DHCP server feature ON or OFF
- An IP addresses pool

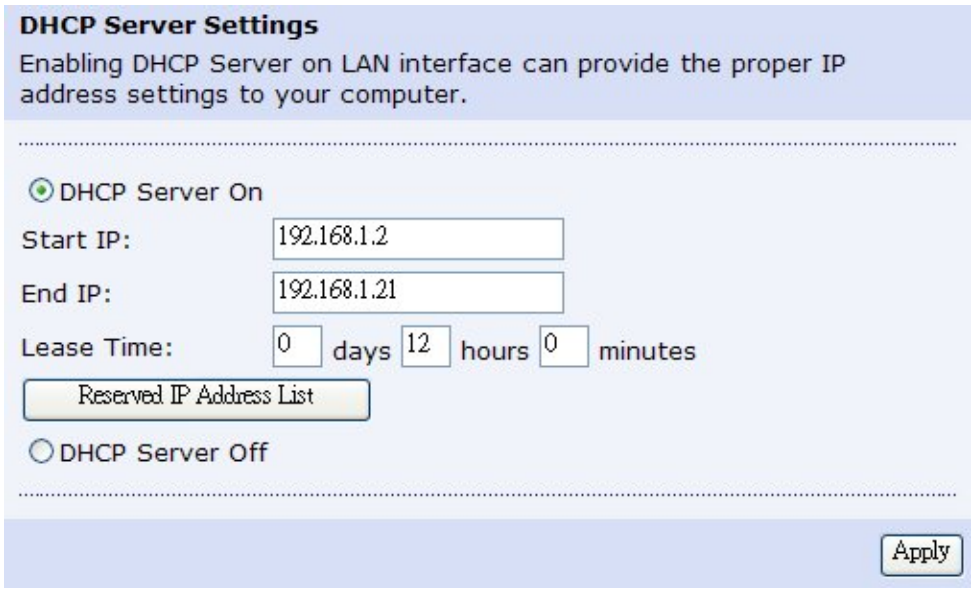


Figure 19: DHCP server configuration

- Click DHCP server On or OFF
- Enter the start IP address of DHCP pool
- Enter the end IP address of DHCP pool
- Enter the lease Time in DAYS/HOURS/MINUTES format
- Reserved IP Address List. You can reserve one specific IP address for a certain PC by adding the mapping entry between MAC address and IP address.

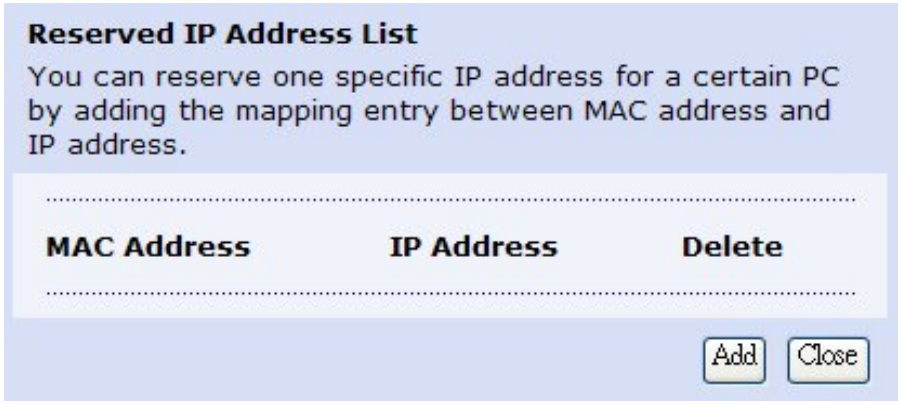


Figure 20: DHCP server – Reserved IP Address List

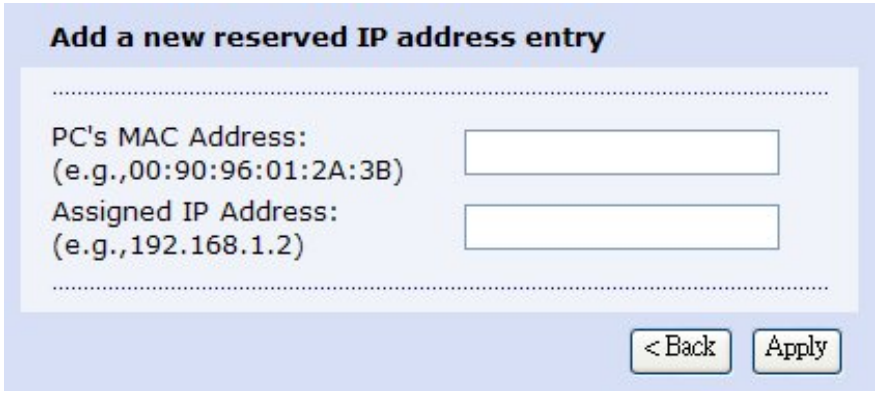


Figure 21: DHCP server – reserved IP address entry

Internet Connection Page{ XE "Configuring:Internet connection" }

You can configure your internet connection from this page. This page displays the details of existing internet connection, if any. You can perform the following functions from this page:

- Configure internet connection
- Configure ADSL
- Specify MAC Spoofing

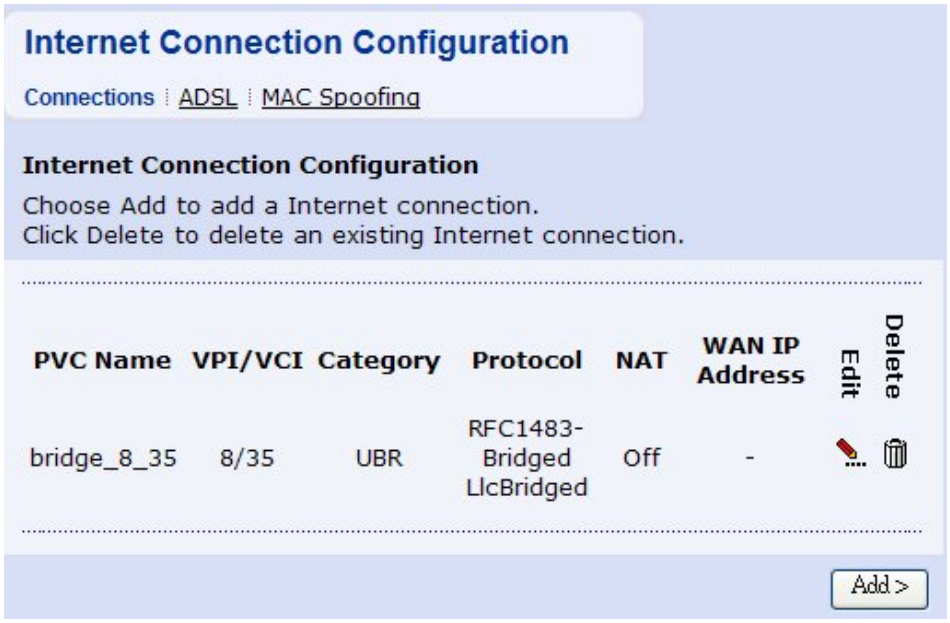


Figure 22: Internet connection configuration

Connections

To configure the internet connection:

- Click *Add*. Follow the steps described under *¡Error! No se encuentra el origen de la referencia.* section to setup the internet connection. If there is existing Internet connection, you may use the *Edit* or *Delete* to edit the connection profile or delete it.

ADSL Configuration

In this web page, you can configure the basic ADSL parameters like enable/disable ADSL port, ADSL mode and some specific values.

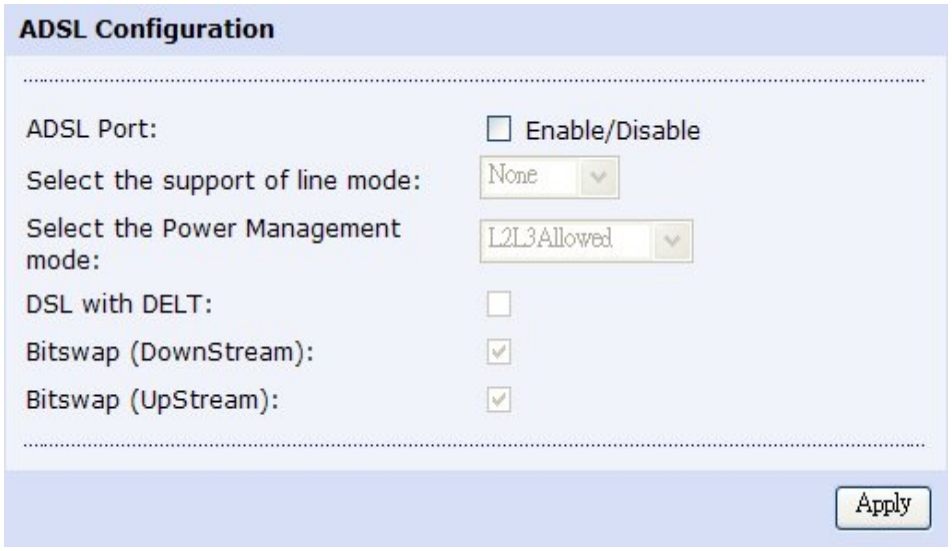


Figure 23: ADSL configuration

To configure ADSL:

- Click to enable the *ADSL Port*.
- Select the support of line mode from the drop down list. You have the option to select from ADSL 2, ADSL2PlusAuto, ADSL2Plus Only.
- You can enable/disable DSL with DELT, Bitswap (Downstream), and Bitswap (UpStream).
- Click *Apply*.

MAC Spoofing

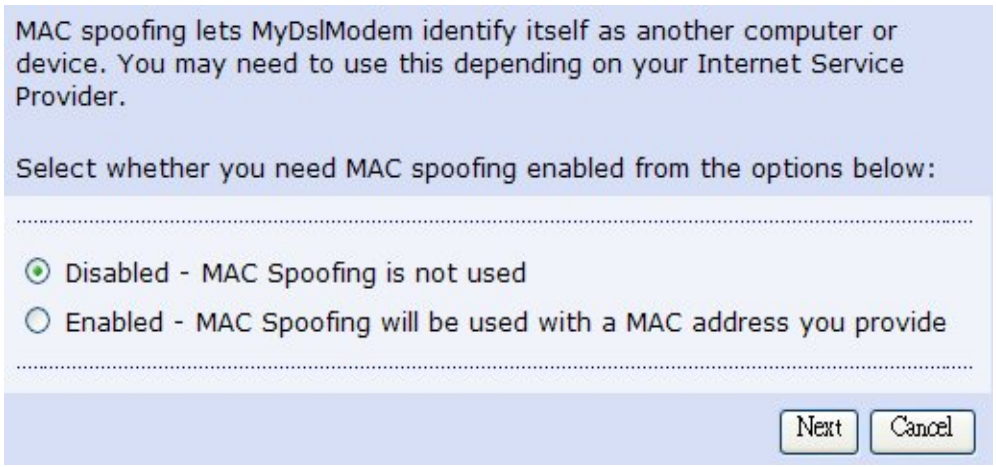


Figure 25: Internet connection - MAC spoofing

MAC spoofing lets the MyDslModem identify itself as another computer or device. You may need to use this depending on your Internet Service Provider.

To specify MAC Spoofing:

- Select either Disabled - MAC Spoofing is not used or Enabled - MAC Spoofing will be used with a MAC address you provide. MAC Spoofing Setup/Confirm page opens based on the option you selected earlier.
- Specify the MAC address in case you enabled the MAC Spoofing.

