ZyXEL NBG-415N

Draft 802.11n Wireless Broadband Router

User's Guide

Version 1.00
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Edition 1.00

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Certifications

Federal Communications Commission (FCC) Interference Statement

The device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operations.

This device has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this device does cause harmful interference to radio/television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and the receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.
- To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

注意！

依據 低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

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前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Notices

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device has been designed for the WLAN 2.4 GHz network throughout the EC region and Switzerland, with restrictions in France.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Certifications

1. Go to www.zyxel.com
2. Select your product from the drop-down list box on the ZyXEL home page to go to that product's page.
3. Select the certification you wish to view from this page

Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions.

- Do NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Do NOT expose your device to dampness, dust or corrosive liquids.
- Do NOT store things on the device.
- Do NOT install, use, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Connect ONLY suitable accessories to the device.
- ONLY qualified service personnel should service or disassemble this device.
- Make sure to connect the cables to the correct ports.
- Place connecting cables carefully so that no one will step on them or stumble over them.
- Always disconnect all cables from this device before servicing or disassembling.
- Use ONLY an appropriate power adaptor or cord for your device.
- Connect the power adaptor or cord to the right supply voltage (for example, 110V AC in North America or 230V AC in Europe).
- Do NOT allow anything to rest on the power adaptor or cord and do NOT place the product where anyone can walk on the power adaptor or cord.
- Do NOT use the device if the power adaptor or cord is damaged as it might cause electrocution.
- If the power adaptor or cord is damaged, remove it from the power outlet.
- Do NOT attempt to repair the power adaptor or cord. Contact your local vendor to order a new one.
- Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- Antenna Warning! This device meets ETSI and FCC certification requirements when using the included antenna(s).

This product is recyclable. Dispose of it properly.

ZyXEL Limited Warranty

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two years from the date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its discretion, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal or higher value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product has been modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

Note

Repair or replacement, as provided under this warranty, is the exclusive remedy of the purchaser. This warranty is in lieu of all other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular use or purpose. ZyXEL shall in no event be held liable for indirect or consequential damages of any kind to the purchaser.

To obtain the services of this warranty, contact ZyXEL's Service Center for your Return Material Authorization number (RMA). Products must be returned Postage Prepaid. It is recommended that the unit be insured when shipped. Any returned products without proof of purchase or those with an out-dated warranty will be repaired or replaced (at the discretion of ZyXEL) and the customer will be billed for parts and labor. All repaired or replaced products will be shipped by ZyXEL to the corresponding return address, Postage Paid. This warranty gives you specific legal rights, and you may also have other rights that vary from country to country.

Registration

Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com for global products, or at www.us.zyxel.com for North American products.

Customer Support

Please have the following information ready when you contact customer support.

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

METHOD	SUPPORT E-MAIL	TELEPHONE	WEB SITE	REGULAR MAIL
LOCATION	SALES E-MAIL	FAX	FTP SITE	
CORPORATE HEADQUARTERS (WORLDWIDE)	support@zyxel.com.tw	+886-3-578-3942	www.zyxel.com www.europe.zyxel.com	ZyXEL Communications Corp. 6 Innovation Road II Science Park Hsinchu 300 Taiwan
	sales@zyxel.com.tw	+886-3-578-2439	ftp.zyxel.com ftp.europe.zyxel.com	
COSTA RICA	soporte@zyxel.co.cr	+506-2017878	www.zyxel.co.cr	ZyXEL Costa Rica Plaza Roble Escazú Etapa El Patio, Tercer Piso San José, Costa Rica
	sales@zyxel.co.cr	+506-2015098	ftp.zyxel.co.cr	
CZECH REPUBLIC	info@cz.zyxel.com	+420-241-091-350	www.zyxel.cz	ZyXEL Communications Czech s.r.o. Modranská 621 143 01 Praha 4 - Modrany Ceská Republika
	info@cz.zyxel.com	+420-241-091-359		
DENMARK	support@zyxel.dk	+45-39-55-07-00	www.zyxel.dk	ZyXEL Communications A/S Columbusvej 2860 Soeborg Denmark
	sales@zyxel.dk	+45-39-55-07-07		
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GERMANY	support@zyxel.de	+49-2405-6909-0	www.zyxel.de	ZyXEL Deutschland GmbH. Adenauerstr. 20/A2 D-52146 Wuerselen Germany
	sales@zyxel.de	+49-2405-6909-99		
HUNGARY	support@zyxel.hu	+36-1-3361649	www.zyxel.hu	ZyXEL Hungary 48, Zoldlomb Str. H-1025, Budapest Hungary
	info@zyxel.hu	+36-1-3259100		
KAZAKHSTAN	http://zyxel.kz/support	+7-3272-590-698	www.zyxel.kz	ZyXEL Kazakhstan 43, Dostyk ave.,Office 414 Dostyk Business Centre 050010, Almaty Republic of Kazakhstan
	sales@zyxel.kz	+7-3272-590-689		
NORTH AMERICA	support@zyxel.com	1-800-255-4101 +1-714-632-0882	www.us.zyxel.com	ZyXEL Communications Inc. 1130 N. Miller St. Anaheim CA 92806-2001 U.S.A.
	sales@zyxel.com	+1-714-632-0858	ftp.us.zyxel.com	

METHOD	SUPPORT E-MAIL	TELEPHONE	WEB SITE	REGULAR MAIL
LOCATION	SALES E-MAIL	FAX	FTP SITE	
NORWAY	support@zyxel.no	+47-22-80-61-80	www.zyxel.no	ZyXEL Communications A/S Nils Hansens vei 13 0667 Oslo Norway
	sales@zyxel.no	+47-22-80-61-81		
POLAND	info@pl.zyxel.com	+48 (22) 333 8250	www.pl.zyxel.com	ZyXEL Communications ul. Okrzei 1A 03-715 Warszawa Poland
		+48 (22) 333 8251		
RUSSIA	http://zyxel.ru/support	+7-095-542-89-29	www.zyxel.ru	ZyXEL Russia Ostrovityanova 37a Str. Moscow, 117279 Russia
	sales@zyxel.ru	+7-095-542-89-25		
SPAIN	support@zyxel.es	+34-902-195-420	www.zyxel.es	ZyXEL Communications Arte, 21 5ª planta 28033 Madrid Spain
	sales@zyxel.es	+34-913-005-345		
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	sales@zyxel.co.uk	+44-1344 303034	ftp.zyxel.co.uk	

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Preface

Congratulations on your purchase of the ZyXEL NBG-415N Wireless Broadband Router.

Note: Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com for global products, or at www.us.zyxel.com for North American products.

Your NBG-415N is easy to install and configure.

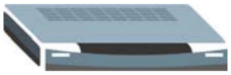
About This User's Guide

This manual is designed to guide you through the configuration of your NBG-415N for its various applications.

Syntax Conventions

- “Enter” means for you to type one or more characters. “Select” or “Choose” means for you to use one predefined choices.
- The SMT menu titles and labels are in **Bold Times New Roman** font. Predefined field choices are in **Bold Arial** font. Command and arrow keys are enclosed in square brackets. [ENTER] means the Enter, or carriage return key; [ESC] means the Escape key and [SPACE BAR] means the Space Bar.
- 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**.
- For brevity’s sake, we will use “e.g.,” as a shorthand for “for instance”, and “i.e.,” for “that is” or “in other words” throughout this manual.
- The ZyXEL NBG-415N Wireless Broadband Router may be referred to as “the NBG-415N” or “the ZyXEL Device” in this user’s guide.

Graphics Icons Key

NBG-415N 	Computer 	Notebook Computer
Server 	Modem 	Wireless Signal
Internet Cloud 	Switch 	Router

Related Documentation

- Supporting Disk

  Refer to the included CD for support documents.

- Quick Start Guide

  The Quick Start Guide is designed to help you get up and running right away. They contain hardware installation/connection information.

- ZyXEL Glossary and Web Site

  Please refer to www.zyxel.com for an online glossary of networking terms and additional support documentation.

User Guide Feedback

Help us help you. Send all User Guide-related comments, questions or suggestions for improvement to the following address, or use e-mail instead. Thank you!

The Technical Writing Team,
ZyXEL Communications Corp.,
6 Innovation Road II,
Science-Based Industrial Park,
Hsinchu, 300, Taiwan.

E-mail: techwriters@zyxel.com.tw

CHAPTER 1
Getting Started

This chapter introduces the main features and applications of your ZyXEL Device.

1.1 Overview

This ZyXEL Device is a secure wireless broadband router with a 4-port switch. The ZyXEL Device is best suited for setting up an Internet sharing network or a wireless network in a home or small business.

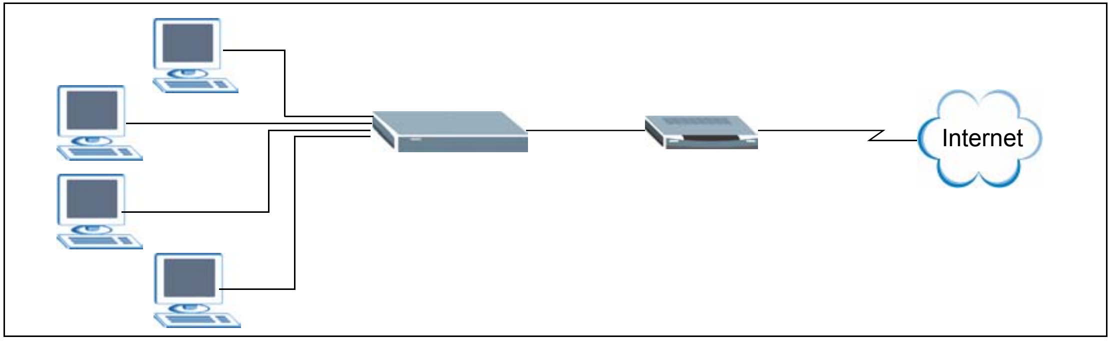
As a wireless router based on the draft IEEE 802.11n standard (also known as pre-N), the ZyXEL Device is able to connect to another draft IEEE 802.11n wireless device at a up to 300 Mbps using two simultaneous data streams. With the smart antenna technology, MIMO (Multiple Input Multiple Output), the ZyXEL Device uses three antennas to transmit and receives data over the wireless network. The use of multiple antennas reduces interference and signal distortion. For backward compatibility, the ZyXEL Device is also able to connect to IEEE 802.11b and IEEE 802.11g devices.

Refer to Appendix A on page 126 for the product specifications.

1.1.1 Internet Sharing Network

For Internet access, connect the WAN Ethernet port to your existing Internet access gateway (company network, or your cable or DSL modem for example) and connect computers or servers to the LAN ports for shared Internet access. See the Quick Start Guide for instructions on hardware connections.

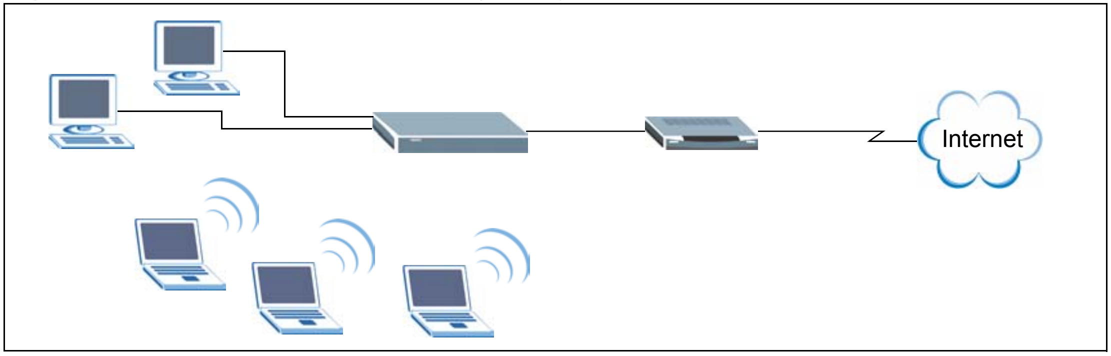
Figure 1 ZyXEL Device for Internet Sharing



1.1.2 Wireless Network

By default, the integrated wireless feature is enabled on the ZyXEL Device that allows you to set up a wireless network in your home or small office. Once connected, wireless clients can access network resources (such Internet access, printers or servers).

Figure 2 Wireless Network Setup Using the ZyXEL Device



You can also configure firewall on the ZyXEL Device for secure Internet access. When the firewall is on, all incoming traffic from the Internet to your network is blocked unless it is initiated from your network. This means that probes from the outside to your network are not allowed, but you can safely browse the Internet and download files for example.

Use web filters to block access to web site addresses that you specify. You can define time periods and days during which web filters are enabled and include or exclude particular computers on your network from content filtering. For example, you could block access to certain web sites for the kids.

1.2 Good Habits for Managing Your ZyXEL Device

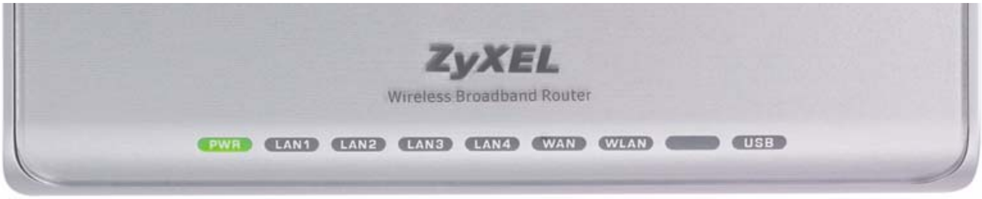
Here are some things you should do regularly.

- Change your password.
- Back up your configuration (and make sure you know how to reload it).

1.2.1 LEDs

The following figure shows the LEDs on the ZyXEL Device.

Figure 3 Front Panel



The following table describes the LEDs.

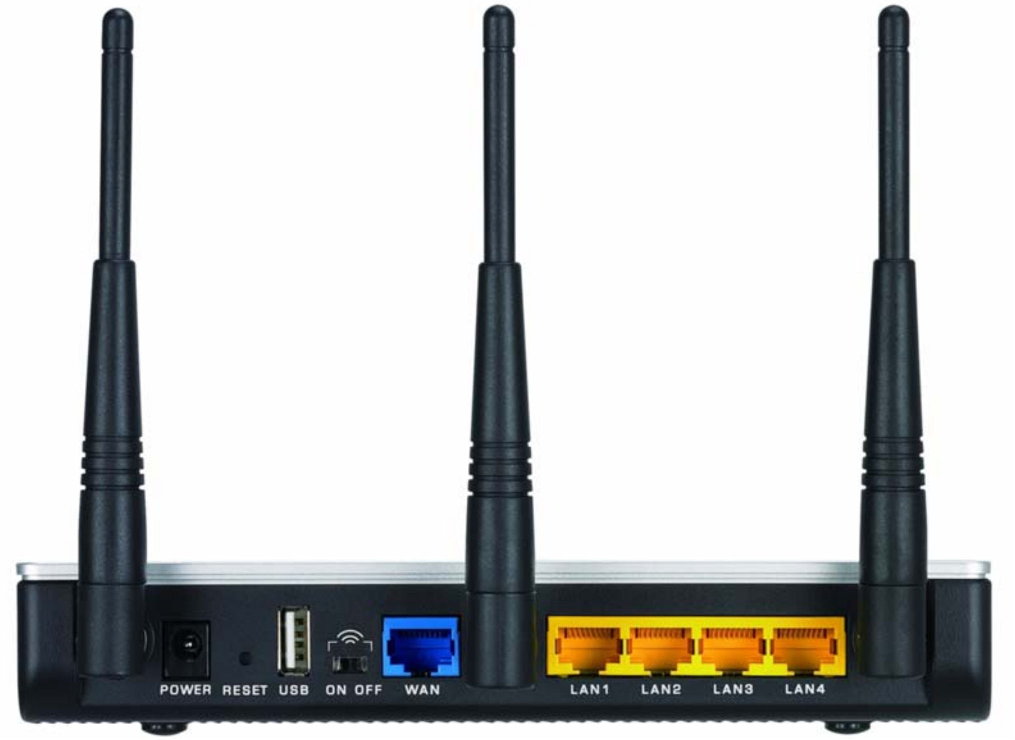
Table 1 Front Panel LEDs

LED	COLOR	STATUS	DESCRIPTION
PWR		Off	The ZyXEL Device is not receiving power.
	Green	On	The ZyXEL Device is receiving power and ready.
		Blinking	The ZyXEL Device is resetting to the factory defaults.
LAN1 .. 4		Off	No device is connected to this port.
	Green	On	An Ethernet device is connected to this port.
		Blinking	The ZyXEL Device is sending/receiving data on this port.
WAN		Off	The WAN connection is not ready, or has failed.
	Green	On	The ZyXEL Device has a successful WAN connection for Internet access.
		Blinking	The ZyXEL Device is sending/receiving data over the WAN port.
WLAN		Off	The WLAN is disabled.
	Amber	On	Pre-N WLAN is enabled on the ZyXEL Device.
		Blinking	The ZyXEL Device is sending/receiving data over the pre-N WLAN.
	Green	On	IEEE 802.11b/g WLAN is enabled on the ZyXEL Device.
		Blinking	The ZyXEL Device is sending/receiving data over the IEEE 802.11b/g WLAN.
USB		Off	The USB port is not in use
	Green	Blinking (3 Times)	Windows Connect Now setup is successful.
		Blinking (Continuous)	Windows Connect Now setup is not successful.

1.3 Rear Panel

The following figure shows the rear panel.

Figure 4 Rear Panel



The following table describes the labels on the rear panel.

Table 2 Rear Panel

LABEL	DESCRIPTION
POWER	Use the included power adaptor to connect this port to an appropriate power source.
RESET	You only need to use this button when you have changed the device login password and have now forgotten it. **Note:** Using the **RESET** button erases all custom settings and resets the device back to the factory defaults. Use a pointed object to press this button in for more than 10 seconds and release. The device resets to the factory default settings and automatically restarts.
USB	Connect a USB storage device to this port to configure wireless settings on wireless clients using the Windows Wireless Now feature (currently available on Windows XP with service pack 2). Refer to Section 6.3 on page 68 for more information.
ON OFF	Use this switch to enable (ON) or disable (OFF) the wireless LAN on the device.
WAN	Use the Ethernet cable that comes with your DSL/cable modem to connect to the Ethernet port on the DSL/cable modem.
LAN 1 .. 4	Use Ethernet cables to connect up to four computers to the ZyXEL Device. To connect more than four computers, use a switch.

CHAPTER 2
The Web Configurator

This chapter introduces the main features and applications of your ZyXEL Device.

2.1 Introduction

The web configurator is an HTML-based management interface that allows easy device setup and management via Internet browser. Use Internet Explorer 6.0 and later or Netscape Navigator 7.0 and later versions. The recommended screen resolution is 1024 by 768 pixels.

In order to use the web configurator you need to allow:

- Web browser pop-up windows from your device. Web pop-up blocking is enabled by default in Windows XP SP (Service Pack) 2.
- JavaScript (enabled by default).
- Java permissions (enabled by default).

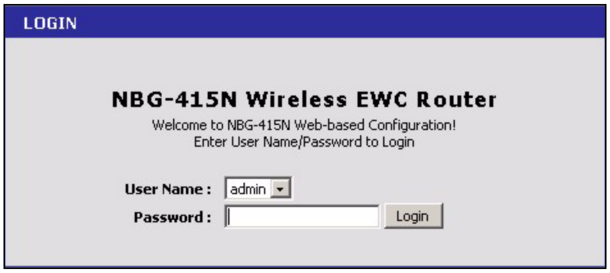
Note: By default, you can only access the web configurator through a LAN port. To access via the WAN, enable remote management in the **Admin** screen.

2.2 Login

Follow the steps below to log into the web configurator.

1. Start your web browser.
2. Type "http://" and the IP address of the ZyXEL Device (for example, the default is 192.168.1.1) in the Location or Address field. Press [ENTER].
3. The login screen appears. Select **admin** in the **User Name** field to log in as an administrator.
4. Enter the associated password. The default administrative login password is "1234".

Figure 5 Web Configurator: Login



LOGIN

NBG-415N Wireless EWC Router

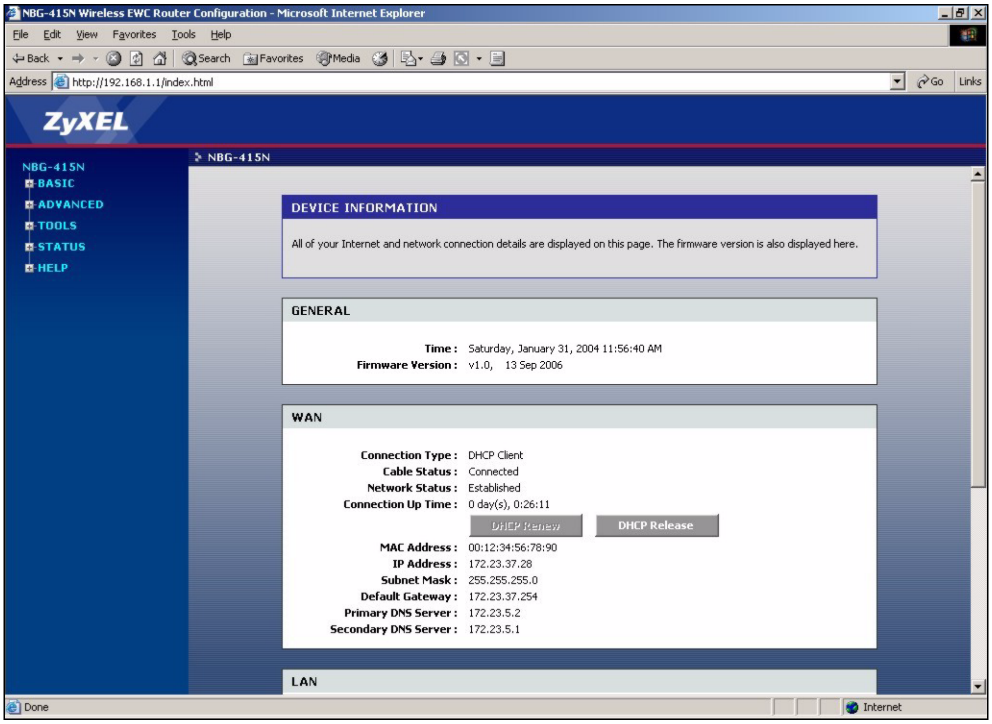
Welcome to NBG-415N Web-based Configuration!
Enter User Name/Password to Login

User Name : admin

Password :

5 Click **Login** to view the first web configurator screen. The **Device Information** screen is the first screen that displays when you access the web configurator.

Figure 6 Web Configurator: Main Screen



NBG-415N Wireless EWC Router Configuration - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address
Go Links
ZyXEL
NBG-415N
BASIC
ADVANCED
TOOLS
STATUS
HELP
NBG-415N
DHCP Renew
DHCP Release
Done
Internet

Address: http://192.168.1.1/index.html

DEVICE INFORMATION

All of your Internet and network connection details are displayed on this page. The firmware version is also displayed here.

GENERAL

Time : Saturday, January 31, 2004 11:56:40 AM
Firmware Version : v1.0, 13 Sep 2006

WAN

Connection Type : DHCP Client
Cable Status : Connected
Network Status : Established
Connection Up Time : 0 day(s), 0:26:11

MAC Address : 00:12:34:56:78:90
IP Address : 172.23.37.28
Subnet Mask : 255.255.255.0
Default Gateway : 172.23.37.254
Primary DNS Server : 172.23.5.2
Secondary DNS Server : 172.23.5.1

LAN

Note: The management session automatically times out after five minutes of inactivity. Simply log back into the ZyXEL Device if this happens to you.

The following table lists the various web configurator screens.

Table 3 Web Configurator: Menus

BASIC	ADVANCED	TOOLS	STATUS	HELP
Start WAN LAN Wireless	Game Hosting Virtual Server Applications StreamEngine Routing Access Control Web Filter MAC Filter Firewall Inbound Filter Wireless Schedules	Admin Time E-mail System Firmware DDNS Ping	Device Info Wireless Logs Statistics	Menu Basic Advanced Tools Status Glossary

2.3 Web Configurator Screen Buttons

The following table describes the common buttons in the web configurator.

Table 4 Web Configurator: Common Screen Buttons

BUTTON	DESCRIPTION
Save Settings	Click this button to save all changes permanently to the device.
Discard Settings	Click this button to discard all changes. **Note:** All unsaved changes in all screens will be lost.
Save	Click this button to save the changes of a configuration screen for the current session.
Clear	Click this button to start configuring a screen again.
✎	Click this button to change the settings of the selected rule.
⛔	Click this button to remove the selected rule.

2.4 Saving Configuration Changes

Note: You must save the current configuration in the ZyXEL Device to make the changes take effect.

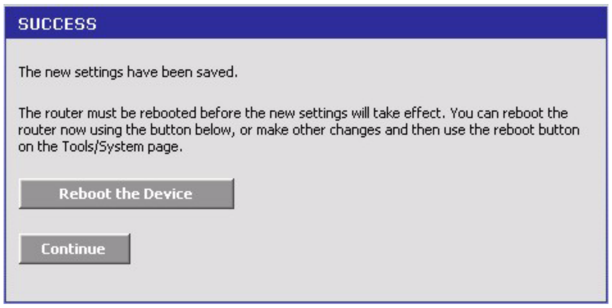
Do NOT turn off the ZyXEL Device during the updating process, as it may corrupt the firmware and make your ZyXEL Device unusable.

Follow the steps below to save configuration changes.

1 Click **Save Settings** in a configuration screen.

2 A **Success** screen displays.

Figure 7 Save Settings: Success



SUCCESS

The new settings have been saved.

The router must be rebooted before the new settings will take effect. You can reboot the router now using the button below, or make other changes and then use the reboot button on the Tools/System page.

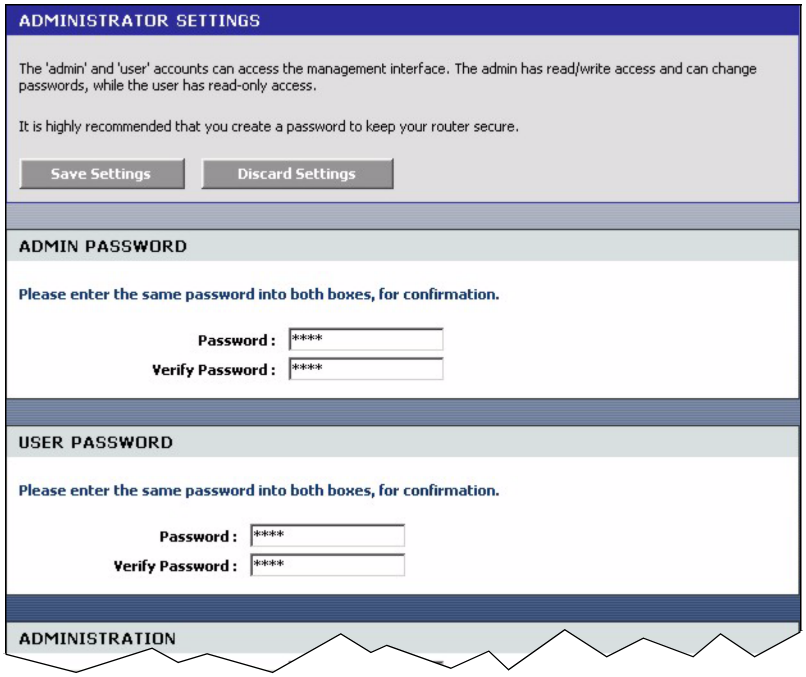
- Click **Reboot the Device** to restart the ZyXEL Device and make the changes take effect. Wait before the ZyXEL Device finishes rebooting before accessing the web configurator again.
- Alternatively, click **Continue** to return to the previous configuration screen.

2.5 Changing Your Password

It is highly recommended that you periodically change the password for the login accounts for security reasons. Click **Tools > Admin** to display the screen as shown next.

Configure the password fields for the admin and user accounts then click **Save Settings** and reboot the device to make the changes take effect.

Figure 8 Change Password



ADMINISTRATOR SETTINGS

The 'admin' and 'user' accounts can access the management interface. The admin has read/write access and can change passwords, while the user has read-only access.

It is highly recommended that you create a password to keep your router secure.

ADMIN PASSWORD

Please enter the same password into both boxes, for confirmation.

Password : ****
Verify Password : ****

USER PASSWORD

Please enter the same password into both boxes, for confirmation.

Password : ****
Verify Password : ****

ADMINISTRATION

The following table describes the related fields in this screen.

Table 5 Change Password

LABEL	DESCRIPTION
Admin Password	
Password	Type the new password in this field.
Verify Password	Type the new password again in this field.
User Password	
Password	Type the new password in this field.
Verify Password	Type the new password again in this field.

2.5.1 Resetting the ZyXEL Device

If you forget your administrative login password or cannot access the web configurator, you will need to use the **RESET** button to reload the factory-default configuration file. This means that you will lose all configurations that you had previously and the password will be reset to "1234".

2.5.1.1 Using the Reset Button

1 Use a pointed object to press the RESET button for more than 10 seconds and then release.

2 Wait until the WAN, LAN and WLAN LEDs turn off and blink. This indicates that the ZyXEL Device has reset the configuration to the factory defaults.

3 Wait until the ZyXEL Device finishes restarting before accessing it again.

CHAPTER 3
Basic

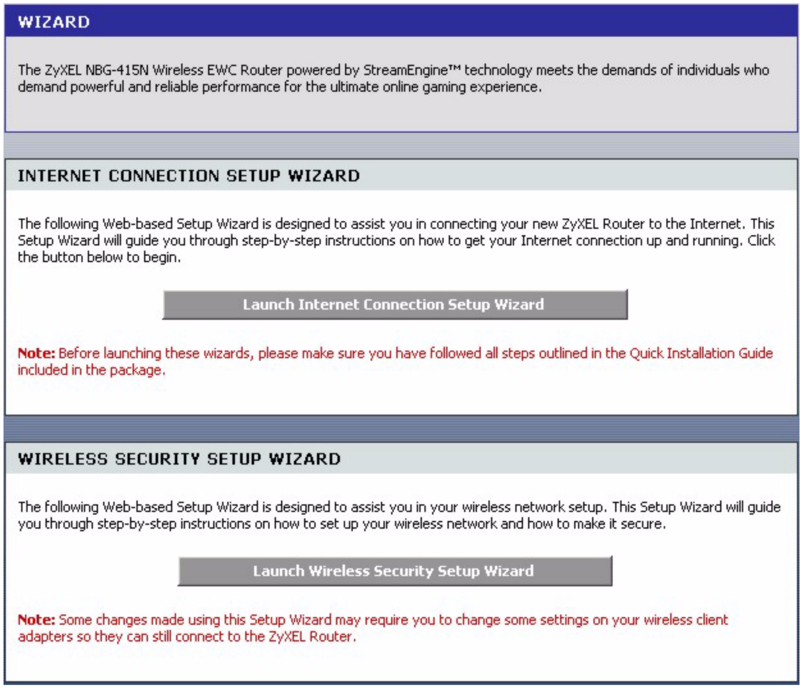
This chapter describes the Basic screens you use to configure the wizard, LAN, WAN and WLAN settings.

3.1 Setup Wizard

You can use the wizard screens to configure the ZyXEL Device for Internet access and secure wireless connection.

Click **Basic** > **Start** to display the main **Wizard** screen. Use the wizard screens to configure basic settings for Internet access and wireless connection.

Figure 9 Basic: Start (Wizard)



WIZARD

The ZyXEL NBG-415N Wireless EWC Router powered by StreamEngine™ technology meets the demands of individuals who demand powerful and reliable performance for the ultimate online gaming experience.

INTERNET CONNECTION SETUP WIZARD

The following Web-based Setup Wizard is designed to assist you in connecting your new ZyXEL Router to the Internet. This Setup Wizard will guide you through step-by-step instructions on how to get your Internet connection up and running. Click the button below to begin.

Note: Before launching these wizards, please make sure you have followed all steps outlined in the Quick Installation Guide included in the package.

WIRELESS SECURITY SETUP WIZARD

The following Web-based Setup Wizard is designed to assist you in your wireless network setup. This Setup Wizard will guide you through step-by-step instructions on how to set up your wireless network and how to make it secure.

Note: Some changes made using this Setup Wizard may require you to change some settings on your wireless client adapters so they can still connect to the ZyXEL Router.

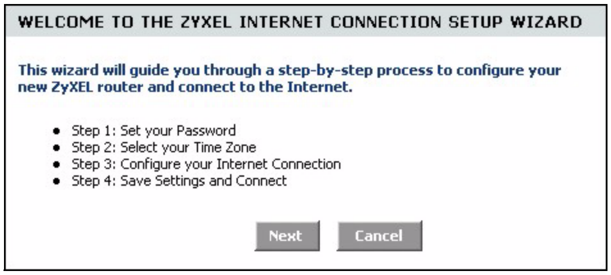
3.1.1 Internet Connection Setup Wizard

Follow the steps below to use the wizard setup screens to configure the ZyXEL Device for Internet access with the information given to you by your ISP.

Note: See the advanced menu chapters for background information on these fields.

1 Click **START > WIZARD > Launch Internet Connection Setup Wizard** to display the first wizard screen. This screen states whether the ZyXEL Device can automatically detect the connection type and access the Internet. If Internet connection is not available, this screen outlines the steps to set up your ZyXEL Device. Click **Next** to continue.

Figure 10 Internet Connection Setup Wizard: Welcome

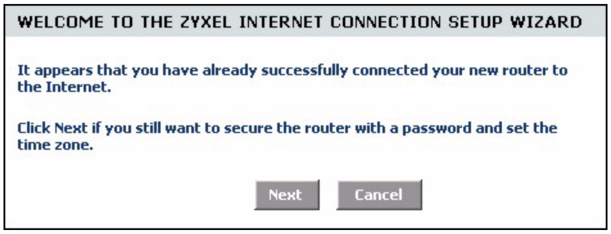


WELCOME TO THE ZYXEL INTERNET CONNECTION SETUP WIZARD

This wizard will guide you through a step-by-step process to configure your new ZyXEL router and connect to the Internet.

- Step 1: Set your Password
- Step 2: Select your Time Zone
- Step 3: Configure your Internet Connection
- Step 4: Save Settings and Connect

Figure 11 Internet Connection Setup Wizard: Welcome (Internet Connection Detected)



WELCOME TO THE ZYXEL INTERNET CONNECTION SETUP WIZARD

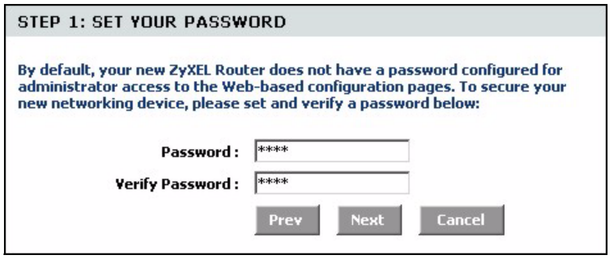
It appears that you have already successfully connected your new router to the Internet.

Click Next if you still want to secure the router with a password and set the time zone.

2 The second wizard screen prompts you to change the login password. Enter a new password in the **Password** field and retype the password in **Verify Password** field to verify. Click **Next**.

Note: Passwords are case sensitive.

Figure 12 Internet Connection Setup Wizard: Step 1



STEP 1: SET YOUR PASSWORD

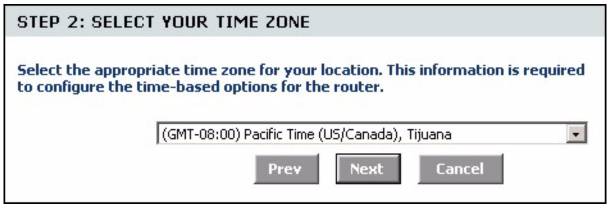
By default, your new ZyXEL Router does not have a password configured for administrator access to the Web-based configuration pages. To secure your new networking device, please set and verify a password below:

Password : ****

Verify Password : ****

3 Select the time zone for your geographical location. For example, if you are in California, select **(GMT-08:00) Pacific Time (US/Canada), Tijuana**. Click **Next**.

Figure 13 Internet Connection Setup Wizard: Step 2



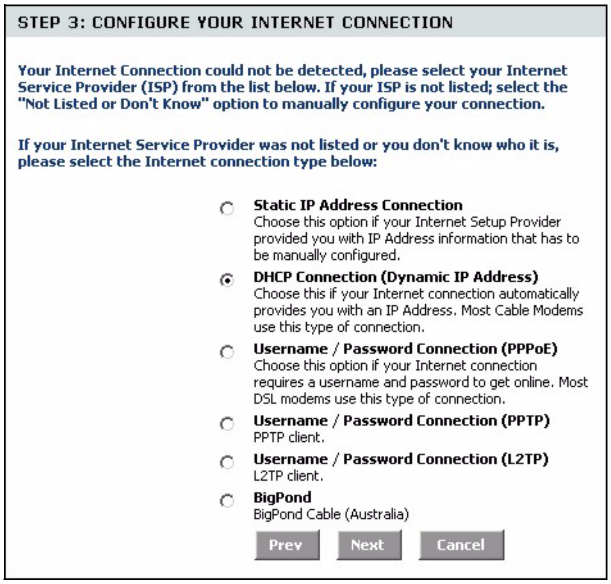
STEP 2: SELECT YOUR TIME ZONE

Select the appropriate time zone for your location. This information is required to configure the time-based options for the router.

(GMT-08:00) Pacific Time (US/Canada), Tijuana

4 Select your Internet connection type and click **Next** to continue.

Figure 14 Internet Connection Setup Wizard: Step 3


STEP 3: CONFIGURE YOUR INTERNET CONNECTION

Your Internet Connection could not be detected, please select your Internet Service Provider (ISP) from the list below. If your ISP is not listed; select the "Not Listed or Don't Know" option to manually configure your connection.

If your Internet Service Provider was not listed or you don't know who it is, please select the Internet connection type below:

○ **Static IP Address Connection**
Choose this option if your Internet Setup Provider provided you with IP Address information that has to be manually configured.

● **DHCP Connection (Dynamic IP Address)**
Choose this if your Internet connection automatically provides you with an IP Address. Most Cable Modems use this type of connection.

○ **Username / Password Connection (PPPoE)**
Choose this option if your Internet connection requires a username and password to get online. Most DSL modems use this type of connection.

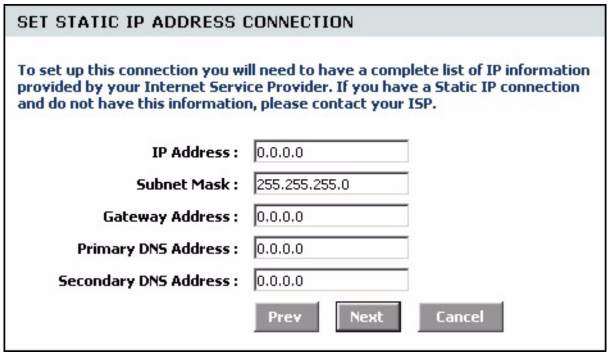
○ **Username / Password Connection (PPTP)**
PPTP client.

○ **Username / Password Connection (L2TP)**
L2TP client.

○ **BigPond**
BigPond Cable (Australia)

5 The next wizard screen varies depending on the connection type you have selected. Configure the fields with the information provided by your ISP and click **Next**.

Figure 15 Internet Connection Setup Wizard: Step 3 (Static IP Address)


SET STATIC IP ADDRESS CONNECTION

To set up this connection you will need to have a complete list of IP information provided by your Internet Service Provider. If you have a Static IP connection and do not have this information, please contact your ISP.

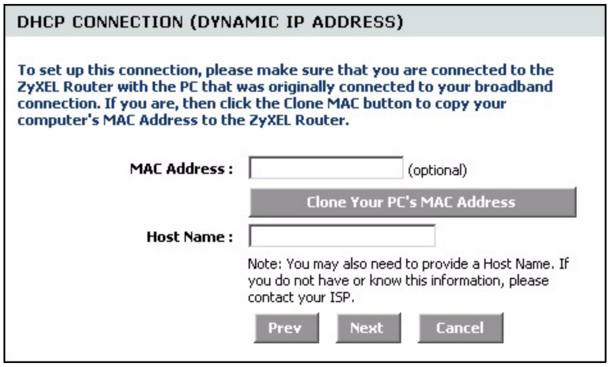
IP Address : 0.0.0.0
Subnet Mask : 255.255.255.0
Gateway Address : 0.0.0.0
Primary DNS Address : 0.0.0.0
Secondary DNS Address : 0.0.0.0

The following table describes the related fields in this screen.

Table 6 Internet Connection Setup Wizard: Step 3 (Dynamic IP Address)

field	description
IP Address	Enter the IP address that your ISP gave you. This should be a static, public IP address.
Subnet Mask	Enter the subnet mask for the IP address.
Gateway Address	Enter the IP address of the router through which this WAN connection will send traffic (the default gateway).
Primary/ Secondary DNS Address	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 computer before you can access it. The ZyXEL Device uses a system DNS server (in the order you specify here) to resolve domain names for VPN, DDNS and the time server. Enter the DNS server IP addresses.

Figure 16 Internet Connection Setup Wizard: Step 3 (Dynamic IP Address)



DHCP CONNECTION (DYNAMIC IP ADDRESS)

To set up this connection, please make sure that you are connected to the ZyXEL Router with the PC that was originally connected to your broadband connection. If you are, then click the Clone MAC button to copy your computer's MAC Address to the ZyXEL Router.

