NBG6716

Simultaneous Dual-Band Wireless AC1750 HD Media Router

Version 1.00
Edition 1, 08/2013

User's Guide

Default Login Details	
LAN IP Address	http://192.168.1.1 (Router Mode) http://192.168.1.2 (Access Point Mode)
Password	1234

IMPORTANT!

READ CAREFULLY BEFORE USE.

KEEP THIS GUIDE FOR FUTURE REFERENCE.

Screenshots and graphics in this book may differ slightly from your product due to differences in your product firmware or your computer operating system. Every effort has been made to ensure that the information in this manual is accurate.

Related Documentation

- Quick Start Guide

  The Quick Start Guide shows how to connect the NBG6716 and access the Web Configurator wizards. It contains information on setting up your network and configuring for Internet access.

Contents Overview

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PART I

User's Guide

1

Introduction

1.1 Overview

This chapter introduces the main features and applications of the NBG6716.

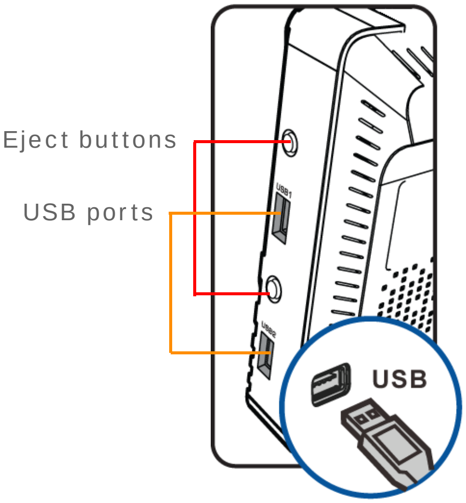
The NBG6716 extends the range of your existing wired network without additional wiring, providing easy network access to mobile users. You can set up a wireless network with other IEEE 802.11a/ac/b/g/n compatible devices.

A range of services such as a firewall and content filtering are also available for secure Internet computing. The NBG6716 also supports the new StreamBoost technology, which is smart Quality of Service (QoS), to redistribute traffic over the NBG6716 for the best possible performance in a home network.

There are two USB 2.0 ports on the side panel of your NBG6716. You can connect USB (version 2.0 or lower) memory sticks, USB hard drives, or USB devices for file sharing. The NBG6716 automatically detects the USB devices.

Two USB eject buttons are located above the USB ports. Push the eject button of the corresponding USB port for 2 seconds. Make sure the USB LED is off before removing your USB device. This will remove your USB device safely, preventing file or data loss if it is being transmitted through the USB device.

Figure 1 USB Ports and Eject Buttons

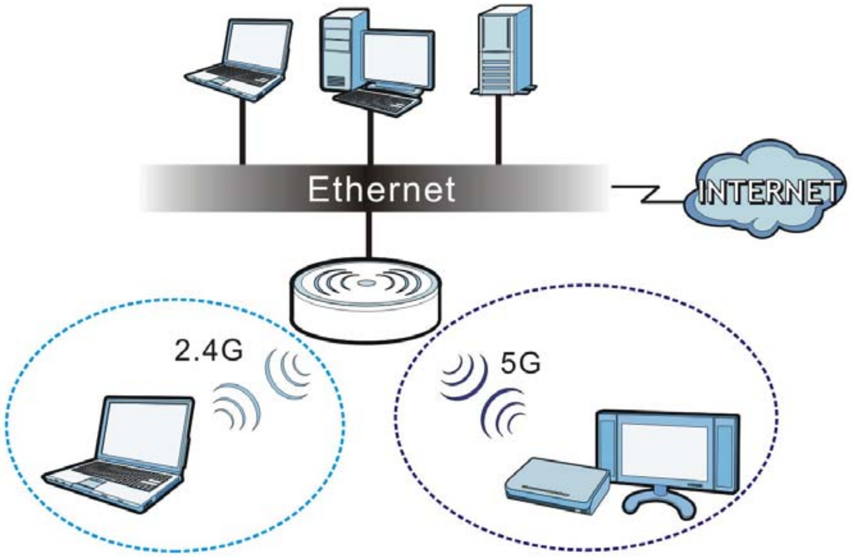


Note: For the USB function, it is strongly recommended to use version 2.0 or lower USB storage devices (such as memory sticks, USB hard drives) and/or USB devices (such as USB printers). Other USB products are not guaranteed to function properly with the NBG6716.

1.1.1 Dual-Band

The NBG6716 is a dual-band AP and able to function both 2.4G and 5G networks at the same time. You could use the 2.4 GHz band for regular Internet surfing and downloading while using the 5 GHz band for time sensitive traffic like high-definition video, music, and gaming.

Figure 2 Dual-Band Application



1.2 Applications

Your can have the following networks using the NBG6716:

- **Wired**. You can connect network devices via the Ethernet ports of the NBG6716 so that they can communicate with each other and access the Internet.
- **Wireless**. Wireless clients can connect to the NBG6716 to access network resources. You can use WPS (Wi-Fi Protected Setup) to create an instant network connection with another WPS-compatible device.
- **WAN**. Connect to a broadband modem/router for Internet access.

1.3 Ways to Manage the NBG6716

Use any of the following methods to manage the NBG6716.

- WPS (Wi-Fi Protected Setup). You can use the WPS button or the WPS section of the Web Configurator to set up a wireless network with your ZyXEL Device.
- Web Configurator. This is recommended for everyday management of the NBG6716 using a (supported) web browser.

1.4 Good Habits for Managing the NBG6716

Do the following things regularly to make the NBG6716 more secure and to manage the NBG6716 more effectively.

- Change the password. Use a password that's not easy to guess and that consists of different types of characters, such as numbers and letters.
- Write down the password and put it in a safe place.
- Back up the configuration (and make sure you know how to restore it). Restoring an earlier working configuration may be useful if the device becomes unstable or even crashes. If you forget your password, you will have to reset the NBG6716 to its factory default settings. If you backed up an earlier configuration file, you would not have to totally re-configure the NBG6716. You could simply restore your last configuration.

1.5 Resetting the NBG6716

If you forget your password or IP address, or you cannot access the Web Configurator, you will need to use the **RESET** button at the back of the NBG6716 to reload the factory-default configuration file. This means that you will lose all configurations that you had previously saved, the password will be reset to “1234” and the IP address will be reset to “192.168.1.1”.

1.5.1 How to Use the RESET Button

1 Make sure the power LED is on.

2 Press the **RESET** button for one to four seconds to restart/reboot the NBG6716.

3 Press the **RESET** button for longer than five seconds to set the NBG6716 back to its factory-default configurations.

1.6 The WPS Button

Your NBG6716 supports Wi-Fi Protected Setup (WPS), which is an easy way to set up a secure wireless network. WPS is an industry standard specification, defined by the Wi-Fi Alliance.

WPS allows you to quickly set up a wireless network with strong security, without having to configure security settings manually. Each WPS connection works between two devices. Both devices must support WPS (check each device's documentation to make sure).

Depending on the devices you have, you can either press a button (on the device itself, or in its configuration utility) or enter a PIN (a unique Personal Identification Number that allows one device to authenticate the other) in each of the two devices. When WPS is activated on a device, it has two minutes to find another device that also has WPS activated. Then, the two devices connect and set up a secure network by themselves.

You can use the WPS button (⊸) on the front panel of the NBG6716 to activate WPS in order to quickly set up a wireless network with strong security.

1 Make sure the power LED is on (not blinking).

2 Press the WPS button for more than three seconds and release it. Press the WPS button on another WPS-enabled device within range of the NBG6716.

Note: You must activate WPS in the NBG6716 and in another wireless device within two minutes of each other.

For more information on using WPS, see Section 8.2 on page 57.

1.7 LEDs

Look at the LED lights on the front panel to determine the status of the NBG6716. Use the **LED** button at the side panel of the device to turn the LED lights on or off. If you have already pushed the **LED** button to the **ON** position but none of the LEDS are on, make sure the NBG6716 is receiving power and the power is turned on.

Note: The **Power** LED will be on even if you push the **LED** button to the **OFF** position. This is for you to determine whether the NBG6716 is powered on.

Figure 3 LED Button

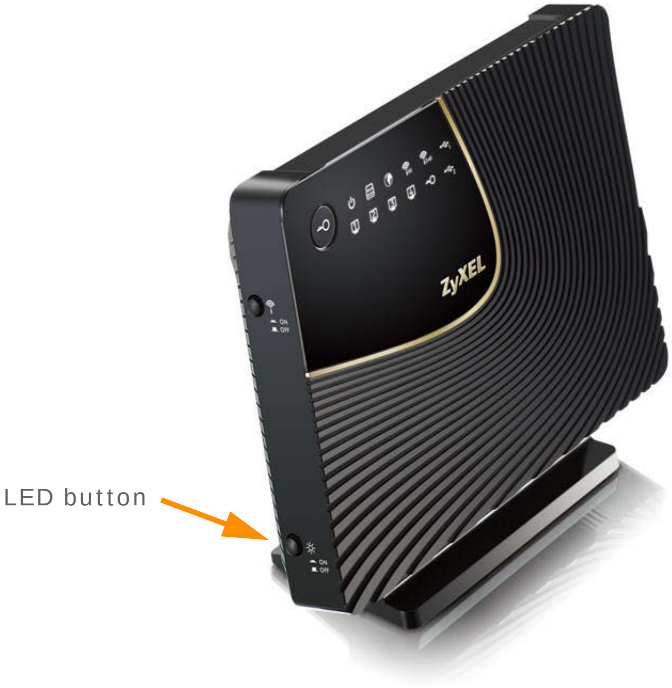
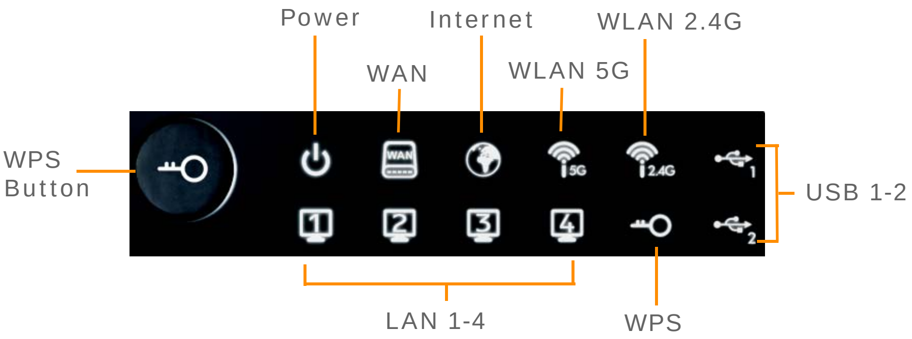


Figure 4 Front Panel



The following table describes the LEDs and the WPS button.

Table 1 Front panel LEDs and WPS button

LED	STATUS	DESCRIPTION
WPS Button	Press this button for 1 second to set up a wireless connection via WiFi Protected Setup with another WPS-enabled client. You must press the WPS button on the client side within 120 seconds for a successful connection. See Section 1.6 on page 15 and Chapter 9 on page 57 for more information on WPS.	
Power	On	The NBG6716 is receiving power and functioning properly.
	Off	The NBG6716 is not receiving power.
WAN	On	The NBG6716's WAN connection is ready.
	Blinking	The NBG6716 is sending/receiving data through the WAN with a 1000Mbps transmission rate.
	Off	The WAN connection is not ready, or has failed.
Internet	On	The NBG6716 has an IP connection but no traffic. Your device has a WAN IP address (either static or assigned by a DHCP server), PPP negotiation was successfully completed (if used) and the connection is up.
	Blinking	The NBG6716 is sending or receiving IP traffic.
	Off	The NBG6716 does not have an IP connection.
WLAN 2.4/5G	On	The NBG6716 is ready, but is not sending/receiving data through the 5G wireless LAN.
	Blinking	The NBG6716 is sending/receiving data through the 5G wireless LAN. The NBG6716 is negotiating a WPS connection with a wireless client.
	Off	The wireless LAN is not ready or has failed.
LAN 1-4	On	The NBG6716's LAN connection is ready.
	Blinking	The NBG6716 is sending/receiving data through the LAN with a 1000Mbps transmission rate.
	Off	The LAN connection is not ready, or has failed.
USB 1-2	On	The NBG6716 has a USB device installed.
	Blinking	The NBG6716 is transmitting and/or receiving data from routers through an installed USB device.
	Off	There is no USB device connected to the NBG6716.

1.8 Wall Mounting

You may need screw anchors if mounting on a concrete or brick wall.

Table 2 Wall Mounting Information

Distance between holes	12.7 cm
M4 Screws	Two
Screw anchors (optional)	Two

1 Select a position free of obstructions on a wall strong enough to hold the weight of the device.

2 Mark two holes on the wall at the appropriate distance apart for the screws.

Be careful to avoid damaging pipes or cables located inside the wall when drilling holes for the screws.

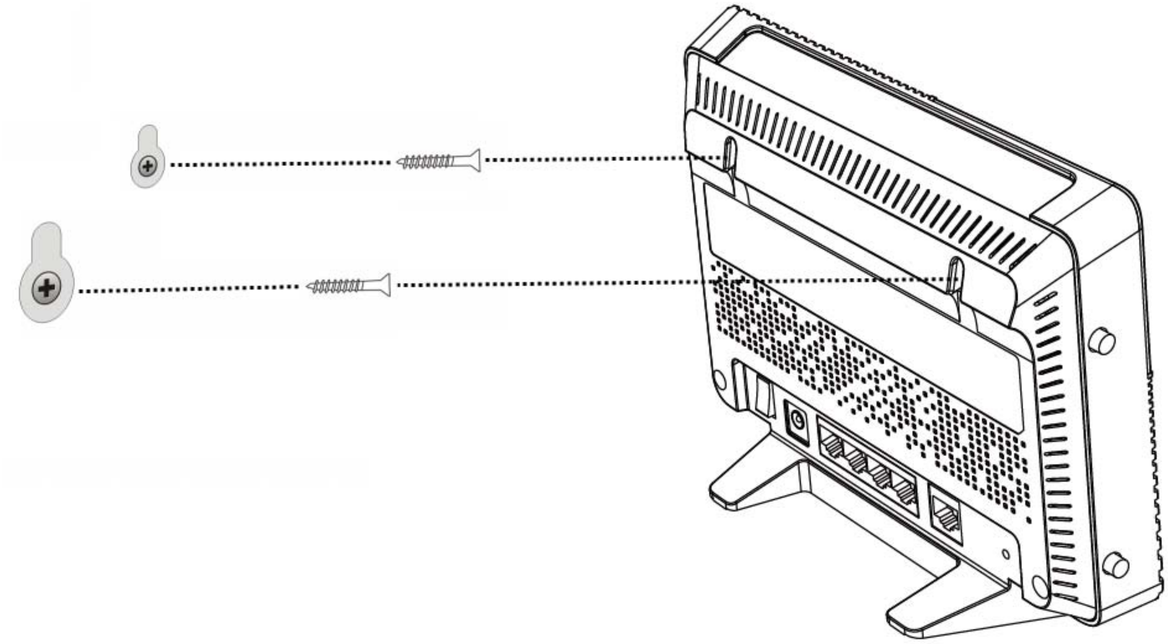
3 If using screw anchors, drill two holes for the screw anchors into the wall. Push the anchors into the full depth of the holes, then insert the screws into the anchors. Do not insert the screws all the way in - leave a small gap of about 0.5 cm.

If not using screw anchors, use a screwdriver to insert the screws into the wall. Do not insert the screws all the way in - leave a gap of about 0.5 cm.

4 Make sure the screws are fastened well enough to hold the weight of the NBG6716 with the connection cables.

5 Align the holes on the back of the NBG6716 with the screws on the wall. Hang the NBG6716 on the screws.

Figure 5 Wall Mounting Example



Connection Wizard

2.1 Overview

This chapter provides information on the wizard setup screens in the Web Configurator.

The Web Configurator’s wizard setup helps you configure your device to access the Internet. Refer to your ISP for your Internet account information. Leave a field blank if you don’t have that information.

2.2 Accessing the Wizard

Launch your web browser and type "http://192.168.1.1" as the website address. Type "1234" (default) as the password and click **Login**.

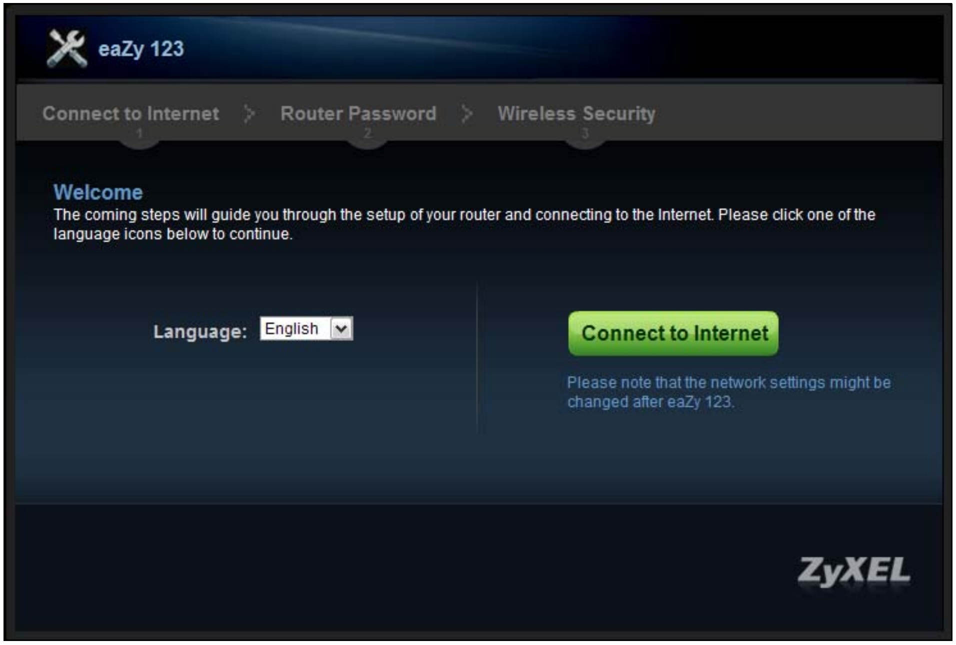
Note: The Wizard appears when the NBG6716 is accessed for the first time or when you reset the NBG6716 to its default factory settings.

If you have already configured the wizard screens and want to open it again, click the **eaZy123** icon on the network map screen in **Easy Mode**.

The Web Configurator is set to **Easy Mode** by default after login. If you are in **Expert Mode**, you can click the **Easy Mode** icon on the upper right corner of any Web Configurator screen to go to **Easy Mode**.

The Wizard screen opens. Choose your **Language** and click **Connect to Internet**.

Figure 6 Welcome



Welcome

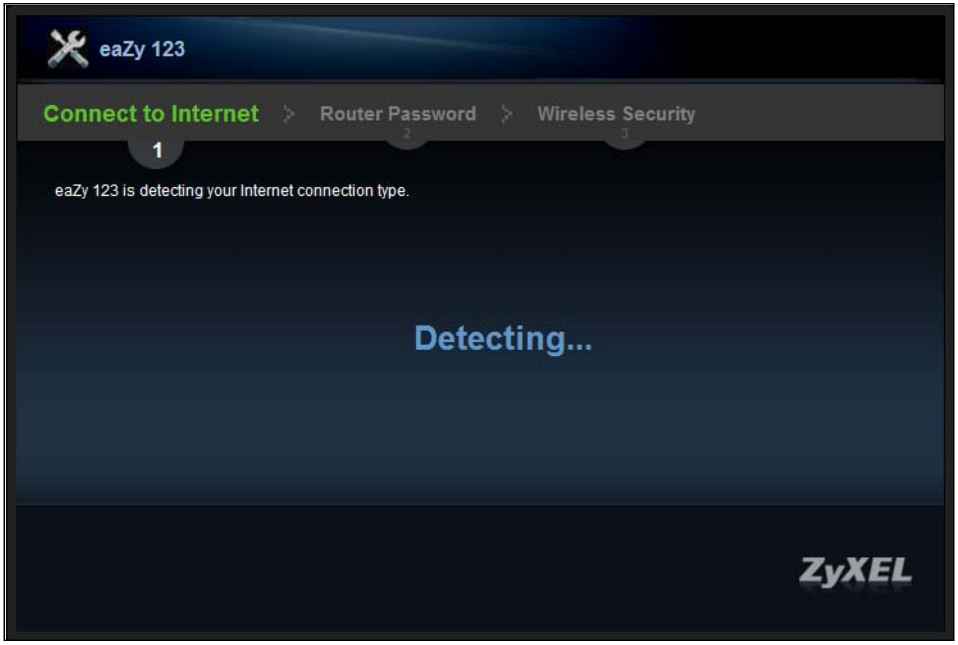
The coming steps will guide you through the setup of your router and connecting to the Internet. Please click one of the language icons below to continue.

Please note that the network settings might be changed after eaZy 123.

2.3 Connect to Internet

The NBG6716 offers two Internet connection types. They are **IPoE** or **PPPoE**. The wizard attempts to detect which WAN connection type you are using.

Figure 7 Detecting your Internet Connection Type



eaZy 123 is detecting your Internet connection type.

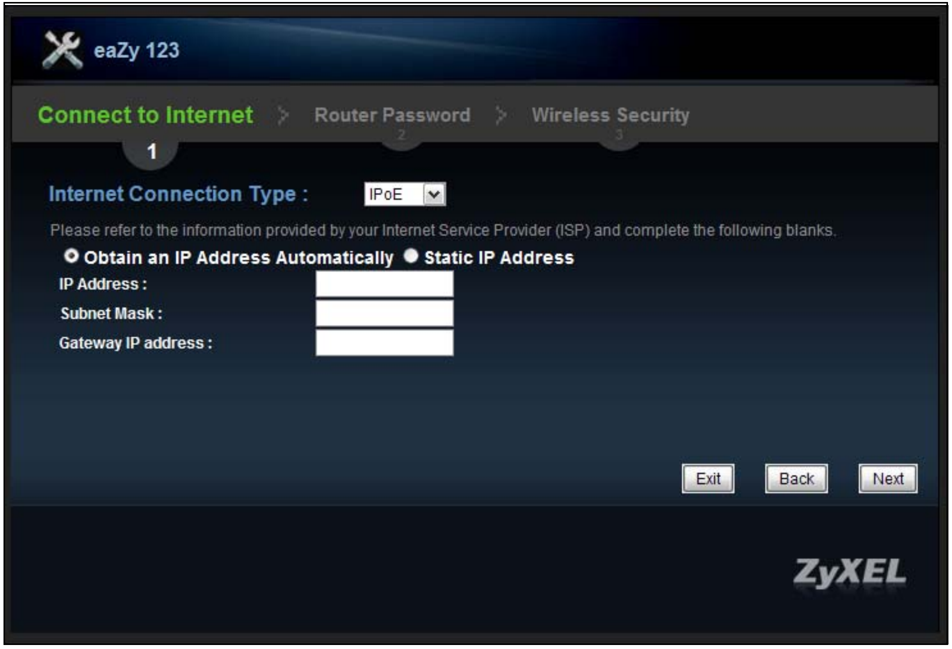
Detecting...

If the wizard does not detect a connection type, you must select one from the drop-down list box. Check with your ISP to make sure you use the correct type.

Note: If you get an error message, check your hardware connections. Make sure your Internet connection is up and running.

The following screen depends on your Internet connection type. Enter the details provided by your Internet Service Provider (ISP) in the fields (if any).

Figure 8 Internet Connection Type



Internet Connection Type : IPoE

Please refer to the information provided by your Internet Service Provider (ISP) and complete the following blanks.

● Obtain an IP Address Automatically ○ Static IP Address

IP Address :

Subnet Mask :

Gateway IP address :

Your NBG6716 detects the following Internet Connection type.

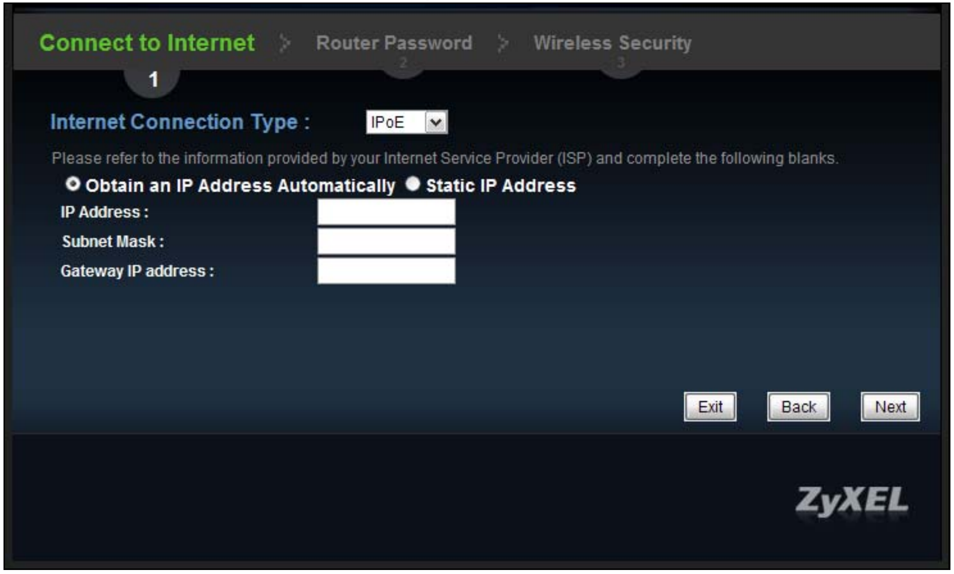
Table 3 Internet Connection Type

CONNECTION TYPE	DESCRIPTION
IPoE	Select the **IPoE** (IP over Ethernet) option when the WAN port is used as a regular Ethernet.
PPPoE	Select the **PPPoE** (Point-to-Point Protocol over Ethernet) option for a dial-up connection.

2.3.1 Connection Type: IPoE

Choose **IPoE** as the **Internet Connection Type** when the WAN port is used as a regular Ethernet. Click **Next**.

Figure 9 Internet Connection Type: IPoE



Internet Connection Type : IPoE

Please refer to the information provided by your Internet Service Provider (ISP) and complete the following blanks.

◉ Obtain an IP Address Automatically ● Static IP Address

IP Address :

Subnet Mask :

Gateway IP address :

The following table describes the labels in this screen.

Table 4 Internet Connection Type: IPoE

LABEL	DESCRIPTION
Internet Connection Type	Select the **IPoE** option.
Obtain an IP Address Automatically	Select this radio button if your ISP did not assign you a fixed IP address.
Static IP Address	Select this radio button if your ISP assigned an IP address for your Internet connection.
IP Address	Enter the IP address provided by your ISP.
Subnet Mask	Enter the IP subnet mask in this field.
Gateway IP Address	Enter the gateway IP address in this field.
Exit	Click this to close the wizard screen without saving.
Back	Click this to return to the previous screen.
Next	Click this to continue.

Note: If you get an error screen after clicking **Next**, you might have selected the wrong Internet Connection type. Click **Back**, make sure your Internet connection is working and select the right Connection Type. Contact your ISP if you are not sure of your Internet Connection type.

2.3.2 Connection Type: PPPoE

Point-to-Point Protocol over Ethernet (PPPoE) functions as a dial-up connection. PPPoE is an IETF (Internet Engineering Task Force) standard specifying how a host personal computer interacts with a broadband modem (for example DSL, cable, wireless, etc.) to achieve access to high-speed data networks.

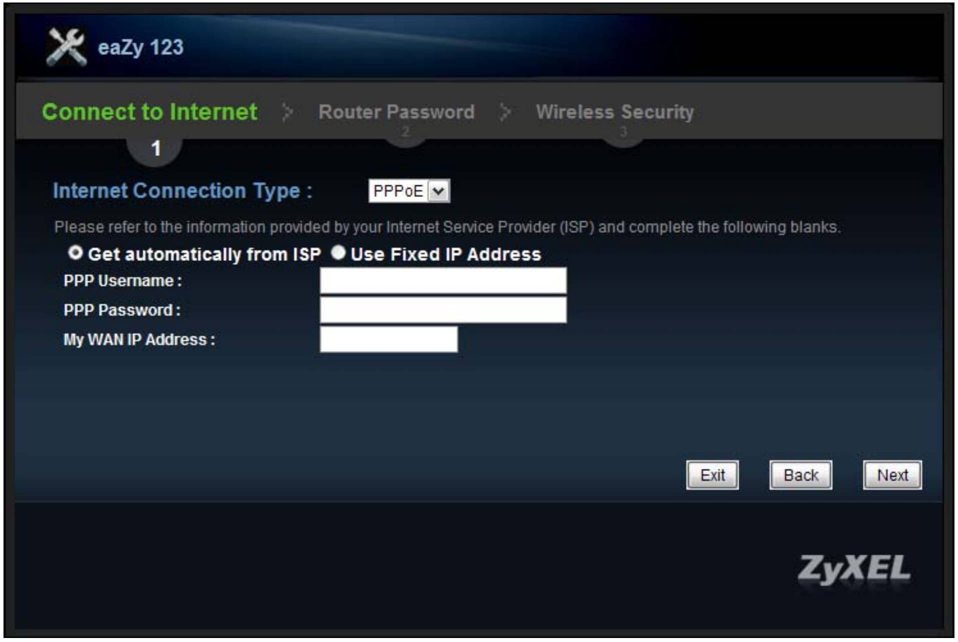
For the service provider, PPPoE offers an access and authentication method that works with existing access control systems (for instance, RADIUS).

One of the benefits of PPPoE is the ability to let end users access one of multiple network services, a function known as dynamic service selection. This enables the service provider to easily create and offer new IP services for specific users.

Operationally, PPPoE saves significant effort for both the subscriber and the ISP/carrier, as it requires no specific configuration of the broadband modem at the subscriber's site.

By implementing PPPoE directly on the NBG6716 (rather than individual computers), the computers on the LAN do not need PPPoE software installed, since the NBG6716 does that part of the task. Furthermore, with NAT, all of the LAN's computers will have Internet access.

Figure 10 Internet Connection Type: PPPoE



Internet Connection Type : PPPoE

Please refer to the information provided by your Internet Service Provider (ISP) and complete the following blanks.

● Get automatically from ISP ○ Use Fixed IP Address

PPP Username :

PPP Password :

My WAN IP Address :

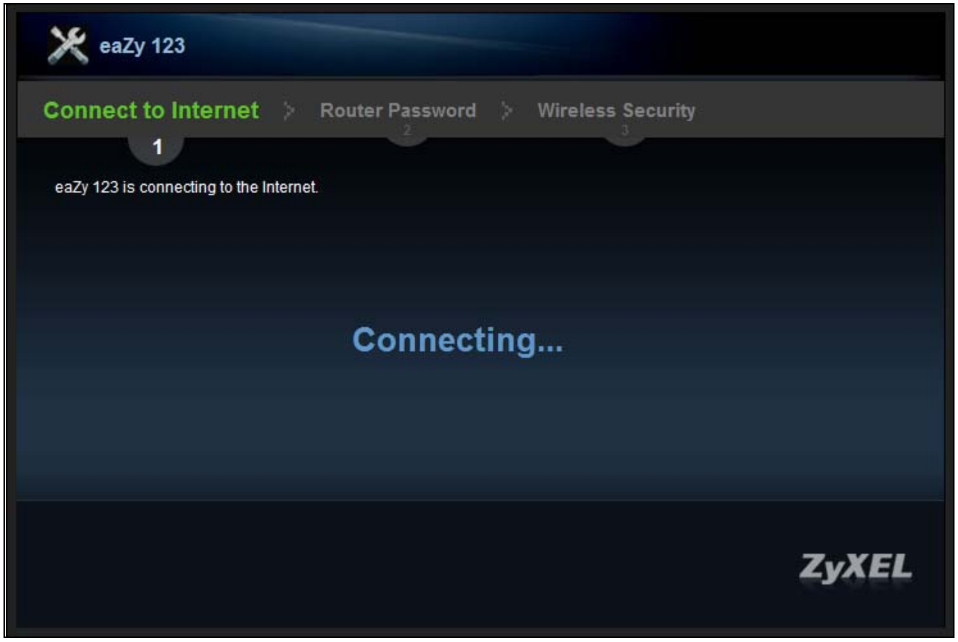
The following table describes the labels in this screen.

Table 5 Internet Connection Type: PPPoE

LABEL	DESCRIPTION
Internet Connection Type	Select the **PPPoE** option for a dial-up connection.
Get automatically from ISP	Select this radio button if your ISP did not assign you a fixed IP address.
Use Fixed IP Address	Select this radio button, provided by your ISP to give the NBG6716 a fixed, unique IP address.
PPP Username	Type the user name given to you by your ISP.
PPP Password	Type the password associated with the user name above.
My WAN IP Address	Type the name of your service provider.
Exit	Click this to close the wizard screen without saving.
Back	Click this to return to the previous screen.
Next	Click this to continue.

The NBG6716 connects to the Internet.

Figure 11 Connecting to the Internet



eaZy 123 is connecting to the Internet.

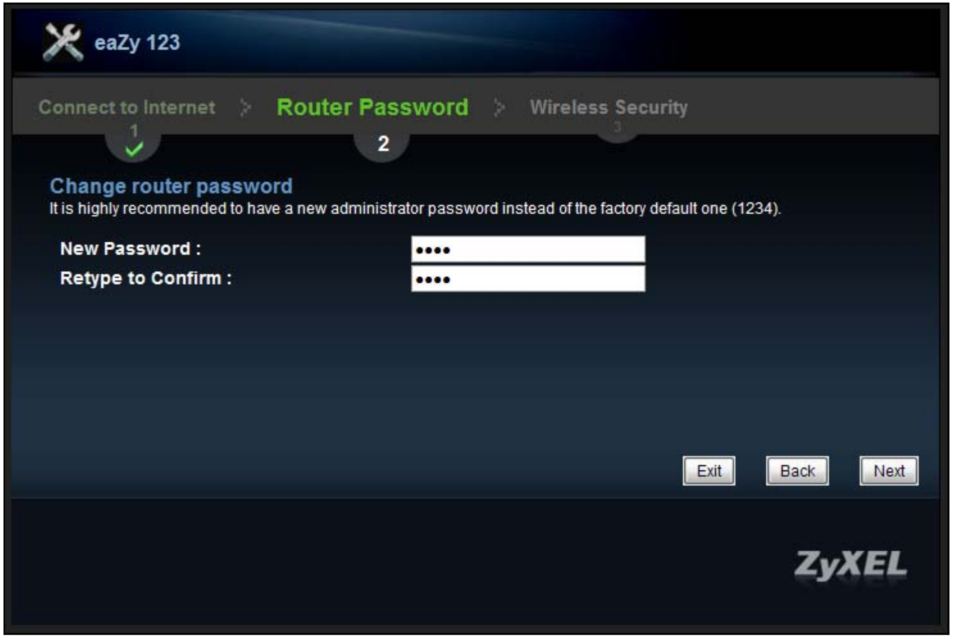
Connecting...

Note: If the Wizard successfully connects to the Internet, it proceeds to the next step. If you get an error message, go back to the previous screen and make sure you have entered the correct information provided by your ISP.

2.4 Router Password

Change the login password in the following screen. Enter the new password and retype it to confirm. Click **Next** to proceed with the **Wireless Security** screen**.**

Figure 12 Router Password



Change router password

It is highly recommended to have a new administrator password instead of the factory default one (1234).

New Password : ••••

Retype to Confirm : ••••

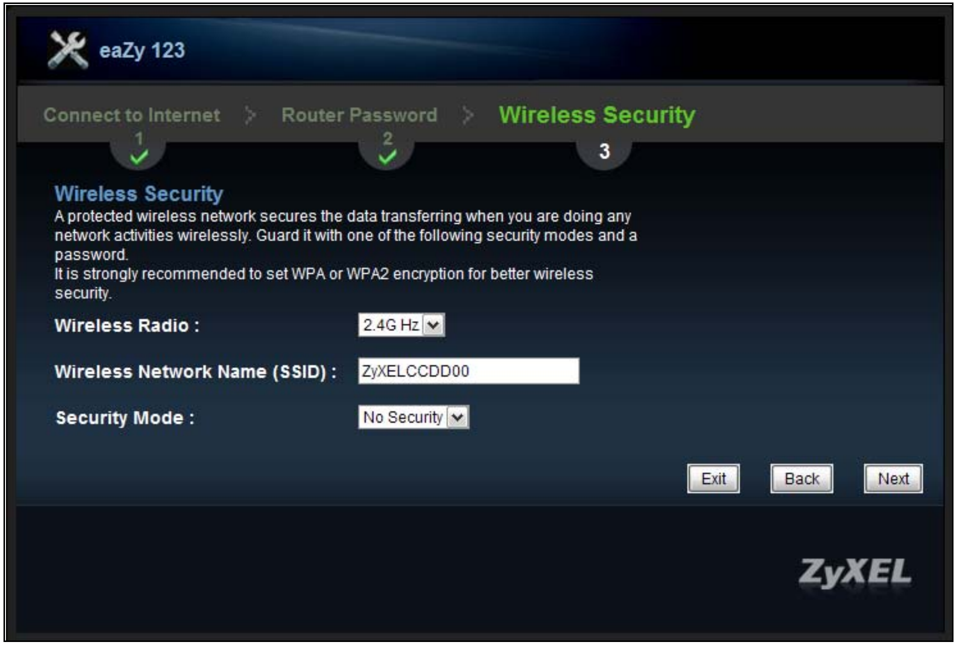
2.5 Wireless Security

Configure Wireless Settings. Configure the wireless network settings on your NBG6716 in the following screen. The fields that show up depend on the kind of security you select.

2.5.1 Wireless Security: No Security

Choose **No Security** in the Wireless Security screen to let wireless devices within range access your wireless network.

Figure 13 Wireless Security: No Security



Wireless Security

A protected wireless network secures the data transferring when you are doing any network activities wirelessly. Guard it with one of the following security modes and a password.

It is strongly recommended to set WPA or WPA2 encryption for better wireless security.

Wireless Radio : 2.4G Hz

Wireless Network Name (SSID) : ZyXELCCDD00

Security Mode : No Security

The following table describes the labels in this screen.

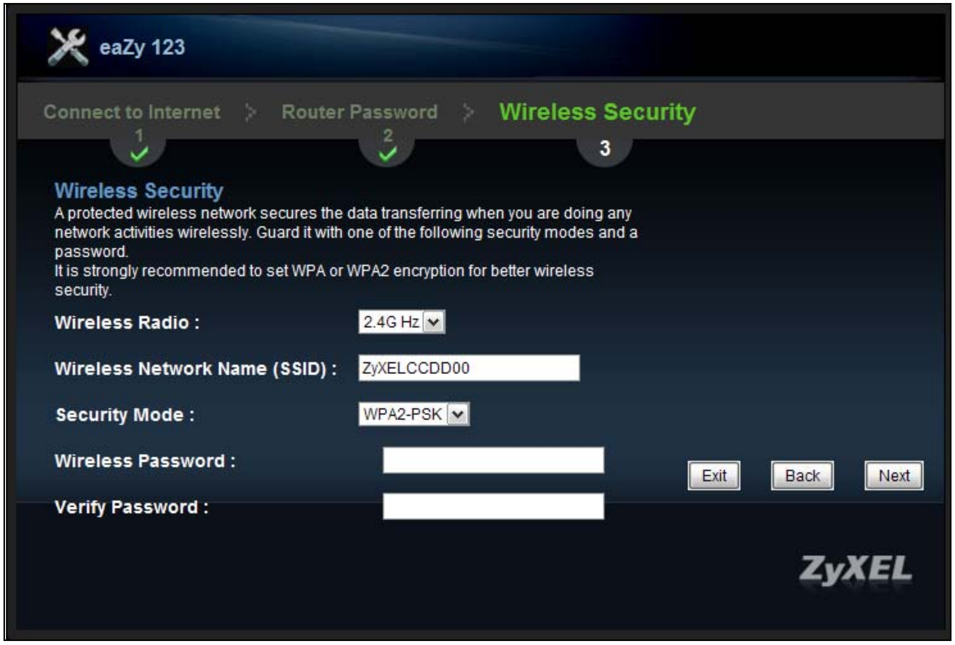
Table 6 Wireless Security: No Security

LABEL	DESCRIPTION
Wireless Radio	Choose whether you want to apply the wireless security to **2.4G Hz** or **5G Hz** wireless radio.
Wireless Network Name (SSID)	Enter a descriptive name (up to 32 printable 7-bit ASCII characters) for the wireless LAN. If you change this field on the NBG6716, make sure all wireless stations use the same SSID in order to access the network.
Security Mode	Select a security level from the drop-down list box. Choose **No Security** to have no wireless LAN security configured. If you do not enable any wireless security on your NBG6716, your network is accessible to any wireless networking device that is within range.
Exit	Click this to close the wizard screen without saving.
Back	Click this to return to the previous screen.
Next	Click this to continue.

2.5.2 Wireless Security: WPA2-PSK

Choose **WPA2-PSK** security in the Wireless Security screen to set up a password for your wireless network.

Figure 14 Wireless Security: WPA2-PSK



Wireless Security

A protected wireless network secures the data transferring when you are doing any network activities wirelessly. Guard it with one of the following security modes and a password.
It is strongly recommended to set WPA or WPA2 encryption for better wireless security.

Wireless Radio : 2.4G Hz

Wireless Network Name (SSID) : ZyXELCCDD00

Security Mode : WPA2-PSK

Wireless Password :

Verify Password :

The following table describes the labels in this screen.

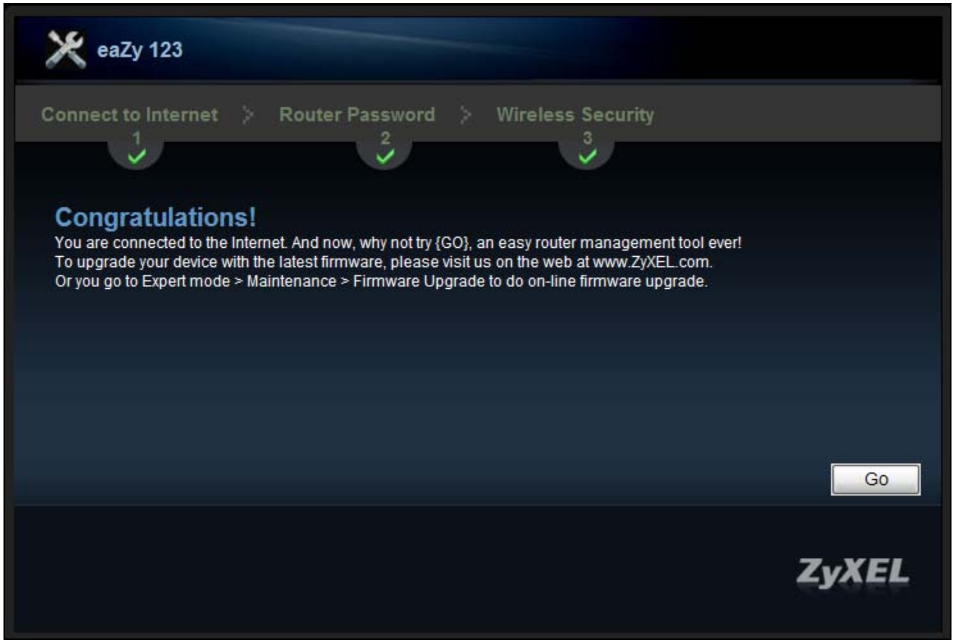
Table 7 Wireless Security: WPA2-PSK

LABEL	DESCRIPTION
Wireless Radio	Choose whether you want to apply the wireless security to **2.4G Hz** or **5G Hz** wireless radio.
Wireless Network Name (SSID)	Enter a descriptive name (up to 32 printable 7-bit ASCII characters) for the wireless LAN. If you change this field on the NBG6716, make sure all wireless stations use the same SSID in order to access the network.
Security Mode	Select a security level from the drop-down list box. Choose **WPA2-PSK** security to configure a Pre-Shared Key. Choose this option only if your wireless clients support WPA2-PSK.
Wireless password	Type from 8 to 63 case-sensitive ASCII characters. You can set up the most secure wireless connection by configuring WPA in the wireless LAN screens.
Verify Password	Retype the password to confirm.
Exit	Click this to close the wizard screen without saving.
Back	Click this to return to the previous screen.
Next	Click this to continue.

Congratulations! Open a web browser, such as Internet Explorer, to visit your favorite website.

Note: If you cannot access the Internet when your computer is connected to one of the NBG6716's LAN ports, check your connections. Then turn the NBG6716 off, wait for a few seconds then turn it back on. If that does not work, log in to the web configurator again and check you have typed all information correctly. See the User's Guide for more suggestions.

Figure 15 Congratulations



Congratulations!

You are connected to the Internet. And now, why not try {GO}, an easy router management tool ever!
To upgrade your device with the latest firmware, please visit us on the web at www.ZyXEL.com.
Or you go to Expert mode > Maintenance > Firmware Upgrade to do on-line firmware upgrade.

You can also click **GO** to open the **Easy Mode** Web Configurator of your NBG6716.

You have successfully set up your NBG6716 to operate on your network and access the Internet. You are now ready to connect wirelessly to your NBG6716 and access the Internet.

3

Introducing the Web Configurator

3.1 Overview

This chapter describes how to access the NBG6716 Web Configurator and provides an overview of its screens.

The Web Configurator is an HTML-based management interface that allows easy setup and management of the NBG6716 via Internet browser. Use Internet Explorer 8.0 and later versions, Mozilla Firefox 21 and later versions, Safari 6.0 and later versions or Google Chrome 26.0 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).