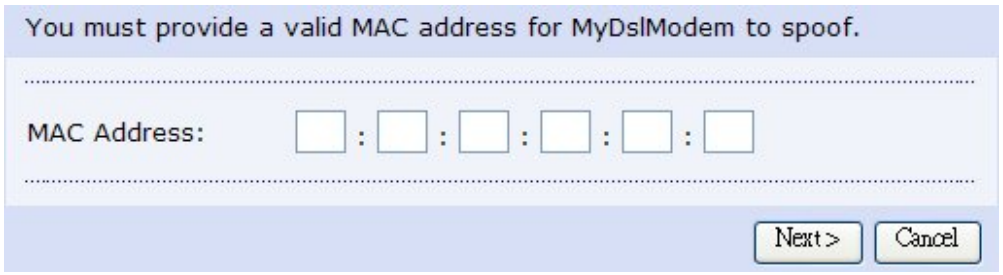


Figure 26: MAC spoofing setup

- Click *Confirm* to confirm the specified MAC Spoofing settings.

Advanced Security Configuration{ XE "Voice Configuration" }

There are two following functions from this page which can be configured:

- DMZ Host
- Port Forwarding

DMZ Host

You can configure DMZ host to provide better security for your local network if you enable the NAT function.

Figure 30: Advanced Security Configuration – DMZ Host -1

The DMZ host is related to the Internet connection interface. You could click the *EDIT* to set the DMZ host. This DMZ host is the computer on your local network that can be accessed from the Internet regarding of port forwarding and firewall settings.

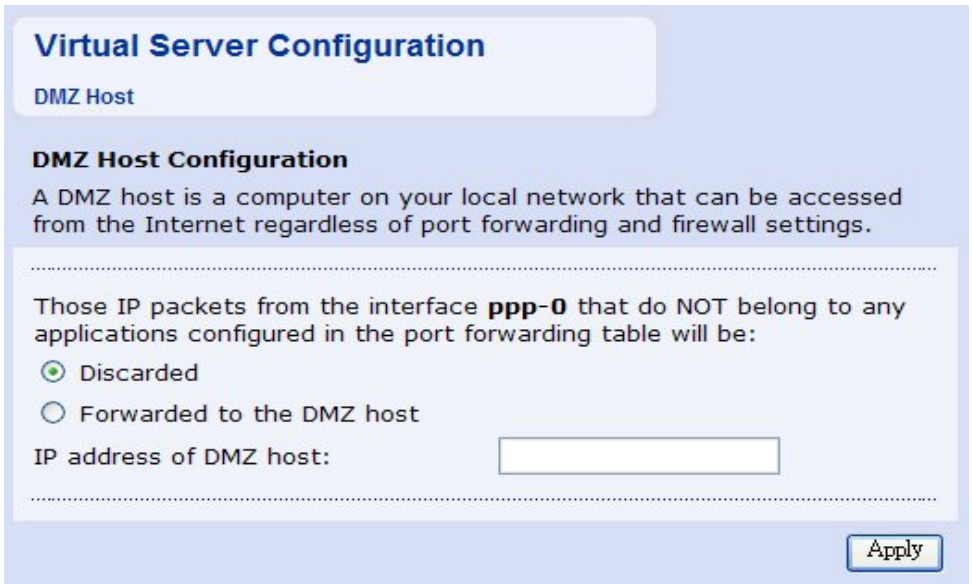


Figure 31: Advanced Security Configuration – DMZ Host-2

Global Settings:

- Enable or disable the DMZ host function
- If enabled, enter the IP address of DMZ host

Port Forwarding

Port forwarding enables you to run a server on your local network that can be accessed from the Internet. You need to set up port forwarding to tell the device on which computer the server is held. When port forwarding is enabled, your router (the device) routes all the inbound traffic on a particular port to the chosen computer on your network.

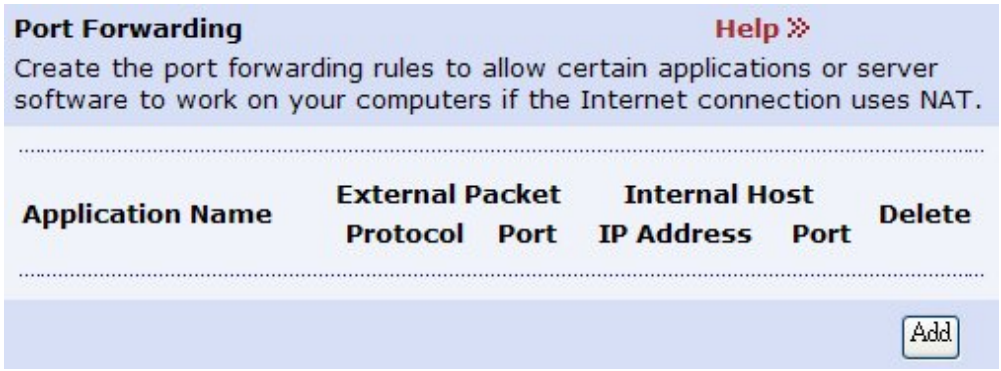


Figure 32: Port Forwarding Configuration

To configure port forwarding:

- Click *Add*.

Add New Part Forwarding Rule page opens:

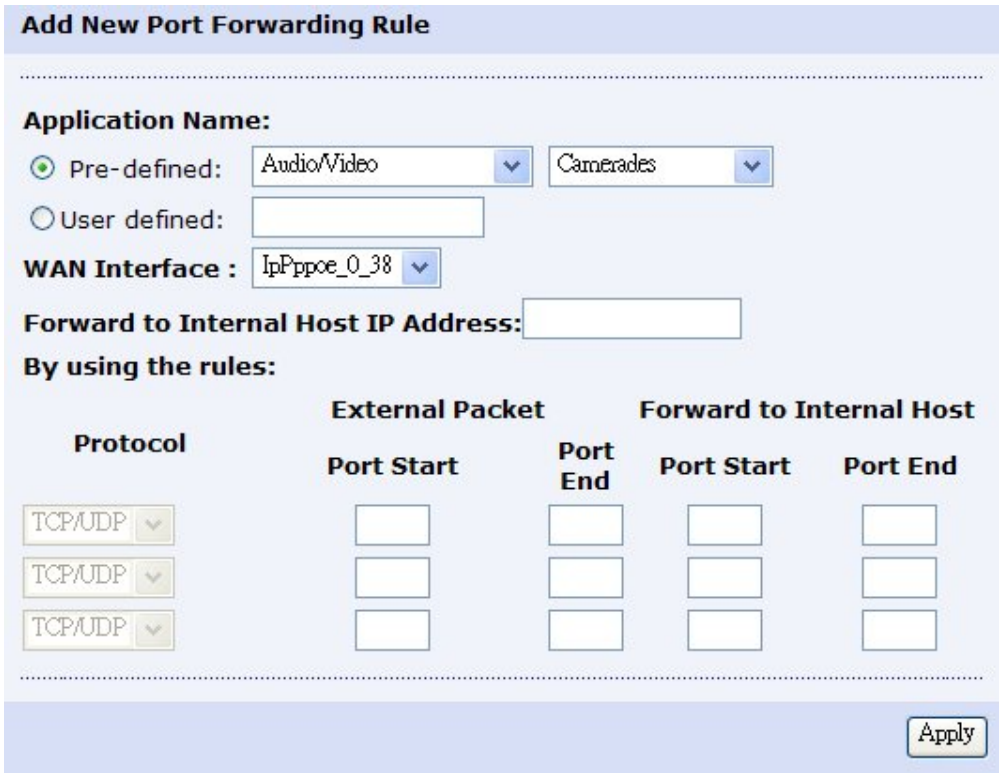


Figure 33: Port Forwarding Configuration – Add New Rule

- Specify the new port forwarding rule name either by selecting from the *Pre-defined* drop down lists or typing a name in *User defined* text box.
- Select the *WAN Interface* from the drop down list where the incoming packet coming from.
- Enter the IP address in Forward to Internal Host IP Address which the server is held.
- Specify the rules by specifying the information such as Protocol/Type, External Packet (Port Start, Port End), and Forward to Internal Host (Port Start, Port End).
- Click *Apply*.

IP Routing{ XE "Voice Configuration" }

You can configure the packet routing table by static routing or dynamic routing.

- Static Routing
- Dynamic Routing

Static Routing

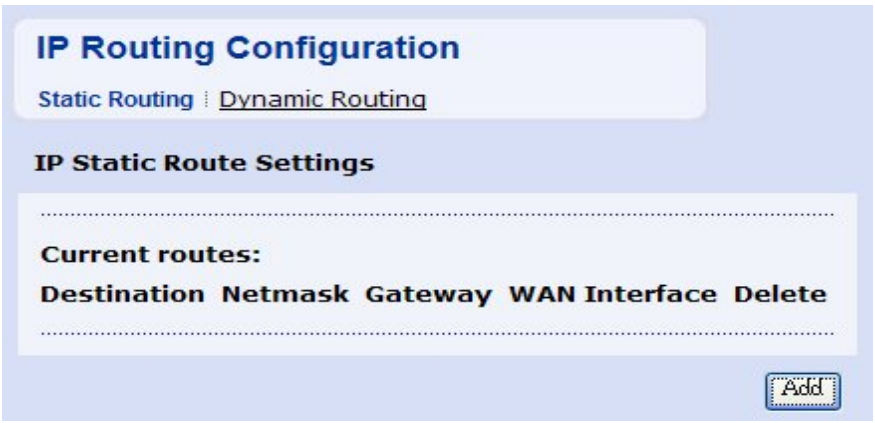


Figure 34: IP Routing Configuration

Under static routing web page, click the *ADD* button to add the static routing table.

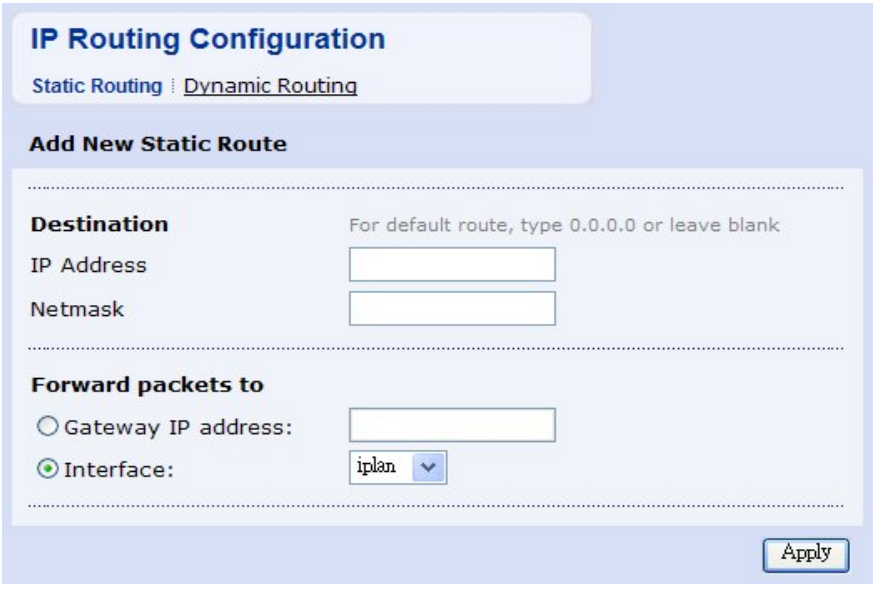


Figure 35: Static IP Routing Configuration

Global settings:

- Specify the destination IP address and its subnet
- Specify the gateway IP address or the interface (LAN or WAN port) where above