MAC Address : (optional)

Host Name :

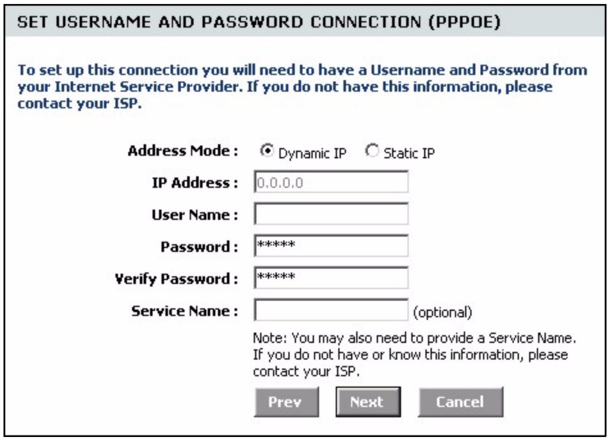
Note: You may also need to provide a Host Name. If you do not have or know this information, please contact your ISP.

The following table describes the related fields in this screen.

Table 7 Internet Connection Setup Wizard: Step 3 (Dynamic IP Address)

FIELD	DESCRIPTION
MAC Address	If required by your ISP, enter your computer MAC address in the **MAC Address** field or click **Clone Your PC's MAC Address** to copy the MAC address of the computer connecting to your ISP onto the ZyXEL Device.
Host Name	If a host name is necessary for a successful Internet connection, enter it in the **Host Name** field. Click **Next** to continue.

Figure 17 Internet Connection Setup Wizard: Step 3 (PPPoE)



SET USERNAME AND PASSWORD CONNECTION (PPPOE)

To set up this connection you will need to have a Username and Password from your Internet Service Provider. If you do not have this information, please contact your ISP.

Address Mode : ● Dynamic IP ○ Static IP

IP Address : 0.0.0.0

User Name :

Password : *****

Verify Password : *****

Service Name : (optional)

Note: You may also need to provide a Service Name. If you do not have or know this information, please contact your ISP.

The following table describes the related fields in this screen.

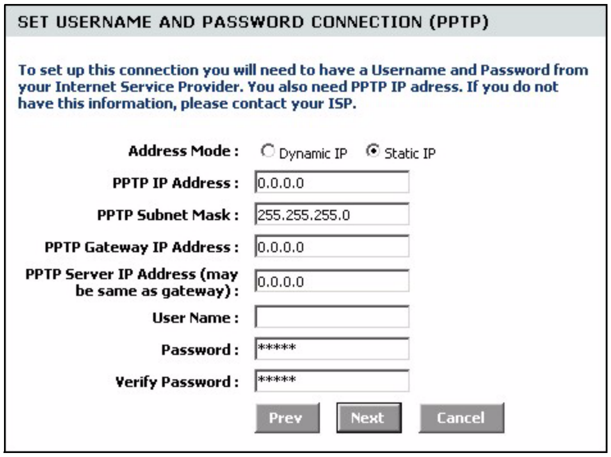
Table 8 Internet Connection Setup Wizard: Step 3 (PPPoE)

FIELD	DESCRIPTION
Address Mode	Select **Dynamic IP** If your ISP did not assign you a fixed IP address. This is the default selection. Select **Static IP** If your ISP assigned a fixed IP address. The set the following fields.

Table 8 Internet Connection Setup Wizard: Step 3 (PPPoE) (continued)

FIELD	DESCRIPTION
IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address that your ISP gave you. This should be a static, public IP address.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.
Service Name	Type the PPPoE service name given to you by your ISP. PPPoE uses a service name to identify and reach the PPPoE server. You can use alphanumeric and -_@$./ characters, and it can be up to 64 characters long.

Figure 18 Internet Connection Setup Wizard: Step 3 (PPTP)



SET USERNAME AND PASSWORD CONNECTION (PPTP)

To set up this connection you will need to have a Username and Password from your Internet Service Provider. You also need PPTP IP adress. If you do not have this information, please contact your ISP.

Address Mode :	○ Dynamic IP ● Static IP
PPTP IP Address :	0.0.0.0
PPTP Subnet Mask :	255.255.255.0
PPTP Gateway IP Address :	0.0.0.0
PPTP Server IP Address (may be same as gateway) :	0.0.0.0
User Name :	
Password :	*****
Verify Password :	*****

The following table describes the related fields in this screen.

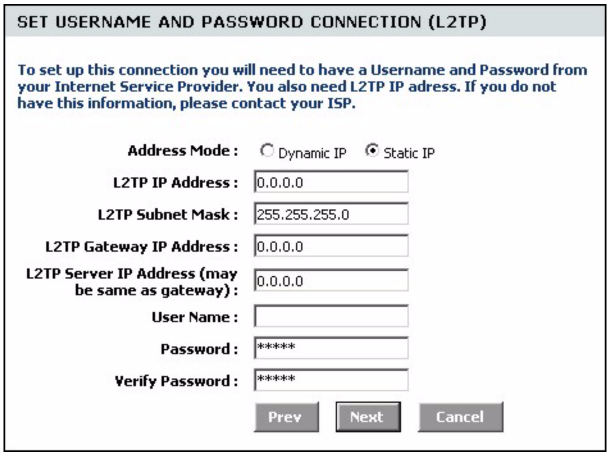
Table 9 Internet Connection Setup Wizard: Step 3 (PPTP)

FIELD	DESCRIPTION
Address Mode	Select **Dynamic IP** If your ISP did not assign you a fixed IP address. This is the default selection. Select **Static IP** If your ISP assigned a fixed IP address. The set the following fields.
PPTP IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address that your ISP gave you. This should be a static, public IP address.
PPTP Subnet Mask	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the subnet mask for the IP address.
PPTP Gateway IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address of the router through which this WAN connection will send traffic (the default gateway).

Table 9 Internet Connection Setup Wizard: Step 3 (PPTP)

FIELD	DESCRIPTION
PPTP Server IP Address (may be same as gateway)	Type the IP address of the PPTP server.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.

Figure 19 Internet Connection Setup Wizard: Step 3 (L2TP)



SET USERNAME AND PASSWORD CONNECTION (L2TP)

To set up this connection you will need to have a Username and Password from your Internet Service Provider. You also need L2TP IP adress. If you do not have this information, please contact your ISP.

Address Mode :	○ Dynamic IP ● Static IP
L2TP IP Address :	0.0.0.0
L2TP Subnet Mask :	255.255.255.0
L2TP Gateway IP Address :	0.0.0.0
L2TP Server IP Address (may be same as gateway) :	0.0.0.0
User Name :	
Password :	*****
Verify Password :	*****

The following table describes the related fields in this screen.

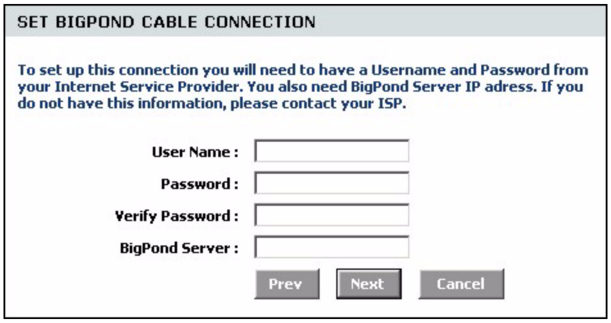
Table 10 Internet Connection Setup Wizard: Step 3 (L2TP)

FIELD	DESCRIPTION
Address Mode	Select **Dynamic IP** If your ISP did not assign you a fixed IP address. This is the default selection. Select **Static IP** If your ISP assigned a fixed IP address. The set the following fields.
L2TP IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address that your ISP gave you. This should be a static, public IP address.
L2TP Subnet Mask	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the subnet mask for the IP address.
L2TP Gateway IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address of the router through which this WAN connection will send traffic (the default gateway).
L2TP Server IP Address (may be same as gateway)	Type the IP address of the L2TP server.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.

Table 10 Internet Connection Setup Wizard: Step 3 (L2TP) (continued)

FIELD	DESCRIPTION
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.

Figure 20 Internet Connection Setup Wizard: Step 3 (BigPond)



SET BIGPOND CABLE CONNECTION

To set up this connection you will need to have a Username and Password from your Internet Service Provider. You also need BigPond Server IP adress. If you do not have this information, please contact your ISP.

User Name :

Password :

Verify Password :

BigPond Server :

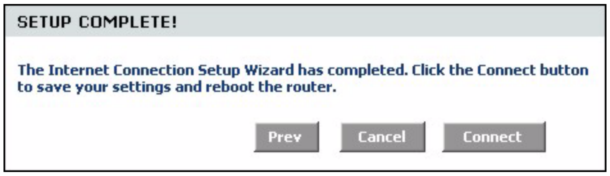
The following table describes the related fields in this screen.

Table 11 Internet Connection Setup Wizard: Step 3 (BigPond)

FIELD	DESCRIPTION
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.
BigPond Server	Type the IP address of the BigPond server.

6 In the las wizard screen, click **Connect** to save the settings to the ZyXEL Device.

Figure 21 Internet Connection Setup Wizard: Setup Complete

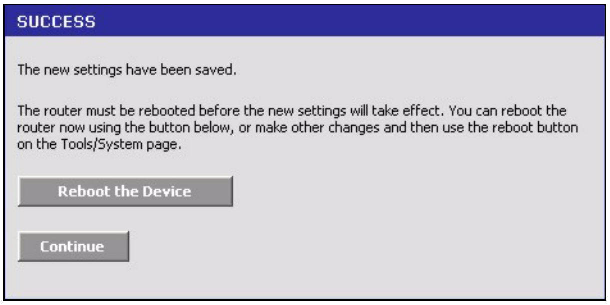


SETUP COMPLETE!

The Internet Connection Setup Wizard has completed. Click the Connect button to save your settings and reboot the router.

7 Click **Reboot the Device** to restart the ZyXEL Device and make the changes take effect.

Figure 22 Internet Connection Setup Wizard: Success



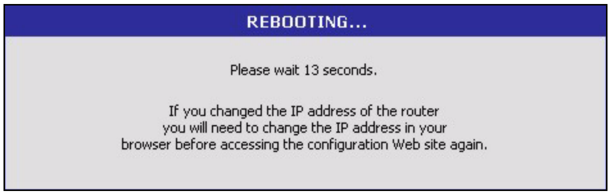
SUCCESS

The new settings have been saved.

The router must be rebooted before the new settings will take effect. You can reboot the router now using the button below, or make other changes and then use the reboot button on the Tools/System page.

8 Wait until the ZyXEL Device finishes rebooting before accessing it again.

Figure 23 Internet Connection Setup Wizard: Rebooting



REBOOTING...

Please wait 13 seconds.

If you changed the IP address of the router you will need to change the IP address in your browser before accessing the configuration Web site again.

9 Test your Internet connection. Launch your web browser and enter any web site address for example, http://www.zyxel.com).

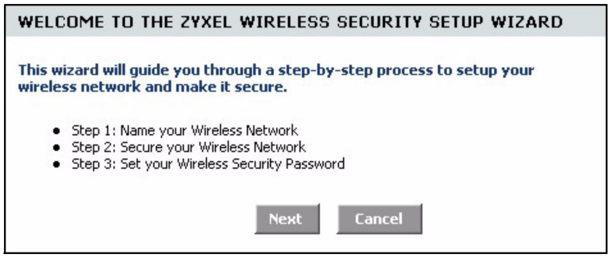
3.2 Wireless Security Setup Wizard

Follow the steps below to use the wizard setup screens to configure a wireless LAN and wireless security setting on the ZyXEL Device.

Note: See the advanced menu chapters for background information on these fields.

1 Click **START** > **WIZARD** > **Launch Wireless Security Setup Wizard** to display the first wizard screen. This screen outlines the steps to set up your ZyXEL Device. Click **Next** to continue.

Figure 24 Wireless Security Setup Wizard



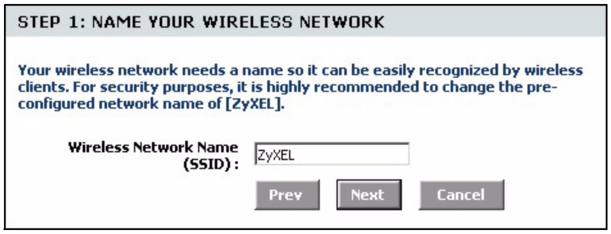
WELCOME TO THE ZYXEL WIRELESS SECURITY SETUP WIZARD

This wizard will guide you through a step-by-step process to setup your wireless network and make it secure.

- Step 1: Name your Wireless Network
- Step 2: Secure your Wireless Network
- Step 3: Set your Wireless Security Password

2 In the **Wireless Network Name** field, enter a descriptive name for identifying the wireless network. To connect to this wireless network, wireless clients must associate to this ID. Click **Next**.

Figure 25 Wireless Security Setup Wizard: Network Name



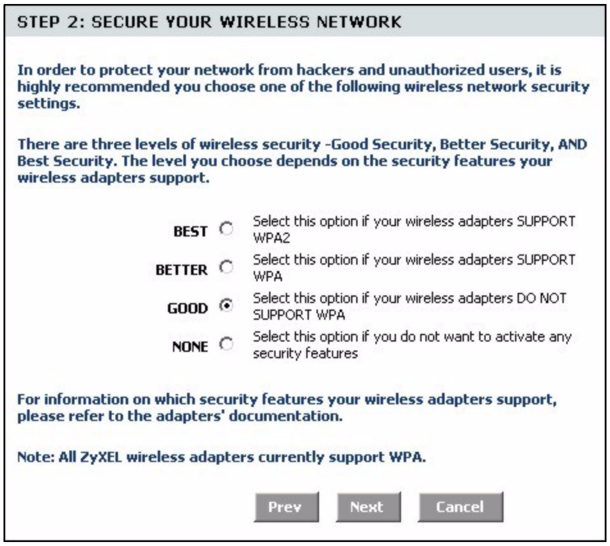
STEP 1: NAME YOUR WIRELESS NETWORK

Your wireless network needs a name so it can be easily recognized by wireless clients. For security purposes, it is highly recommended to change the pre-configured network name of [ZyXEL].

Wireless Network Name (SSID) : ZyXEL

3 Follow the on-screen instruction and select a wireless security mode. Click **Next**.

Figure 26 Wireless Security Setup Wizard: Security



STEP 2: SECURE YOUR WIRELESS NETWORK

In order to protect your network from hackers and unauthorized users, it is highly recommended you choose one of the following wireless network security settings.

There are three levels of wireless security -Good Security, Better Security, AND Best Security. The level you choose depends on the security features your wireless adapters support.

BEST ○ Select this option if your wireless adapters SUPPORT WPA2

BETTER ○ Select this option if your wireless adapters SUPPORT WPA

GOOD ● Select this option if your wireless adapters DO NOT SUPPORT WPA

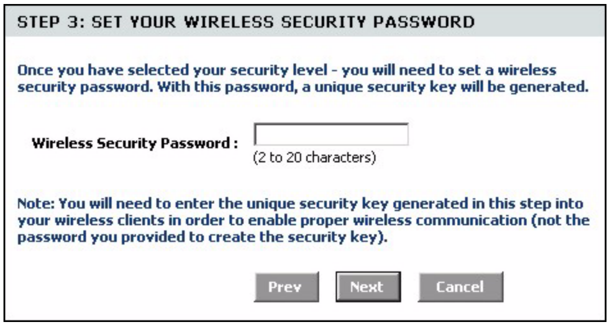
NONE ○ Select this option if you do not want to activate any security features

For information on which security features your wireless adapters support, please refer to the adapters' documentation.

Note: All ZyXEL wireless adapters currently support WPA.

4 The next screen displays if you enable a wireless security mode. Follow the on-screen instruction. Enter a WEP key if you select **GOOD** security level. If you select **BETTER** or **BEST** security level, enter a password that the ZyXEL Device uses to generate a unique wireless secret key. Click **Next**.

Figure 27 Wireless Security Setup Wizard: Security Key



STEP 3: SET YOUR WIRELESS SECURITY PASSWORD

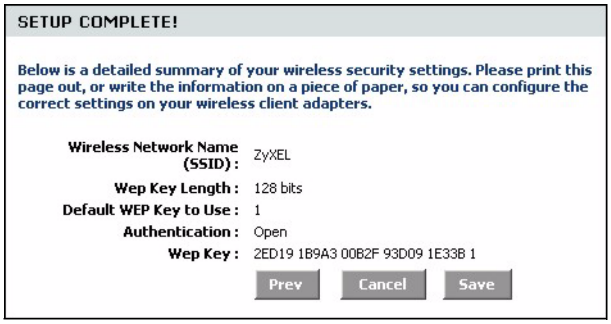
Once you have selected your security level - you will need to set a wireless security password. With this password, a unique security key will be generated.

Wireless Security Password : (2 to 20 characters)

Note: You will need to enter the unique security key generated in this step into your wireless clients in order to enable proper wireless communication (not the password you provided to create the security key).

5 Check your wireless LAN settings in this screen and click **Save** to save the settings to the ZyXEL Device.

Figure 28 Wireless Security Setup Wizard: Finish



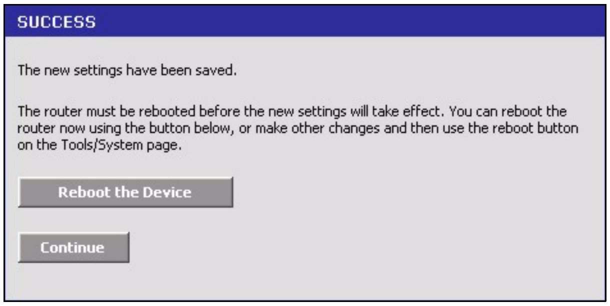
SETUP COMPLETE!

Below is a detailed summary of your wireless security settings. Please print this page out, or write the information on a piece of paper, so you can configure the correct settings on your wireless client adapters.

Wireless Network Name (SSID) :	ZyXEL
Wep Key Length :	128 bits
Default WEP Key to Use :	1
Authentication :	Open
Wep Key :	2ED19 1B9A3 00B2F 93D09 1E33B 1

6 Click **Reboot the Device** to restart the ZyXEL Device and make the changes take effect.

Figure 29 Wireless Security Setup Wizard: Success



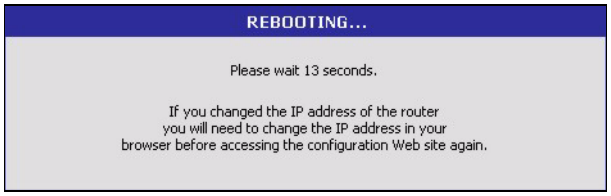
SUCCESS

The new settings have been saved.

The router must be rebooted before the new settings will take effect. You can reboot the router now using the button below, or make other changes and then use the reboot button on the Tools/System page.

7 Wait until the ZyXEL Device finishes rebooting before accessing it again.

Figure 30 Wireless Security Setup Wizard: Rebooting



REBOOTING...

Please wait 13 seconds.

If you changed the IP address of the router you will need to change the IP address in your browser before accessing the configuration Web site again.

8 Test your wireless connection. On a wireless client, associate to the wireless network on the ZyXEL Device (the default network name is “ZyXEL”). See the documentation that comes with the wireless client for more information.

CHAPTER 4
WAN

This chapter introduces shows you how to configure the WAN using the advanced configuration screen for Internet access.

4.1 WAN Overview

You can use the advanced **WAN** configuration screen to configure the WAN port for Internet access. Select the Internet access mode (**Static IP**, **Dynamic IP**, **PPPoE**, **PPTP** and **L2TP**) your ISP uses on the ZyXEL Device.

4.1.1 WAN IP Address Assignment

Every computer on the Internet must have a unique IP address. If your networks are isolated from the Internet, for instance, only between your two branch offices, you can assign any IP addresses to the hosts without problems. However, the Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of IP addresses specifically for private networks.

Table 12 Private IP Address Ranges

10.0.0.0	-	10.255.255.255
172.16.0.0	-	172.31.255.255
192.168.0.0	-	192.168.255.255

You can obtain your IP address from the IANA, from an ISP or have it assigned by a private network. If you belong to a small organization and your Internet access is through an ISP, the ISP can provide you with the Internet addresses for your local networks. On the other hand, if you are part of a much larger organization, you should consult your network administrator for the appropriate IP addresses.

Note: Regardless of your particular situation, do not create an arbitrary IP address; always follow the guidelines above. For more information on address assignment, please refer to RFC 1597, Address Allocation for Private Internets and RFC 1466, Guidelines for Management of IP Address Space.

4.1.2 DNS Server Address Assignment

Use DNS (Domain Name System) to map a domain name to its corresponding IP address and vice versa, for instance, the IP address of www.zyxel.com is 204.217.0.2. The DNS server is extremely important because without it, you must know the IP address of a computer before you can access it.

The ZyXEL Device can get the DNS server addresses in the following ways.

1. The ISP tells you the DNS server addresses, usually in the form of an information sheet, when you sign up. If your ISP gives you DNS server addresses, manually enter them in the DNS server fields.
2. If your ISP dynamically assigns the DNS server IP addresses (along with the ZyXEL Device's WAN IP address), set the DNS server fields to get the DNS server address from the ISP.
3. You can manually enter the IP addresses of other DNS servers. These servers can be public or private. A DNS server could even be behind a remote IPSec router.

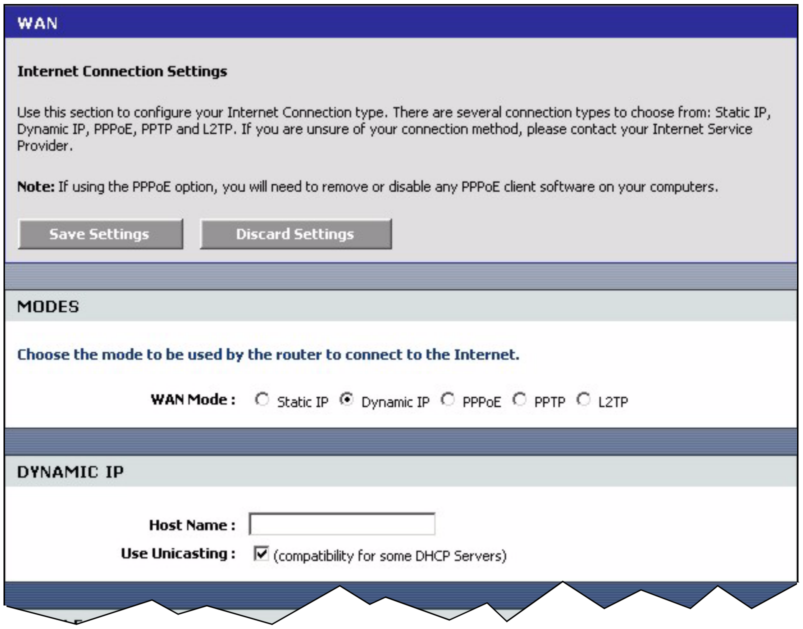
4.2 WAN Configuration

To display the advanced **WAN** configuration screen, click **BASIC > WAN**. Fields in this screen vary depending on the option you select in the **WAN Mode** field.

4.2.1 WAN Connection: Dynamic IP

Select **Dynamic IP** in the **WAN** screen when your ISP gives you a fixed public IP address.

Figure 31 Basic: WAN: Dynamic IP



WAN

Internet Connection Settings

Use this section to configure your Internet Connection type. There are several connection types to choose from: Static IP, Dynamic IP, PPPoE, PPTP and L2TP. If you are unsure of your connection method, please contact your Internet Service Provider.

Note: If using the PPPoE option, you will need to remove or disable any PPPoE client software on your computers.

MODES

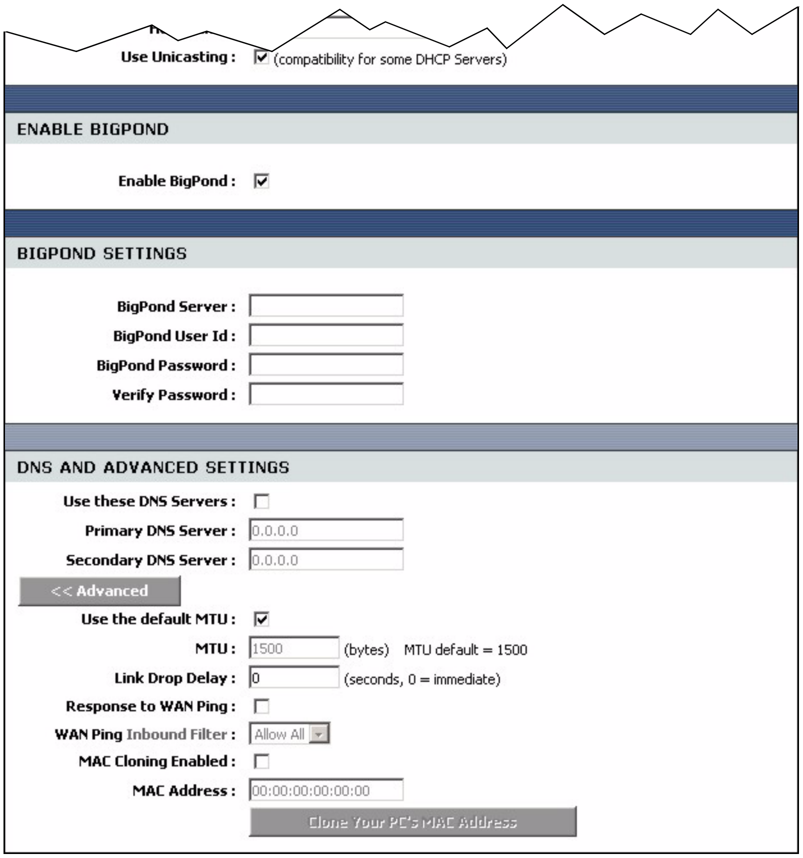
Choose the mode to be used by the router to connect to the Internet.

WAN Mode : ○ Static IP ● Dynamic IP ○ PPPoE ○ PPTP ○ L2TP

DYNAMIC IP

Host Name :

Use Unicasting : ☑ (compatibility for some DHCP Servers)



Use Unicasting : ☑ (compatibility for some DHCP Servers)

ENABLE BIGPOND

Enable BigPond : ☑

BIGPOND SETTINGS

BigPond Server :

BigPond User Id :

BigPond Password :

Verify Password :

DNS AND ADVANCED SETTINGS

Use these DNS Servers : □

Primary DNS Server : 0.0.0.0

Secondary DNS Server : 0.0.0.0

Use the default MTU : ☑

MTU : 1500 (bytes) MTU default = 1500

Link Drop Delay : 0 (seconds, 0 = immediate)

Response to WAN Ping : □

WAN Ping Inbound Filter : Allow All

MAC Cloning Enabled : □

MAC Address : 00:00:00:00:00:00

The following table describes the fields in this screen.

Table 13 Basic: WAN: Dynamic IP

LABEL	DESCRIPTION
MODES	
WAN	Select **Dynamic IP** if you are not given a fixed public IP address and the account information (such as the user name and password).
Dynamic IP	
Hostname	This field is optional. Enter your computer’s hostname which the ISP checks before Internet access is allowed.
Use Unicasting	Select this option If your ZyXEL Device is unable to obtain a WAN IP address from the ISP. This allows the ZyXEL Device to accept unicast DHCP responses from the DHCP server instead of broadcast DHCP responses.
Enable BigPond	Select **Enable BigPond** if you subscribe to Internet service from BigPond in Australia. Then configure the fields below with the information provided.
BigPond Settings	
BigPond Server	Type the IP address of the BigPond server.
BigPond User ID	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.

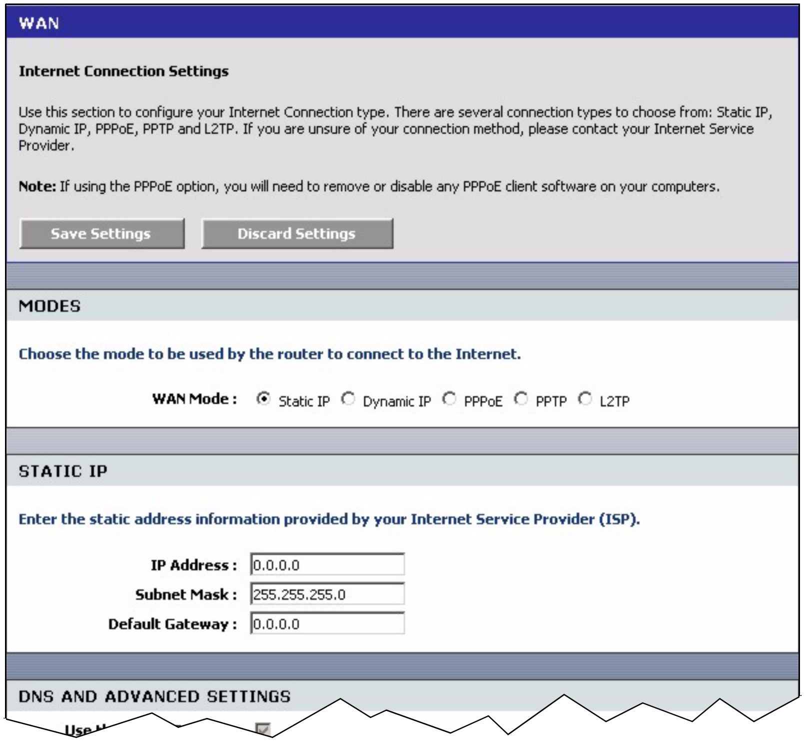
Table 13 Basic: WAN: Dynamic IP (continued)

LABEL	DESCRIPTION
BigPond Password	Type the password associated with the user name above. Use up to 64 ASCII characters except [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.
DNS Settings	
Use these DNS Servers	Select this option to manually enter the DNS server IP address(es) in the field(s) provided.
Primary/ Secondary DNS Server	Enter the IP address (provided by your ISP) of the DNS server in dotted decimal notation.
Advanced >>	Click **Advanced >>** to display more WAN configuration fields.
<< Advanced	Click **<< Advanced** to hide the advanced WAN configuration fields.
Use the Default MTU	Maximum Transmission Unit (MTU) is a parameter that determines the largest packet size (in bytes) that the ZyXEL Device will send to the WAN. If LAN devices send larger packets, the ZyXEL Device will break them into smaller packets. Ideally, you should set this to match the MTU of the connection to your ISP. Select this option to use the default MTU. Clear this checkbox to manually enter an MTU size below.
MTU	Enter the MTU size (between 256 and 2296). Typical values are 1500 bytes for an Ethernet connection and 1492 bytes for a PPPoE connection. Make sure the MTU size matches the ISP’s network or Internet connection may fail.
Link Drop Delay	
MAC Cloning Enabled	Select this option to set the ZyXEL Device to copy the MAC address of your computer.
MAC Address	Enter the IP address of the computer on the LAN whose MAC you are cloning. It is recommended that you clone the MAC address prior to hooking up the WAN port.
Clone Your PC’s MAC Address	Click **Clone Your PC’s MAC Address** to have the ZyXEL Device automatically copy the MAC address from your computer.

4.2.2 WAN Configuration: Static IP

Select **Dynamic IP** in the **WAN** screen when your ISP gives you a fixed public IP address.

Figure 32 Basic: WAN: Static IP



Internet Connection Settings

Use this section to configure your Internet Connection type. There are several connection types to choose from: Static IP, Dynamic IP, PPPoE, PPTP and L2TP. If you are unsure of your connection method, please contact your Internet Service Provider.

Note: If using the PPPoE option, you will need to remove or disable any PPPoE client software on your computers.

Choose the mode to be used by the router to connect to the Internet.

WAN Mode : ● Static IP ○ Dynamic IP ○ PPPoE ○ PPTP ○ L2TP

Enter the static address information provided by your Internet Service Provider (ISP).

IP Address : 0.0.0.0
Subnet Mask : 255.255.255.0
Default Gateway : 0.0.0.0

The following table describes the related fields in this screen.

Table 14 Basic: WAN: Static IP

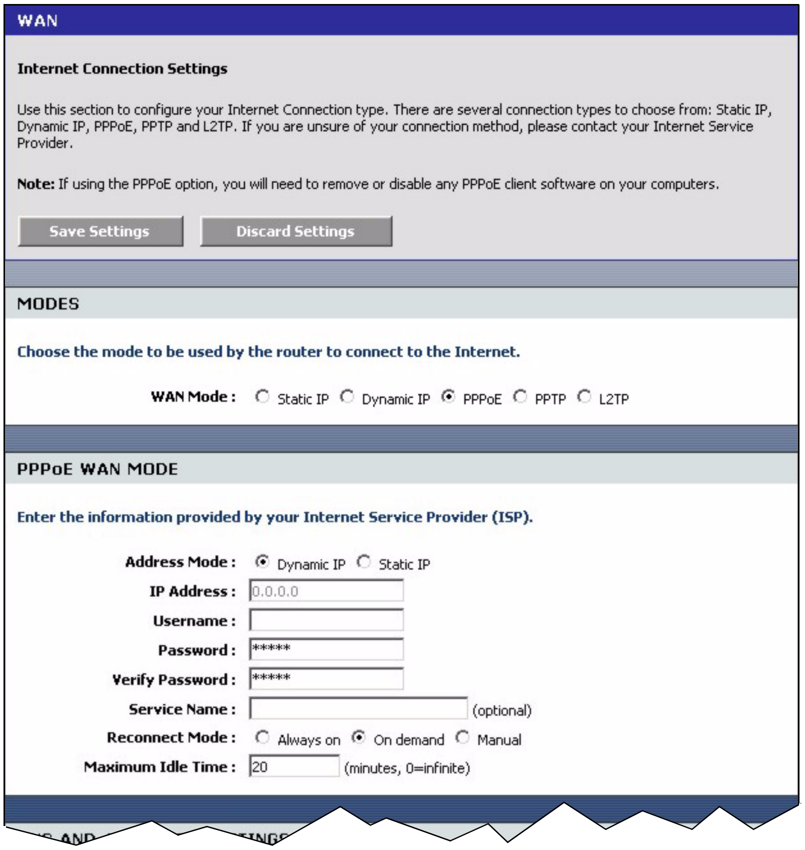
LABEL	DESCRIPTION
MODES	
WAN	Select **Static IP** if your ISP gives you a fixed public IP address.
STATIC IP	
IP Address	Enter the WAN IP address exactly as given by your ISP in dotted decimal notation.
Subnet Mask	Enter the IP subnet mask as given by your ISP in dotted decimal notation.
Default Gateway	Enter the gateway IP address as given by your ISP in dotted decimal notation.

Refer to Table 13 on page 44 for other field descriptions.

4.2.3 WAN Configuration: PPPoE

If your ISP uses the PPPoE (Point-to-Point Protocol over Ethernet) protocol for Internet access, select **PPPoE** in the **WAN Mode** field.

Figure 33 Basic: WAN: PPPoE



WAN

Internet Connection Settings

Use this section to configure your Internet Connection type. There are several connection types to choose from: Static IP, Dynamic IP, PPPoE, PPTP and L2TP. If you are unsure of your connection method, please contact your Internet Service Provider.

Note: If using the PPPoE option, you will need to remove or disable any PPPoE client software on your computers.

MODES

Choose the mode to be used by the router to connect to the Internet.

WAN Mode : ○ Static IP ○ Dynamic IP ● PPPoE ○ PPTP ○ L2TP

PPPoE WAN MODE

Enter the information provided by your Internet Service Provider (ISP).

Address Mode : ● Dynamic IP ○ Static IP

IP Address : 0.0.0.0

Username :

Password : *****

Verify Password : *****

Service Name : (optional)

Reconnect Mode : ○ Always on ● On demand ○ Manual

Maximum Idle Time : 20 (minutes, 0=infinite)

The following table describes the related fields in this screen.

Table 15 Basic: WAN: PPPoE

LABEL	DESCRIPTION
MODES	
WAN	Select **PPPoE** if your ISP gives you Internet access account information (such as the username and password).
PPPoE WAN MODE	
Address Mode	Select **Dynamic IP** If your ISP did not assign you a fixed IP address. This is the default selection. Select **Static IP** If your ISP assigned a fixed IP address. The set the following fields.
IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address that your ISP gave you. This should be a static, public IP address.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.

Table 15 Basic: WAN: PPPoE (continued)

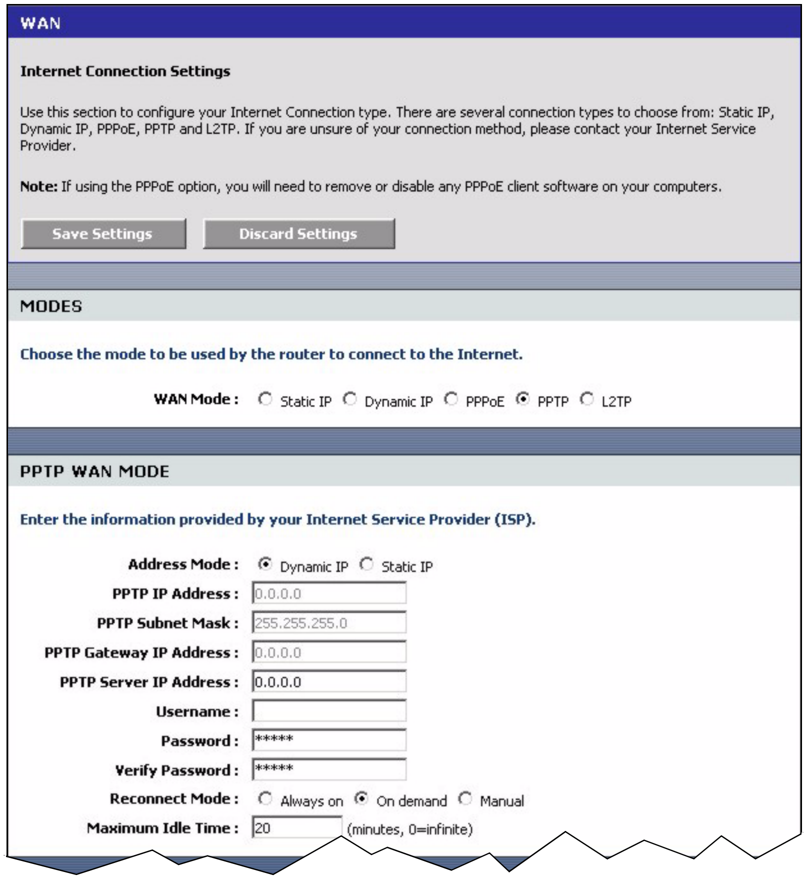
LABEL	DESCRIPTION
Service Name	Type the PPPoE service name given to you by your ISP. PPPoE uses a service name to identify and reach the PPPoE server. You can use alphanumeric and -_@$./ characters, and it can be up to 64 characters long.
Reconnect Mode	Specify how you want to re-establish an Internet connection after the idle timeout. Select **Always On** when you want your connection up all the time. The ZyXEL Device will try to bring up the connection automatically if it is disconnected. Select **On Demand** when you don't want the connection up all the time and specify an idle time-out in the **Maximum Idle Timeout** field. Select **Manual** when you want to manually re-establish the connection if it is disconnected.
Maximum Idle Time	This value specifies the time in seconds that elapses before the ZyXEL Device automatically disconnects from the PPPoE server.

Refer to Table 13 on page 44 for other field descriptions.

4.2.4 WAN Connection: PPTP

If your ISP uses PPTP protocol for Internet access, select **PPTP** in the **WAN Mode** field.

Figure 34 Basic: WAN: PPTP



WAN

Internet Connection Settings

Use this section to configure your Internet Connection type. There are several connection types to choose from: Static IP, Dynamic IP, PPPoE, PPTP and L2TP. If you are unsure of your connection method, please contact your Internet Service Provider.

Note: If using the PPPoE option, you will need to remove or disable any PPPoE client software on your computers.

MODES

Choose the mode to be used by the router to connect to the Internet.

WAN Mode : ○ Static IP ○ Dynamic IP ○ PPPoE ● PPTP ○ L2TP

PPTP WAN MODE

Enter the information provided by your Internet Service Provider (ISP).

Address Mode :	● Dynamic IP ○ Static IP
PPTP IP Address :	0.0.0.0
PPTP Subnet Mask :	255.255.255.0
PPTP Gateway IP Address :	0.0.0.0
PPTP Server IP Address :	0.0.0.0
Username :	
Password :	*****
Verify Password :	*****
Reconnect Mode :	○ Always on ● On demand ○ Manual
Maximum Idle Time :	20 (minutes, 0=infinite)

The following table describes the related fields in this screen.