Refer to the Troubleshooting chapter (Chapter 24 on page 176) to see how to make sure these functions are allowed in Internet Explorer.

3.2 Accessing the Web Configurator

1 Make sure your NBG6716 hardware is properly connected and prepare your computer or computer network to connect to the NBG6716 (refer to the Quick Start Guide).

2 Launch your web browser.

3 The NBG6716 is in router mode by default. Type "http://192.168.1.1" as the website address.

If the NBG6716 is in access point, the IP address is 192.168.1.2. See Chapter 4 on page 31 for more information about the modes of the NBG6716.

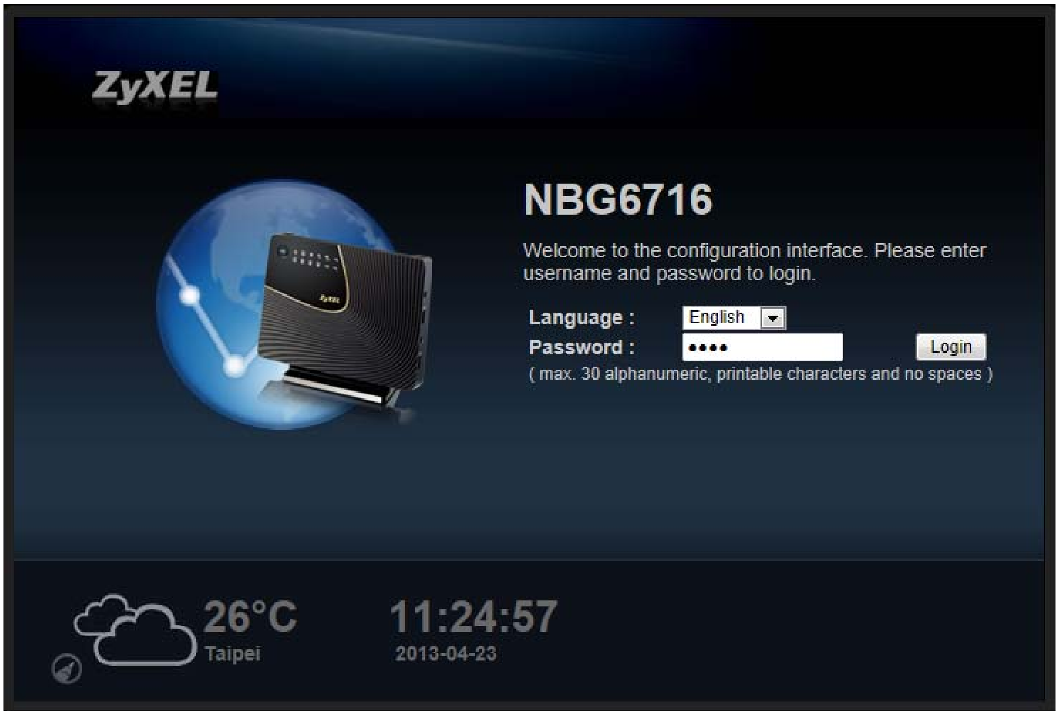
Your computer must be in the same subnet in order to access this website address.

3.2.1 Login Screen

Note: If this is the first time you are accessing the Web Configurator, you may be redirected to the Wizard. Refer to Chapter 2 on page 19 for the Connection Wizard screens.

The Web Configurator initially displays the following login screen.

Figure 16 Login screen



NBG6716

Welcome to the configuration interface. Please enter username and password to login.

Language : English

Password : ••••

(max. 30 alphanumeric, printable characters and no spaces)

26°C Taipei

11:24:57 2013-04-23

The following table describes the labels in this screen.

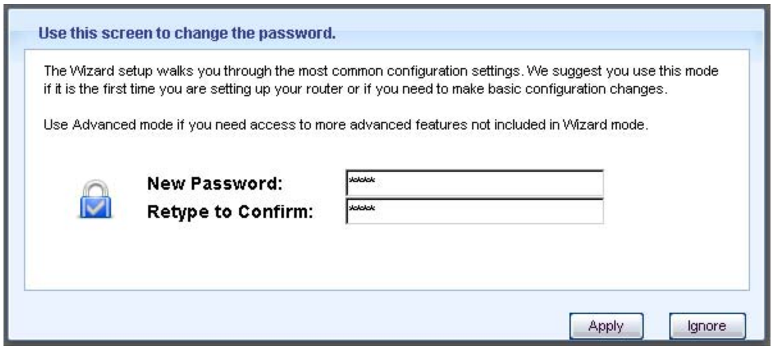
Table 8 Login screen

LABEL	DESCRIPTION
Language	Select the language you want to use to configure the Web Configurator.
Password	Type "1234" (default) as the password. Click **Login**.
18°C Taipei	This shows the current weather, either in celsius or fahrenheit, of the city you specify in Section 3.2.2.1 on page 30.
11:24:57 2013-04-23	This shows the time (hh:mm:ss) and date (yyyy:mm:dd) of the timezone you select in Section 23.5 on page 168. The time is in 24-hour format, for example 15:00 is 3:00 PM.

3.2.2 Password Screen

You should see a screen asking you to change your password (highly recommended) as shown next.

Figure 17 Change Password Screen



Use this screen to change the password.

The Wizard setup walks you through the most common configuration settings. We suggest you use this mode if it is the first time you are setting up your router or if you need to make basic configuration changes.

Use Advanced mode if you need access to more advanced features not included in Wizard mode.

New Password: ****

Retype to Confirm: ****

The following table describes the labels in this screen.

Table 9 Change Password Screen

LABEL	DESCRIPTION
New Password	Type a new password.
Retype to Confirm	Retype the password for confirmation.
Apply	Click **Apply** to save your changes back to the NBG6716.
Ignore	Click **Ignore** if you do not want to change the password this time.

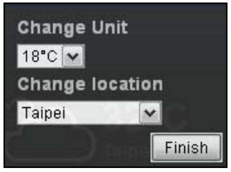
Note: The management session automatically times out when the time period set in the **Administrator Inactivity Timer** field expires (default five minutes; go to Chapter 23 on page 166 to change this). Simply log back into the NBG6716 if this happens.

3.2.2.1 Weather Edit

You can change the temperature unit and select the location for which you want to know the weather.

Click the icon to change the Weather display.

Figure 18 Change Weather



Change Unit: 18°C
Change location: Taipei

The following table describes the labels in this screen.

Table 10 Change Weather

LABEL	DESCRIPTION
Change Unit	Choose which temperature unit you want the NBG6716 to display.
Change Location	Select the location for which you want to know the weather. If the city you want is not listed, choose one that is closest to it.
Finish	Click this to apply the settings and refresh the date and time display.

4

NBG6716 Modes

4.1 Overview

This chapter introduces the different modes available on your NBG6716. First, the term “mode” refers to two things in this User’s Guide.

- **Web Configurator mode**. This refers to the Web Configurator interface you want to use for editing NBG6716 features.
- **Device mode**. This is the operating mode of your NBG6716, or simply how the NBG6716 is being used in the network.

4.1.1 Web Configurator Modes

This refers to the configuration interface of the Web Configurator, which has two modes:

- **Easy Mode**: The Web Configurator shows this mode by default. Refer to Chapter 5 on page 32 for more information on the screens in this mode. This interface may be sufficient for users who just want to use the device.
- **Expert Mode**: Advanced users can change to this mode to customize all the functions of the NBG6716. Click **Expert Mode** after logging into the Web Configurator. The User’s Guide Chapter 3 on page 28 through Chapter 23 on page 174 discusses the screens in this mode.

4.1.2 Device Modes

This refers to the operating mode of the NBG6716, which can act as a:

- **Router**: This is the default device mode of the NBG6716. Use this mode to connect the local network to another network, like the Internet. Go to Section 6.2 on page 43 to view the **Status** screen in this mode.
- **Access Point**: Use this mode if you want to extend your network by allowing network devices to connect to the NBG6716 wirelessly. Go to Section 7.4 on page 52 to view the **Status** screen in this mode.

For more information on these modes and to change the mode of your NBG6716, refer to Chapter 23 on page 174.

The menu for changing device modes is available in **Expert Mode** only.

Note: Choose your device mode carefully to avoid having to change it later.

When changing to another mode, the IP address of the NBG6716 changes. The running applications and services of the network devices connected to the NBG6716 can be interrupted.

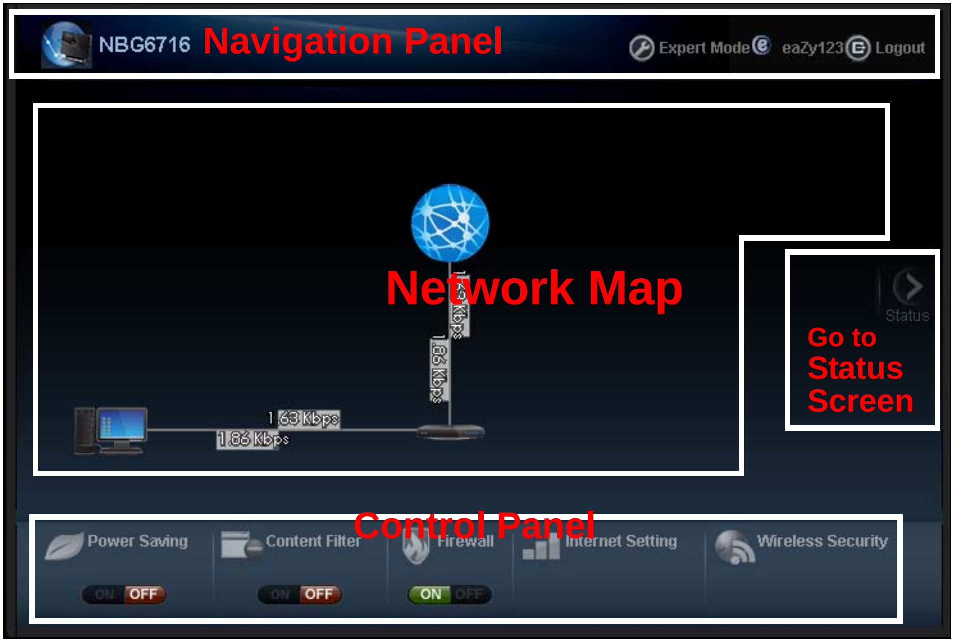
Easy Mode

5.1 Overview

The Web Configurator is set to **Easy Mode** by default. You can configure several key features of the NBG6716 in this mode. This mode is useful to users who are not fully familiar with some features that are usually intended for network administrators.

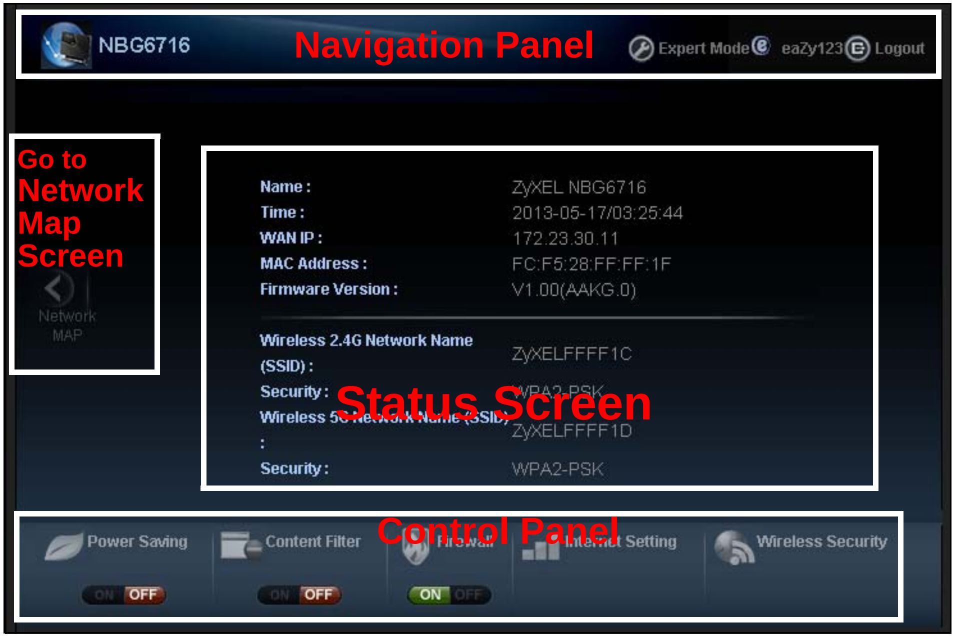
When you log in to the Web Configurator, the following screen opens.

Figure 19 Easy Mode: Network Map



Click **Status** to open the following screen.

Figure 20 Easy Mode: Status Screen



Name : ZyXEL NBG6716
Time : 2013-05-17/03:25:44
WAN IP : 172.23.30.11
MAC Address : FC:F5:28:FF:FF:1F
Firmware Version : V1.00(AAKG.0)

Wireless 2.4G Network Name (SSID) : ZyXELFFFF1C
Security : WPA2-PSK
Wireless 5G Network Name (SSID) : ZyXELFFFF1D
Security : WPA2-PSK

Power Saving: ON [✓ OFF]
Content Filter: ON [✓ OFF]
Firewall: [✓ ON] OFF

5.2 What You Can Do

You can do the following in this mode:

- Use the **Navigation Panel** to opt out of the **Easy Mode** (Section 5.4 on page 34).
- Use the **Network Map** screen to check whether your NBG6716 is connected to the Internet or any networking devices and view the transmission speed between them (Section 5.5 on page 34).
- Use the **Control Panel** to configure and enable NBG6716 features, including wireless scheduling, wireless security, content filtering, firewall and so on (Section 5.6 on page 35).
- Use the **Status Screen** to view read-only information about the NBG6716, including the WAN IP, MAC address of the NBG6716, the firmware version and wireless settigns (Section 5.7 on page 41).

5.3 What You Need to Know

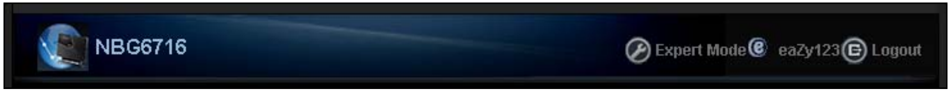
Between the different device modes, the **Control Panel** (Section 5.6 on page 35) changes depending on which features are applicable to the mode:

- **Router Mode**: All **Control Panel** features are available.
- **Access Point Mode**: Only **Power Saving** and **Wireless Security** are available.

5.4 Navigation Panel

Use this navigation panel to opt out of the **Easy Mode**.

Figure 21 Control Panel



The following table describes the labels in this screen.

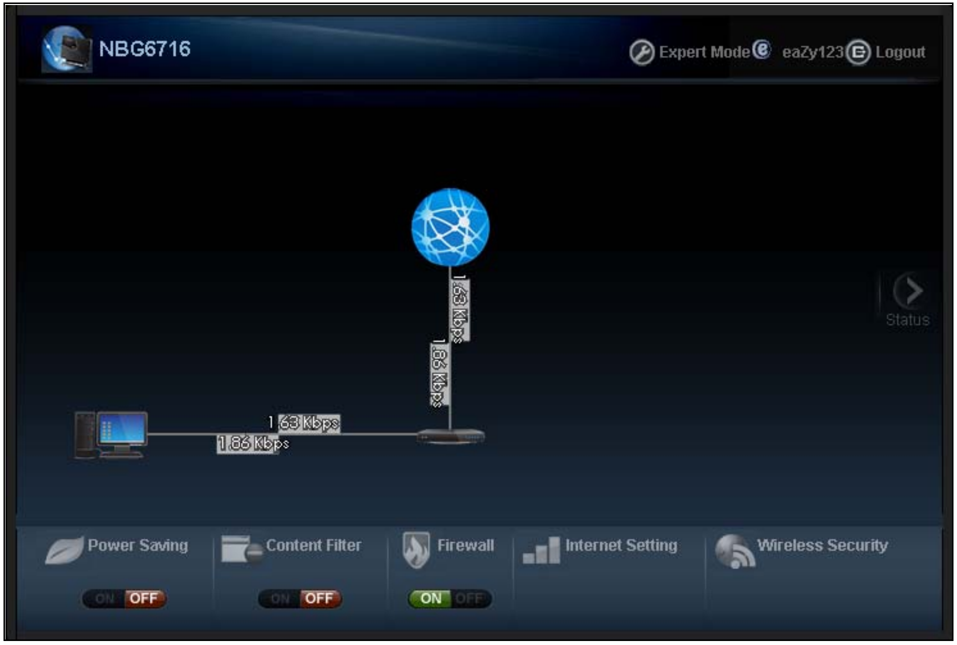
Table 11 Control Panel

ITEM	DESCRIPTION
Expert Mode	Click this to change to **Expert Mode** and customize features of the NBG6716.
eaZy123	Click this icon to open the setup wizard.
Logout	Click this to end the Web Configurator session and go to the **Login** page.

5.5 Network Map

When you log into the Web Configurator, the Network Map is shown as follows.

Figure 22 Network Map

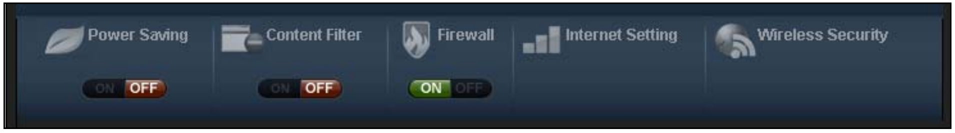


You can view the upstream and downstream transmission speed between the NBG6716 and the Internet and/or between the NBG6716 and the connected device(s) (represented by icons indicating the kind of network device), including those connecting wirelessly.

5.6 Control Panel

The features configurable in **Easy Mode** are shown in the **Control Panel**.

Figure 23 Control Panel



Switch **ON** to enable the feature. Otherwise, switch **OFF**. If the feature is turned on, the green light flashes. If it is turned off, the red light flashes.

Additionally, click the feature to open a screen where you can edit its settings.

The following table describes the labels in this screen.

Table 12 Control Panel

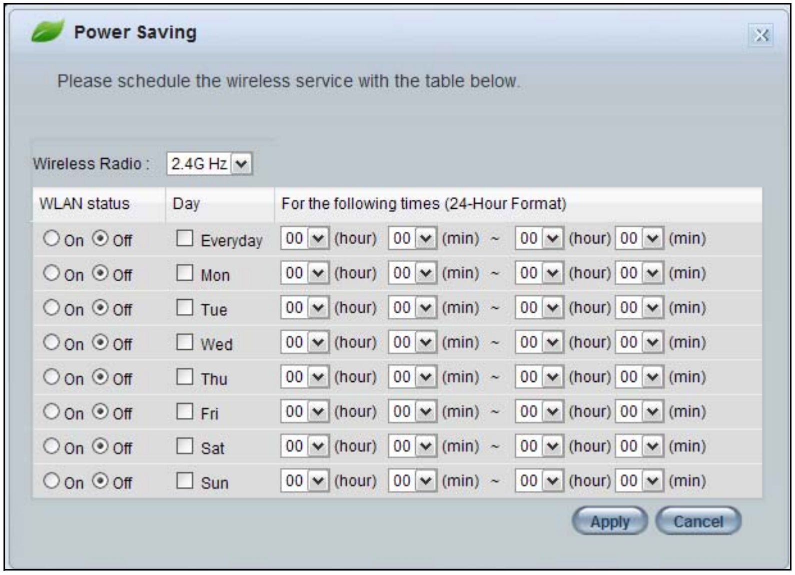
ITEM	DESCRIPTION
Power Saving	Click this to schedule the wireless feature of the NBG6716. Disabling the wireless function helps lower the energy consumption of the NBG6716. Switch **ON** to apply wireless scheduling. Otherwise, switch **OFF**. Refer to Section 5.6.1 on page 35 to see this screen.
Content Filter	Click this to restrict access to certain websites, based on keywords contained in URLs, to which you do not want users in your network to open. Switch **ON** to apply website filtering. Otherwise, switch **OFF**. Refer to Section 5.6.2 on page 36 to see this screen.
Firewall	Switch **ON** to ensure that your network is protected from Denial of Service (DoS) attacks. Otherwise, switch **OFF**. Refer to Section 5.6.3 on page 37 to see this screen.
Internet Setting	Click this to configure the Internet connection settings. Refer to Section 5.6.4 on page 37 to see this screen.
Wireless Security	Click this to configure the wireless security, such as SSID, security mode and WPS key on your NBG6716. Refer to Section 5.6.5 on page 39 to see this screen.

5.6.1 Power Saving

Use this screen to set the day of the week and time of the day when your wireless LAN is turned on and off. Wireless LAN scheduling is disabled by default.

Disabling the wireless capability lowers the energy consumption of the of the NBG6716.

Figure 24 Power Saving



Power Saving

Please schedule the wireless service with the table below.

Wireless Radio : 2.4G Hz

WLAN status	Day	For the following times (24-Hour Format)
○ On ● Off	□ Everyday	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Mon	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Tue	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Wed	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Thu	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Fri	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Sat	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Sun	00 (hour) 00 (min) ~ 00 (hour) 00 (min)

The following table describes the labels in this screen.

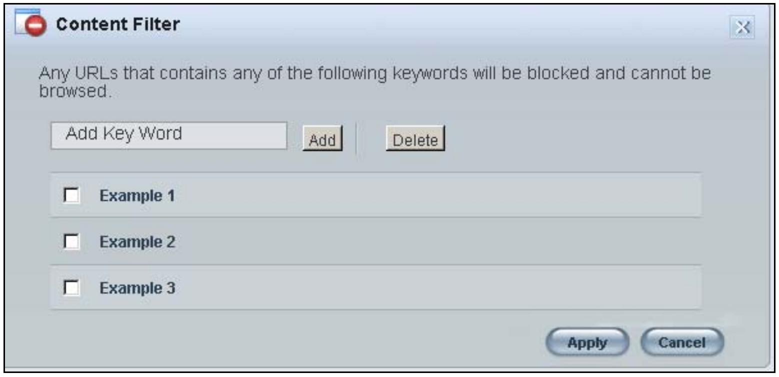
Table 13 Power Saving

LABEL	DESCRIPTION
Wireless Radio	Choose whether you want to apply the power saving schedule to **2.4G Hz** or **5G Hz** wireless radio.
WLAN Status	Select **On** or **Off** to specify whether the Wireless LAN is turned on or off (depending on what you selected in the **WLAN Status** field). This field works in conjunction with the **Day** and **For the following times** fields.
Day	Select **Everyday** or the specific days to turn the Wireless LAN on or off. If you select **Everyday** you can not select any specific days. This field works in conjunction with the **For the following times** field.
For the following times (24-Hour Format)	Select a begin time using the first set of **hour** and minute (**min**) drop down boxes and select an end time using the second set of **hour** and minute (**min**) drop down boxes. If you have chosen **On** earlier for the WLAN Status the Wireless LAN will turn on between the two times you enter in these fields. If you have chosen **Off** earlier for the WLAN Status the Wireless LAN will turn off between the two times you enter in these fields. In this time format, midnight is 00:00 and progresses up to 24:00. For example, 6:00 PM is 18:00.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to close this screen without saving any changes.

5.6.2 Content Filter

Use this screen to restrict access to certain websites, based on keywords contained in URLs, to which you do not want users in your network to open.

Figure 25 Content Filter



Content Filter

Any URLs that contains any of the following keywords will be blocked and cannot be browsed.

The following table describes the labels in this screen.

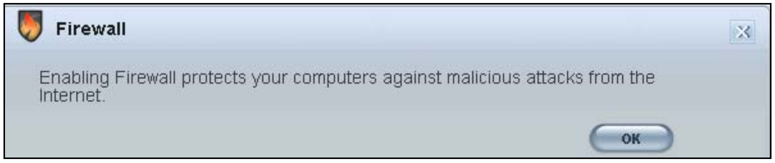
Table 14 Content Filter

LABEL	DESCRIPTION
Add	Click **Add** after you have typed a keyword. Repeat this procedure to add other keywords. Up to 64 keywords are allowed. Note: The NBG6716 does not recognize wildcard characters as keywords. When you try to access a web page containing a keyword, you will get a message telling you that the content filter is blocking this request.
Delete	Highlight a keyword in the text box and click **Delete** to remove it. The keyword disappears from the text box after you click **Apply**.
Apply	Click **Apply** to save your changes.
Cancel	Click **Cancel** to close this screen without saving any changes.

5.6.3 Firewall

Enable this feature to protect the network from Denial of Service (DoS) attacks. The NBG6716 blocks repetitive pings from the WAN that can otherwise cause systems to slow down or hang.

Figure 26 Firewall



Firewall

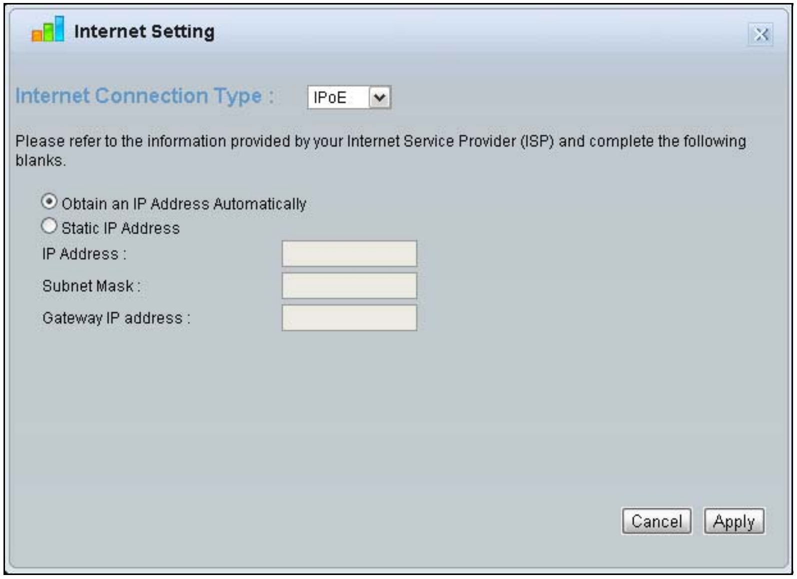
Enabling Firewall protects your computers against malicious attacks from the Internet.

Click **OK** to close this screen.

5.6.4 Internet Setting

Use this screen to configure your NBG6716 for Internet access. You should already have Internet account information from your ISP. The screen varies depending on the Internet connection type you selected.

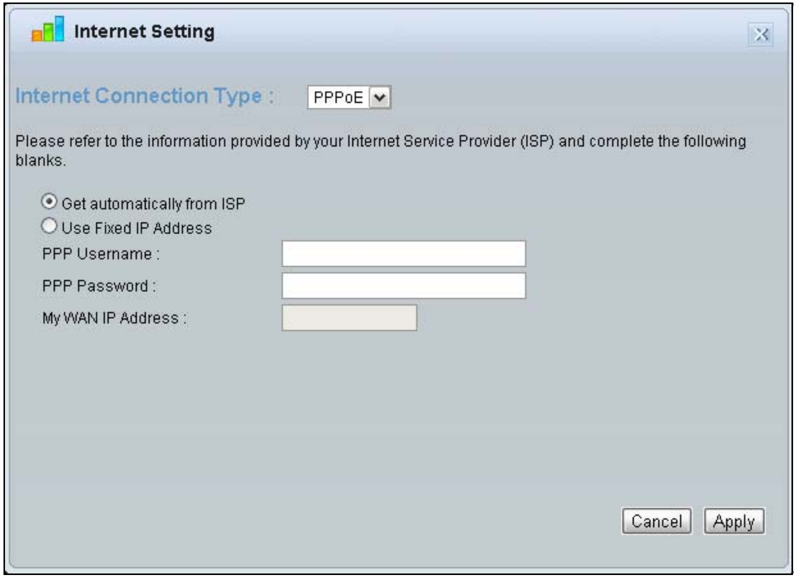
Figure 27 Internet Setting (IPoE)



Please refer to the information provided by your Internet Service Provider (ISP) and complete the following blanks.

● Obtain an IP Address Automatically
○ Static IP Address

Figure 28 Internet Setting (PPPoE)



Please refer to the information provided by your Internet Service Provider (ISP) and complete the following blanks.

● Get automatically from ISP
○ Use Fixed IP Address

The following table describes the labels in this screen.

Table 15 Internet Setting

LABEL	DESCRIPTION
Internet Connection Type	Select the **IPoE** (IP over Ethernet) option when the WAN port is used as a regular Ethernet. Select the **PPPoE** (Point-to-Point Protocol over Ethernet) option for a dial-up connection.
The following fields are available if you select **IPoE**.	
Obtain an IP Address Automatically	Select this radio button if your ISP did not assign you a fixed IP address.
Static IP Address	Select this radio button if your ISP assigned an IP address for your Internet connection.
IP Address	Enter the IP address provided by your ISP.

Table 15 Internet Setting (continued)

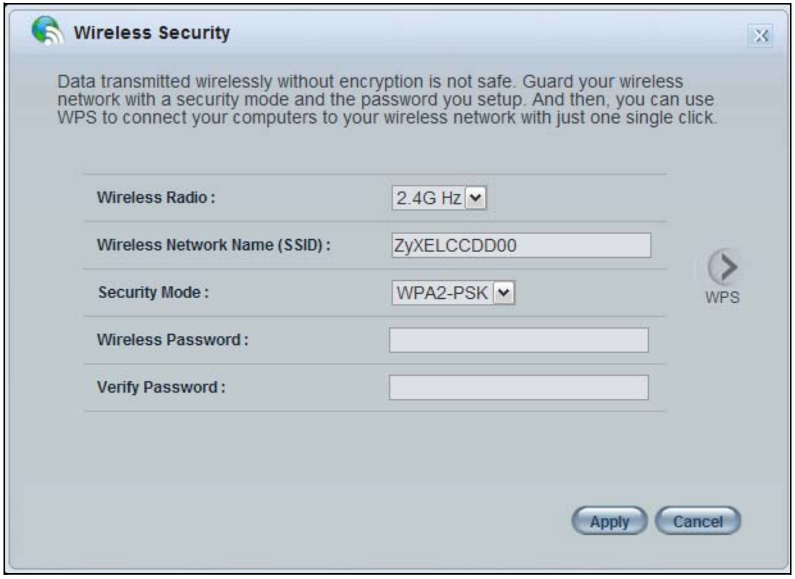
LABEL	DESCRIPTION
Subnet Mask	Enter the IP subnet mask in this field.
Gateway IP Address	Enter the gateway IP address in this field.
The following fields are available if you select **PPPoE**.	
Get automatically from ISP	Select this radio button if your ISP did not assign you a fixed IP address.
Use Fixed IP Address	Select this radio button, provided by your ISP to give the NBG6716 a fixed, unique IP address.
PPP Username	Type the user name given to you by your ISP.
PPP Password	Type the password associated with the user name above.
My WAN IP Address	Type the name of your service provider.
Cancel	Click **Cancel** to close this screen.
Apply	Click **Apply** to save your changes back to the NBG6716.

5.6.5 Wireless Security

Use this screen to configure security for your the wireless LAN. You can enter the SSID and select the wireless security mode in the following screen.

Note: You can enable the wireless function of your NBG6716 by first turning on the switch in the back panel.

Figure 29 Wireless Security



Wireless Security

Data transmitted wirelessly without encryption is not safe. Guard your wireless network with a security mode and the password you setup. And then, you can use WPS to connect your computers to your wireless network with just one single click.

Wireless Radio : 2.4G Hz

Wireless Network Name (SSID) : ZyXELCCDD00

Security Mode : WPA2-PSK

Wireless Password :

Verify Password :

The following table describes the general wireless LAN labels in this screen.

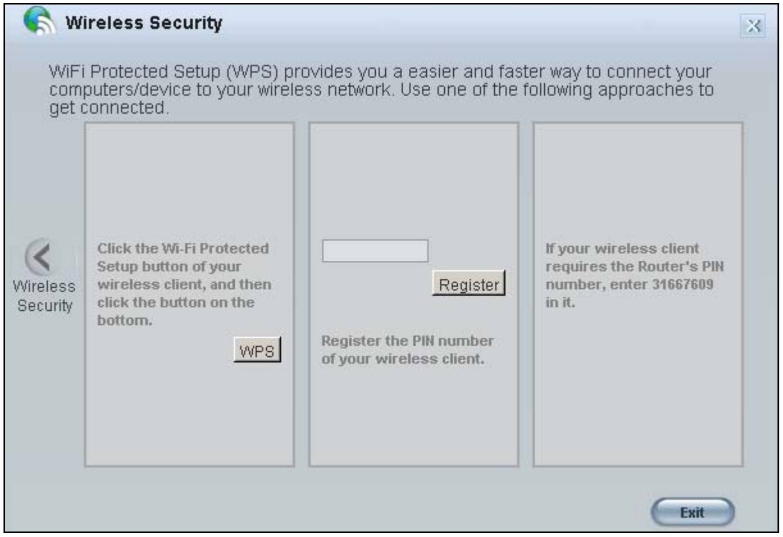
Table 16 Wireless Security

LABEL	DESCRIPTION
Wireless Radio	Choose whether you want to apply the wireless security to **2.4G Hz** or **5G Hz** wireless radio.
Wireless Network Name (SSID)	(Service Set IDentity) The SSID identifies the Service Set with which a wireless station is associated. Wireless stations associating to the access point (AP) must have the same SSID. Enter a descriptive name (up to 32 keyboard characters) for the wireless LAN.
Security mode	Select **WPA2-PSK** to add security on this wireless network. The wireless clients which want to associate to this network must have same wireless security settings as this device. After you select to use a security, additional options appears in this screen. Select **No Security** to allow any client to connect to this network without authentication.
Wireless password	This field appears when you choose wither **WPA2-PSK** as the security mode. Type a pre-shared key from 8 to 63 case-sensitive keyboard characters.
Verify password	Type the password again to confirm.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to close this screen.
WPS	Click this to configure the WPS screen. You can transfer the wireless settings configured here (**Wireless Security** screen) to another wireless device that supports WPS.

5.6.6 WPS

Use this screen to add a wireless station to the network using WPS. Click **WPS** in the **Wireless Security** to open the following screen.

Figure 30 Wireless Security: WPS



Wireless Security

WiFi Protected Setup (WPS) provides you a easier and faster way to connect your computers/device to your wireless network. Use one of the following approaches to get connected.

Click the Wi-Fi Protected Setup button of your wireless client, and then click the button on the bottom.

Register the PIN number of your wireless client.

If your wireless client requires the Router's PIN number, enter 31667609 in it.

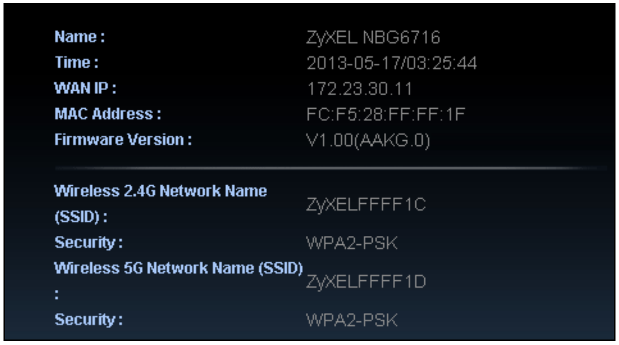
The following table describes the labels in this screen.

Table 17 Wireless Security: WPS

LABEL	DESCRIPTION
Wireless Security	Click this to go back to the **Wireless Security** screen.
WPS	Create a secure wireless network simply by pressing a button. The NBG6716 scans for a WPS-enabled device within the range and performs wireless security information synchronization. Note: After you click the **WPS** button on this screen, you have to press a similar button in the wireless station utility within 2 minutes. To add the second wireless station, you have to press these buttons on both device and the wireless station again after the first 2 minutes.
Register	Create a secure wireless network simply by entering a wireless client's PIN (Personal Identification Number) in the NBG6716's interface and pushing this button. Type the same PIN number generated in the wireless station's utility. Then click **Register** to associate to each other and perform the wireless security information synchronization.
Exit	Click **Exit** to close this screen.

5.7 Status Screen in Easy Mode

In the Network Map screen, click **Status** to view read-only information about the NBG6716.



Name :	ZyXEL NBG6716
Time :	2013-05-17/03:25:44
WAN IP :	172.23.30.11
MAC Address :	FC:F5:28:FF:FF:1F
Firmware Version :	V1.00(AAKG.0)
Wireless 2.4G Network Name (SSID) :	ZyXELFFFF1C
Security :	WPA2-PSK
Wireless 5G Network Name (SSID) :	ZyXELFFFF1D
Security :	WPA2-PSK

Figure 31 Status Screen in Easy Mode

The following table describes the labels in this screen.

Table 18 Status Screen in Easy Mode

ITEM	DESCRIPTION
Name	This is the name of the NBG6716 in the network. You can change this in the **Maintenance > General** screen in Section 23.3 on page 166.
Time	This is the current system date and time. The date is in YYYY:MM:DD (Year-Month-Day) format. The time is in HH:MM:SS (Hour:Minutes:Seconds) format.
WAN IP	This is the IP address of the WAN port.
MAC Address	This is the MAC address of the NBG6716.

Table 18 Status Screen in Easy Mode (continued)

ITEM	DESCRIPTION
Firmware Version	This shows the firmware version of the NBG6716. The firmware version format shows the trunk version, model code and release number.
Wireless 2.4G Network Name (SSID) Wireless 5G Network Name (SSID)	This shows the SSID of the wireless network. You can configure this in the Wireless Security screen (Section 5.6.5 on page 39; Section 11.2 on page 89).
Security	This shows the wireless security used by the NBG6716.

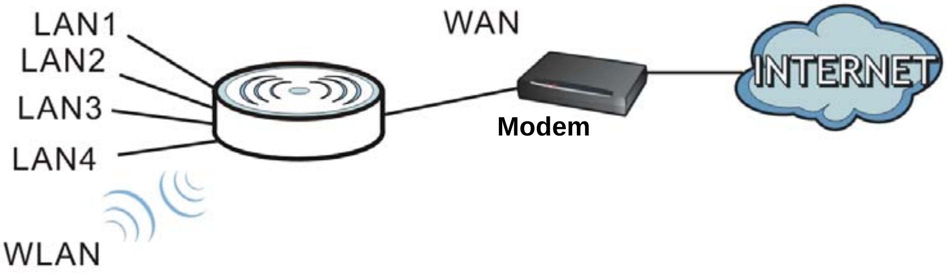
6

Router Mode

6.1 Overview

The NBG6716 is set to router mode by default. Routers are used to connect the local network to another network (for example, the Internet). In the figure below, the NBG6716 connects the local network (**LAN1** ~ **LAN4**) to the Internet.

Figure 32 NBG6716 Network

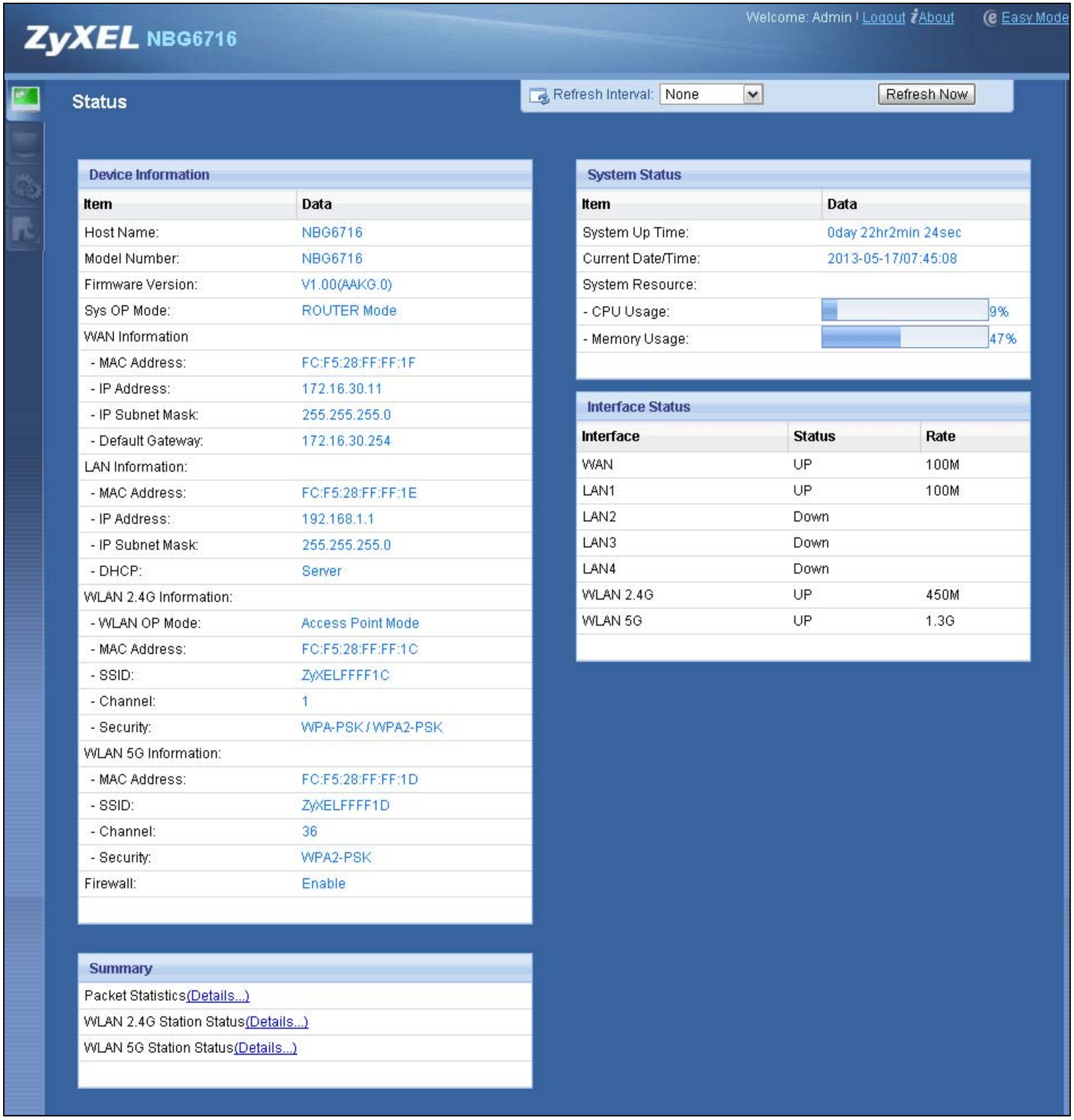


Note: The **Status** screen is shown after changing to the **Expert Mode** of the Web Configurator. It varies depending on the device mode of your NBG6716.

6.2 Router Mode Status Screen

Click to open the status screen.

Figure 33 Status Screen: Router Mode



Device Information

Item	Data
Host Name:	NBG6716
Model Number:	NBG6716
Firmware Version:	V1.00(AAKG.0)
Sys OP Mode:	ROUTER Mode
WAN Information	
- MAC Address:	FC:F5:28:FF:FF:1F
- IP Address:	172.16.30.11
- IP Subnet Mask:	255.255.255.0
- Default Gateway:	172.16.30.254
LAN Information:	
- MAC Address:	FC:F5:28:FF:FF:1E
- IP Address:	192.168.1.1
- IP Subnet Mask:	255.255.255.0
- DHCP:	Server
WLAN 2.4G Information:	
- WLAN OP Mode:	Access Point Mode
- MAC Address:	FC:F5:28:FF:FF:1C
- SSID:	ZyXELFFFF1C
- Channel:	1
- Security:	WPA-PSK / WPA2-PSK
WLAN 5G Information:	
- MAC Address:	FC:F5:28:FF:FF:1D
- SSID:	ZyXELFFFF1D
- Channel:	36
- Security:	WPA2-PSK
Firewall:	Enable

System Status

Item	Data
System Up Time:	0day 22hr2min 24sec
Current Date/Time:	2013-05-17/07:45:08
System Resource:	
- CPU Usage:	9%
- Memory Usage:	47%

Interface Status

Interface	Status	Rate
WAN	UP	100M
LAN1	UP	100M
LAN2	Down	
LAN3	Down	
LAN4	Down	
WLAN 2.4G	UP	450M
WLAN 5G	UP	1.3G

Summary

Packet Statistics(Details...)
WLAN 2.4G Station Status(Details...)
WLAN 5G Station Status(Details...)

The following table describes the icons shown in the **Status** screen.

Table 19 Status Screen Icon Key

ICON	DESCRIPTION
Logout	Click this at any time to exit the Web Configurator.
About	Click this icon to view copyright and a link for related product information.
Easy Mode	Click this icon to go to Easy Mode. See Chapter 5 on page 32.
Refresh Interval: None	Select a number of seconds or **None** from the drop-down list box to refresh all screen statistics automatically at the end of every time interval or to not refresh the screen statistics.
Refresh Now	Click this button to refresh the status screen statistics.

Table 19 Status Screen Icon Key (continued)

ICON	DESCRIPTION
🖥	Click this icon to see the **Status** page. The information in this screen depends on the device mode you select.
🖥	Click this icon to see the **Monitor** navigation menu.
⚙	Click this icon to see the **Configuration** navigation menu.
🔧	Click this icon to see the **Maintenance** navigation menu.

The following table describes the labels shown in the **Status** screen.