Dynamic Routing

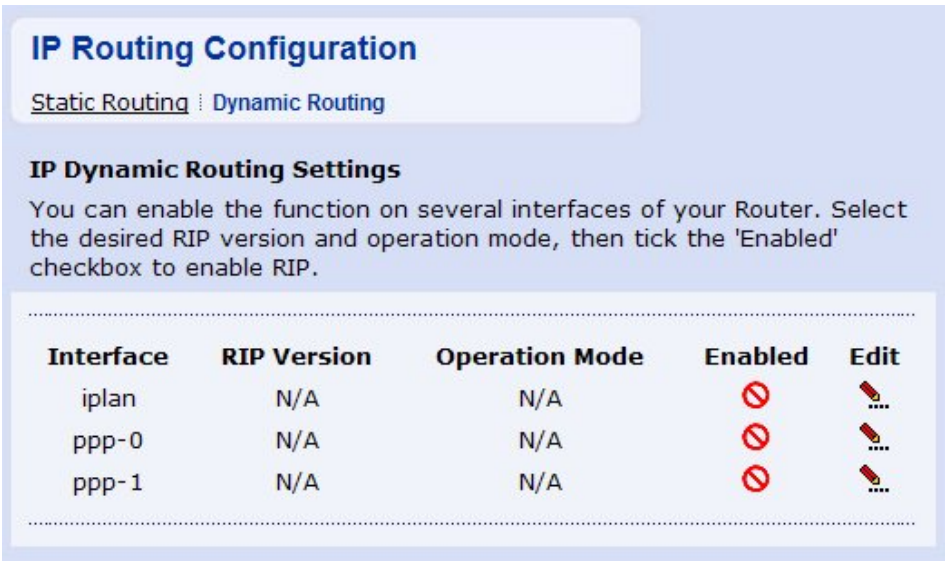


Figure 36: Dynamic IP Routing Configuration

To enable the dynamic routing:

- Select the Interface where to share and exchange the routing table. Click *Edit*.
- Select the *RIP Version* as *1*, *2* or *both*.
- Select the Operation Mode as Active, Passive, or Send Only.
- Select *Enabled*.
- Click *Apply*.

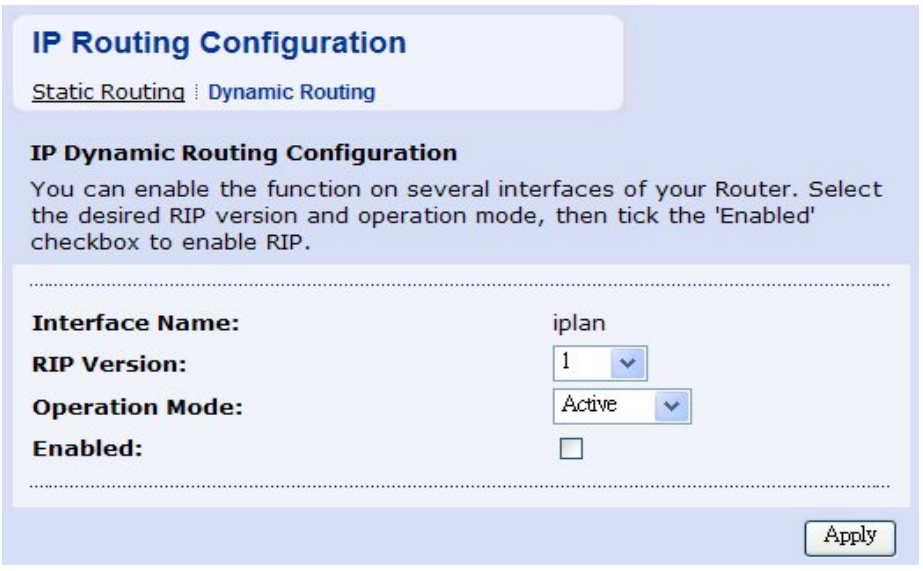


Figure 37: Dynamic IP Routing Configuration

DNS Client{ XE "Voice Configuration" }

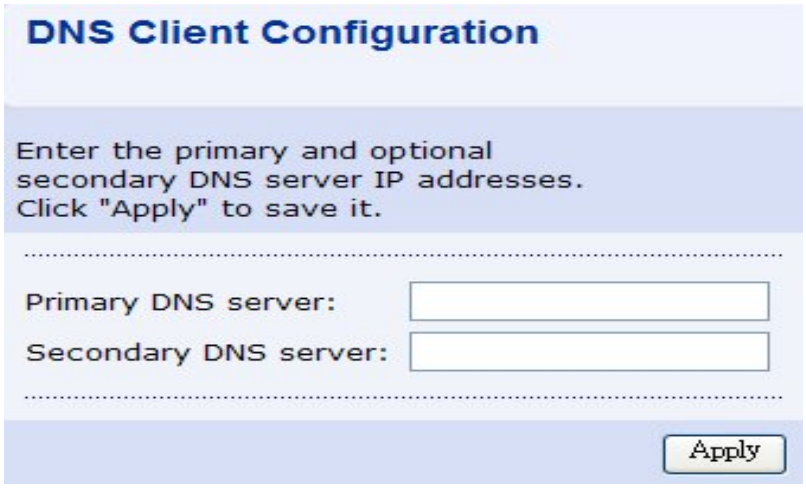


Figure 38: DNS Client Configuration

To specify DNS Client:

- Configure the DNS client by specifying the primary and secondary DNS server.
- Click *Apply*.

IGMP Proxy{ XE "Voice Configuration" }

Configure this proxy to run a server on your local network that can be accessed from the Internet. See Help for more information

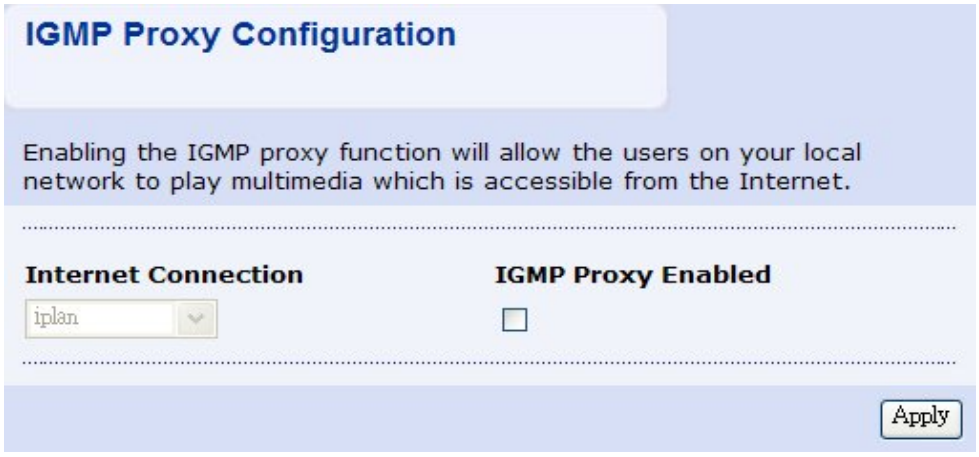


Figure 39: IGMP proxy configuration

To enable IGMP proxy:

- Select the connection from *Internet Connection* drop down list.
- Select IGMP Proxy Enabled.
- Click *Apply*.

DNS Relay{ XE "Voice Configuration" }

The device can relay DNS query packets to the real DNS server and feedback back the IP address to the PC.

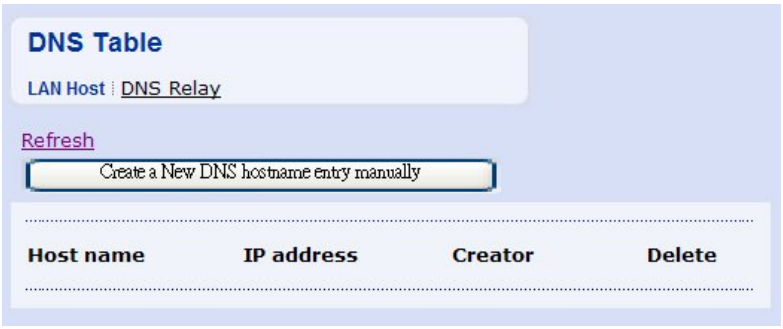


Figure 40: Local network configuration - DNS relay

Existing DNS relay details, if created before are displayed on the DNS Relay page. You can refresh the details by clicking *Refresh*.

To create a new DNS Hostname, click Create a New DNS Hostname entry manually.

DNS Table page opens:

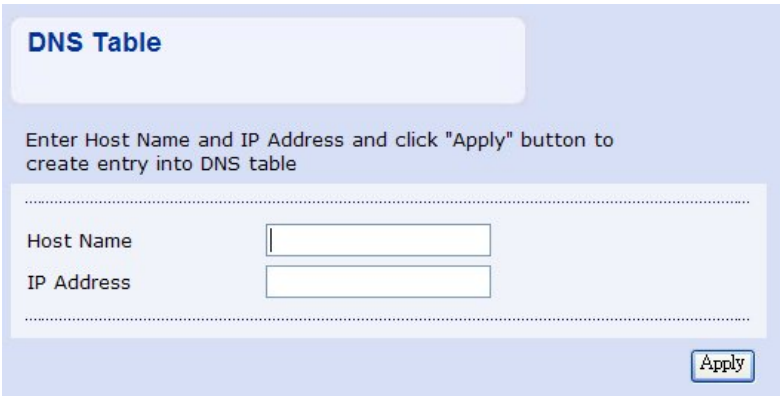


Figure 41: DNS relay – Create a DNS host

- Enter the Host Name and IP Address.
- Click *Apply*.

Quality of Service{ XE "Voice Configuration" }

You can configure the priority of packets through this web page.

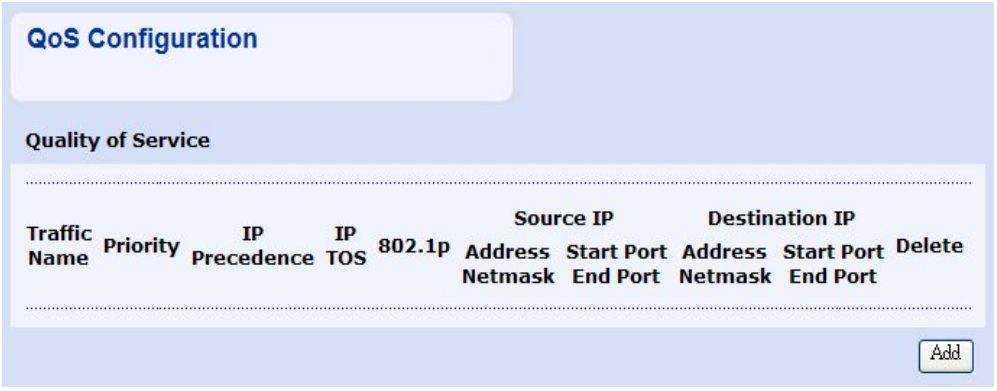


Figure 44: Quality of Service

Click *Add* to create the packet classifier.