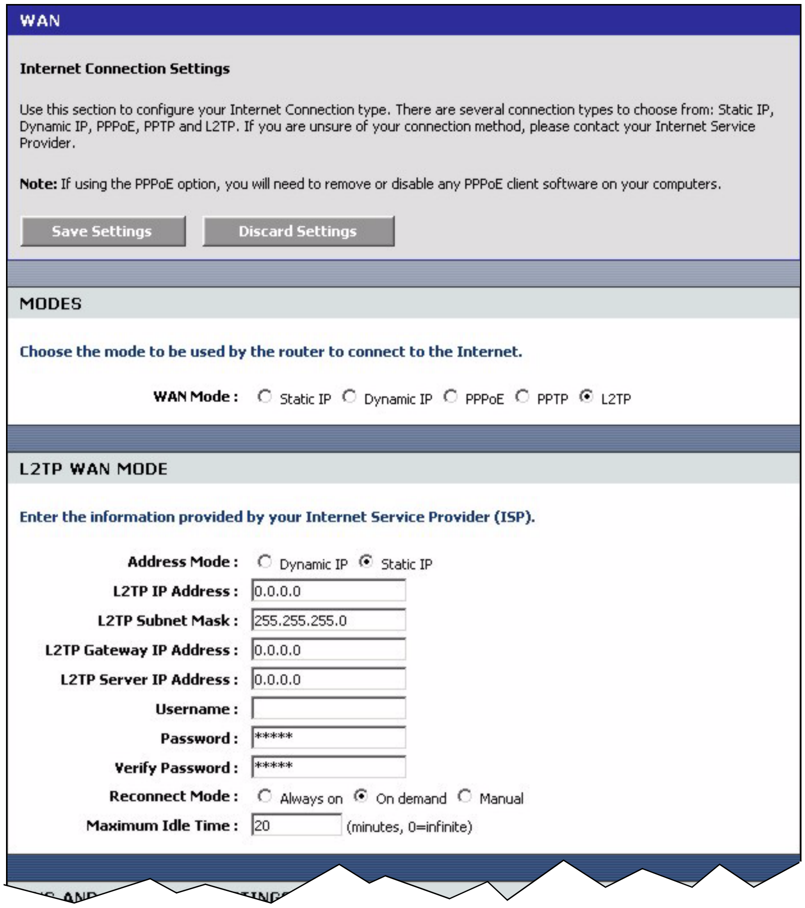
Table 16 Basic: WAN: PPTP

LABEL	DESCRIPTION
MODES	
WAN	Select **PPTP** if your ISP gives you Internet access account information (such as the username and password).
PPTP WAN MODE	
Address Mode	Select **Dynamic IP** If your ISP did not assign you a fixed IP address. This is the default selection. Select **Static IP** If your ISP assigned a fixed IP address. The set the following fields.
PPTP IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address that your ISP gave you. This should be a static, public IP address.
PPTP Subnet Mask	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the subnet mask for the IP address.
PPTP Gateway IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address of the router through which this WAN connection will send traffic (the default gateway).
PPTP Server IP Address (may be same as gateway)	Type the IP address of the PPTP server.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.
Reconnect Mode	Specify how you want to re-establish an Internet connection after the idle timeout. Select **Always On** when you want your connection up all the time. The ZyXEL Device will try to bring up the connection automatically if it is disconnected. Select **On Demand** when you don't want the connection up all the time and specify an idle time-out in the **Maximum Idle Timeout** field. Select **Manual** when you want to manually re-establish the connection if it is disconnected.
Maximum Idle Time	This value specifies the time in seconds that elapses before the ZyXEL Device automatically disconnects from the PPPoE server.

4.2.5 WAN Connection: L2TP

If your ISP uses L2TP protocol for Internet access, select **L2TP** in the **WAN Mode** field.

Figure 35 Basic: WAN: L2TP



Internet Connection Settings

Use this section to configure your Internet Connection type. There are several connection types to choose from: Static IP, Dynamic IP, PPPoE, PPTP and L2TP. If you are unsure of your connection method, please contact your Internet Service Provider.

Note: If using the PPPoE option, you will need to remove or disable any PPPoE client software on your computers.

MODES

Choose the mode to be used by the router to connect to the Internet.

WAN Mode : ○ Static IP ○ Dynamic IP ○ PPPoE ○ PPTP ● L2TP

L2TP WAN MODE

Enter the information provided by your Internet Service Provider (ISP).

Address Mode :	○ Dynamic IP ● Static IP
L2TP IP Address :	0.0.0.0
L2TP Subnet Mask :	255.255.255.0
L2TP Gateway IP Address :	0.0.0.0
L2TP Server IP Address :	0.0.0.0
Username :	
Password :	*****
Verify Password :	*****
Reconnect Mode :	○ Always on ● On demand ○ Manual
Maximum Idle Time :	20 (minutes, 0=infinite)

The following table describes the related fields in this screen.

Table 17 Basic: WAN: L2TP

LABEL	DESCRIPTION
MODES	
WAN	Select **L2TP** if your ISP gives you Internet access account information (such as the username and password).
L2TP WAN MODE	
Address Mode	Select **Dynamic IP** If your ISP did not assign you a fixed IP address. This is the default selection. Select **Static IP** If your ISP assigned a fixed IP address. The set the following fields.
L2TP IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address that your ISP gave you. This should be a static, public IP address.
L2TP Subnet Mask	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the subnet mask for the IP address.
L2TP Gateway IP Address	This field is applicable if you select **Static IP** in the **Address Mode** field. Enter the IP address of the router through which this WAN connection will send traffic (the default gateway).

Table 17 Basic: WAN: L2TP (continued)

LABEL	DESCRIPTION
L2TP Server IP Address (may be same as gateway)	Type the IP address of the L2TP server.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except the [,] and ?. This field can be blank.
Verify Password	Type your password again for confirmation.
Reconnect Mode	Specify how you want to re-establish an Internet connection after the idle timeout. Select **Always On** when you want your connection up all the time. The ZyXEL Device will try to bring up the connection automatically if it is disconnected. Select **On Demand** when you don't want the connection up all the time and specify an idle time-out in the **Maximum Idle Timeout** field. Select **Manual** when you want to manually re-establish the connection if it is disconnected.
Maximum Idle Time	This value specifies the time in seconds that elapses before the ZyXEL Device automatically disconnects from the L2TP server.

4.3 Internet Connection Test

After you have configured Internet connection settings on the ZyXEL Device, test the connection. Launch a web browser and enter any web site address for example, http://www.zyxel.com).

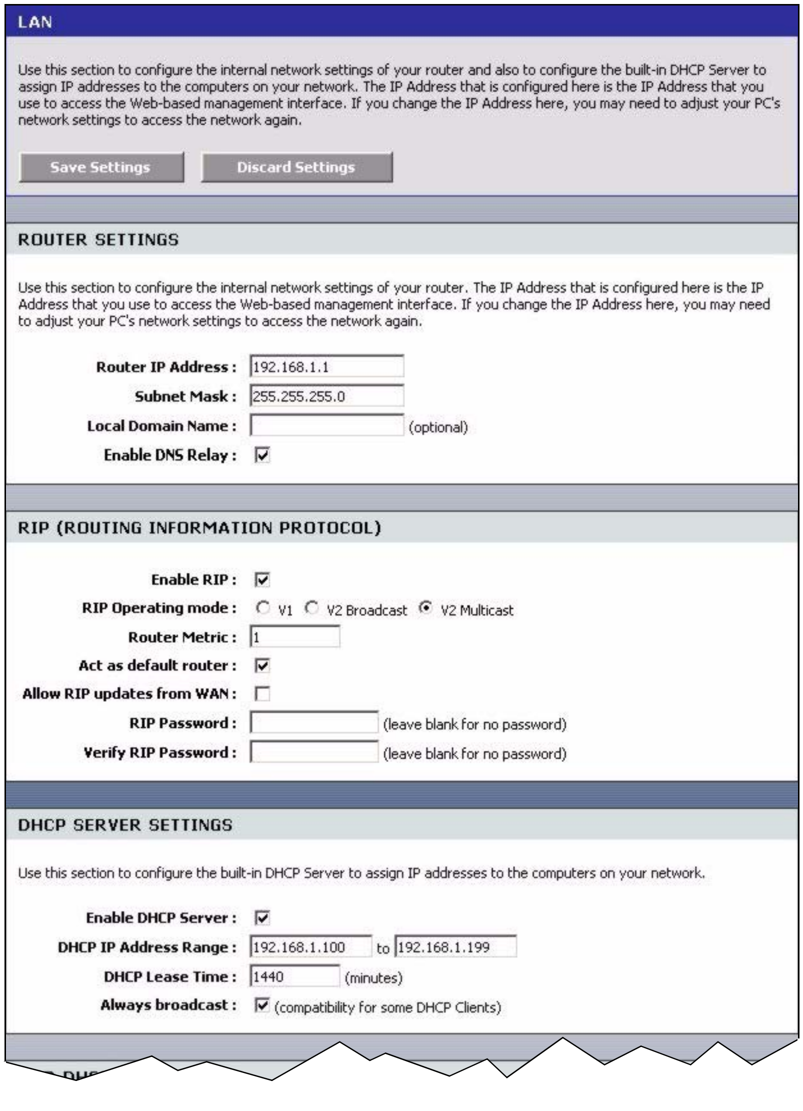
CHAPTER 5 LAN

5.1 Overview

Local Area Network (LAN) is a shared communication system to which many computers are attached. Use **LAN** screen to set the IP address and subnet mask of the LAN interface on the ZyXEL Device. You can also configure DHCP settings in the **LAN** screen.

Click **Basic** > **LAN** to display the configuration screen.

Figure 36 Basic: LAN



LAN

Use this section to configure the internal network settings of your router and also to configure the built-in DHCP Server to assign IP addresses to the computers on your network. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

ROUTER SETTINGS

Use this section to configure the internal network settings of your router. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

Router IP Address : 192.168.1.1
Subnet Mask : 255.255.255.0
Local Domain Name : (optional)
Enable DNS Relay : ☑

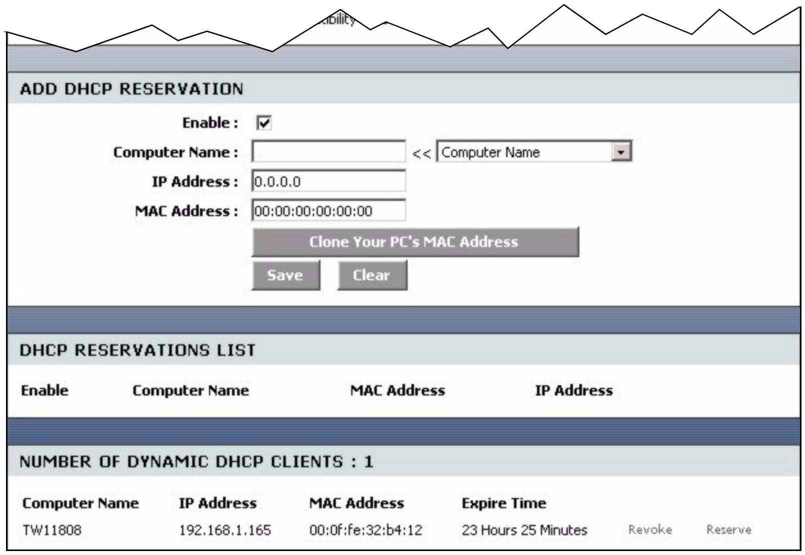
RIP (ROUTING INFORMATION PROTOCOL)

Enable RIP : ☑
RIP Operating mode : ○ V1 ○ V2 Broadcast ● V2 Multicast
Router Metric : 1
Act as default router : ☑
Allow RIP updates from WAN : □
RIP Password : (leave blank for no password)
Verify RIP Password : (leave blank for no password)

DHCP SERVER SETTINGS

Use this section to configure the built-in DHCP Server to assign IP addresses to the computers on your network.

Enable DHCP Server : ☑
DHCP IP Address Range : 192.168.1.100 to 192.168.1.199
DHCP Lease Time : 1440 (minutes)
Always broadcast : ☑ (compatibility for some DHCP Clients)



ADD DHCP RESERVATION

Enable : ☑

Computer Name : << Computer Name

IP Address : 0.0.0.0

MAC Address : 00:00:00:00:00:00

DHCP RESERVATIONS LIST

Enable	Computer Name	MAC Address	IP Address

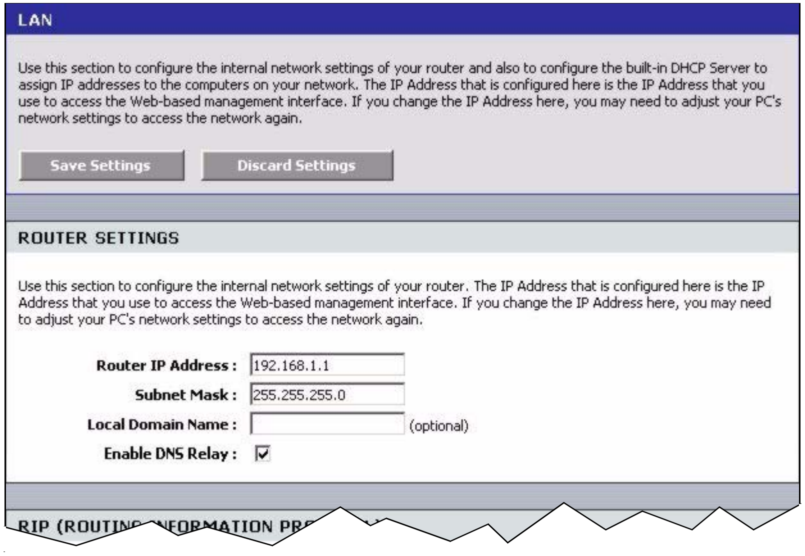
NUMBER OF DYNAMIC DHCP CLIENTS : 1

Computer Name	IP Address	MAC Address	Expire Time		
TW11808	192.168.1.165	00:0f:fe:32:b4:12	23 Hours 25 Minutes	Revoke	Reserve

5.1.1 Router Settings

To set the LAN settings (such as the IP address, subnet mask) on the ZyXEL Device, configure the fields in the **ROUTER SETTINGS** section in the **LAN** screen.

Figure 37 Basic: LAN: Router Settings



LAN

Use this section to configure the internal network settings of your router and also to configure the built-in DHCP Server to assign IP addresses to the computers on your network. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

ROUTER SETTINGS

Use this section to configure the internal network settings of your router. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

Router IP Address : 192.168.1.1

Subnet Mask : 255.255.255.0

Local Domain Name : (optional)

Enable DNS Relay : ☑

The following table describes the labels in this screen.

Table 18 Basic: LAN: Router Settings

LABEL	DESCRIPTION
ROUTER SETTINGS	
IP Address	Type the IP address of your ZyXEL Device in dotted decimal notation. 192.168.1.1 is the factory default. Alternatively, click the right mouse button to copy and/or paste the IP address.
Default Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your ZyXEL Device automatically calculate the subnet mask based on the IP address that you assign. Unless you are implementing subnetting, use the subnet mask computed by the ZyXEL Device.
Local Domain Name	This field is optional. The DHCP server on your ZyXEL Device assigns the domain name to the computer(s) on the WLAN. for the wireless network. For example, if you enter "mynetwork.net" here, and you have a wireless laptop with a computer name of chris, that laptop will be known as "chris.mynetwork.net" to other computers on the WLAN.
Enable DNS Relay	Select this option to set the ZyXEL Device to forward DNS requests to the ISP's DNS server. This allows computers behind the ZyXEL Device to always receive replies from a DNS server even when the ZyXEL Device obtains a different DNS server address from the ISP upon re-establishing the WAN connection. **Note:** You should disable DNS relay if you have set up a DNS server on the LAN in the **Virtual Server** screen.

5.1.2 RIP Setup

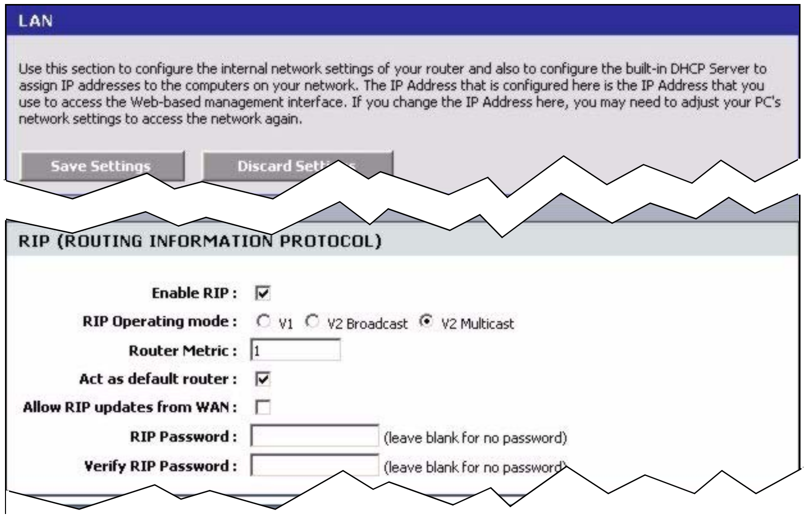
RIP (Routing Information Protocol) allows the ZyXEL Device to exchange routing information with other routers.

RIP version controls the format and the broadcasting method of the RIP packets that the ZyXEL Device sends (it recognizes both formats when receiving). RIP version 1 (**V1**)is universally supported. RIP version 1 is probably adequate for most networks, unless you have an unusual network topology.

RIP version 2 carries more information in the packets.Both **V2 Broadcast** and **V2 Multicast** sends the routing data in RIP version2 format; the difference being that **V2 Broadcast** uses subnet broadcasting while **V2 Multicast** uses multicasting.

To configure RIP settings on the ZyXEL Device, set the fields under **RIP (ROUTING INFORMATION PROTOCOL)** section in the **LAN** screen.

Figure 38 Basic: LAN: RIP



LAN

Use this section to configure the internal network settings of your router and also to configure the built-in DHCP Server to assign IP addresses to the computers on your network. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

RIP (ROUTING INFORMATION PROTOCOL)

Enable RIP :	☑
RIP Operating mode :	○ V1 ○ V2 Broadcast ● V2 Multicast
Router Metric :	1
Act as default router :	☑
Allow RIP updates from WAN :	□
RIP Password :	(leave blank for no password)
Verify RIP Password :	(leave blank for no password)

The following table describes the labels in this screen.

Table 19 Basic: LAN: RIP

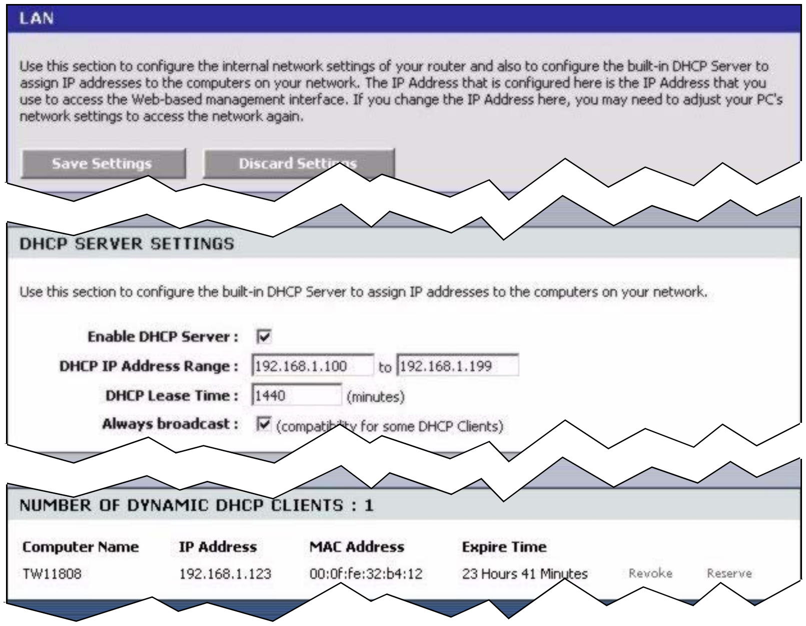
LABEL	DESCRIPTION
RIP	
Enable RIP	Select this option to activate RIP on the ZyXEL Device.
RIP Operating mode	Specify the RIP version the ZyXEL Device is to use. Select **V1** if the other routers do not support RIP version 2. Select **V2 Broadcast** if some routers support RIP version 1 and some support RIP version 2. Select **V2 Multicast** if the ZyXEL Device is the only router on your network or that tall other routers support RIP version 2 only.
Router Metric	The metric represents the “cost” of transmission through the ZyXEL Device. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Enter 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.
Allow RIP updates from WAN	Select this option to allow the ZyXEL Device to send/receive RIP packets through the WAN port for RIP information update. It is recommended that you disable this option unless requested to do so by your ISP.
RIP Password	When you set the ZyXEL Device to use RIP version 2, you may enter a password to allow only authorized RIP packets to the ZyXEL Device. Enter the password if provided by your ISP.
Verify RIP Password	Enter the password again to confirm.

5.1.3 DHCP Server Settings

DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients to obtain TCP/IP configuration at start-up from a server. You can configure the ZyXEL Device as a DHCP server or disable it. When configured as a server, the ZyXEL Device provides the TCP/IP configuration for the DHCP client. If DHCP service is disabled, you must have another DHCP server on your LAN, or else the computer must be manually configured.

To configure DHCP settings on the ZyXEL Device, set the **DHCP SERVER SETTINGS** fields in the **LAN** screen. You can also view the list of DHCP client computers in this screen.

Figure 39 Basic: LAN: DHCP Server Settings



LAN

Use this section to configure the internal network settings of your router and also to configure the built-in DHCP Server to assign IP addresses to the computers on your network. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

DHCP SERVER SETTINGS

Use this section to configure the built-in DHCP Server to assign IP addresses to the computers on your network.

Enable DHCP Server : ☑

DHCP IP Address Range : 192.168.1.100 to 192.168.1.199

DHCP Lease Time : 1440 (minutes)

Always broadcast : ☑ (compatibility for some DHCP Clients)

NUMBER OF DYNAMIC DHCP CLIENTS : 1

Computer Name	IP Address	MAC Address	Expire Time		
TW11808	192.168.1.123	00:0f:fe:32:b4:12	23 Hours 41 Minutes	Revoke	Reserve

The following table describes the labels in this screen.

Table 20 Basic: LAN: DHCP Server Settings

LABEL	DESCRIPTION
ENABLE	
Enable DHCP Server	DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients (workstations) to obtain TCP/IP configuration at startup from a server. Select this option to set the ZyXEL Device to assign network information (IP address, DNS information etc.) to an Ethernet device connected to the **LAN** ports. Clear this check box to stop the ZyXEL Device from acting as a DHCP server. you must have another DHCP server on your LAN, or else the computer must be manually configured.
DHCP Address Range	The ZyXEL Device is pre-configured to provide IP addresses (ranging from 192.168.1.100 to 192.168.1.199) to DHCP clients. This configuration leaves some IP addresses (excluding the ZyXEL Device itself) in the lower and upper ranges for other server computers, for instance, servers for mail, FTP, TFTP, web, etc., that you may have. Specify the starting and end IP address for the DHCP clients.

Table 20 Basic: LAN: DHCP Server Settings (continued)

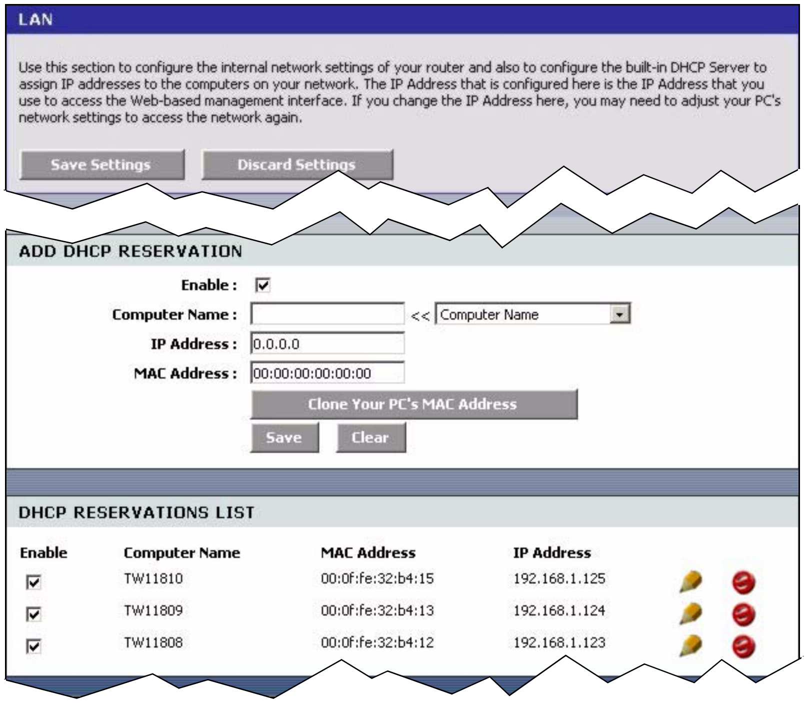
LABEL	DESCRIPTION
DHCP Lease Time	Specify the time (in minutes) a DHCP client is allowed to use the assigned IP address from the ZyXEL Device. Once the lease time is up, the DHCP client has to renew the lease.
Always Broadcast	Some older DHSP client software disable DHCP broadcasting, thus some computers may not be able to obtain an IP address from the ZyXEL Device. Select this option to set the ZyXEL Device to broadcast DHCP replies. This ensures that all LAN computers can get an IP address at the cost of increased broadcast traffic on the LAN.
NUMBER OF DYNMAIC DHCP CLIENTS	This field displays the number of DHCP clients.
Computer Name	This field displays the name of the DHCP client computer.
MAC Address	This field displays the MAC address of the DHCP client computer.
IP Address	This field displays the IP address of the DHCP client computer.

5.1.4 DHCP Reservation

DHCP reservation, also known as static DHCP, allows the ZyXEL Device to assign specific IP addresses on the LAN to specific individual computers based on their MAC addresses.

Configure DHCP Reservation settings in the **LAN** screen. You can also view the list of reserved IP addresses in this screen.

Figure 40 Basic: LAN: DHCP Reservation



LAN

Use this section to configure the internal network settings of your router and also to configure the built-in DHCP Server to assign IP addresses to the computers on your network. The IP Address that is configured here is the IP Address that you use to access the Web-based management interface. If you change the IP Address here, you may need to adjust your PC's network settings to access the network again.

ADD DHCP RESERVATION

Enable :	☑
Computer Name :	<< Computer Name
IP Address :	0.0.0.0
MAC Address :	00:00:00:00:00:00

DHCP RESERVATIONS LIST

Enable	Computer Name	MAC Address	IP Address
☑	TW11810	00:0f:fe:32:b4:15	192.168.1.125
☑	TW11809	00:0f:fe:32:b4:13	192.168.1.124
☑	TW11808	00:0f:fe:32:b4:12	192.168.1.123

The following table describes the labels in this screen.

Table 21 Basic: LAN: DHCP Reservation

LABEL	DESCRIPTION
ADD DHCP RESERVATION	
Enable	Select this option to enable static DHCP to set the ZyXEL Device to assign one IP address on the LAN to a specific computer based on the MAC address. Clear this check box to disable this feature.
Computer Name	Enter the name of the DHCP client computer. This is for identification purposes. You can also select the name of the client computer currently connected to the ZyXEL Device. The ZyXEL Device automatically fills the information in the fields below.
IP Address	Type the IP address that you want to assign to the computer on your LAN. Alternatively, select from the list of dynamic client computer names in the drop-down list box. The ZyXEL Device automatically enters the current assigned IP address.
MAC Address	Type the MAC address (with colons) of a computer on your LAN. Or click **Clone Your PC’s MAC Address** to copy the MAC address of your computer.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
DHCP RESERVATIONS LIST	
Enable	Select this option to activate the static DHCP setting.
Computer Name	This field displays the name of the DHCP client computer.
MAC Address	This field displays the MAC address.
IP Address	This field displays the IP address of the MAC address.

CHAPTER 6 WLAN

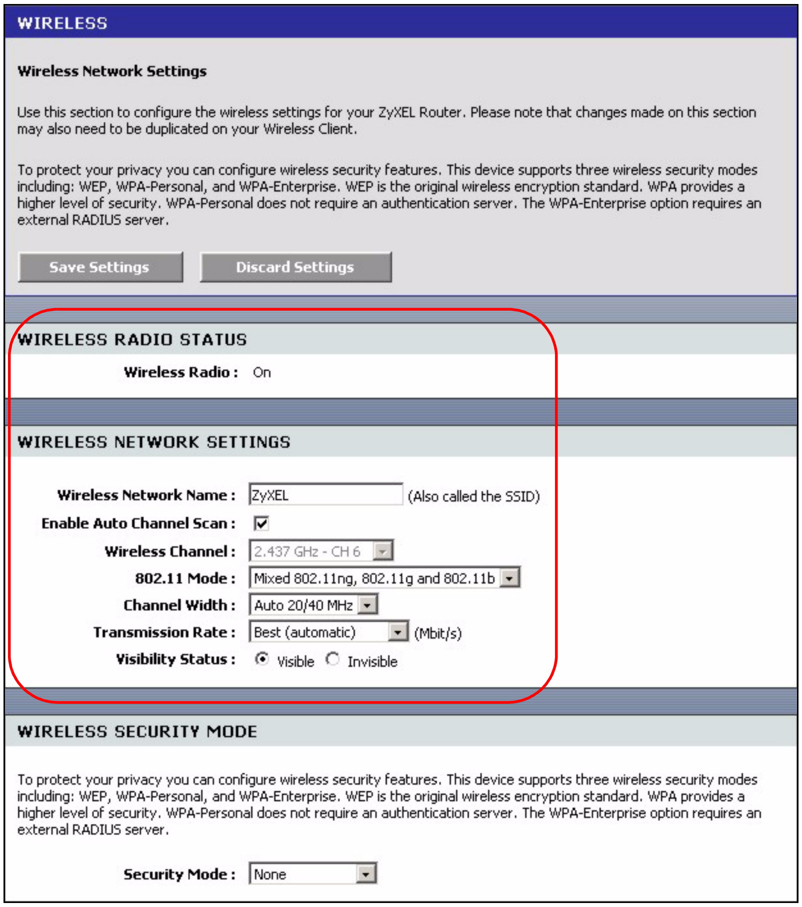
This chapter shows how to configure general WLAN and WLAN security settings in the **WLAN** screen.

6.1 General Wireless LAN Setup

Refer to Appendix B on page 128 for background information.

Configure general wireless LAN settings in the **Wireless** screen. Click **Basic** > **Wireless** to display the configuration screen.

Figure 41 Basic: Wireless: General Setup



WIRELESS

Wireless Network Settings

Use this section to configure the wireless settings for your ZyXEL Router. Please note that changes made on this section may also need to be duplicated on your Wireless Client.

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

WIRELESS RADIO STATUS

Wireless Radio : On

WIRELESS NETWORK SETTINGS

Wireless Network Name : ZyXEL (Also called the SSID)
Enable Auto Channel Scan : ☑
Wireless Channel : 2.437 GHz - CH 6
802.11 Mode : Mixed 802.11ng, 802.11g and 802.11b
Channel Width : Auto 20/40 MHz
Transmission Rate : Best (automatic) (Mbit/s)
Visibility Status : ● Visible ○ Invisible

WIRELESS SECURITY MODE

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

Security Mode : None

THe following table describes the related labels in this screen.

Table 22 Basic: Wireless: General Setup

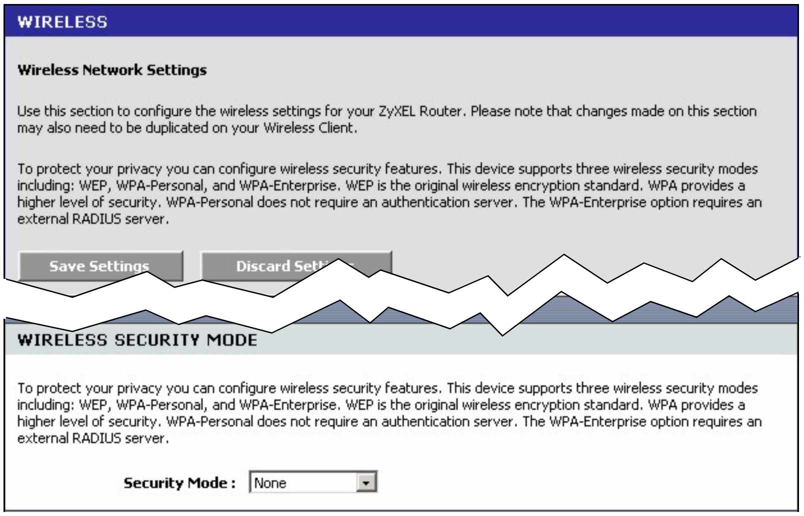
LABEL	DESCRIPTION
WIRELESS RADIO STATUS	This field displays whether the wireless LAN feature is enabled (**ON**) or disabled (**OFF**). You can enable and disable the wireless LAN feature on the ZyXEL Device by using the wireless LAN switch at the rear panel of the ZyXEL Device. Refer to the Quick Start Guide for more information.
WIRELESS NETWORK SETTINS	
Wireless Network Name	This is also known as the SSID (Service Set IDentification), which is a unique name to identify the ZyXEL Device in the wireless LAN. Wireless stations associating to the ZyXEL Device must have the same SSID. Enter a descriptive name of up to 32 printable characters (including spaces; alphabetic characters are case-sensitive).
Enable Auto Channel Scan	The radio frequency used by IEEE 802.11 wireless devices is called a channel. Select this option to set the ZyXEL Device to automatically scan for and select the optimum channel in the wireless network.
Wireless Channel	This field is disabled when you enable auto channel scan. Select a channel from the drop-down list box.
802.11 Mode	Select **802.11b only** to have the ZyXEL Device connect to an IEEE 802.11b wireless device only and vice versa. Select **Mixed 802.11b and 802.11g** to have the ZyXEL Device connect to either an IEEE 802.11g or IEEE 802.11b wireless device. Select **802.11g only** to have the ZyXEL Device connect to an IEEE 802.11g wireless device only and vice versa. Select **802.11ng only** to have the ZyXEL Device connect to an IEEE 802.11ng wireless device only and vice versa. Select **Mixed 802.11ng, 802.11g and 802.11b** to have the ZyXEL Device connect to either an IEEE 802.11ng, IEEE 802.11g or IEEE 802.11b wireless device.
Channel Width	Specify the wireless channel bandwidth mode the ZyXEL Device is to use. Select **20 MHz** to set the ZyXEL Device to transmit at up to 20 MHz to other wireless devices (including draft-N compatible wireless devices). Select this option to solve wireless connection problems in a mixed network. Select **Auto 20/40 MHz** to set the ZyXEL Device to automatically switch between the 20 MHz and 40 MHz operation. The ZyXEL Device will use 40 Mhz for maximum transmission speed between other draft-N compatible wireless devices. If an adjacent channel is used by an IEEE 802.11b/g device, the ZyXEL Device reverts to use 20 MHz operation. This is the recommended option.
Transmission Rate	Select a transmission speed from the drop-down list box.
Visibility Status	Select **Invisible** to hide the SSID in so a station cannot obtain the SSID through AP scanning. Select **Visible** to make the ESSID visible so a station can obtain the SSID through AP scanning.

6.2 Wireless LAN Security

Wireless LAN security is vital to your network to protect wireless communications. If you do not enable any wireless security on your ZyXEL Device, the ZyXEL Device's wireless communications are accessible to any wireless networking device that is in the coverage area. Refer to Appendix B on page 128 for background information.

Configure the wireless LAN security using the **Wireless** screen. Click **Basic > Wireless** to display the configuration screen. This screen varies depending on the option you select in the **Security Mode** field.

Figure 42 Basic: Wireless: WLAN Security Setup



WIRELESS

Wireless Network Settings

Use this section to configure the wireless settings for your ZyXEL Router. Please note that changes made on this section may also need to be duplicated on your Wireless Client.

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

WIRELESS SECURITY MODE

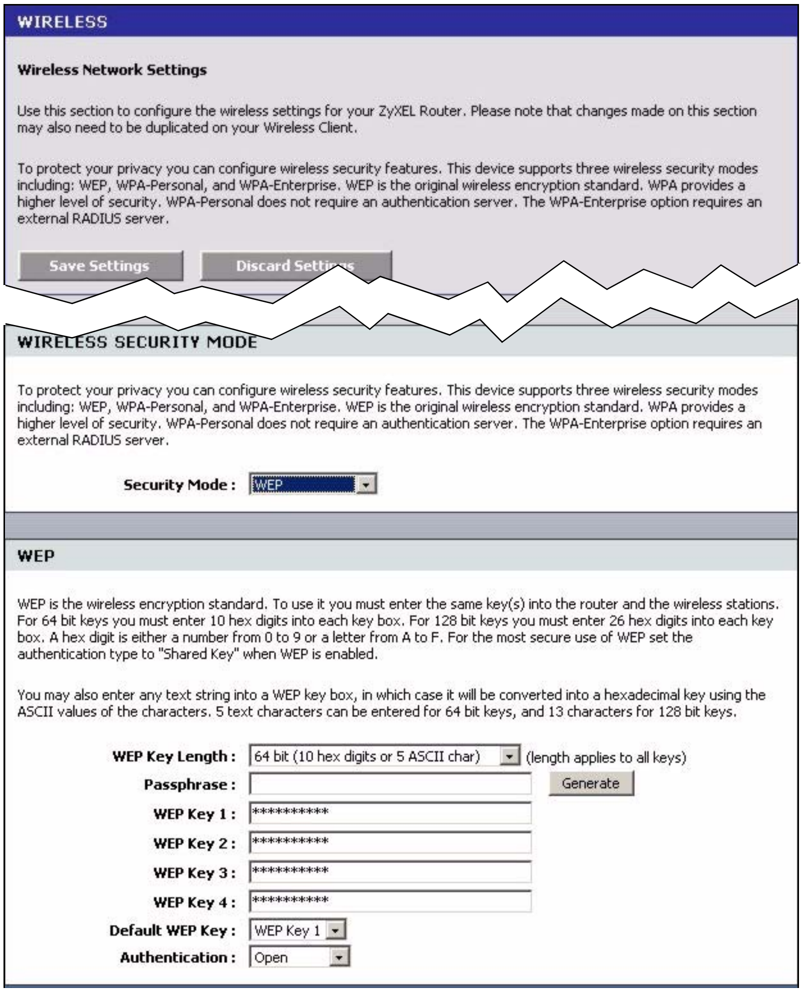
To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

Security Mode : None

6.2.1 WLAN Security Setup: WEP

To configure basic WEP key encryption, select **WEP** in the **Security Mode** field in the **Wireless** screen.

Figure 43 Basic: Wireless: WLAN Security Setup: WEP



WIRELESS

Wireless Network Settings

Use this section to configure the wireless settings for your ZyXEL Router. Please note that changes made on this section may also need to be duplicated on your Wireless Client.

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

WIRELESS SECURITY MODE

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

Security Mode : WEP

WEP

WEP is the wireless encryption standard. To use it you must enter the same key(s) into the router and the wireless stations. For 64 bit keys you must enter 10 hex digits into each key box. For 128 bit keys you must enter 26 hex digits into each key box. A hex digit is either a number from 0 to 9 or a letter from A to F. For the most secure use of WEP set the authentication type to "Shared Key" when WEP is enabled.

You may also enter any text string into a WEP key box, in which case it will be converted into a hexadecimal key using the ASCII values of the characters. 5 text characters can be entered for 64 bit keys, and 13 characters for 128 bit keys.

WEP Key Length : 64 bit (10 hex digits or 5 ASCII char) (length applies to all keys)

Passphrase :

WEP Key 1 : ***********

WEP Key 2 : ***********

WEP Key 3 : ***********

WEP Key 4 : ***********

Default WEP Key : WEP Key 1

Authentication : Open

The following table describes the related fields in this screen.

Table 23 Basic: Wireless: WLAN Security Setup: WEP

LABEL	DESCRIPTION
WEP	
WEP Key Length	WEP (Wired Equivalent Privacy) encrypts data frames before transmitting over the wireless network. Select **64-bit (10 hex digits or 5 ASCII char)** or **128-bit (26 hex digits or 13 ASCII char)**.
Key 1 .. 4	The WEP keys are used to encrypt data. Both the ZyXEL Device and the wireless stations must use the same WEP key for data transmission. If you want to manually set the WEP keys, enter the key in the field provided. If you chose **64-bit**, then enter 10 hexadecimal characters ("0-9", "A-F"). If you chose **128-bit**, then enter26 hexadecimal characters ("0-9", "A-F"). The values for the WEP keys must be set up exactly the same on all wireless devices in the same wireless LAN. You must configure all four keys, but only one key can be used at any one time. The default key is key 1.

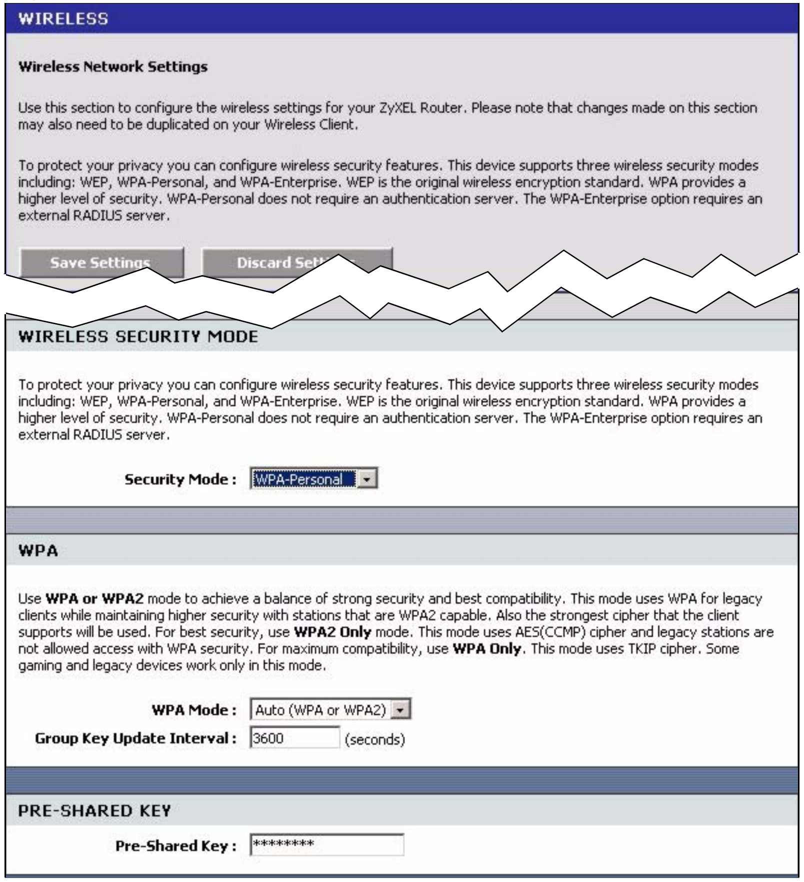
Table 23 Basic: Wireless: WLAN Security Setup: WEP (continued)

LABEL	DESCRIPTION
Default WEP Key	Select a default WEP key to use for data encryption.
Authentication	Select an authentication method. Choices are **Shared Key**, **Open** and **Auto**.