Table 20 Status Screen: Router Mode

LABEL	DESCRIPTION
Device Information	
Host Name	This is the **System Name** you enter in the **Maintenance** > **General** screen. It is for identification purposes.
Model Number	This is the model name of your device.
Firmware Version	This is the firmware version and the date created.
Sys OP Mode	This is the device mode (Section 4.1.2 on page 31) to which the NBG6716 is set - **Router Mode**.
WAN Information	
MAC Address	This shows the WAN Ethernet adapter MAC Address of your device.
IP Address	This shows the WAN port's IP address.
IP Subnet Mask	This shows the WAN port's subnet mask.
Default Gateway	This shows the WAN port's gateway IP address.
LAN Information	
MAC Address	This shows the LAN Ethernet adapter MAC Address of your device.
IP Address	This shows the LAN port's IP address.
IP Subnet Mask	This shows the LAN port's subnet mask.
DHCP	This shows the LAN port's DHCP role - **Server** or **Disable**.
WLAN 2.4G Information	
WLAN OP Mode	This is the device mode (Section 4.1.2 on page 31) to which the NBG6716's wireless LAN is set - **Access Point Mode**.
MAC Address	This shows the 2.4GHz wireless adapter MAC Address of your device.
SSID	This shows a descriptive name used to identify the NBG6716 in the 2.4GHz wireless LAN.
Channel	This shows the channel number which you select manually.
Security	This shows the level of wireless security the NBG6716 is using.
WLAN 5G Information	
MAC Address	This shows the 5GHz wireless adapter MAC Address of your device.
SSID	This shows a descriptive name used to identify the NBG6716 in the 5GHz wireless LAN.
Channel	This shows the channel number which you select manually.
Security	This shows the level of wireless security the NBG6716 is using.
Firewall	This shows whether the firewall is enabled or not.
Summary	

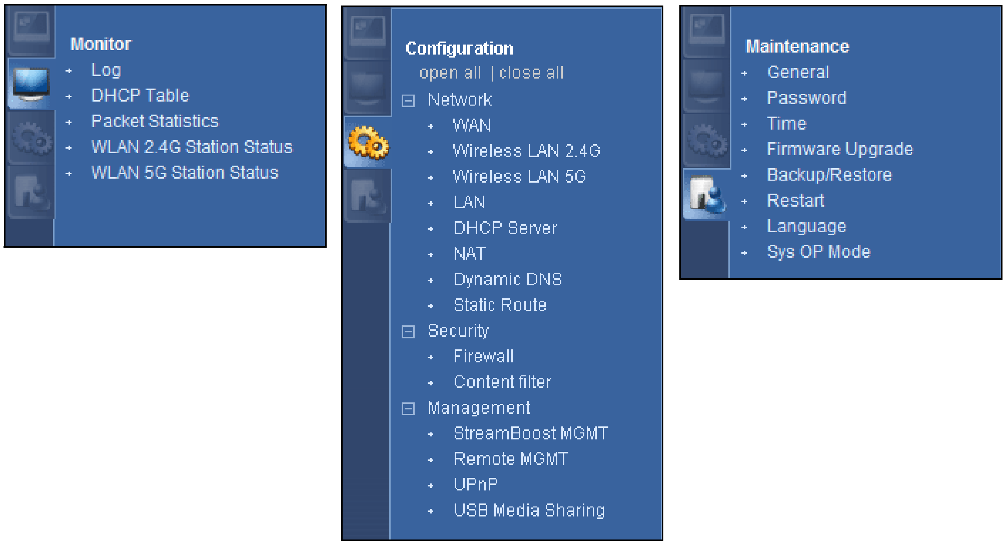
Table 20 Status Screen: Router Mode (continued)

LABEL	DESCRIPTION
Packet Statistics	Click **Details...** to go to the **Monitor > Packet Statistics** screen (Section 9.5 on page 73). Use this screen to view port status and packet specific statistics.
WLAN 2.4G Station Status	Click **Details...** to go to the **Monitor > WLAN 2.4G Station Status** screen (Section 9.6 on page 74). Use this screen to view the wireless stations that are currently associated to the NBG6716's 2.4GHz wireless LAN.
WLAN 5G Station Status	Click **Details...** to go to the **Monitor > WLAN 5G Station Status** screen (Section 9.6 on page 74). Use this screen to view the wireless stations that are currently associated to the NBG6716's 5GHz wireless LAN.
System Status	
Item	This column shows the type of data the NBG6716 is recording.
Data	This column shows the actual data recorded by the NBG6716.
System Up Time	This is the total time the NBG6716 has been on.
Current Date/Time	This field displays your NBG6716's present date and time.
System Resource	
- CPU Usage	This displays what percentage of the NBG6716's processing ability is currently used. When this percentage is close to 100%, the NBG6716 is running at full load, and the throughput is not going to improve anymore. If you want some applications to have more throughput, you should turn off other applications (for example, using bandwidth management.)
- Memory Usage	This shows what percentage of the heap memory the NBG6716 is using.
Interface Status	
Interface	This displays the NBG6716 port types. The port types are: **WAN**, **LAN** and **WLAN**.
Status	For the LAN and WAN ports, this field displays **Down** (line is down) or **Up** (line is up or connected). For the 2.4GHz/5GHz WLAN, it displays **Up** when the 2.4GHz/5GHz WLAN is enabled or **Down** when the 2.4G/5G WLAN is disabled.
Rate	For the LAN ports, this displays the port speed and duplex setting or **N/A** when the line is disconnected. For the WAN port, it displays the port speed and duplex setting if you're using Ethernet encapsulation. This field displays **N/A** when the line is disconnected. For the 2.4GHz/5GHz WLAN, it displays the maximum transmission rate when the 2.4GHz/5GHz WLAN is enabled and **N/A** when the WLAN is disabled.

6.2.1 Navigation Panel

Use the sub-menus on the navigation panel to configure NBG6716 features.

Figure 34 Navigation Panel: Router Mode



The following table describes the sub-menus.

Table 21 Navigation Panel: Router Mode

LINK	TAB	FUNCTION
Status		This screen shows the NBG6716's general device, system and interface status information. Use this screen to access summary statistics tables.
MONITOR		
Log	View Log	Use this screen to view the list of activities recorded by your NBG6716.
	Log Setting	Use this screen to select the logs you wish to display.
DHCP Table		Use this screen to view current DHCP client information.
Packet Statistics		Use this screen to view port status and packet specific statistics.
WLAN 2.4G Station Status		Use this screen to view the wireless stations that are currently associated to the NBG6716's 2.4GHz wireless LAN.
WLAN 5G Station Status		Use this screen to view the wireless stations that are currently associated to the NBG6716's 5GHz wireless LAN.
CONFIGURATION		
Network		
WAN	Internet Connection	This screen allows you to configure ISP parameters, WAN IP address assignment, DNS servers and the WAN MAC address.
	Advanced	Use this screen to configure other advanced properties.

Table 21 Navigation Panel: Router Mode (continued)

LINK	TAB	FUNCTION
Wireless LAN 2.4G/5G	General	Use this screen to enable the wireless LAN and configure wireless LAN and wireless security settings.
	More AP	Use this screen to configure multiple BSSs on the NBG6716.
	MAC Filter	Use the MAC filter screen to configure the NBG6716 to block access to devices or block the devices from accessing the NBG6716.
	Advanced	This screen allows you to configure advanced wireless settings.
	QoS	Use this screen to configure Wi-Fi Multimedia Quality of Service (WMM QoS). WMM QoS allows you to prioritize wireless traffic according to the delivery requirements of individual services.
	WPS	Use this screen to configure WPS.
	WPS Station	Use this screen to add a wireless station using WPS.
	Scheduling	Use this screen to schedule the times the Wireless LAN is enabled.
LAN	IP	Use this screen to configure LAN IP address and subnet mask.
	IP Alias	Use this screen to have the NBG6716 apply IP alias to create LAN subnets.
DHCP Server	General	Use this screen to enable the NBG6716's DHCP server.
	Advanced	Use this screen to assign IP addresses to specific individual computers based on their MAC addresses and to have DNS servers assigned by the DHCP server.
	Client List	Use this screen to view information related to your DHCP status.
NAT	General	Use this screen to enable NAT.
	Port Forwarding	Use this screen to configure servers behind the NBG6716 and forward incoming service requests to the server(s) on your local network.
	Port Trigger	Use this screen to change your NBG6716's port triggering settings.
Dynamic DNS	Dynamic DNS	Use this screen to set up dynamic DNS.
Static Route	Static Route	Use this screen to configure IP static routes.
Security		
Firewall	General	Use this screen to activate/deactivate the firewall.
	Services	This screen shows a summary of the firewall rules, and allows you to edit/ add a firewall rule.
Content Filter	Content Filter	Use this screen to block certain web features and sites containing certain keywords in the URL.
Management		
Streamboost Management	Network	Use this screen to view transmission data rates between the NBG6716 and the Internet or conencted devices.
	Bandwidth	Use this screen to configure the maximum allowable bandwidth and enable automatic update.
	Priorities	Use this screen to change the priority of the conencted devices.
	Up Time	Use this screen to view the top five traffic flows transmitting from/to the selected LAN device(s).
	Downloads	Use this screen to view the type and percentage of most download traffic.
	All Events	Use this screen to view the time at which a traffic flow is given bandwidth for optimal, good or best-effort performance.

Table 21 Navigation Panel: Router Mode (continued)

LINK	TAB	FUNCTION
Remote Management	WWW	Use this screen to configure through which interface(s) and from which IP address(es) users can use HTTP to manage the NBG6716.
	Telnet	Use this screen to configure through which interface(s) and from which IP address(es) users can use Telnet to manage the NBG6716.
	Wake On LAN	Use this screen to enable Wake on LAN to remotely turn on a device on the local network.
UPnP	General	Use this screen to enable UPnP on the NBG6716.
USB Media Sharing	DLNA	Use this screen to have the NBG6716 function as a DLNA-compliant media server, that lets DLNA-compliant media clients play video, audio, and photo content files stored on the connected USB storage device.
	SAMBA	Use this screen to enable file sharing through the NBG6716.
	FTP	Use this screen to have the NBG6716 act as a FTP server.
MAINTENANCE		
General	General	Use this screen to view and change administrative settings such as system and domain names.
Password	Password Setup	Use this screen to change the password of your NBG6716.
Time	Time Setting	Use this screen to change your NBG6716’s time and date.
Firmware Upgrade	Firmware Upgrade	Use this screen to upload firmware to your NBG6716.
Backup/ Restore	Backup/ Restore	Use this screen to backup and restore the configuration or reset the factory defaults to your NBG6716.
Restart	System Restart	This screen allows you to reboot the NBG6716 without turning the power off.
Language	Language	This screen allows you to select the language you prefer.
Sys OP Mode	Sys OP Mode	This screen allows you to select whether your device acts as a router, or an access point.

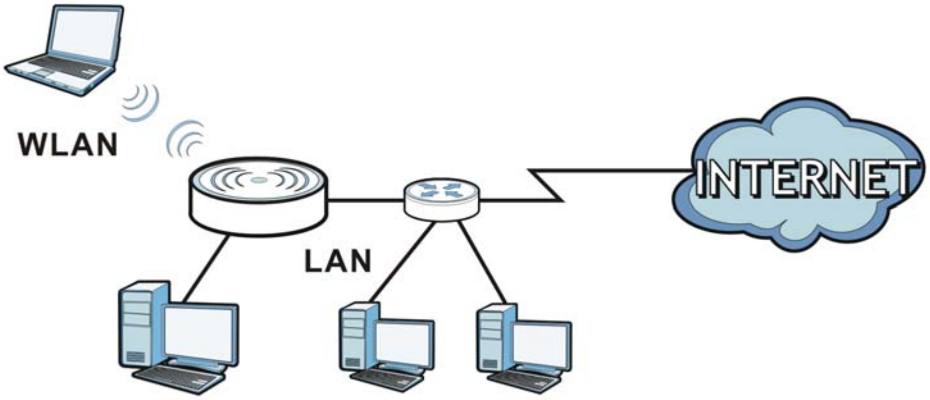
7

Access Point Mode

7.1 Overview

Use your NBG6716 as an access point (AP) if you already have a router or gateway on your network. In this mode your NBG6716 bridges a wired network (LAN) and wireless LAN (WLAN) in the same subnet. See the figure below for an example.

Figure 35 Wireless Internet Access in Access Point Mode



Many screens that are available in **Router Mode** are not available in **Access Point Mode**, such as NAT and firewall.

Note: See Chapter 8 on page 57 for an example of setting up a wireless network in Access Point mode.

7.2 What You Can Do

- Use the **Status** screen to view read-only information about your NBG6716 (Section 7.4 on page 52).
- Use the **LAN** screen to set the IP address for your NBG6716 acting as an access point (Section 7.5 on page 54).

7.3 What You Need to Know

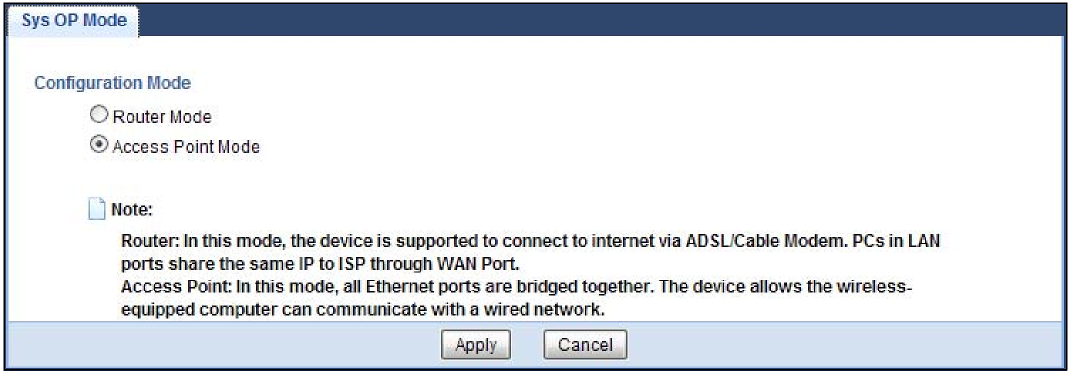
See Chapter 8 on page 57 for a tutorial on setting up a network with the NBG6716 as an access point.

7.3.1 Setting your NBG6716 to AP Mode

1 Log into the Web Configurator if you haven't already. See the Quick start Guide for instructions on how to do this.

2 To use your NBG6716 as an access point, go to **Maintenance > Sys OP Mode** and select **Access Point Mode**.

Figure 36 Changing to Access Point mode



Configuration Mode

○ Router Mode

● Access Point Mode

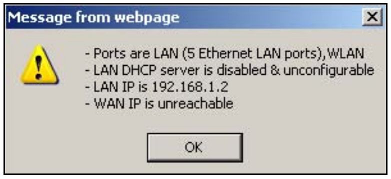
Note:

Router: In this mode, the device is supported to connect to internet via ADSL/Cable Modem. PCs in LAN ports share the same IP to ISP through WAN Port.
Access Point: In this mode, all Ethernet ports are bridged together. The device allows the wireless-equipped computer can communicate with a wired network.

Note: You have to log in to the Web Configurator again when you change modes. As soon as you do, your NBG6716 is already in Access Point mode.

3 When you select **Access Point Mode**, the following pop-up message window appears.

Figure 37 Pop up for Access Point mode



- Ports are LAN (5 Ethernet LAN ports),WLAN
- LAN DHCP server is disabled & unconfigurable
- LAN IP is 192.168.1.2
- WAN IP is unreachable

Click **OK**. Then click **Apply**. The Web Configurator refreshes once the change to Access Point mode is successful.

7.3.2 Accessing the Web Configurator in Access Point Mode

Log in to the Web Configurator in Access Point mode, do the following:

1 Connect your computer to the LAN port of the NBG6716.

2 The default IP address of the NBG6716 is “192.168.1.2”. In this case, your computer must have an IP address in the range between “192.168.1.3” and “192.168.1.254”.

3 Click **Start > Run** on your computer in Windows. Type “cmd” in the dialog box. Enter “ipconfig” to show your computer's IP address. If your computer's IP address is not in the correct range then see Appendix B on page 193 for information on changing your computer's IP address.

4 After you've set your computer's IP address, open a web browser such as Internet Explorer and type “192.168.1.2” as the web address in your web browser.

Note: After clicking **Login**, the **Easy Mode** appears. Refer to Section on page 32 for the **Easy Mode** screens. Change to **Expert Mode** to see the screens described in the sections following this.

7.3.3 Configuring your WLAN and Maintenance Settings

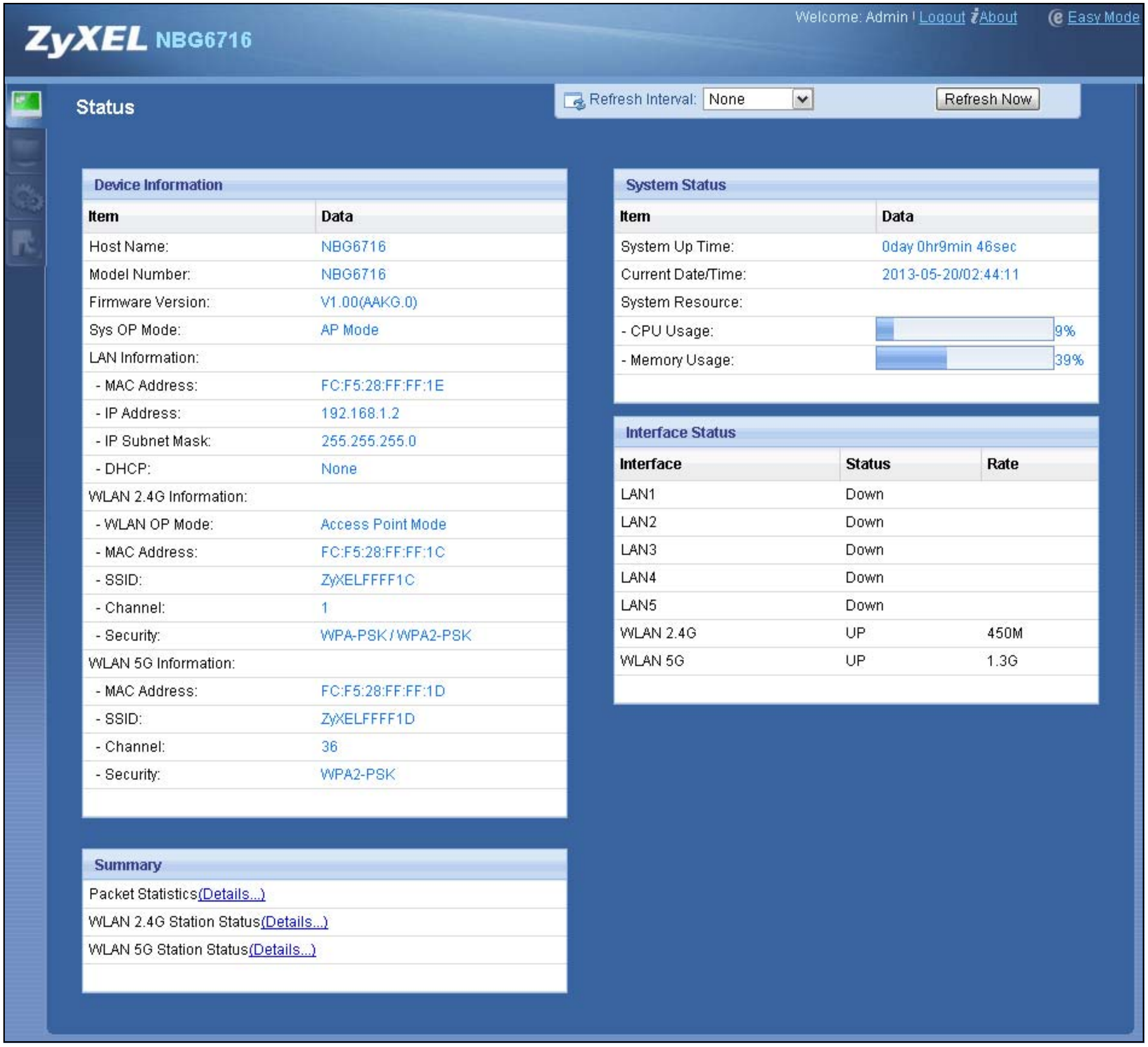
The configuration of wireless and maintenance settings in **Access Point Mode** is the same as for **Router Mode**.

- See Chapter 11 on page 84 for information on the configuring your wireless network.
- See Chapter 23 on page 166 for information on configuring your Maintenance settings.

7.4 AP Mode Status Screen

Click to open the **Status** screen.

Figure 38 Status Screen: Access Point Mode



Device Information

Item	Data
Host Name:	NBG6716
Model Number:	NBG6716
Firmware Version:	V1.00(AAKG.0)
Sys OP Mode:	AP Mode
LAN Information:	
- MAC Address:	FC:F5:28:FF:FF:1E
- IP Address:	192.168.1.2
- IP Subnet Mask:	255.255.255.0
- DHCP:	None
WLAN 2.4G Information:	
- WLAN OP Mode:	Access Point Mode
- MAC Address:	FC:F5:28:FF:FF:1C
- SSID:	ZyXELFFFF1C
- Channel:	1
- Security:	WPA-PSK / WPA2-PSK
WLAN 5G Information:	
- MAC Address:	FC:F5:28:FF:FF:1D
- SSID:	ZyXELFFFF1D
- Channel:	36
- Security:	WPA2-PSK

System Status

Item	Data
System Up Time:	0day 0hr9min 46sec
Current Date/Time:	2013-05-20/02:44:11
System Resource:	
- CPU Usage:	9%
- Memory Usage:	39%

Interface Status

Interface	Status	Rate
LAN1	Down	
LAN2	Down	
LAN3	Down	
LAN4	Down	
LAN5	Down	
WLAN 2.4G	UP	450M
WLAN 5G	UP	1.3G

Summary

Packet Statistics(Details...)
WLAN 2.4G Station Status(Details...)
WLAN 5G Station Status(Details...)

The following table describes the labels shown in the **Status** screen.

Table 22 Status Screen: Access Point Mode

LABEL	DESCRIPTION
Device Information	
Host Name	This is the **System Name** you enter in the **Maintenance** > **General** screen. It is for identification purposes.
Model Number	This is the model name of your device.
Firmware Version	This is the firmware version and the date created.
Sys OP Mode	This is the device mode (Section 4.1.2 on page 31) to which the NBG6716 is set - **AP Mode**.
LAN Information	
MAC Address	This shows the LAN Ethernet adapter MAC Address of your device.
IP Address	This shows the LAN port's IP address.
IP Subnet Mask	This shows the LAN port's subnet mask.
DHCP	This shows the LAN port's DHCP role - **Client** or **None**.
WLAN 2.4G Information	
WLAN OP Mode	This is the device mode (Section 4.1.2 on page 31) to which the NBG6716's wireless LAN is set - **Access Point Mode**.
MAC Address	This shows the 2.4GHz wireless adapter MAC Address of your device.
SSID	This shows a descriptive name used to identify the NBG6716 in the 2.4GHz wireless LAN.
Channel	This shows the channel number which you select manually.
Security	This shows the level of wireless security the NBG6716 is using.
WLAN 5G Information	
MAC Address	This shows the 5GHz wireless adapter MAC Address of your device.
SSID	This shows a descriptive name used to identify the NBG6716 in the 5GHz wireless LAN.
Channel	This shows the channel number which you select manually.
Security	This shows the level of wireless security the NBG6716 is using.
Summary	
Packet Statistics	Click **Details...** to go to the **Monitor > Packet Statistics** screen (Section 9.5 on page 73). Use this screen to view port status and packet specific statistics.
WLAN 2.4G Station Status	Click **Details...** to go to the **Monitor > WLAN 2.4G Station Status** screen (Section 9.6 on page 74). Use this screen to view the wireless stations that are currently associated to the NBG6716's 2.4GHz wireless LAN.
WLAN 5G Station Status	Click **Details...** to go to the **Monitor > WLAN 5G Station Status** screen (Section 9.6 on page 74). Use this screen to view the wireless stations that are currently associated to the NBG6716's 5GHz wireless LAN.
System Status	
Item	This column shows the type of data the NBG6716 is recording.
Data	This column shows the actual data recorded by the NBG6716.
System Up Time	This is the total time the NBG6716 has been on.
Current Date/Time	This field displays your NBG6716's present date and time.
System Resource	
- CPU Usage	This displays what percentage of the NBG6716's processing ability is currently used. When this percentage is close to 100%, the NBG6716 is running at full load, and the throughput is not going to improve anymore. If you want some applications to have more throughput, you should turn off other applications (for example, using bandwidth management.)
- Memory Usage	This shows what percentage of the heap memory the NBG6716 is using.

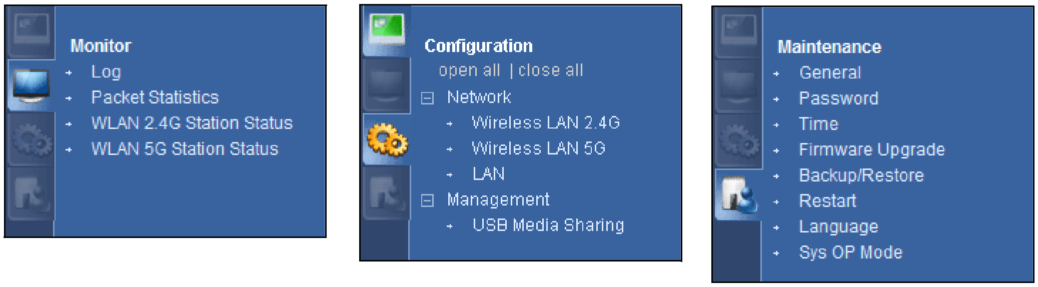
Table 22 Status Screen: Access Point Mode (continued)

LABEL	DESCRIPTION
Interface Status	
Interface	This displays the NBG6716 port types. The port types are: **LAN** and **WLAN**.
Status	For the LAN ports, this field displays **Down** (line is down) or **Up** (line is up or connected). For the 2.4GHz/5GHz WLAN, it displays **Up** when the 2.4GHz/5GHz WLAN is enabled or **Down** when the 2.4G/5G WLAN is disabled.
Rate	For the LAN ports, this displays the port speed and duplex setting or **N/A** when the line is disconnected. For the 2.4GHz/5GHz WLAN, it displays the maximum transmission rate when the 2.4GHz/5GHz WLAN is enabled and **N/A** when the WLAN is disabled.

7.4.1 Navigation Panel

Use the menu in the navigation panel to configure NBG6716 features in **Access Point Mode**.

Figure 39 Menu: Access Point Mode



Refer to Table 21 on page 47 for descriptions of the labels shown in the navigation panel.

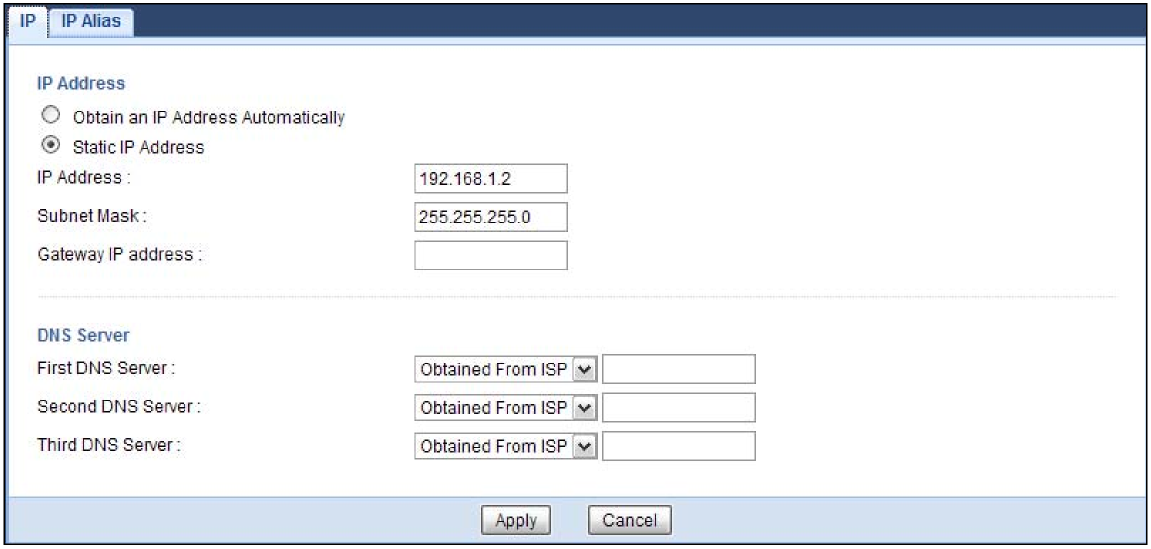
7.5 LAN Screen

Use this section to configure your LAN settings while in **Access Point Mode**.

Click **Network > LAN** to see the screen below.

Note: If you change the IP address of the NBG6716 in the screen below, you will need to log into the NBG6716 again using the new IP address.

Figure 40 Network > LAN > IP



IP Address

○ Obtain an IP Address Automatically

● Static IP Address

IP Address : 192.168.1.2

Subnet Mask : 255.255.255.0

Gateway IP address :

DNS Server

First DNS Server : Obtained From ISP

Second DNS Server : Obtained From ISP

Third DNS Server : Obtained From ISP

The table below describes the labels in the screen.

Table 23 Network > LAN > IP

LABEL	DESCRIPTION
Obtain an IP Address Automatically	When you enable this, the NBG6716 gets its IP address from the network's DHCP server (for example, your ISP). Users connected to the NBG6716 can now access the network (i.e., the Internet if the IP address is given by the ISP). The Web Configurator may no longer be accessible unless you know the IP address assigned by the DHCP server to the NBG6716. You need to reset the NBG6716 to be able to access the Web Configurator again (see Section 23.7 on page 171 for details on how to reset the NBG6716). Also when you select this, you cannot enter an IP address for your NBG6716 in the field below.
Static IP Address	Click this if you want to specify the IP address of your NBG6716. Or if your ISP or network administrator gave you a static IP address to access the network or the Internet.
IP Address	Type the IP address in dotted decimal notation. The default setting is 192.168.1.2. If you change the IP address you will have to log in again with the new IP address.
Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your NBG6716 will 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 NBG6716.
Gateway IP Address	Enter a **Gateway IP Address** (if your ISP or network administrator gave you one) in this field.
DNS Assignment	
First DNS Server Second DNS Server Third DNS Server	Select **Obtained From ISP** if your ISP dynamically assigns DNS server information (and the NBG6716's WAN IP address). The field to the right displays the (read-only) DNS server IP address that the ISP assigns. Select **User-Defined** if you have the IP address of a DNS server. Enter the DNS server's IP address in the field to the right. If you chose **User-Defined**, but leave the IP address set to 0.0.0.0, **User-Defined** changes to **None** after you click **Apply**. If you set a second choice to **User-Defined**, and enter the same IP address, the second **User-Defined** changes to **None** after you click **Apply**. Select **None** if you do not want to configure DNS servers. If you do not configure a DNS server, you must know the IP address of a computer in order to access it.

Table 23 Network > LAN > IP (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

Tutorials

8.1 Overview

This chapter provides tutorials for setting up your NBG6716.

- Set Up a Wireless Network with WPS
- Configure Wireless Security without WPS
- Using Multiple SSIDs on the NBG6716

8.2 Set Up a Wireless Network with WPS

This section gives you an example of how to set up wireless network using WPS. This example uses the NBG6716 as the AP and NWD210N as the wireless client which connects to a notebook.

Note: The wireless client must be a WPS-aware device (for example, a WPS USB adapter or PCI card).

There are two WPS methods for creating a secure connection. This tutorial shows you how to do both.

- **Push Button Configuration (PBC)** - create a secure wireless network simply by pressing a button. See Section 8.2.1 on page 57.This is the easier method.
- **PIN Configuration** - create a secure wireless network simply by entering a wireless client's PIN (Personal Identification Number) in the NBG6716’s interface. See Section 8.2.2 on page 58. This is the more secure method, since one device can authenticate the other.

8.2.1 Push Button Configuration (PBC)

1 Make sure that your NBG6716 is turned on. Make sure the **WIFI** button (at the side panel of the NBG6716) is pushed in, and that the device is placed within range of your notebook.

2 Make sure that you have installed the wireless client (this example uses the NWD210N) driver and utility in your notebook.

3 In the wireless client utility, find the WPS settings. Enable WPS and press the WPS button (**Start** or **WPS** button)

4 Log into NBG6716’s Web Configurator and press the **Push Button** in the **Configuration > Network > Wireless LAN 2.4G > WPS Station** screen.

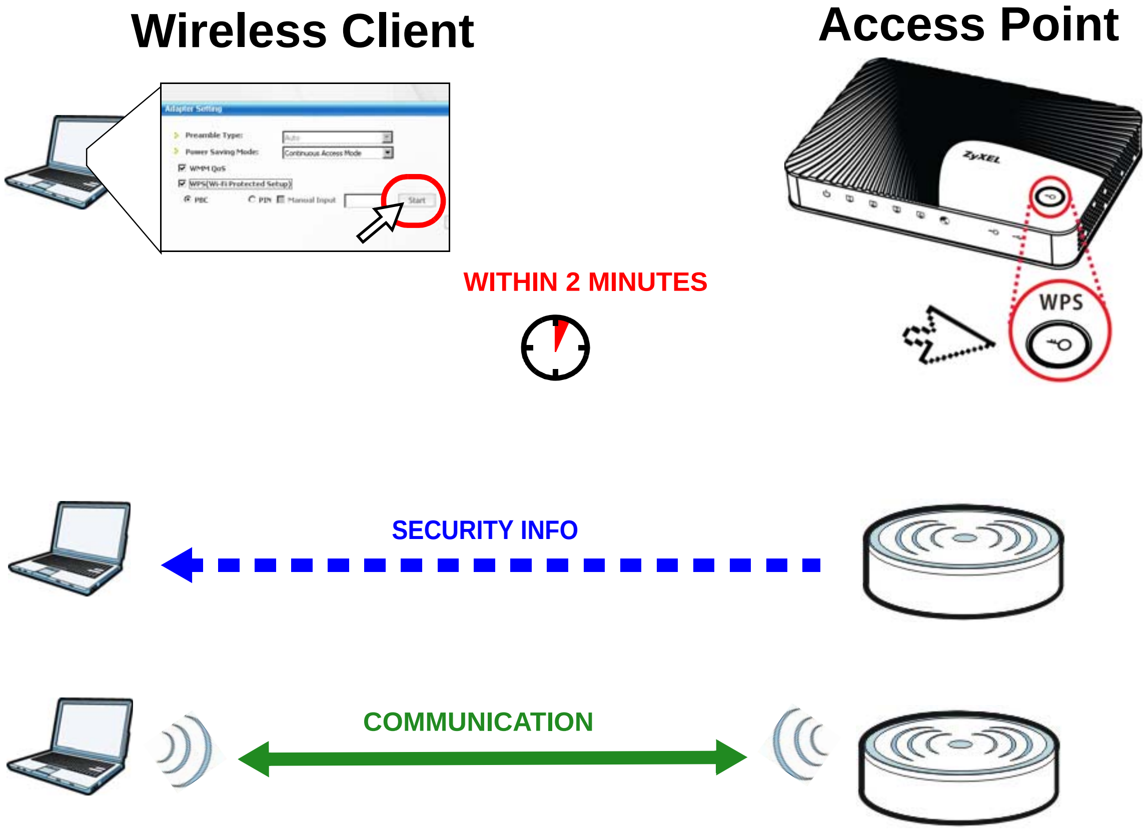
Note: Your NBG6716 has a WPS button located on its panel, as well as a WPS button in its configuration utility. Both buttons have exactly the same function; you can use one or the other.

Note: It doesn't matter which button is pressed first. You must press the second button within two minutes of pressing the first one.

The NBG6716 sends the proper configuration settings to the wireless client. This may take up to two minutes. Then the wireless client is able to communicate with the NBG6716 securely.

The following figure shows you an example to set up wireless network and security by pressing a button on both NBG6716 and wireless client (the NWD210N in this example).

Figure 41 Example WPS Process: PBC Method



Preamble Type: Auto
Power Saving Mode: Continuous Access Mode
☑ WMM QoS
☑ WPS(Wi-Fi Protected Setup)
● PBC ○ PIN ☐ Manual Input Start

8.2.2 PIN Configuration

When you use the PIN configuration method, you need to use both NBG6716's configuration interface and the client's utilities.

1 Launch your wireless client's configuration utility. Go to the WPS settings and select the PIN method to get a PIN number.

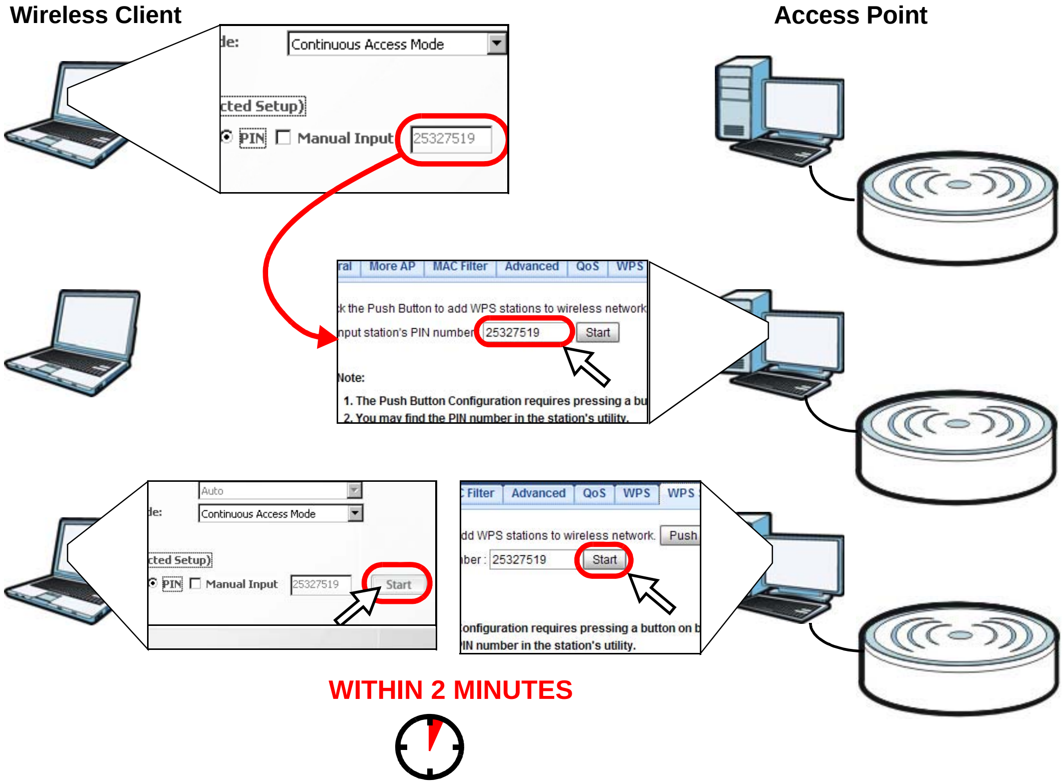
2 Enter the PIN number to the **PIN** field in the **Configuration > Network > Wireless LAN 2.4G > WPS Station** screen on the NBG6716.

3 Click **Start** buttons (or button next to the PIN field) on both the wireless client utility screen and the NBG6716's **WPS Station** screen within two minutes.

The NBG6716 authenticates the wireless client and sends the proper configuration settings to the wireless client. This may take up to two minutes. Then the wireless client is able to communicate with the NBG6716 securely.

The following figure shows you the example to set up wireless network and security on NBG6716 and wireless client (ex. NWD210N in this example) by using PIN method.

Figure 42 Example WPS Process: PIN Method


Wireless Client
Access Point
de: Continuous Access Mode
cted Setup)
● PIN □ Manual Input 25327519
ral | More AP | MAC Filter | Advanced | QoS | WPS
k the Push Button to add WPS stations to wireless network
nput station's PIN number 25327519 Start
Note:
1. The Push Button Configuration requires pressing a bu
2. You may find the PIN number in the station's utility.
Auto
de: Continuous Access Mode
cted Setup)
● PIN □ Manual Input 25327519 Start
Filter | Advanced | QoS | WPS | WPS
dd WPS stations to wireless network. Push
ber : 25327519 Start
onfiguration requires pressing a button on b
IN number in the station's utility.
WITHIN 2 MINUTES

8.3 Configure Wireless Security without WPS

This example shows you how to configure wireless security settings with the following parameters on your NBG6716.

SSID	SSID_Example3
Channel	6
Security	WPA2-PSK (Pre-Shared Key: ThisismyWPA-PSKpre-sharedkey)

Follow the steps below to configure the wireless settings on your NBG6716.

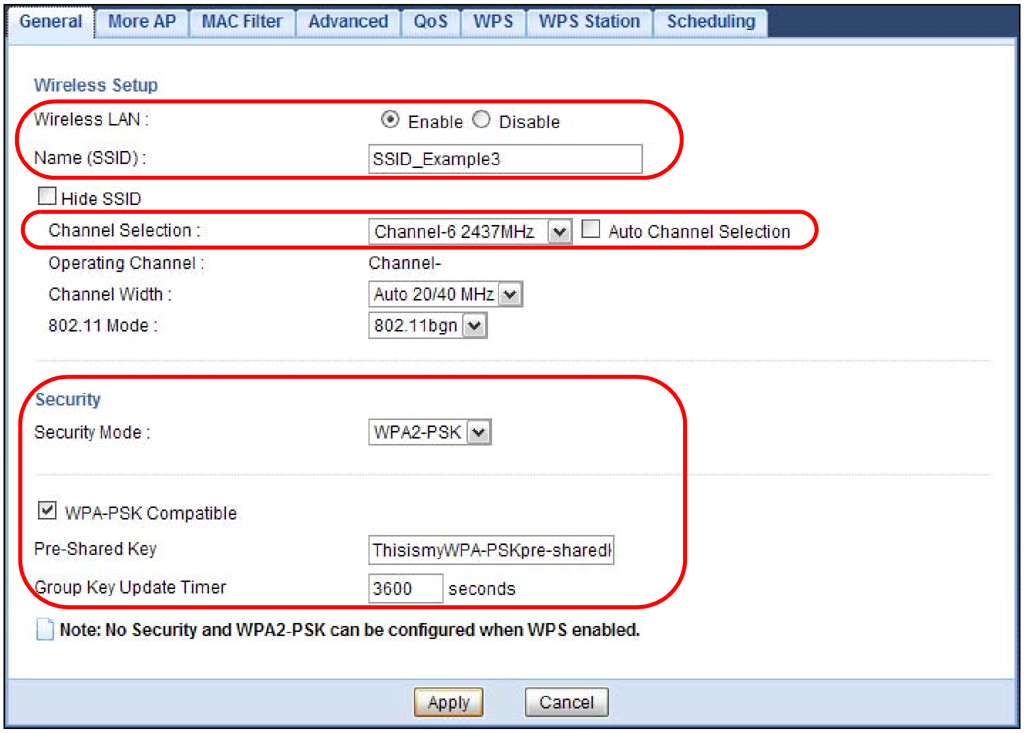
The instructions require that your hardware is connected (see the Quick Start Guide) and you are logged into the Web Configurator through your LAN connection (see Section 3.2 on page 28).

1 Make sure the **WIFI** switch (at the back panel of the NBG6716) is set to **ON**.

2 Open the **Configuration > Network** > **Wireless LAN 2.4G > General** screen in the AP's Web Configurator.

3 Confirm that the wireless LAN is enabled on the NBG6716.

4 Enter **SSID_Example3** as the SSID and select **Channel-06** as the channel. Set security mode to **WPA2-PSK** and enter **ThisismyWPA-PSKpre-sharedkey** in the **Pre-Shared Key** field. Click **Apply**.



Wireless Setup

Wireless LAN : ● Enable ○ Disable

Name (SSID) : SSID_Example3

□ Hide SSID

Channel Selection : Channel-6 2437MHz □ Auto Channel Selection

Operating Channel : Channel-

Channel Width : Auto 20/40 MHz

802.11 Mode : 802.11bgn

Security

Security Mode : WPA2-PSK

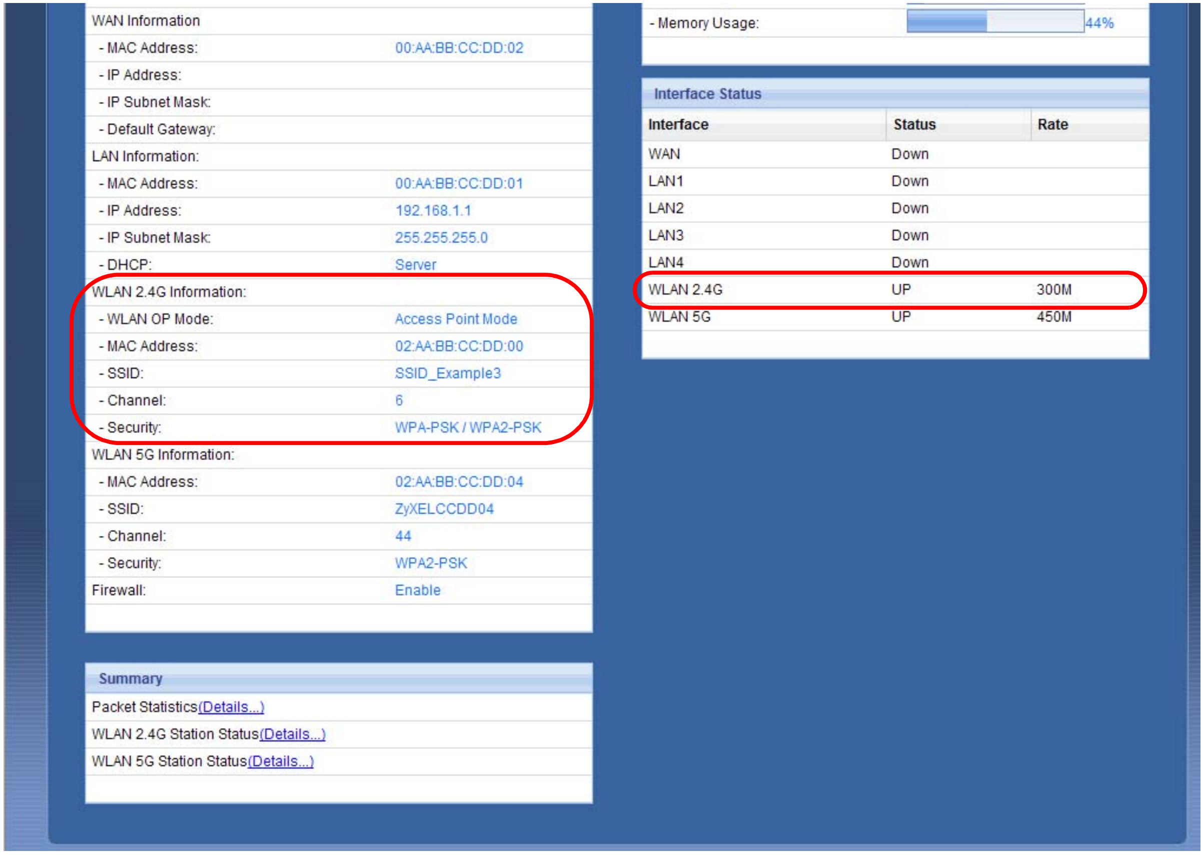
☑ WPA-PSK Compatible

Pre-Shared Key ThisismyWPA-PSKpre-sharedl

Group Key Update Timer 3600 seconds

Note: No Security and WPA2-PSK can be configured when WPS enabled.