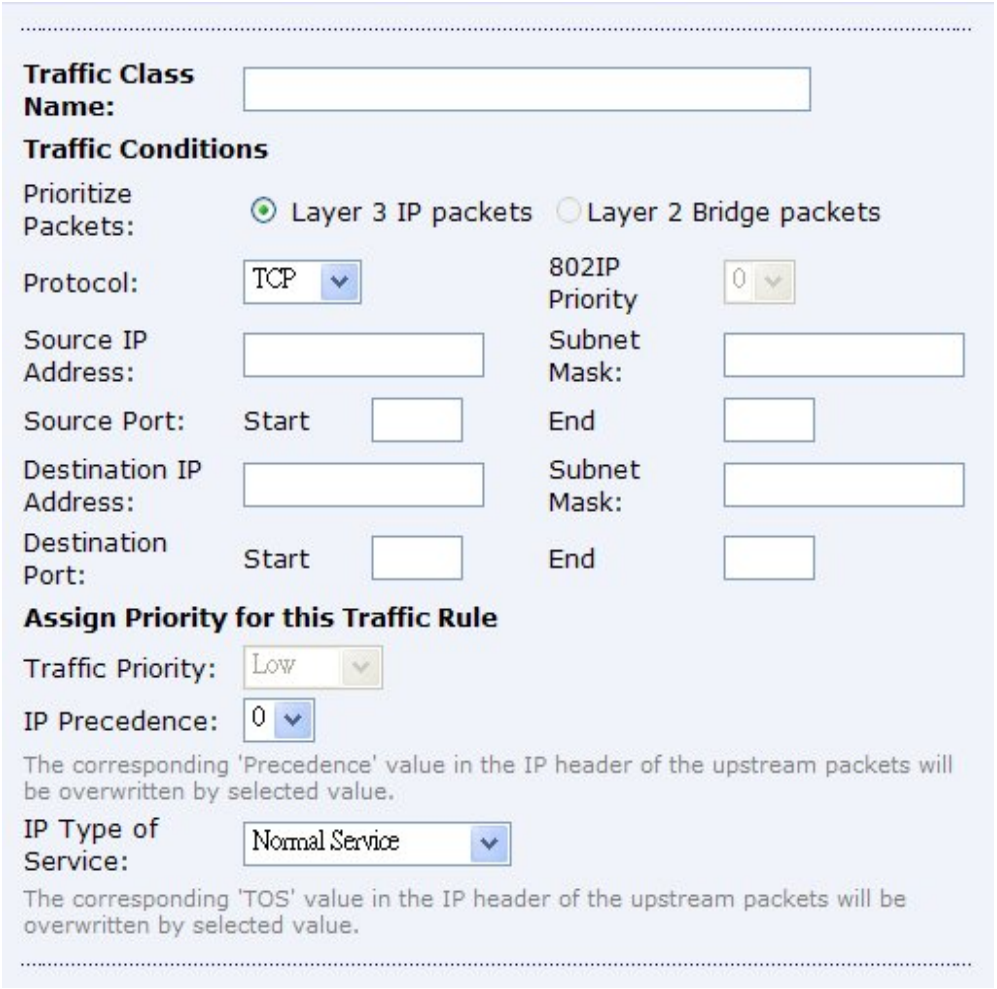


Figure 45: Rule of Quality of Service

Quality of Service, global settings:

- Enter the name for this classifier (rule)
- Select the packet layer (layer 3 or layer 2) to prioritize packets
- Packet type which is prioritized
- Source IP address and subnet
- Source port range from start to end
- Destination IP address and subnet
- Destination port range from start to end
- Assign the traffic priority, IP precedence and the IP type of service.
- Click *Apply* to add this QoS rule.

7 System

The System web page menu comprises:

- Admin Password
- Reset & Restart
- Backup Configuration
- Remote Access

Admin Password{ XE "Security:IP Filtering" }

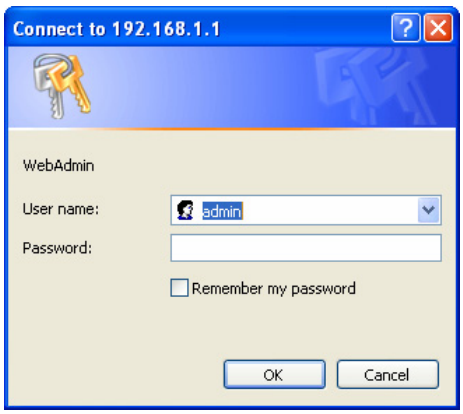
This web page lets you change the user name and password.

Figure 46: Administration Password

To change the password:

- Enter the user name in *User name*.
- Enter the new password in *New password*.
- Confirm the password by retyping it in *Confirm New password*.
- Click *Apply*.

A window opens prompting you re-login with your new username or password:



- Click *OK*.

Reset & Restart{ XE "Security:IP Filtering" }

This web page allows you to restart your device or reset all settings to factory default settings.

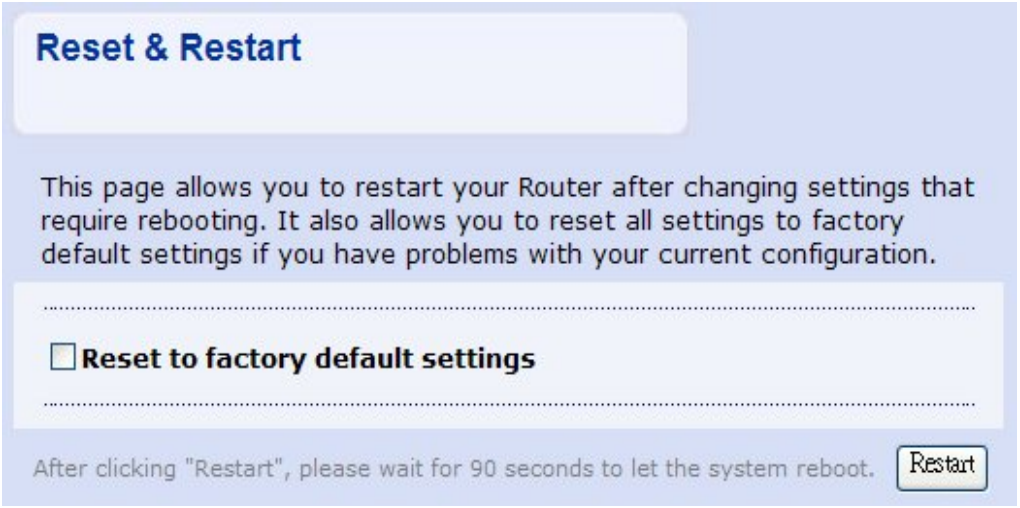


Figure 47: Reset & Restart

- Click the *Restart* button without the check of "Reset to factory default settings" to restart the device with current settings.
- Click the *Restart* button with the check of "Reset to factory default settings" to restore the factory settings back to the device.

Backup Configuration{ XE "Security:IP Filtering" }

This web page allows you to restart your device or reset all settings to factory default settings.

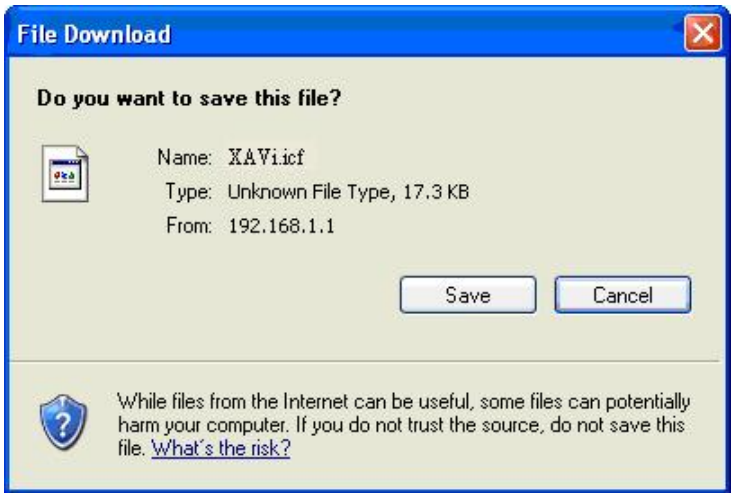
Figure 48: Backup & Restore Configuration

Backup Configuration

To save the backup configuration file:

- Click *Backup*.

A message window opens prompting you to save the file:



- Click *Save*.
- Specify the path where the file is to be saved and click *Save*.

Restore Configuration

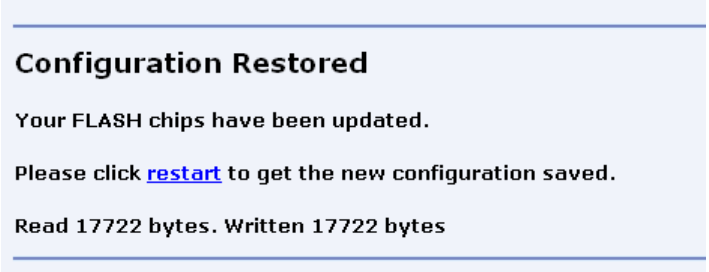
To restore the previously saved configuration:

- Click *Browse* to specify the path of the saved configuration file and click *Open*.
- Click *Upgrade*.

WARNING

Do not restart your router during configuration restore process.

A message appears indicating the status of restoration:



- Click *restart* to save new configuration.

8 Status

You can see the following statuses from the status menu:

- Broadband Line
- Internet Connection
- Traffic Status
- DHCP Table
- Routing Table
- ARP Table

Broadband Line

This web page shows the ADSL status in details. If you are interesting in the parameters, please contact technical support to get the description..

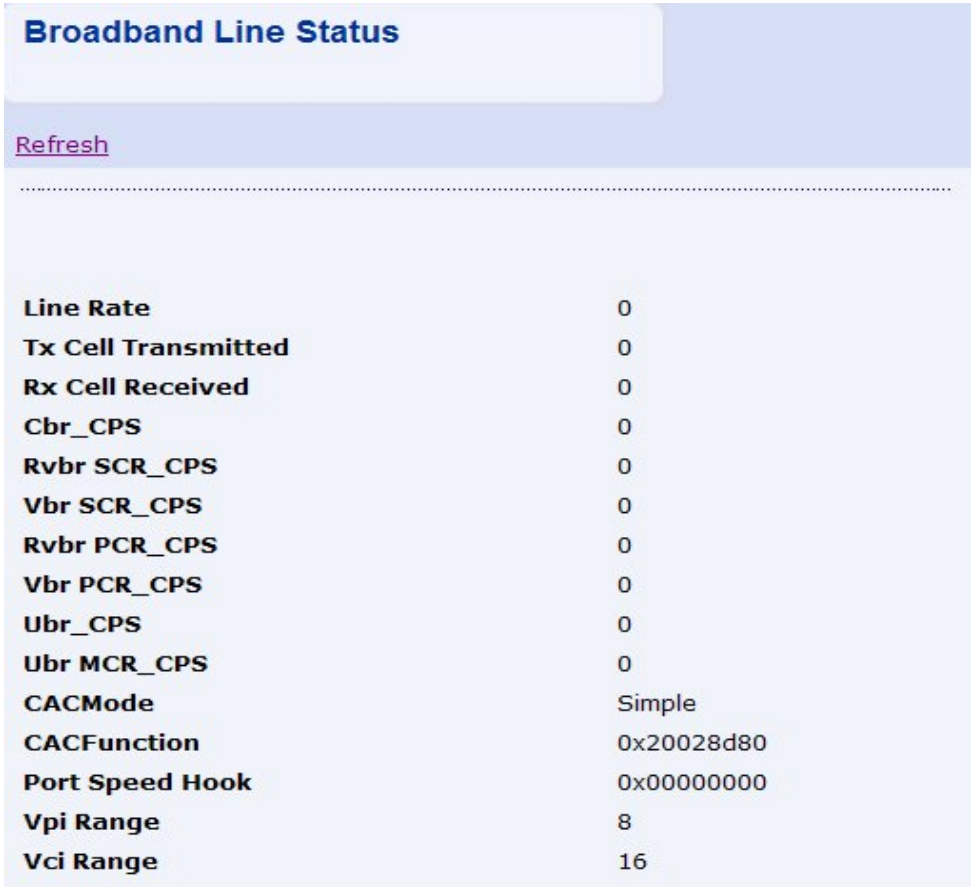
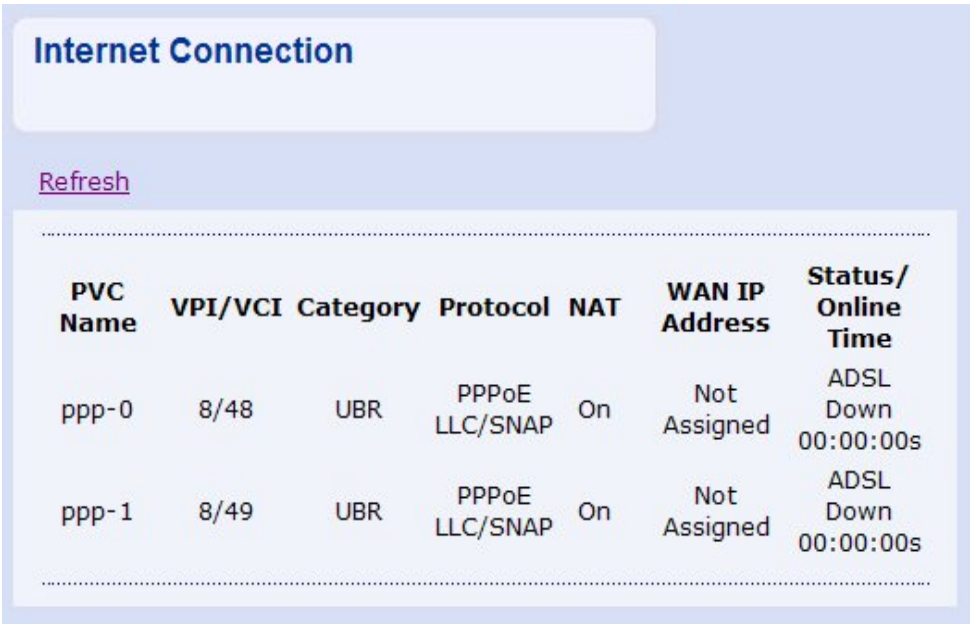