6.2.2 WLAN Security Setup: WPA-Personal

If you want better WLAN security than WEP but do not have a RADIUS server on your network, select **WPA-Personal** in the **Security Mode** field in the **Wireless** screen.

Figure 44 Basic: Wireless: WLAN Security Setup: WPA-Personal



WIRELESS

Wireless Network Settings

Use this section to configure the wireless settings for your ZyXEL Router. Please note that changes made on this section may also need to be duplicated on your Wireless Client.

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

WIRELESS SECURITY MODE

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

Security Mode : WPA-Personal

WPA

Use **WPA or WPA2** mode to achieve a balance of strong security and best compatibility. This mode uses WPA for legacy clients while maintaining higher security with stations that are WPA2 capable. Also the strongest cipher that the client supports will be used. For best security, use **WPA2 Only** mode. This mode uses AES(CCMP) cipher and legacy stations are not allowed access with WPA security. For maximum compatibility, use **WPA Only**. This mode uses TKIP cipher. Some gaming and legacy devices work only in this mode.

WPA Mode : Auto (WPA or WPA2)

Group Key Update Interval : 3600 (seconds)

PRE-SHARED KEY

Pre-Shared Key : ********

The following table describes the related labels in this screen.

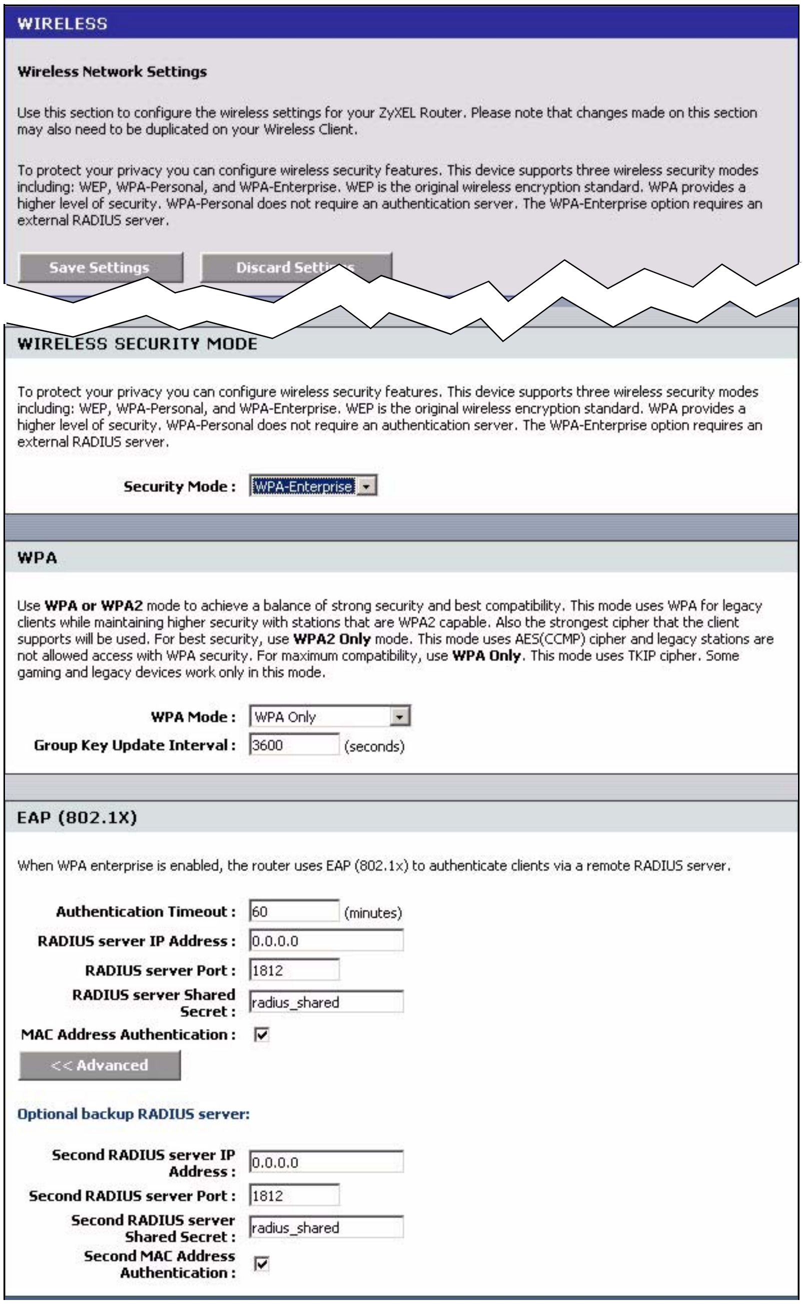
Table 24 Basic: WLAN Security Setup: WPA-Personal

LABEL	DESCRIPTION
WPA	
WPA Mode	Specify a WPA mode. Make sure the peer device(s) is also set to use the same WPA mode. Select **Auto (WPA or WPA2)** to set the ZyXEL Device to use WPA2 first and then WPA if connection fails with WPA2. Select **WPA Only** to set the ZyXEL Device to use WPA. WPA is a older implementation than WPA2. Select **WPA2 Only** to set the ZyXEL Device to use WPA2 only.
Group Key Update Interval	This is the rate at which an AP or RADIUS server sends a new group key out to all clients. The re-keying process is the WPA equivalent of automatically changing the WEP key for an AP and all stations in a WLAN on a periodic basis. Enter an update time in seconds.
PRE SHARED KEY	
Pre-Shared Key	Type a pre-shared key from 8 to 63 case-sensitive ASCII characters (including spaces and symbols).

6.2.3 WLAN Security Setup: WPA-Enterprise

If you want better WLAN security than WEP and have a RADIUS server on your network, select **WPA-Enterprise** in the **Security Mode** field in the **Wireless** screen.

Figure 45 Basic: Wireless: WLAN Security Setup: WPA-Enterprise



WIRELESS

Wireless Network Settings

Use this section to configure the wireless settings for your ZyXEL Router. Please note that changes made on this section may also need to be duplicated on your Wireless Client.

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

WIRELESS SECURITY MODE

To protect your privacy you can configure wireless security features. This device supports three wireless security modes including: WEP, WPA-Personal, and WPA-Enterprise. WEP is the original wireless encryption standard. WPA provides a higher level of security. WPA-Personal does not require an authentication server. The WPA-Enterprise option requires an external RADIUS server.

Security Mode : WPA-Enterprise

WPA

Use **WPA or WPA2** mode to achieve a balance of strong security and best compatibility. This mode uses WPA for legacy clients while maintaining higher security with stations that are WPA2 capable. Also the strongest cipher that the client supports will be used. For best security, use **WPA2 Only** mode. This mode uses AES(CCMP) cipher and legacy stations are not allowed access with WPA security. For maximum compatibility, use **WPA Only**. This mode uses TKIP cipher. Some gaming and legacy devices work only in this mode.

WPA Mode : WPA Only

Group Key Update Interval : 3600 (seconds)

EAP (802.1X)

When WPA enterprise is enabled, the router uses EAP (802.1x) to authenticate clients via a remote RADIUS server.

Authentication Timeout : 60 (minutes)

RADIUS server IP Address : 0.0.0.0

RADIUS server Port : 1812

RADIUS server Shared Secret : radius_shared

MAC Address Authentication : ☑

Optional backup RADIUS server:

Second RADIUS server IP Address : 0.0.0.0

Second RADIUS server Port : 1812

Second RADIUS server Shared Secret : radius_shared

Second MAC Address Authentication : ☑

The following table describes the related labels in this screen.

Table 25 Basic: WLAN Security Setup: WPA-Enterprise

LABEL	DESCRIPTION
WPA	
WPA Mode	Specify a WPA mode. Make sure the peer device(s) is also set to use the same WPA mode. Select **Auto (WPA or WPA2)** to set the ZyXEL Device to use WPA2 first and then WPA if connection fails with WPA2. Select **WPA Only** to set the ZyXEL Device to use WPA. WPA is a older implementation than WPA2. Select **WPA2 Only** to set the ZyXEL Device to use WPA2 only.
Group Key Update Interval	This is the rate at which an AP or RADIUS server sends a new group key out to all clients. The re-keying process is the WPA equivalent of automatically changing the WEP key for an AP and all stations in a WLAN on a periodic basis. Enter an update time in seconds.
EAP (802.1X)	
Authentication Timeout	Specify how often wireless stations have to reenter user names and passwords in order to stay connected. Enter a time interval between 10 and 65535 seconds. If wireless station authentication is done using a RADIUS server, the reauthentication timer on the RADIUS server has priority.
RADIUS Server IP Address	Enter the IP address of the external authentication server in dotted decimal notation.
RADIUS Server 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.
RADIUS Server Shared Secret	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the access points. The key is not sent over the network. This key must be the same on the external authentication server and ZyXEL Device.
MAC Address Authentication	Select this option to force a user to connect from the same computer when logging into the wireless network.
Advanced >>	Click **Advanced >>** to display the fields to configure the second RADIUS server.
<< Advanced	Click **<< Advanced** to hide the fields.
Optional Backup RADIUS Server	
Second RADIUS Server IP Address	Enter the IP address of the external authentication server in dotted decimal notation.
Second RADIUS Server 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.
Second RADIUS Server Shared Secret	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the access points. The key is not sent over the network. This key must be the same on the external authentication server and ZyXEL Device.
Second MAC Address Authentication	Select this option to force a user to connect from the same computer when logging into the wireless network.

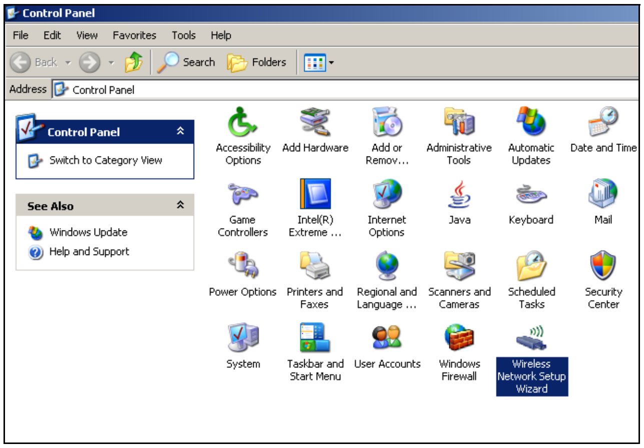
6.3 Wireless Client Setup using Windows® Connect Now

With Windows® Connect Now, you can transfer wireless settings on your ZyXEL Device to a USB memory stick and then save the settings to the wireless client computer(s). This allows you to easily set up a wireless LAN. To take advantage of this feature, you need:

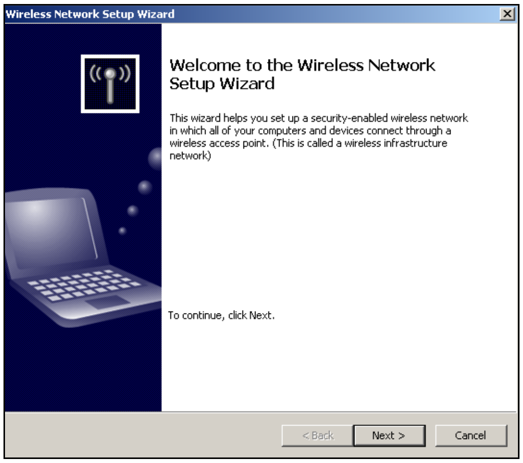
- A USB memory stick with at least 300K of available memory.
- Windows XP with Service Pack 2 (SP2).

Follow the steps below to set up a wireless LAN using Windows® Connect Now.

1 Click **Start** > **Control Panel** and double-click **Wireless Network Setup Wizard**.



2 The first wizard screen displays. Click **Next** in each screen to continue.

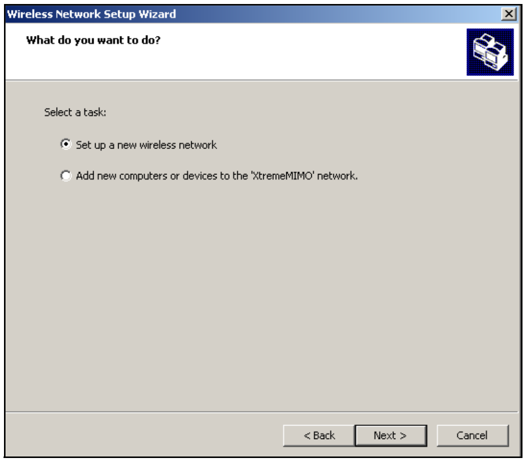


Welcome to the Wireless Network Setup Wizard

This wizard helps you set up a security-enabled wireless network in which all of your computers and devices connect through a wireless access point. (This is called a wireless infrastructure network)

To continue, click Next.

3 Select **Set up a new wireless network to configure a new wireless network**.



Wireless Network Setup Wizard

What do you want to do?

Select a task:

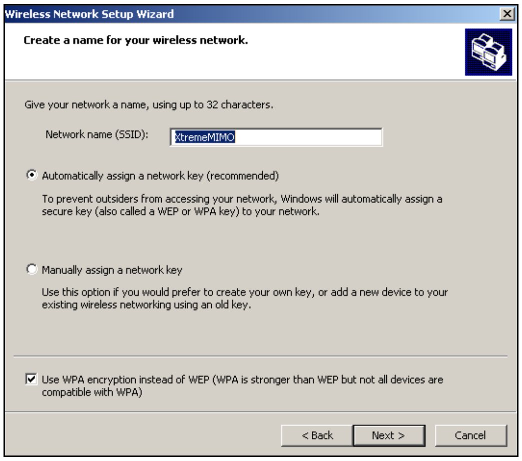
● Set up a new wireless network

○ Add new computers or devices to the 'XtremeMIMO' network.

4 In the **Network name (SSID)** field, specify a unique name to identify your wireless LAN.

5 Select **Automatically assign a network key to have Windows create a security key**.

6 Select **Use WPA encryption instead of WEP for data encryption**.



Wireless Network Setup Wizard

Create a name for your wireless network.

Give your network a name, using up to 32 characters.

Network name (SSID): XtremeMIMO

● Automatically assign a network key (recommended)

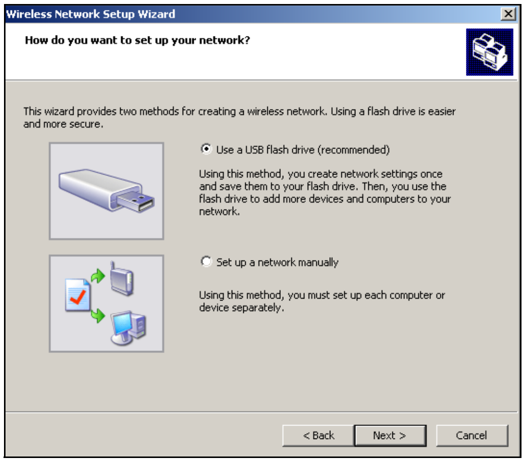
To prevent outsiders from accessing your network, Windows will automatically assign a secure key (also called a WEP or WPA key) to your network.

○ Manually assign a network key

Use this option if you would prefer to create your own key, or add a new device to your existing wireless networking using an old key.

☑ Use WPA encryption instead of WEP (WPA is stronger than WEP but not all devices are compatible with WPA)

7 Select **Use a USB Flash drive to set up a wireless network**.



Wireless Network Setup Wizard

How do you want to set up your network?

This wizard provides two methods for creating a wireless network. Using a flash drive is easier and more secure.

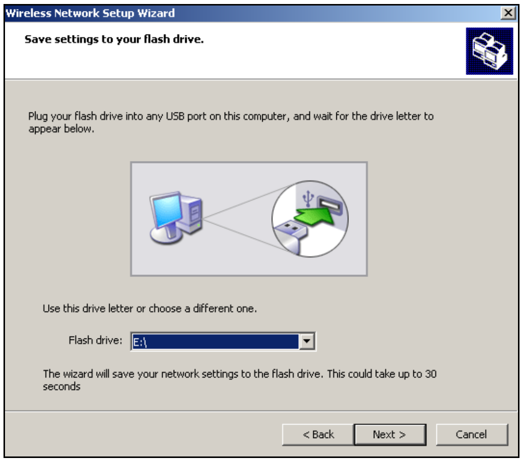
● Use a USB flash drive (recommended)

Using this method, you create network settings once and save them to your flash drive. Then, you use the flash drive to add more devices and computers to your network.

○ Set up a network manually

Using this method, you must set up each computer or device separately.

8 Connect the USB drive to your computer and specify the drive letter in the **Flash drive** field.



Save settings to your flash drive.

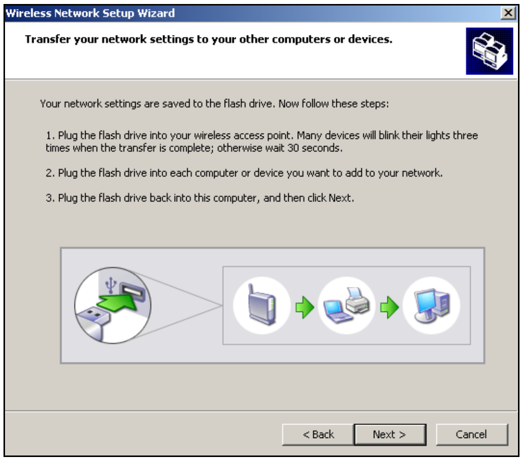
Plug your flash drive into any USB port on this computer, and wait for the drive letter to appear below.

Use this drive letter or choose a different one.

Flash drive: E:\

The wizard will save your network settings to the flash drive. This could take up to 30 seconds

9 Follow the instructions on the screen.



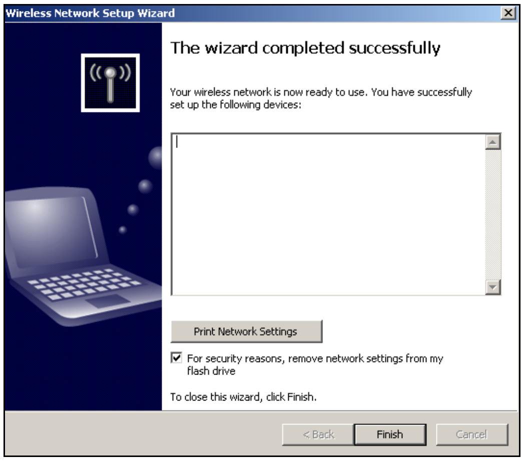
Transfer your network settings to your other computers or devices.

Your network settings are saved to the flash drive. Now follow these steps:

1. Plug the flash drive into your wireless access point. Many devices will blink their lights three times when the transfer is complete; otherwise wait 30 seconds.
2. Plug the flash drive into each computer or device you want to add to your network.
3. Plug the flash drive back into this computer, and then click Next.

10 This screen displays when you have successfully set up a secure wireless network. Click **Finish**.

11 From a wireless computer, test your wireless LAN connection to the ZyXEL Device.



The wizard completed successfully

Your wireless network is now ready to use. You have successfully set up the following devices:

☑ For security reasons, remove network settings from my flash drive

To close this wizard, click Finish.

CHAPTER 7 Advanced

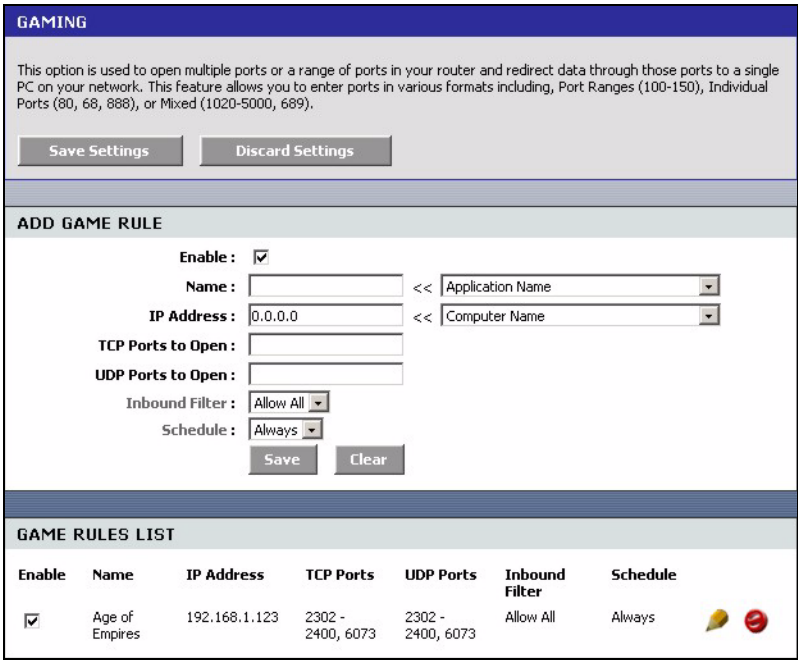
This chapter describes the Advanced screens you use to configure routing and security features.

7.1 Game Hosting

Some Internet applications (such as video conferencing and Internet games) require multiple connections between the clients and the server. These applications do not work through NAT-enabled networks. Your ZyXEL Device is a NAT-enabled device. In order to allow these applications to work in your network, you have to configure the ZyXEL Device to forward these applications to ports on a computer hosting the services.

To set the ZyXEL Device to forward applications to allowed ports, click **Advanced** > **Game Hosting** to display the configuration screen.

Figure 46 Advanced: Game Hosting



GAMING

This option is used to open multiple ports or a range of ports in your router and redirect data through those ports to a single PC on your network. This feature allows you to enter ports in various formats including, Port Ranges (100-150), Individual Ports (80, 68, 888), or Mixed (1020-5000, 689).

ADD GAME RULE

Enable :	☑
Name :	<< Application Name
IP Address :	0.0.0.0 << Computer Name
TCP Ports to Open :	
UDP Ports to Open :	
Inbound Filter :	Allow All
Schedule :	Always

GAME RULES LIST

Enable	Name	IP Address	TCP Ports	UDP Ports	Inbound Filter	Schedule	
☑	Age of Empires	192.168.1.123	2302 - 2400, 6073	2302 - 2400, 6073	Allow All	Always	

The following table describes the fields in this screen.

Table 26 Advanced: Game Hosting

LABEL	DESCRIPTION
Enable	Click **Enable** to activate this feature. Clear this check box to deactivate this feature. Note that some Internet applications may not work in your network behind the ZyXEL Device.
Name	Enter a descriptive name for this setting. Alternatively, select a pre-defined application name from the drop-down list box. The pre-configured port number ranges for the selected application will be automatically displayed below.
IP Address	Enter the IP address (in dotted decimal notation) of a local computer hosting the selected service. Alternatively, select the name of a LAN computer from the drop-down list box. The IP address of the selected computer will be displayed in this field.
TCP Ports to Open	Specify the TCP port(s) for the application. You can enter a port number and/or a range of ports. For example, 6159-6180, 99.
UDP Ports to Open	Specify the UDP port(s) for the application. You can enter a port number and/or a range of ports. For example, 6159-6180, 99.
Inbound Filter	Select a filter action on the traffic. Select You can configure filter actions in the **Inbound Filter** screen.
Schedule	Select the name of a time setting during which this setting is active. You can configure schedules in the **Schedules** screen.
Save	Click **Save** to save the changes of a configuration screen for the current session.
Clear	Click **Clear** to start configuring a screen again.
Game Rules List	
Enable	Select this option to activate this setting. Clear this checkbox to disable this setting.
Name	This field displays the descriptive name for this setting.
IP Address	This field displays the IP address of the local computer to which the specified traffic is forwarded.
TCP Ports	This field displays the TCP port(s) the specified traffic is forwarded.
UDP Ports	This field displays the UDP port(s) the specified traffic is forwarded.
Inbound Filter	This field displays the name of the filter on the incoming traffic.
Schedule	This field displays the name of the schedule to use.

7.2 Virtual Server

With the virtual server (also known as port forwarding) feature, you can make inside (behind NAT on the LAN) servers, for example, web or FTP, visible to the outside world even though NAT makes your whole inside network appear as a single computer to the outside world.

You may enter a single port number or a range of port numbers to be forwarded, and the local IP address of the desired server. The port number identifies a service; for example, web service is on port 80 and FTP on port 21. In some cases, such as for unknown services or where one server can support more than one service (for example both FTP and web service), it might be better to specify a range of port numbers. You can allocate a server IP address that corresponds to a port or a range of ports.

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

7.2.1 Common Services and Port Numbers

The most often used port numbers are shown in the following table. Please refer to RFC 1700 for further information about port numbers.

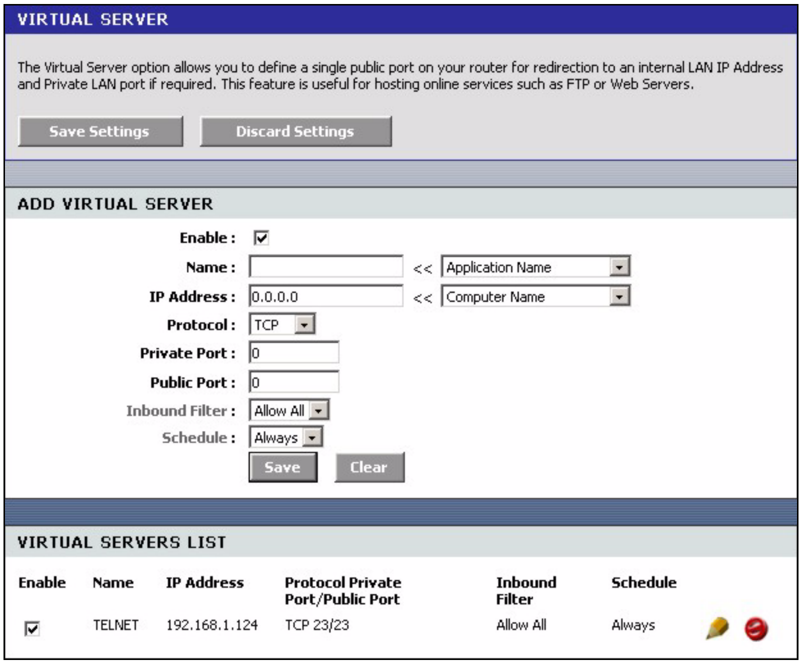
Table 27 Virtual Server: Common Services and Port Numbers

SERVICES	PORT NUMBER
ECHO	7
FTP (File Transfer Protocol)	21
SMTP (Simple Mail Transfer Protocol)	25
DNS (Domain Name System)	53
Finger	79
HTTP (Hyper Text Transfer protocol or WWW, Web)	80
POP3 (Post Office Protocol)	110
NNTP (Network News Transport Protocol)	119
SNMP (Simple Network Management Protocol)	161
SNMP trap	162
PPTP (Point-to-Point Tunneling Protocol)	1723

7.2.2 Virtual Server Setup

To configure virtual server settings, click **Advanced > Virtual Server**.

Figure 47 Advanced: Virtual Server



VIRTUAL SERVER

The Virtual Server option allows you to define a single public port on your router for redirection to an internal LAN IP Address and Private LAN port if required. This feature is useful for hosting online services such as FTP or Web Servers.

ADD VIRTUAL SERVER

Enable : ☑

Name : << Application Name

IP Address : 0.0.0.0 << Computer Name

Protocol : TCP

Private Port : 0

Public Port : 0

Inbound Filter : Allow All

Schedule : Always

VIRTUAL SERVERS LIST

Enable	Name	IP Address	Protocol Private Port/Public Port	Inbound Filter	Schedule
☑	TELNET	192.168.1.124	TCP 23/23	Allow All	Always

The following table describes the labels in this screen.

Table 28 Advanced: Virtual Server

LABEL	DESCRIPTION
Active	Select this check box to enable this virtual server setting. Clear this check box to disallow forwarding of these ports to an inside server without having to delete the entry.
Name	Enter a name to identify this port-forwarding rule. Alternatively, select a pre-defined name from the drop-down list box to have the ZyXEL Device fill in the default port numbers for the selected service.
IP Address	Enter the inside IP address of the inside server. Alternatively, select the name of a LAN computer from the drop-down list box to have the ZyXEL Device fill in the IP address of the computer.
Protocol	Select the protocol type (**TCP**, **UDP** or **Both**).
Private Port	Enter the port number to which you want the ZyXEL Device to translate the public port.
Public Port	Enter the incoming port number for the selected service.
Inbound Filter	Select a filter action on the traffic. Select You can configure filter actions in the **Inbound Filter** screen.
Schedule	Select the name of a time setting during which this setting is active. You can configure schedules in the **Schedules** screen.
Save	Click this button to save the changes of a configuration screen for the current session.
Clear	Click this button to start configuring a screen again.
Virtual Server List	

Table 28 Advanced: Virtual Server (continued)

LABEL	DESCRIPTION
Enable	Select this check box to enable this virtual server setting. Clear this check box to disallow forwarding of these ports to an inside server without having to delete the entry.
Name	This field displays the descriptive name for this setting.
IP Address	This field displays the IP address of the inside server.
Protocol	This field displays the protocol type.
Private Port	This field displays the port number to which you want the ZyXEL Device to translate the public port.
Public Port	This field displays the incoming port number.
Inbound Filter	This field displays the name of the filter on the incoming traffic.
Schedule	This field displays the name of the schedule to use.

7.3 Applications

You can enable Application Layer Gateway (ALG) to allow certain NAT un-friendly applications (such as SIP) to operate properly through the ZyXEL Device. Alternatively, you can configure port triggering to allow computers on the LAN to dynamically take turns using the service

7.3.1 Port Triggering

Some services use a dedicated range of ports on the client side and a dedicated range of ports on the server side. With regular port forwarding (or virtual server setup) you set a forwarding port in NAT to forward a service (coming in from the server on the WAN) to the IP address of a computer on the client side (LAN). The problem is that port forwarding only forwards a service to a single LAN IP address. In order to use the same service on a different LAN computer, you have to manually replace the LAN computer's IP address in the forwarding port with another LAN computer's IP address.

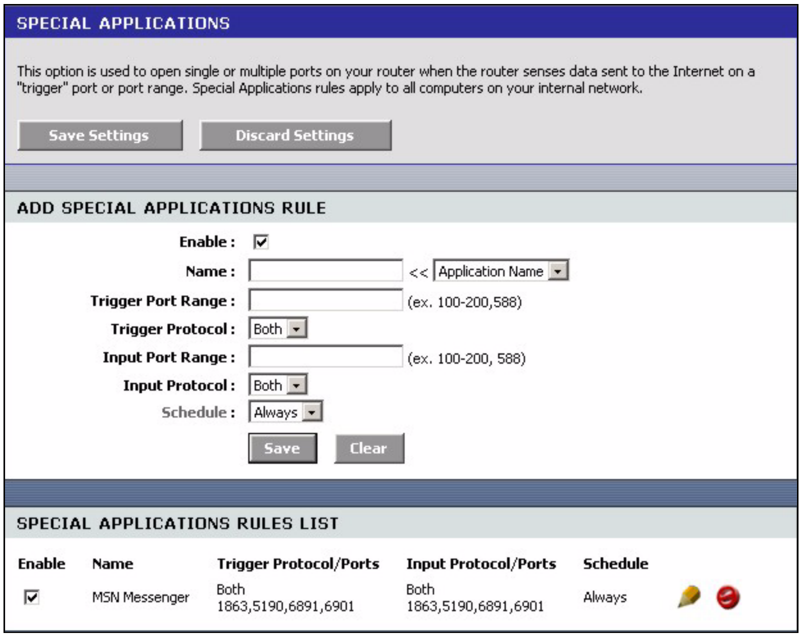
Trigger port forwarding solves this problem by allowing computers on the LAN to dynamically take turns using the service. The ZyXEL Device records the IP address of a LAN computer that sends traffic to the WAN to request a service with a specific port number and protocol ("trigger" port and protocol). When the ZyXEL Device's WAN port receives a response with a specific port number and protocol ("input" port and protocol), the ZyXEL Device forwards the traffic to the LAN IP address of the computer that sent the request. After that computer’s connection for that service closes, another computer on the LAN can use the service in the same manner. This way you do not need to configure a new IP address each time you want a different LAN computer to use the application.

7.3.2 Configuring Special Applications

Use the **Special Applications** screen to configure port triggers and set up ALG passthroughs for specific applications (such as online games).

Click **Advanced** > **Applications** to display the configuration screen.

Figure 48 Advanced: Applications


SPECIAL APPLICATIONS

This option is used to open single or multiple ports on your router when the router senses data sent to the Internet on a "trigger" port or port range. Special Applications rules apply to all computers on your internal network.

ADD SPECIAL APPLICATIONS RULE

Enable : ☑

Name : << Application Name

Trigger Port Range : (ex. 100-200,588)

Trigger Protocol : Both

Input Port Range : (ex. 100-200, 588)

Input Protocol : Both

Schedule : Always

SPECIAL APPLICATIONS RULES LIST

Enable	Name	Trigger Protocol/Ports	Input Protocol/Ports	Schedule
☑	MSN Messenger	Both 1863,5190,6891,6901	Both 1863,5190,6891,6901	Always

The following table describes the labels in this screen.

Table 29 Advanced: Applications

LABEL	DESCRIPTION
Add Special Applications Rule	
Enable	Select this option to activate this rule.
Name	Enter a descriptive name for identification purposes. Alternatively, select a pre-defined application name from the drop-down list box to have the ZyXEL Device fill in the default port numbers and protocol type for the selected application.
Trigger Port Range	The trigger port is a port (or a range of ports) that causes (or triggers) the ZyXEL Device to record the IP address of the LAN computer that sent the traffic to a server on the WAN. Specify a port or a range of ports.
Trigger Protocol	Select a protocol type for the application.
Input Port Range	Incoming is a port (or a range of ports) that a server on the WAN uses when it sends out a particular service. The ZyXEL Device forwards the traffic with this port (or range of ports) to the client computer on the LAN that requested the service. Specify a port or a range of ports.

Table 29 Advanced: Applications (continued)

LABEL	DESCRIPTION
Input Protocol	Select the protocol used by the traffic coming to the router through the opened port range.
Schedule	Select the name of a time setting during which this setting is active. You can configure schedules in the **Schedules** screen.
Save	Click **Save** to save the changes of a configuration screen for the current session.
Clear	Click **Clear** to start configuring a screen again.
Special Applications Rule List	
Enable	Select this check box to enable this trigger port setting. Clear this check box to deactivate it.
Name	This field displays the descriptive name of this trigger port setting.
Trigger Protocol/ Ports	This field displays the trigger port (or port range) and the trigger protocol type.
Input Protocol/Ports	This field displays the input port (or port range) and the input protocol type.
Schedule	This field displays the name of the schedule to use.

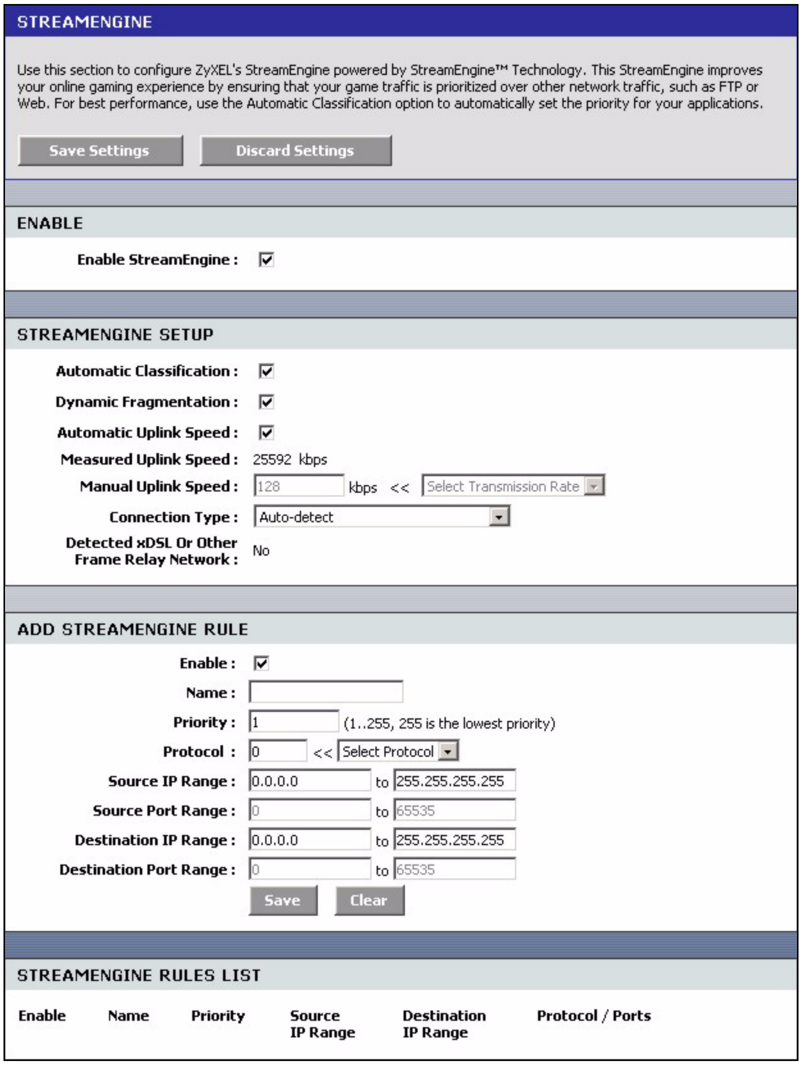
7.4 StreamEngine^{TM}

Use the **StreamEngine** screen to configure traffic priorities. This improves network quality for your applications (such as online gaming). StreamEngine improves your online gaming experience by ensuring that your game traffic is prioritized over other network traffic, such as FTP or Web.

For better performance, use the **Automatic Classificatio**n option to automatically set the priority for your applications.

Click **Advanced** > **StreamEngine** to display the configuration screen.

Figure 49 Advanced: StreamEgine



STREAMENGINE

Use this section to configure ZyXEL's StreamEngine powered by StreamEngine™ Technology. This StreamEngine improves your online gaming experience by ensuring that your game traffic is prioritized over other network traffic, such as FTP or Web. For best performance, use the Automatic Classification option to automatically set the priority for your applications.

ENABLE

Enable StreamEngine : ☑

STREAMENGINE SETUP

Automatic Classification : ☑

Dynamic Fragmentation : ☑

Automatic Uplink Speed : ☑

Measured Uplink Speed : 25592 kbps

Manual Uplink Speed : 128 kbps << Select Transmission Rate

Connection Type : Auto-detect

Detected xDSL Or Other Frame Relay Network : No

ADD STREAMENGINE RULE

Enable : ☑

Name :

Priority : 1 (1..255, 255 is the lowest priority)

Protocol : 0 << Select Protocol

Source IP Range : 0.0.0.0 to 255.255.255.255

Source Port Range : 0 to 65535

Destination IP Range : 0.0.0.0 to 255.255.255.255

Destination Port Range : 0 to 65535

STREAMENGINE RULES LIST

Enable	Name	Priority	Source IP Range	Destination IP Range	Protocol / Ports

The following table describes the labels in this screen.

Table 30 Advanced: StreamEngine

LABEL	DESCRIPTION
Enable StreamEngine	Select this option to enable this feature.
StreamEngine Setup	
Automatic Classification	Select this option to set the ZyXEL Device to automatically classify the traffic based on the default
Dynamic Fragmentation	Select this option to set the ZyXEL Device to break up large packets with high priority. This improves transmission quality.
Automatic Uplink Speed	Select this option to set the ZyXEL Device to automatically detect and set the optimum WAN connection speed.
Measured Uplink Speed	This field displays the detected transmission speed of the WAN connection that was last established. This uplink speed may be different from the actual transmission speed depending on your network environment and line condition.