5 Open the **Status** screen. Verify your wireless and wireless security settings under **Device Information** and check if the WLAN connection is up under **Interface Status**.



WAN Information	
- MAC Address:	00:AA:BB:CC:DD:02
- IP Address:	
- IP Subnet Mask:	
- Default Gateway:	
LAN Information:	
- MAC Address:	00:AA:BB:CC:DD:01
- IP Address:	192.168.1.1
- IP Subnet Mask:	255.255.255.0
- DHCP:	Server
WLAN 2.4G Information:	
- WLAN OP Mode:	Access Point Mode
- MAC Address:	02:AA:BB:CC:DD:00
- SSID:	SSID_Example3
- Channel:	6
- Security:	WPA-PSK / WPA2-PSK
WLAN 5G Information:	
- MAC Address:	02:AA:BB:CC:DD:04
- SSID:	ZyXELCCDD04
- Channel:	44
- Security:	WPA2-PSK
Firewall:	Enable

Summary

Packet Statistics(Details...)

WLAN 2.4G Station Status(Details...)

WLAN 5G Station Status(Details...)

- Memory Usage: 44%

Interface Status

Interface	Status	Rate
WAN	Down	
LAN1	Down	
LAN2	Down	
LAN3	Down	
LAN4	Down	
WLAN 2.4G	UP	300M
WLAN 5G	UP	450M

8.3.1 Configure Your Notebook

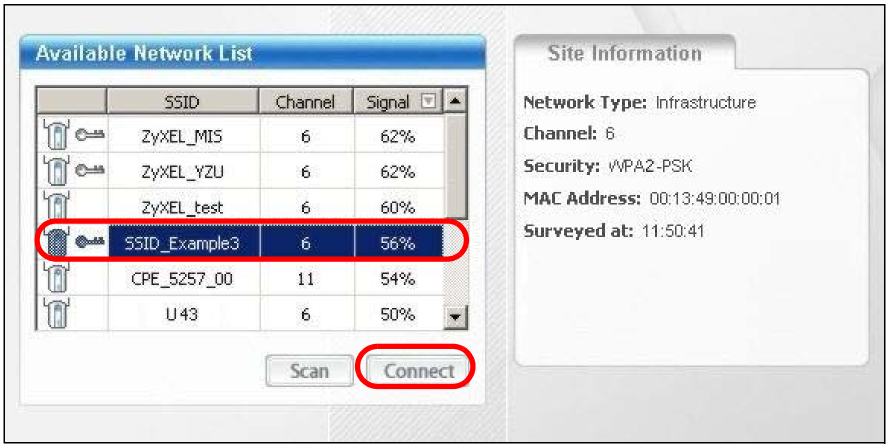
Note: We use the ZyXEL NWD2205 wireless adapter utility screens as an example for the wireless client. The screens may vary for different models.

1 The NBG6716 supports IEEE 802.11a, IEEE 802.11b, IEEE 802.11g and IEEE 802.11n wireless clients. Make sure that your notebook or computer’s wireless adapter supports one of these standards.

2 Wireless adapters come with software sometimes called a “utility” that you install on your computer. See your wireless adapter’s User’s Guide for information on how to do that.

3 After you’ve installed the utility, open it. If you cannot see your utility’s icon on your screen, go to **Start > Programs** and click on your utility in the list of programs that appears. The utility displays a list of APs within range, as shown in the example screen below.

4 Select SSID_Example3 and click **Connect**.



Available Network List

	SSID	Channel	Signal
	ZyXEL_MIS	6	62%
	ZyXEL_YZU	6	62%
	ZyXEL_test	6	60%
	SSID_Example3	6	56%
	CPE_5257_00	11	54%
	U43	6	50%

Site Information

Network Type: Infrastructure

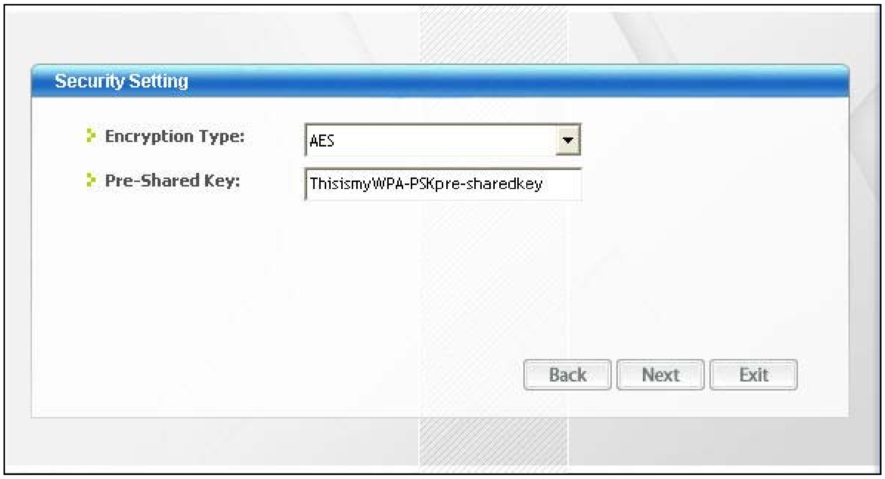
Channel: 6

Security: WPA2-PSK

MAC Address: 00:13:49:00:00:01

Surveyed at: 11:50:41

5 Select **AES** and type the security key in the following screen. Click **Next**.

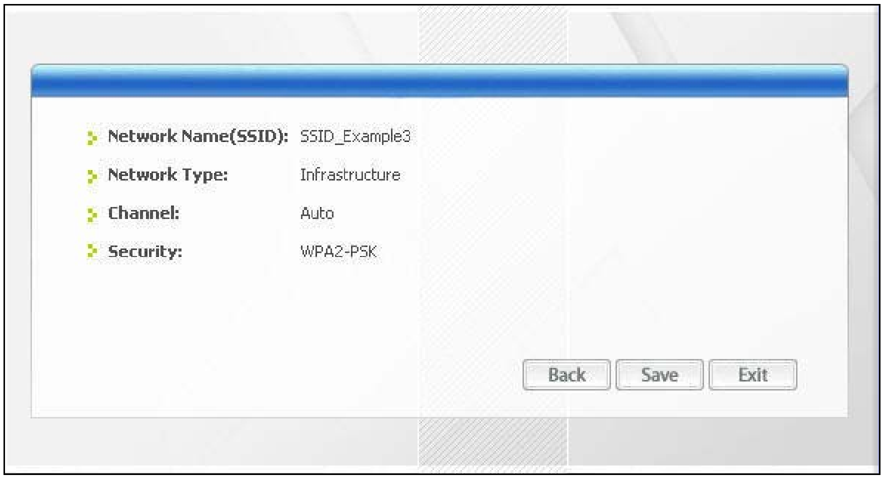


Security Setting

Encryption Type: AES

Pre-Shared Key: ThisismyWPA-PSKpre-sharedkey

6 The **Confirm Save** window appears. Check your settings and click **Save** to continue.



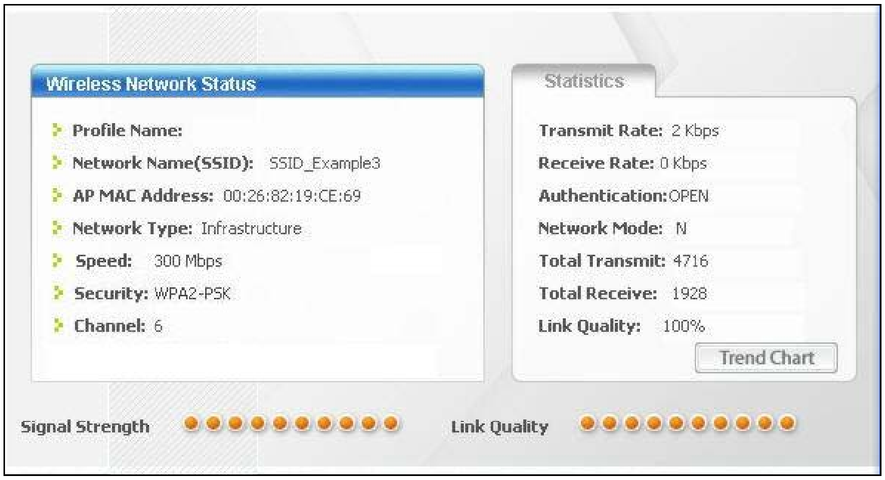
Network Name(SSID): SSID_Example3

Network Type: Infrastructure

Channel: Auto

Security: WPA2-PSK

7 Check the status of your wireless connection in the screen below. If your wireless connection is weak or you have no connection, see the Troubleshooting section of this User's Guide.



Wireless Network Status

- Profile Name:
- Network Name(SSID): SSID_Example3
- AP MAC Address: 00:26:82:19:CE:69
- Network Type: Infrastructure
- Speed: 300 Mbps
- Security: WPA2-PSK
- Channel: 6

Statistics

Transmit Rate: 2 Kbps
Receive Rate: 0 Kbps
Authentication: OPEN
Network Mode: N
Total Transmit: 4716
Total Receive: 1928
Link Quality: 100%

Signal Strength ●●●●●●●●●● Link Quality ●●●●●●●●●●

If your connection is successful, open your Internet browser and enter http://www.zyxel.com or the URL of any other web site in the address bar. If you are able to access the web site, your wireless connection is successfully configured.

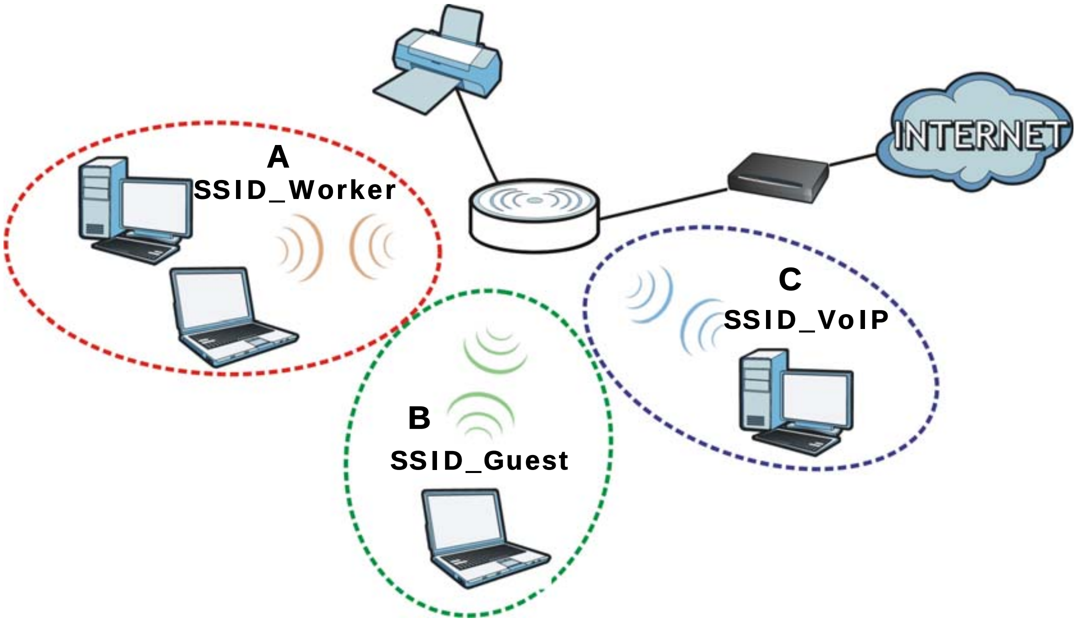
8.4 Using Multiple SSIDs on the NBG6716

You can configure more than one SSID on a NBG6716. See Section 11.4 on page 97.

This allows you to configure multiple independent wireless networks on the NBG6716 as if there were multiple APs (virtual APs). Each virtual AP has its own SSID, wireless security type and MAC filtering settings. That is, each SSID on the NBG6716 represents a different access point/wireless network to wireless clients in the network.

Clients can associate only with the SSIDs for which they have the correct security settings. Clients using different SSIDs can access the Internet and the wired network behind the NBG6716 (such as a printer).

For example, you may set up three wireless networks (**A**, **B** and **C**) in your office. **A** is for workers, **B** is for guests and **C** is specific to a VoIP device in the meeting room.



8.4.1 Configuring Security Settings of Multiple SSIDs

The NBG6716 is in router mode by default.

This example shows you how to configure the SSIDs with the following parameters on your NBG6716 (in router mode).

SSID	SECURITY TYPE	KEY	MAC FILTERING
SSID_Worker	WPA2-PSK WPA Compatible	DoNotStealMyWirelessNetwork	Disable
SSID_VoIP	WPA-PSK	VoIPOnly12345678	Allow 00:A0:C5:01:23:45
SSID_Guest	WPA-PSK	keyexample123	Disable

1 Connect your computer to the LAN port of the NBG6716 using an Ethernet cable.

2 The default IP address of the NBG6716 in router mode is “192.168.1.1”. In this case, your computer must have an IP address in the range between “192.168.1.2” and “192.168.1.254”.

3 Click **Start > Run** on your computer in Windows. Type “cmd” in the dialog box. Enter “ipconfig” to show your computer’s IP address. If your computer’s IP address is not in the correct range then see Appendix B on page 193 for information on changing your computer’s IP address.

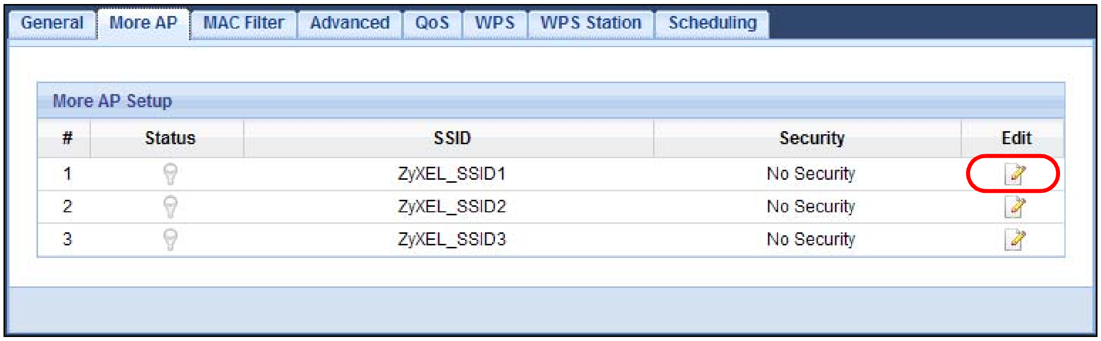
4 After you’ve set your computer’s IP address, open a web browser such as Internet Explorer and type “http://192.168.1.1” as the web address in your web browser.

5 Enter “1234” (default) as the password and click **Login**.

6 Type a new password and retype it to confirm, then click **Apply**. Otherwise, click **Ignore**.

7 The **Easy Mode** appears. Click **Expert Mode** in the navigation panel.

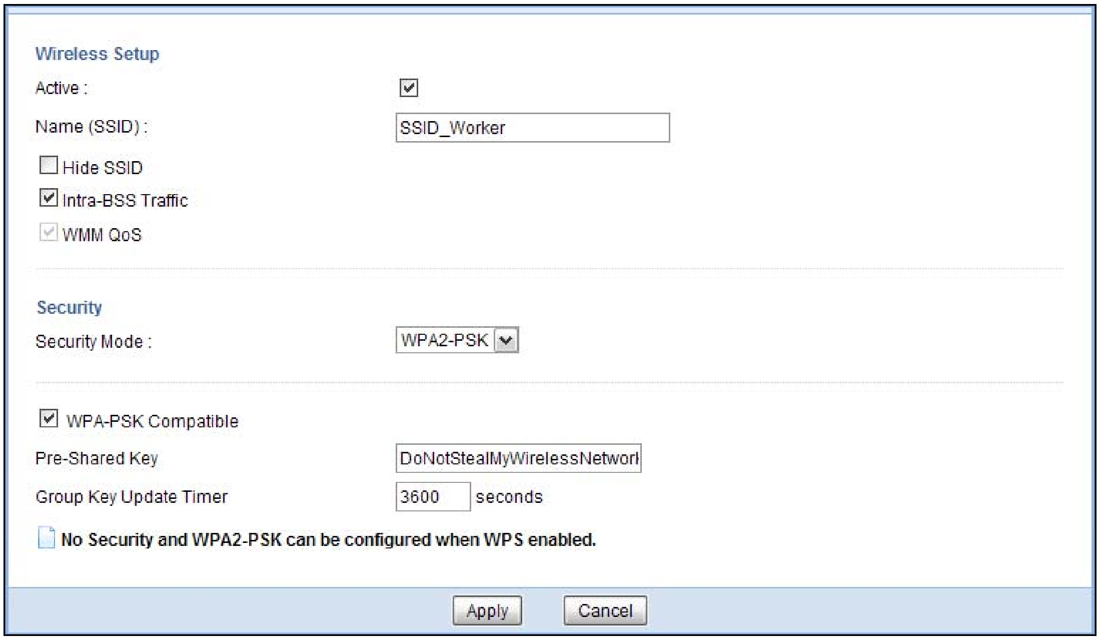
8 Go to **Configuration > Network > Wireless LAN 2.4G > More AP**. Click the **Edit** icon of the first entry to configure wireless and security settings for **SSID_Worker**.



More AP Setup

#	Status	SSID	Security	Edit
1	○	ZyXEL_SSID1	No Security	✎
2	○	ZyXEL_SSID2	No Security	✎
3	○	ZyXEL_SSID3	No Security	✎

9 Configure the screen as follows. In this example, you enable **Intra-BSS Traffic** for **SSID_Worker** to allow wireless clients in the same wireless network to communicate with each other. Click **Apply**.



Wireless Setup

Active : ☑

Name (SSID) : SSID_Worker

☐ Hide SSID

☑ Intra-BSS Traffic

☑ WMM QoS

Security

Security Mode : WPA2-PSK

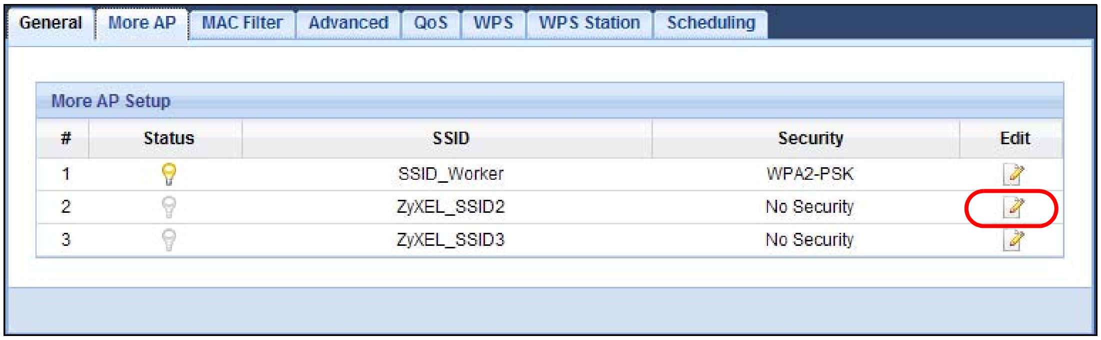
☑ WPA-PSK Compatible

Pre-Shared Key DoNotStealMyWirelessNetworl

Group Key Update Timer 3600 seconds

No Security and WPA2-PSK can be configured when WPS enabled.

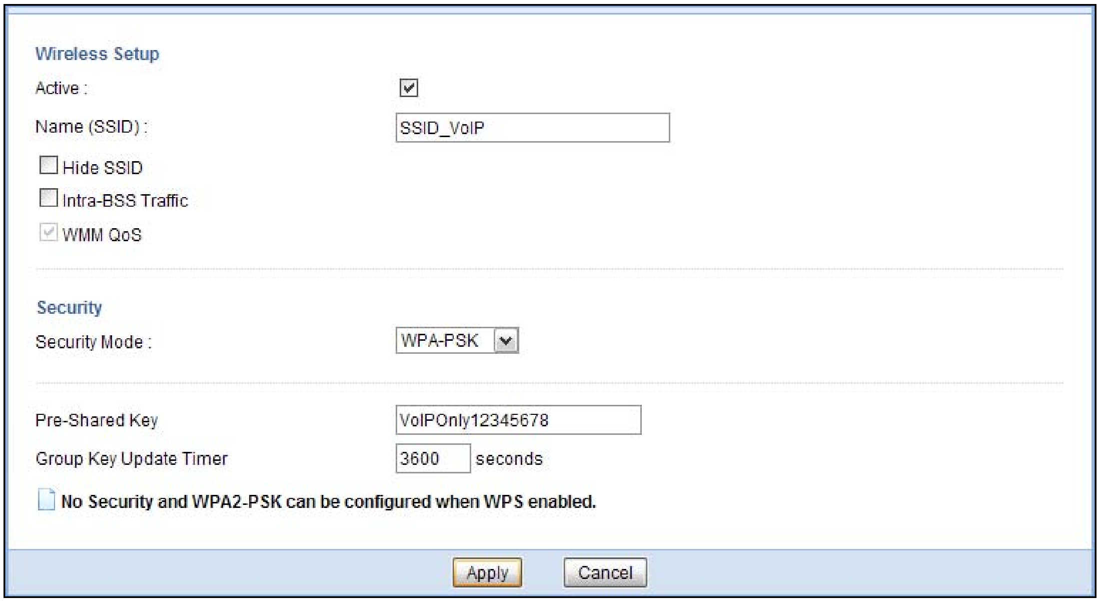
10 Click the **Edit** icon of the second entry to configure wireless and security settings for **SSID_VoIP**.



More AP Setup

#	Status	SSID	Security	Edit
1	●	SSID_Worker	WPA2-PSK	✎
2	○	ZyXEL_SSID2	No Security	✎
3	○	ZyXEL_SSID3	No Security	✎

11 Configure the screen as follows. You do not enable **Intra-BSS Traffic** for **SSID_VoIP**. Click **Apply**.



Wireless Setup

Active : ☑

Name (SSID) : SSID_VoIP

☐ Hide SSID

☐ Intra-BSS Traffic

☑ WMM QoS

Security

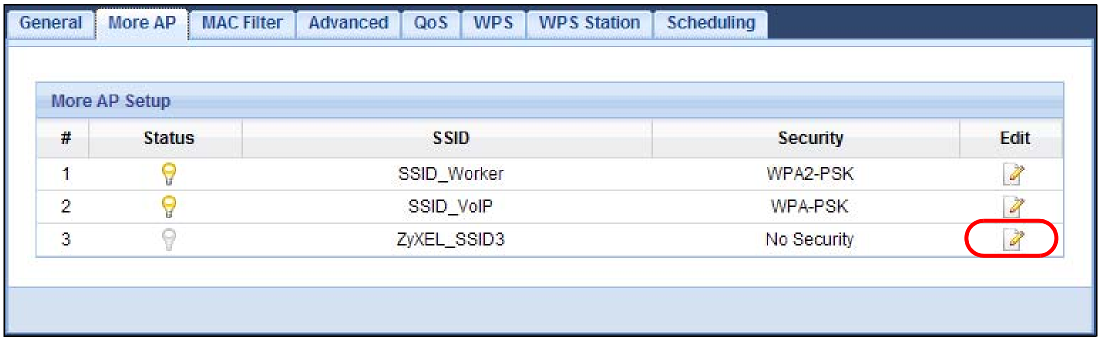
Security Mode : WPA-PSK

Pre-Shared Key: VoIPOnly12345678

Group Key Update Timer: 3600 seconds

No Security and WPA2-PSK can be configured when WPS enabled.

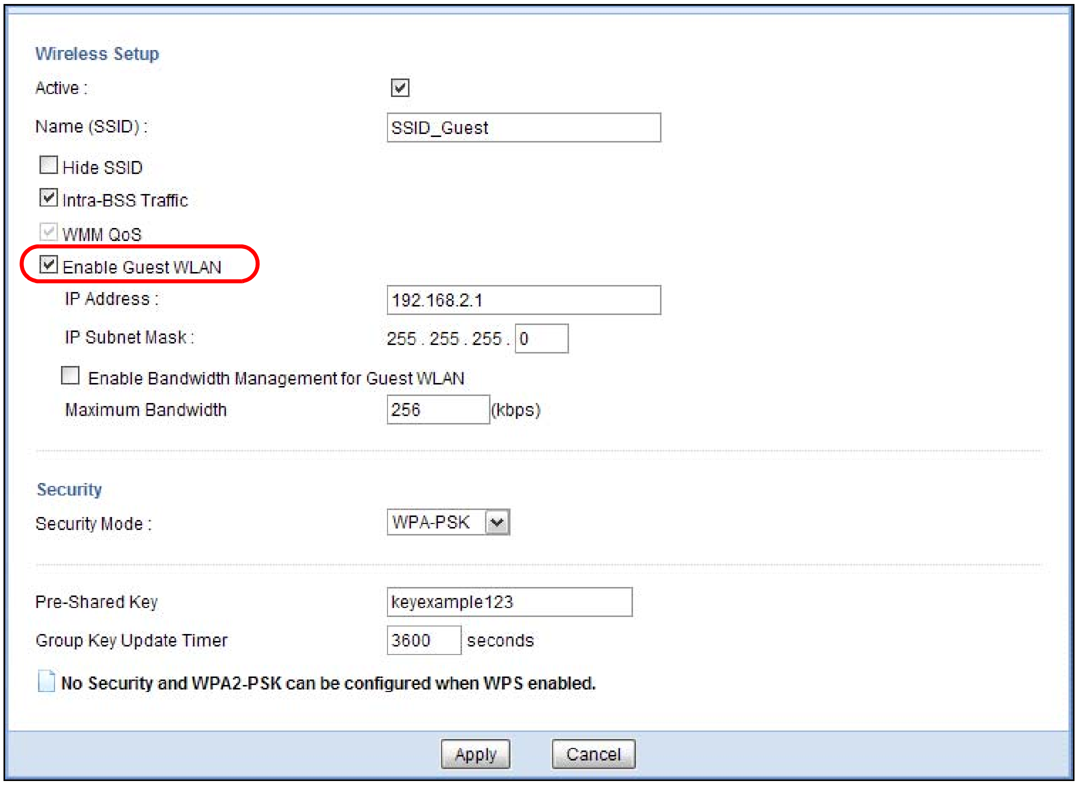
12 Click the **Edit** icon of the third entry to configure wireless and security settings for **SSID_Guest**.



More AP Setup

#	Status	SSID	Security	Edit
1	●	SSID_Worker	WPA2-PSK	✎
2	●	SSID_VoIP	WPA-PSK	✎
3	○	ZyXEL_SSID3	No Security	✎

13 Configure the screen as follows. In this example, you enable **Intra-BSS Traffic** for **SSID_Guest** to allow wireless clients in the same wireless network to communicate with each other. Select **Enable Guest WLAN** to allow clients to access the Internet only. Click **Apply**.



Wireless Setup

Active : ☑

Name (SSID) : SSID_Guest

☐ Hide SSID

☑ Intra-BSS Traffic

☑ WMM QoS

☑ Enable Guest WLAN

IP Address : 192.168.2.1

IP Subnet Mask : 255 . 255 . 255 . 0

☐ Enable Bandwidth Management for Guest WLAN

Maximum Bandwidth 256 (kbps)

Security

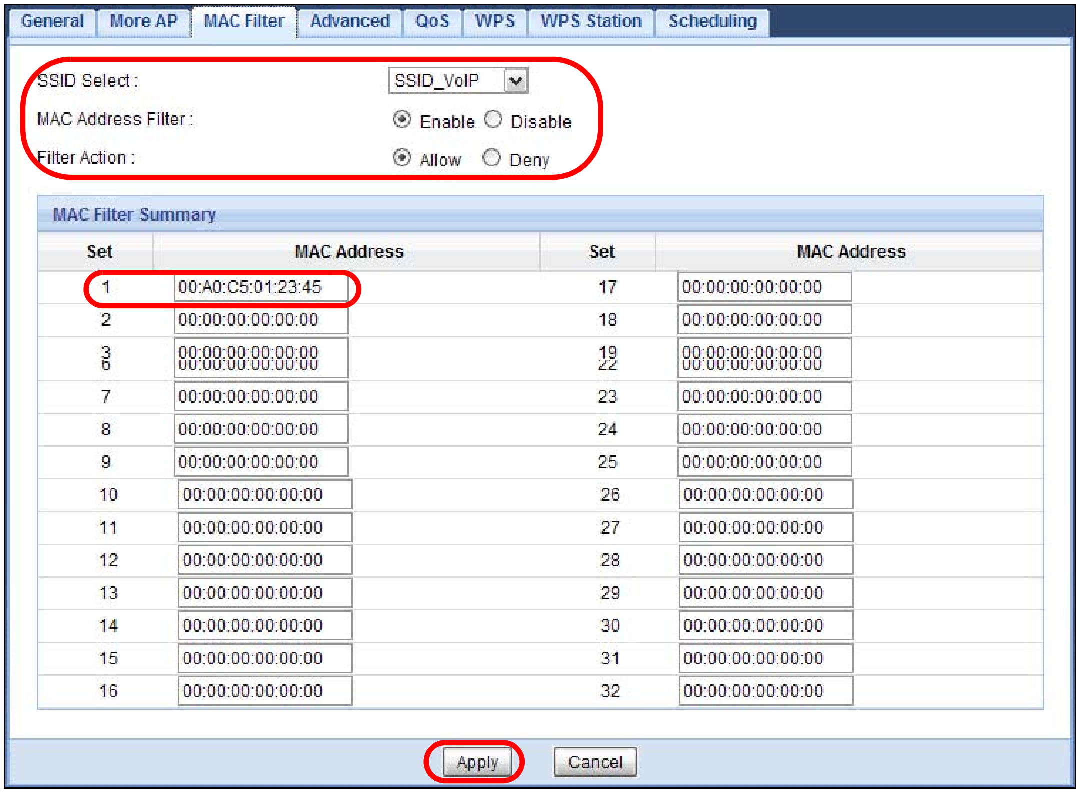
Security Mode : WPA-PSK

Pre-Shared Key keyexample123

Group Key Update Timer 3600 seconds

No Security and WPA2-PSK can be configured when WPS enabled.

14 Click the **MAC Filter** tab to configure MAC filtering for the **SSID_VoIP** wireless network. Select **SSID_VoIP** from the **SSID Select** drop-down list, enable MAC address filtering and set the **Filter Action** to **Allow**. Enter the VoIP device’s MAC address in the **Mac Address** field and click **Apply** to allow only the VoIP device to associate with the NBG6716 using this SSID.



SSID Select : SSID_VoIP

MAC Address Filter : ● Enable ○ Disable

Filter Action : ● Allow ○ Deny

MAC Filter Summary

Set	MAC Address	Set	MAC Address
1	00:A0:C5:01:23:45	17	00:00:00:00:00:00
2	00:00:00:00:00:00	18	00:00:00:00:00:00
3 6	00:00:00:00:00:00 00:00:00:00:00:00	19 22	00:00:00:00:00:00 00:00:00:00:00:00
7	00:00:00:00:00:00	23	00:00:00:00:00:00
8	00:00:00:00:00:00	24	00:00:00:00:00:00
9	00:00:00:00:00:00	25	00:00:00:00:00:00
10	00:00:00:00:00:00	26	00:00:00:00:00:00
11	00:00:00:00:00:00	27	00:00:00:00:00:00
12	00:00:00:00:00:00	28	00:00:00:00:00:00
13	00:00:00:00:00:00	29	00:00:00:00:00:00
14	00:00:00:00:00:00	30	00:00:00:00:00:00
15	00:00:00:00:00:00	31	00:00:00:00:00:00
16	00:00:00:00:00:00	32	00:00:00:00:00:00

PART II

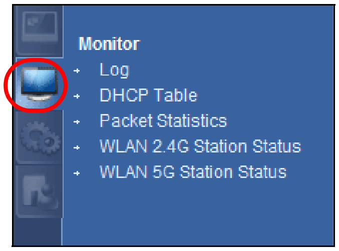
Technical Reference

Monitor

9.1 Overview

This chapter discusses read-only information related to the device state of the NBG6716.

To access the Monitor screens, go to **Expert Mode** after login, then click .



You can also click the links in the **Summary** table of the **Status** screen to view the packets sent/ received as well as the status of clients connected to the NBG6716.

9.2 What You Can Do

- Use the **Log** screens to see the logs for the activity on the NBG6716 and select the logs you wish to display (Section 9.3 on page 71).
- Use the **DHCP Table** screen to view information related to your DHCP status (Section 9.4 on page 72).
- use the **Packet Statistics** screen to view port status, packet specific statistics, the "system up time" and so on (Section 9.5 on page 73).
- Use the **WLAN 2.4G/5G Station Status** screen to view the wireless stations that are currently associated to the NBG6716 (Section 9.6 on page 74).

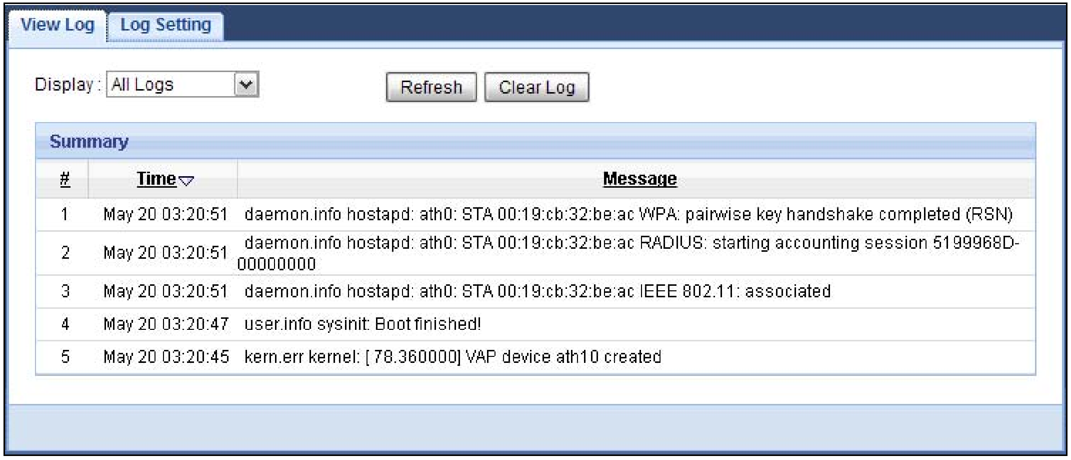
9.3 The Log Screen

The Web Configurator allows you to look at all of the NBG6716’s logs in one location and select the logs you wish to display.

9.3.1 View Log

Use the **View Log** screen to see the logged messages for the NBG6716. The log wraps around and deletes the old entries after it fills. Select what logs you want to see from the **Display** drop list. The log choices depend on your settings in the **Log Setting** screen. Click **Refresh** to renew the log screen. Click **Clear Log** to delete all the logs.

Figure 43 View Log



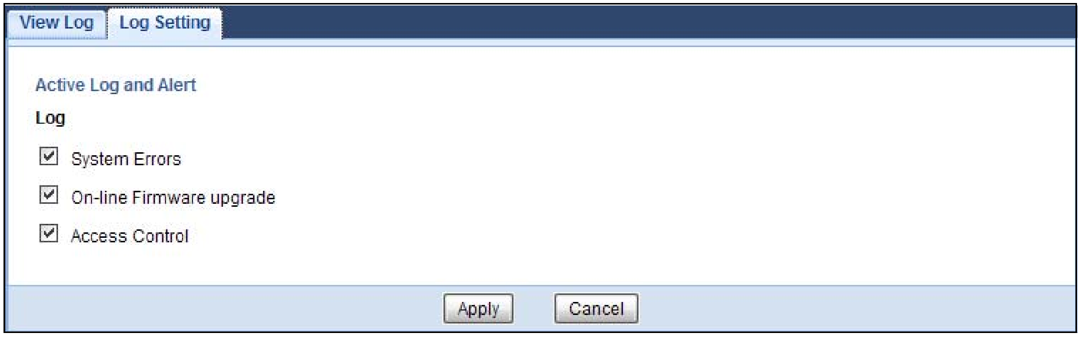
Summary

#	Time	Message
1	May 20 03:20:51	daemon.info hostapd: ath0: STA 00:19:cb:32:be:ac WPA: pairwise key handshake completed (RSN)
2	May 20 03:20:51	daemon.info hostapd: ath0: STA 00:19:cb:32:be:ac RADIUS: starting accounting session 5199968D-00000000
3	May 20 03:20:51	daemon.info hostapd: ath0: STA 00:19:cb:32:be:ac IEEE 802.11: associated
4	May 20 03:20:47	user.info sysinit: Boot finished!
5	May 20 03:20:45	kern.err kernel: [78.360000] VAP device ath10 created

9.3.2 Log Setting

You can configure which logs to display in the **View Log** screen. Go to the **Log Setting** screen and select the logs you wish to display. Click **Apply** to save your settings. Click **Cancel** to start the screen afresh.

Figure 44 Log Settings



Active Log and Alert

Log

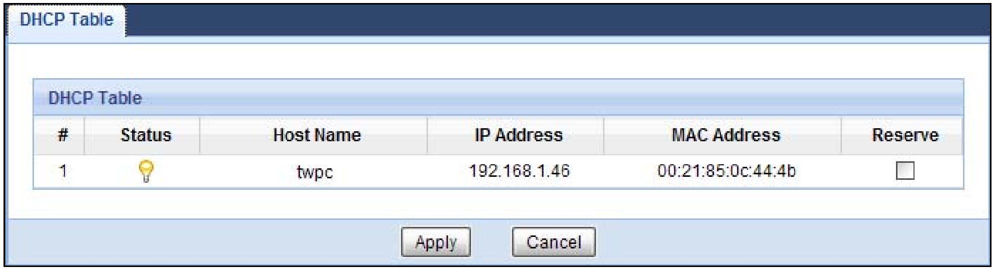
- ☑ System Errors
- ☑ On-line Firmware upgrade
- ☑ Access Control

9.4 DHCP Table

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 NBG6716's LAN as a DHCP server or disable it. When configured as a server, the NBG6716 provides the TCP/IP configuration for the clients. If DHCP service is disabled, you must have another DHCP server on that network, or else the computer must be manually configured.

Click **Monitor > DHCP Table** or **Configuration > Network > DHCP Server > Client List**. Read-only information here relates to your DHCP status. The DHCP table shows current DHCP client information (including **MAC Address**, and **IP Address**) of all network clients using the NBG6716's DHCP server.

Figure 45 Monitor > DHCP Table



#	Status	Host Name	IP Address	MAC Address	Reserve
1	●	twpc	192.168.1.46	00:21:85:0c:44:4b	□

The following table describes the labels in this screen.

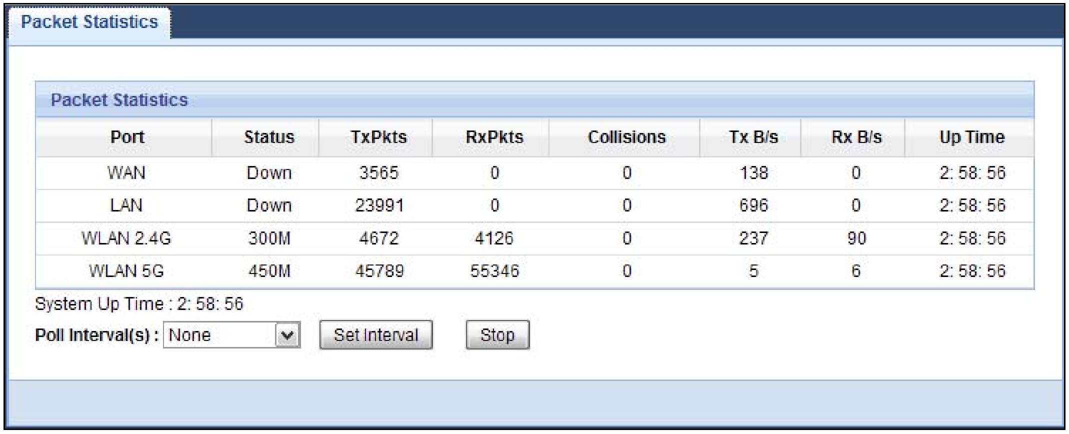
Table 24 Monitor > DHCP Table

LABEL	DESCRIPTION
#	This is the index number of the host computer.
Status	This field displays whether the connection to the host computer is up (a yellow bulb) or down (a gray bulb).
Host Name	This field displays the computer host name.
IP Address	This field displays the IP address relative to the # field listed above.
MAC Address	This field shows the MAC address of the computer with the name in the **Host Name** field. Every Ethernet device has a unique MAC (Media Access Control) address which uniquely identifies a device. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00:A0:C5:00:00:02.
Reserve	Select this if you want to reserve the IP address for this specific MAC address.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

9.5 Packet Statistics

Click **Monitor > Packet Statistics** or the **Packet Statistics (Details...)** hyperlink in the **Status** screen. Read-only information here includes port status, packet specific statistics and the "system up time". The **Poll Interval(s)** field is configurable and is used for refreshing the screen.

Figure 46 Monitor > Packet Statistics



Port	Status	TxPkts	RxPkts	Collisions	Tx B/s	Rx B/s	Up Time
WAN	Down	3565	0	0	138	0	2: 58: 56
LAN	Down	23991	0	0	696	0	2: 58: 56
WLAN 2.4G	300M	4672	4126	0	237	90	2: 58: 56
WLAN 5G	450M	45789	55346	0	5	6	2: 58: 56

System Up Time : 2: 58: 56

Poll Interval(s) : None

The following table describes the labels in this screen.

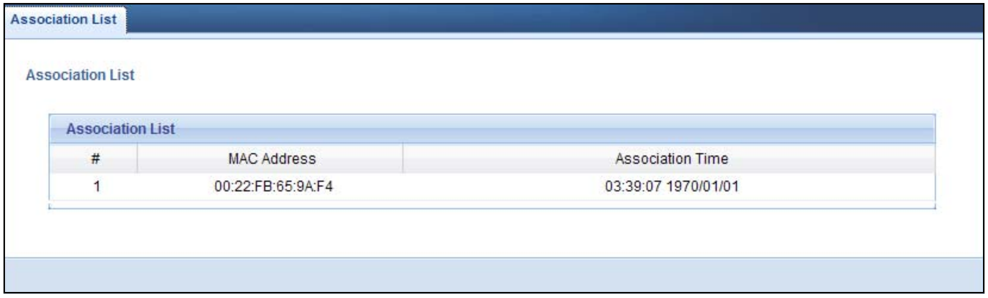
Table 25 Monitor > Packet Statistics

LABEL	DESCRIPTION
Port	This is the NBG6716’s interface type.
Status	For the LAN ports, this displays the port speed and duplex setting or **Down** when the line is disconnected. For the WAN port, it displays the port speed and duplex setting if you’re using Ethernet encapsulation and **Idle** (line (ppp) idle), **Dial** (starting to trigger a call) and **Drop** (dropping a call) if you're using PPPoE encapsulation. This field displays **Down** when the line is disconnected. For the 2.4GHz or 5GHz WLAN, it displays the maximum transmission rate when the WLAN is enabled and **Down** when the WLAN is disabled.
TxPkts	This is the number of transmitted packets on this port.
RxPkts	This is the number of received packets on this port.
Collisions	This is the number of collisions on this port.
Tx B/s	This displays the transmission speed in bytes per second on this port.
Rx B/s	This displays the reception speed in bytes per second on this port.
Up Time	This is the total time the NBG6716 has been for each session.
System Up Time	This is the total time the NBG6716 has been on.
Poll Interval(s)	Enter the time interval in seconds for refreshing statistics in this field.
Set Interval	Click this button to apply the new poll interval you entered in the **Poll Interval(s)** field.
Stop	Click **Stop** to stop refreshing statistics.