Figure 50: Status of Broadband Line

Internet Connection

This web page shows current defined PVC profiles and its connection status including PVC name, VPI/VCI values, ATM QoS, Internet connection protocol, NAT, WAN IP address and connection online time.



Internet Connection

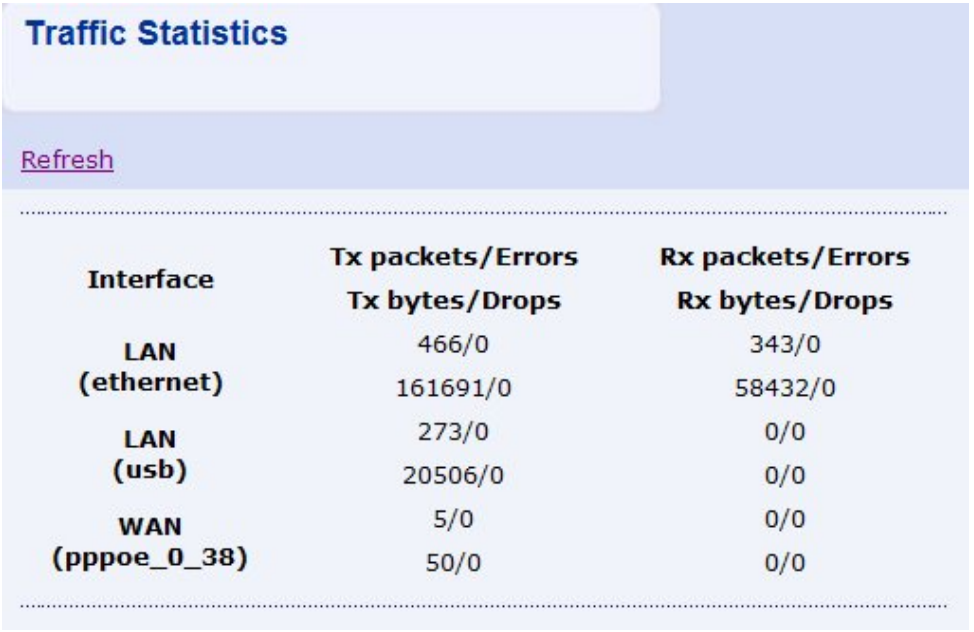
Refresh

PVC Name	VPI/VCI	Category	Protocol	NAT	WAN IP Address	Status/ Online Time
ppp-0	8/48	UBR	PPPoE LLC/SNAP	On	Not Assigned	ADSL Down 00:00:00s
ppp-1	8/49	UBR	PPPoE LLC/SNAP	On	Not Assigned	ADSL Down 00:00:00s

Figure 51: Status of Internet Connection

Traffic Status

This web page shows traffic statistics of TX&RX both directions including Ethernet ports, USB port and WAN ports.



Traffic Statistics

Refresh

Interface	Tx packets/Errors Tx bytes/Drops	Rx packets/Errors Rx bytes/Drops
LAN (ethernet)	466/0 161691/0	343/0 58432/0
LAN (usb)	273/0 20506/0	0/0 0/0
WAN (pppoe_0_38)	5/0 50/0	0/0 0/0

Figure 52: Traffic Status

DHCP Table

This web page shows all the PCs who request an IP address from the device. Those messages show in the web page, MAC address of PC, assigned IP address, Lease Time and the host name of PC.

Figure 53: DHCP Table

Routing Table

This web page shows the routing table of the device which shows the packet flow when the device receives incoming packets from WAN port and LAN port.

Figure 54: Routing Table

ARP Table

This web page shows the relationship between MAC address and IP address where the device learns from the data traffic. Besides, it also record the interface where the device learns this information.

Figure 64: ARP Table

A Appendix A - Configuring the Internet Settings

This appendix provides instructions for configuring the Internet settings on your computers to work with the device.

Configuring Ethernet PCs

Before you begin

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


Note

In some cases, you may want to assign Internet information manually to some or all of your computers rather than allow the device to do so. See

Assigning static Internet information to your PCs section.

- If you have connected your LAN PCs via Ethernet to the device, follow the instructions that correspond to the operating system installed on your PC:
- Windows® XP PCs
- Windows 2000 PCs
- Windows Me PCs
- Windows\ 95, 98 PCs
- Windows NT 4.0 workstations

Windows® XP PCs

In the Windows task bar, click the *Start* button, and then click *Control Panel*.

Double-click the Network Connections icon.

In the *LAN or High-Speed Internet* window, right-click on the icon corresponding to your network interface card (NIC) and select *Properties*. (Often, this icon is labeled *Local Area Connection*).The *Local Area Connection* dialog box is displayed with a list of currently installed network items.

Ensure that the check box to the left of the item labelled *Internet Protocol TCP/IP* is checked and click *Properties*.

In the Internet Protocol (TCP/IP) Properties dialog box, click the radio button labelled Obtain an IP address automatically. Also click the radio button labelled Obtain DNS server address automatically.

Click *OK* twice to confirm your changes, and then close the Control Panel.

Windows 2000 PCs

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

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

Double-click the Network and Dial-up Connections icon.

In the *Network and Dial-up Connections* window, right-click the Local Area Connection icon, and then select *Properties*. The *Local Area Connection Properties*

dialog box is displayed with a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 10.

If Internet Protocol (TCP/IP) does not display as an installed component, click *Install.*

In the *Select Network Component* Type dialog box, select *Protocol*, and then click *Add.*

Select *Internet Protocol (TCP/IP)* in the Network Protocols list, and then click *OK*. You may be prompted to install files from your Windows 2000 installation CD or other media. Follow the instructions to install the files.

If prompted, click *OK* to restart your computer with the new settings. Next, configure the PCs to accept IP information assigned by the device.

In the *Control Panel*, double-click the Network and Dial-up Connections icon.

In the *Network and Dial-up Connections* window, right-click the Local Area Connection icon, and then select *Properties*.

In the Local Area Connection Properties dialog box, select *Internet Protocol (TCP/IP),* and then click *Properties*.

In the Internet Protocol (TCP/IP) Properties dialog box, click the radio button labelled Obtain an IP address automatically. Also click the radio button labelled Obtain DNS server address automatically.

Click *OK* twice to confirm and save your changes, and then close the Control Panel.

Windows Me PCs

In the Windows task bar, click the Start button, point to Settings, and then click Control Panel.

Double-click the Network and Dial-up Connections icon.

In the Network and Dial-up Connections window, right-click the Network icon, and then select Properties. The Network Properties dialog box displays with a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 11.

If Internet Protocol (TCP/IP) does not display as an installed component, click Add.

In the Select Network Component Type dialog box, select Protocol, and then click Add.

Select Microsoft in the Manufacturers box.

Select Internet Protocol (TCP/IP) in the Network Protocols list, and then click OK. You may be prompted to install files from your Windows Me installation CD or other media. Follow the instructions to install the files.

If prompted, click OK to restart your computer with the new settings. Next, configure the PCs to accept IP information assigned by the device.

In the Control Panel, double-click the Network and Dial-up Connections icon.

In Network and Dial-up Connections window, right-click the Network icon, and then select Properties.

In the Network Properties dialog box, select TCP/IP, and then click Properties.

In the TCP/IP Settings dialog box, click the radio button labelled Server assigned IP address. Also click the radio button labelled Server assigned name server address.

Click OK twice to confirm and save your changes, and then close the Control Panel.

Windows\ 95, 98 PCs

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

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

Double-click the Network icon. The *Network* dialog box displays with a list of currently installed network components. If the list includes TCP/IP, and then the protocol has already been enabled. Skip to step 9.

If TCP/IP does not display as an installed component, click *Add.* The Select Network Component Type dialog box displays.

Select *Protocol*, and then click *Add…*The Select Network Protocol dialog box displays.

Click on *Microsoft* in the Manufacturers list box, and then click *TCP/IP* in the Network Protocols list box.

Click *OK* to return to the Network dialog box, and then click *OK* again. You may be prompted to install files from your Windows 95/98 installation CD. Follow the instructions to install the files.

Click *OK* to restart the PC and complete the TCP/IP installation. Next, configure the PCs to accept IP information assigned by the device.

Open the Control Panel window, and then click the Network icon.

Select the network component labeled TCP/IP, and then click *Properties*. If you have multiple TCP/IP listings, select the listing associated with your network card or adapter.

In the TCP/IP Properties dialog box, click the IP Address tab.

Click the radio button labeled Obtain an IP address automatically.

Click the DNS Configuration tab, and then click the radio button labelled *Obtain an IP address automatically*.

Click *OK* twice to confirm and save your changes. You will be prompted to restart Windows.

Click *Yes*.

Windows NT 4.0 workstations

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

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

In the Control Panel window, double click the Network icon.

In the *Network dialog* box, click the *Protocols* tab. The *Protocols* tab displays a list of currently installed network protocols. If the list includes TCP/IP, then the protocol has already been enabled. Skip to step 9.

If TCP/IP does not display as an installed component, click *Add.*

In the *Select Network Protocol* dialog box, select *TCP/IP*, and then click *OK*. You may be prompted to install files from your Windows NT installation CD or other media. Follow the instructions to install the files. After all files are installed, a window displays to inform you that a TCP/IP service called DHCP can be set up to dynamically assign IP information.

Click *Yes* to continue, and then click *OK* if prompted to restart your computer. Next, configure the PCs to accept IP information assigned by the device.

Open the Control Panel window, and then double-click the Network icon.

In the *Network* dialog box, click the *Protocols* tab.

In the *Protocols* tab, select *TCP/IP*, and then click *Properties*.