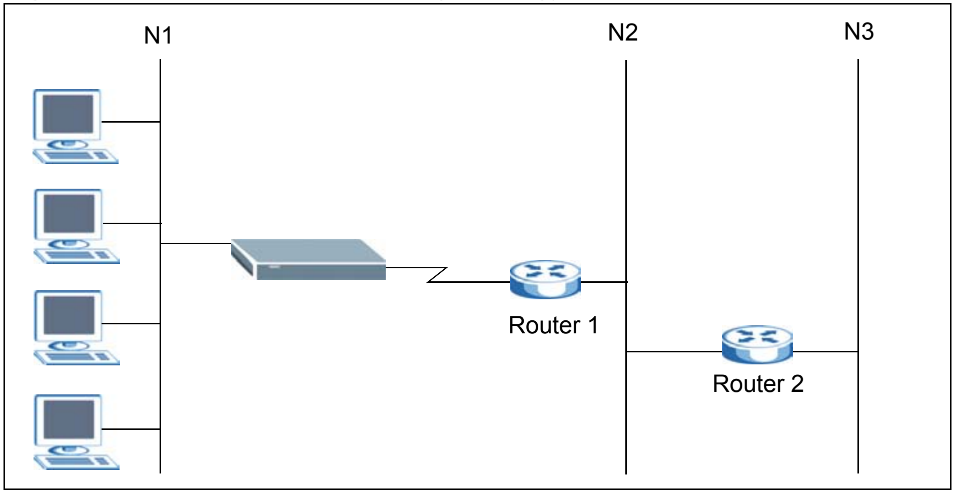
Table 30 Advanced: StreamEngine (continued)

LABEL	DESCRIPTION
Manual Uplink Speed	This field is not applicable when you select the **Automatic Uplink Speed** option above. Enter a number or select a pre-defined choice from the drop-down list box to manually set the uplink speed for the WAN connection.
Connection Type	Select **Auto-detect** to set the ZyXEL Device to automatically detect the Internet connection type. Select **xDSL or Other Frame Relay Network** if the ZyXEL Device connects to the Internet via a DSL modem. Select **Cable or Other Broadband Network** if the ZyXEL Device connects to the Internet via a cable modem.
Detected xDSL or Framerelay Network	This field is applicable when you select **Auto-detect** in the **Connection Type** field. This field displays the name of the detected line connection type.
Add StreamEngine Rule	
Enable	Select this option to enable this rule.
Name	Enter a descriptive name for identification purposes.
Priority	Specify a priority for the traffic type specified below. Enter a number between 1 (highest) and 255 (lowest).
Protocol	Enter the protocol number or select a pre-defined protocol type from the drop-down list box.
Source IP Range	Specify one or a range of source IP addresses in the fields provided. Enter the same IP address in the **to** field if you want to specify one IP address.
Source Port Range	Specify one or a range of source port numbers. Enter the same number in the **to** field if you want to specify one source port.
Destination IP Range	Specify one or a range of destination IP addresses in the fields provided. Enter the same IP address in the **to** field if you want to specify one IP address.
Destination Port Range	Specify one or a range of destination port numbers. Enter the same number in the **to** field if you want to specify one destination port.
Save	Click **Save** to save the settings.
Clear	Click **Clear** to start configuring this part of the screen again.
StreamEngine Rule List	
Enable	Select this option to activate this rule. Clear this check box to disable this rule without deleting it.
Name	THis field displays the descriptive name for the rule.
Priority	This field displays the priority level (1 to 255) of this rule.
Source IP Range	This field displays one or a range of source IP addresses.
Destination IP Range	This field displays one or a range of destination IP addresses.
Protocol/Ports	This field displays the protocol and port numbers.

7.5 Routing

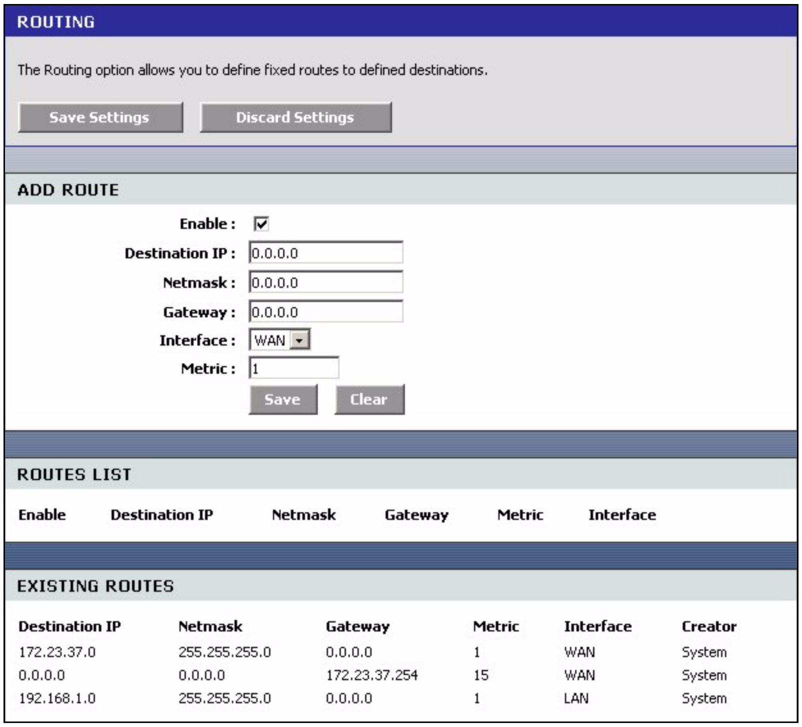
Each remote node specifies only the network to which the gateway is directly connected, and the ZyXEL Device has no knowledge of the networks beyond. For instance, the ZyXEL Device knows about network N2 in the following figure through remote node Router 1. However, the ZyXEL Device is unable to route a packet to network N3 because it doesn't know that there is a route through the same remote node Router 1 (via gateway Router 2). The static routes are for you to tell the ZyXEL Device about the networks beyond the remote nodes.

Figure 50 Example of Static Routing Topology



To view the routing table configure static routes, click **Advanced** > **Routing** to display the configuration screen.

Figure 51 Advanced: Routing



ROUTING

The Routing option allows you to define fixed routes to defined destinations.

ADD ROUTE

Enable :	☑
Destination IP :	0.0.0.0
Netmask :	0.0.0.0
Gateway :	0.0.0.0
Interface :	WAN
Metric :	1

ROUTES LIST

Enable	Destination IP	Netmask	Gateway	Metric	Interface

EXISTING ROUTES

Destination IP	Netmask	Gateway	Metric	Interface	Creator
172.23.37.0	255.255.255.0	0.0.0.0	1	WAN	System
0.0.0.0	0.0.0.0	172.23.37.254	15	WAN	System
192.168.1.0	255.255.255.0	0.0.0.0	1	LAN	System

The following table describes the labels in this screen.

Table 31 Advanced: Routing

LABEL	DESCRIPTION
Add Route	
Enable	Select this option to activate this setting. This field is not applicable for pre-defined routes.
Destination IP	Enter the destination IP address in dotted decimal notation.
Netmask	Enter the subnet mask.
Gateway	Enter the IP address of the gateway device for the selected interface below.
Interface	Select an interface to which you want to apply the setting.
Metric	Metric represents the “cost” of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Enter 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.
Save	Click **Save** to save the settings.
Clear	Click **Clear** to start configuring this part of the screen again.
Routes List	
Enable	Select this option to activate this rule. Clear this check box to disable this rule without deleting it.
Destination IP	This field displays the destination IP address.
Netmask	This field displays the subnet mask for the destination IP address above.
Gateway	This field displays the IP address of the gateway device.

Table 31 Advanced: Routing (continued)

LABEL	DESCRIPTION
Metric	This field displays the "cost" of this route.
Interface	This field displays the interface to which this routing setting is applied.
Exiting Routes	
Destination IP	This field displays the destination IP address.
Netmask	This field displays the subnet mask for the destination IP address above.
Gateway	This field displays the IP address of the gateway device.
Metric	This field displays the "cost" of this route.
Interface	This field displays the interface to which this routing setting is applied.
Creator	This field displays the person/device that created this static route on the ZyXEL Device.

7.6 Access Control

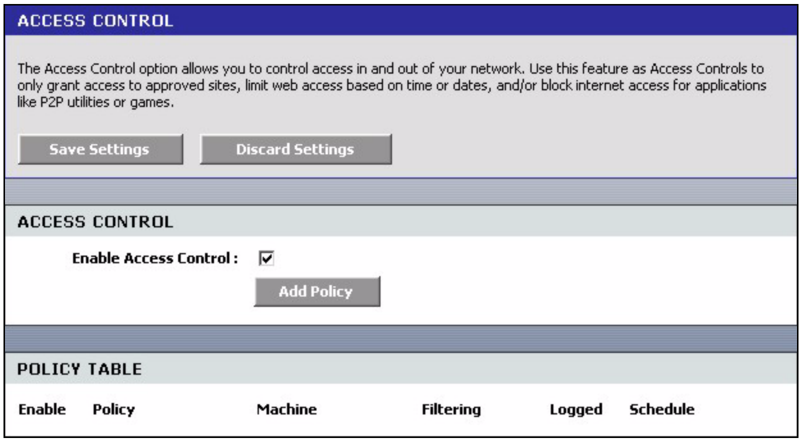
Internet access control allows you to create and enforce Internet access policies tailored to your needs. Access control gives you the ability to block specified computers and/or applications from accessing the Internet. You can also set a schedule for when the ZyXEL Device performs content filtering.

Follow the steps below to configure an access control rule.

1 Click **Advanced > Access Control** to display the configuration screen.

2 Select **Enable Access Control** to activate this feature.

Figure 52 Advanced: Access Control



ACCESS CONTROL

The Access Control option allows you to control access in and out of your network. Use this feature as Access Controls to only grant access to approved sites, limit web access based on time or dates, and/or block internet access for applications like P2P utilities or games.

ACCESS CONTROL

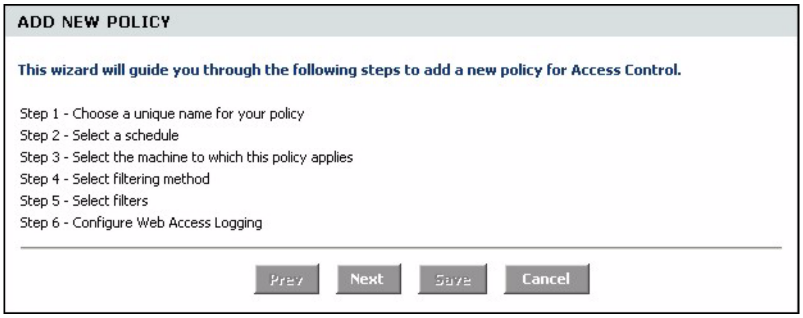
Enable Access Control : ☑

POLICY TABLE

Enable	Policy	Machine	Filtering	Logged	Schedule

3 Click **Add Policy** to display the wizard screen. This screen outlines the steps to create an access control policy. Click **Next**.

Figure 53 Advanced: Access Control: Wizard



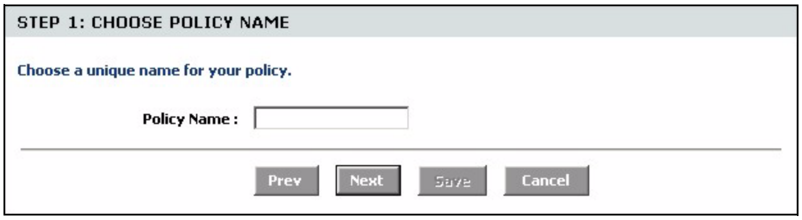
ADD NEW POLICY

This wizard will guide you through the following steps to add a new policy for Access Control.

Step 1 - Choose a unique name for your policy
Step 2 - Select a schedule
Step 3 - Select the machine to which this policy applies
Step 4 - Select filtering method
Step 5 - Select filters
Step 6 - Configure Web Access Logging

4 In the first wizard screen, enter a descriptive name for identification purposes. Click **Next** to continue.

Figure 54 Advanced: Access Control: Wizard: Policy Name



STEP 1: CHOOSE POLICY NAME

Choose a unique name for your policy.

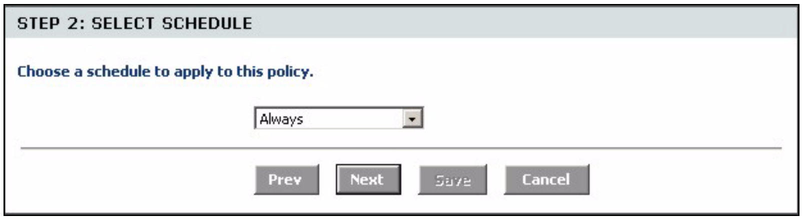
Policy Name :

5 Specify the time this rule is active.

Select the name of a schedule from the drop-down list box. You can configure a schedule in the **Schedule** screen.

Click **Next** to continue.

Figure 55 Advanced: Access Control: Wizard: Select Schedule



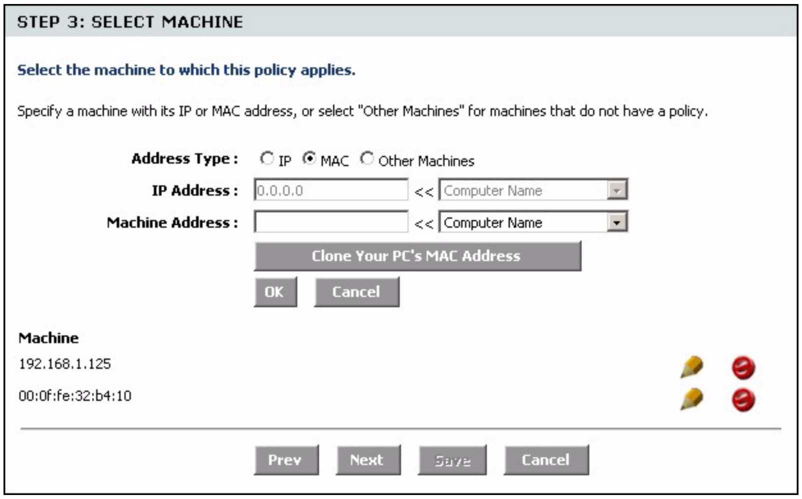
STEP 2: SELECT SCHEDULE

Choose a schedule to apply to this policy.

Always

6 In this wizard screen, specify the address type and the Ethernet device(s) to which the settings apply. Click **Next**.

Figure 56 Advanced: Access Control: Wizard: Select Machine



STEP 3: SELECT MACHINE

Select the machine to which this policy applies.

Specify a machine with its IP or MAC address, or select "Other Machines" for machines that do not have a policy.

Address Type : ○ IP ● MAC ○ Other Machines

IP Address : 0.0.0.0 << Computer Name

Machine Address : << Computer Name

Machine

192.168.1.125

00:0f:fe:32:b4:10

The following table describes the labels in this screen.

Table 32 Advanced: Access Control: Wizard: Select Machine

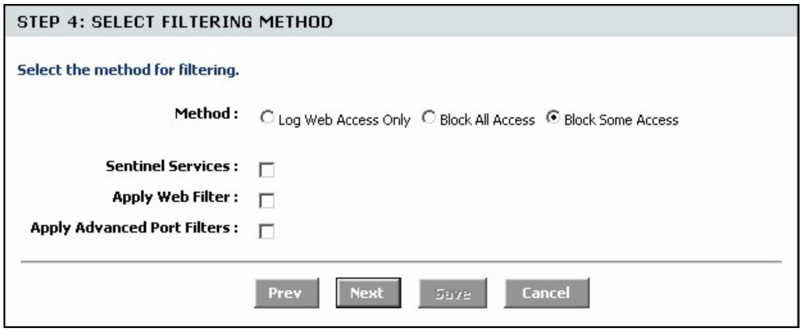
LABEL	DESCRIPTION
Address Type	Select the address type this rule checks.
IP Address	This field is applicable when you select **IP** in the **Address Type** field above. Enter the IP address of a device to which you want to apply this rule. Alternatively, select a device name from the drop-down list box.
MAC Address	This field is applicable when you select **MAC** in the **Address Type** field. Enter the MAc address of the device to which you want to apply this rule. Alternatively, select a device name from the drop-down list box.
Copy Your PC’s MAC Address	This button is applicable when you select **MAC** in the **Address Type** field. Click this button to copy the MAC address of your computer.
OK	Click **OK** to add the Ethernet device settings.
Cancel	Click **Cancel** to start configuring this part of the screen again.
Machine	This field displays the IP address or MAC address of the Ethernet device(s) to which the access control policy is applied.
Schedule	Specify the time this rule is active. Select the name of a schedule from the drop-down list box. You can configure a schedule in the **Schedule** screen.
Apply Web Filter	Select this option to apply the web filters you configure in the Web Filter screen.
Log Internet Access	Select this option to set the ZyXEL Device to create logs for Internet access activity.
Filter Ports	Click this button to display the fields you use to configure port filters.
Port Filter Rules	
Enable	Select this option to activate this rule. Clear this check box to deactivate this rule.
Name	Enter a descriptive name for identification purposes.
Dest IP Start	Enter the start of the destination IP address range.
Dest IP End	Enter the end of the destination IP address range.
Protocol	Select a protocol type from the drop-down list box.

Table 32 Advanced: Access Control: Wizard: Select Machine (continued)

LABEL	DESCRIPTION
Dest Port Start	Enter the start of the destination port range.
Dest Port End	Enter the end of the destination port range.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
Access Control Rules List	
Enable	Select this option to activate the rule. Clear this check box to disable the rule without deleting it.
Policy	This field displays the name of the port filter policy you configured for this access control rule.
Machine	This field displays the IP or MAC address of the device to which this access control rule is applied.
Schedule	This field displays the name of the schedule to use.
Web Filter	This field indicates whether web filters apply to this access control rule.
Logged	This field indicates whether Internet access activities are logged.

7 Select the access control method, the filter(s) to apply and click **Next**.

Figure 57 Advanced: Access Control: Wizard: Filtering Method



STEP 4: SELECT FILTERING METHOD

Select the method for filtering.

Method : ○ Log Web Access Only ○ Block All Access ● Block Some Access

Sentinel Services : □

Apply Web Filter : □

Apply Advanced Port Filters : □

The following table describes the labels in this screen.

Table 33 Advanced: Access Control: Wizard: Filtering Method

LABEL	DESCRIPTION
Method	
Log Web Access Only	Select this option to set the ZyXEL Device to create logs for Internet access activity.
Block All Access	Select this option to disallow the specified Ethernet device(s) from accessing the Internet.
Block Some Access	Select this option to allow or deny access to specified destination(s).
Sentinel Services	This field displays when you select **Block Some Access**. Select this option to block access to web sites classified in the specified category(ies).

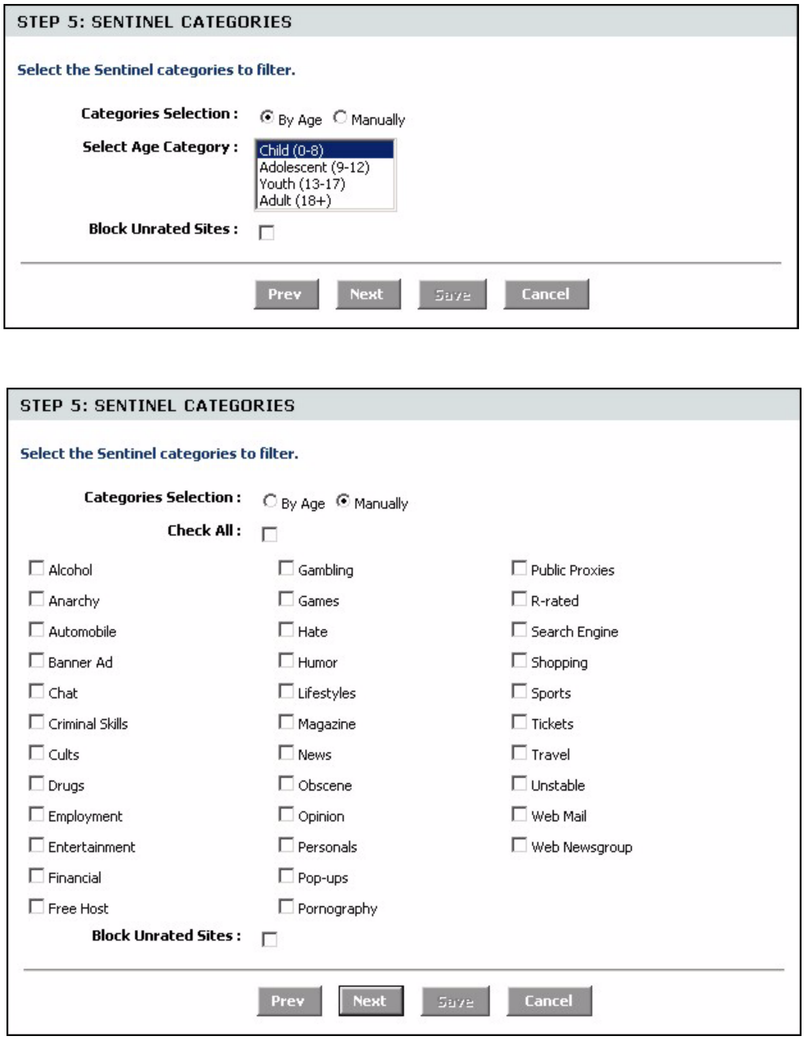
Table 33 Advanced: Access Control: Wizard: Filtering Method (continued)

LABEL	DESCRIPTION
Apply Web Filter	This field displays when you select **Block Some Access**. Select this option to apply the web filters you configure in the **Web Filter** screen.
Apply Advanced Port Filters	This field displays when you select **Block Some Access**. Select this option to apply the web filters you configure in the **Port Filter** screen.
Filter Ports	Click this button to display the fields you use to configure port filters.
Port Filter Rules	
Enable	Select this option to activate this rule. Clear this check box to deactivate this rule.
Name	Enter a descriptive name for identification purposes.
Dest IP Start	Enter the start of the destination IP address range.
Dest IP End	Enter the end of the destination IP address range.
Protocol	Select a protocol type from the drop-down list box.
Dest Port Start	Enter the start of the destination port range.
Dest Port End	Enter the end of the destination port range.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
Access Control Rules List	
Enable	Select this option to activate the rule. Clear this check box to disable the rule without deleting it.
Policy	This field displays the name of the port filter policy you configured for this access control rule.
Machine	This field displays the IP or MAC address of the device to which this access control rule is applied.
Schedule	This field displays the name of the schedule to use.
Web Filter	This field indicates whether web filters apply to this access control rule.
Logged	This field indicates whether Internet access activities are logged.

8 If you select **Sentinel Services** in the previous screen, the **Service Categories** screen displays. Use this screen to configure category-based content filtering.

This screen varies depending on what you select in the **Categories Selection** field.

Figure 58 Advanced: Access Control: Wizard: Filtering Method



STEP 5: SENTINEL CATEGORIES

Select the Sentinel categories to filter.

Categories Selection : ● By Age ○ Manually

Select Age Category : Child (0-8) / Adolescent (9-12) / Youth (13-17) / Adult (18+)

Block Unrated Sites : □

STEP 5: SENTINEL CATEGORIES

Select the Sentinel categories to filter.

Categories Selection : ○ By Age ● Manually

Check All : □

- □ Alcohol
- □ Anarchy
- □ Automobile
- □ Banner Ad
- □ Chat
- □ Criminal Skills
- □ Cults
- □ Drugs
- □ Employment
- □ Entertainment
- □ Financial
- □ Free Host
- □ Gambling
- □ Games
- □ Hate
- □ Humor
- □ Lifestyles
- □ Magazine
- □ News
- □ Obscene
- □ Opinion
- □ Personals
- □ Pop-ups
- □ Pornography
- □ Public Proxies
- □ R-rated
- □ Search Engine
- □ Shopping
- □ Sports
- □ Tickets
- □ Travel
- □ Unstable
- □ Web Mail
- □ Web Newsgroup

Block Unrated Sites : □

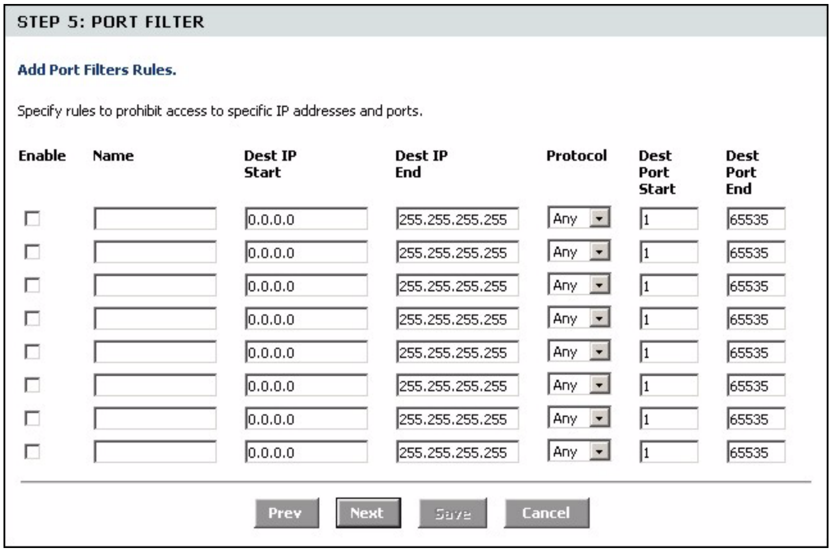
The following table describes the labels in this screen.

Table 34 Advanced: Access Control: Wizard: Filtering Method

LABEL	DESCRIPTION
Category Selection	Select **By Age** to block access to web sites categorized by age group. Select **Manually** to select the web site categories manually.
Select Age Category	Select an age group from the list.
Check All	Select this option to select all categories below.
Block Unrated Sites	Select this option to prevent users from accessing web pages that are not categorized.

9 If you select **Apply Advanced Port Filters** in the previous screen, the **Port Filter** screen displays. Use this screen to configure port filter(s) that blocks access to specified port(s) on a computer.

Figure 59 Advanced: Access Control: Wizard: Port Filter



STEP 5: PORT FILTER

Add Port Filters Rules.

Specify rules to prohibit access to specific IP addresses and ports.

Enable	Name	Dest IP Start	Dest IP End	Protocol	Dest Port Start	Dest Port End
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535
□		0.0.0.0	255.255.255.255	Any	1	65535

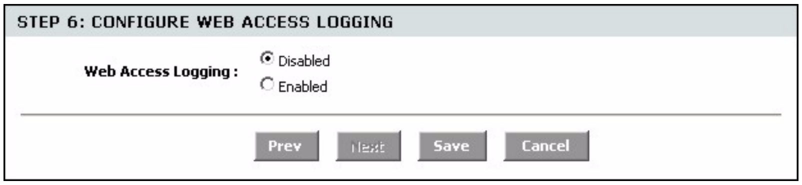
The following table describes the labels in this screen.

Table 35 Advanced: Access Control: Wizard: Filtering Method

LABEL	DESCRIPTION
Enable	Select this option to activate this rule. Clear this check box to deactivate this rule.
Name	Enter a descriptive name for identification purposes.
Dest IP Start	Enter the start of the destination IP address range.
Dest IP End	Enter the end of the destination IP address range.
Protocol	Select a protocol type from the drop-down list box.
Dest Port Start	Enter the start of the destination port range.
Dest Port End	Enter the end of the destination port range.

10 In this screen, select **Enabled** to set the ZyXEL Device to create logs for Internet access activity. Select **Disabled** to deactivate this feature.

Figure 60 Advanced: Access Control: Wizard: Web Access Logging

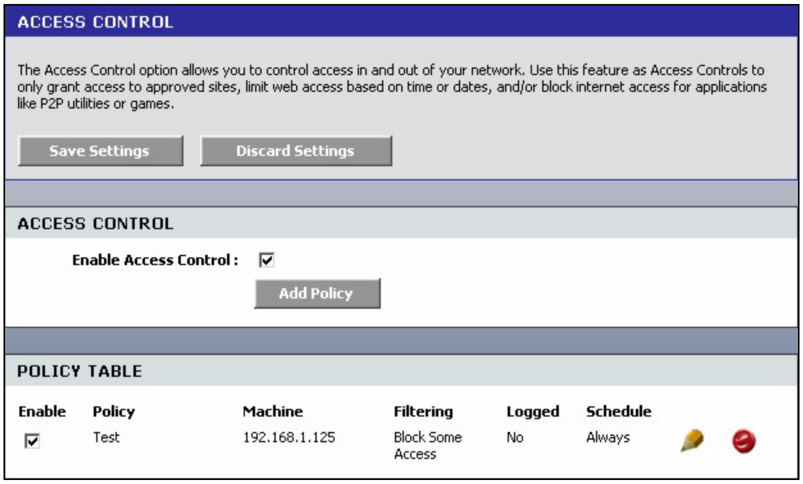


STEP 6: CONFIGURE WEB ACCESS LOGGING

Web Access Logging : ● Disabled ○ Enabled

11 Click **Save** to save the settings and return to the main **Access Control** screen. You should see the new access control policy in the **Policy Table**.

Figure 61 Advanced: Access Control: Example



ACCESS CONTROL

The Access Control option allows you to control access in and out of your network. Use this feature as Access Controls to only grant access to approved sites, limit web access based on time or dates, and/or block internet access for applications like P2P utilities or games.

ACCESS CONTROL

Enable Access Control : ☑

POLICY TABLE

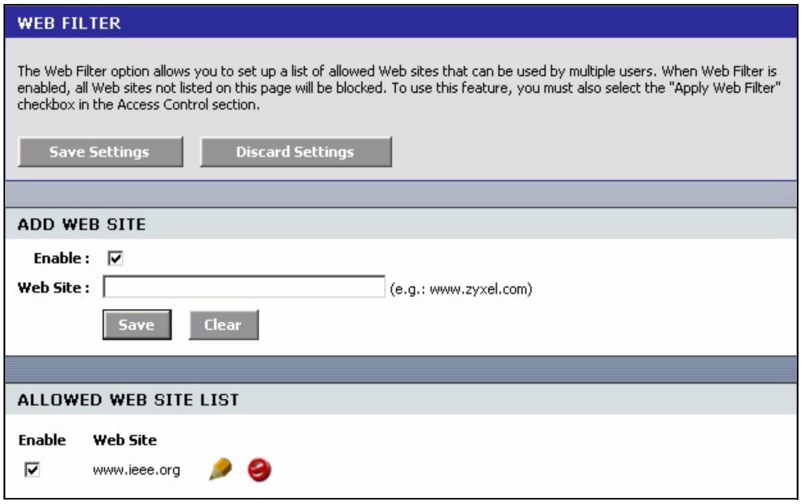
Enable	Policy	Machine	Filtering	Logged	Schedule
☑	Test	192.168.1.125	Block Some Access	No	Always

7.7 Web Filter

The **Web Filter** screen gives you the ability to allow access only to web sites that you specify.

Click **Advanced** > **Web Filter** to display the configuration screen.

Figure 62 Advanced: Web Filter



WEB FILTER

The Web Filter option allows you to set up a list of allowed Web sites that can be used by multiple users. When Web Filter is enabled, all Web sites not listed on this page will be blocked. To use this feature, you must also select the "Apply Web Filter" checkbox in the Access Control section.

ADD WEB SITE

Enable : ☑

Web Site : (e.g.: www.zyxel.com)

ALLOWED WEB SITE LIST

Enable	Web Site
☑	www.ieee.org

The following table describes the labels in this screen.

Table 36 Advanced: Web Filter

LABEL	DESCRIPTION
Add Web Site	
Enable	Select this option to activate this setting. Clear this check box to disable it.

Table 36 Advanced: Web Filter (continued)

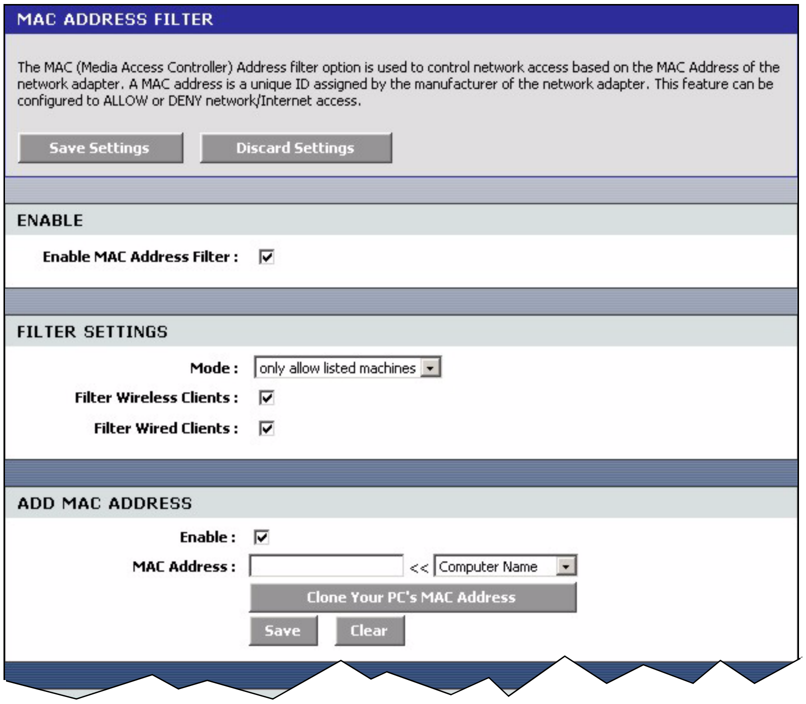
LABEL	DESCRIPTION
Web Site	Enter the web site address to which you want to allow access. For example, if you enter zyxel.com, the ZyXEL Device allows access to www.zyxel.com, support.zyxel.com or product.zyxel.com, etc. For web sites that obtain data from another web site, you need to allow access to those web sites as well. For example, if www.zyxel.com gets a graphic file from www.mysite.com, then you must also enter www.mysite.com in this screen. **Note:** Do NOT enter “http://”.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
Allowed Web Site List	This table lists the addresses of the web sites that you want to allow access.
Enable	Select this option to allow access to this web site. Clear this check box to block access.
Web Site	This field displays the web site address.

7.8 MAC Filter

MAC address filtering means sifting traffic going through the ZyXEL Device based on the source and/or destination MAC addresses. You can set the ZyXEL Device to filter packets from connected wireless clients or computers on the wired LAN.

Click **Advanced** > **MAC Filter** to display the configuration screen.

Figure 63 Advanced: MAC Filter



MAC ADDRESS FILTER

The MAC (Media Access Controller) Address filter option is used to control network access based on the MAC Address of the network adapter. A MAC address is a unique ID assigned by the manufacturer of the network adapter. This feature can be configured to ALLOW or DENY network/Internet access.

ENABLE

Enable MAC Address Filter : ☑

FILTER SETTINGS

Mode : only allow listed machines

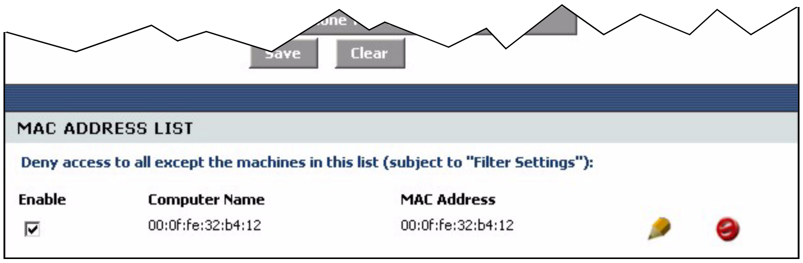
Filter Wireless Clients : ☑

Filter Wired Clients : ☑

ADD MAC ADDRESS

Enable : ☑

MAC Address : << Computer Name



MAC ADDRESS LIST

Deny access to all except the machines in this list (subject to "Filter Settings"):

Enable	Computer Name	MAC Address
☑	00:0f:fe:32:b4:12	00:0f:fe:32:b4:12

The following table describes the labels in this screen.

Table 37 Advanced: MAC Filter

LABEL	DESCRIPTION
Enable	Select **Enable MAC Address Filter** to activate this setting. Clear this check box to disable it.
Filter Settings	
Mode	Select **only deny listed machines** to block frames to/from the specified MAC address(es). Select **only allow listed machines** to forward frames to/from the specified MAC address(es).
Filter Wireless Clients	Select this option to apply the filter settings to the wireless clients.
Filter Wired Clients	Select this option to apply the filter settings to the wired computers on the LAN.
Add MAC Address	
Enable	Select **Enable** to activate this filter setting. Clear this check box to disable it.
MAC Address	Enter the MAC address (in six pairs of dotted haxidecimal notation) of a computer whose traffic you want to filter. Or select a computer MAC address from the drop-down list box.
Copy Your PC's MAC Address	Click this button to copy the MAC address of your computer. **Note:** In order for the ZyXEL Device to copy your computer's MAC address, your computer must be connected directly to the ZyXEL Device.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
MAC Address List	
Enable	Select this option to activate this filter setting. Clear this check box to disable it without deleting it.
Computer Name	This field displays the name of the computer.
MAC Address	This field displays the MAC address of a computer whose traffic you want to filter.

7.9 Firewall

Stateful packet inspection (SPI) firewalls restrict access by screening data packets against defined access rules. They make access control decisions based on IP address and protocol. They also "inspect" the session data to assure the integrity of the connection and to adapt to dynamic protocols. These firewalls generally provide the best speed and transparency; however, they may lack the granular application level access control or caching that some proxies support.

The ZyXEL Device firewall is a stateful inspection firewall and is designed to protect against Denial of Service attacks when activated. The ZyXEL Device’s purpose is to allow a private Local Area Network (LAN) to be securely connected to the Internet. The ZyXEL Device can be used to prevent theft, destruction and modification of data, as well as log events, which may be important to the security of your network. The ZyXEL Device also has packet-filtering capabilities.

7.9.1 DMZ

The DeMilitarized Zone (DMZ) provides a way for public servers (Web, e-mail, FTP, etc.) to be visible to the outside world (while still being protected from DoS (Denial of Service) attacks such as SYN flooding and Ping of Death). These public servers can also still be accessed from the secure LAN.

7.9.2 ALG

Some applications cannot operate through NAT (are NAT un-friendly) because they embed IP addresses and port numbers in their packets’ data payload. The ZyXEL Device examines and uses IP address and port number information embedded in the data stream. When a device behind the ZyXEL Device uses an application for which the ZyXEL Device has ALG service enabled, the ZyXEL Device translates the device’s private IP address inside the data stream to a public IP address. It also records session port numbers and dynamically creates implicit NAT port forwarding and firewall rules for the application’s traffic to come in from the WAN to the LAN.

7.9.3 NAT Endpoint Filtering

NAT Endpoint Filtering controls how the ZyXEL Device’s NAT manages incoming connection requests to ports that are already being used. Three filtering options are available on UDP and TCP packets.

- Endpoint Independent

  Once a LAN-side application has created a connection through a specific port, NAT will forward any incoming connection requests with the same port to the LAN-side application regardless of their origin. This is the least restrictive option, giving the best connectivity and allowing some applications (for example, P2P applications) to behave almost as if they are directly connected to the Internet.

The Endpoint Independent filters take priority over inbound filters or schedules, so it is possible for an incoming session request related to an outgoing session to enter through a port in spite of an active inbound filter on that port. However, packets will be rejected as expected when sent to blocked ports (whether blocked by the schedule or by inbound filter) for which there are no active sessions.

- Address Restricted

With the Address Restricted option, NAT forwards incoming connection requests to a LAN-side host only when they come from the same IP address with which a connection was established. This allows the remote application to send data back through a port different from the one used when the outgoing session was created.

Use Address Restricted Filters to allow your ZyXEL Device to communicate with routers using other NAT types (such as symmetric NATs) and still apply inbound filters and scheduled access to traffic.

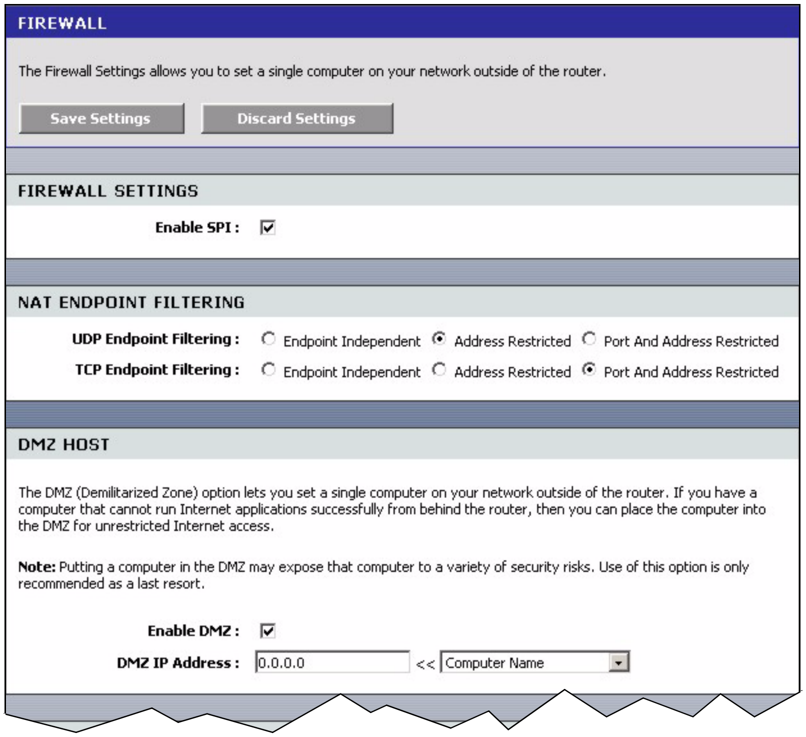
- Port And Address Restricted

Port and Address Restricted Filtering does not forward any incoming connection requests with the same port address as an already establish connection. This ensures that inbound filters and schedules work. In some cases, you may need to configure port triggers, virtual servers, or port forwarding to open the ports used by the applications.

7.9.4 Configuring Firewall

To configure the firewall and DMZ settings, click **Advanced > Firewall** to display the configuration screen.

Figure 64 Advanced: Firewall



FIREWALL

The Firewall Settings allows you to set a single computer on your network outside of the router.