9.6 WLAN Station Status

Click **Monitor > WLAN 2.4G/5G Station Status** or the **WLAN 2.4G/5G Station Status (Details...)** hyperlink in the **Status** screen. View the wireless stations that are currently associated to the NBG6716’s 2.4GHz or 5GHz wireless network in the **Association List**. Association means that a wireless client (for example, your network or computer with a wireless network card) has connected successfully to the AP (or wireless router) using the same SSID, channel and security settings.

Figure 47 Monitor > WLAN Station Status



Association List

Association List

#	MAC Address	Association Time
1	00:22:FB:65:9A:F4	03:39:07 1970/01/01

The following table describes the labels in this screen.

Table 26 Monitor > WLAN Station Status

LABEL	DESCRIPTION
#	This is the index number of an associated wireless station.
MAC Address	This field displays the MAC address of an associated wireless station.
Association Time	This field displays the time a wireless station first associated with the NBG6716's WLAN.

10

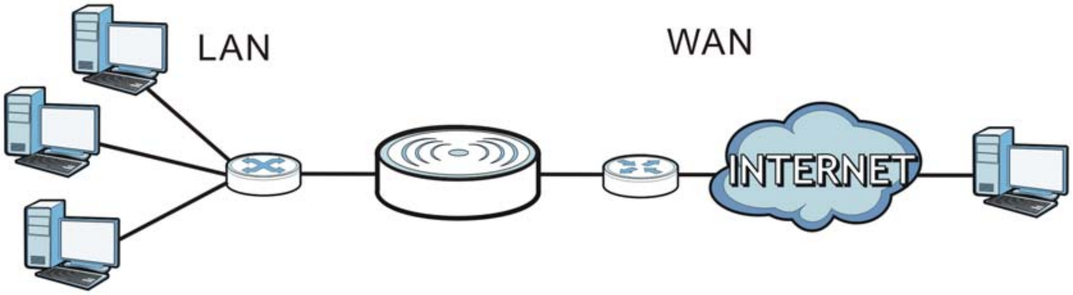
WAN

10.1 Overview

This chapter discusses the NBG6716’s **WAN** screens. Use these screens to configure your NBG6716 for Internet access.

A WAN (Wide Area Network) connection is an outside connection to another network or the Internet. It connects your private networks such as a LAN (Local Area Network) and other networks, so that a computer in one location can communicate with computers in other locations.

Figure 48 LAN and WAN



10.2 What You Can Do

- Use the **Internet Connection** screen to enter your ISP information and set how the computer acquires its IP, DNS and WAN MAC addresses (Section 10.4 on page 78).
- Use the **Advanced** screen to enable multicasting, configure Windows networking and bridge (Section 10.5 on page 82).

10.3 What You Need To Know

The information in this section can help you configure the screens for your WAN connection, as well as enable/disable some advanced features of your NBG6716.

10.3.1 Configuring Your Internet Connection

Encapsulation Method

Encapsulation is used to include data from an upper layer protocol into a lower layer protocol. To set up a WAN connection to the Internet, you need to use the same encapsulation method used by your ISP (Internet Service Provider). If your ISP offers a dial-up Internet connection using PPPoE (PPP over Ethernet) or PPTP (Point-to-Point Tunneling Protocol), they should also provide a username and password (and service name) for user authentication.

WAN IP Address

The WAN IP address is an IP address for the NBG6716, which makes it accessible from an outside network. It is used by the NBG6716 to communicate with other devices in other networks. It can be static (fixed) or dynamically assigned by the ISP each time the NBG6716 tries to access the Internet.

If your ISP assigns you a static WAN IP address, they should also assign you the subnet mask and DNS server IP address(es) (and a gateway IP address if you use the Ethernet or ENET ENCAP encapsulation method).

DNS Server Address Assignment

Use Domain Name System (DNS) 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 NBG6716 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 NBG6716’s WAN IP address), set the DNS server fields to get the DNS server address from the ISP.

WAN MAC Address

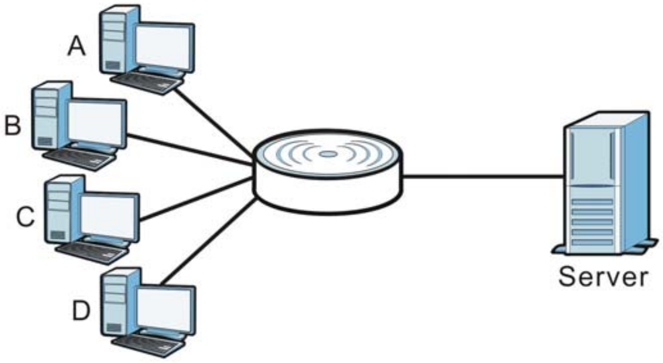
The MAC address screen allows users to configure the WAN port's MAC address by either using the factory default or cloning the MAC address from a computer on your LAN. Choose **Factory Default** to select the factory assigned default MAC Address.

Otherwise, click **Clone the computer's MAC address - IP Address** and enter the IP address of the computer on the LAN whose MAC you are cloning. Once it is successfully configured, the address will be copied to configuration file. It is recommended that you clone the MAC address prior to hooking up the WAN Port.

Multicast

Traditionally, IP packets are transmitted in one of either two ways - Unicast (1 sender - 1 recipient) or Broadcast (1 sender - everybody on the network). Multicast delivers IP packets to a group of hosts on the network - not everybody and not just 1.

Figure 49 Multicast Example



In the multicast example above, systems A and D comprise one multicast group. In multicasting, the server only needs to send one data stream and this is delivered to systems A and D.

IGMP (Internet Group Multicast Protocol) is a network-layer protocol used to establish membership in a multicast group - it is not used to carry user data. The NBG6716 supports both IGMP version 1 (**IGMP-v1**) and IGMP version 2 (**IGMP-v2**).

At start up, the NBG6716 queries all directly connected networks to gather group membership. After that, the NBG6716 periodically updates this information. IP multicasting can be enabled/ disabled on the NBG6716 WAN interface in the Web Configurator (**WAN**). Select **None** to disable IP multicasting on these interfaces.

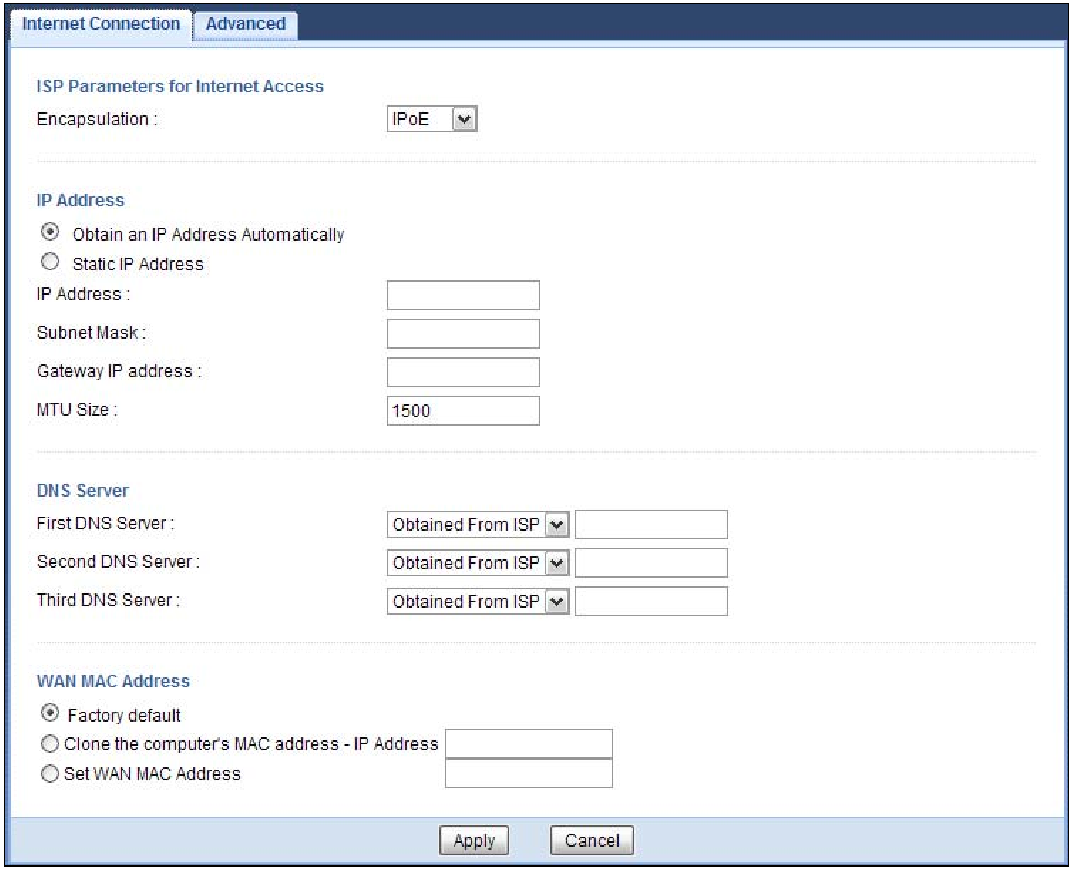
10.4 Internet Connection

Use this screen to change your NBG6716's Internet access settings. Click **Network** > **WAN** from the **Configuration** menu. The screen differs according to the encapsulation you choose.

10.4.1 IPoE Encapsulation

This screen displays when you select **IPoE** encapsulation.

Figure 50 Network > WAN > Internet Connection: IPoE Encapsulation



ISP Parameters for Internet Access

Encapsulation : IPoE

IP Address

● Obtain an IP Address Automatically

○ Static IP Address

IP Address :

Subnet Mask :

Gateway IP address :

MTU Size : 1500

DNS Server

First DNS Server : Obtained From ISP

Second DNS Server : Obtained From ISP

Third DNS Server : Obtained From ISP

WAN MAC Address

● Factory default

○ Clone the computer's MAC address - IP Address

○ Set WAN MAC Address

The following table describes the labels in this screen.

Table 27 Network > WAN > Internet Connection: IPoE Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Encapsulation	You must choose the **IPoE** option when the WAN port is used as a regular Ethernet.
IP Address	
Obtain an IP Address Automatically	Select this option If your ISP did not assign you a fixed IP address. This is the default selection.
Static IP Address	Select this option If the ISP assigned a fixed IP address.
IP Address	Enter your WAN IP address in this field if you selected **Static IP Address**.
Subnet Mask	Enter the **Subnet Mask** in this field.
Gateway IP Address	Enter a **Gateway IP Address** (if your ISP gave you one) in this field.
MTU Size	Enter the MTU (Maximum Transmission Unit) size for each packet. If a larger packet arrives, the NBG6716 divides it into smaller fragments.
DNS Server	

Table 27 Network > WAN > Internet Connection: IPoE Encapsulation (continued)

LABEL	DESCRIPTION
First DNS Server Second DNS Server Third DNS Server	Select **Obtained From ISP** if your ISP dynamically assigns DNS server information (and the NBG6716's WAN IP address). The field to the right displays the (read-only) DNS server IP address that the ISP assigns. Select **User-Defined** if you have the IP address of a DNS server. Enter the DNS server's IP address in the field to the right. If you chose **User-Defined**, but leave the IP address set to 0.0.0.0, **User-Defined** changes to **None** after you click **Apply**. If you set a second choice to **User-Defined**, and enter the same IP address, the second **User-Defined** changes to **None** after you click **Apply**. Select **None** if you do not want to configure DNS servers. If you do not configure a DNS server, you must know the IP address of a computer in order to access it.
WAN MAC Address	The MAC address section allows users to configure the WAN port's MAC address by either using the NBG6716’s MAC address, copying the MAC address from a computer on your LAN or manually entering a MAC address.
Factory default	Select **Factory default** to use the factory assigned default MAC Address.
Clone the computer’s MAC address - IP Address	Select **Clone the computer's MAC address - IP Address** and enter the IP address of the computer on the LAN whose MAC you are cloning.
Set WAN MAC Address	Select this option and enter the MAC address you want to use.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

10.4.2 PPPoE Encapsulation

The NBG6716 supports PPPoE (Point-to-Point Protocol over Ethernet). PPPoE is an IETF standard (RFC 2516) specifying how a personal computer (PC) interacts with a broadband modem (DSL, cable, wireless, etc.) connection. The **PPP over Ethernet** option is for a dial-up connection using PPPoE.

For the service provider, PPPoE offers an access and authentication method that works with existing access control systems (for example Radius).

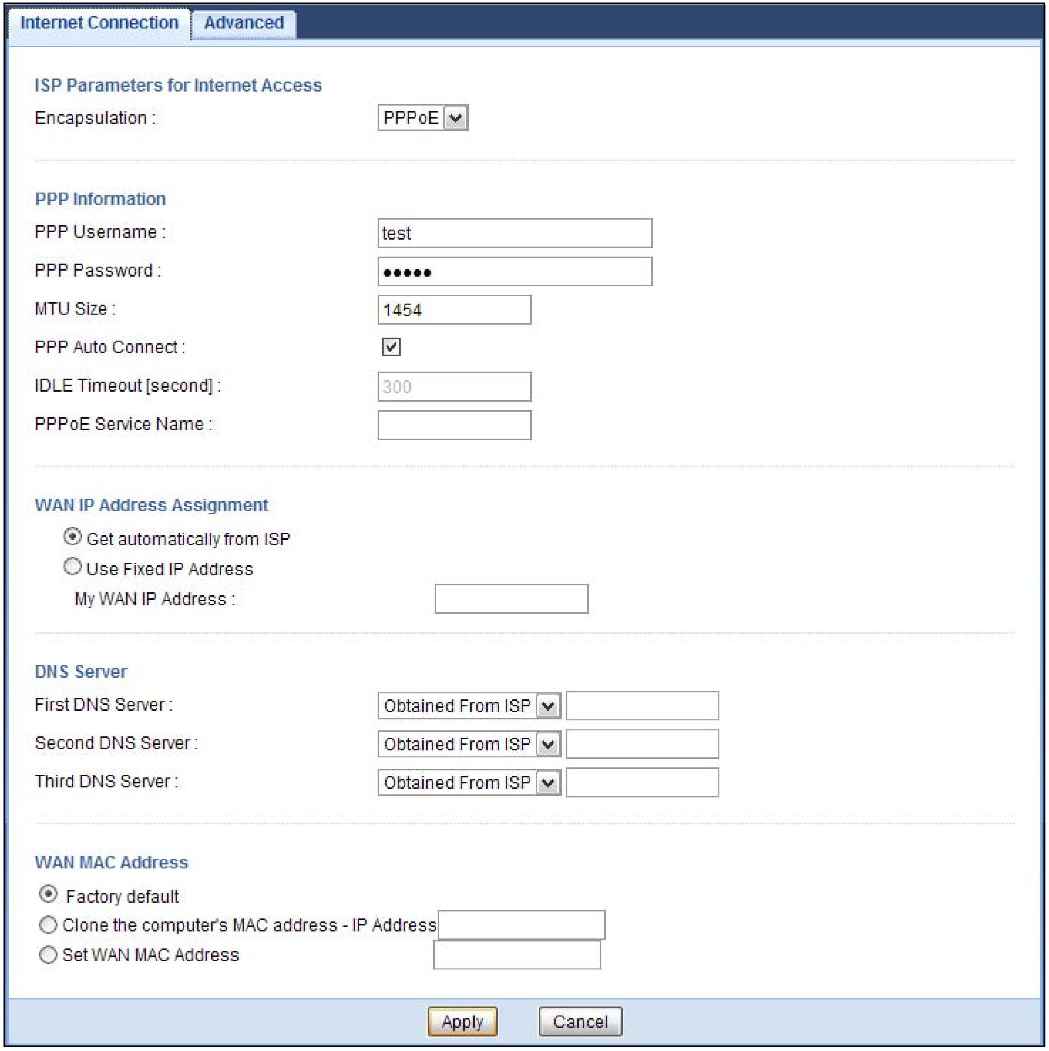
One of the benefits of PPPoE is the ability to let you access one of multiple network services, a function known as dynamic service selection. This enables the service provider to easily create and offer new IP services for individuals.

Operationally, PPPoE saves significant effort for both you and the ISP or carrier, as it requires no specific configuration of the broadband modem at the customer site.

By implementing PPPoE directly on the NBG6716 (rather than individual computers), the computers on the LAN do not need PPPoE software installed, since the NBG6716 does that part of the task. Furthermore, with NAT, all of the LANs’ computers will have access.

This screen displays when you select **PPPoE** encapsulation.

Figure 51 Network > WAN > Internet Connection: PPPoE Encapsulation



ISP Parameters for Internet Access

Encapsulation : PPPoE

PPP Information

PPP Username : test

PPP Password : •••••

MTU Size : 1454

PPP Auto Connect : ☑

IDLE Timeout [second] : 300

PPPoE Service Name :

WAN IP Address Assignment

● Get automatically from ISP

○ Use Fixed IP Address

My WAN IP Address :

DNS Server

First DNS Server : Obtained From ISP

Second DNS Server : Obtained From ISP

Third DNS Server : Obtained From ISP

WAN MAC Address

● Factory default

○ Clone the computer's MAC address - IP Address

○ Set WAN MAC Address

The following table describes the labels in this screen.

Table 28 Network > WAN > Internet Connection: PPPoE Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Encapsulation	Select **PPPoE** if you connect to your Internet via dial-up.
PPP Information	
PPP Username	Type the user name given to you by your ISP.
PPP Password	Type the password associated with the user name above.
MTU Size	Enter the Maximum Transmission Unit (MTU) or the largest packet size per frame that your NBG6716 can receive and process.
PPP Auto Connect	Select this option if you do not want the connection to time out.
Idle Timeout (second)	This value specifies the time in minutes that elapses before the router automatically disconnects from the PPPoE server.

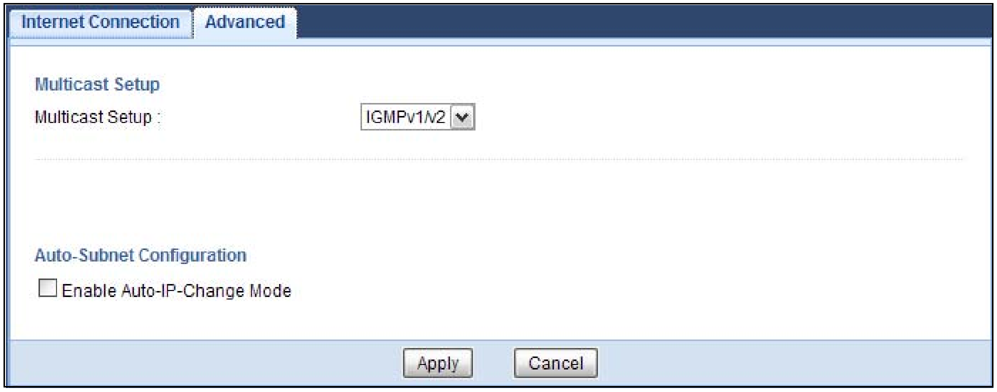
Table 28 Network > WAN > Internet Connection: PPPoE Encapsulation (continued)

LABEL	DESCRIPTION
PPPoE Service Name	Enter the PPPoE service name specified in the ISP account.
WAN IP Address Assignment	
Get automatically from ISP	Select this option If your ISP did not assign you a fixed IP address. This is the default selection.
Use Fixed IP Address	Select this option If the ISP assigned a fixed IP address.
My WAN IP Address	Enter your WAN IP address in this field if you selected **Use Fixed IP Address**.
DNS Server	
First DNS Server Second DNS Server Third DNS Server	Select **Obtained From ISP** if your ISP dynamically assigns DNS server information (and the NBG6716's WAN IP address). The field to the right displays the (read-only) DNS server IP address that the ISP assigns. Select **User-Defined** if you have the IP address of a DNS server. Enter the DNS server's IP address in the field to the right. If you chose **User-Defined**, but leave the IP address set to 0.0.0.0, **User-Defined** changes to **None** after you click **Apply**. If you set a second choice to **User-Defined**, and enter the same IP address, the second **User-Defined** changes to **None** after you click **Apply**. Select **None** if you do not want to configure DNS servers. If you do not configure a DNS server, you must know the IP address of a computer in order to access it.
WAN MAC Address	The MAC address section allows users to configure the WAN port's MAC address by using the NBG6716's MAC address, copying the MAC address from a computer on your LAN or manually entering a MAC address.
Factory default	Select **Factory default** to use the factory assigned default MAC Address.
Clone the computer's MAC address - IP Address	Select **Clone the computer's MAC address - IP Address** and enter the IP address of the computer on the LAN whose MAC you are cloning.
Set WAN MAC Address	Select this option and enter the MAC address you want to use.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

10.5 Advanced WAN Screen

To change your NBG6716's advanced WAN settings, click **Network** > **WAN** > **Advanced**. The screen appears as shown.

Figure 52 Network > WAN > Advanced



Multicast Setup

Multicast Setup : IGMPv1/v2

Auto-Subnet Configuration

□ Enable Auto-IP-Change Mode

The following table describes the labels in this screen.

Table 29 Network > WAN > Advanced

LABEL	DESCRIPTION
Multicast Setup	
Multicast	Select **IGMPv1/v2** to enable multicasting. This applies to traffic routed from the WAN to the LAN. Select **None** to disable this feature. This may cause incoming traffic to be dropped or sent to all connected network devices.
Auto-Subnet Configuration	
Enable Auto-IP-Change mode	Select this option to have the NBG6716 change its LAN IP address to 10.0.0.1 or 192.168.1.1 accordingly when the NBG6716 gets a dynamic WAN IP address in the same subnet as the LAN IP address 192.168.1.1 or 10.0.0.1. The NAT, DHCP server and firewall functions on the NBG6716 are still available in this mode.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

11

Wireless LAN

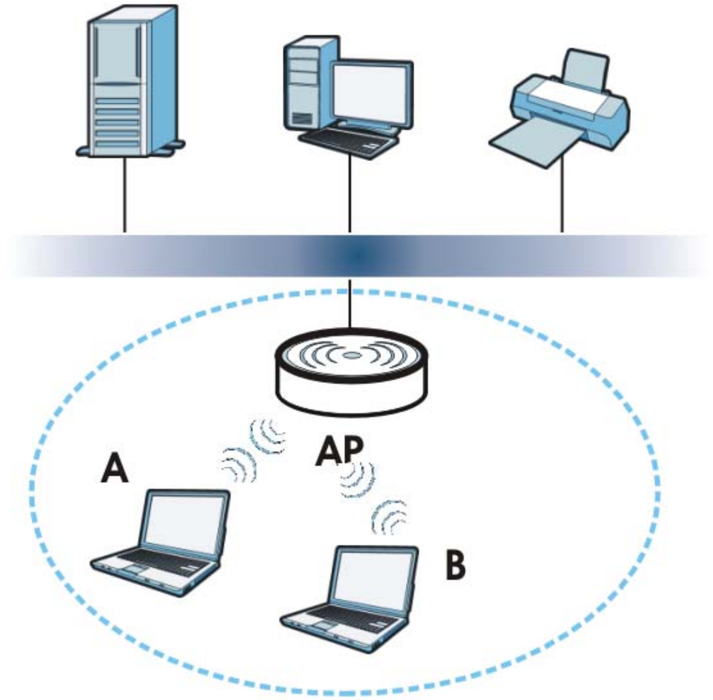
11.1 Overview

This chapter discusses how to configure the wireless network settings in your NBG6716. The NBG6716 is able to function both 2.4GHz and 5GHz network at the same time. You can have different wireless and wireless security settings for 2.4GHz and 5GHz wireless LANs. Click **Configuration > Network > Wireless LAN 2.4G** or **Wireless LAN 5G** to configure to do so.

See the appendices for more detailed information about wireless networks.

The following figure provides an example of a wireless network.

Figure 53 Example of a Wireless Network



The wireless network is the part in the blue circle. In this wireless network, devices **A** and **B** are called wireless clients. The wireless clients use the access point (AP) to interact with other devices (such as the printer) or with the Internet. Your NBG6716 is the AP.

11.1.1 What You Can Do

- Use the **General** screen to turn the wireless connection on or off, set up wireless security between the NBG6716 and the wireless clients, and make other basic configuration changes (Section 11.2 on page 89).
- Use the **More AP** screen to set up multiple wireless networks on your NBG6716 (Section 11.4 on page 97).
- Use the **MAC Filter** screen to allow or deny wireless stations based on their MAC addresses from connecting to the NBG6716 (Section 11.5 on page 100).
- Use the **Advanced** screen to allow intra-BSS networking and set the RTS/CTS Threshold (Section 11.6 on page 102).
- Use the **QoS** screen to ensure Quality of Service (QoS) in your wireless network (Section 11.7 on page 102).
- Use the **WPS** screen to quickly set up a wireless network with strong security, without having to configure security settings manually (Section 11.8 on page 103).
- Use the **WPS Station** screen to add a wireless station using WPS (Section 11.9 on page 105).
- Use the **Scheduling** screen to set the times your wireless LAN is turned on and off (Section 11.10 on page 105).

11.1.2 What You Should Know

Every wireless network must follow these basic guidelines.

- Every wireless client in the same wireless network must use the same SSID.

  The SSID is the name of the wireless network. It stands for Service Set IDentity.
- If two wireless networks overlap, they should use different channels.

  Like radio stations or television channels, each wireless network uses a specific channel, or frequency, to send and receive information.
- Every wireless client in the same wireless network must use security compatible with the AP.

  Security stops unauthorized devices from using the wireless network. It can also protect the information that is sent in the wireless network.

Wireless Security Overview

The following sections introduce different types of wireless security you can set up in the wireless network.

SSID

Normally, the AP acts like a beacon and regularly broadcasts the SSID in the area. You can hide the SSID instead, in which case the AP does not broadcast the SSID. In addition, you should change the default SSID to something that is difficult to guess.

This type of security is fairly weak, however, because there are ways for unauthorized devices to get the SSID. In addition, unauthorized devices can still see the information that is sent in the wireless network.

MAC Address Filter

Every wireless client has a unique identification number, called a MAC address.[1] A MAC address is usually written using twelve hexadecimal characters[2]; for example, 00A0C5000002 or 00:A0:C5:00:00:02. To get the MAC address for each wireless client, see the appropriate User's Guide or other documentation.

You can use the MAC address filter to tell the AP which wireless clients are allowed or not allowed to use the wireless network. If a wireless client is allowed to use the wireless network, it still has to have the correct settings (SSID, channel, and security). If a wireless client is not allowed to use the wireless network, it does not matter if it has the correct settings.

This type of security does not protect the information that is sent in the wireless network. Furthermore, there are ways for unauthorized devices to get the MAC address of an authorized wireless client. Then, they can use that MAC address to use the wireless network.

User Authentication

You can make every user log in to the wireless network before they can use it. This is called user authentication. However, every wireless client in the wireless network has to support IEEE 802.1x to do this.

For wireless networks, there are two typical places to store the user names and passwords for each user.

- In the AP: this feature is called a local user database or a local database.
- In a RADIUS server: this is a server used in businesses more than in homes.

If your AP does not provide a local user database and if you do not have a RADIUS server, you cannot set up user names and passwords for your users.

Unauthorized devices can still see the information that is sent in the wireless network, even if they cannot use the wireless network. Furthermore, there are ways for unauthorized wireless users to get a valid user name and password. Then, they can use that user name and password to use the wireless network.

Local user databases also have an additional limitation that is explained in the next section.

Encryption

Wireless networks can use encryption to protect the information that is sent in the wireless network. Encryption is like a secret code. If you do not know the secret code, you cannot understand the message.

[1] Some wireless devices, such as scanners, can detect wireless networks but cannot use wireless networks. These kinds of wireless devices might not have MAC addresses.

[2] Hexadecimal characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F.

The types of encryption you can choose depend on the type of user authentication. (See page 86 for information about this.)

Table 30 Types of Encryption for Each Type of Authentication

	NO AUTHENTICATION	RADIUS SERVER
Weakest	No Security	WPA
↕	Static WEP	
	WPA-PSK	
Strongest	WPA2-PSK	WPA2

For example, if the wireless network has a RADIUS server, you can choose **WPA** or **WPA2**. If users do not log in to the wireless network, you can choose no encryption, **Static WEP**, **WPA-PSK**, or **WPA2-PSK**.

Usually, you should set up the strongest encryption that every wireless client in the wireless network supports. For example, suppose the AP does not have a local user database, and you do not have a RADIUS server. Therefore, there is no user authentication. Suppose the wireless network has two wireless clients. Device A only supports WEP, and device B supports WEP and WPA. Therefore, you should set up **Static WEP** in the wireless network.

Note: It is recommended that wireless networks use **WPA-PSK**, **WPA**, or stronger encryption. IEEE 802.1x and WEP encryption are better than none at all, but it is still possible for unauthorized devices to figure out the original information pretty quickly.

Note: It is not possible to use **WPA-PSK**, **WPA** or stronger encryption with a local user database. In this case, it is better to set up stronger encryption with no authentication than to set up weaker encryption with the local user database.

When you select **WPA2** or **WPA2-PSK** in your NBG6716, you can also select an option (**WPA/ WPA-PSK Compatible**) to support WPA/WPA-PSK as well. In this case, if some wireless clients support WPA and some support WPA2, you should set up **WPA2-PSK** or **WPA2** (depending on the type of wireless network login) and select the **WPA/WPA-PSK Compatible** option in the NBG6716.

Many types of encryption use a key to protect the information in the wireless network. The longer the key, the stronger the encryption. Every wireless client in the wireless network must have the same key.

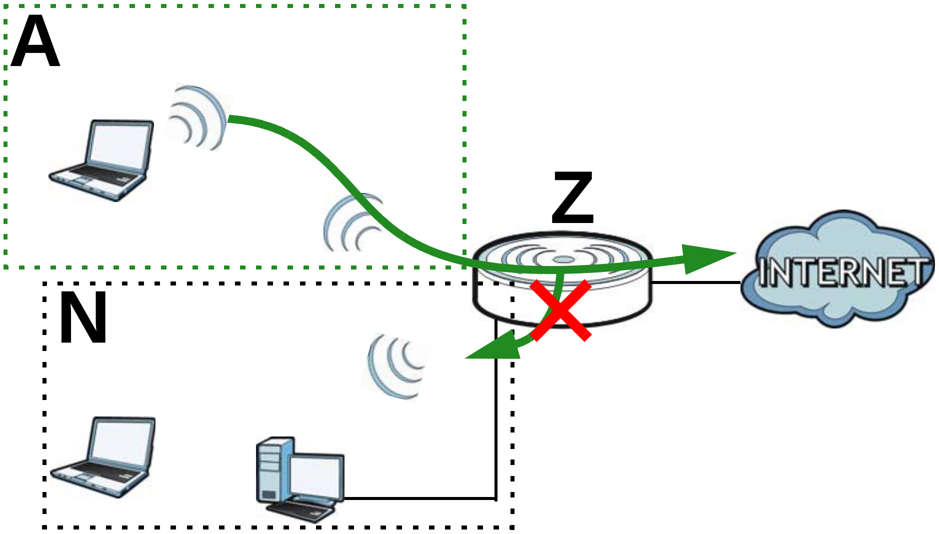
Guest WLAN

Guest WLAN allows you to set up a wireless network where users can access to Internet via the NBG6716 (**Z**), but not other networks connected to the **Z**. In the following figure, a guest user can access the Internet from the guest wireless network **A** via **Z** but not the home or company network **N**.

Note: The home or company network **N** and Guest WLAN network are independent networks.

Note: Only Router mode supports guest WLAN.

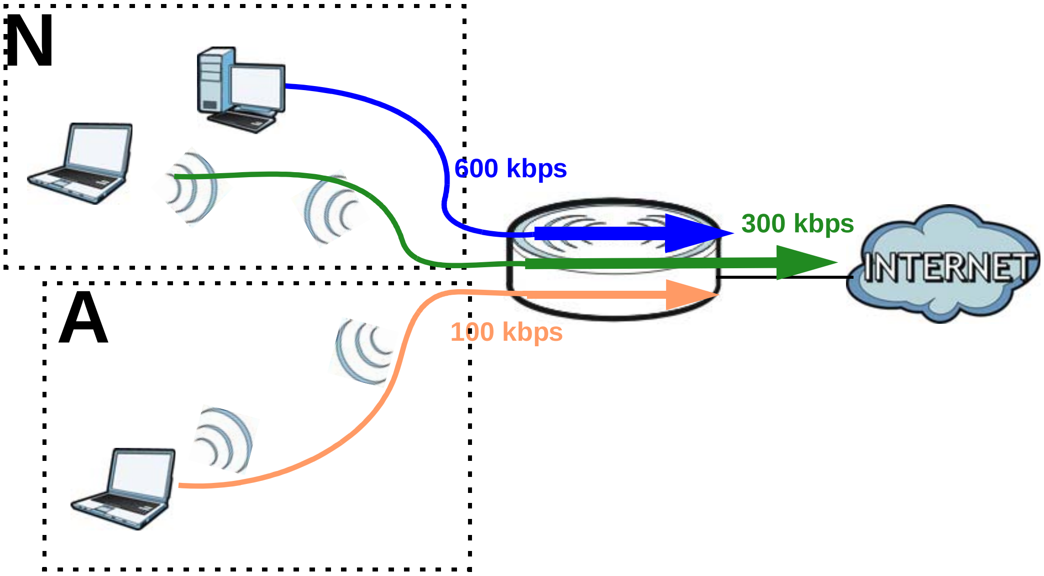
Figure 54 Guest Wireless LAN Network



Guest WLAN Bandwidth

The Guest WLAN Bandwidth function allows you to restrict the maximum bandwidth for the guest wireless network. Additionally, you can also define bandwidth for your home or office network. An example is shown next to define maximum bandwidth for your networks (**A** is Guest WLAN and **N** is home or company network.)

Figure 55 Example: Bandwidth for Different Networks



WPS

WiFi Protected Setup (WPS) is an industry standard specification, defined by the WiFi Alliance. WPS allows you to quickly set up a wireless network with strong security, without having to configure security settings manually. Depending on the devices in your network, you can either press a button (on the device itself, or in its configuration utility) or enter a PIN (Personal Identification

Number) in the devices. Then, they connect and set up a secure network by themselves. See how to set up a secure wireless network using WPS in the Section 8.2 on page 57.

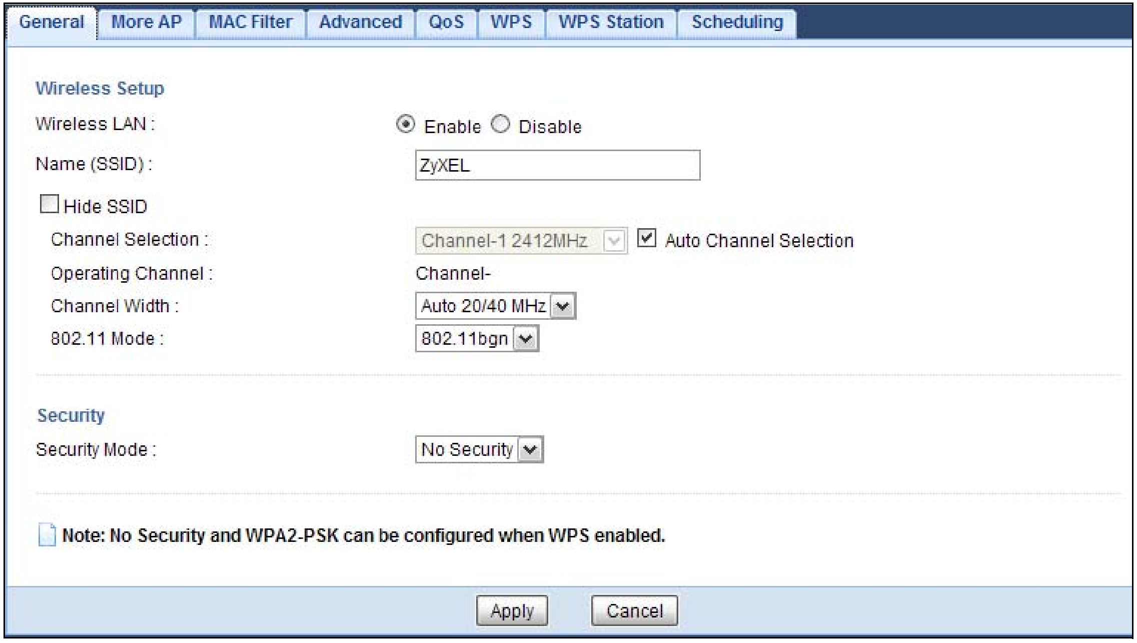
11.2 General Wireless LAN Screen

Use this screen to configure the SSID and wireless security of the wireless LAN.

Note: If you are configuring the NBG6716 from a computer connected to the wireless LAN and you change the NBG6716's SSID, channel or security settings, you will lose your wireless connection when you press **Apply** to confirm. You must then change the wireless settings of your computer to match the NBG6716's new settings.

Click **Network** > **Wireless LAN 2.4G/5G** to open the **General** screen.

Figure 56 Network > Wireless LAN 2.4G/5G > General



Wireless Setup

Wireless LAN : ● Enable ○ Disable

Name (SSID) : ZyXEL

□ Hide SSID

Channel Selection : Channel-1 2412MHz ☑ Auto Channel Selection

Operating Channel : Channel-

Channel Width : Auto 20/40 MHz

802.11 Mode : 802.11bgn

Security

Security Mode : No Security

Note: No Security and WPA2-PSK can be configured when WPS enabled.

The following table describes the general wireless LAN labels in this screen.

Table 31 Network > Wireless LAN 2.4G/5G > General

LABEL	DESCRIPTION
Wireless LAN	Select **Enable** to activate the 2.4GHz and/or 5GHz wireless LAN. Select **Disable** to turn it off. You can enable or disable both 2.4GHz and 5GHz wireless LANs by using the **WIFI** button located on the back panel of the NBG6716.
Name (SSID)	The SSID (Service Set IDentity) identifies the Service Set with which a wireless client is associated. Enter a descriptive name (up to 32 printable characters found on a typical English language keyboard) for the wireless LAN.
Hide SSID	Select this check box to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool.

Table 31 Network > Wireless LAN 2.4G/5G > General (continued)

LABEL	DESCRIPTION
Channel Selection	Set the operating frequency/channel depending on your particular region. Select a channel from the drop-down list box. The options vary depending on the frequency band and the country you are in. Refer to the Connection Wizard chapter for more information on channels. This option is only available if **Auto Channel Selection** is disabled.
Auto Channel Selection	Select this check box for the NBG6716 to automatically choose the channel with the least interference. Deselect this check box if you wish to manually select the channel using the **Channel Selection** field.
Operating Channel	This displays the channel the NBG6716 is currently using.
Channel Width	Select the wireless channel width used by NBG6716. A standard 20MHz channel offers transfer speeds of up to 144Mbps (2.4GHz) or 217Mbps (5GHZ) whereas a 40MHz channel uses two standard channels and offers speeds of up to 300Mbps (2.4GHz) or 450Mbps (5GHZ). An IEEE 802.11ac-specific 80MHz channel offers speeds of up to 1.3Gbps. Because not all devices support 40 MHz and/or 80 MHz channels, select **Auto 20/40 MHz** or **Auto 20/40/80 MHz** to allow the NBG6716 to adjust the channel bandwidth automatically. **40 MHz** (channel bonding or dual channel) bonds two adjacent radio channels to increase throughput. A **80 MHz** channel consists of two adjacent 40 MHz channels. The wireless clients must also support **40 MHz** or **80 MHz**. It is often better to use the 20 MHz setting in a location where the environment hinders the wireless signal. Select **20 MHz** if you want to lessen radio interference with other wireless devices in your neighborhood or the wireless clients do not support channel bonding.
802.11 Mode	If you are in the **Wireless LAN 2.4G > General** screen, you can select from the following: • **802.11b**: allows either IEEE 802.11b or IEEE 802.11g compliant WLAN devices to associate with the NBG6716. In this mode, all wireless devices can only transmit at the data rates supported by IEEE 802.11b. • **802.11g**: allows IEEE 802.11g compliant WLAN devices to associate with the Device. IEEE 802.11b compliant WLAN devices can associate with the NBG6716 only when they use the short preamble type. • **802.11bg**: allows either IEEE 802.11b or IEEE 802.11g compliant WLAN devices to associate with the NBG6716. The NBG6716 adjusts the transmission rate automatically according to the wireless standard supported by the wireless devices. • **802.11n**: allows IEEE 802.11n compliant WLAN devices to associate with the NBG6716. This can increase transmission rates, although IEEE 802.11b or IEEE 802.11g clients will not be able to connect to the NBG6716. I • **802.11gn**: allows either IEEE 802.11g or IEEE 802.11n compliant WLAN devices to associate with the NBG6716. The transmission rate of your NBG6716 might be reduced. • **802.11 bgn**: allows IEEE802.11b, IEEE802.11g and IEEE802.11n compliant WLAN devices to associate with the NBG6716. The transmission rate of your NBG6716 might be reduced. If you are in the **Wireless LAN 5G > General** screen, you can select from the following: • **802.11a**: allows only IEEE 802.11a compliant WLAN devices to associate with the NBG6716. • **802.11an**: allows both IEEE802.11n and IEEE802.11a compliant WLAN devices to associate with the NBG6716. The transmission rate of your NBG6716 might be reduced. • **802.11ac**: allows only IEEE 802.11ac compliant WLAN devices to associate with the NBG6716.

Table 31 Network > Wireless LAN 2.4G/5G > General (continued)

LABEL	DESCRIPTION
Security Mode	Select **Static WEP**, **WPA-PSK**, **WPA**, **WPA2-PSK** or **WPA2** to add security on this wireless network. The wireless clients which want to associate to this network must have same wireless security settings as this device. After you select to use a security, additional options appears in this screen. See Section 11.3 on page 91 for detailed information on different security modes. Or you can select **No Security** to allow any client to associate this network without authentication. Note: If the WPS function is enabled (default), only **No Security** and **WPA2-PSK** are available in this field.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

See the rest of this chapter for information on the other labels in this screen.

11.3 Wireless Security

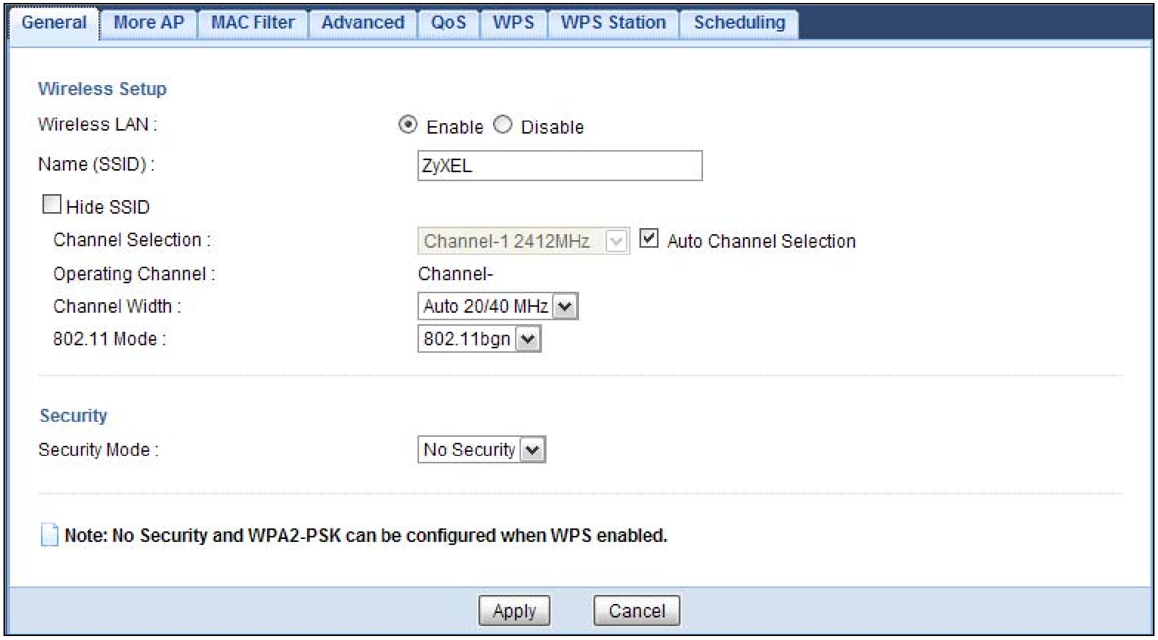
The screen varies depending on what you select in the **Security Mode** field.

11.3.1 No Security

Select **No Security** to allow wireless clients to communicate with the access points without any data encryption.

Note: If you do not enable any wireless security on your NBG6716, your network is accessible to any wireless networking device that is within range.

Figure 57 Network > Wireless LAN 2.4G/5G > General: No Security



Wireless Setup

Wireless LAN : ● Enable ○ Disable

Name (SSID) : ZyXEL

□ Hide SSID

Channel Selection : Channel-1 2412MHz ☑ Auto Channel Selection

Operating Channel : Channel-

Channel Width : Auto 20/40 MHz

802.11 Mode : 802.11bgn

Security

Security Mode : No Security

Note: No Security and WPA2-PSK can be configured when WPS enabled.

The following table describes the labels in this screen.