In the Microsoft TCP/IP Properties dialog box, click the radio button labelled Obtain an IP address from a DHCP server.

Click *OK* twice to confirm and save your changes, and then close the Control Panel.

Assigning static Internet information to your PCs

If you are a typical user, you will not need to assign static Internet information to your LAN PCs because your ISP automatically assigns this information for you.

{ XE "IP configuration: static IP addresses" **}{** XE "PC Configuration:static IP addresses" **}{** XE "Static IP addresses" **}**In some cases however, you may want to assign Internet information to some or all of your PCs directly (often called "statically"), rather than allowing the device to assign it. This option may be desirable (but not required) if:

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

Before you begin, you must have the following information available:

- The IP address and subnet mask of each PC
- The IP address of the default gateway for your LAN. In most cases, this is the address assigned to the LAN port on the device. By default, the LAN port**{** XE "LAN port:default IP information" **}** is assigned the IP address 192.168.1.1. (You can change this number or another number can be assigned by your ISP.)
- The IP address of your ISP's Domain Name System (DNS) server.

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


Note

Your PCs must have IP addresses that place them in the same subnet as the device*'s LAN port.*

B Appendix B - IP Addresses, Network Masks, and Subnets

IP Addresses


Note

This section refers only to IP addresses for IPv4 (version 4 of the Internet Protocol). IPv6 addresses are not covered.

This section assumes basic knowledge of binary numbers, bits, and bytes.

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

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

Structure of an IP address

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

Similarly, IP addresses contain two kinds of information:

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

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

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

Here are some examples of valid IP addresses:

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

Network classes

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

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

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

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

Some important notes regarding IP addresses:

- The class can be determined easily from field1:
  field1 = 1-126: Class A
  field1 = 128-191: Class B
  field1 = 192-223: Class C
  (field1 values not shown are reserved for special uses)
- A host ID can have any value except all fields set to 0 or all fields set to 255, as those values are reserved for special uses.

Subnet masks

Definition mask

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

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

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

255.255.255.128

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

11111111. 11111111. 11111111.10000000

As with any class C address, all of the bits in field1 through field3 are part of the network ID, but note how the mask specifies that the first bit in field4 is also included. Since this extra bit has only two values (0 and 1), this means there are two subnets. Each subnet uses the remaining 7 bits in field4 for its host IDs, which range from 1 to 126 hosts (instead of the usual 0 to 255 for a class C address).

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

255.255.255.192 or 11111111. 11111111. 11111111.11000000

The two extra bits in field4 can have four values (00, 01, 10, 11), so there are four subnets. Each subnet uses the remaining six bits in field4 for its host IDs, ranging from 1 to 62.

Note

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

Class A:255.0.0.0
Class B:255.255.0.0
Class C:255.255.255.0

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

C Appendix C - Troubleshooting

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

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

Troubleshooting Suggestions

Problem	Troubleshooting Suggestion
LEDs	
Power LED does not illuminate after product is turned on.	**{** XE "LEDs:troubleshooting" **}**Verify that you are using the power cable provided with the device and that it is securely connected to the device and a wall socket/power strip.
Internet LED does not illuminate after phone cable is attached.	Verify that a standard telephone cable (called an RJ-11 cable) like the one provided is securely connected to the DSL port and your wall phone port. Allow about 30 seconds for the device to negotiate a connection with your ISP.
LINK LAN LED does not illuminate after Ethernet cable is attached.	Verify that the Ethernet cable is securely connected to your LAN hub or PC and to the device. Make sure the PC and/or hub is turned on. Verify that your cable is sufficient for your network requirements. A 100 Mbit/sec network (10BaseTx) should use cables labeled CAT 5. A 10Mbit/sec network may tolerate lower quality cables.
Internet Access	
My PC cannot access the Internet	Run a health check on your device. Use the ping utility (discussed in the following section) to check whether your PC can communicate with the device's LAN IP address (by default 192.168.1.1). If it cannot, check the Ethernet cabling. If you statically assigned a private IP address to the computer, (not a registered public address), verify the following: • Check that the gateway IP address on the computer is your public IP address (see Current Status on page 1 for instructions on viewing the IP information.) If it is not, correct the address or configure the PC to receive IP information automatically. • Verify with your ISP that the DNS server specified for the PC is valid. Correct the address or configure the PC to receive this information automatically.
My LAN PCs cannot display web pages on the Internet.	Verify that the DNS server IP address specified on the PCs is correct for your ISP, as discussed in the item above. If you specified that the DNS server be assigned dynamically from a server, then verify with your ISP that the address configured on the device is correct, and then you can use the ping utility, discussed on page 50, to test connectivity with your ISP's DNS server.
Web pages	

Problem	Troubleshooting Suggestion
*I forgot/lost my user ID or password**{** XE "Password:recovering" **}**.*	If you have not changed the password from the default, try using "admin" as both the user ID and password. Otherwise, you can reset the device to the default configuration by pressing three times the Reset Default button on the front panel of the device. Then, type the default User ID and password shown above. **WARNING:** Resetting the device removes any custom settings and returns all settings to their default values.
I cannot access the web pages from my browser.	Use the ping utility, discussed in the following section, to check whether the PC can communicate with the device's LAN IP address (by default 192.168.1.1). If it cannot, check the Ethernet cabling. Verify that you are using Internet Explorer or Netscape Navigator v4.0 or later. Verify that the PC's IP address is defined as being on the same subnet as the IP address assigned to the LAN port on the device*.*
My changes to the web pages are not being retained.	Be sure to use the *Confirm Changes* function after any changes.

Diagnosing Problem using IP Utilities

Ping

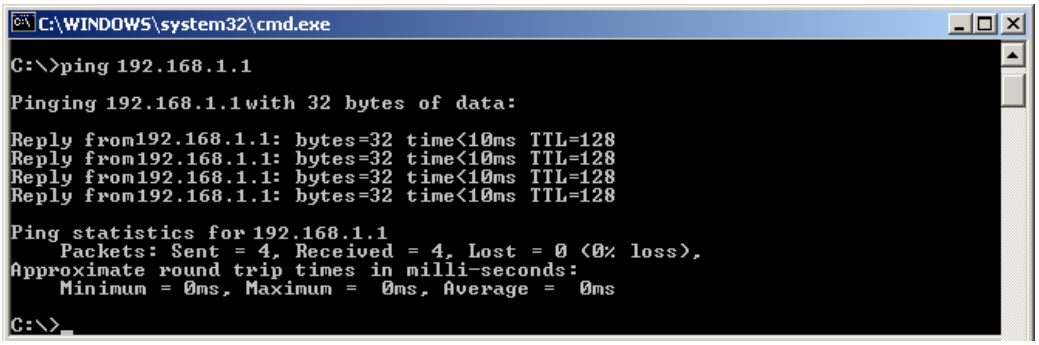
Ping is a command you can use to check whether your PC can recognize other computers on your network and the Internet. A ping command sends a message to the computer you specify. If the computer receives the message, it sends messages in reply. To use it, you must know the IP address of the computer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

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

ping 192.168.1.1

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

If the target computer receives the message, a *Command Prompt* window is displayed:



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

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

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

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

nslookup

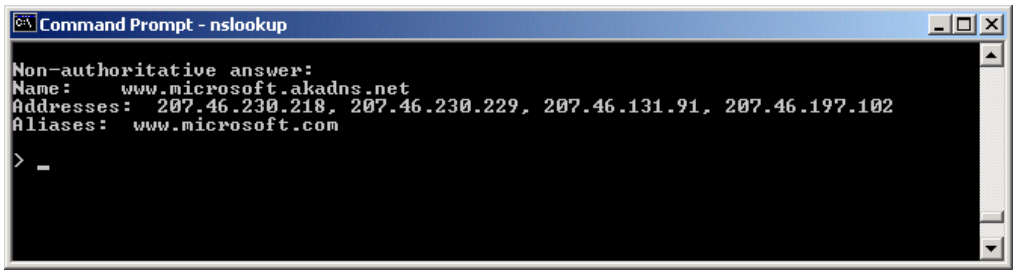
You can use the nslookup command to determine the IP address associated with an Internet site name. You specify the common name, and the nslookup command looks up the name in on your DNS server (usually located with your ISP). If that name is not an entry in your ISP's DNS table, the request is then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

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

Nslookup

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

The window will display the associate IP address, if known, as shown below:



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

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

D Appendix D - Advanced DSL port attributes

The following table displays detailed information about the advanced DSL port attributes.


Note

You should only need to refer to these attributes if your ISP has asked you to check something or if you are experienced in DSL port configuration.

Attribute	Value
Line Rate	DSL down stream trained rate (cells/sec)
TxCellTransmitted	Number of transmitted ATM cells
RxCellReceived	Number of received ATM cells
Cbr_CPS	Bit rate for CBR QoS Class
Rvbr SCR_CPS	Sustained cell rate for rt-vbr
Vbr SCR_CPS	Sustained cell rate for nrt-vbr
Rvbr PCR_CPS	Peak cell rate for rt-vbr
Vbr PCR_CPS	Peak cell rate for nrt-vbr
Ubr_CPS	Cell rate for UBR+
Ubr MCR_CPS	Minimum Cell rate for UBR+
CACMode	Gives CAC Mode
CACFunction	Call Admission control function
Port Speed Hook	Function to accommodate the port speed changes
Vpi Range	Range of valid VPI
Vci Range	Range of valid VCI
Default Pcr	Default Peak Cell Rate
Traffic Shaping	Gives weather traffic shaping is enabled/disabled
Ni Type	Network Interface Type
Is Dsl Dma Up	Operational Status of DSL DMA block
Enabled Channels	Number of enabled channels
DSP Firmware Version	DSP code version number
DSP Version	DSL driver version number
Connected	Current connected state: True – modem is connected to a remote modem False – modem is not connected to a remote modem
Operational Mode	Current operating (connected) mode (modulation)

Attribute	Value
State	Current state of the device: Idle – not connected or attempting to connect HandShake – connecting/hunting for remote modem Training – connecting/found a remote modem Showtime – connected to remote modem
Watchdog	Watchdog timer which confirms that the DSP is executing a program correctly
Operation Progress	Detailed startup information to be used for debugging
Last Failed	This value is reset to 0 each time a startup is attempted. If there is a failure, it indicates the reason for the failure.
Tx Bit Rate	Transmit rate (bits per second) of the device
Rx Bit Rate	Receive rate (bits per second) of the device
Tx Cell Rate	Transmit rate (cells per second) of the device
Rx Cell Rate	Receive rate (cells per second) of the device
Phy TXCell Count	Transmit ATM cell counter
Phy RXCell Count	Receive ATM cell counter
Phy Cell Drop Count	UTOPIA cell drop counter
Overall Failure	Indicates the cause of failure
Local ITUCountry Code	Country code used by the device (modulation specific)
Local SEF	Number of severely errored frame defects received by the device
Local End LOS	Number of loss of signal defects received by the device
Local SNRMargin	The local Signal to Noise Ration margin
Local Line Attn	The local attenuation values
Local Tx Power	Current transmit power attenuation of the device
Local Fast Channel Rx Rate	Receive rate (bits per second) of the device on the fast path
Local Fast Channel Tx Rate	Transmit rate (bits per second) of the device on the fast path
Local Fast Channel FEC	Instances of Forward Error Correction required by the device on the fast channel
Local Fast Channel CRC	Number of CRC errors received by the device on the fast channel
Local Fast Channel HEC	Number of ATM Cell Header errors corrected by the device on the fast channel
Local Fast Channel NCD	Number of no cell delineation received by the device on the fast channel
Local Fast Channel OCD	Number of out of cell delineation received by the device on the fast channel
Local Interleaved Channel Rx Rate	Receive rate (bits per second) of the device on the interleaved path
Local Interleaved Channel Tx Rate	Transmit rate (bits per second) of the device on the interleaved path