FIREWALL SETTINGS

Enable SPI : ☑

NAT ENDPOINT FILTERING

UDP Endpoint Filtering : ○ Endpoint Independent ● Address Restricted ○ Port And Address Restricted

TCP Endpoint Filtering : ○ Endpoint Independent ○ Address Restricted ● Port And Address Restricted

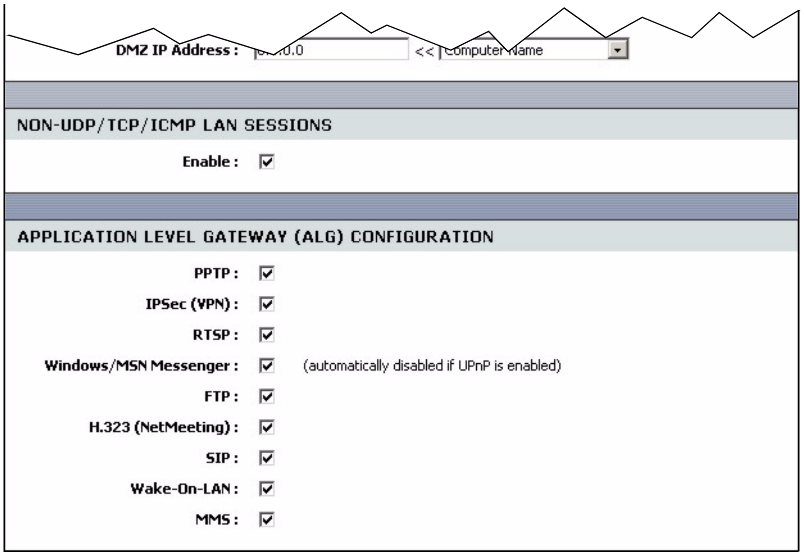
DMZ HOST

The DMZ (Demilitarized Zone) option lets you set a single computer on your network outside of the router. If you have a computer that cannot run Internet applications successfully from behind the router, then you can place the computer into the DMZ for unrestricted Internet access.

Note: Putting a computer in the DMZ may expose that computer to a variety of security risks. Use of this option is only recommended as a last resort.

Enable DMZ : ☑

DMZ IP Address : 0.0.0.0 << Computer Name



DMZ IP Address : 0.0.0.0 << Computer Name

NON-UDP/TCP/ICMP LAN SESSIONS

Enable : ☑

APPLICATION LEVEL GATEWAY (ALG) CONFIGURATION

PPTP : ☑

IPSec (VPN) : ☑

RTSP : ☑

Windows/MSN Messenger : ☑ (automatically disabled if UPnP is enabled)

FTP : ☑

H.323 (NetMeeting) : ☑

SIP : ☑

Wake-On-LAN : ☑

MMS : ☑

The following table describes the labels in this screen.

Table 38 Advanced: Firewall

LABEL	DESCRIPTION
Enable SPI	Select this option to activate stateful packet inspection. Clear this check box to disable this feature.
NAT Endpoint Filtering	The NAT Endpoint Filtering options control how the router's NAT manages incoming connection requests to ports that are already being used.
UDP Endpoint Filtering	Select the end-point filtering option for UDP traffic.
TCP Endpoint Filtering	Select the end-point filtering option for TCP traffic.
DMZ Host	
Enable DMZ	Select this option to activate the DMZ feature to protect the specified device on the LAN.
DMZ IP Address	Enter the IP address (in dotted decimal notation) of a computer which you want to protect on the LAN. Or select a computer IP address from the drop-down list box.
Non-UDP/TCP/ ICMP LAN Sessions	You can set your ZyXEL Device to recognize sessions initiated by a VPN connection from the LAN to the Internet (WAN) even though the VPN connection uses an unknown protocol type (any protocols other than UDP, TCP, and ICMP). This feature allows a single VPN connection to a remote host without the need for an ALG. This feature does not apply to DMZ hosts (if enabled). DMZ hosts can handles these sessions. Select **Enable** to allow a single VPN connection to a remote host. For multiple VPN connections, the appropriate VPN ALG must be enabled. Clear the checkbox to disable this feature. However, you must also disable the appropriate VPN ALG to deactivate the VPN connection.
Application Level Gateway (ALG) Application	
PPTP	Select this option to allow multiple computers on the LAN to connect to a remote network using the PPTP protocol.

Table 38 Advanced: Firewall (continued)

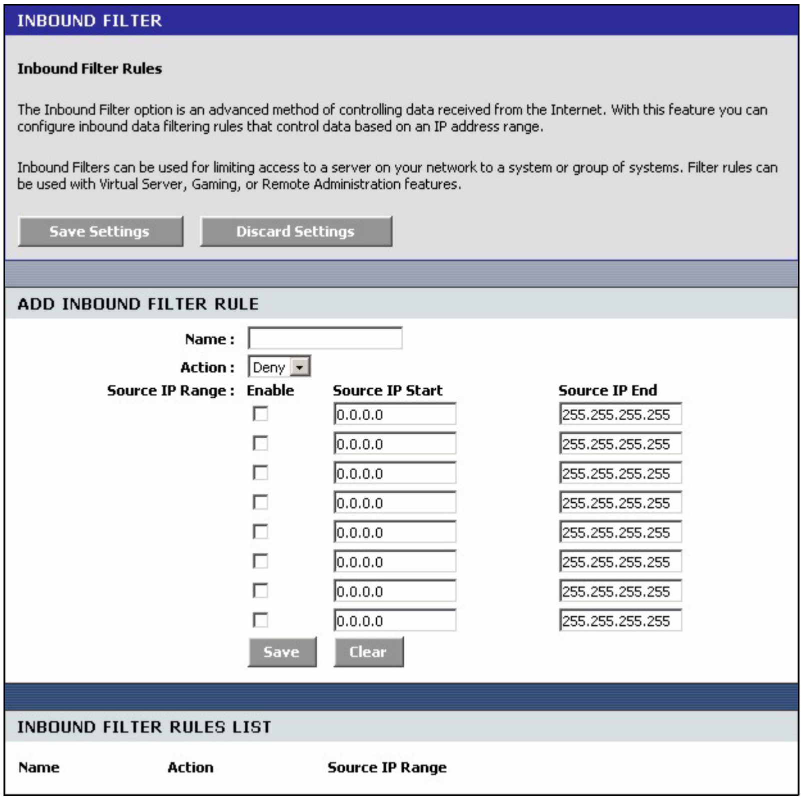
LABEL	DESCRIPTION
IPSec VPN	Select this option to allow multiple VPN clients to connect to a remote network using the IPSec protocol. This ALG may affect VPN connections for VPN clients using NAT traversal. In this case, clear this check box to disable this ALG.
RTSP	Select this option to allow applications (such as QuickTime and Real Player) that use Real Time Streaming Protocol (RTSP) to receive streaming media from the Internet.
Windows Messenger	Select this feature to allow the use of Microsoft Windows Messenger on computers in the LAN. **Note:** You must also enable the SIP ALG.
FTP	Select this option to allow FTP data transfer through a NAT-enabled network. You must also set up the FTP server settings in the **Virtual Server** screen.
H.232 (NetMeeting)	Select this option to allow Microsoft NetMeeting clients to communicate through a NAT-enabled network. You must also set up the NetMeeting server settings in the **Virtual Server** screen.
SIP	Select this option to allow devices and applications using VoIP (Voice over IP) to communicate over NAT. Clear this check box to disable this ALG if the devices/applications use NAT traversal.
Wake-On-LAN	Select this option to forward "magic packets" or wake-up packets from the WAN to a LAN computer or device with Wake-on-LAN (WOL) feature. You must also define the WOL server settings in the **Virtual Server** screen. The LAN IP address for the virtual server is typically set to the broadcast address of 192.168.0.255. The computer on the LAN whose MAC address is contained in the magic packet will be awakened.
MMS	Select this option to allow Windows Media Player, using MMS protocol, to receive streaming data from the Internet.

7.10 Inbound Filter

An inbound filter allows you to filter packets based on IP addresses. You can use inbound filters to control access to network resources (such as a web server) or for remote management of the device.

Click **Advanced** > **Inbound Filter** to display the configuration screen.

Figure 65 Advanced: Inbound Filter



INBOUND FILTER

Inbound Filter Rules

The Inbound Filter option is an advanced method of controlling data received from the Internet. With this feature you can configure inbound data filtering rules that control data based on an IP address range.

Inbound Filters can be used for limiting access to a server on your network to a system or group of systems. Filter rules can be used with Virtual Server, Gaming, or Remote Administration features.

ADD INBOUND FILTER RULE

Name :

Action : Deny

Source IP Range : Enable	Source IP Start	Source IP End
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255
□	0.0.0.0	255.255.255.255

INBOUND FILTER RULES LIST

Name	Action	Source IP Range

The following table describes the labels in this screen.

Table 39 Advanced: Inbound Filter

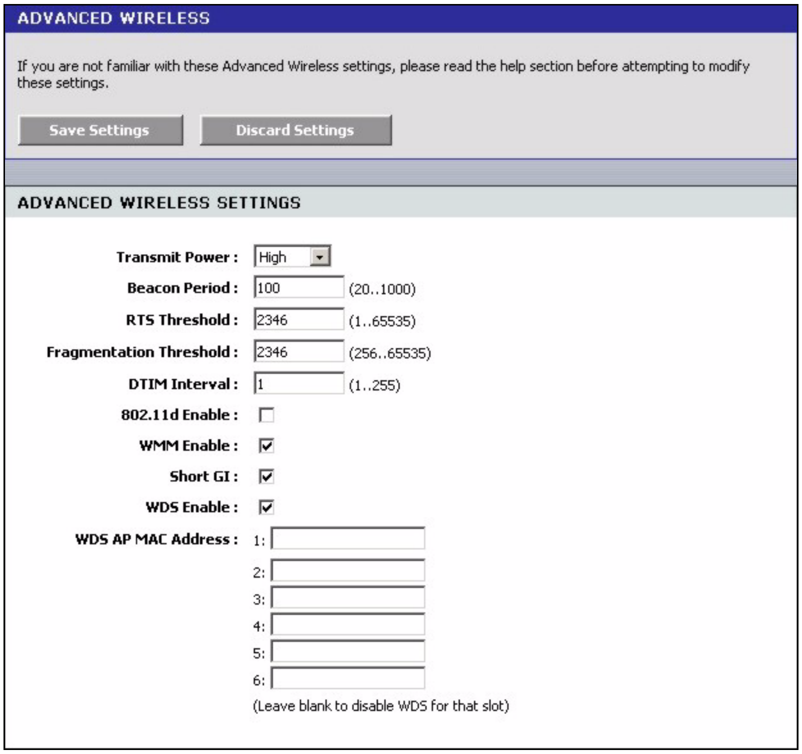
LABEL	DESCRIPTION
Add Inbound Filter Rule	
Name	Enter a descriptive name (up to 16 characters) for this filter setting. This is for identification purposes only.
Action	Select **Deny** to block packets from the specified IP address(es). Select **Allow** to forward packets from the specified IP address(es).
Source IP Range	
Enable	Select this option to activate the filter action on the specified IP address range. Clear this check box to disable the filter action on the IP address range.
Source IP Start	Enter the start of the source IP address range.
Source IP End	Enter the end of the source IP address range.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
Inbound Filter Rules List	
Name	This field displays the name of the inbound filter.
Action	This field displays the action on the packets from the specified IP address range.
Source IP Range	This field displays the source IP address range(s).

7.11 Advanced Wireless

Refer to Appendix B on page 128 for background information.

To configure advanced wireless settings, click **Advanced** > **Wireless** to display the screen.

Figure 66 Advanced: Wireless ‘



ADVANCED WIRELESS

If you are not familiar with these Advanced Wireless settings, please read the help section before attempting to modify these settings.

ADVANCED WIRELESS SETTINGS

Transmit Power :	High
Beacon Period :	100 (20..1000)
RTS Threshold :	2346 (1..65535)
Fragmentation Threshold :	2346 (256..65535)
DTIM Interval :	1 (1..255)
802.11d Enable :	□
WMM Enable :	☑
Short GI :	☑
WDS Enable :	☑
WDS AP MAC Address :	1:
	2:
	3:
	4:
	5:
	6:
	(Leave blank to disable WDS for that slot)

The following table describes the labels in this screen.

Table 40 Advanced: Wireless

LABEL	DESCRIPTION
Advanced Wireless Settings	
Transmission Power	Select an option in this field to set the transmission power of the antennas to reduce your wireless coverage area.
Beacon Period	A wireless AP sets out a beacon to announce its presence and maintain an orderly communication between other wireless devices. Enter the time (between 20 and 1000 ms) the ZyXEL Device waits before sending a beacon to the wireless clients.
RTS Threshold	The RTS (Request To Send) threshold (number of bytes) is for enabling RTS/CTS. Data with its frame size larger than this value will perform the RTS/CTS handshake. Setting this value to be larger than the maximum MSDU (MAC service data unit) size turns off RTS/CTS. Setting this value to zero turns on RTS/CTS. Enter a new value between 0 and 2432.
Fragmentation Threshold	This is the threshold (number of bytes) for the fragmentation boundary for directed messages. It is the maximum data fragment size that can be sent. Enter a value between 256 and 2432.

Table 40 Advanced: Wireless (continued)

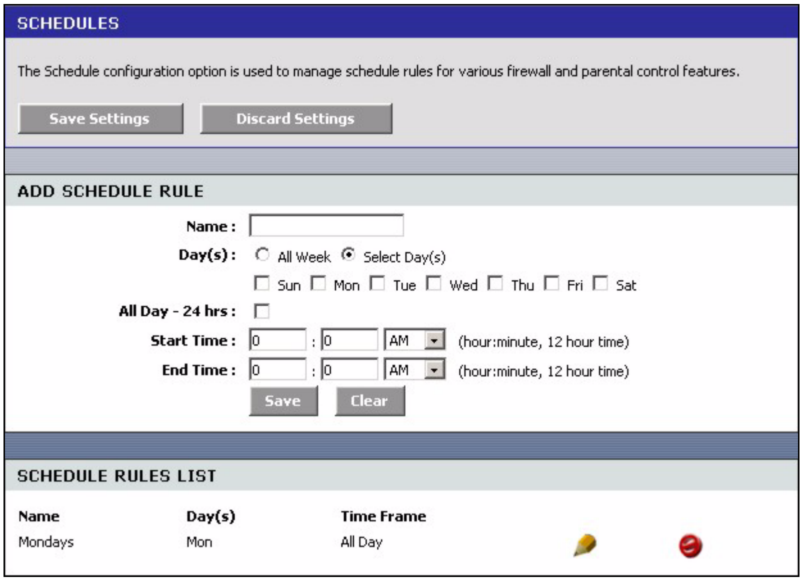
LABEL	DESCRIPTION
DTIM Interval	A DTIM (Delivery Traffic Indication Message) is included in a beacon to synchronize wireless transmission. DTIM is a countdown information for wireless clients to listen to the next broadcast or multicast messages. Enter the time (between 1 and 255 ms) the ZyXEL Device waits between sending a beacon with DTIM.
802.11d Enable	802.11d is a wireless communication specification for countries where other IEEE802.11 devices are not allowed. 802.11d is suitable if you want global roaming (that is using your wireless devices worldwide). Select this option to enable this feature.
WMM Enable	Select this option to activate the WM (WiFi Multi-Media) feature on the ZyXEL Device. This helps reduce latency and jitter when transmitting multi-media content over the wireless connection.
Short GI	Select this option to set the ZyXEL Device to use a short guard interval (GI) of 400ns. This increases throughput at the cost of increased error rate in certain network environments with greater radio interference.
WDS Enable	Select this option to activate the WDS (Wireless Distribution System) feature. A Distribution System (DS) is a wired connection between two or more APs, while a WDS is a wireless connection. An AP using WDS can function as a wireless network bridge allowing you to wirelessly connect two wired network segments. **Note:** You cannot enable WPA and WDS at the same time.
WDS AP MAC Address	These fields display when you select **WDS Enable**. Enter the MAC address (in six paris of dotted haxidecimal notation) of the neighboring AP(s) that participates in the WDS.

7.12 Schedules

You can define schedule settings on the ZyXEL Device and apply these schedule settings in other configuration screens (such as Game Hosting and Virtual Server).

Click **Advanced** > **Schedules** to display the configuration screen.

Figure 67 Advanced: Schedule



SCHEDULES

The Schedule configuration option is used to manage schedule rules for various firewall and parental control features.

ADD SCHEDULE RULE

Name :

Day(s) : ○ All Week ● Select Day(s)

□ Sun □ Mon □ Tue □ Wed □ Thu □ Fri □ Sat

All Day - 24 hrs : □

Start Time : 0 : 0 AM (hour:minute, 12 hour time)

End Time : 0 : 0 AM (hour:minute, 12 hour time)

SCHEDULE RULES LIST

Name	Day(s)	Time Frame
Mondays	Mon	All Day

The following table describes the labels in this screen.

Table 41 Advanced: Schedule

LABEL	DESCRIPTION
Name	Enter a descriptive name (up to 16 characters) for this schedule setting. This is for identification purposes only.
Day(s)	Select **All Week** or **Select Day(s)** to specify the day(s) of the week.
All Day - 24 hrs	Select this option to enable the schedule for the entire day for the specified day(s).
Start Time	Set the start of the schedule.
End Time	Set the end of the schedule.
Save	Click **Save** to save the settings in this part of the screen.
Clear	Click **Clear** to start configuring this part of the screen again.
Schedule Rules List	
Name	This field displays the descriptive for the schedule.
Day(s)	This field displays the day of the week the schedule is active.
Time Frame	This field displays the time of the day the schedule is active.

CHAPTER 8 Tools

This chapter describes the Tools screens you use to configure login passwords, system time, logs, DDNS and firmware and configuration settings.

8.1 Administrator Settings

You can change the login account passwords, enable UPnP and configure remote access settings in the **Admin** screen.

8.1.1 Login Accounts

You can log into the web configurator using one of the following accounts.

- Administrator (admin)

  This is the system administrator’s account with full access rights. You can view system status and set the configuration screens using this account.

- Normal User (user)

  This account allows you to view device system status and configuration settings in the web configurator. configuration is not allowed.

8.1.2 UPnP

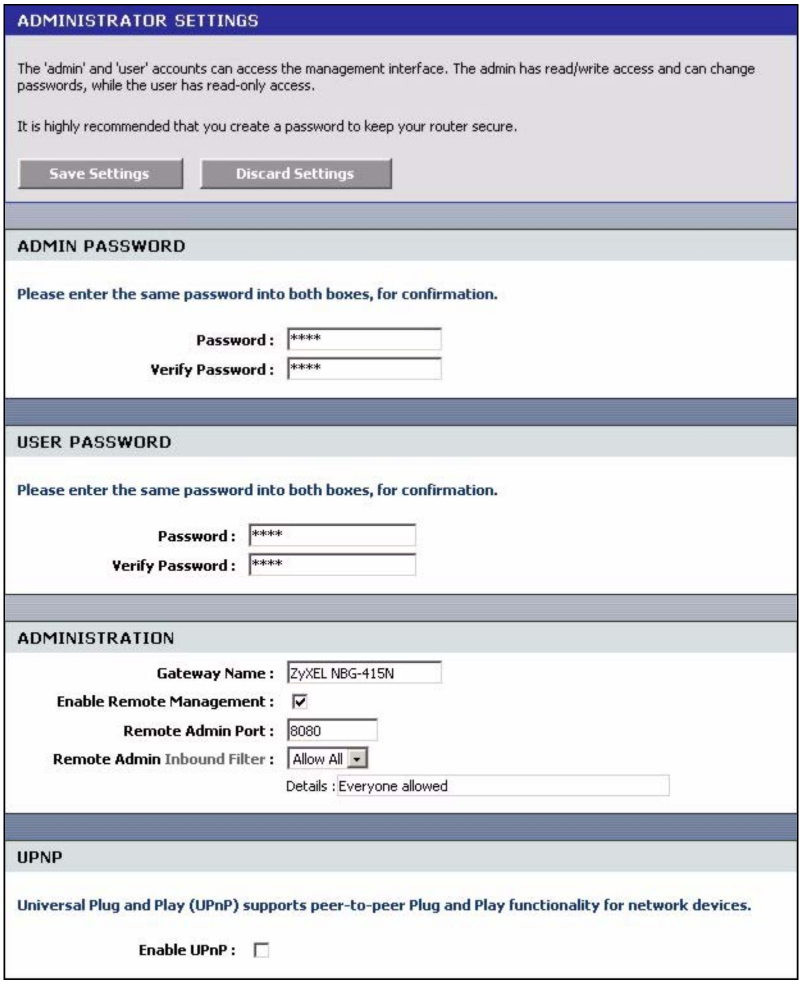
Universal Plug and Play (UPnP) is a distributed, open networking standard that uses TCP/IP for simple peer-to-peer network connectivity between devices. A UPnP device can dynamically join a network, obtain an IP address, convey its capabilities and learn about other devices on the network. In turn, a device can leave a network smoothly and automatically when it is no longer in use.

8.1.3 The Admin Screen

Use the **Admin** screen to configure login passwords, remote management and UPnP. You can also restore and backup the device configuration in this screen.

Click **Tools** > **Admin** to display the configuration screen.

Figure 68 Tools: Admin



ADMINISTRATOR SETTINGS

The 'admin' and 'user' accounts can access the management interface. The admin has read/write access and can change passwords, while the user has read-only access.

It is highly recommended that you create a password to keep your router secure.

ADMIN PASSWORD

Please enter the same password into both boxes, for confirmation.

Password : ****
Verify Password : ****

USER PASSWORD

Please enter the same password into both boxes, for confirmation.

Password : ****
Verify Password : ****

ADMINISTRATION

Gateway Name : ZyXEL NBG-415N
Enable Remote Management : ☑
Remote Admin Port : 8080
Remote Admin Inbound Filter : Allow All
Details : Everyone allowed

UPNP

Universal Plug and Play (UPnP) supports peer-to-peer Plug and Play functionality for network devices.

Enable UPnP : □

The following table describes the labels in this screen.

Table 42 Tools: Admin

LABEL	DESCRIPTION
Admin Password	
Password	Type the new password in this field. You can enter up to 15 characters and spaces are not allowed.
Verify Password	Type the new password again in this field.
User Password	
Password	Type the new password in this field. You can enter up to 15 characters and spaces are not allowed.
Verify Password	Type the new password again in this field.
Administration	
Gateway Name	Enter a descriptive name (up to 32 characters) for your ZyXEL Device. This is for identification purposes only.

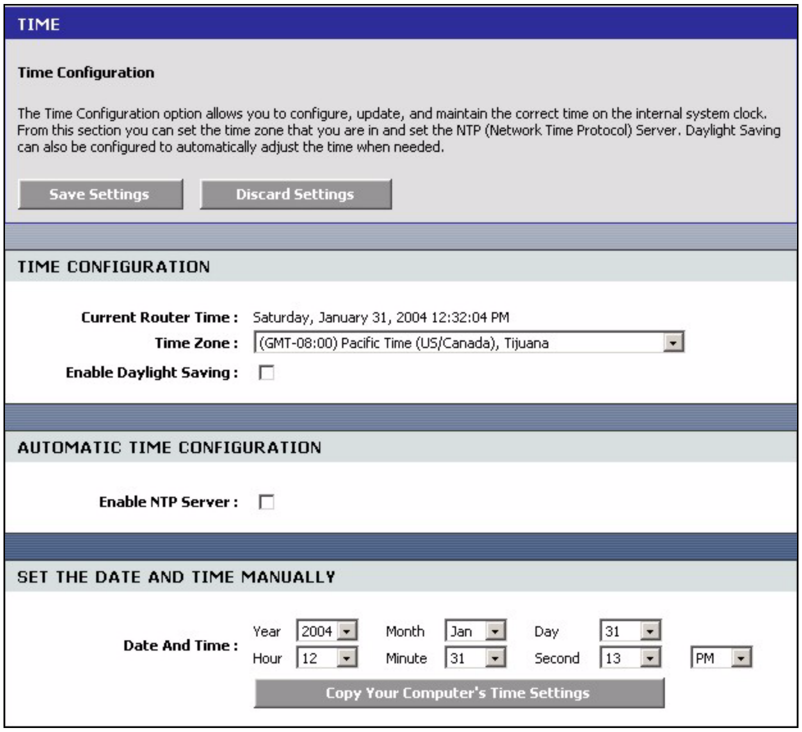
Table 42 Tools: Admin (continued)

LABEL	DESCRIPTION
Enable Remote Management	Remote management allows you to allow access to the ZyXEL Device web configurator from the WAN. Select this option to activate this feature and set the fields that display below. Clear this check box to disable this feature.
Remote Admin Port	Enter the port number to access the ZyXEL Device for device management over the WAN. For example, if you enter 8080 in this field and the WAN IP address of the ZyXEL Device is 172.23.37.205, then you must enter http://172.23.37.205:8080 to access the web configurator on the ZyXEL Device.
Remote Admin Inbound Filter	Select an inbound filter from the drop-down list box to restrict remote management access to your ZyXEL Device over the WAN. You can select the default filters to allow or deny all access. You can configure a customer inbound filter in the **Inbound Filter** screen (click **Advanced > Inbound Filter**). Refer to Section 7.10 on page 96 for more information.
UPNP	
Enable UPNP	Select this option to activate this feature.
Web Configurator Language	The web configurator on the ZyXEL Device is multilingual.
Enable Auto Detection	Select this option to set the web configurator to automatically detect and display the interface in your language.

8.2 System Time and Date

To change your ZyXEL Device's time and date, click **Tools** > **Time**. Use this screen to configure the ZyXEL Device's system time based on your local time zone.

Figure 69 Tools: Time



TIME

Time Configuration

The Time Configuration option allows you to configure, update, and maintain the correct time on the internal system clock. From this section you can set the time zone that you are in and set the NTP (Network Time Protocol) Server. Daylight Saving can also be configured to automatically adjust the time when needed.

TIME CONFIGURATION

Current Router Time : Saturday, January 31, 2004 12:32:04 PM

Time Zone : (GMT-08:00) Pacific Time (US/Canada), Tijuana

Enable Daylight Saving : □

AUTOMATIC TIME CONFIGURATION

Enable NTP Server : □

SET THE DATE AND TIME MANUALLY

Date And Time : Year 2004 Month Jan Day 31 Hour 12 Minute 31 Second 13 PM

The following table describes the labels in this screen.

Table 43 Tools: Time

LABEL	DESCRIPTION
Time Configuration	
Current Router Time	This field displays the current system time and date.
Time Zone	Choose the time zone of your location. This will set the time difference between your time zone and Greenwich Mean Time (GMT).
Enable Daylight Saving	Daylight saving 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 daytime light in the evening. Select this option to if you use Daylight Saving Time.
Daylight Saving Offset	Enter the off set time for daylight saving time.
Daylight Saving Dates	

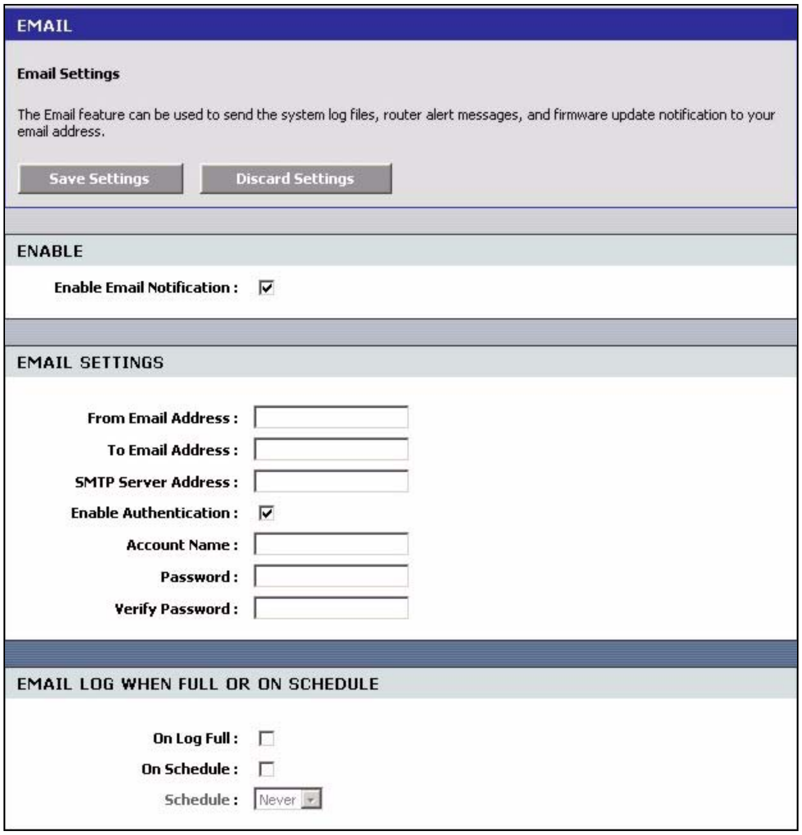
Table 43 Tools: Time (continued)

LABEL	DESCRIPTION
DST Start	Configure the day and time when Daylight Saving Time starts if you selected **Enable Daylight Saving**. The **Time** 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 you would select **1st**, **Sun**, **Apr** and select **2 am** in the **Time** 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 you would select the last **Sun**, **Mar**. The time you select in the **Time** field depends on your time zone. In Germany for instance, you would type 2 because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
DST End	Configure the day and time when Daylight Saving Time ends if you selected **Enable Daylight Saving**. The **Time** 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 you would select the last **Sun**, **Oct** and select **2 am** in the **Time** 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 you would select the last **Sun**, **Oct**. The time you select in the **Time** field depends on your time zone. In Germany for instance, you would type 2 because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
Automatic Time Configuration	
Enable NTP Server	Select this option to have the ZyXEL Device get the time and date from the Network Time Protocol (NTP) time server you specified below.
NTP Server Used	Enter the IP address (in dotted decimal notation) of the time server or select one from the pre-defined list.
Set the Date and Time Manually	These fields display when you clear the **Enable NTP Server** checkbox.
Date and Time	Set these fields to configure the system date and time.
Copy Your Computer’s Time Settings	Click this button to get the system date and time from your computer.

8.3 E-mail

Click **Tools > E-mail** configure where the ZyXEL Device is to send logs and alerts.

Figure 70 Tools: E-mail



EMAIL

Email Settings

The Email feature can be used to send the system log files, router alert messages, and firmware update notification to your email address.

ENABLE

Enable Email Notification : ☑

EMAIL SETTINGS

From Email Address :

To Email Address :

SMTP Server Address :

Enable Authentication : ☑

Account Name :

Password :

Verify Password :

EMAIL LOG WHEN FULL OR ON SCHEDULE

On Log Full : □

On Schedule : □

Schedule : Never

The following table describes the labels in this screen.

Table 44 Tools: E-mail

LABEL	DESCRIPTION
Enable	Select **Enable Email Notification** to activate this feature.
Email Settings	
From Email Address	Enter an e-mail as the sender.
To Email Address	Enter the e-mail address to which notifications are sent.
SMTP Server Address	SMTP (Simple Mail Transfer Protocol) is the message-exchange standard for the Internet. SMTP enables you to move messages from one e-mail server to another. Enter the IP address (in dotted decimal notation) of the mail server.
Enable Authentication	Select the check box to activate SMTP authentication. If mail server authentication is needed but this feature is disabled, you will not receive the e-mail logs.
Account Name	Enter the user name (up to 31 characters) (usually the user name of a mail account).
Password	Enter the password associated with the user name above.
Verify Password	Enter the password again for verification.
Email Log When Full or On Schedule	

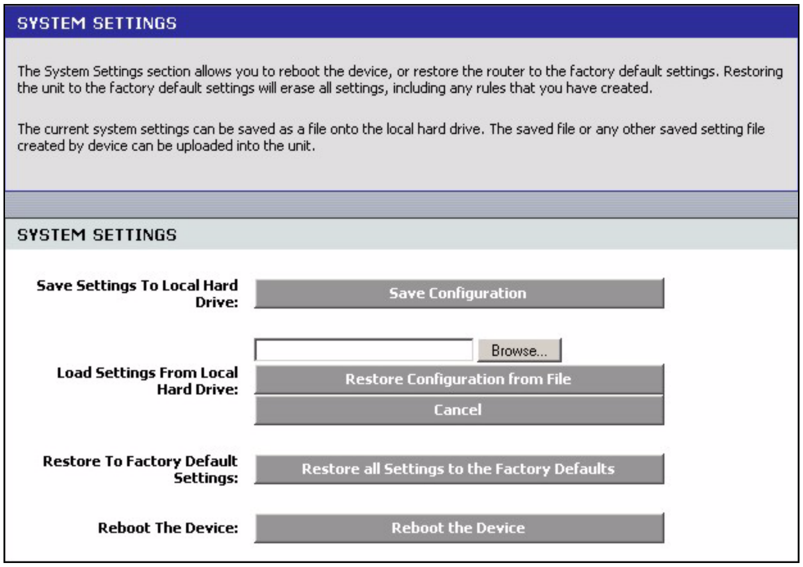
Table 44 Tools: E-mail (continued)

LABEL	DESCRIPTION
On Log Full	Select this option to send logs when all log entries are filled.
On Schedule	Select this option to send logs at the time defined in the time selected in the **Schedule** field.

8.4 System

Use the **System** screen to reboot or reset your ZyXEL Device. Click **Tools** > **System** to display the screen as shown.

Figure 71 Tools: System



The System Settings section allows you to reboot the device, or restore the router to the factory default settings. Restoring the unit to the factory default settings will erase all settings, including any rules that you have created.

The current system settings can be saved as a file onto the local hard drive. The saved file or any other saved setting file created by device can be uploaded into the unit.

SYSTEM SETTINGS
Save Settings To Local Hard Drive:
Save Configuration
Browse...
Load Settings From Local Hard Drive:
Restore Configuration from File
Cancel
Restore To Factory Default Settings:
Restore all Settings to the Factory Defaults
Reboot The Device:
Reboot the Device

8.4.1 Save Configuration

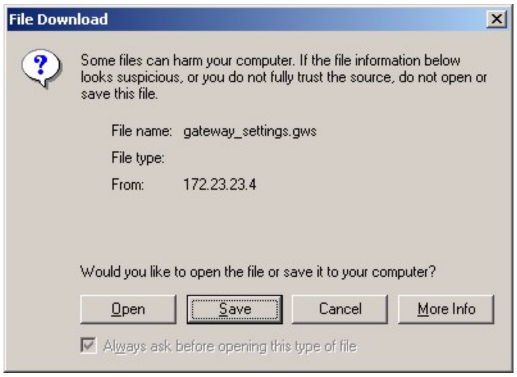
Note: Do not turn off the ZyXEL Device while the file transfer process is taking place.

Follow the steps below to back up the current configuration of the ZyXEL Device.

1 In the web configurator, click **Tools** > **System** (see Figure 68 on page 103) and click **Save Configuration**.

2 A **File Download** screen displays. Click **Save**.

Figure 72 Tools: Admin: File Download



File Download

Some files can harm your computer. If the file information below looks suspicious, or you do not fully trust the source, do not open or save this file.

File name: gateway_settings.gws

File type:

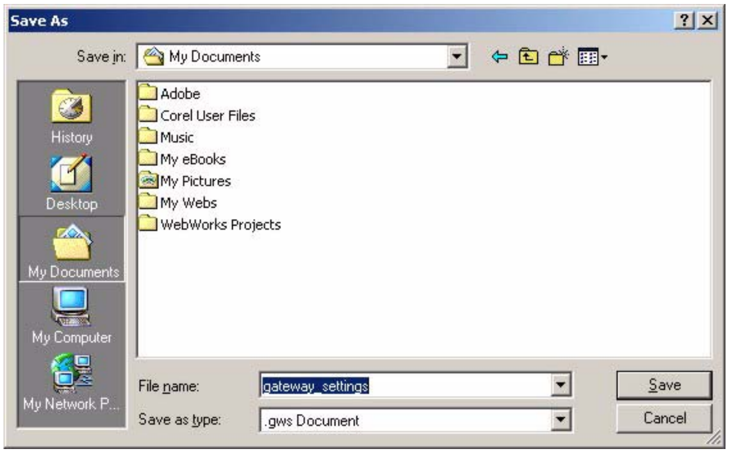
From: 172.23.23.4

Would you like to open the file or save it to your computer?

☑ Always ask before opening this type of file

3 A **Save As** screen displays. Accept the default file location and name or specify a location and name. Click **Save** to back up the configuration file.

Figure 73 Tools: Admin: Save As



Save As

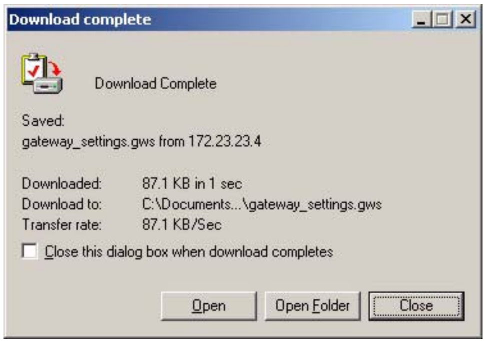
Save in: My Documents

File name: gateway_settings

Save as type: .gws Document

4 After the back up process is complete, a **Download complete** screen displays. Click **Close** to close the screen.

Figure 74 Tools: Admin:



Download complete

Download Complete

Saved:
gateway_settings.gws from 172.23.23.4

Downloaded: 87.1 KB in 1 sec
Download to: C:\Documents...\gateway_settings.gws
Transfer rate: 87.1 KB/Sec

□ Close this dialog box when download completes

8.4.2 Load Configuration

Note: Do not turn off the ZyXEL Device while the file transfer process is taking place.

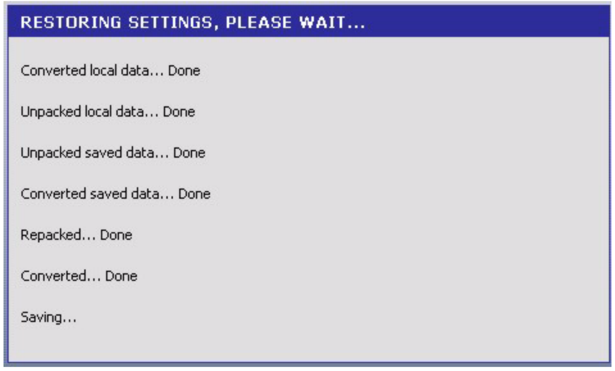
Follow the steps below to restore a previously saved configuration file to the ZyXEL Device.

1 In the web configurator click **Tools** > **System** (see Figure 68 on page 103).

2 In the **Load Settings From Local Hard Drive** field, enter a configuration file name in the field provided or click **Browse** to locate it.

3 Click **Restore Configuration from File** to start the file upload process. A status screen displays showing the restoration progress.

Figure 75 Tools: Admin: Configuration Restore Progress



RESTORING SETTINGS, PLEASE WAIT...

Converted local data... Done

Unpacked local data... Done

Unpacked saved data... Done

Converted saved data... Done

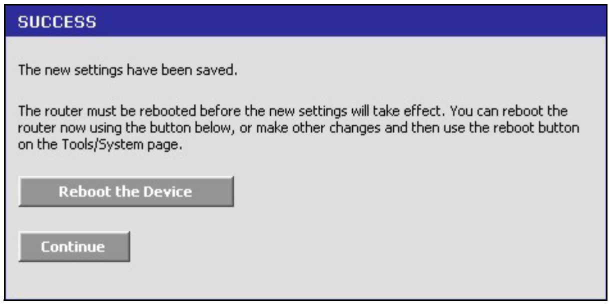
Repacked... Done

Converted... Done

Saving...

4 After the settings are restored successfully, a screen displays as shown. Click **Reboot the Device** to restart the ZyXEL Device and make the changes take effect.

Figure 76 Tools: Admin: Configuration Restore Progress: Success



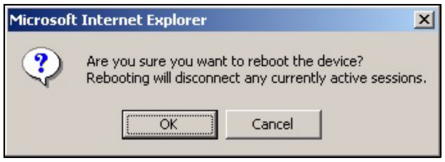
SUCCESS

The new settings have been saved.

The router must be rebooted before the new settings will take effect. You can reboot the router now using the button below, or make other changes and then use the reboot button on the Tools/System page.

5 Click **OK** to restart.

Figure 77 Tools: Admin: Configuration Restore Progress: Prompt

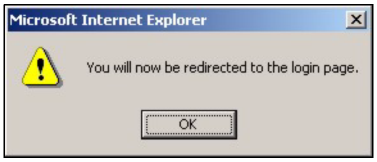


Microsoft Internet Explorer

Are you sure you want to reboot the device?
Rebooting will disconnect any currently active sessions.

6 Click **OK** again to display the login screen.

Figure 78 Tools: Admin: Configuration Restore Progress: Redirect



Microsoft Internet Explorer

You will now be redirected to the login page.

8.4.3 Reset Configuration

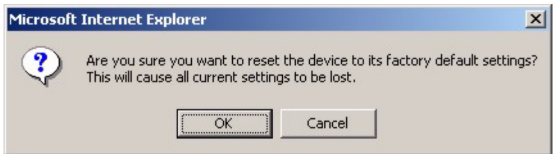
Note: When you reset the device, all custom changes will be lost.

Follow the steps below to reset your ZyXEL Device.

1 In the web configurator, click **Tools** > **System** and click **Restore all Settings to the Factory Defaults**.

2 A screen displays. Click **OK** to continue.

Figure 79 Tools: System: Reset



Are you sure you want to reset the device to its factory default settings?
This will cause all current settings to be lost.