Table 32 Network > Wireless LAN 2.4G/5G > General: No Security

LABEL	DESCRIPTION
Security Mode	Choose **No Security** from the drop-down list box.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

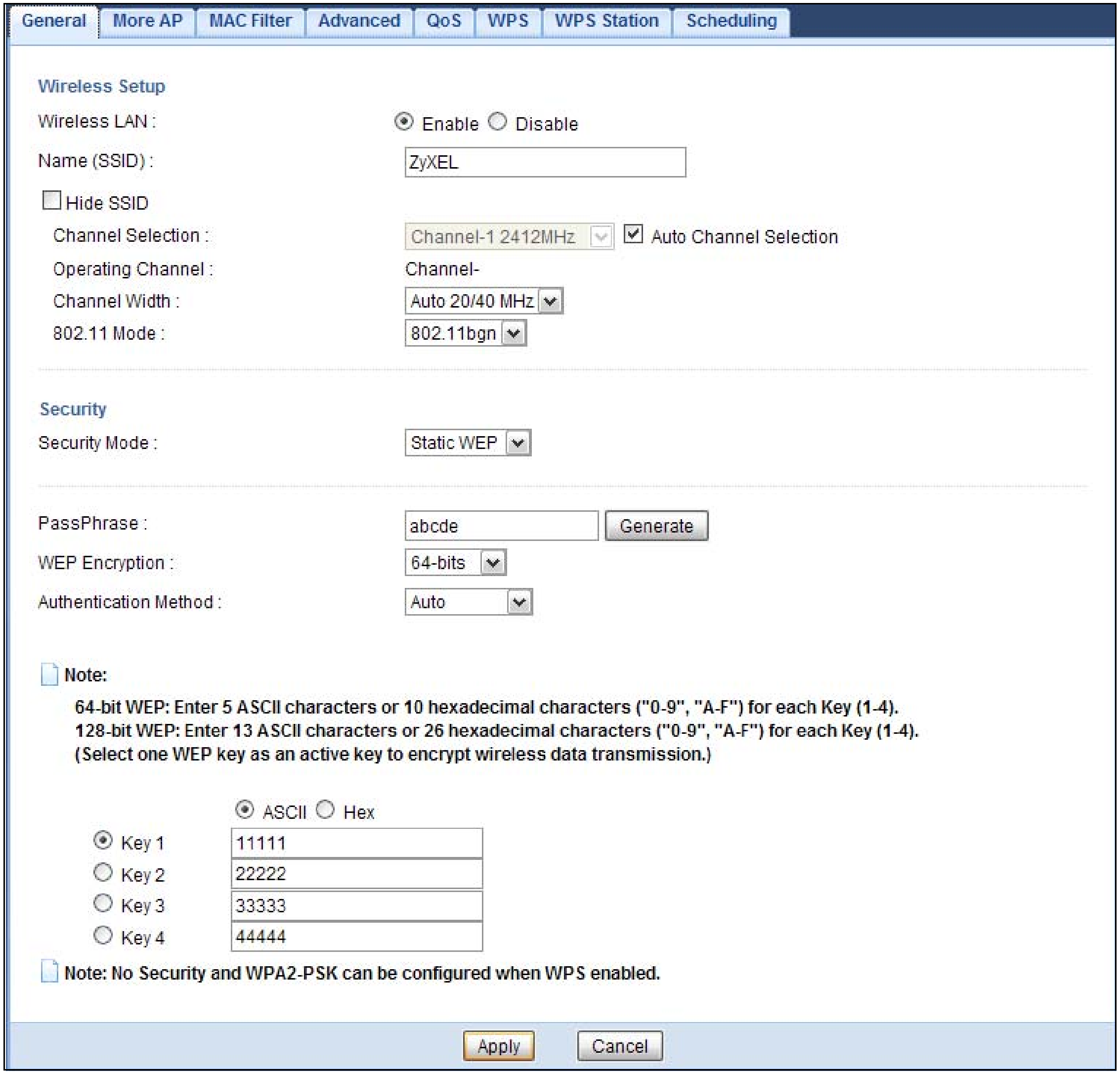
11.3.2 WEP Encryption

WEP encryption scrambles the data transmitted between the wireless stations and the access points to keep network communications private. It encrypts unicast and multicast communications in a network. Both the wireless stations and the access points must use the same WEP key.

Your NBG6716 allows you to configure up to four 64-bit or 128-bit WEP keys but only one key can be enabled at any one time.

Select **Static WEP** from the **Security Mode** list.

Figure 58 Network > Wireless LAN 2.4G/5G > General: Static WEP



Wireless Setup

Wireless LAN : ● Enable ○ Disable

Name (SSID) : ZyXEL

□ Hide SSID

Channel Selection : Channel-1 2412MHz ☑ Auto Channel Selection

Operating Channel : Channel-

Channel Width : Auto 20/40 MHz

802.11 Mode : 802.11bgn

Security

Security Mode : Static WEP

PassPhrase : abcde

WEP Encryption : 64-bits

Authentication Method : Auto

Note:

64-bit WEP: Enter 5 ASCII characters or 10 hexadecimal characters ("0-9", "A-F") for each Key (1-4).
128-bit WEP: Enter 13 ASCII characters or 26 hexadecimal characters ("0-9", "A-F") for each Key (1-4).
(Select one WEP key as an active key to encrypt wireless data transmission.)

● ASCII ○ Hex

● Key 1 11111
○ Key 2 22222
○ Key 3 33333
○ Key 4 44444

Note: No Security and WPA2-PSK can be configured when WPS enabled.

The following table describes the wireless LAN security labels in this screen.

Table 33 Network > Wireless LAN 2.4G/5G > General: Static WEP

LABEL	DESCRIPTION
Security Mode	Select **Static WEP** to enable data encryption.
PassPhrase	Enter a Passphrase (up to 26 printable characters) and click **Generate**. A passphrase functions like a password. In WEP security mode, it is further converted by the NBG6716 into a complicated string that is referred to as the “key”. This key is requested from all devices wishing to connect to a wireless network.
WEP Encryption	Select **64-bits** or **128-bits**. This dictates the length of the security key that the network is going to use.
Authentication Method	Select **Auto** or **Shared Key** from the drop-down list box. This field specifies whether the wireless clients have to provide the WEP key to login to the wireless client. Keep this setting at **Auto** unless you want to force a key verification before communication between the wireless client and the NBG6716 occurs. Select **Shared Key** to force the clients to provide the WEP key prior to communication.

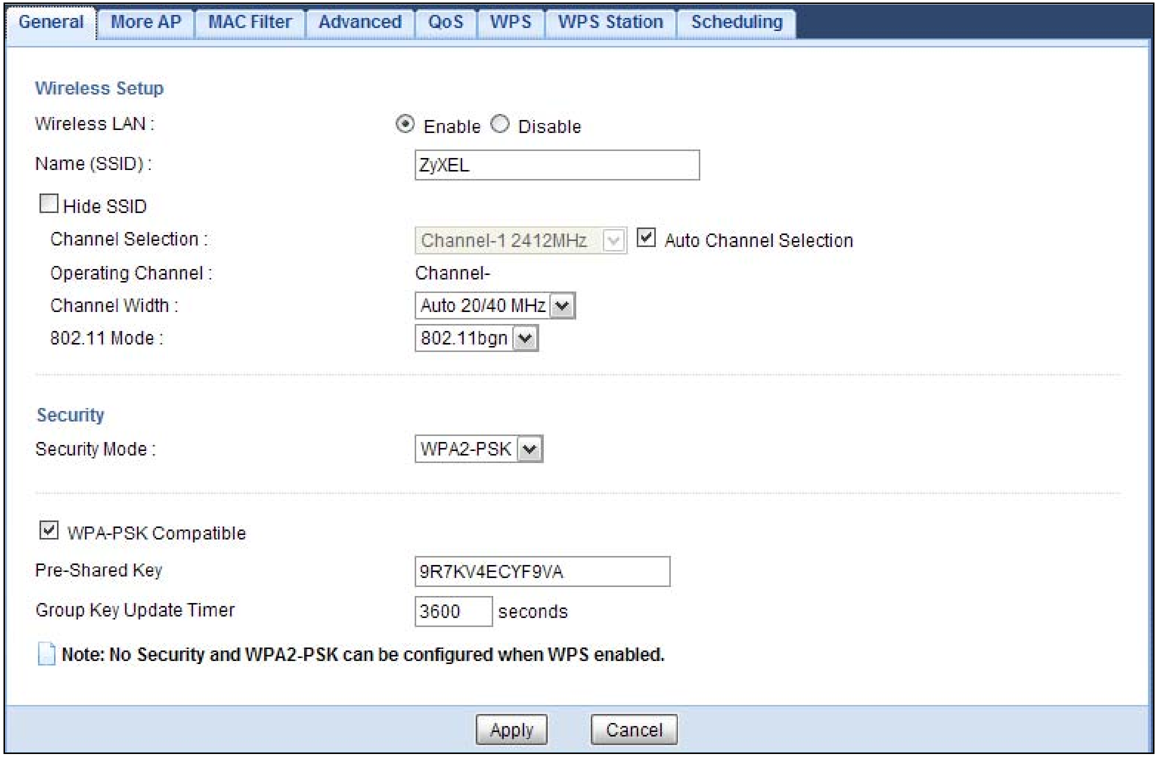
Table 33 Network > Wireless LAN 2.4G/5G > General: Static WEP (continued)

LABEL	DESCRIPTION
ASCII	Select this option in order to enter ASCII characters as WEP key.
Hex	Select this option in order to enter hexadecimal characters as a WEP key. The preceding "0x", that identifies a hexadecimal key, is entered automatically.
Key 1 to Key 4	The WEP keys are used to encrypt data. Both the NBG6716 and the wireless stations must use the same WEP key for data transmission. If you chose **64-bits**, then enter any 5 ASCII characters or 10 hexadecimal characters ("0-9", "A-F"). If you chose **128-bits**, then enter 13 ASCII characters or 26 hexadecimal characters ("0-9", "A-F"). You must configure at least one key, only one key can be activated at any one time. The default key is key 1.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.3.3 WPA-PSK/WPA2-PSK

Select **WPA-PSK** or **WPA2-PSK** from the **Security Mode** list.

Figure 59 Network > Wireless LAN 2.4G/5G > General: WPA-PSK/WPA2-PSK



Wireless Setup

Wireless LAN : ● Enable ○ Disable

Name (SSID) : ZyXEL

□ Hide SSID

Channel Selection : Channel-1 2412MHz ☑ Auto Channel Selection

Operating Channel : Channel-

Channel Width : Auto 20/40 MHz

802.11 Mode : 802.11bgn

Security

Security Mode : WPA2-PSK

☑ WPA-PSK Compatible

Pre-Shared Key 9R7KV4ECYF9VA

Group Key Update Timer 3600 seconds

Note: No Security and WPA2-PSK can be configured when WPS enabled.

The following table describes the labels in this screen.

Table 34 Network > Wireless LAN 2.4G/5G > General: WPA-PSK/WPA2-PSK

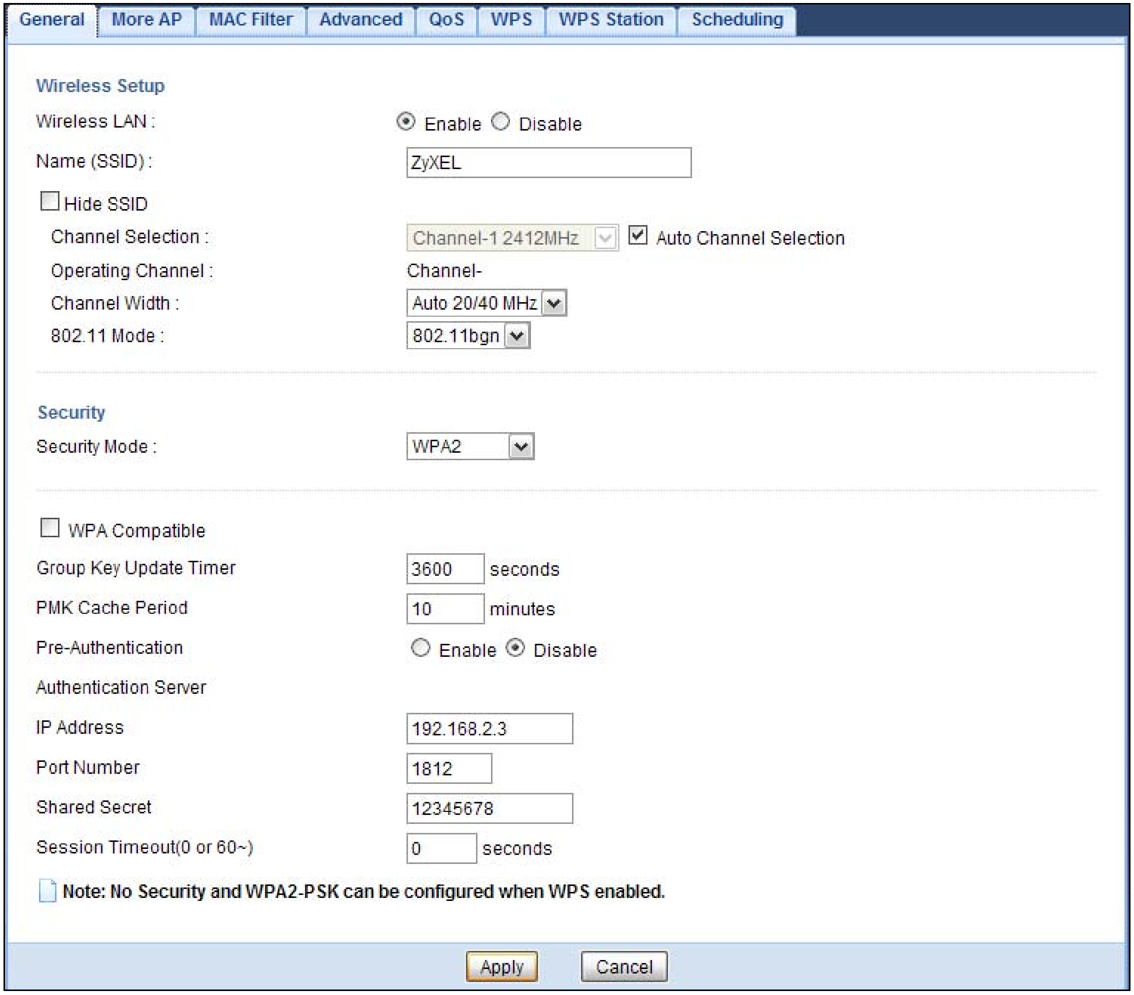
LABEL	DESCRIPTION
Security Mode	Select **WPA-PSK** or **WPA2-PSK** to enable data encryption.
WPA-PSK Compatible	This field appears when you choose **WPA2-PSK** as the **Security Mode**. Check this field to allow wireless devices using **WPA-PSK** security mode to connect to your NBG6716.
Pre-Shared Key	**WPA-PSK/WPA2-PSK** uses a simple common password for authentication. Type a pre-shared key from 8 to 63 case-sensitive keyboard characters.
Group Key Update Timer	The **Group Key Update Timer** is the rate at which the AP sends a new group key out to all clients. The default is **3600** seconds (60 minutes).
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.3.4 WPA/WPA2

Select **WPA** or **WPA2** from the **Security Mode** list.

Note: WPA or WPA2 is not available if you enable WPS before you configure WPA or WPA2 in the **Wireless LAN 2.4G/5G > General** screen.

Figure 60 Network > Wireless LAN 2.4G/5G > General: WPA/WPA2



Wireless Setup

Wireless LAN : ● Enable ○ Disable

Name (SSID) : ZyXEL

□ Hide SSID

Channel Selection : Channel-1 2412MHz ☑ Auto Channel Selection

Operating Channel : Channel-

Channel Width : Auto 20/40 MHz

802.11 Mode : 802.11bgn

Security

Security Mode : WPA2

□ WPA Compatible

Group Key Update Timer 3600 seconds

PMK Cache Period 10 minutes

Pre-Authentication ○ Enable ● Disable

Authentication Server

IP Address 192.168.2.3

Port Number 1812

Shared Secret 12345678

Session Timeout(0 or 60~) 0 seconds

Note: No Security and WPA2-PSK can be configured when WPS enabled.

The following table describes the labels in this screen.

Table 35 Network > Wireless LAN 2.4G/5G > General: WPA/WPA2

LABEL	DESCRIPTION
Security Mode	Select **WPA** or **WPA2** to enable data encryption.
WPA Compatible	This check box is available only when you select **WPA2-PSK** or **WPA2** in the **Security Mode** field. Select the check box to have both WPA2 and WPA wireless clients be able to communicate with the NBG6716 even when the NBG6716 is using WPA2-PSK or WPA2.
Group Key Update Timer	The **Group Key Update Timer** is the rate at which the AP (if using **WPA-PSK/ WPA2-PSK** key management) or RADIUS server (if using **WPA/WPA2** key management) sends a new group key out to all clients. The re-keying process is the WPA/WPA2 equivalent of automatically changing the WEP key for an AP and all stations in a WLAN on a periodic basis. Setting of the **Group Key Update Timer** is also supported in **WPA-PSK/WPA2-PSK** mode.
PMK Cache Period	This field is available only when you select **WPA2**. Specify how often wireless clients have to resend usernames and passwords in order to stay connected. Enter a time interval between 10 and 999999 minutes. Note: If wireless client authentication is done using a RADIUS server, the reauthentication timer on the RADIUS server has priority.

Table 35 Network > Wireless LAN 2.4G/5G > General: WPA/WPA2 (continued)

LABEL	DESCRIPTION
Pre-Authentication	This field is available only when you select **WPA2**. Pre-authentication enables fast roaming by allowing the wireless client (already connecting to an AP) to perform IEEE 802.1x authentication with another AP before connecting to it. Select **Enable** to turn on preauthentication in WAP2. Otherwise, select **Disable**.
Authentication Server	
IP Address	Enter the IP address of the external authentication server in dotted decimal notation.
Port Number	Enter the port number of the external authentication server. You need not change this value unless your network administrator instructs you to do so with additional information.
Shared Secret	Enter a password (up to 127 alphanumeric characters) as the key to be shared between the external authentication server and the NBG6716. The key must be the same on the external authentication server and your NBG6716. The key is not sent over the network.
Session Timeout	The NBG6716 automatically disconnects a wireless client from the wireless and wired networks after a period of inactivity. The wireless client needs to send the username and password again before it can use the wireless and wired networks again. Some wireless clients may prompt users for a username and password; other clients may use saved login credentials. In either case, there is usually a short delay while the wireless client logs in to the wireless network again. Enter the time in seconds from 0 to 999999.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

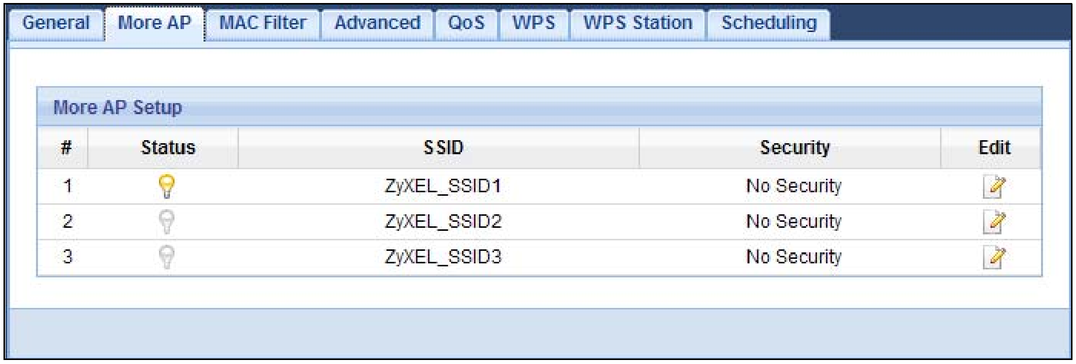
11.4 More AP Screen

This screen allows you to enable and configure multiple wireless networks and guest wireless network settings on the NBG6716.

You can configure up to four SSIDs to enable multiple BSSs (Basic Service Sets) on the NBG6716. This allows you to use one access point to provide several BSSs simultaneously. You can then assign varying security types to different SSIDs. Wireless clients can use different SSIDs to associate with the same access point.

Click **Network > Wireless LAN 2.4G/5G > More AP**. The following screen displays.

Figure 61 Network > Wireless LAN 2.4G/5G > More AP



More AP Setup

#	Status	SSID	Security	Edit
1	💡	ZyXEL_SSID1	No Security	✎
2	○	ZyXEL_SSID2	No Security	✎
3	○	ZyXEL_SSID3	No Security	✎

The following table describes the labels in this screen.

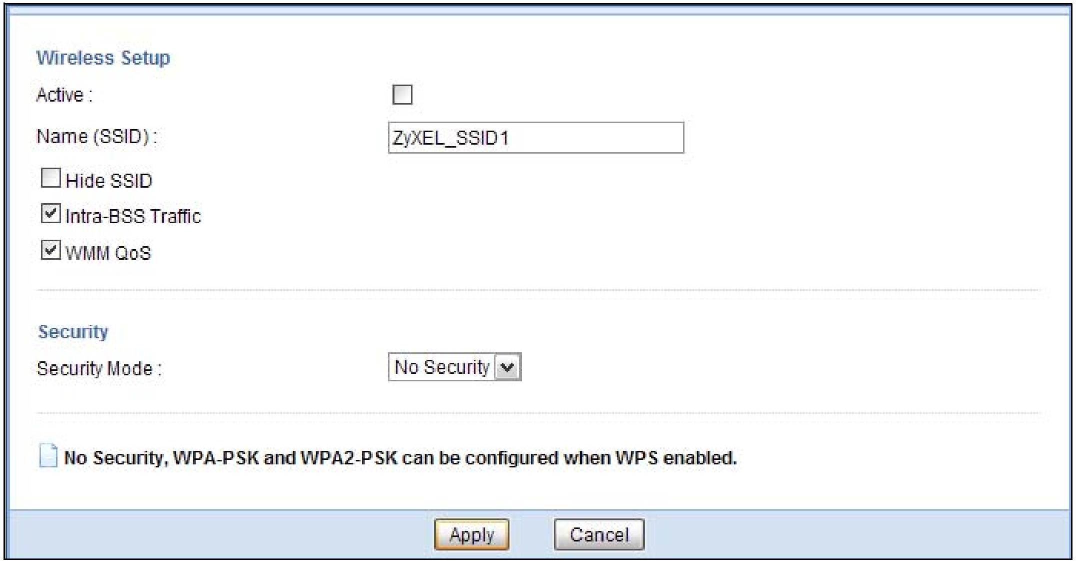
Table 36 Network > Wireless LAN 2.4G/5G > More AP

LABEL	DESCRIPTION
#	This is the index number of each SSID profile.
Status	This shows whether the SSID profile is active (a yellow bulb) or not (a gray bulb).
SSID	An SSID profile is the set of parameters relating to one of the NBG6716's BSSs. The SSID (Service Set IDentifier) identifies the Service Set with which a wireless device is associated. This field displays the name of the wireless profile on the network. When a wireless client scans for an AP to associate with, this is the name that is broadcast and seen in the wireless client utility.
Security	This field indicates the security mode of the SSID profile.
Edit	Click the **Edit** icon to configure the SSID profile.

11.4.1 More AP Edit

Use this screen to edit an SSID profile. Click the **Edit** icon next to an SSID in the **More AP** screen. The following screen displays.

Figure 62 Network > Wireless LAN 2.4G/5G > More AP: Edit



Wireless Setup

Active : □

Name (SSID) : ZyXEL_SSID1

□ Hide SSID

☑ Intra-BSS Traffic

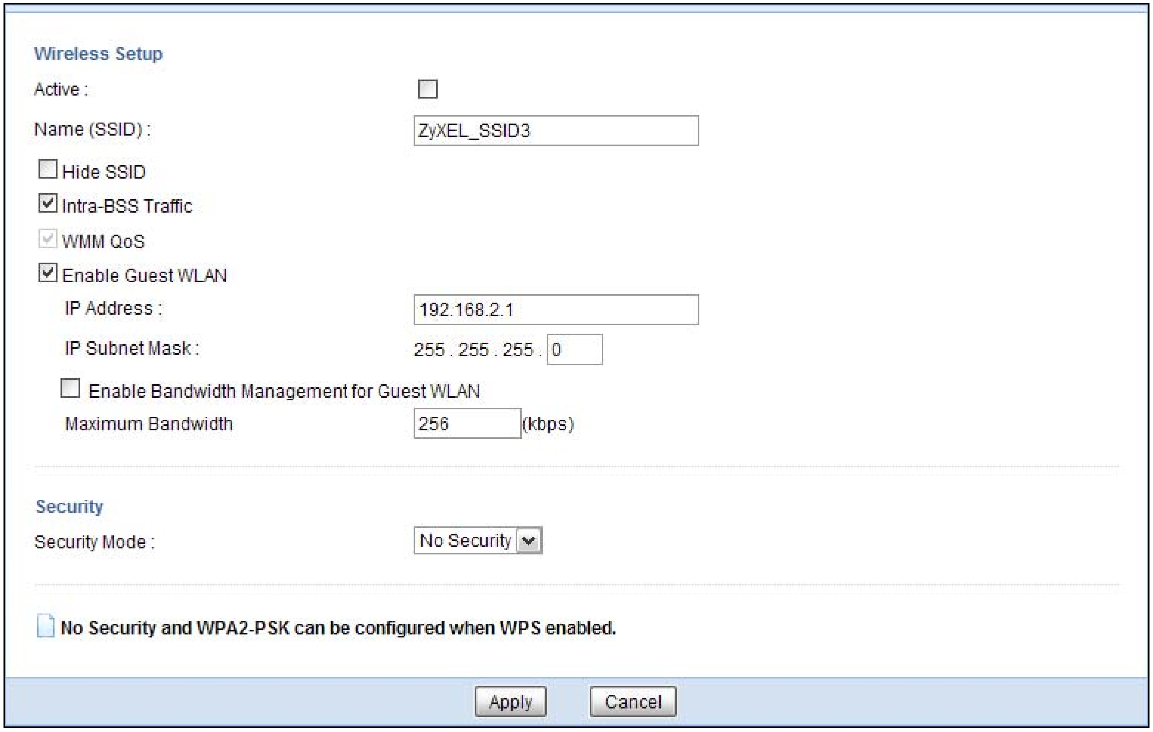
☑ WMM QoS

Security

Security Mode : No Security

No Security, WPA-PSK and WPA2-PSK can be configured when WPS enabled.

Figure 63 Network > Wireless LAN 2.4G/5G > More AP: Edit (the last SSID)



Wireless Setup

Active : □

Name (SSID) : ZyXEL_SSID3

□ Hide SSID

☑ Intra-BSS Traffic

☑ WMM QoS

☑ Enable Guest WLAN

IP Address : 192.168.2.1

IP Subnet Mask : 255 . 255 . 255 . 0

□ Enable Bandwidth Management for Guest WLAN

Maximum Bandwidth 256 (kbps)

Security

Security Mode : No Security

No Security and WPA2-PSK can be configured when WPS enabled.

The following table describes the labels in this screen.

Table 37 Network > Wireless LAN 2.4G/5G > More AP: Edit

LABEL	DESCRIPTION
Active	Select this to activate the SSID profile.
Name (SSID)	The SSID (Service Set IDentity) identifies the Service Set with which a wireless client is associated. Enter a descriptive name (up to 32 printable characters found on a typical English language keyboard) for the wireless LAN.
Hide SSID	Select this check box to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool.
Intra-BSS Traffic	A Basic Service Set (BSS) exists when all communications between wireless clients or between a wireless client and a wired network client go through one access point (AP). Intra-BSS traffic is traffic between wireless clients in the BSS. When Intra-BSS is enabled, wireless clients can access the wired network and communicate with each other. When Intra-BSS is disabled, wireless clients can still access the wired network but cannot communicate with each other.
WMM QoS	Check this to have the NBG6716 automatically give a service a priority level according to the ToS value in the IP header of packets it sends. WMM QoS (Wifi MultiMedia Quality of Service) gives high priority to voice and video, which makes them run more smoothly.
Enable Guest WLAN	Select the check box to activate guest wireless LAN. This is available only for the last SSID on the NBG6716. Note: Only Router mode supports guest WLAN. AP mode, Universal Repeater mode, WISP mode and WISP + Universal Repeater mode don't support guest WLAN.
IP Address	Type an IP address for the devices on the Guest WLAN using this as the gateway IP address.
IP Subnet Mask	Type the subnet mask for the guest wireless LAN.

Table 37 Network > Wireless LAN 2.4G/5G > More AP: Edit (continued)

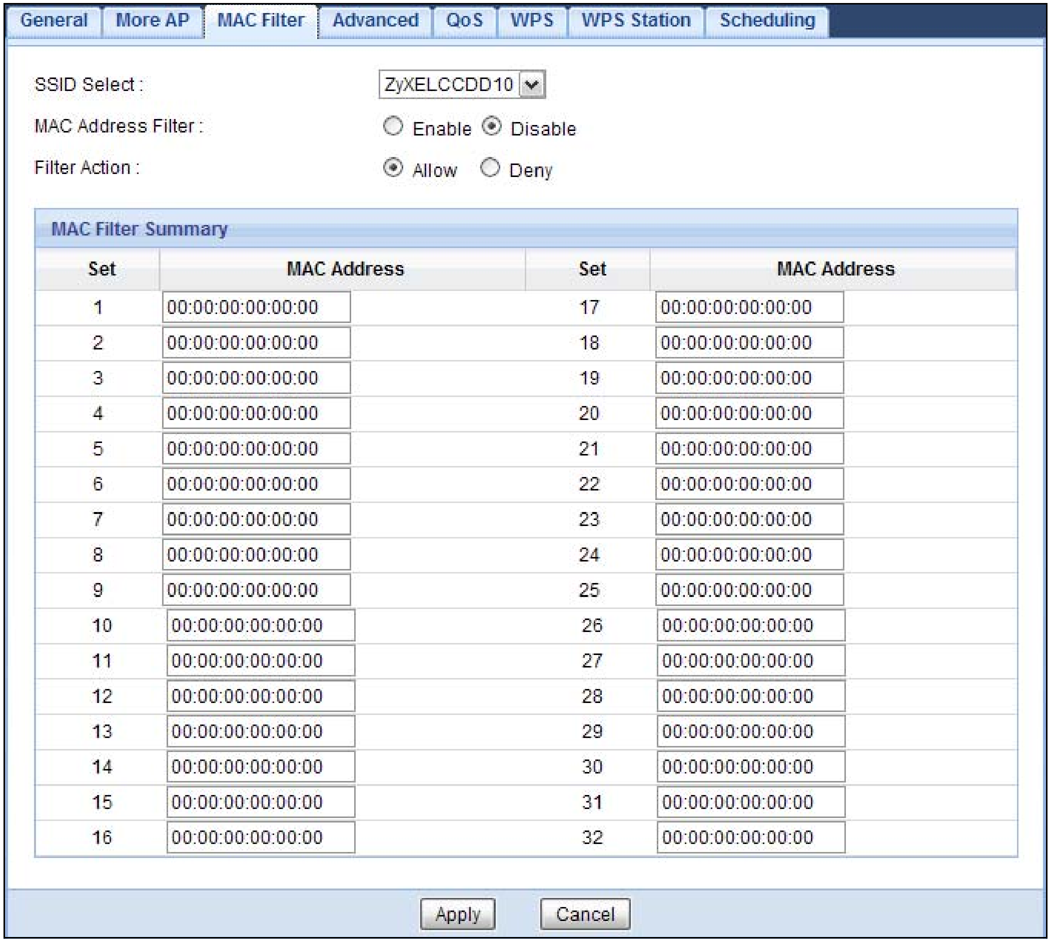
LABEL	DESCRIPTION
Enable Bandwidth Management for Guest WLAN	Select this to turn on bandwidth management for the Guest WLAN network.
Maximum Bandwidth	Enter a number to specify maximum bandwidth the Guest WLAN network can use.
Security Mode	Select **Static WEP**, **WPA-PSK**, **WPA**, **WPA2-PSK** or **WPA2** to add security on this wireless network. The wireless clients which want to associate to this network must have same wireless security settings as this device. After you select to use a security, additional options appears in this screen. See Section 11.3 on page 91 for detailed information on different security modes. Or you can select **No Security** to allow any client to associate this network without authentication. Note: If the WPS function is enabled (default), only **No Security** and **WPA2-PSK** are available in this field.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.5 MAC Filter Screen

The MAC filter screen allows you to configure the NBG6716 to give exclusive access to devices (**Allow**) or exclude devices from accessing the NBG6716 (**Deny**). Every Ethernet device has a unique MAC (Media Access Control) 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. You need to know the MAC address of the devices to configure this screen.

To change your NBG6716’s MAC filter settings, click **Network** > **Wireless LAN 2.4G/5G** > **MAC Filter**. The screen appears as shown.

Figure 64 Network > Wireless LAN 2.4G/5G > MAC Filter



SSID Select : ZyXELCCDD10

MAC Address Filter : ○ Enable ● Disable

Filter Action : ● Allow ○ Deny

MAC Filter Summary

Set	MAC Address	Set	MAC Address
1	00:00:00:00:00:00	17	00:00:00:00:00:00
2	00:00:00:00:00:00	18	00:00:00:00:00:00
3	00:00:00:00:00:00	19	00:00:00:00:00:00
4	00:00:00:00:00:00	20	00:00:00:00:00:00
5	00:00:00:00:00:00	21	00:00:00:00:00:00
6	00:00:00:00:00:00	22	00:00:00:00:00:00
7	00:00:00:00:00:00	23	00:00:00:00:00:00
8	00:00:00:00:00:00	24	00:00:00:00:00:00
9	00:00:00:00:00:00	25	00:00:00:00:00:00
10	00:00:00:00:00:00	26	00:00:00:00:00:00
11	00:00:00:00:00:00	27	00:00:00:00:00:00
12	00:00:00:00:00:00	28	00:00:00:00:00:00
13	00:00:00:00:00:00	29	00:00:00:00:00:00
14	00:00:00:00:00:00	30	00:00:00:00:00:00
15	00:00:00:00:00:00	31	00:00:00:00:00:00
16	00:00:00:00:00:00	32	00:00:00:00:00:00

The following table describes the labels in this menu.

Table 38 Network > Wireless LAN 2.4G/5G > MAC Filter

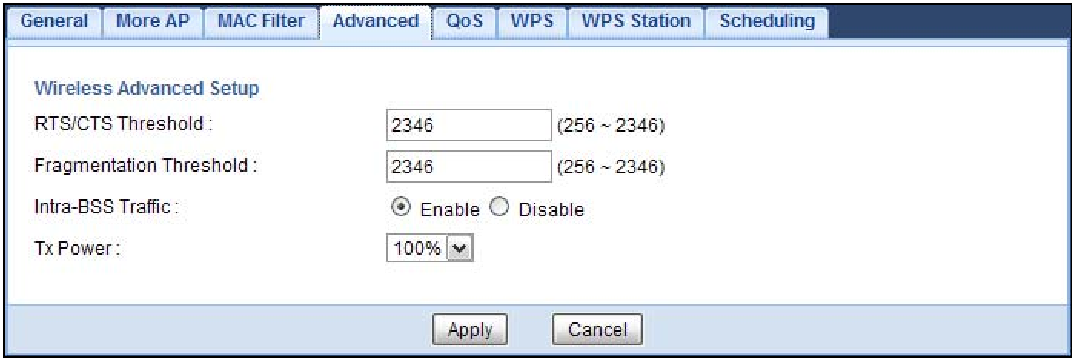
LABEL	DESCRIPTION
SSID Select	Select the SSID for which you want to configure MAC filtering.
MAC Address Filter	Select to turn on (**Enable**) or off (**Disable**) MAC address filtering.
Filter Action	Define the filter action for the list of MAC addresses in the MAC Filter Summary table. Select **Allow** to permit access to the NBG6716, MAC addresses not listed will be denied access to the NBG6716. Select **Deny** to block access to the NBG6716, MAC addresses not listed will be allowed to access the NBG6716.
MAC Filter Summary	
Set	This is the index number of the MAC address.
MAC Address	Enter the MAC address of the wireless station that are allowed or denied access to the NBG6716.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.6 Wireless LAN Advanced Screen

Use this screen to allow wireless advanced features, such as the output power, RTS/CTS Threshold settings.

Click **Network** > **Wireless LAN 2.4G/5G** > **Advanced**. The screen appears as shown.

Figure 65 Network > Wireless LAN 2.4G/5G > Advanced



Wireless Advanced Setup

RTS/CTS Threshold : 2346 (256 ~ 2346)

Fragmentation Threshold : 2346 (256 ~ 2346)

Intra-BSS Traffic : ● Enable ○ Disable

Tx Power : 100%

The following table describes the labels in this screen.

Table 39 Network > Wireless LAN 2.4G/5G > Advanced

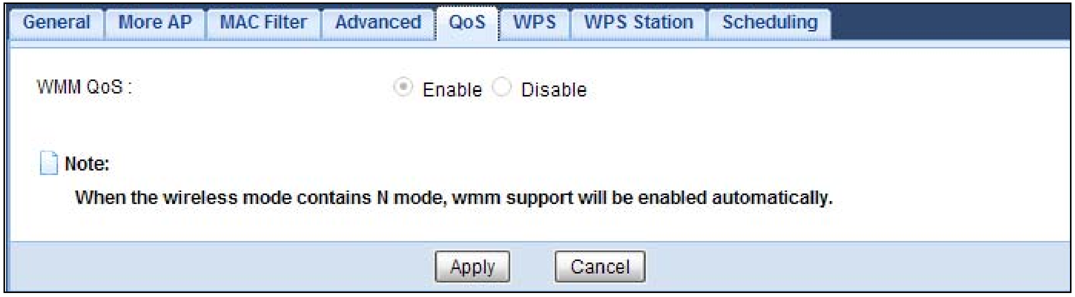
LABEL	DESCRIPTION
RTS/CTS Threshold	Data with its frame size larger than this value will perform the RTS (Request To Send)/ CTS (Clear To Send) handshake. This field is not configurable and the NBG6716 automatically changes to use the maximum value if you select **802.11n**, **802.11an**, **802.11gn**, **802.11bgn** or **802.11ac** in the **Wireless LAN 2.4G/5G > General** screen.
Fragmentation Threshold	The threshold (number of bytes) for the fragmentation boundary for directed messages. It is the maximum data fragment size that can be sent. This field is not configurable and the NBG6716 automatically changes to use the maximum value if you select **802.11n**, **802.11an**, **802.11gn**, **802.11bgn** or **802.11ac** in the **Wireless LAN 2.4G/5G > General** screen.
Intra-BSS Traffic	A Basic Service Set (BSS) exists when all communications between wireless clients or between a wireless client and a wired network client go through one access point (AP). Intra-BSS traffic is traffic between wireless clients in the BSS. When Intra-BSS is enabled, wireless clients can access the wired network and communicate with each other. When Intra-BSS is disabled, wireless clients can still access the wired network but cannot communicate with each other.
Tx Power	Set the output power of the NBG6716 in this field. If there is a high density of APs in an area, decrease the output power of the NBG6716 to reduce interference with other APs. Select one of the following **100%**, **90%**, **75%**, **50%**, **25%** or **10%**.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.7 Quality of Service (QoS) Screen

The QoS screen allows you to automatically give a service (such as VoIP and video) a priority level.

Click **Network** > **Wireless LAN 2.4G/5G** > **QoS**. The following screen appears.

Figure 66 Network > Wireless LAN 2.4G/5G > QoS



WMM QoS : ● Enable ○ Disable

Note:

When the wireless mode contains N mode, wmm support will be enabled automatically.

The following table describes the labels in this screen.

Table 40 Network > Wireless LAN 2.4G/5G > QoS

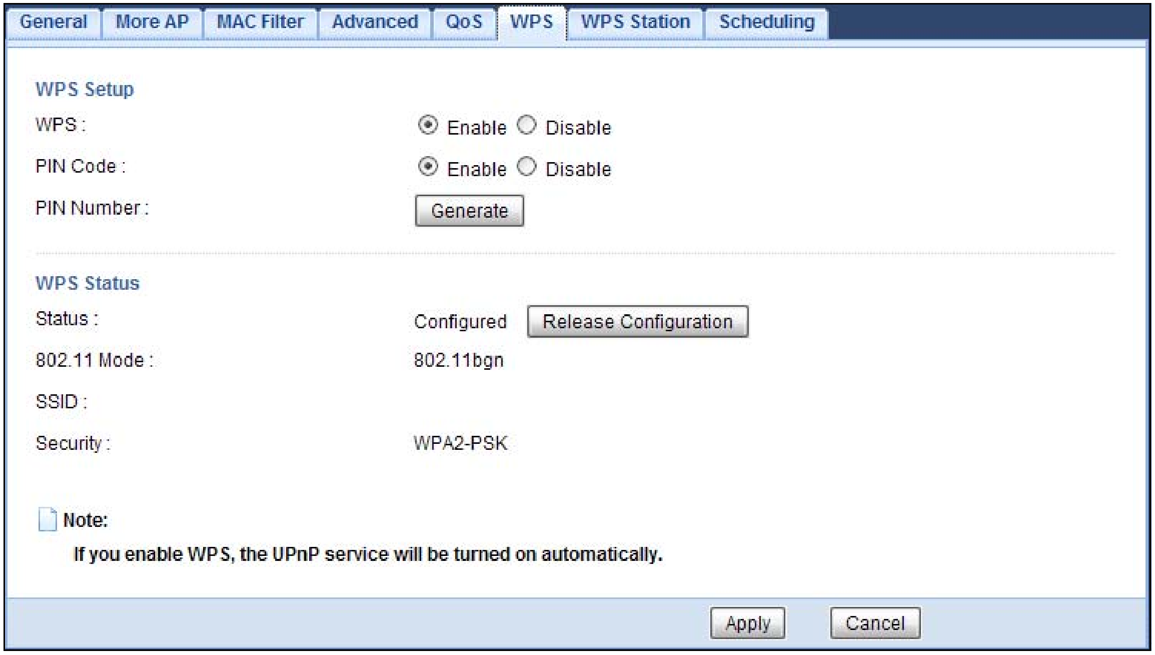
LABEL	DESCRIPTION
WMM QoS	Select **Enable** to have the NBG6716 automatically give a service a priority level according to the ToS value in the IP header of packets it sends. WMM QoS (Wifi MultiMedia Quality of Service) gives high priority to voice and video, which makes them run more smoothly. This field is not configurable and the NBG6716 automatically enables WMM QoS if you select **802.11n**, **802.11an**, **802.11gn**, **802.11bgn** or **802.11ac** in the **Wireless LAN 24G/5G > General** screen.
Apply	Click **Apply** to save your changes to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.8 WPS Screen

Use this screen to enable/disable WPS, view or generate a new PIN number and check current WPS status. To open this screen, click **Network** > **Wireless LAN 2.4G/5G** > **WPS**.

Note: With WPS, wireless clients can only connect to the wireless network using the first SSID on the NBG6716.

Figure 67 Network > Wireless LAN 2.4G/5G > WPS



WPS Setup

WPS : ● Enable ○ Disable

PIN Code : ● Enable ○ Disable

PIN Number : Generate

WPS Status

Status : Configured Release Configuration

802.11 Mode : 802.11bgn

SSID :

Security : WPA2-PSK

Note:

If you enable WPS, the UPnP service will be turned on automatically.

The following table describes the labels in this screen.

Table 41 Network > Wireless LAN 2.4G/5G > WPS

LABEL	DESCRIPTION
WPS Setup	
WPS	Select **Enable** to turn on the WPS feature. Otherwise, select **Disable**.
PIN Code	Select **Enable** and click **Apply** to allow the PIN Configuration method. If you select **Disable**, you cannot create a new PIN number.
PIN Number	This is the WPS PIN (Personal Identification Number) of the NBG6716. Enter this PIN in the configuration utility of the device you want to connect to the NBG6716 using WPS. The PIN is not necessary when you use WPS push-button method. Click **Generate** to generate a new PIN number.
WPS Status	
Status	This displays **Configured** when the NBG6716 has connected to a wireless network using WPS or when **WPS Enable** is selected and wireless or wireless security settings have been changed. The current wireless and wireless security settings also appear in the screen. This displays **Unconfigured** if WPS is disabled and there are no wireless or wireless security changes on the NBG6716 or you click **Release Configuration** to remove the configured wireless and wireless security settings.
Release Configuration	This button is only available when the WPS status displays **Configured**. Click this button to remove all configured wireless and wireless security settings for WPS connections on the NBG6716.
802.11 Mode	This is the 802.11 mode used. Only compliant WLAN devices can associate with the NBG6716.
SSID	This is the name of the wireless network (the NBG6716's first SSID).
Security	This is the type of wireless security employed by the network.

Table 41 Network > Wireless LAN 2.4G/5G > WPS (continued)

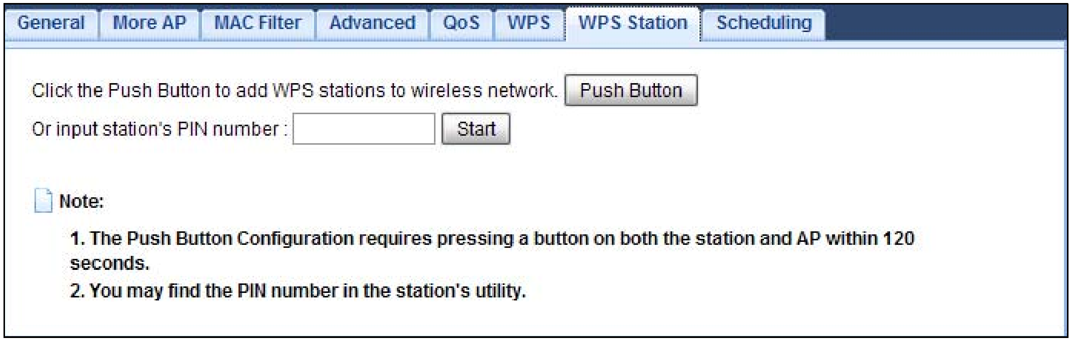
LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

11.9 WPS Station Screen

Use this screen when you want to add a wireless station using WPS. To open this screen, click **Network** > **Wireless LAN 2.4G/5G** > **WPS Station** tab.