Attribute	Value
Local Interleaved Channel FEC	Instances of Forward Error Correction required by the device on the interleaved channel
Local Interleaved Channel CRC	Number of CRC errors received by the device on the interleaved channel
Local Interleaved Channel HEC	Number of ATM Cell Header errors corrected by the device on the interleaved channel
Local Interleaved Channel NCD	Number of no cell delineation received by the device on the interleaved channel
Local Interleaved Channel OCD	Number of out of cell delineation received by the device on the interleaved channel
Remote SEF	Number of severely errored frame defects received by the device
Remote LOS	Number of loss of signal defects received by the device
Remote Line Attn	The remote attenuation values
Remote SNRMargin	The remote Signal to Noise Ration margin
Remote Fast Channel FEC	Instances of Forward Error Correction required by the device on the fast channel
Remote Fast Channel CRC	Number of CRC errors received by the device on the fast channel
Remote Fast Channel HEC	Number of ATM Cell Header errors corrected by the device on the fast channel
Remote Fast Channel NCD	Number of no cell delineation received by the device on the fast channel
Remote Interleaved Channel FEC	Instances of Forward Error Correction required by the device on the interleaved channel
Remote Interleaved Channel CRC	Number of CRC errors received by the device on the interleaved channel
Remote Interleaved Channel HEC	Number of ATM Cell Header errors corrected by the device on the interleaved channel
Remote Interleaved Channel NCD	Number of no cell delineation received by the device on the interleaved channel
Activate Line	Abort – deactivates the DSL link None – signifies that this parameter has been read Start – activates the DSL link
Host Control	Disable – terminates any host/API interaction with the DSP (for testing purposes) Enable – enables host/API interaction with the DSP
Auto Start	"True" - A Connection will be established at power up. "False" - The modem will remain in Idle mode at power up.
Failsafe	True – a failsafe timer is activated when a startup request is made. Once a connection has been established, the failsafe timer is disabled False – a failsafe timer is not activated when a startup request is made

Attribute	Value
Whip	Possible Values if compiled for Whip Serial: Serial or Inactive Possible Values if compiled for Whip TCP: TCP or Inactive Possible Values if compiled for Whip Serial/TCP: Serial, TCP or Inactive
Whip Active	Indicated state of whip. Possible values are Inactive, SerialActive and TCPActive
Action	An action given when ActivateLine is set to Start. Possible values are Startup, SpectrumReverb, SpectrumMedely or SpectrumPilot
Standard	Indicates the preferred standard compliance. *Multimode* indicates that the device automatically detects the other end as one of the supported standards.
Utopia Interface	Level1 – Utopia Level 1 internal framing is used with the DSP Level2 – Utopia Level 2 internal framing is used with the DSP
EC FDM Mode	EC – enables Echo Cancellation. This setting is necessary if your device is connected to a high speed CO. FDM – enables Frequency Division Multiplexing
Max Bits Per Bin	The maximum number of bits per bin. This can be any value between 1 and 15
Tx Start Bin	A value that indicates the lowest bin number allowed for transmit signal
Tx End Bin	A value that indicates the highest bin number allowed for transmit signal
Rx Start Bin	A value that indicates the lowest bin number allowed for receive signal
Rx End Bin	A value that indicates the highest bin number allowed for receive signal
Rx Auto Bin Adjust	Disable – the bin settings configured as the RxStartBin/RxEndBin parameters are used Enable – DSP automatically adjusts the bin selection for receive signal
Tx Attenuation	A value between 0dB and 12dB that indicates the transmit power attenuation
Bit Swap	Disable – disables the adjustment of the number of bits assigned to a subcarrier without interrupting data flow Enable – enables the adjustment off the number of bits assigned to a subcarrier without interrupting data flow
Max Down Rate	A value that sets the maximum downstream rate for those applications where it is necessary to limit the downstream data rate
Physical Port	A value between 0 and 14 that sets the Utopia Level 2 Utopia address

Attribute	Value
Retrain	Disable – disables full retrain capability Enable – enables full retrain capability
Detect Noise	Enables/disables noise detection (only valid for Annex AHS)
Capability	This parameter controls whether the CPE will attempt to startup using alternate standards if the CO does not support G.Span (High Speed (HS)). The CPE has the ability to connect in either ADSL Annex A or G.Span. This is provided by the ADSL/Annex A /G.Span Auto Detect feature. The standard used depends on the capability of the CO. Using Auto Detect, startup at the CPE is first attempted in Annex A. The CO is the master and the CPE is the slave. If the result of handshake with the CO is G.Span (HS), then the CPE will switch to G.Span. If the CO does not support G.Span, then the resultant connection will be ADSL Annex A. This parameter must be set to AHS to configure the modem for A & HS 'two-speed' Auto Detect. For Auto Detect, all other parameters should be set to the Annex A profile. If UTOPIA Level 2 framing is set (using the UtopiaInterface parameter), ensure that the UTOPIA address is set (using the PhysicalPort parameter) as there is no default value. If the result of handshake with the CO is G.Span (HS), then the CPE will switch to G.Span and the appropriate CPE parameters will be automatically re-configured by the DSP for G.Span operation. A: Annex A capable AHS: Annex A or High Speed capable Disable: the device does not send any standards capability information to the CO.
Coding Gain	The gain due to trellis/RS coding. Its value ranges from 0-7 dB. *Auto* automatically selects the coding gain.
Framer Type	Value can be set to Type 0 – 3 or Type3ET. To enable DataBoost set FramerType to Type3ET
Dying Gasp	Enables/disables dying gasp.
Defaults	Sets the recommended default parameters for a given Standard.
Reset Defaults	Reset device to use default port configuration

E Appendix E - Glossary

Term	Description
10BASE-T	A designation for the type of wiring used by Ethernet networks with a data rate of 10 Mbps. Also known as Category 3 (CAT 3) wiring. See *data rate, Ethernet*.
100BASE-T	A designation for the type of wiring used by Ethernet networks with a data rate of 100 Mbps. Also known as Category 5 (CAT 5) wiring. See *data rate, Ethernet*.
ADSL	Asymmetric Digital Subscriber Line The most commonly deployed "flavor" of DSL for home users is asymmetrical DSL. The term asymmetrical refers to its unequal data rates for downloading and uploading (the download rate is higher than the upload rate). The asymmetrical rates benefit home users because they typically download much more data from the Internet than they upload.
Analog	An analog signal is a signal that has had its frequency modified in some way, such as by amplifying its strength or varying its frequency, in order to add information to the signal. The voice component in DSL is an analog signal. See *digital*.
ATM	Asynchronous Transfer Mode A standard for high-speed transmission of data, text, voice, and video, widely used within the Internet. ATM data rates range from 45 Mbps to 2.5 Gbps. See *data rate*.
Authenticate	To verify a user's identity, such as by prompting for a password.
Binary	The "base two" system of numbers that uses only two digits, 0 and 1, to represent all numbers. In binary, the number 1 is written as 1, 2 as 10, 3 as 11, 4 as 100, etc. Although expressed as decimal numbers for convenience, IP addresses in actual use are binary numbers; e.g., the IP address 209.191.4.240 is 11010001.10111111.00000100.11110000 in binary. See bit, IP address, network mask.
Bit	Short for "binary digit," a bit is a number that can have two values, 0 or 1. See binary.
Bps	bits per second

Bridging	Passing data from your network to your ISP and vice versa using the hardware addresses of the devices at each location. Bridging contrasts with routing which can add more intelligence to data transfers by using network addresses instead. The device can perform both routing and bridging. Typically, when both functions are enabled, the device routes IP data and bridges all other types of data. See routing.
Broadband	A telecommunications technology that can send different types of data over the same medium. DSL is a broadband technology.
Broadcast	To send data to all computers on a network.
DHCP	Dynamic Host Configuration Protocol DHCP automates address assignment and management. When a computer connects to the LAN, DHCP assigns it an IP address from a shared pool of IP addresses; after a specified time limit, DHCP returns the address to the pool.
DHCP relay	Dynamic Host Configuration Protocol relay A DHCP relay is a computer that forwards DHCP data between computers that request IP addresses and the DHCP server that assigns the addresses. Each of the device's interfaces can be configured as a DHCP relay. See DHCP.
DHCP server	Dynamic Host Configuration Protocol server A DHCP server is a computer that is responsible for assigning IP addresses to the computers on a LAN. See DHCP.
Digital	Of data, having a form based on discrete values expressed as binary numbers (0's and 1's). The data component in DSL is a digital signal. See analog.
DNS	Domain Name System The DNS maps domain names into IP addresses. DNS information is distributed hierarchically throughout the Internet among computers called DNS servers. For example, www.yahoo.com is the domain name associated with IP address 216.115.108.243. When you start to access a web site, a DNS server looks up the requested domain name to find its corresponding IP address. If the DNS server cannot find the IP address, it communicates with higher-level DNS servers to determine the IP address. See domain name.
Domain name	A domain name is a user-friendly name used in place of its associated IP address. Domain names must be unique; their assignment is controlled by the Internet Corporation for Assigned Names and Numbers (ICANN). Domain names are a key element of URLs, which identify a specific file at a web site. See DNS.

Download	To transfer data in the downstream direction, i.e., from the Internet to the user.
DSL	Digital Subscriber Line A technology that allows both digital data and analog voice signals to travel over existing copper telephone lines.
Encryption keys	See network keys
Ethernet	The most commonly installed computer network technology, usually using twisted pair wiring. Ethernet data rates are 10 Mbps and 100 Mbps. See also 10BASE-T, 100BASE-T, twisted pair.
FTP	File Transfer Protocol A program used to transfer files between computers connected to the Internet. Common uses include uploading new or updated files to a web server, and downloading files from a web server.
Gbps	Abbreviation of Gigabits per second, or one billion bits per second. Internet data rates are often expressed in Gbps.
Host	A device (usually a computer) connected to a network.
HTTP	Hyper-Text Transfer Protocol HTTP is the main protocol used to transfer data from web sites so that it can be displayed by web browsers. See web browser, web site.
Hub	A hub is a place of convergence where data arrives from one or more directions and is forwarded out in one or more directions. It connects an Ethernet bridge/router to a group of PCs on a LAN and allows communication to pass between the networked devices.
ICMP	Internet Control Message Protocol An Internet protocol used to report errors and other network-related information. The ping command makes use of ICMP.
IEEE	The Institute of Electrical and Electronics Engineers is a technical professional society that fosters the development of standards that often become national and international standards.
Internet	The global collection of interconnected networks used for both private and business communications.
Intranet	A private, company-internal network that looks like part of the Internet (users access information using web browsers), but is accessible only by employees.