3 Wait until the ZyXEL Device finishes rebooting before accessing the web configurator.

8.4.4 Rebooting Your ZyXEL Device

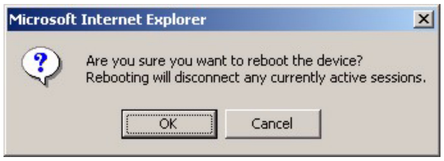
Note: When you reboot the device, all unsaved changes will be lost.

Follow the steps below to restart your ZyXEL Device.

1 In the web configurator, click **Tools** > **System** and click **Reboot the Device**.

2 A screen displays. Click **OK** to continue.

Figure 80 Tools: System: Reboot the Device



Are you sure you want to reboot the device?
Rebooting will disconnect any currently active sessions.

3 Wait until the ZyXEL Device finishes rebooting before accessing the web configurator.

8.5 Firmware

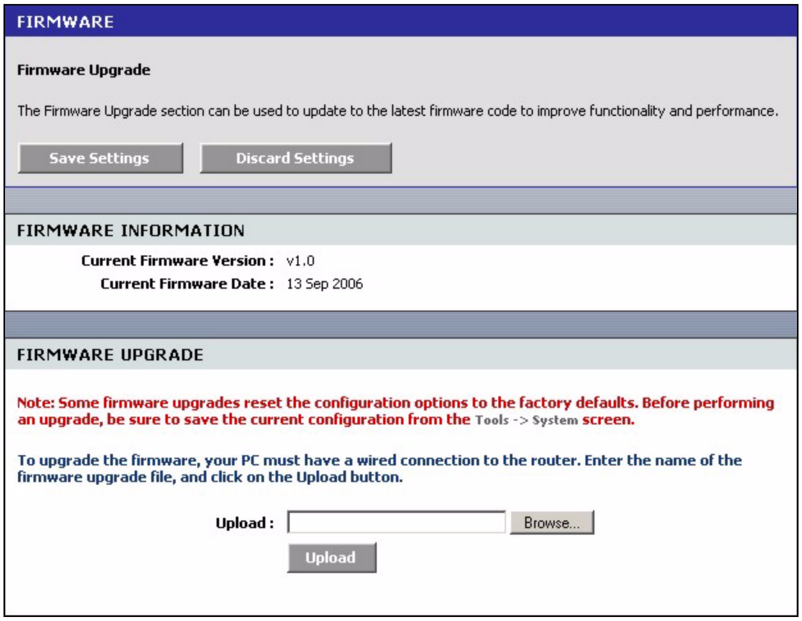
Use the Firmware screen to update the firmware on your ZyXEL Device.

1 Back up the current device configuration in the **System** screen.

1 Download the latest firmware file from www.zyxel.com.

2 In the web configurator, click **Tools** > **Firmware**.

Figure 81 Tools: Firmware



FIRMWARE

Firmware Upgrade

The Firmware Upgrade section can be used to update to the latest firmware code to improve functionality and performance.

FIRMWARE INFORMATION

Current Firmware Version : v1.0

Current Firmware Date : 13 Sep 2006

FIRMWARE UPGRADE

Note: Some firmware upgrades reset the configuration options to the factory defaults. Before performing an upgrade, be sure to save the current configuration from the Tools -> System screen.

To upgrade the firmware, your PC must have a wired connection to the router. Enter the name of the firmware upgrade file, and click on the Upload button.

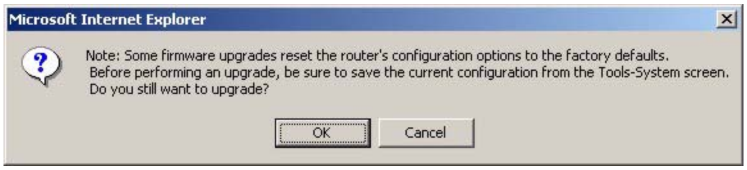
Upload :

3 In the **Upload** field, enter the new firmware file name or click **Browse** to locate it.

4 Click **Upload** to start the file transfer process.

5 A screen displays as shown, click **OK** to continue.

Figure 82 Tools: Firmware: Prompt

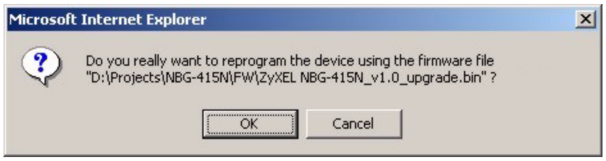


Microsoft Internet Explorer

Note: Some firmware upgrades reset the router's configuration options to the factory defaults.
Before performing an upgrade, be sure to save the current configuration from the Tools-System screen.
Do you still want to upgrade?

6 Click **OK** again to confirm the firmware file you want to upload to the device.

Figure 83 Tools: Firmware: Confirm



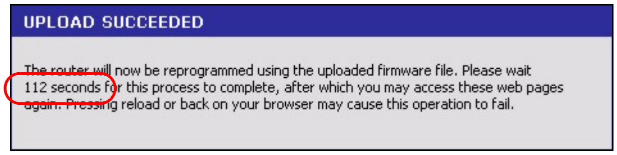
Microsoft Internet Explorer

Do you really want to reprogram the device using the firmware file
"D:\Projects\NBG-415N\FW\ZyXEL NBG-415N_v1.0_upgrade.bin" ?

Note: Do not turn off the ZyXEL Device while the file transfer process is taking place.

7 Wait for the ZyXEL Device finishes rebooting before accessing the web configurator again. Check the firmware version and date in the **Firmware** screen.

Figure 84 Tools: Firmware: Wait



UPLOAD SUCCEEDED

The router will now be reprogrammed using the uploaded firmware file. Please wait 112 seconds for this process to complete, after which you may access these web pages again. Pressing reload or back on your browser may cause this operation to fail.

8.6 DDNS

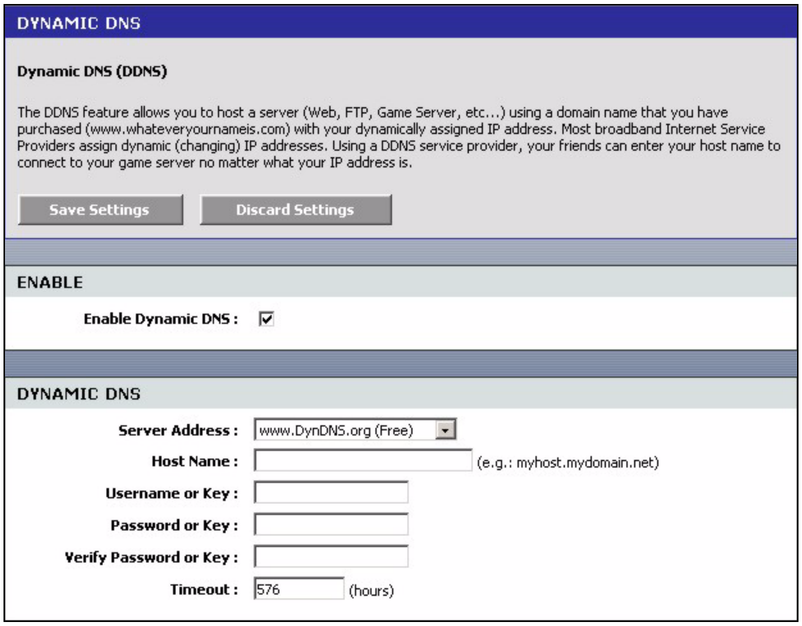
Dynamic DNS (DDNS) allows you to update your current dynamic IP address with one or many dynamic DNS services so that anyone can contact you (in NetMeeting, CU-SeeMe, etc.). You can also access your FTP server or Web site on your own computer using a domain name (for instance myhost.dhs.org, where myhost is a name of your choice) that will never change instead of using an IP address that changes each time you reconnect. Your friends or relatives will always be able to call you even if they don't know your IP address.

First of all, you need to have registered a dynamic DNS account with from a DDNS service provider (for example, www.dyndns.org). This is for people with a dynamic IP from their ISP or DHCP server that would still like to have a domain name. The Dynamic DNS service provider will give you a password or key.

Note: You must go to the Dynamic DNS service provider's website and register a user account and a domain name before you can use the Dynamic DNS service with your ZyXEL Device.

Click **Tools** > **DDNS** to display the configuration screen.

Figure 85 Tools: DDNS



DYNAMIC DNS

Dynamic DNS (DDNS)

The DDNS feature allows you to host a server (Web, FTP, Game Server, etc...) using a domain name that you have purchased (www.whateveryournameis.com) with your dynamically assigned IP address. Most broadband Internet Service Providers assign dynamic (changing) IP addresses. Using a DDNS service provider, your friends can enter your host name to connect to your game server no matter what your IP address is.

ENABLE

Enable Dynamic DNS : ☑

DYNAMIC DNS

Server Address : www.DynDNS.org (Free)

Host Name : (e.g.: myhost.mydomain.net)

Username or Key :

Password or Key :

Verify Password or Key :

Timeout : 576 (hours)

The following table describes the labels in this screen.

Table 45 Tools: DDNS

LABEL	DESCRIPTION
Enable	Select Enable Dynamic DNS to active this feature.
Dynamic DNS	
Service Address	Select the web address of your Dynamic DNS service provider.

Table 45 Tools: DDNS (continued)

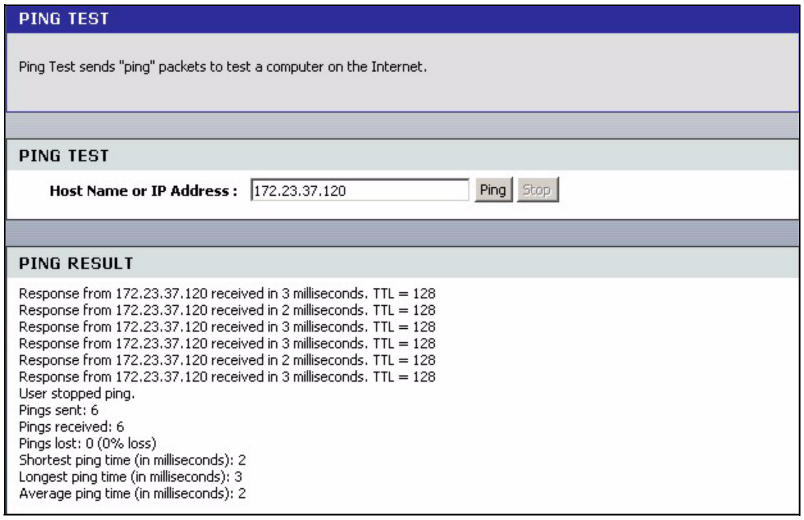
LABEL	DESCRIPTION
Host Name	Enter the system name.
Username or Key	Enter your user name. You can use up to 31 alphanumeric characters (and the underscore). Spaces are not allowed.
Password or Key	Enter the password associated with the user name above. You can use up to 31 alphanumeric characters (and the underscore). Spaces are not allowed.
Verify Password or Key	Enter the password again for confirmation.
Timeout	Specify the time (in hours) the ZyXEL Device waits before time out.

8.7 Ping

You can use the **Ping Test** screen to check whether the ZyXEL Device can connect to other Ethernet devices on your network and the Internet. When the ping feature is activated, the ZyXEL Device sends a message to the Ethernet device you specify. If the Ethernet device receives the message, it sends back messages in reply.

To use the ping feature, you must know the IP address or domain name of the Ethernet device you are trying to communicate with. Click **Tools > Ping** to display the configuration screen.

Figure 86 Tool: Ping



PING TEST

Ping Test sends "ping" packets to test a computer on the Internet.

PING TEST

Host Name or IP Address : 172.23.37.120 [Ping] [Stop]

PING RESULT

```
Response from 172.23.37.120 received in 3 milliseconds. TTL = 128
Response from 172.23.37.120 received in 2 milliseconds. TTL = 128
Response from 172.23.37.120 received in 3 milliseconds. TTL = 128
Response from 172.23.37.120 received in 3 milliseconds. TTL = 128
Response from 172.23.37.120 received in 2 milliseconds. TTL = 128
Response from 172.23.37.120 received in 3 milliseconds. TTL = 128
User stopped ping.
Pings sent: 6
Pings received: 6
Pings lost: 0 (0% loss)
Shortest ping time (in milliseconds): 2
Longest ping time (in milliseconds): 3
Average ping time (in milliseconds): 2
```

The following table describes the labels in this screen.

Table 46 Tools: Ping

LABEL	DESCRIPTION
Ping Test	
Host Name or Ping Address	Enter the IP address or the domain name of the Ethernet device to which you want to test the connection.

Table 46 Tools: Ping (continued)

LABEL	DESCRIPTION
Ping	Click **Ping** to start the connection test. The ping test will not end until you click **Stop**.
Stop	Click **Stop** to terminate the ping test.
Ping Result	This table displays the connection test result. If the ZyXEL Device receives reply messages from an Ethernet device, the reply information is automatically displayed in this table. If the ZyXEL Device is unable to receive any response from an Ethernet device, no connection test status is displayed until you click **Stop**.

CHAPTER 9
Status

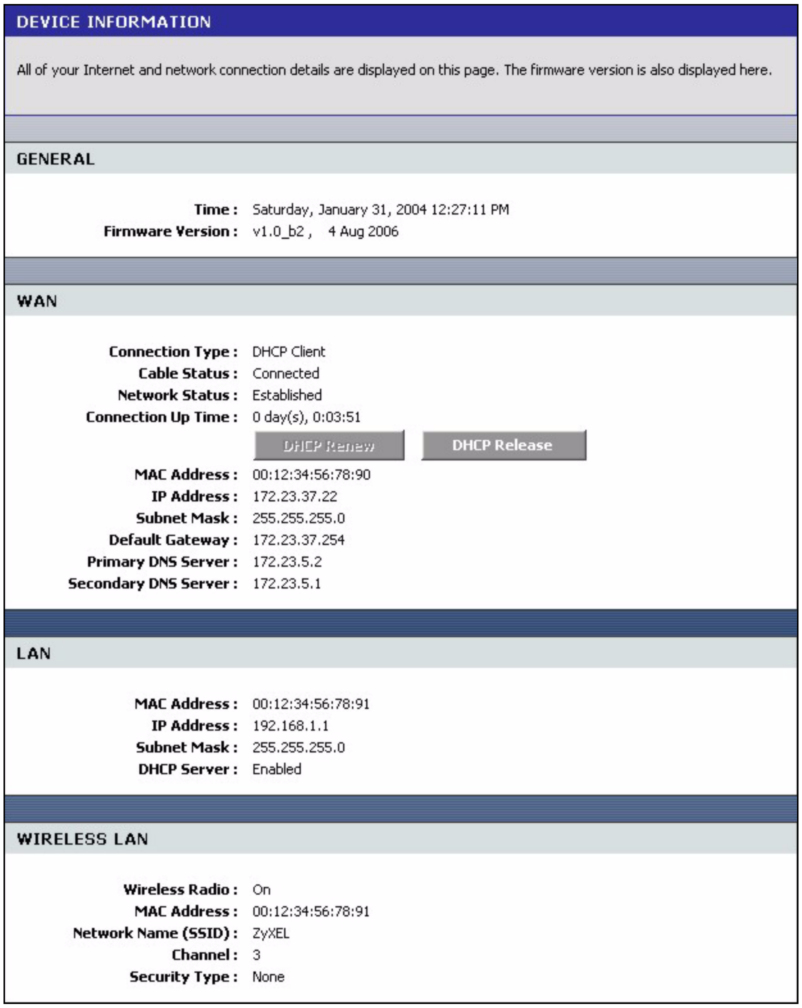
This chapter describes the **Status** screens you use to view the system status and logs.

9.1 Device Info

Display the **Device Status** screen to view device information such as the system time and interface settings.

Click **Status** > **Device Status** to display the screen.

Figure 87 Status: Device Info



DEVICE INFORMATION

All of your Internet and network connection details are displayed on this page. The firmware version is also displayed here.

GENERAL

Time : Saturday, January 31, 2004 12:27:11 PM
Firmware Version : v1.0_b2 , 4 Aug 2006

WAN

Connection Type : DHCP Client
Cable Status : Connected
Network Status : Established
Connection Up Time : 0 day(s), 0:03:51
MAC Address : 00:12:34:56:78:90
IP Address : 172.23.37.22
Subnet Mask : 255.255.255.0
Default Gateway : 172.23.37.254
Primary DNS Server : 172.23.5.2
Secondary DNS Server : 172.23.5.1

LAN

MAC Address : 00:12:34:56:78:91
IP Address : 192.168.1.1
Subnet Mask : 255.255.255.0
DHCP Server : Enabled

WIRELESS LAN

Wireless Radio : On
MAC Address : 00:12:34:56:78:91
Network Name (SSID) : ZyXEL
Channel : 3
Security Type : None

The following table describes the labels in this screen.

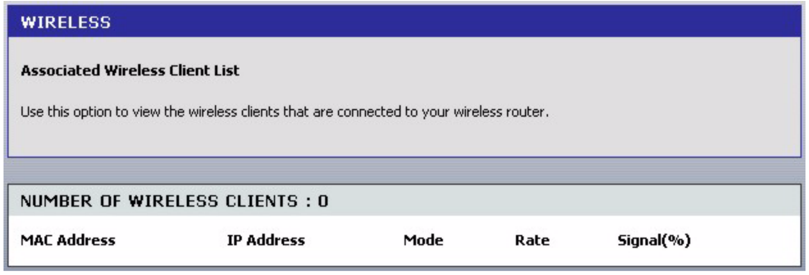
Table 47 Status: Device Information

LABEL	DESCRIPTION
General	
Time	This field displays the current system date and time.
Firmware Version	This field displays the firmware version and the date created.
WAN	
Connection Type	This field displays the connection status.
Cable Status	This field indicates whether the Ethernet cable is connected or not.
Network Status	This field indicates whether a connection to the ISP is up or not.
Connection Up Time	This field displays the time since the connection was up.
DHCP Renew	This button is applicable when the ZyXEL Device uses a dynamic IP address. Click **DHCP Renew** to get a new dynamic IP address.
DHCP Release	This button is applicable when the ZyXEL Device uses a dynamic IP address. Click **DHCP Release** to release the current IP address. You must then click **DHCP Renew** to get a new IP address.
Connect	This button is available when the ZyXEL Device is set to use PPPoE connection type. Click **Connect** to establish an Internet connection using PPPoE.
Disconnect	This button is available when the ZyXEL Device is set to use PPPoE connection type. Click **Disconnect** to disconnect the Internet connection.
MAC Address	This field displays the MAC address of the WAN port on the ZyXEL Device.
IP Address	This field displays the WAN IP address.
Subnet Mask	This field displays the WAN subnet mask.
Default Gateway	This field displays the IP address of the gateway on the WAN.
Primary/ Secondary DNS Server	This field displays the IP address(es) of the DNS server(s).
LAN	
MAC Address	This field displays the MAC address of the LAN port on the ZyXEL Device.
IP Address	This field displays the LAN IP address.
Subnet Mask	This field displays the LAN subnet mask.
DHCP Server	This field displays whether the DHCP server is active or not on the LAN.
Wireless LAN	
Wireless Radio	This field displays whether the wireless LAN feature is active or not.
MAC Address	This field displays the MAC address of the WLAN interface on the ZyXEL Device.
Network Name (SSID)	This field displays the name of the wireless network.
Channel	This field displays the wireless channel number the ZyXEL Device is using.
Security Type	This field displays the wireless LAN security type.

9.2 Wireless

To view a list of wireless clients currently connected to the ZyXEL Device, click **Status** > **Wireless**.

Figure 88 Status: Wireless



WIRELESS

Associated Wireless Client List

Use this option to view the wireless clients that are connected to your wireless router.

NUMBER OF WIRELESS CLIENTS : 0

MAC Address	IP Address	Mode	Rate	Signal(%)

The following table describes the fields in this screen.

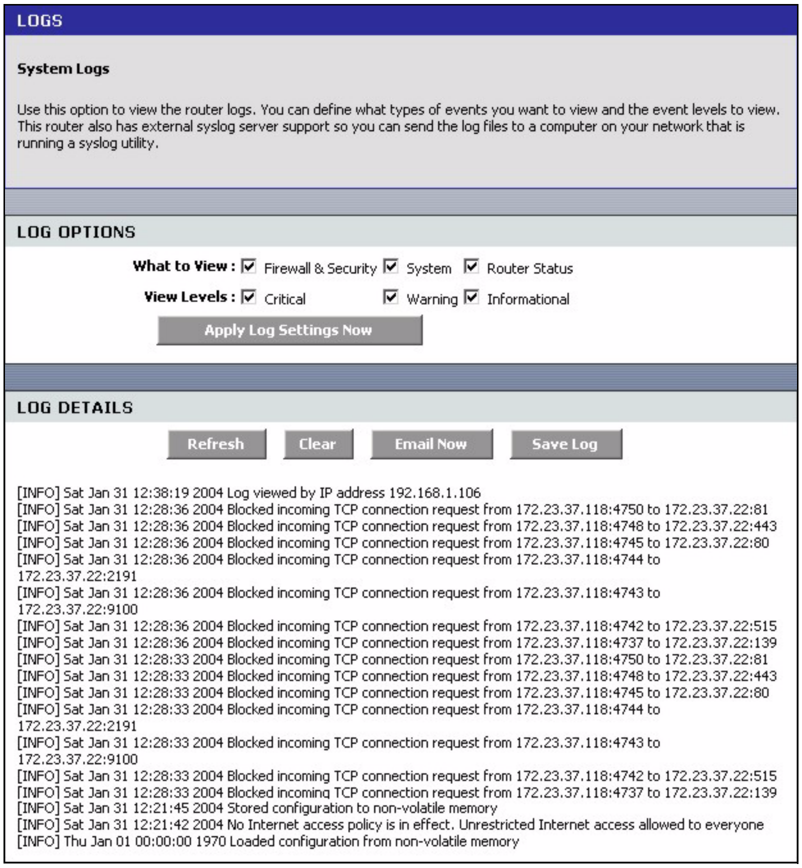
Table 48 Status: Wireless

LABEL	DESCRIPTION
Number of Wireless Clients	This field displays the number of wireless clients currently connected to the ZyXEL Device.
MAC Address	This field displays the MAC (Media Access Control) address of an associated wireless station. Every Ethernet device has a unique MAC address. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00:A0:C5:00:00:02.
IP Address	This field displays the LAN IP address of the wireless client.
Mode	This field displays the wireless standard the wireless client is using.
Rate	This field displays the transmission rate (in megabits per second) of the wireless client.
Signal (%)	This field displays the relative measurement of the signal strength (in percentage).

9.3 Logs

To view system logs, click **Status** > **Logs**.

Figure 89 Status: Logs



System Logs

Use this option to view the router logs. You can define what types of events you want to view and the event levels to view. This router also has external syslog server support so you can send the log files to a computer on your network that is running a syslog utility.

What to View : ☑ Firewall & Security ☑ System ☑ Router Status

View Levels : ☑ Critical ☑ Warning ☑ Informational

```
[INFO] Sat Jan 31 12:38:19 2004 Log viewed by IP address 192.168.1.106
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4750 to 172.23.37.22:81
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4748 to 172.23.37.22:443
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4745 to 172.23.37.22:80
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4744 to
172.23.37.22:2191
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4743 to
172.23.37.22:9100
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4742 to 172.23.37.22:515
[INFO] Sat Jan 31 12:28:36 2004 Blocked incoming TCP connection request from 172.23.37.118:4737 to 172.23.37.22:139
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4750 to 172.23.37.22:81
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4748 to 172.23.37.22:443
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4745 to 172.23.37.22:80
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4744 to
172.23.37.22:2191
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4743 to
172.23.37.22:9100
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4742 to 172.23.37.22:515
[INFO] Sat Jan 31 12:28:33 2004 Blocked incoming TCP connection request from 172.23.37.118:4737 to 172.23.37.22:139
[INFO] Sat Jan 31 12:21:45 2004 Stored configuration to non-volatile memory
[INFO] Sat Jan 31 12:21:42 2004 No Internet access policy is in effect. Unrestricted Internet access allowed to everyone
[INFO] Thu Jan 01 00:00:00 1970 Loaded configuration from non-volatile memory
```

The following table describes the labels in this screen.

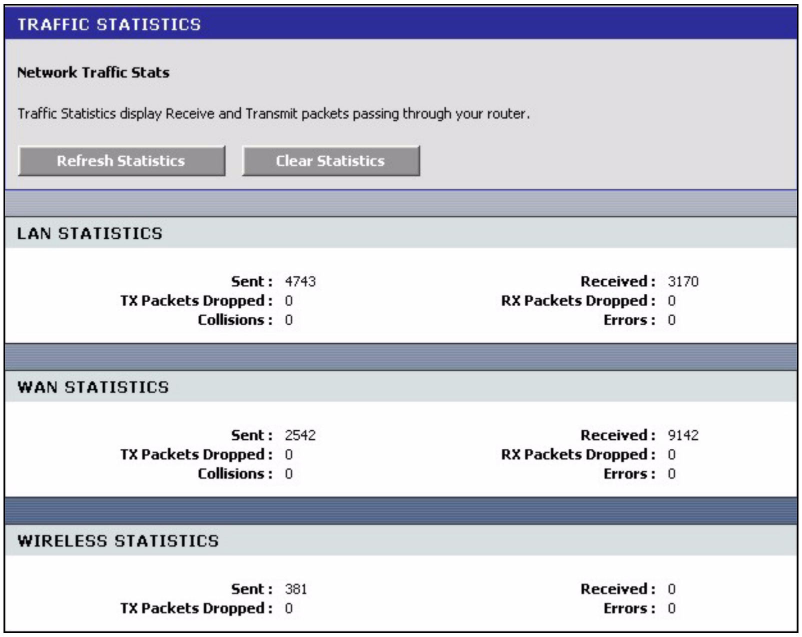
Table 49 Status: Logs

LABEL	DESCRIPTION
Log Options	
What to View	Select the type of logs to display in this screen.
View Levels	Select the log severity level to display in this screen.
Apply Log Settings Now	Click this button to save the changes in this screen.
Log Details	
Refresh	Click **Refresh** to update this screen.
Clear	Click **Clear** to delete all the logs. Once deleted, you cannot view the logs again.
Email Now	Click **Email Now** to send the logs to the e-mail you specified in the **Tools > E-mail** screen.
Save Log	Click **Save Log** to store the logs to a file on your computer.

9.4 Statistics

To view the LAN, WAN and WLAN statistics, click **Status** > **Statistics**.

Figure 90 Status: Statistics



TRAFFIC STATISTICS

Network Traffic Stats

Traffic Statistics display Receive and Transmit packets passing through your router.

LAN STATISTICS

Sent : 4743
TX Packets Dropped : 0
Collisions : 0
Received : 3170
RX Packets Dropped : 0
Errors : 0

WAN STATISTICS

Sent : 2542
TX Packets Dropped : 0
Collisions : 0
Received : 9142
RX Packets Dropped : 0
Errors : 0

WIRELESS STATISTICS

Sent : 381
TX Packets Dropped : 0
Received : 0
Errors : 0

The following table describes the labels in this screen.

Table 50 Status: Statistics

LABEL	DESCRIPTION
LAN Statistics	
Sent	This field displays the number of packets sent on the LAN.
Tx Packets Dropped	This field displays the number of transmitted packets that were dropped on the LAN.
Collisions	This field displays the number of packets sent with collision errors on the LAN.
Received	This field displays the number of packets received on the LAN.
Rx Packets Dropped	This field displays the number of packets received that were dropped on the LAN.
Errors	This field displays the number of packets received with errors on the LAN.
WAN Statistics	
Sent	This field displays the number of packets sent on the WAN.
Tx Packets Dropped	This field displays the number of transmitted packets that were dropped on the WAN.
Collisions	This field displays the number of packets sent with collision errors on the WAN.
Received	This field displays the number of packets received on the WAN.
Rx Packets Dropped	This field displays the number of packets received that were dropped on the WAN.
Errors	This field displays the number of packets received with errors on the WAN.

Table 50 Status: Statistics (continued)

LABEL	DESCRIPTION
WLAN Statistics	
Sent	This field displays the number of packets sent on the WLAN.
Tx Packets Dropped	This field displays the number of transmitted packets that were dropped on the WLAN.
Received	This field displays the number of packets received on the WLAN.
Errors	This field displays the number of packets received with errors on the WLAN.

CHAPTER 10 Troubleshooting

This chapter covers potential problems and the corresponding remedies.

10.1 Problems Starting Up the ZyXEL Device

Table 51 Troubleshooting Starting Up Your ZyXEL Device

PROBLEM	CORRECTIVE ACTION
None of the LEDs turn on when I turn on the ZyXEL Device.	Make sure that the ZyXEL Device’s power adaptor is connected to the ZyXEL Device and plugged in to an appropriate power source. Make sure that the ZyXEL Device and the power source are ZyXEL Device turned on. Turn the ZyXEL Device off and on. If the error persists, you may have a hardware problem. In this case, you should contact your vendor.

10.2 Problems with the LAN

Table 52 Troubleshooting the LAN

PROBLEM	CORRECTIVE ACTION
The LAN LEDs do not turn on.	Check your Ethernet cable connections (refer to the Quick Start Guide for details). Check for faulty Ethernet cables.
	Make sure your computer’s Ethernet Card is working properly.
I cannot access the ZyXEL Device from the LAN.	If you assign the computer a static IP address, make sure that the IP address and the subnet mask of the ZyXEL Device and your computer(s) are on the same subnet.

10.3 Problems with the WAN

Table 53 Troubleshooting the WAN

PROBLEM	CORRECTIVE ACTION
The WAN LED is off.	Check the connections between the ZyXEL Device WAN port and the cable/DSL modem or Ethernet jack.
	Check whether your cable/DSL device requires a crossover or straight-through cable.
I cannot get a WAN IP address from the ISP.	In the web configurator, display the **WAN** screen to verify your Internet account settings. The ISP provides the WAN IP address after authenticating you. Authentication may be through the user name and password, the MAC address or the host name. The username and password are required for Internet access, make sure that you have entered the correct service type, user name and password (be sure to use the correct casing).
I cannot access the Internet.	Make sure the ZyXEL Device is turned on and connected to the network. Verify your WAN settings. Refer to the chapter on WAN setup. Make sure you have entered the correct user name and password.
The Internet connection disconnects.	If you use PPPoE, PPTP or L2TP mode, check the idle time-out setting. If the problem persists, contact your ISP.

10.4 Problems with the WLAN

Table 54 Troubleshooting the WLAN

PROBLEM	CORRECTIVE ACTION
The WLAN LED is off.	Check that the **ON OFF** switch is in the **ON** position. This switch allows you to enable or disable WLAN connection on the ZyXEL Device without having to log into the web configurator.
I cannot access the WLAN.	Make sure you have configured your wireless station to use the same wireless settings as the ZyXEL Device. Check that you have set the wireless station to use the same wireless security mode and/or keys.

10.5 Problems Accessing the ZyXEL Device

Table 55 Troubleshooting Accessing the ZyXEL Device

PROBLEM	CORRECTIVE ACTION
I cannot access the ZyXEL Device on the LAN.	Make sure your computer is connected to a **LAN** port on the ZyXEL Device. Use the ZyXEL Device’s LAN IP address when configuring from the LAN. The default LAN IP address is 192.168.1.1. The IP addresses of your computer and the ZyXEL Device must be on the same subnet for LAN access. Check that traffic from your computer to the ZyXEL Device is not blocked by an access control policy or MAC address filter.
I cannot log into the web configurator	The username is “admin”. The default password is “1234”. The **Password** and **Username** fields are case-sensitive. Make sure that you enter the correct password and username using the proper casing. If you have changed the password and have now forgotten it, you will need to upload the default configuration file. This restores all of the factory defaults including the password.

10.6 Problems with Internet Access

Table 56 Troubleshooting Restricted Web Pages and Keyword Blocking

PROBLEM	CORRECTIVE ACTION
Access to a restricted web page is not blocked.	Make sure that the Enable Parental Control check box is selected in the Parental Control screen.
	Make sure that you select a category in the Parental Control screen to restrict access to web pages relevant to that category. For example, select the Gambling check box to prevent access to www.onlinegambling.com.
Access to a web page with a forbidden URL is not blocked.	Make sure that you have enabled the web filter function on the ZyXEL Device. Make sure that the web site address is NOT listed in the **Allowed Web SIte List**.

APPENDIX A
Product Specifications

The following table is a summary of other features available.

Table 57 Hardware Features

WLAN	The ZyXEL Device is able to connect to another draft IEEE 802.11n wireless device at up to 300 Mbps. The ZyXEL Device is also able to connect to IEEE 802.11b and IEEE 802.11g devices.
MIMO (Multiple Input Multiple Output)	The ZyXEL Device supports MIMO to increase both transmission speed and range of your wireless network.
Antenna	Three detachable (reverse SMA) 4 dBi gain
USB Port	USB version 1.1. Connect a USB storage device to this USB port to transfer wireless LAN settings on the ZyXEL Device to your wireless client(s) with the Windows Connect Now feature in Windows XP (SP2).
Ethernet ports	Auto-negotiating: 10 Mbps or 100 Mbps in either half-duplex or full-duplex mode. Auto-crossover: Use either crossover or straight-through Ethernet cables.
Dimensions (D x W x H)	156 mm x 198 mm x 29.5 mm
Power Specification	INPUT: 100-240V, 50/60Hz, 0.5A OUTPUT: 5.0V-2.5A
Operation Temperature	0º C ~ 50º C
Storage Temperature	-20º C ~ 60º C
Operation Humidity	20% ~ 95% RH
Storage Humidity	10% ~ 90% RH

Table 58 Firmware Features

FEATURE	DESCRIPTION
Draft IEEE 802.11N	Based on the draft IEEE 802.11n standard (also known as pre-N), the ZyXEL Device is able to connect to another draft IEEE 802.11n wireless device at a up to 300 Mbps.
Wireless LAN Security	Your ZyXEL Device supports various security methods (WEP, WPA, WPA2 with AES and IKE) to protect communication in your wireless LAN.
Windows Connect Now	This feature allows you to easily transfer wireless settings on your ZyXEL Device to a USB memory stick and then save the settings to wireless client computer(s).
StreamEngine™	You can set this feature on the ZyXEL Device to perform intelligent and automatic traffic prioritizing for time-sensitive applications (such as voice).

Table 58 Firmware Features

FEATURE	DESCRIPTION
Network Address Translation (NAT)	Each computer on your network must have its own unique IP address. Use NAT to convert a single public IP address to multiple private IP addresses for the computers on your network.
Port Forwarding	If you have a server (mail or web server for example) on your network, then use this feature to let people access it from the Internet.
DHCP (Dynamic Host Configuration Protocol)	Use this feature to have the ZyXEL Device assign IP addresses, an IP default gateway and DNS servers to computers on your network.
Dynamic DNS Support	With Dynamic DNS (Domain Name System) support, you can use a fixed URL, www.zyxel.com for example, with a dynamic IP address. You must register for this service with a Dynamic DNS service provider.
Universal Plug and Play (UPnP)	The ZyXEL Device can communicate with other UPnP enabled devices in a network.
Time and Date	Get the current time and date from an external server when you turn on your ZyXEL Device. You can also set the time manually. These dates and times are then used in logs.
Logging and Tracing	Use packet tracing and logs for troubleshooting. You can send logs from the ZyXEL Device to an external UNIX syslog server.
Device Management	Use the web configurator to easily configure the rich range of features on the ZyXEL Device.
Firmware Upgrade	Download new firmware (when available) from the ZyXEL web site and use the web configurator, an FTP or a TFTP tool to put it on the ZyXEL Device.
Configuration Backup & Restoration	Make a copy of the ZyXEL Device's configuration and put it back on the ZyXEL Device later if you decide you want to revert back to an earlier configuration.

Table 59 Default LAN and Management Settings

Default LAN IP Address	192.168.1.1
Default Subnet Mask	255.255.255.0 (24 bits)
Default Login Username	admin
Default Login Password	1234
DHCP Pool	192.168.1.100 to 192.168.1.199

Appendix B
Wireless LANs

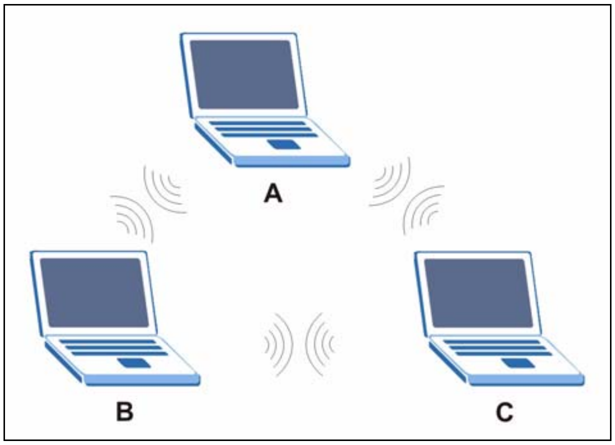
Wireless LAN Topologies

This section discusses ad-hoc and infrastructure wireless LAN topologies.

Ad-hoc Wireless LAN Configuration

The simplest WLAN configuration is an independent (Ad-hoc) WLAN that connects a set of computers with wireless stations (A, B, C). Any time two or more wireless adapters are within range of each other, they can set up an independent network, which is commonly referred to as an Ad-hoc network or Independent Basic Service Set (IBSS). The following diagram shows an example of notebook computers using wireless adapters to form an Ad-hoc wireless LAN.

Figure 91 Peer-to-Peer Communication in an Ad-hoc Network

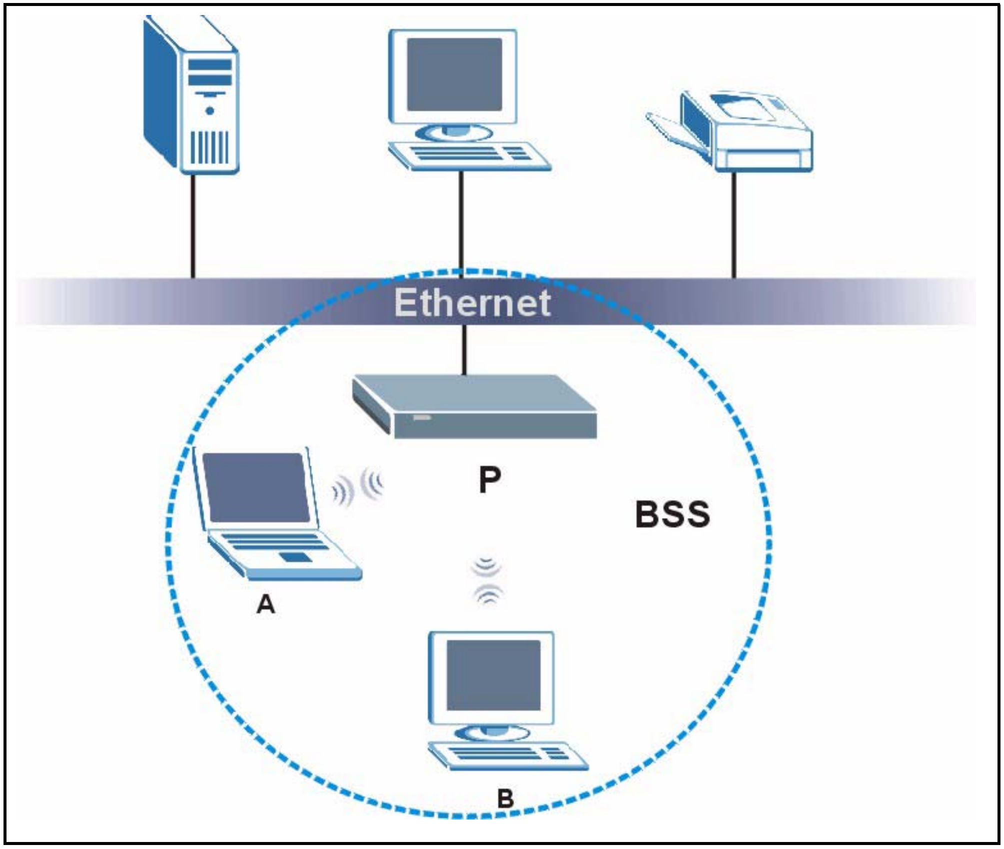


BSS

A Basic Service Set (BSS) exists when all communications between wireless stations or between a wireless station and a wired network client go through one access point (AP).

Intra-BSS traffic is traffic between wireless stations in the BSS. When Intra-BSS is enabled, wireless station A and B can access the wired network and communicate with each other. When Intra-BSS is disabled, wireless station A and B can still access the wired network but cannot communicate with each other.