Note: After you click **Push Button** on this screen, you have to press a similar button in the wireless station utility within 2 minutes. To add the second wireless station, you have to press these buttons on both device and the wireless station again after the first 2 minutes.

Figure 68 Network > Wireless LAN 2.4G/5G > WPS Station



Click the Push Button to add WPS stations to wireless network.

Or input station's PIN number :

Note:

1. The Push Button Configuration requires pressing a button on both the station and AP within 120 seconds.

2. You may find the PIN number in the station's utility.

The following table describes the labels in this screen.

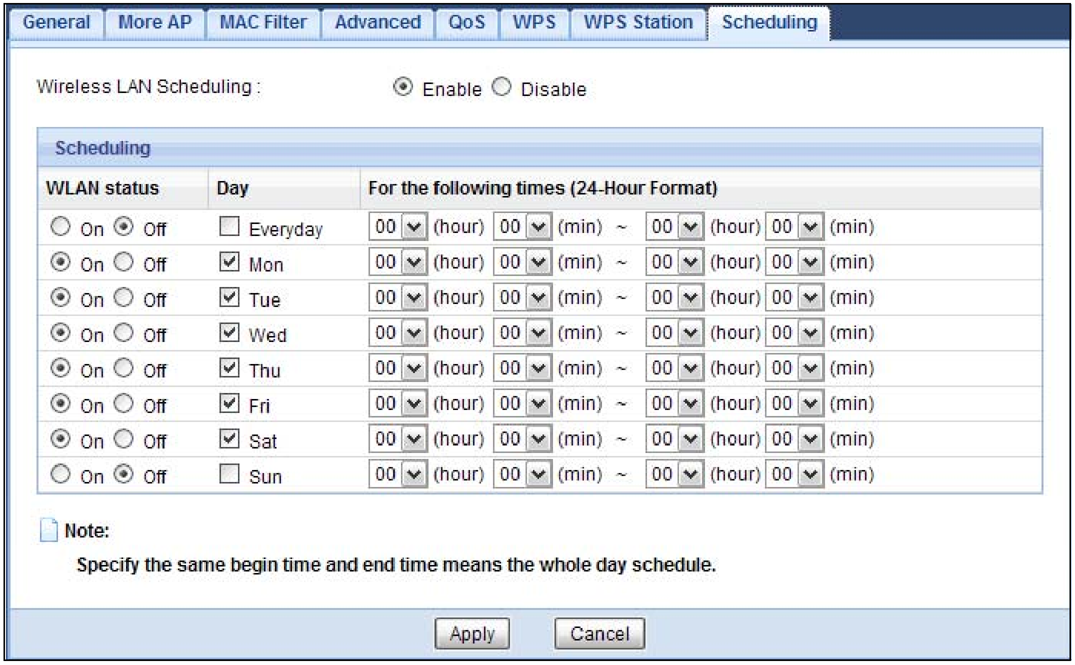
Table 42 Network > Wireless LAN 2.4G/5G > WPS Station

LABEL	DESCRIPTION
Push Button	Use this button when you use the PBC (Push Button Configuration) method to configure wireless stations's wireless settings. Click this to start WPS-aware wireless station scanning and the wireless security information synchronization.
Or input station's PIN number	Use this button when you use the PIN Configuration method to configure wireless station's wireless settings. Type the same PIN number generated in the wireless station's utility. Then click **Start** to associate to each other and perform the wireless security information synchronization.

11.10 Scheduling Screen

Use this screen to set the times your wireless LAN is turned on and off. Wireless LAN scheduling is disabled by default. The wireless LAN can be scheduled to turn on or off on certain days and at certain times. To open this screen, click **Network** > **Wireless LAN 2.4G/5G** > **Scheduling** tab.

Figure 69 Network > Wireless LAN 2.4G/5G > Scheduling



Wireless LAN Scheduling : ● Enable ○ Disable

Scheduling

WLAN status	Day	For the following times (24-Hour Format)
○ On ● Off	□ Everyday	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
● On ○ Off	☑ Mon	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
● On ○ Off	☑ Tue	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
● On ○ Off	☑ Wed	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
● On ○ Off	☑ Thu	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
● On ○ Off	☑ Fri	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
● On ○ Off	☑ Sat	00 (hour) 00 (min) ~ 00 (hour) 00 (min)
○ On ● Off	□ Sun	00 (hour) 00 (min) ~ 00 (hour) 00 (min)

Note:

Specify the same begin time and end time means the whole day schedule.

The following table describes the labels in this screen.

Table 43 Network > Wireless LAN 2.4G/5G > Scheduling

LABEL	DESCRIPTION
Wireless LAN Scheduling	
Wireless LAN Scheduling	Select **Enable** to activate the wireless LAN scheduling feature. Select **Disable** to turn it off.
Scheduling	
WLAN Status	Select **On** or **Off** to specify whether the Wireless LAN is turned on or off. This field works in conjunction with the **Day** and **For the following times** fields.
Day	Select **Everyday** or the specific days to turn the Wireless LAN on or off. If you select **Everyday** you can not select any specific days. This field works in conjunction with the **For the following times** field.
For the following times (24-Hour Format)	Select a begin time using the first set of **hour** and minute (**min**) drop down boxes and select an end time using the second set of **hour** and minute (**min**) drop down boxes. If you have chosen **On** earlier for the WLAN Status the Wireless LAN will turn on between the two times you enter in these fields. If you have chosen **Off** earlier for the WLAN Status the Wireless LAN will turn off between the two times you enter in these fields.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

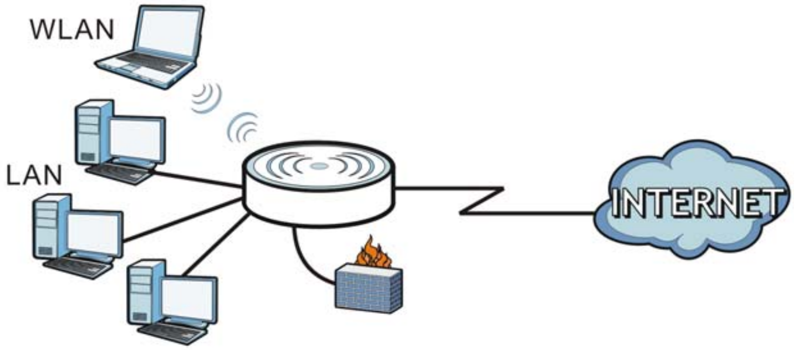
LAN

12.1 Overview

This chapter describes how to configure LAN settings.

A Local Area Network (LAN) is a shared communication system to which many computers are attached. A LAN is a computer network limited to the immediate area, usually the same building or floor of a building.

Figure 70 LAN Example



The LAN screens can help you configure a manage IP address, and partition your physical network into logical networks.

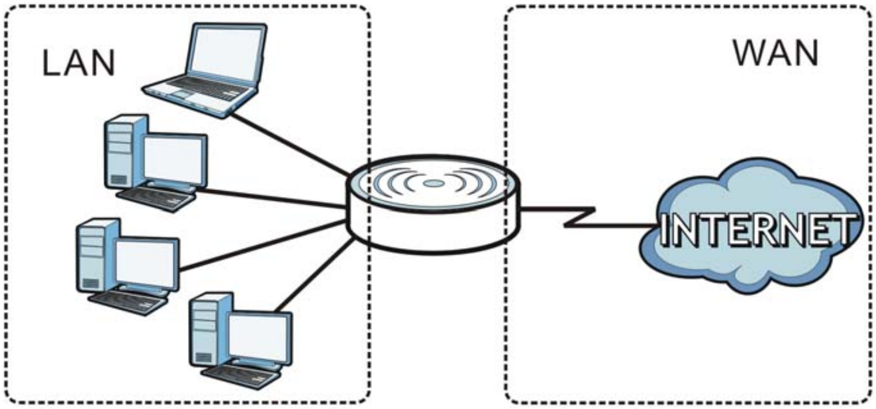
12.2 What You Can Do

- Use the **IP** screen to change the IP address for your NBG6716 (Section 12.4 on page 108).
- Use the **IP Alias** screen to have the NBG6716 apply IP alias to create LAN subnets (Section 12.5 on page 109).

12.3 What You Need To Know

The actual physical connection determines whether the NBG6716 ports are LAN or WAN ports. There are two separate IP networks, one inside the LAN network and the other outside the WAN network as shown next.

Figure 71 LAN and WAN IP Addresses



The LAN parameters of the NBG6716 in router mode are preset in the factory with the following values:

- IP address of 192.168.1.1 with subnet mask of 255.255.255.0 (24 bits)
- DHCP server enabled with 32 client IP addresses starting from 192.168.1.33.

These parameters should work for the majority of installations. If your ISP gives you explicit DNS server address(es), read the embedded Web Configurator help regarding what fields need to be configured.

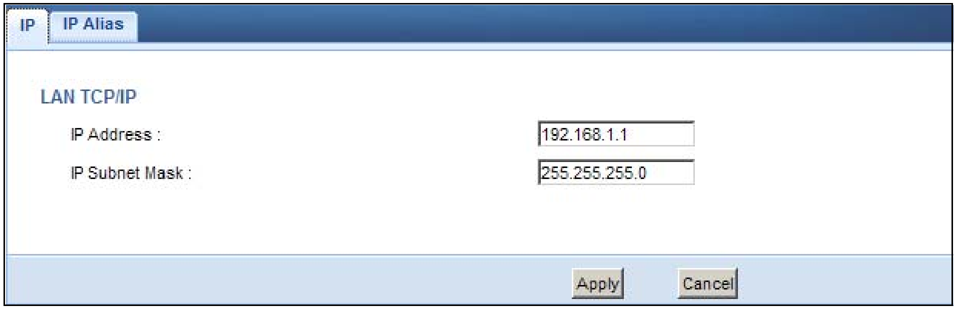
12.3.1 IP Alias

IP alias allows you to partition a physical network into different logical networks over the same Ethernet interface. The NBG6716 supports three logical LAN interfaces via its single physical Ethernet interface with the NBG6716 itself as the gateway for each LAN network.

12.4 LAN IP Screen

Use this screen to change the IP address for your NBG6716. Click **Network > LAN > IP**.

Figure 72 Network > LAN > IP



LAN TCP/IP

IP Address : 192.168.1.1

IP Subnet Mask : 255.255.255.0

The following table describes the labels in this screen.

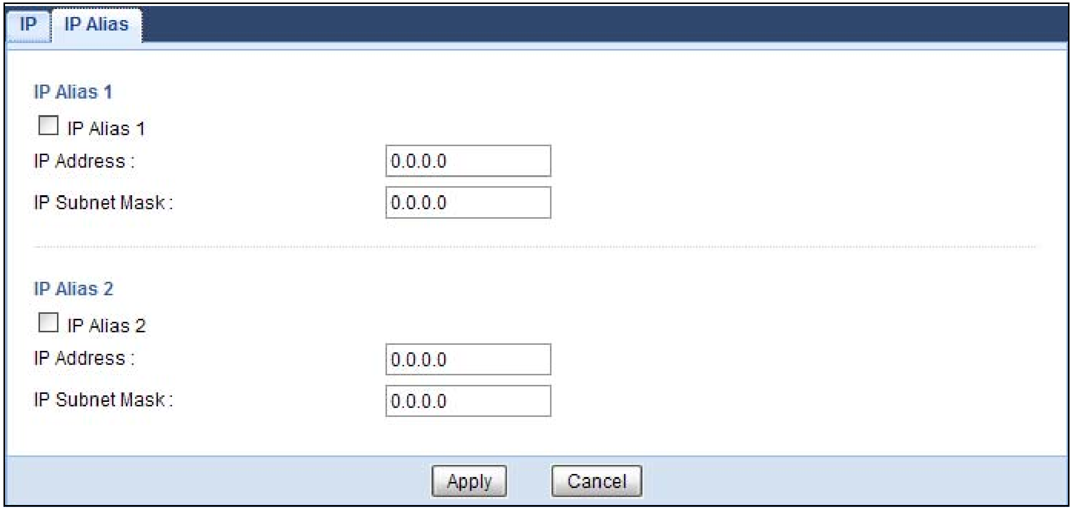
Table 44 Network > LAN > IP

LABEL	DESCRIPTION
IP Address	Type the IP address of your NBG6716 in dotted decimal notation.
IP Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your NBG6716 will 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 NBG6716.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

12.5 IP Alias Screen

Use this screen to have the NBG6716 apply IP alias to create LAN subnets. Click **LAN** > **IP Alias**.

Figure 73 Network > LAN > IP Alias



IP Alias 1

☐ IP Alias 1

IP Address : 0.0.0.0

IP Subnet Mask : 0.0.0.0

IP Alias 2

☐ IP Alias 2

IP Address : 0.0.0.0

IP Subnet Mask : 0.0.0.0

The following table describes the labels in this screen.

Table 45 Network > LAN > IP Alias

LABEL	DESCRIPTION
IP Alias 1, 2	Check this to enable IP alias to configure another LAN network for the NBG6716.
IP Address	Type the IP alias address of your NBG6716 in dotted decimal notation.
IP Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your NBG6716 will 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 NBG6716.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

DHCP Server

13.1 Overview

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 NBG6716's LAN as a DHCP server or disable it. When configured as a server, the NBG6716 provides the TCP/IP configuration for the clients. If DHCP service is disabled, you must have another DHCP server on your LAN, or else the computer must be manually configured.

13.1.1 What You Can Do

- Use the **General** screen to enable the DHCP server (Section 13.2 on page 111).
- Use the **Advanced** screen to assign IP addresses on the LAN to specific individual computers based on their MAC Addresses (Section 13.3 on page 111).
- Use the **Client List** screen to view the current DHCP client information (Section 13.4 on page 113).

13.1.2 What You Need To Know

The following terms and concepts may help as you read through this chapter.

LAN TCP/IP

The NBG6716 has built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

IP Pool Setup

The NBG6716 is pre-configured with a pool of 32 IP addresses starting from 192.168.1.33 to 192.168.1.64. This configuration leaves 31 IP addresses (excluding the NBG6716 itself) in the lower range (192.168.1.2 to 192.168.1.32) for other server computers, for instance, servers for mail, FTP, TFTP, web, etc., that you may have.

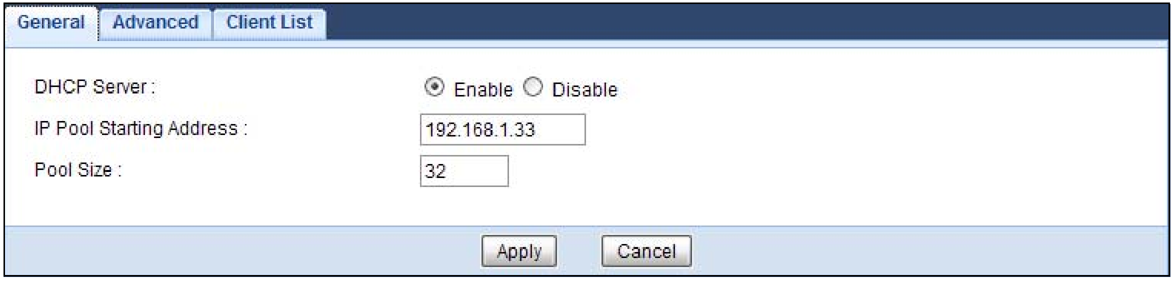
MAC Addresses

Every Ethernet device has a unique MAC (Media Access Control) 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. Find out the MAC addresses of your network devices if you intend to add them to the **DHCP Client List** screen.

13.2 DHCP Server General Screen

Use this screen to enable the DHCP server. Click **Network** > **DHCP Server**. The following screen displays.

Figure 74 Network > DHCP Server > General



DHCP Server : ● Enable ○ Disable

IP Pool Starting Address : 192.168.1.33

Pool Size : 32

The following table describes the labels in this screen.

Table 46 Network > DHCP Server > General

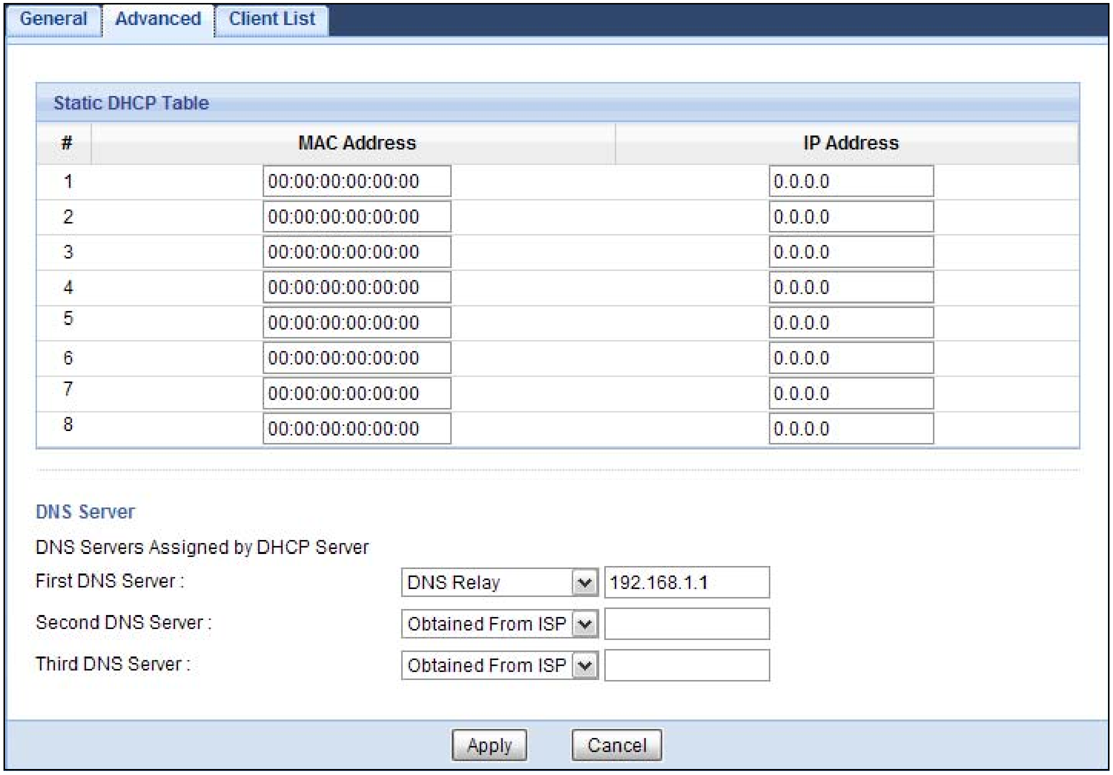
LABEL	DESCRIPTION
DHCP Server	Select **Enable** to activate DHCP for LAN. DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients (computers) to obtain TCP/IP configuration at startup from a server. Enable the DHCP server unless your ISP instructs you to do otherwise. Select **Disable** to stop the NBG6716 acting as a DHCP server. When configured as a server, the NBG6716 provides TCP/IP configuration for the clients. If not, DHCP service is disabled and you must have another DHCP server on your LAN, or else the computers must be manually configured. When set as a server, fill in the following four fields.
IP Pool Starting Address	This field specifies the first of the contiguous addresses in the IP address pool for LAN.
Pool Size	This field specifies the size, or count of the IP address pool for LAN.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

13.3 DHCP Server Advanced Screen

This screen allows you to assign IP addresses on the LAN to specific individual computers based on their MAC addresses. You can also use this screen to configure the DNS server information that the NBG6716 sends to the DHCP clients.

To change your NBG6716’s static DHCP settings, click **Network** > **DHCP Server** > **Advanced**. The following screen displays.

Figure 75 Network > DHCP Server > Advanced



Static DHCP Table

#	MAC Address	IP Address
1	00:00:00:00:00:00	0.0.0.0
2	00:00:00:00:00:00	0.0.0.0
3	00:00:00:00:00:00	0.0.0.0
4	00:00:00:00:00:00	0.0.0.0
5	00:00:00:00:00:00	0.0.0.0
6	00:00:00:00:00:00	0.0.0.0
7	00:00:00:00:00:00	0.0.0.0
8	00:00:00:00:00:00	0.0.0.0

DNS Server

DNS Servers Assigned by DHCP Server

First DNS Server : DNS Relay 192.168.1.1

Second DNS Server : Obtained From ISP

Third DNS Server : Obtained From ISP

The following table describes the labels in this screen.

Table 47 Network > DHCP Server > Advanced

LABEL	DESCRIPTION
Static DHCP Table	
#	This is the index number of the static IP table entry (row).
MAC Address	Type the MAC address (with colons) of a computer on your LAN.
IP Address	Type the LAN IP address of a computer on your LAN.
DNS Server	
DNS Servers Assigned by DHCP Server	The NBG6716 passes a DNS (Domain Name System) server IP address (in the order you specify here) to the DHCP clients. The NBG6716 only passes this information to the LAN DHCP clients when you enable **DHCP Server**. When you disable **DHCP Server**, DHCP service is disabled and you must have another DHCP sever on your LAN, or else the computers must have their DNS server addresses manually configured.

Table 47 Network > DHCP Server > Advanced (continued)

LABEL	DESCRIPTION
First DNS Server Second DNS Server Third DNS Server	Select **Obtained From ISP** if your ISP dynamically assigns DNS server information (and the NBG6716's WAN IP address). The field to the right displays the (read-only) DNS server IP address that the ISP assigns. Select **User-Defined** if you have the IP address of a DNS server. Enter the DNS server's IP address in the field to the right. If you chose **User-Defined**, but leave the IP address set to 0.0.0.0, **User-Defined** changes to **None** after you click **Apply**. If you set a second choice to **User-Defined**, and enter the same IP address, the second **User-Defined** changes to **None** after you click **Apply**. Select **DNS Relay** to have the NBG6716 act as a DNS proxy. The NBG6716's LAN IP address displays in the field to the right (read-only). The NBG6716 tells the DHCP clients on the LAN that the NBG6716 itself is the DNS server. When a computer on the LAN sends a DNS query to the NBG6716, the NBG6716 forwards the query to the NBG6716's system DNS server (configured in the **WAN > Internet Connection** screen) and relays the response back to the computer. You can only select **DNS Relay** for one of the three servers; if you select **DNS Relay** for a second or third DNS server, that choice changes to **None** after you click **Apply**. Select **None** if you do not want to configure DNS servers. If you do not configure a DNS server, you must know the IP address of a computer in order to access it.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

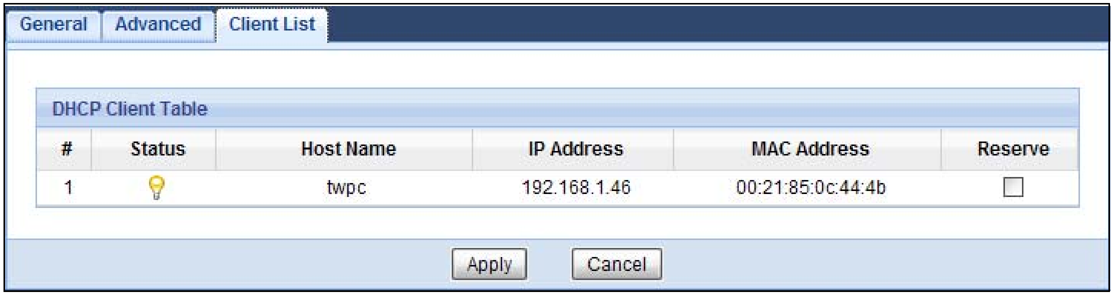
13.4 DHCP Client List Screen

The DHCP table shows current DHCP client information (including IP Address, Host Name and MAC Address) of network clients using the NBG6716's DHCP servers.

Configure this screen to always assign an IP address to a MAC address (and host name). Click **Network > DHCP Server > Client List**.

Note: You can also view a read-only client list by clicking **Monitor > DHCP Server**.

Figure 76 Network > DHCP Server > Client List



DHCP Client Table

#	Status	Host Name	IP Address	MAC Address	Reserve
1	💡	twpc	192.168.1.46	00:21:85:0c:44:4b	□

The following table describes the labels in this screen.

Table 48 Network > DHCP Server > Client List

LABEL	DESCRIPTION
#	This is the index number of the host computer.
Status	This field displays whether the connection to the host computer is up (a yellow bulb) or down (a gray bulb).

Table 48 Network > DHCP Server > Client List (continued)

LABEL	DESCRIPTION
Host Name	This field displays the computer host name.
IP Address	This field displays the IP address relative to the # field listed above.
MAC Address	This field shows the MAC address of the computer with the name in the **Host Name** field. Every Ethernet device has a unique MAC (Media Access Control) address which uniquely identifies a device. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00:A0:C5:00:00:02.
Reserve	Select this if you want to reserve the IP address for this specific MAC address.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14

NAT

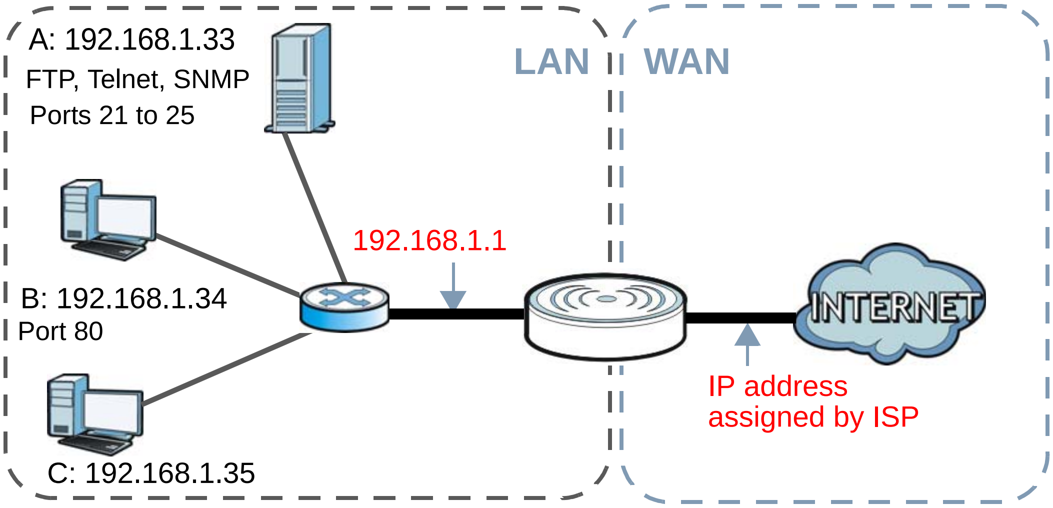
14.1 Overview

NAT (Network Address Translation - NAT, RFC 1631) is the translation of the IP address of a host in a packet. For example, the source address of an outgoing packet, used within one network is changed to a different IP address known within another network.

The figure below is a simple illustration of a NAT network. You want to assign ports 21-25 to one FTP, Telnet and SMTP server (**A** in the example), port 80 to another (**B** in the example) and assign a default server IP address of 192.168.1.35 to a third (**C** in the example).

You assign the LAN IP addresses to the devices (**A** to **D**) connected to your NBG6716. The ISP assigns the WAN IP address. The NAT network appears as a single host on the Internet. All traffic coming from **A** to **D** going out to the Internet use the IP address of the NBG6716, which is 192.168.1.1.

Figure 77 NAT Example



This chapter discusses how to configure NAT on the NBG6716.

Note: You must create a firewall rule in addition to setting up NAT, to allow traffic from the WAN to be forwarded through the NBG6716.

14.1.1 What You Can Do

- Use the **General** screen to enable NAT (Section 14.2 on page 117).

- Use the **Port Forwarding** screen to set a default server and change your NBG6716's port forwarding settings to forward incoming service requests to the server(s) on your local network (Section 14.3 on page 118).
- Use the **Port Trigger** screen to change your NBG6716's trigger port settings (Section 14.5.3 on page 123).

14.1.2 What You Need To Know

The following terms and concepts may help as you read through this chapter.

Inside/Outside

This denotes where a host is located relative to the NBG6716, for example, the computers of your subscribers are the inside hosts, while the web servers on the Internet are the outside hosts.

Global/Local

This denotes the IP address of a host in a packet as the packet traverses a router, for example, the local address refers to the IP address of a host when the packet is in the local network, while the global address refers to the IP address of the host when the same packet is traveling in the WAN side.

Note: Inside/outside refers to the location of a host, while global/local refers to the IP address of a host used in a packet.

An inside local address (ILA) is the IP address of an inside host in a packet when the packet is still in the local network, while an inside global address (IGA) is the IP address of the same inside host when the packet is on the WAN side. The following table summarizes this information.

Table 49 NAT Definitions

ITEM	DESCRIPTION
Inside	This refers to the host on the LAN.
Outside	This refers to the host on the WAN.
Local	This refers to the packet address (source or destination) as the packet travels on the LAN.
Global	This refers to the packet address (source or destination) as the packet travels on the WAN.

Note: NAT never changes the IP address (either local or global) of an outside host.

What NAT Does

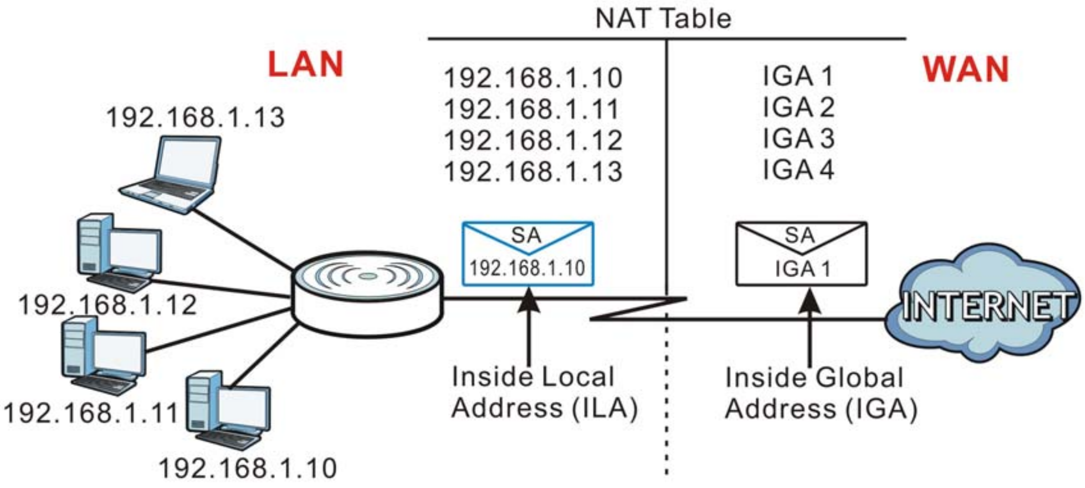
In the simplest form, NAT changes the source IP address in a packet received from a subscriber (the inside local address) to another (the inside global address) before forwarding the packet to the WAN side. When the response comes back, NAT translates the destination address (the inside global address) back to the inside local address before forwarding it to the original inside host. Note that the IP address (either local or global) of an outside host is never changed.

The global IP addresses for the inside hosts can be either static or dynamically assigned by the ISP. In addition, you can designate servers, for example, a web server and a telnet server, on your local network and make them accessible to the outside world. If you do not define any servers , NAT offers the additional benefit of firewall protection. With no servers defined, your NBG6716 filters out all incoming inquiries, thus preventing intruders from probing your network. For more information on IP address translation, refer to *RFC 1631*, *The IP Network Address Translator (NAT)*.

How NAT Works

Each packet has two addresses – a source address and a destination address. For outgoing packets, the ILA (Inside Local Address) is the source address on the LAN, and the IGA (Inside Global Address) is the source address on the WAN. For incoming packets, the ILA is the destination address on the LAN, and the IGA is the destination address on the WAN. NAT maps private (local) IP addresses to globally unique ones required for communication with hosts on other networks. It replaces the original IP source address in each packet and then forwards it to the Internet. The NBG6716 keeps track of the original addresses and port numbers so incoming reply packets can have their original values restored. The following figure illustrates this.

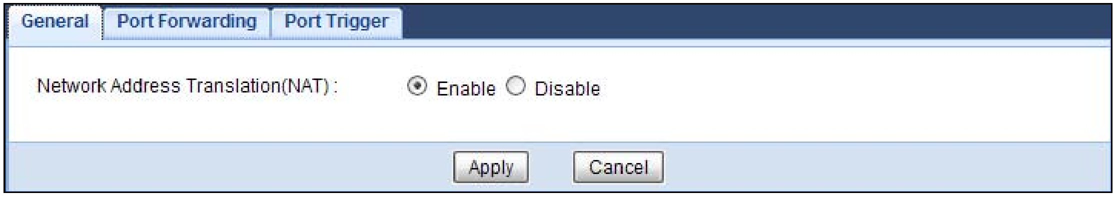
Figure 78 How NAT Works



14.2 General

Use this screen to enable NAT and set a default server. Click **Network > NAT** to open the **General** screen.

Figure 79 Network > NAT > General



Network Address Translation(NAT) : ● Enable ○ Disable

The following table describes the labels in this screen.

Table 50 Network > NAT > General

LABEL	DESCRIPTION
Network Address Translation (NAT)	Network Address Translation (NAT) allows the translation of an Internet protocol address used within one network (for example a private IP address used in a local network) to a different IP address known within another network (for example a public IP address used on the Internet). Select **Enable** to activate NAT. Select **Disable** to turn it off.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.3 Port Forwarding Screen

Use this screen to forward incoming service requests to the server(s) on your local network and set a default server. 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.

In addition to the servers for specified services, NAT supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default is not defined, the service request is simply discarded.

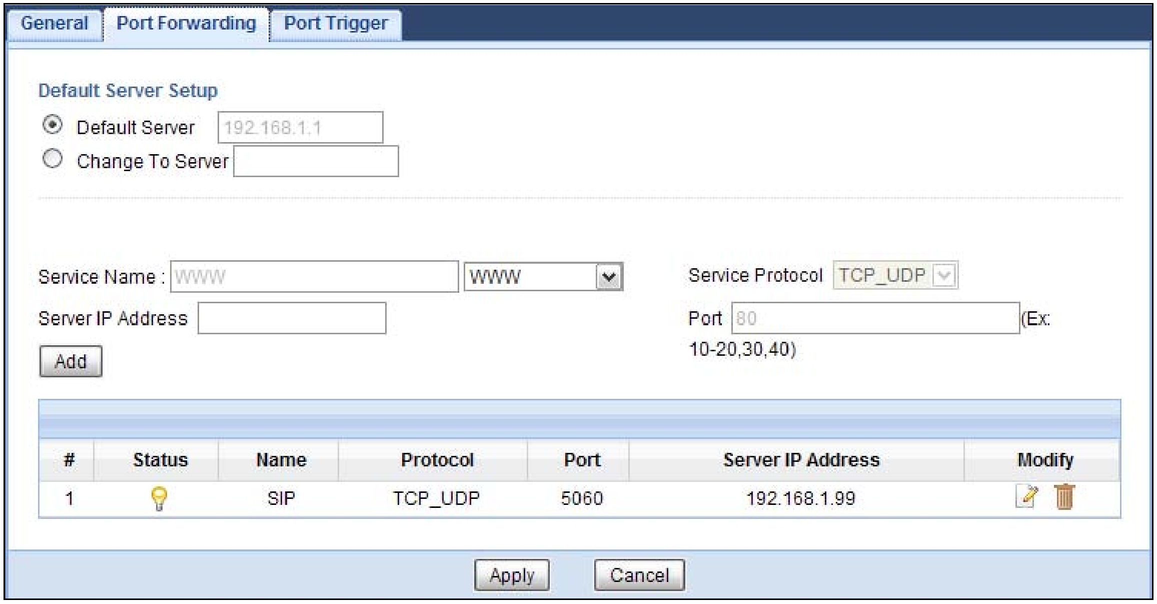
Note: Many residential broadband ISP accounts do not allow you to run any server processes (such as a Web or FTP server) from your location. Your ISP may periodically check for servers and may suspend your account if it discovers any active services at your location. If you are unsure, refer to your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

Port forwarding allows you to define the local servers to which the incoming services will be forwarded. To change your NBG6716's port forwarding settings, click **Network > NAT** > **Port Forwarding**. The screen appears as shown.

Note: If you do not assign a **Default Server**, the NBG6716 discards all packets received for ports that are not specified in this screen or remote management.

Refer to Appendix C on page 221 for port numbers commonly used for particular services.

Figure 80 Network > NAT > Port Forwarding



Default Server Setup

● Default Server 192.168.1.1

○ Change To Server

Service Name : WWW WWW

Service Protocol TCP_UDP

Server IP Address

Port 80 (Ex: 10-20,30,40)

Add

#	Status	Name	Protocol	Port	Server IP Address	Modify
1	💡	SIP	TCP_UDP	5060	192.168.1.99	✎ 🗑

Apply Cancel

The following table describes the labels in this screen.

Table 51 Network > NAT > Port Forwarding

LABEL	DESCRIPTION
Default Server Setup	
Default Server	In addition to the servers for specified services, NAT supports a default server. A default server receives packets from ports that are not specified in the **Port Forwarding** screen. You can decide whether you want to use the default server or specify a server manually. Select this to use the default server.
Change to Server	Select this and manually enter the server's IP address.
Service Name	Select a pre-defined service from the drop-down list box. The pre-defined service port number(s) and protocol will be displayed in the port forwarding summary table. Otherwise, select **User define** to manually enter the port number(s) and select the IP protocol.
Service Protocol	Select the transport layer protocol supported by this virtual server. Choices are **TCP**, **UDP**, or **TCP_UDP**. If you have chosen a pre-defined service in the **Service Name** field, the protocol will be configured automatically.
Server IP Address	Enter the inside IP address of the virtual server here and click **Add** to add it in the port forwarding summary table.
#	This is the number of an individual port forwarding server entry.
Status	This icon is turned on when the rule is enabled.
Name	This field displays a name to identify this rule.
Protocol	This is the transport layer protocol used for the service.
Port	This field displays the port number(s).
Server IP Address	This field displays the inside IP address of the server.
Modify	Click the **Edit** icon to open the edit screen where you can modify an existing rule. Click the **Delete** icon to remove a rule.

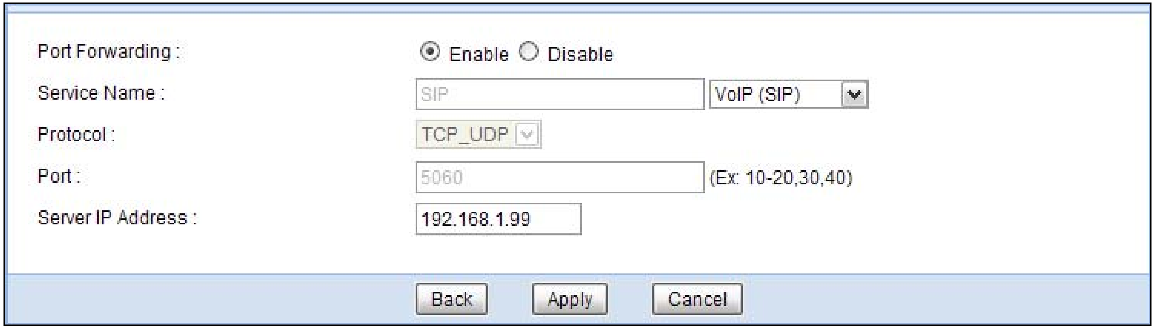
Table 51 Network > NAT > Port Forwarding (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.3.1 Port Forwarding Edit Screen

This screen lets you edit a port forwarding rule. Click a rule's **Edit** icon in the **Port Forwarding** screen to open the following screen.

Figure 81 Network > NAT > Port Forwarding Edit



Port Forwarding : ● Enable ○ Disable

Service Name : SIP VoIP (SIP)

Protocol : TCP_UDP

Port : 5060 (Ex: 10-20,30,40)

Server IP Address : 192.168.1.99

The following table describes the labels in this screen.

Table 52 Network > NAT > Port Forwarding Edit

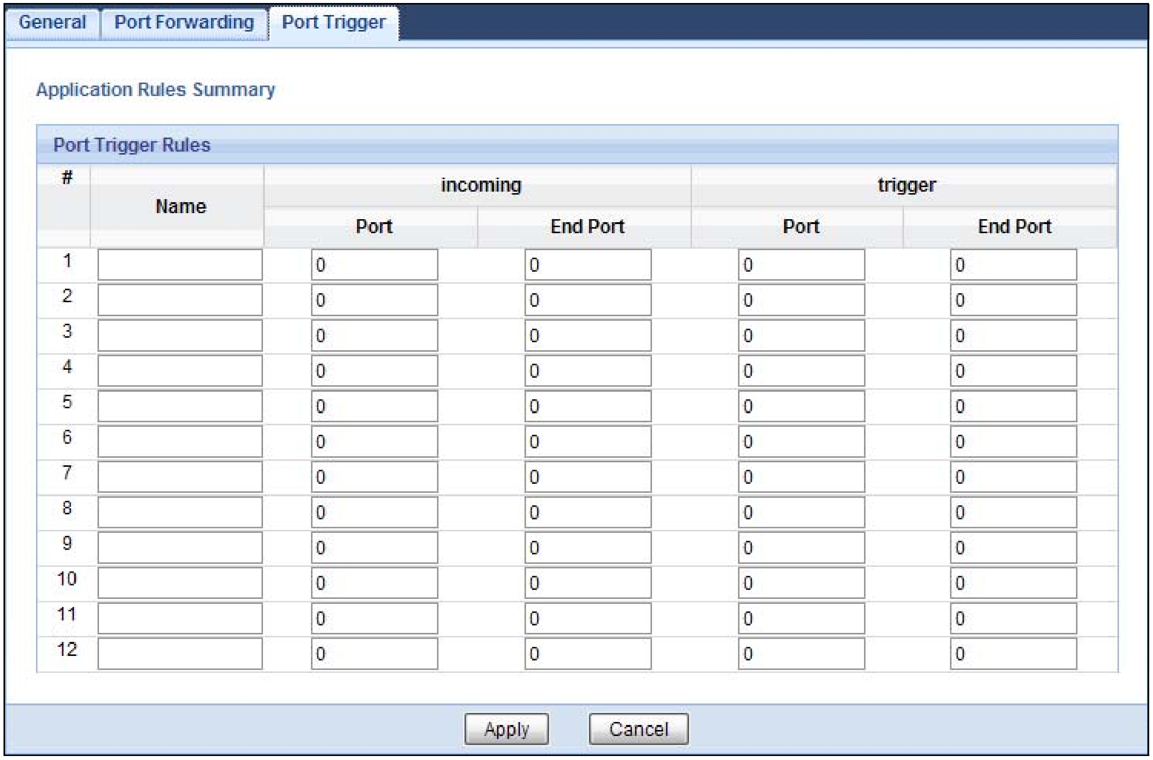
LABEL	DESCRIPTION
Port Forwarding	Select **Enable** to turn on this rule and the requested service can be forwarded to the host with a specified internal IP address. Select **Disable** to disallow forwarding of these ports to an inside server without having to delete the entry.
Service Name	Type a name (of up to 31 printable characters) to identify this rule in the first field next to **Service Name**. Otherwise, select a predefined service in the second field next to **Service Name**. The predefined service name and port number(s) will display in the **Service Name** and **Port** fields.
Protocol	Select the transport layer protocol supported by this virtual server. Choices are **TCP**, **UDP**, or **TCP_UDP**. If you have chosen a pre-defined service in the **Service Name** field, the protocol will be configured automatically.
Port	Type a port number(s) to define the service to be forwarded to the specified server. To specify a range of ports, enter a hyphen (-) between the first port and the last port, such as 10-.
Server IP Address	Type the IP address of the server on your LAN that receives packets from the port(s) specified in the **Port** field.
Back	Click **Back** to return to the previous screen.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.4 Port Trigger Screen

To change your NBG6716’s trigger port settings, click **Network > NAT > Port Trigger**. The screen appears as shown.

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

Figure 82 Network > NAT > Port Trigger



Application Rules Summary

Port Trigger Rules

#	Name	incoming		trigger	
		Port	End Port	Port	End Port
1		0	0	0	0
2		0	0	0	0
3		0	0	0	0
4		0	0	0	0
5		0	0	0	0
6		0	0	0	0
7		0	0	0	0
8		0	0	0	0
9		0	0	0	0
10		0	0	0	0
11		0	0	0	0
12		0	0	0	0

The following table describes the labels in this screen.

Table 53 Network > NAT > Port Trigger

LABEL	DESCRIPTION
#	This is the rule index number (read-only).
Name	Type a unique name (up to 15 characters) for identification purposes. All characters are permitted - including spaces.
Incoming	Incoming is a port (or a range of ports) that a server on the WAN uses when it sends out a particular service. The NBG6716 forwards the traffic with this port (or range of ports) to the client computer on the LAN that requested the service.
Port	Type a port number or the starting port number in a range of port numbers.
End Port	Type a port number or the ending port number in a range of port numbers.
Trigger	The trigger port is a port (or a range of ports) that causes (or triggers) the NBG6716 to record the IP address of the LAN computer that sent the traffic to a server on the WAN.
Port	Type a port number or the starting port number in a range of port numbers.
End Port	Type a port number or the ending port number in a range of port numbers.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.5 Technical Reference

The following section contains additional technical information about the NBG6716 features described in this chapter.

14.5.1 NATPort Forwarding: Services and Port Numbers

A port forwarding set is a list of inside (behind NAT on the LAN) servers, for example, web or FTP, that you can make accessible to the outside world even though NAT makes your whole inside network appear as a single machine to the outside world.