IP	See TCP/IP.
IP address	Internet Protocol address The address of a host (computer) on the Internet, consisting of four numbers, each from 0 to 255, separated by periods, e.g., 209.191.4.240. An IP address consists of a network ID that identifies the particular network the host belongs to, and a host ID uniquely identifying the host itself on that network. A network mask is used to define the network ID and the host ID. Because IP addresses are difficult to remember, they usually have an associated domain name that can be specified instead. See domain name, network mask.
ISP	Internet Service Provider A company that provides Internet access to its customers, usually for a fee.
LAN	Local Area Network. A network limited to a small geographic area, such as a home or small office.
LED	Light Emitting Diode An electronic light-emitting device. The indicator lights on the front of the device are LEDs.
MAC address	Media Access Control address The permanent hardware address of a device, assigned by its manufacturer. MAC addresses are expressed as six pairs of hex characters, with each pair separated by colons. For example; NN:NN:NN:NN:NN:NN.
Mask	See network mask.
Mbps	Abbreviation for Megabits per second, or one million bits per second. Network data rates are often expressed in Mbps.
NAT	Network Address Translation A service performed by many routers that translates your network's publicly known IP address into a private IP address for each computer on your LAN. Only your router and your LAN know these addresses; the outside world sees only the public IP address when talking to a computer on your LAN.
Network	A group of computers that are connected together, allowing them to communicate with each other and share resources, such as software, files, etc. A network can be small, such as a LAN, or very large, such as the Internet.
Network keys	(Also known as encryption keys.) 64-bit and 128-bit encryption keys used in WEP wireless security schemes. The keys encrypt data over the WLAN, and only wireless PCs configured with WEP keys

	that correspond to the keys configured on the device can send/receive encrypted data.
Network mask	A network mask is a sequence of bits applied to an IP address to select the network ID while ignoring the host ID. Bits set to 1 mean "select this bit" while bits set to 0 mean "ignore this bit." For example, if the network mask 255.255.255.0 is applied to the IP address 100.10.50.1, the network ID is 100.10.50, and the host ID is 1. See binary, IP address, subnet.
NIC	Network Interface Card An adapter card that plugs into your computer and provides the physical interface to your network cabling. For Ethernet NICs this is typically an RJ-45 connector. See Ethernet, RJ-45.
Packet	Data transmitted on a network consists of units called packets. Each packet contains a payload (the data), plus overhead information such as where it came from (source address) and where it should go (destination address).
Ping	Packet Internet (or Inter-Network) Groper A program used to verify whether the host associated with an IP address is online. It can also be used to reveal the IP address for a given domain name.
Port	A physical access point to a device such as a computer or router, through which data flows into and out of the device.
PPP	Point-to-Point Protocol A protocol for serial data transmission that is used to carry IP (and other protocol) data between your ISP and your computer. The WAN interface on the device uses two forms of PPP called PPPoA and PPPoE. See PPPoA, PPPoE.
PPPoA	Point-to-Point Protocol over ATM One of the two types of PPP interfaces you can define for a Virtual Circuit (VC), the other type being PPPoE. You can define only one PPPoA interface per VC.
PPPoE	Point-to-Point Protocol over Ethernet One of the two types of PPP interfaces you can define for a Virtual Circuit (VC), the other type being PPPoA. You can define one or more PPPoE interfaces per VC.
Protocol	A set of rules governing the transmission of data. In order for a data transmission to work, both ends of the connection have to follow the rules of the protocol.
Remote	In a physically separate location. For example, an employee away on travel who logs in to the company's intranet is a remote user.

RIP	Routing Information Protocol The original TCP/IP routing protocol. There are two versions of RIP: version I and version II.
RJ-11	Registered Jack Standard-11 The standard plug used to connect telephones, fax machines, modems, etc. to a telephone port. It is a 6-pin connector usually containing four wires.
RJ-45	Registered Jack Standard-45 The 8-pin plug used in transmitting data over phone lines. Ethernet cabling usually uses this type of connector.
Routing	Forwarding data between your network and the Internet on the most efficient route, based on the data's destination IP address and current network conditions. A device that performs routing is called a router.
SDNS	Secondary Domain Name System (server) A DNS server that can be used if the primary DSN server is not available. See DNS.
Subnet	A subnet is a portion of a network. The subnet is distinguished from the larger network by a subnet mask that selects some of the computers of the network and excludes all others. The subnet's computers remain physically connected to the rest of the parent network, but they are treated as though they were on a separate network. See network mask.
Subnet mask	A mask that defines a subnet. See network mask.
TCP	See TCP/IP.
TCP/IP	Transmission Control Protocol/Internet Protocol The basic protocols used on the Internet. TCP is responsible for dividing data up into packets for delivery and reassembling them at the destination, while IP is responsible for delivering the packets from source to destination. When TCP and IP are bundled with higher-level applications such as HTTP, FTP, Telnet, etc., TCP/IP refers to this whole suite of protocols.
Telnet	An interactive, character-based program used to access a remote computer. While HTTP (the web protocol) and FTP only allow you to download files from a remote computer, Telnet allows you to log into and use a computer from a remote location.
TFTP	Trivial File Transfer Protocol A protocol for file transfers, TFTP is easier to use than File Transfer Protocol (FTP) but not as capable or secure.
TKIP	Temporal Key Integrity Protocol (TKIP) provides WPA with a data encryption function. It ensures that a unique master key is generated for each packet, supports message integrity and

	sequencing rules and supports re-keying mechanisms.
Triggers	Triggers are used to deal with application protocols that create separate sessions. Some applications, such as NetMeeting, open secondary connections during normal operations, for example, a connection to a server is established using one port, but data transfers are performed on a separate connection. A trigger tells the device to expect these secondary sessions and how to handle them. Once you set a trigger, the embedded IP address of each incoming packet is replaced by the correct host address so that NAT can translate packets to the correct destination. You can specify whether you want to carry out address replacement, and if so, whether to replace addresses on TCP packets only, UDP packets only, or both.
Twisted pair	The ordinary copper telephone wiring used by telephone companies. It contains one or more wire pairs twisted together to reduce inductance and noise. Each telephone line uses one pair. In homes, it is most often installed with two pairs. For Ethernet LANs, a higher grade called Category 3 (CAT 3) is used for 10BASE-T networks, and an even higher grade called Category 5 (CAT 5) is used for 100BASE-T networks. See 10BASE-T, 100BASE-T, Ethernet.
Unnumbered interfaces	An unnumbered interface is an IP interface that does not have a local subnet associated with it. Instead, it uses a router-id that serves as the source and destination address of packets sent to and from the router. Unlike the IP address of a normal interface, the router-id of an unnumbered interface is allowed to be the same as the IP address of another interface. For example, the WAN unnumbered interface of your device uses the same IP address of the LAN interface (192.168.1.1). The unnumbered interface is temporary – PPP or DHCP will assign a 'real' IP address automatically.
Upstream	The direction of data transmission from the user to the Internet.
VC	Virtual Circuit A connection from your DSL router to your ISP.
VCI	Virtual Circuit Identifier Together with the Virtual Path Identifier (VPI), the VCI uniquely identifies a VC. Your ISP will tell you the VCI for each VC they provide. See VC.

VPI	Virtual Path Identifier Together with the Virtual Circuit Identifier (VCI), the VPI uniquely identifies a VC. Your ISP will tell you the VPI for each VC they provide. See VC.
WAN	Wide Area Network Any network spread over a large geographical area, such as a country or continent. With respect to the device, WAN refers to the Internet.
Web browser	A software program that uses Hyper-Text Transfer Protocol (HTTP) to download information from (and upload to) web sites, and displays the information, which may consist of text, graphic images, audio, or video, to the user. Web browsers use Hyper-Text Transfer Protocol (HTTP). Popular web browsers include Netscape Navigator and Microsoft Internet Explorer. See HTTP, web site, WWW.
Web page	A web site file typically containing text, graphics and hyperlinks (cross-references) to the other pages on that web site, as well as to pages on other web sites. When a user accesses a web site, the first page that is displayed is called the home page. See hyperlink, web site.
Web site	A computer on the Internet that distributes information to (and gets information from) remote users through web browsers. A web site typically consists of web pages that contain text, graphics, and hyperlinks. See hyperlink, web page.
WEP	Wired Equivalent Privacy (WEP) encrypts data over WLANs. Data is encrypted into blocks of either 64 bits length or 128 bits length. The encrypted data can only be sent and received by users with access to a private network key. Each PC on your wireless network must be manually configured with the same key as your device in order to allow wireless encrypted data transmissions. Eavesdroppers cannot access your network if they do not know your private key. WEP is considered to be a low security option.
Wireless	Wireless is a term used to describe telecommunications in which electromagnetic waves (rather than some form of wire) carry the signal over part or the entire communication path. See wireless LAN.
Wireless LAN	A wireless LAN (WLAN) is one in which a mobile user can connect to a local area network (LAN) through a wireless (radio) connection. A standard, IEEE 802.11, specifies the technologies for wireless LANs.
WPA	Wi-Fi Protected Access WPA is an initiative by the IEEE and Wi-Fi Alliance to address the security limitations of WEP. WPA provides a stronger data encryption method (called Temporal Key Integrity Protocol (TKIP)). It runs in a special, easy-to-set-up home mode called Pre-Shared Key (PSK) that allows you to manually enter a pass phrase on all the

	devices in your wireless network. WPA data encryption is based on a WPA master key. The master key is derived from the pass phrase and the network name (SSID) of the device. It provides improved data encryption and stronger user authentication. The mode of WPA supported on your device is called Pre-Shared Key (PSK), which allows you to manually enter a type of key called a pass phrase.
WWW	World Wide Web Also called (the) Web. Collective term for all web sites anywhere in the world that can be accessed via the Internet.

F Appendix F - Specification

A1. Hardware Specifications

- LAN Interface
- One 10/100BaseT Ethernet port
- Connector – RJ-45
- One USB 1.1 device port, type B connector

- WAN ADSL Line Interface
- Compliant with ITU-T G.992.1, G.992.2, G.992.3, G.992.5 and ANSI and ANSI T1. 413 Issue 2
- Line Impedance: 100 Ω
- Connection Loops: One (pair wire)
- Connector: RJ-11

- Indicators
- PWR – Green LED indicates power and operation
- WAN – Green LED indicates ADSL connection
- PPP – Green LED indicates PPP connection
- LAN – Green LED indicates LAN data Transmitting / Receiving
- USB – Green LED indicates data Transmitting / Receiving through USB port (***X8824e/X8824m only***)
- ALM – Red LED indicates device error (***X8821e/X8821m only***)

- OAM&P
- Local: Telnet or Web management via Ethernet
- Remote: Telnet or Web Management

- Environment
- Operation Temperature: 0°C ~ 45°C
- Operation Humidity: 5% ~ 95%
- Storage Temperature: -20 ~ +85°C
- Storage Humidity: 5%~95%

- Power
- AC Adapter: Input 110/220VAC, 50/60Hz; Output 15VAC 1A

- Certificates
- CE, CB

A2. Software Specifications

- ATM
- ATM Cells over ADSL, AAL5
- Bridge mode: Supports 8 PVCs
- Router mode: Supports 5 PVCs
- Supports UBR, CBR, VBR-nrt, and VBR-rt traffic classes
- ATM Forum UNI 3.0, UNI 3.1, UNI 4.0
- ILMI 4.0

- Bridging
- Transparent Bridging and spanning tree protocol (IEEE 802.1D)
- RFC2684 (RFC 1483) Bridged
- IP packet filtering
- ZIPB (Zero installation PPP Bridge)

- Routing
- IP routing: RIP1 and RIP2, and static routing
- PPPoE and IP over ATM, PPP over ATM
- PAP and CHAP for user authentication in PPP connection
- RFC2684 (RFC1483) Routed
- NAT/PAT with extensive ALG support
- Supports SNTP and DNS relay
- Virtual interface and secondary IP addresses
- Supports IP QoS per RFC2472/2475 Routing

- Configuration and Network Management Features
- TR-037 compliant auto-configuration using ILMI
- DHCP client, server and reply for IP management
- System Log capability
- WEB and Telnet for local or remote management
- TFTP, HTTP for firmware upgrade and configuration
- TR-069 for local and remote configuration and management