Figure 92 Basic Service Set



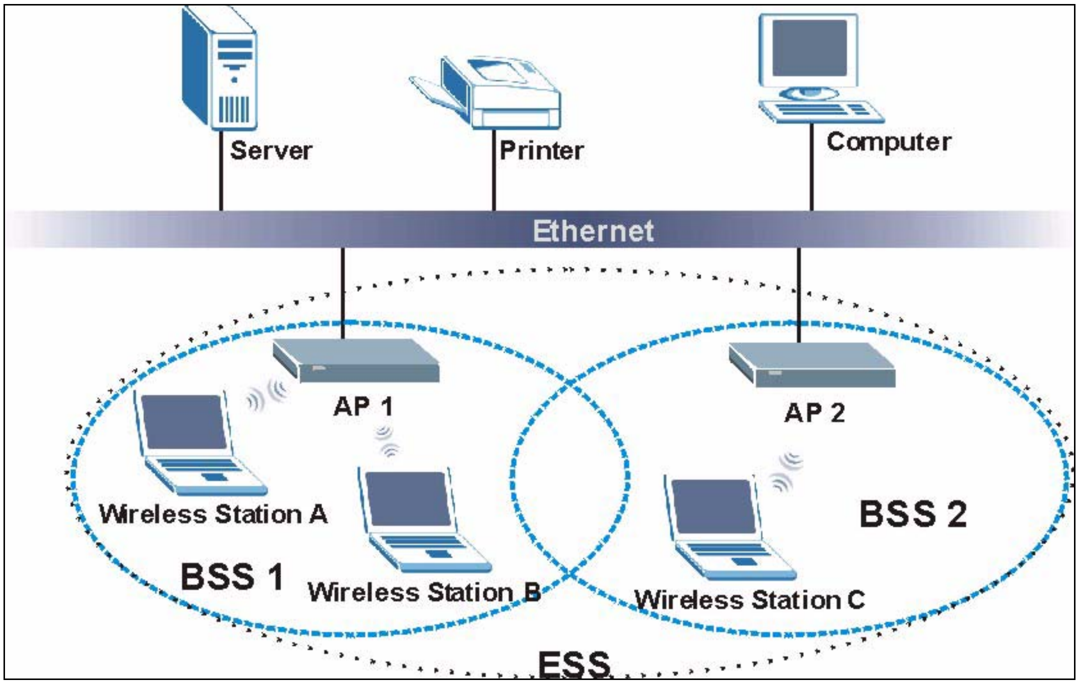
ESS

An Extended Service Set (ESS) consists of a series of overlapping BSSs, each containing an access point, with each access point connected together by a wired network. This wired connection between APs is called a Distribution System (DS).

This type of wireless LAN topology is called an Infrastructure WLAN. The Access Points not only provide communication with the wired network but also mediate wireless network traffic in the immediate neighborhood.

An ESSID (ESS IDentification) uniquely identifies each ESS. All access points and their associated wireless stations within the same ESS must have the same ESSID in order to communicate.

Figure 93 Infrastructure WLAN



Channel

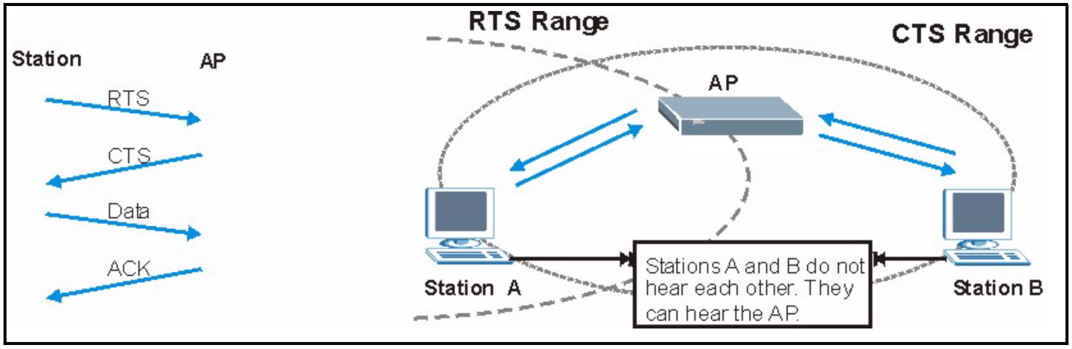
A channel is the radio frequency(ies) used by IEEE 802.11a/b/g wireless devices. Channels available depend on your geographical area. You may have a choice of channels (for your region) so you should use a different channel than an adjacent AP (access point) to reduce interference. Interference occurs when radio signals from different access points overlap causing interference and degrading performance.

Adjacent channels partially overlap however. To avoid interference due to overlap, your AP should be on a channel at least five channels away from a channel that an adjacent AP is using. For example, if your region has 11 channels and an adjacent AP is using channel 1, then you need to select a channel between 6 or 11.

RTS/CTS

A hidden node occurs when two stations are within range of the same access point, but are not within range of each other. The following figure illustrates a hidden node. Both stations (STA) are within range of the access point (AP) or wireless gateway, but out-of-range of each other, so they cannot "hear" each other, that is they do not know if the channel is currently being used. Therefore, they are considered hidden from each other.

Figure 94 RTS/CTS


Station
AP
RTS
CTS
Data
ACK
RTS Range
CTS Range
AP
Station A
Station B
Stations A and B do not hear each other. They can hear the AP.

When station A sends data to the AP, it might not know that the station B is already using the channel. If these two stations send data at the same time, collisions may occur when both sets of data arrive at the AP at the same time, resulting in a loss of messages for both stations.

RTS/CTS is designed to prevent collisions due to hidden nodes. An **RTS/CTS** defines the biggest size data frame you can send before an RTS (Request To Send)/CTS (Clear to Send) handshake is invoked.

When a data frame exceeds the **RTS/CTS** value you set (between 0 to 2432 bytes), the station that wants to transmit this frame must first send an RTS (Request To Send) message to the AP for permission to send it. The AP then responds with a CTS (Clear to Send) message to all other stations within its range to notify them to defer their transmission. It also reserves and confirms with the requesting station the time frame for the requested transmission.

Stations can send frames smaller than the specified **RTS/CTS** directly to the AP without the RTS (Request To Send)/CTS (Clear to Send) handshake.

You should only configure **RTS/CTS** if the possibility of hidden nodes exists on your network and the "cost" of resending large frames is more than the extra network overhead involved in the RTS (Request To Send)/CTS (Clear to Send) handshake.

If the **RTS/CTS** value is greater than the **Fragmentation Threshold** value (see next), then the RTS (Request To Send)/CTS (Clear to Send) handshake will never occur as data frames will be fragmented before they reach **RTS/CTS** size.

Note: Enabling the RTS Threshold causes redundant network overhead that could negatively affect the throughput performance instead of providing a remedy.

Fragmentation Threshold

A **Fragmentation Threshold** is the maximum data fragment size (between 256 and 2432 bytes) that can be sent in the wireless network before the AP will fragment the packet into smaller data frames.

A large **Fragmentation Threshold** is recommended for networks not prone to interference while you should set a smaller threshold for busy networks or networks that are prone to interference.

If the **Fragmentation Threshold** value is smaller than the **RTS/CTS** value (see previously) you set then the RTS (Request To Send)/CTS (Clear to Send) handshake will never occur as data frames will be fragmented before they reach **RTS/CTS** size.

Preamble Type

A preamble is used to synchronize the transmission timing in your wireless network. There are two preamble modes: **Long** and **Short**.

Short preamble takes less time to process and minimizes overhead, so it should be used in a good wireless network environment when all wireless stations support it.

Select **Long** if you have a 'noisy' network or are unsure of what preamble mode your wireless stations support as all IEEE 802.11b compliant wireless adapters must support long preamble. However, not all wireless adapters support short preamble. Use long preamble if you are unsure what preamble mode the wireless adapters support, to ensure interpretability between the AP and the wireless stations and to provide more reliable communication in 'noisy' networks.

Select **Dynamic** to have the AP automatically use short preamble when all wireless stations support it, otherwise the AP uses long preamble.

Note: The AP and the wireless stations MUST use the same preamble mode in order to communicate.

IEEE 802.11g Wireless LAN

IEEE 802.11g is fully compatible with the IEEE 802.11b standard. This means an IEEE 802.11b adapter can interface directly with an IEEE 802.11g access point (and vice versa) at 11 Mbps or lower depending on range. IEEE 802.11g has several intermediate rate steps between the maximum and minimum data rates. The IEEE 802.11g data rate and modulation are as follows:

Table 60 IEEE 802.11g

DATA RATE (MBPS)	MODULATION
1	DBPSK (Differential Binary Phase Shift Keyed)
2	DQPSK (Differential Quadrature Phase Shift Keying)
5.5 / 11	CCK (Complementary Code Keying)
6/9/12/18/24/36/48/54	OFDM (Orthogonal Frequency Division Multiplexing)

IEEE 802.1x

In June 2001, the IEEE 802.1x standard was designed to extend the features of IEEE 802.11 to support extended authentication as well as providing additional accounting and control features. It is supported by Windows XP and a number of network devices. Some advantages of IEEE 802.1x are:

- User based identification that allows for roaming.
- Support for RADIUS (Remote Authentication Dial In User Service, RFC 2138, 2139) for centralized user profile and accounting management on a network RADIUS server.
- Support for EAP (Extensible Authentication Protocol, RFC 2486) that allows additional authentication methods to be deployed with no changes to the access point or the wireless stations.

RADIUS

RADIUS is based on a client-server model that supports authentication, authorization and accounting. The access point is the client and the server is the RADIUS server. The RADIUS server handles the following tasks:

- Authentication

  Determines the identity of the users.
- Authorization

  Determines the network services available to authenticated users once they are connected to the network.
- Accounting

  Keeps track of the client's network activity.

RADIUS is a simple package exchange in which your AP acts as a message relay between the wireless station and the network RADIUS server.

Types of RADIUS Messages

The following types of RADIUS messages are exchanged between the access point and the RADIUS server for user authentication:

- Access-Request

  Sent by an access point requesting authentication.
- Access-Reject

  Sent by a RADIUS server rejecting access.
- Access-Accept

  Sent by a RADIUS server allowing access.

- Access-Challenge

  Sent by a RADIUS server requesting more information in order to allow access. The access point sends a proper response from the user and then sends another Access-Request message.

The following types of RADIUS messages are exchanged between the access point and the RADIUS server for user accounting:

- Accounting-Request

  Sent by the access point requesting accounting.

- Accounting-Response

  Sent by the RADIUS server to indicate that it has started or stopped accounting.

In order to ensure network security, the access point and the RADIUS server use a shared secret key, which is a password, they both know. The key is not sent over the network. In addition to the shared key, password information exchanged is also encrypted to protect the network from unauthorized access.

Types of Authentication

This appendix discusses some popular authentication types: **EAP-MD5**, **EAP-TLS**, **EAP-TTLS**, **PEAP** and **LEAP**.

The type of authentication you use depends on the RADIUS server or the AP. Consult your network administrator for more information.

EAP-MD5 (Message-Digest Algorithm 5)

MD5 authentication is the simplest one-way authentication method. The authentication server sends a challenge to the wireless station. The wireless station 'proves' that it knows the password by encrypting the password with the challenge and sends back the information. Password is not sent in plain text.

However, MD5 authentication has some weaknesses. Since the authentication server needs to get the plaintext passwords, the passwords must be stored. Thus someone other than the authentication server may access the password file. In addition, it is possible to impersonate an authentication server as MD5 authentication method does not perform mutual authentication. Finally, MD5 authentication method does not support data encryption with dynamic session key. You must configure WEP encryption keys for data encryption.

EAP-TLS (Transport Layer Security)

With EAP-TLS, digital certifications are needed by both the server and the wireless stations for mutual authentication. The server presents a certificate to the client. After validating the identity of the server, the client sends a different certificate to the server. The exchange of certificates is done in the open before a secured tunnel is created. This makes user identity vulnerable to passive attacks. A digital certificate is an electronic ID card that authenticates the sender’s identity. However, to implement EAP-TLS, you need a Certificate Authority (CA) to handle certificates, which imposes a management overhead.

EAP-TTLS (Tunneled Transport Layer Service)

EAP-TTLS is an extension of the EAP-TLS authentication that uses certificates for only the server-side authentications to establish a secure connection. Client authentication is then done by sending username and password through the secure connection, thus client identity is protected. For client authentication, EAP-TTLS supports EAP methods and legacy authentication methods such as PAP, CHAP, MS-CHAP and MS-CHAP v2.

PEAP (Protected EAP)

Like EAP-TTLS, server-side certificate authentication is used to establish a secure connection, then use simple username and password methods through the secured connection to authenticate the clients, thus hiding client identity. However, PEAP only supports EAP methods, such as EAP-MD5, EAP-MSCHAPv2 and EAP-GTC (EAP-Generic Token Card), for client authentication. EAP-GTC is implemented only by Cisco.

LEAP

LEAP (Lightweight Extensible Authentication Protocol) is a Cisco implementation of IEEE 802.1x.

Dynamic WEP Key Exchange

The AP maps a unique key that is generated with the RADIUS server. This key expires when the wireless connection times out, disconnects or reauthentication times out. A new WEP key is generated each time reauthentication is performed.

If this feature is enabled, it is not necessary to configure a default encryption key in the Wireless screen. You may still configure and store keys here, but they will not be used while Dynamic WEP is enabled.

Note: EAP-MD5 cannot be used with dynamic WEP key exchange

For added security, certificate-based authentications (EAP-TLS, EAP-TTLS and PEAP) use dynamic keys for data encryption. They are often deployed in corporate environments, but for public deployment, a simple user name and password pair is more practical. The following table is a comparison of the features of authentication types.

Table 61 Comparison of EAP Authentication Types

	EAP-MD5	EAP-TLS	EAP-TTLS	PEAP	LEAP
Mutual Authentication	No	Yes	Yes	Yes	Yes
Certificate – Client	No	Yes	Optional	Optional	No
Certificate – Server	No	Yes	Yes	Yes	No
Dynamic Key Exchange	No	Yes	Yes	Yes	Yes
Credential Integrity	None	Strong	Strong	Strong	Moderate
Deployment Difficulty	Easy	Hard	Moderate	Moderate	Moderate
Client Identity Protection	No	No	Yes	Yes	No

WPA(2)

Wi-Fi Protected Access (WPA) is a subset of the IEEE 802.11i standard. WPA2 (IEEE 802.11i) is a wireless security standard that defines stronger encryption, authentication and key management than WPA.

Key differences between WPA(2) and WEP are improved data encryption and user authentication.

Encryption

Both WPA and WPA2 improve data encryption by using Temporal Key Integrity Protocol (TKIP), Message Integrity Check (MIC) and IEEE 802.1x. In addition to TKIP, WPA2 also uses Advanced Encryption Standard (AES) in the Counter mode with Cipher block chaining Message authentication code Protocol (CCMP) to offer stronger encryption.

Temporal Key Integrity Protocol (TKIP) uses 128-bit keys that are dynamically generated and distributed by the authentication server. It includes a per-packet key mixing function, a Message Integrity Check (MIC) named Michael, an extended initialization vector (IV) with sequencing rules, and a re-keying mechanism.

TKIP regularly changes and rotates the encryption keys so that the same encryption key is never used twice. The RADIUS server distributes a Pairwise Master Key (PMK) key to the AP that then sets up a key hierarchy and management system, using the pair-wise key to dynamically generate unique data encryption keys to encrypt every data packet that is wirelessly communicated between the AP and the wireless clients. This all happens in the background automatically.

WPA2 AES (Advanced Encryption Standard) is a block cipher that uses a 256-bit mathematical algorithm called Rijndael.

The Message Integrity Check (MIC) is designed to prevent an attacker from capturing data packets, altering them and resending them. The MIC provides a strong mathematical function in which the receiver and the transmitter each compute and then compare the MIC. If they do not match, it is assumed that the data has been tampered with and the packet is dropped.

By generating unique data encryption keys for every data packet and by creating an integrity checking mechanism (MIC), TKIP makes it much more difficult to decode data on a Wi-Fi network than WEP, making it difficult for an intruder to break into the network.

The encryption mechanisms used for WPA and WPA-PSK are the same. The only difference between the two is that WPA-PSK uses a simple common password, instead of user-specific credentials. The common-password approach makes WPA-PSK susceptible to brute-force password-guessing attacks but it's still an improvement over WEP as it employs an easier-to-use, consistent, single, alphanumeric password.

User Authentication

WPA or WPA2 applies IEEE 802.1x and Extensible Authentication Protocol (EAP) to authenticate wireless clients using an external RADIUS database.

If both an AP and the wireless clients support WPA2 and you have an external RADIUS server, use WPA2 for stronger data encryption. If you don't have an external RADIUS server, you should use WPA2 -PSK (WPA2 -Pre-Shared Key) that only requires a single (identical) password entered into each access point, wireless gateway and wireless client. As long as the passwords match, a wireless client will be granted access to a WLAN.

If the AP or the wireless clients do not support WPA2, just use WPA or WPA-PSK depending on whether you have an external RADIUS server or not.

Select WEP only when the AP and/or wireless clients do not support WPA or WPA2. WEP is less secure than WPA or WPA2.

10.6.1 WPA(2)-PSK Application Example

A WPA(2)-PSK application looks as follows.

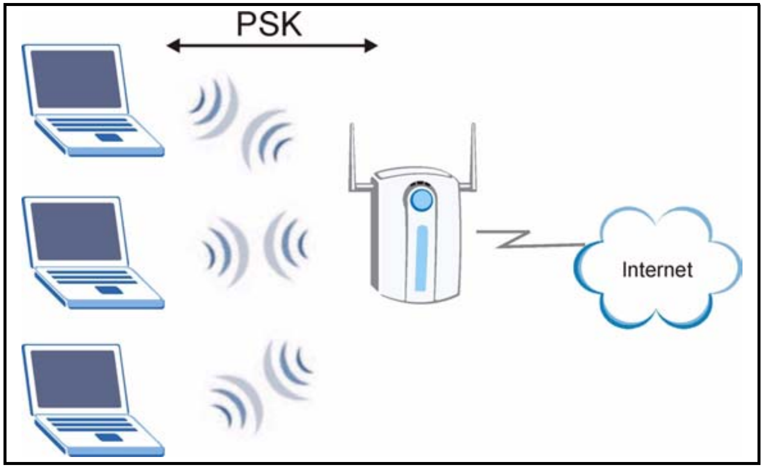
1 First enter identical passwords into the AP and all wireless clients. The Pre-Shared Key (PSK) must consist of between 8 and 63 ASCII characters (including spaces and symbols).

2 The AP checks each wireless client's password and (only) allows it to join the network if the password matches.

3 The AP derives and distributes keys to the wireless clients.

4 The AP and wireless clients use the TKIP or AES encryption process to encrypt data exchanged between them.

Figure 95 WPA(2)-PSK Authentication



10.6.2 WPA(2) with RADIUS Application Example

You need the IP address of the RADIUS server, its port number (default is 1812), and the RADIUS shared secret. A WPA(2) application example with an external RADIUS server looks as follows. "A" is the RADIUS server. "DS" is the distribution system.

1. The AP passes the wireless client's authentication request to the RADIUS server.
2. The RADIUS server then checks the user's identification against its database and grants or denies network access accordingly.
3. The RADIUS server distributes a Pairwise Master Key (PMK) key to the AP that then sets up a key hierarchy and management system, using the pair-wise key to dynamically generate unique data encryption keys to encrypt every data packet that is wirelessly communicated between the AP and the wireless clients.

Security Parameters Summary

Refer to this table to see what other security parameters you should configure for each Authentication Method/ key management protocol type. MAC address filters are not dependent on how you configure these security features.

Table 62 Wireless Security Relational Matrix

AUTHENTICATION METHOD/ KEY MANAGEMENT PROTOCOL	ENCRYPTION METHOD	ENTER MANUAL KEY	IEEE 802.1X
Open	None	No	Disable
			Enable without Dynamic WEP Key
Open	WEP	No	Enable with Dynamic WEP Key
		Yes	Enable without Dynamic WEP Key
		Yes	Disable

Table 62 Wireless Security Relational Matrix (continued)

AUTHENTICATION METHOD/ KEY MANAGEMENT PROTOCOL	ENCRYPTION METHOD	ENTER MANUAL KEY	IEEE 802.1X
Shared	WEP	No	Enable with Dynamic WEP Key
		Yes	Enable without Dynamic WEP Key
		Yes	Disable
WPA	TKIP	No	Enable
WPA-PSK	TKIP	Yes	Enable
WPA2	AES	No	Enable
WPA2-PSK	AES	Yes	Enable

Appendix C
Setting up Your Computer’s IP Address

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

Windows 95/98/Me/NT/2000/XP, 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 should already be installed on computers using Windows NT/2000/XP, Macintosh OS 7 and later operating systems.

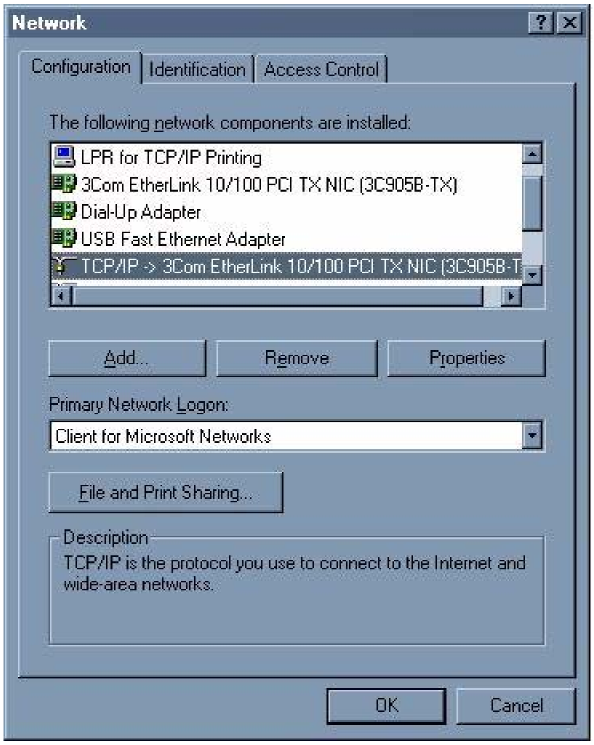
After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

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 NBG-415N’s LAN port.

Windows 95/98/Me

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

Figure 96 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:

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

2 Select **Adapter** and then click **Add**.

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

If you need TCP/IP:

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

2 Select **Protocol** and then click **Add**.

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

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

If you need Client for Microsoft Networks:

1 Click **Add**.

2 Select **Client** and then click **Add**.

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

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

5 Restart your computer so the changes you made take effect.

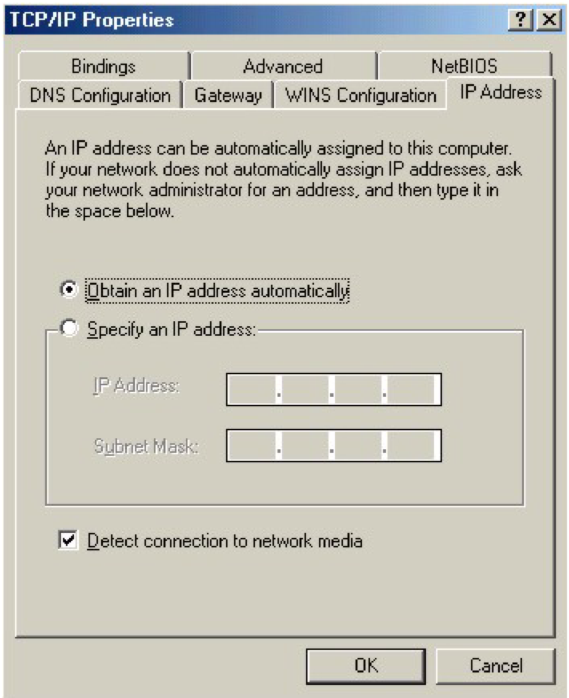
Configuring

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 97 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: . . .

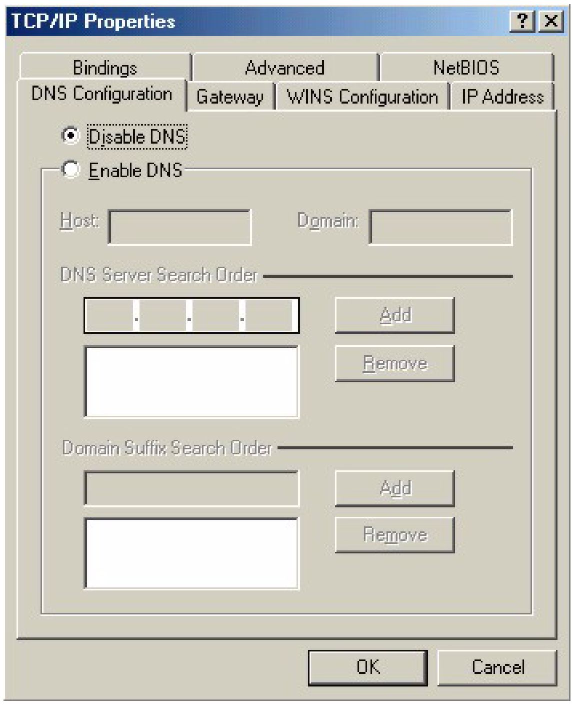
Subnet Mask: . . .

☑ 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 may not need to fill them all in).

Figure 98 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 NBG-415N and restart your computer when prompted.

Verifying Settings

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

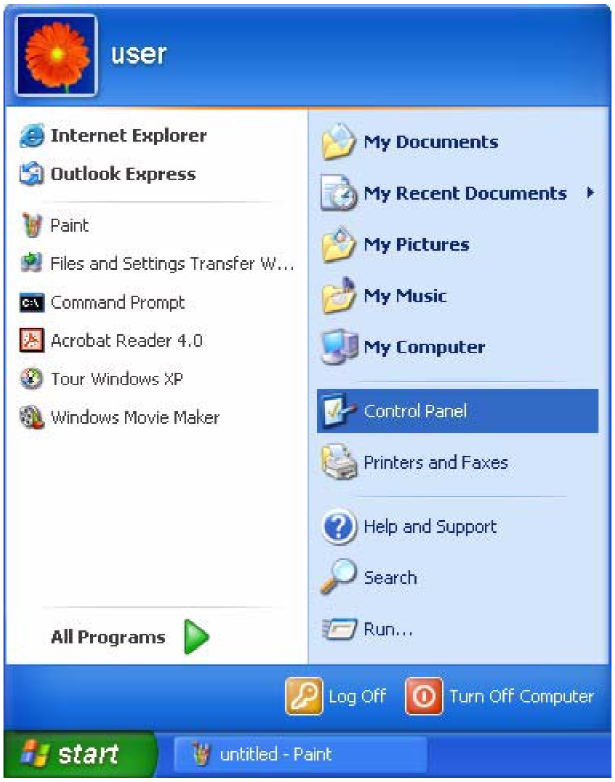
2 In the **Run** window, type "winipcfg" and then click **OK** to open the **IP Configuration** window.

3 Select your network adapter. You should see your computer's IP address, subnet mask and default gateway.

Windows 2000/NT/XP

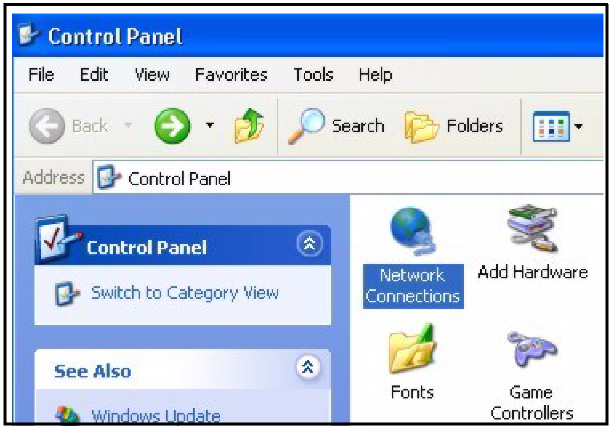
1 For Windows XP, click **start**, **Control Panel**. In Windows 2000/NT, click **Start**, **Settings**, **Control Panel**.

Figure 99 Windows XP: Start Menu



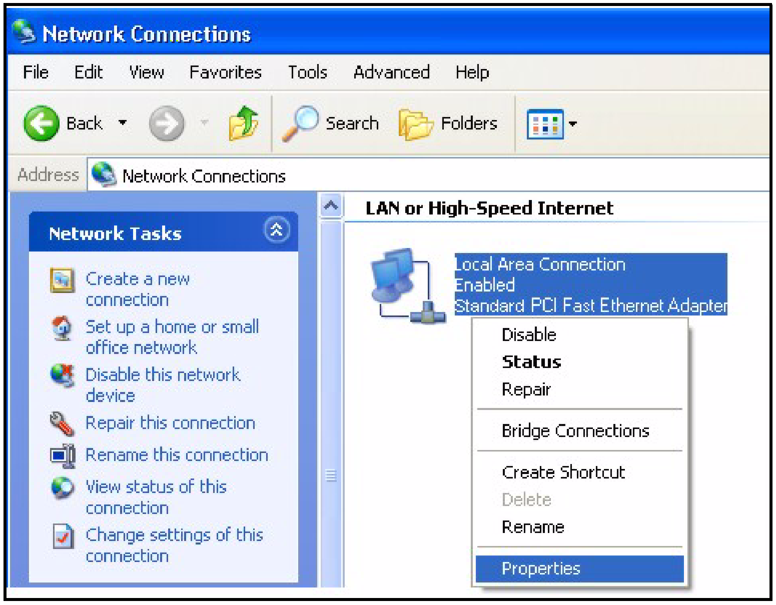
2 For Windows XP, click **Network Connections**. For Windows 2000/NT, click **Network and Dial-up Connections**.

Figure 100 Windows XP: Control Panel



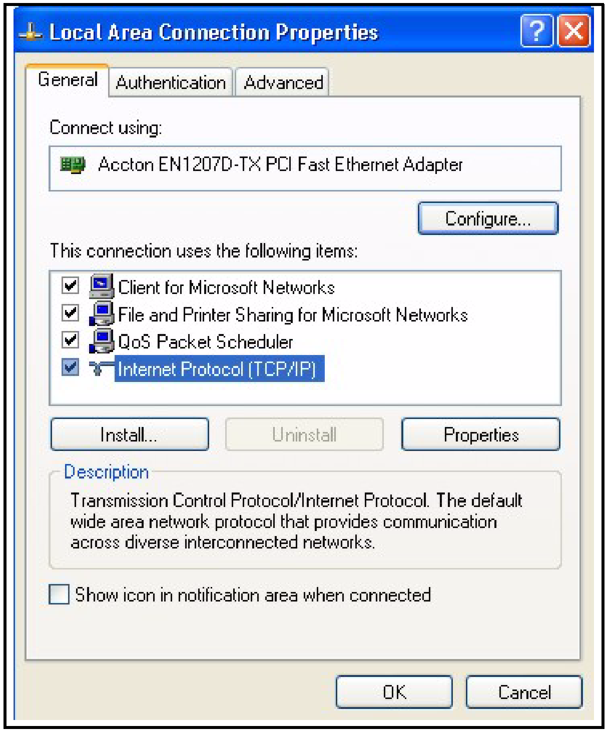
3 Right-click **Local Area Connection** and then click **Properties**.

Figure 101 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 102 Windows XP: Local Area Connection Properties



Connect using:

Accton EN1207D-TX 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)

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

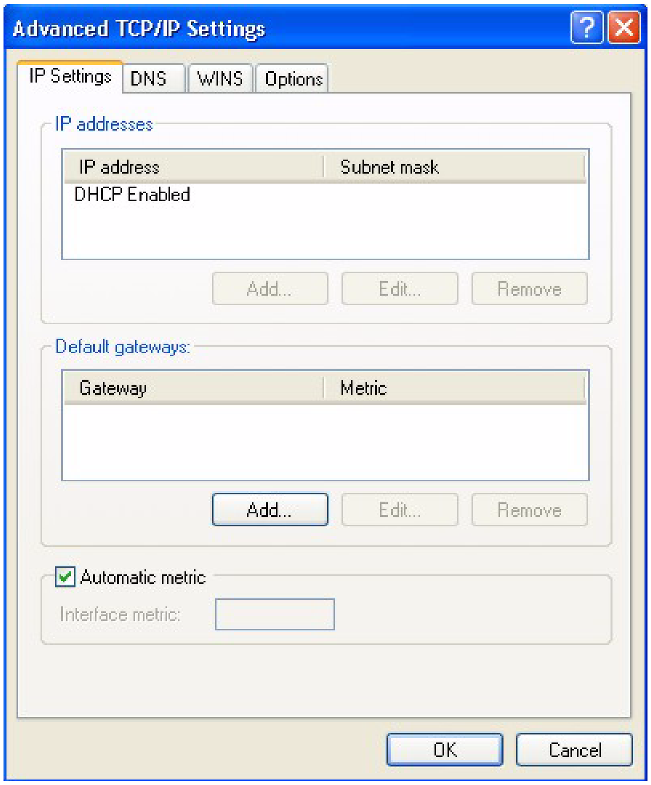
☐ Show icon in notification area when connected

5 The **Internet Protocol TCP/IP Properties** window opens (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 103 Windows XP: Advanced TCP/IP Settings



DHCP Enabled

☑ Automatic metric

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

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

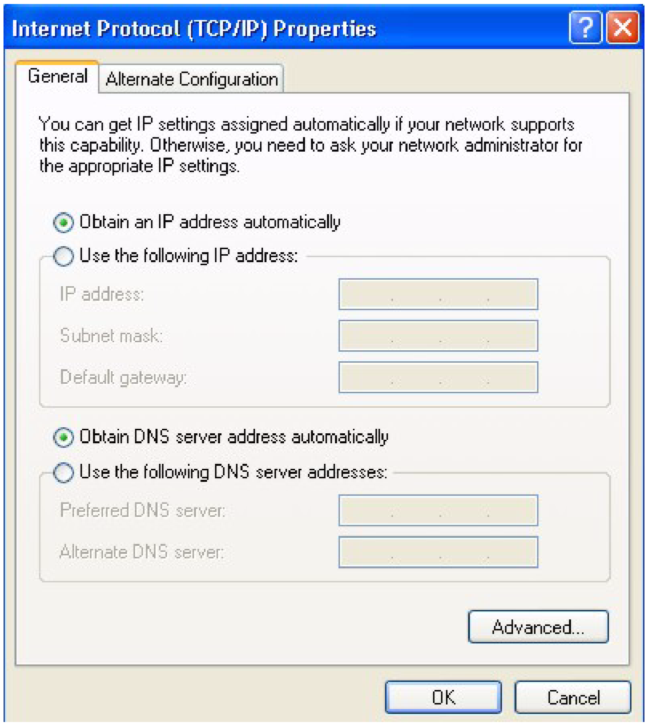
- In the **IP Settings** tab, in IP addresses, click **Add**.
- In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.
- Repeat the above two steps for each IP address you want to add.
- Configure additional default gateways in the **IP 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 address(es).
- If you know your DNS server IP address(es), 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 104 Windows XP: Internet Protocol (TCP/IP) Properties



Internet Protocol (TCP/IP) Properties

General | Alternate Configuration

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:

IP address: . . .

Subnet mask: . . .

Default gateway: . . .

● Obtain DNS server address automatically

○ Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

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

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

10Turn on your NBG-415N and restart your computer (if prompted).

Verifying Settings

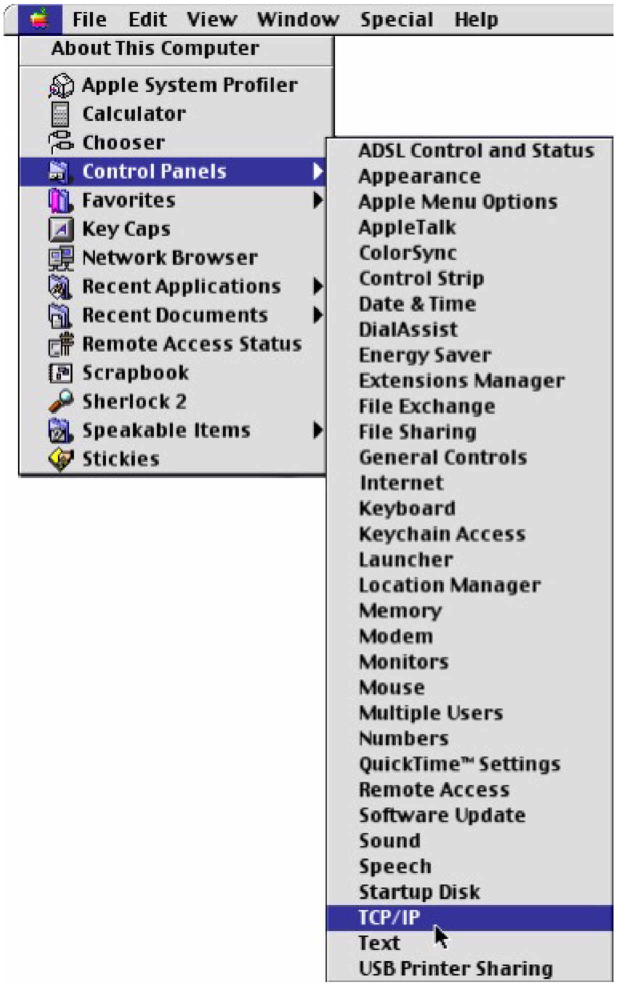
1 Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

2 In the **Command Prompt** window, type "ipconfig" and then 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

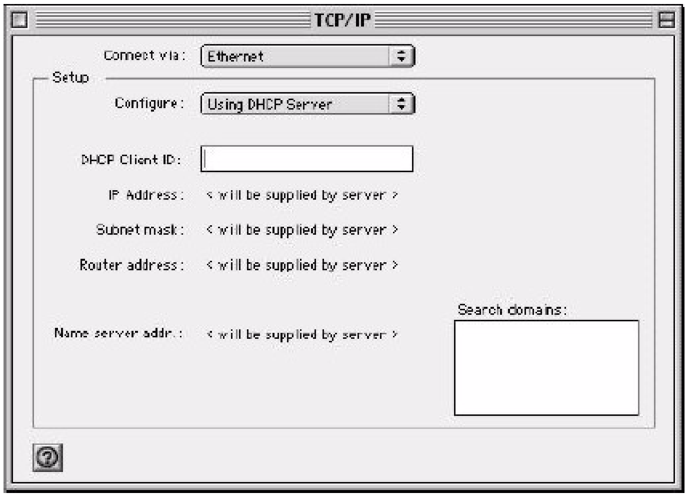
1 Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.

Figure 105 Macintosh OS 8/9: Apple Menu



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

Figure 106 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 >

Search domains:

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

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 NBG-415N 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 NBG-415N and restart your computer (if prompted).

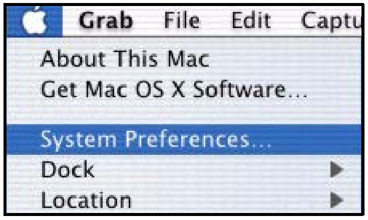
Verifying Settings

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 107 Macintosh OS X: Apple Menu

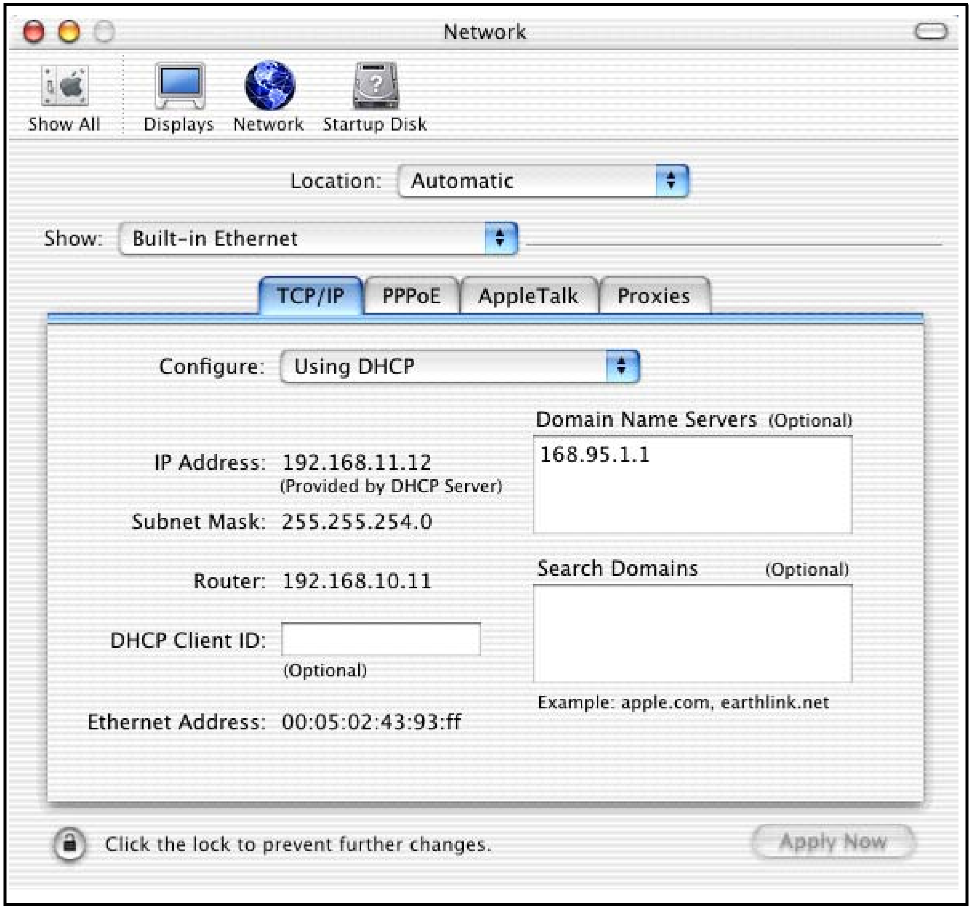


2 Click **Network** in the icon bar.

- 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 108 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

Click the lock to prevent further changes.

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 NBG-415N in the **Router address** box.

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

6 Turn on your NBG-415N and restart your computer (if prompted).

Verifying Settings

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

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