Use the **Port Forwarding** screen to forward incoming service requests to the server(s) on your local network. 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.

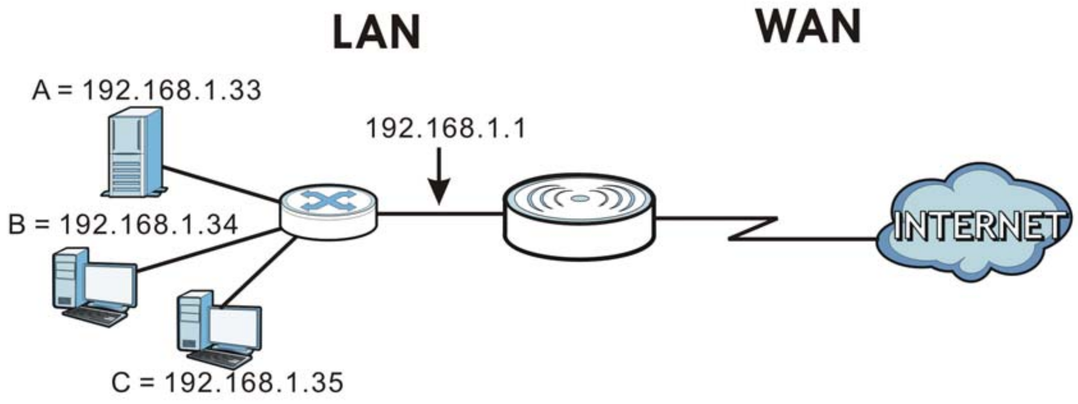
In addition to the servers for specified services, NAT supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default is not defined, the service request is simply discarded.

Note: 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.

14.5.2 NAT Port Forwarding Example

Let's say you want to assign ports 21-25 to one FTP, Telnet and SMTP server (**A** in the example), port 80 to another (**B** in the example) and assign a default server IP address of 192.168.1.35 to a third (**C** in the example). You assign the LAN IP addresses and the ISP assigns the WAN IP address. The NAT network appears as a single host on the Internet.

Figure 83 Multiple Servers Behind NAT Example



14.5.3 Trigger Port Forwarding

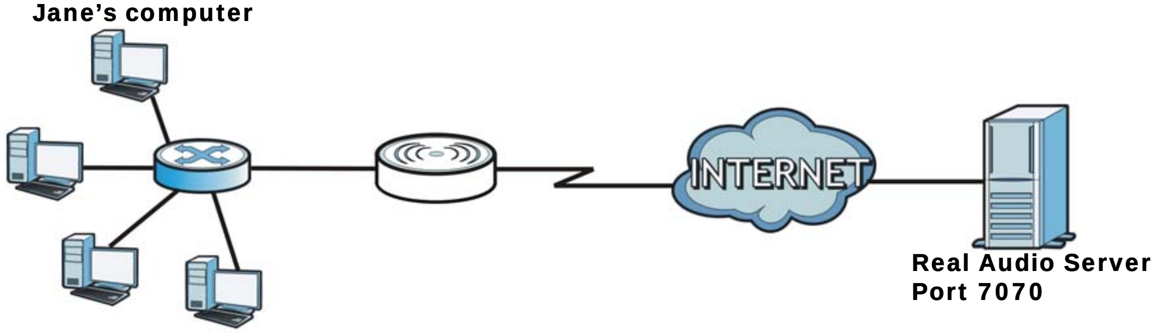
Some services use a dedicated range of ports on the client side and a dedicated range of ports on the server side. With regular port forwarding you set a forwarding port in NAT to forward a service (coming in from the server on the WAN) to the IP address of a computer on the client side (LAN). The problem 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 NBG6716 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 (a "trigger" port). When the NBG6716's WAN port receives a response with a specific port number and protocol ("incoming" port), the NBG6716 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.

14.5.4 Trigger Port Forwarding Example

The following is an example of trigger port forwarding.

Figure 84 Trigger Port Forwarding Process: Example



1 Jane requests a file from the Real Audio server (port 7070).

2 Port 7070 is a “trigger” port and causes the NBG6716 to record Jane’s computer IP address. The NBG6716 associates Jane's computer IP address with the "incoming" port range of 6970-7170.

3 The Real Audio server responds using a port number ranging between 6970-7170.

4 The NBG6716 forwards the traffic to Jane’s computer IP address.

5 Only Jane can connect to the Real Audio server until the connection is closed or times out. The NBG6716 times out in three minutes with UDP (User Datagram Protocol), or two hours with TCP/IP (Transfer Control Protocol/Internet Protocol).

14.5.5 Two Points To Remember About Trigger Ports

1 Trigger events only happen on data that is coming from inside the NBG6716 and going to the outside.

2 If an application needs a continuous data stream, that port (range) will be tied up so that another computer on the LAN can't trigger it.

15

DDNS

15.1 Overview

DDNS services let you use a domain name with a dynamic IP address.

15.1.1 What You Need To Know

The following terms and concepts may help as you read through this chapter.

What is DDNS?

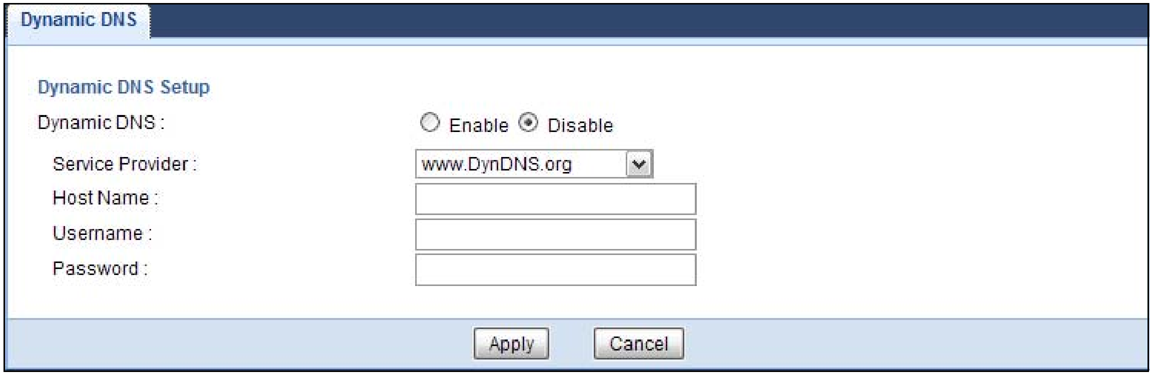
Dynamic Domain Name Service (DDNS) services let you use a fixed domain name with a dynamic IP address. Users can always use the same domain name instead of a different dynamic IP address that changes each time to connect to the NBG6716 or a server in your network.

Note: The NBG6716 must have a public global IP address and you should have your registered DDNS account information on hand.

15.2 General

To change your NBG6716's DDNS, click **Network > DDNS**. The screen appears as shown.

Figure 85 Dynamic DNS



Dynamic DNS

Dynamic DNS Setup

Dynamic DNS :	○ Enable ● Disable
Service Provider :	www.DynDNS.org
Host Name :	
Username :	
Password :	

The following table describes the labels in this screen.

Table 54 Dynamic DNS

LABEL	DESCRIPTION
Dynamic DNS	Select **Enable** to use dynamic DNS. Select **Disable** to turn this feature off.
Service Provider	Select the name of your Dynamic DNS service provider.
Host Name	Enter a host names in the field provided. You can specify up to two host names in the field separated by a comma (",").
Usename	Enter your user name.
Password	Enter the password assigned to you.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

16

Static Route

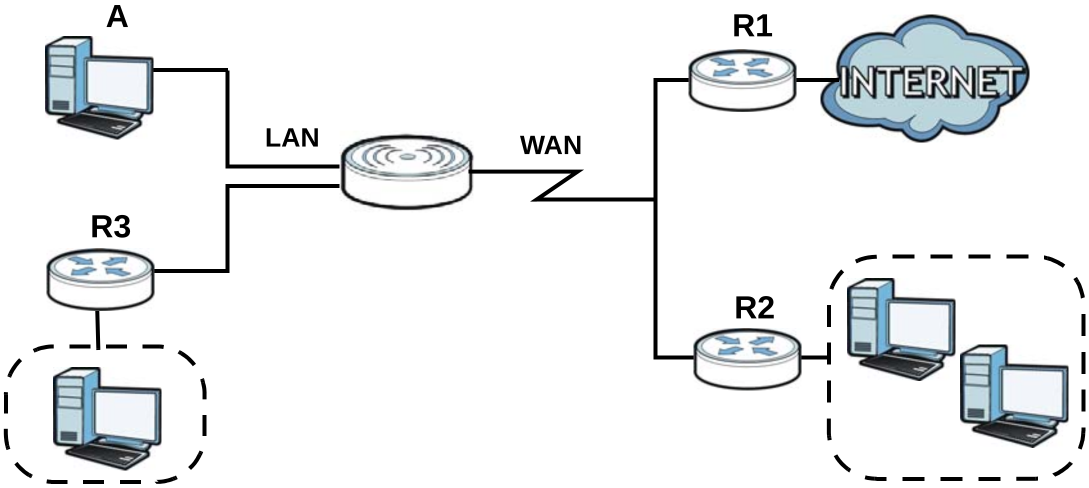
16.1 Overview

This chapter shows you how to configure static routes for your NBG6716.

The NBG6716 usually uses the default gateway to route outbound traffic from computers on the LAN to the Internet. To have the NBG6716 send data to devices not reachable through the default gateway, use static routes.

For example, the next figure shows a computer (**A**) connected to the NBG6716’s LAN interface. The NBG6716 routes most traffic from **A** to the Internet through the NBG6716’s default gateway (**R1**). You create one static route to connect to services offered by your ISP behind router **R2**. You create another static route to communicate with a separate network behind a router **R3** connected to the LAN.

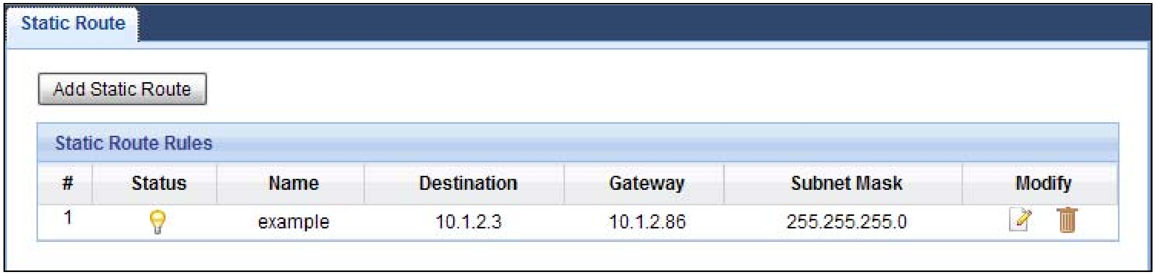
Figure 86 Example of Static Routing Topology



16.2 IP Static Route Screen

Click **Network > Static Route** to open the **Static Route** screen.

Figure 87 Network > Static Route



Static Route Rules

#	Status	Name	Destination	Gateway	Subnet Mask	Modify
1	●	example	10.1.2.3	10.1.2.86	255.255.255.0	✎ 🗑

The following table describes the labels in this screen.

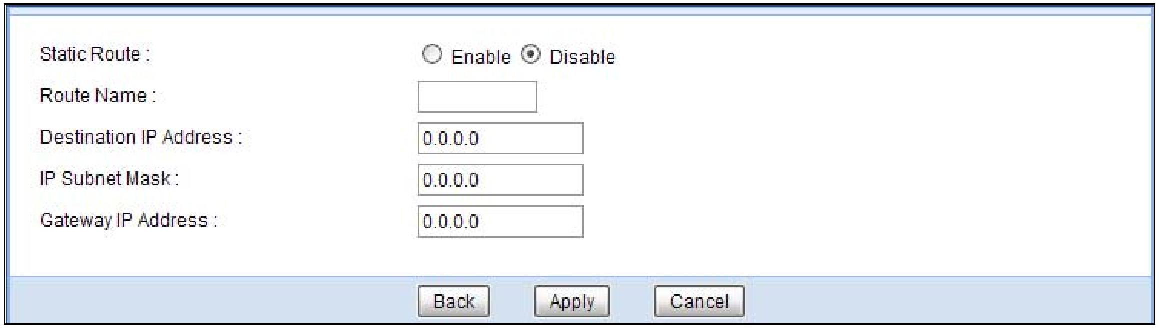
Table 55 Network > Static Route

LABEL	DESCRIPTION
Add Static Route	Click this to create a new rule.
#	This is the number of an individual static route.
Status	This field indicates whether the rule is active (yellow bulb) or not (gray bulb).
Name	This field displays a name to identify this rule.
Destination	This parameter specifies the IP network address of the final destination. Routing is always based on network number.
Gateway	This is the IP address of the gateway. The gateway is a router or switch on the same network segment as the device's LAN or WAN port. The gateway helps forward packets to their destinations.
Subent Mask	This parameter specifies the IP network subnet mask of the final destination.
Modify	Click the **Edit** icon to open a screen where you can modify an existing rule. Click the **Delete** icon to remove a rule from the NBG6716.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

16.2.1 Add/Edit Static Route

Click the **Add Static Route** button or a rule’s **Edit** icon in the **Static Route** screen. Use this screen to configure the required information for a static route.

Figure 88 Network > Static Route: Add/Edit



Static Route :	○ Enable ● Disable
Route Name :	
Destination IP Address :	0.0.0.0
IP Subnet Mask :	0.0.0.0
Gateway IP Address :	0.0.0.0

The following table describes the labels in this screen.

Table 56 Network > Static Route: Add/Edit

LABEL	DESCRIPTION
Static Route	Select to enable or disable this rule.
Route Name	Type a name to identify this rule. You can use up to printable English keyboard characters, including spaces.
Destination IP Address	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.
IP Subnet Mask	Enter the IP subnet mask here.
Gateway IP Address	Enter the IP address of the next-hop gateway. The gateway is a router or switch on the same segment as your NBG6716's interface(s). The gateway helps forward packets to their destinations.
Back	Click **Back** to return to the previous screen without saving.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to set every field in this screen to its last-saved value.

Firewall

17.1 Overview

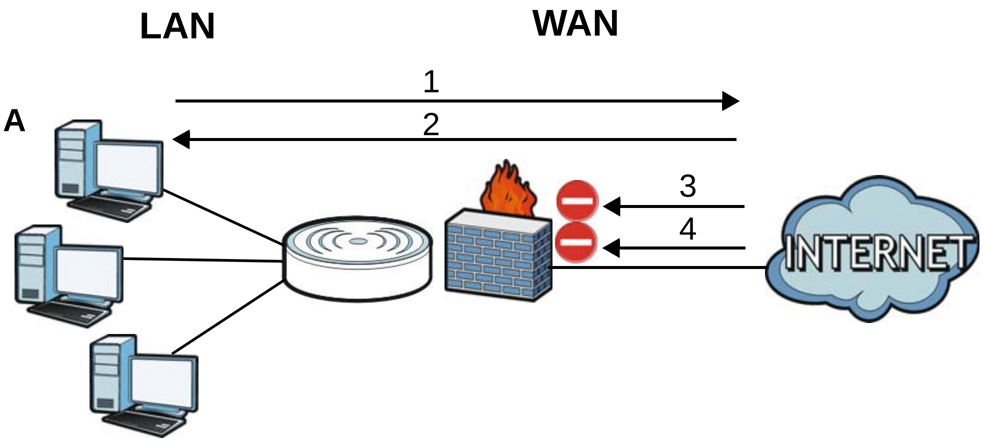
Use these screens to enable and configure the firewall that protects your NBG6716 and your LAN from unwanted or malicious traffic.

Enable the firewall to protect your LAN computers from attacks by hackers on the Internet and control access between the LAN and WAN. By default the firewall:

- allows traffic that originates from your LAN computers to go to all of the networks.
- blocks traffic that originates on the other networks from going to the LAN.

The following figure illustrates the default firewall action. User **A** can initiate an IM (Instant Messaging) session from the LAN to the WAN (1). Return traffic for this session is also allowed (2). However other traffic initiated from the WAN is blocked (3 and 4).

Figure 89 Default Firewall Action



17.1.1 What You Can Do

- Use the **General** screen to enable or disable the NBG6716's firewall (Section 17.2 on page 132).
- Use the **Services** screen enable service blocking, enter/delete/modify the services you want to block and the date/time you want to block them (Section 17.3 on page 132).

17.1.2 What You Need To Know

The following terms and concepts may help as you read through this chapter.

What is a Firewall?

Originally, the term “firewall” referred to a construction technique designed to prevent the spread of fire from one room to another. The networking term "firewall" is a system or group of systems that enforces an access-control policy between two networks. It may also be defined as a mechanism used to protect a trusted network from a network that is not trusted. Of course, firewalls cannot solve every security problem. A firewall is one of the mechanisms used to establish a network security perimeter in support of a network security policy. It should never be the only mechanism or method employed. For a firewall to guard effectively, you must design and deploy it appropriately. This requires integrating the firewall into a broad information-security policy. In addition, specific policies must be implemented within the firewall itself.

Stateful Inspection Firewall

Stateful inspection 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. Firewalls, of one type or another, have become an integral part of standard security solutions for enterprises.

About the NBG6716 Firewall

The NBG6716’s firewall feature physically separates the LAN and the WAN and acts as a secure gateway for all data passing between the networks.

It is a stateful inspection firewall and is designed to protect against Denial of Service attacks when activated (click the **General** tab under **Firewall** and then click the **Enable Firewall** check box). The NBG6716's purpose is to allow a private Local Area Network (LAN) to be securely connected to the Internet. The NBG6716 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 NBG6716 is installed between the LAN and a broadband modem connecting to the Internet. This allows it to act as a secure gateway for all data passing between the Internet and the LAN.

The NBG6716 has one Ethernet WAN port and four Ethernet LAN ports, which are used to physically separate the network into two areas.The WAN (Wide Area Network) port attaches to the broadband (cable or DSL) modem to the Internet.

The LAN (Local Area Network) port attaches to a network of computers, which needs security from the outside world. These computers will have access to Internet services such as e-mail, FTP and the World Wide Web. However, "inbound access" is not allowed (by default) unless the remote host is authorized to use a specific service.

Guidelines For Enhancing Security With Your Firewall

1. Change the default password via Web Configurator.
2. Think about access control before you connect to the network in any way, including attaching a modem to the port.
3. Limit who can access your router.

4 Don't enable any local service (such as NTP) that you don't use. Any enabled service could present a potential security risk. A determined hacker might be able to find creative ways to misuse the enabled services to access the firewall or the network.

5 For local services that are enabled, protect against misuse. Protect by configuring the services to communicate only with specific peers, and protect by configuring rules to block packets for the services at specific interfaces.

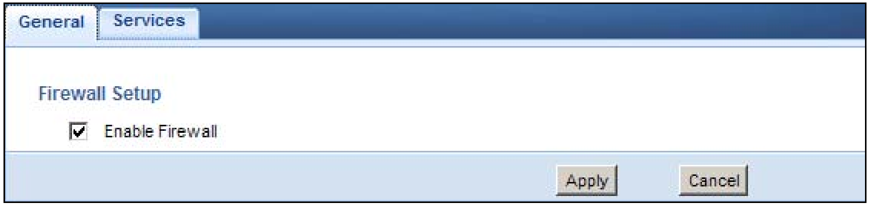
6 Protect against IP spoofing by making sure the firewall is active.

7 Keep the firewall in a secured (locked) room.

17.2 General Screen

Use this screen to enable or disable the NBG6716's firewall, and set up firewall logs. Click **Security** > **Firewall** to open the **General** screen.

Figure 90 Security > Firewall > General l



The following table describes the labels in this screen.

Table 57 Security > Firewall > General

LABEL	DESCRIPTION
Enable Firewall	Select this check box to activate the firewall. The NBG6716 performs access control and protects against Denial of Service (DoS) attacks when the firewall is activated.
Apply	Click **Apply** to save the settings.
Cancel	Click **Cancel** to start configuring this screen again.

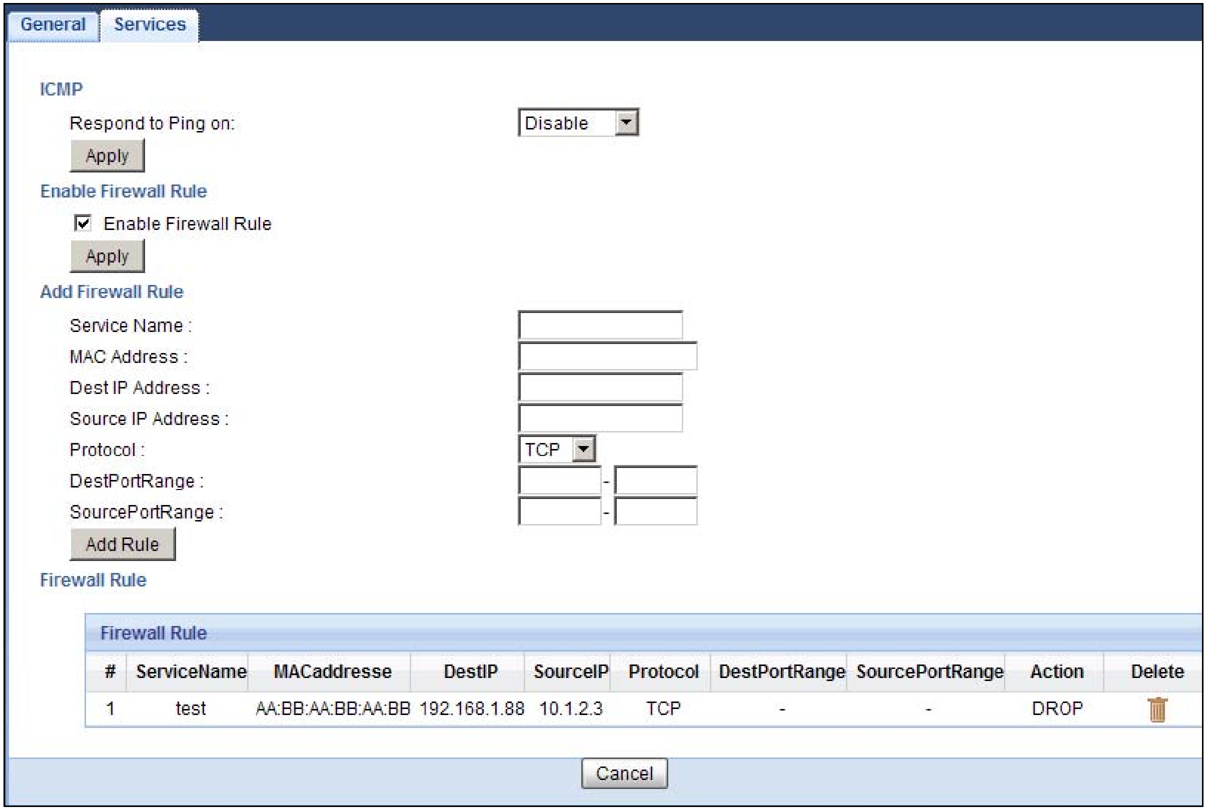
17.3 Services Screen

If an outside user attempts to probe an unsupported port on your NBG6716, an ICMP response packet is automatically returned. This allows the outside user to know the NBG6716 exists. Use this screen to prevent the ICMP response packet from being sent. This keeps outsiders from discovering your NBG6716 when unsupported ports are probed.

You can also use this screen to enable service blocking, enter/delete/modify the services you want to block and the date/time you want to block them.

Click **Security** > **Firewall** > **Services**. The screen appears as shown next.

Figure 91 Security > Firewall > Services l



ICMP

Respond to Ping on: Disable

Enable Firewall Rule

☑ Enable Firewall Rule

Add Firewall Rule

Service Name :	
MAC Address :	
Dest IP Address :	
Source IP Address :	
Protocol :	TCP
DestPortRange :	-
SourcePortRange :	-

Firewall Rule

Firewall Rule

#	ServiceName	MACaddresse	DestIP	SourceIP	Protocol	DestPortRange	SourcePortRange	Action	Delete
1	test	AA:BB:AA:BB:AA:BB	192.168.1.88	10.1.2.3	TCP	-	-	DROP	🗑

The following table describes the labels in this screen.

Table 58 Security > Firewall > Services

LABEL	DESCRIPTION
LABEL	**DESCRIPTION**
ICMP	Internet Control Message Protocol is a message control and error-reporting protocol between a host server and a gateway to the Internet. ICMP uses Internet Protocol (IP) datagrams, but the messages are processed by the TCP/IP software and directly apparent to the application user.
Respond to Ping on	The NBG6716 will not respond to any incoming Ping requests when **Disable** is selected. Select **LAN** to reply to incoming LAN Ping requests. Select **WAN** to reply to incoming WAN Ping requests. Otherwise select **LAN&WAN** to reply to all incoming LAN and WAN Ping requests.
Apply	Click **Apply** to save the settings.
Enable Firewall Rule	
Enable Firewall Rule	Select this check box to activate the firewall rules that you define (see **Add Firewall Rule** below).
Apply	Click **Apply** to save the settings.
Add Firewall Rule	
Service Name	Enter a name that identifies or describes the firewall rule.
MAC Address	Enter the MAC address of the computer for which the firewall rule applies.
Dest IP Address	Enter the IP address of the computer to which traffic for the application or service is entering. The NBG6716 applies the firewall rule to traffic initiating from this computer.

Table 58 Security > Firewall > Services (continued)

LABEL	DESCRIPTION
Source IP Address	Enter the IP address of the computer that initializes traffic for the application or service. The NBG6716 applies the firewall rule to traffic initiating from this computer.
Protocol	Select the protocol (**TCP**, **UDP** or **ICMP**) used to transport the packets for which you want to apply the firewall rule.
Dest Port Range	Enter the port number/range of the destination that define the traffic type, for example TCP port 80 defines web traffic.
Source Port Range	Enter the port number/range of the source that define the traffic type, for example TCP port 80 defines web traffic.
Add Rule	Click **Add** to save the firewall rule.
Firewall Rule	
#	This is your firewall rule number. The ordering of your rules is important as rules are applied in turn.
Service Name	This is a name that identifies or describes the firewall rule.
MAC address	This is the MAC address of the computer for which the firewall rule applies.
Dest IP	This is the IP address of the computer to which traffic for the application or service is entering.
Source IP	This is the IP address of the computer from which traffic for the application or service is initialized.
Protocol	This is the protocol (**TCP**, **UDP** or **ICMP**) used to transport the packets for which you want to apply the firewall rule.
Dest Port Range	This is the port number/range of the destination that define the traffic type, for example TCP port 80 defines web traffic.
Source Port Range	This is the port number/range of the source that define the traffic type, for example TCP port 80 defines web traffic.
Action	**DROP** - Traffic matching the conditions of the firewall rule are stopped.
Delete	Click **Delete** to remove the firewall rule.
Cancel	Click **Cancel** to start configuring this screen again.

See Appendix C on page 221 for commonly used services and port numbers.

18

Content Filtering

18.1 Overview

This chapter provides a brief overview of content filtering using the embedded web GUI.

Internet content filtering allows you to create and enforce Internet access policies tailored to your needs. Content filtering is the ability to block certain web features or specific URL keywords.

18.1.1 What You Need To Know

The following terms and concepts may help as you read through this chapter.

Content Filtering Profiles

Content filtering allows you to block certain web features, such as cookies, and/or block access to specific web sites. For example, you can configure one policy that blocks John Doe's access to arts and entertainment web pages.

A content filtering profile conveniently stores your custom settings for the following features.

Keyword Blocking URL Checking

The NBG6716 checks the URL's domain name (or IP address) and file path separately when performing keyword blocking.

The URL's domain name or IP address is the characters that come before the first slash in the URL. For example, with the URL www.zyxel.com.tw/news/pressroom.php, the domain name is www.zyxel.com.tw.

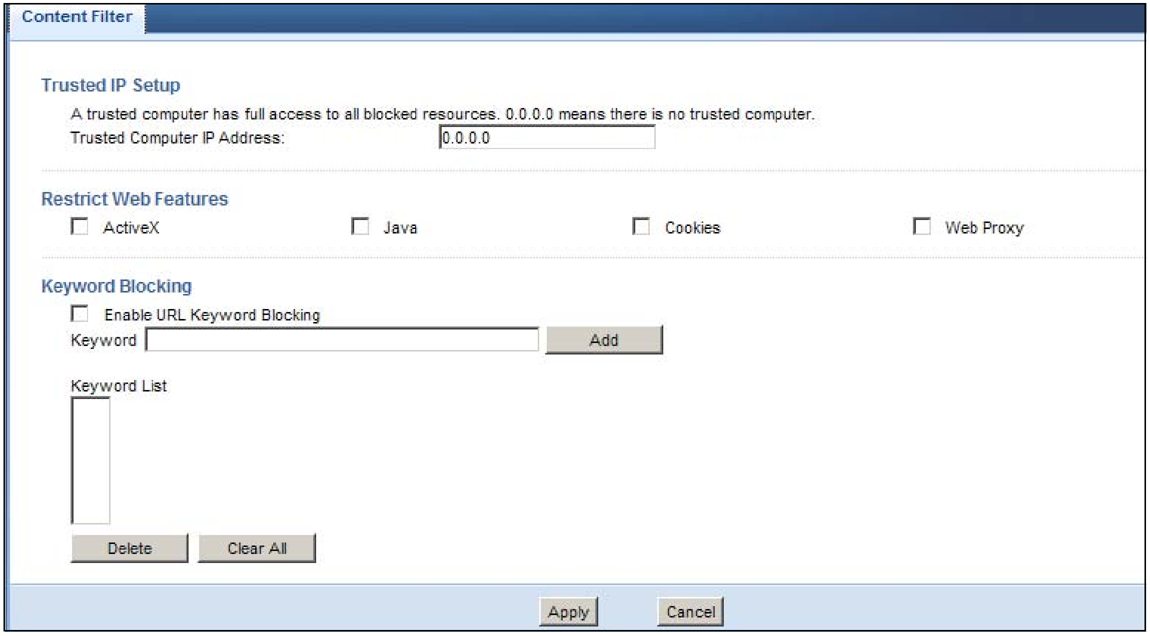
The file path is the characters that come after the first slash in the URL. For example, with the URL www.zyxel.com.tw/news/pressroom.php, the file path is news/pressroom.php.

Since the NBG6716 checks the URL's domain name (or IP address) and file path separately, it will not find items that go across the two. For example, with the URL www.zyxel.com.tw/news/pressroom.php, the NBG6716 would find "tw" in the domain name (www.zyxel.com.tw). It would also find "news" in the file path (news/pressroom.php) but it would not find "tw/news".

18.2 Content Filter

Use this screen to restrict web features, add keywords for blocking and designate a trusted computer. Click **Security** > **Content Filter** to open the **Content Filter** screen.

Figure 92 Security > Content Filter



Trusted IP Setup

A trusted computer has full access to all blocked resources. 0.0.0.0 means there is no trusted computer.

Trusted Computer IP Address: 0.0.0.0

Restrict Web Features

□ ActiveX □ Java □ Cookies □ Web Proxy

Keyword Blocking

□ Enable URL Keyword Blocking

Keyword

Keyword List

The following table describes the labels in this screen.

Table 59 Security > Content Filter

LABEL	DESCRIPTION
Trusted IP Setup	To enable this feature, type an IP address of any one of the computers in your network that you want to have as a trusted computer. This allows the trusted computer to have full access to all features that are configured to be blocked by content filtering. Leave this field blank to have no trusted computers.
Restrict Web Features	Select the box(es) to restrict a feature. When you download a page containing a restricted feature, that part of the web page will appear blank or grayed out.
ActiveX	A tool for building dynamic and active Web pages and distributed object applications. When you visit an ActiveX Web site, ActiveX controls are downloaded to your browser, where they remain in case you visit the site again.
Java	A programming language and development environment for building downloadable Web components or Internet and intranet business applications of all kinds.
Cookies	Used by Web servers to track usage and provide service based on ID.
Web Proxy	A server that acts as an intermediary between a user and the Internet to provide security, administrative control, and caching service. When a proxy server is located on the WAN it is possible for LAN users to circumvent content filtering by pointing to this proxy server.
Enable URL Keyword Blocking	The NBG6716 can block Web sites with URLs that contain certain keywords in the domain name or IP address. For example, if the keyword "bad" was enabled, all sites containing this keyword in the domain name or IP address will be blocked, e.g., URL http://www.website.com/bad.html would be blocked. Select this check box to enable this feature.
Keyword	Type a keyword in this field. You may use any character (up to 64 characters). Wildcards are not allowed. You can also enter a numerical IP address.
Add	Click **Add** after you have typed a keyword. Repeat this procedure to add other keywords. Up to 64 keywords are allowed. When you try to access a web page containing a keyword, you will get a message telling you that the content filter is blocking this request.

Table 59 Security > Content Filter (continued)

LABEL	DESCRIPTION
Keyword List	This list displays the keywords already added.
Delete	Highlight a keyword in the lower box and click **Delete** to remove it. The keyword disappears from the text box after you click **Apply**.
Clear All	Click this button to remove all of the listed keywords.
Apply	Click **Apply** to save your changes.
Cancel	Click **Cancel** to begin configuring this screen afresh

18.3 Technical Reference

The following section contains additional technical information about the NBG6716 features described in this chapter.

18.3.1 Customizing Keyword Blocking URL Checking

You can use commands to set how much of a website's URL the content filter is to check for keyword blocking. See the appendices for information on how to access and use the command interpreter.

Domain Name or IP Address URL Checking

By default, the NBG6716 checks the URL's domain name or IP address when performing keyword blocking.

This means that the NBG6716 checks the characters that come before the first slash in the URL.

For example, with the URL www.zyxel.com.tw/news/pressroom.php, content filtering only searches for keywords within www.zyxel.com.tw.

Full Path URL Checking

Full path URL checking has the NBG6716 check the characters that come before the last slash in the URL.

For example, with the URL www.zyxel.com.tw/news/pressroom.php, full path URL checking searches for keywords within www.zyxel.com.tw/news/.

Use the `ip urlfilter customize actionFlags 6 [disable | enable]` command to extend (or not extend) the keyword blocking search to include the URL's full path.

File Name URL Checking

Filename URL checking has the NBG6716 check all of the characters in the URL.

For example, filename URL checking searches for keywords within the URL www.zyxel.com.tw/news/pressroom.php.

Use the `ip urlfilter customize actionFlags 8 [disable | enable]` command to extend (or not extend) the keyword blocking search to include the URL's complete filename.

19

StreamBoost Management

19.1 Overview

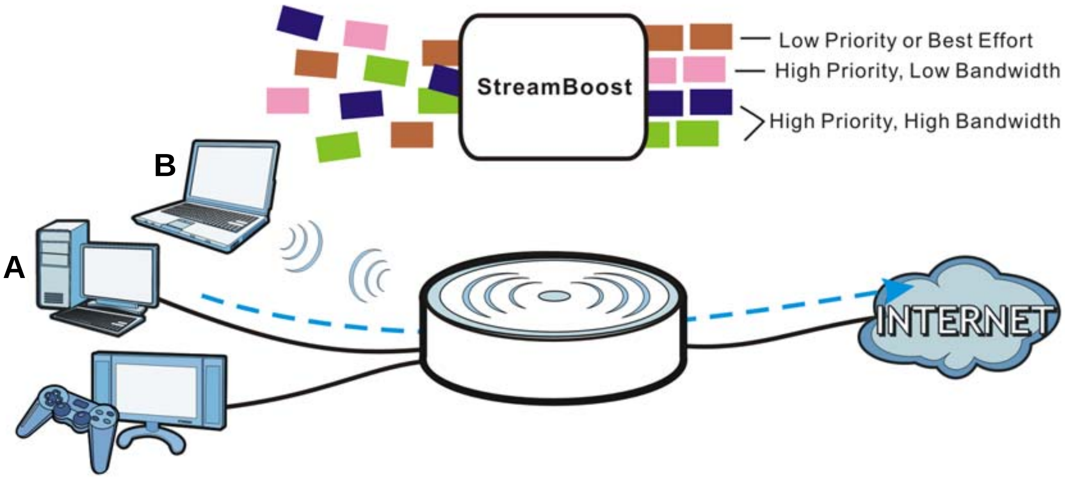
The NBG6716 supports the new StreamBoost technology, introduced by Qualcomm, to redistribute traffic over the NBG6716 for the best possible performance in a home network.

Streamboost is smart Quality of Service (QoS). Streamboost detects traffic flows and applies traffic shaping polcies automatically. It gives each device and each application the priority and provides the exact amount of bandwidth they need at a given time. This helps free up bandwidth for other applications or connected deivces. If there is not enough bandwidth for optimal performance, Streamboost makes sure the application or device has the minimum acceptable bandwidth which is determined according to the StreamBoost's cloud-based database.

Real-time application traffic (such as on-line games or communications) and video/audio streaming are given the highest priority. Downloads or torrent files are classified as best effort and placed lower than general network traffic (general browsing).

In the figure below, the StreamBoost-enabled NBG6716 differentiates incoming traffic flows going from the LAN device (**A**) or wireless device (**B**) to the Internet. It shapes traffic and gives priority and allocate bandwidth according to traffic types.

Figure 93 StreamBoost Management Example


StreamBoost
Low Priority or Best Effort
High Priority, Low Bandwidth
High Priority, High Bandwidth
B
A
INTERNET

19.2 What You Can Do

- Use the **Network** screen to view transmission data rates between the NBG6716 and the Internet or conencted devices (Section 19.3 on page 140).

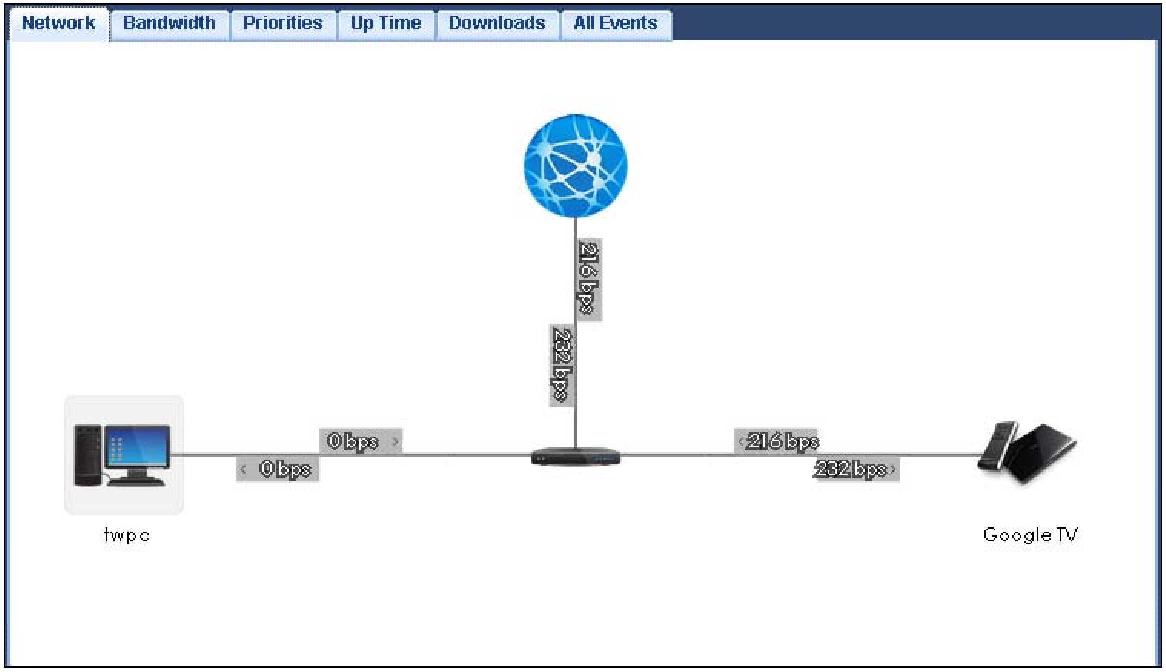
- Use the **Bandwidth** screen to configure the maximum allowable bandwidth and enable automatic update(Section 19.4 on page 140).
- Use the **Priorities** screen to prioritize the connected devices (Section 19.5 on page 142).
- Use the **Up Time** screen to view the top five traffic flows transmitting from/to the selected LAN device(s) (Section 19.6 on page 142).
- Use the **Downloads** screen to view the type and percentage of most download traffic (Section 19.7 on page 143).
- Use the **All Events** screen to view the time at which a traffic flow is given bandwidth for optimal, good or best-effort performance (Section 19.8 on page 144).

19.3 Network Screen

Use this screen to view the current upstream and downstream transmission speeds between the NBG6716 and the Internet and/or between the NBG6716 and the connected device(s) (represented by icons indicating the kind of network device), including those connecting wirelessly.

Click **Management > StreamBoost MGMT > Network** to open the **Network** screen.

Figure 94 Management > StreamBoost Management > Network

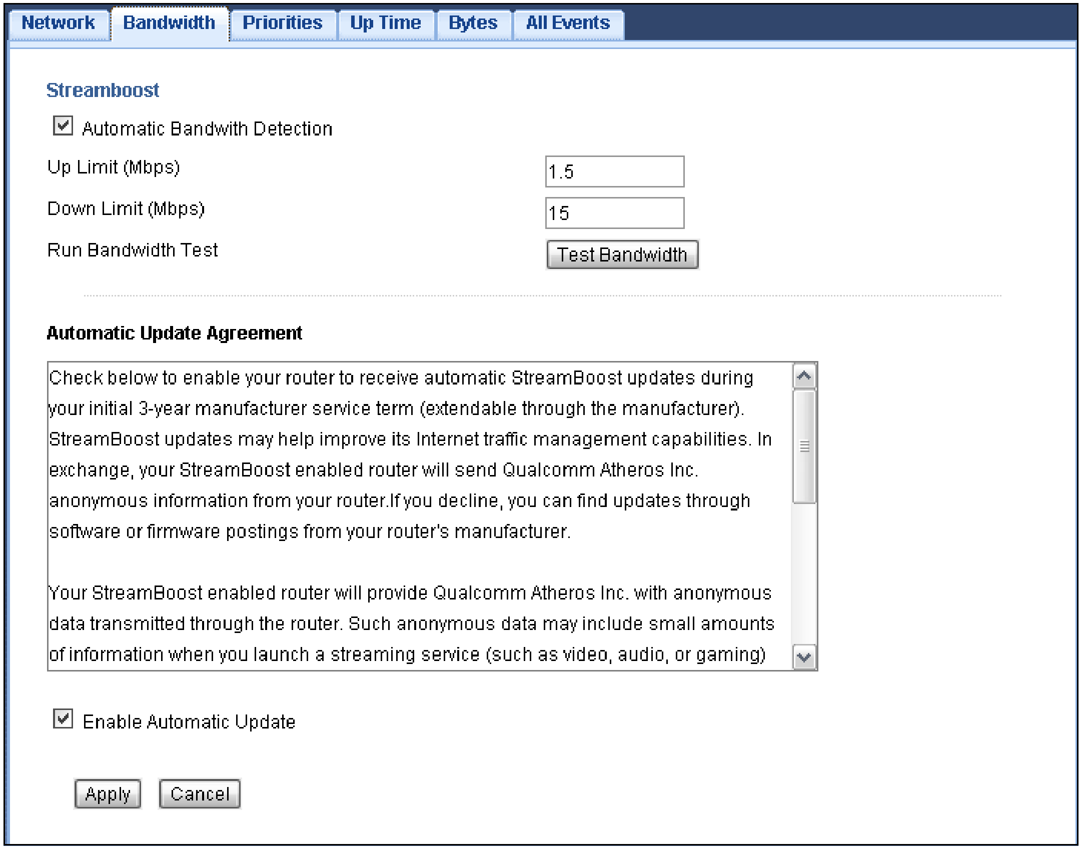


19.4 Banwidth Screen

Use this screen to configure the maximum allowable bandwidth on the NBG6716 and allow the NBG6716 to get StreamBoost database updates automatically.

Click **Management > StreamBoost MGMT > Bandwidth** to open the **Bandwidth** screen.

Figure 95 Management > StreamBoost Management > Bandwidth



Streamboost

☑ Automatic Bandwith Detection

Up Limit (Mbps) 1.5

Down Limit (Mbps) 15

Run Bandwidth Test Test Bandwidth

Automatic Update Agreement

Check below to enable your router to receive automatic StreamBoost updates during your initial 3-year manufacturer service term (extendable through the manufacturer). StreamBoost updates may help improve its Internet traffic management capabilities. In exchange, your StreamBoost enabled router will send Qualcomm Atheros Inc. anonymous information from your router.If you decline, you can find updates through software or firmware postings from your router's manufacturer.

Your StreamBoost enabled router will provide Qualcomm Atheros Inc. with anonymous data transmitted through the router. Such anonymous data may include small amounts of information when you launch a streaming service (such as video, audio, or gaming)

☑ Enable Automatic Update

Apply Cancel

The following table describes the labels in this screen.

Table 60 Management > StreamBoost Management > Bandwidth

LABEL	DESCRIPTION
Automatic Bandwidth Detection	Select this option to control the maximum or minimum amounts of bandwidth that can be used by traffic.
Up Limit	Set the total amount of bandwidth that you want to dedicate to uplink (or outgoing) traffic. This is traffic from LAN/WLAN to WAN.
Down Limit	Set the total amount of bandwidth that you want to dedicate to downlink (or incoming) traffic. This is traffic from WAN to LAN/WLAN.
Run Bandwidth Test	Click **Test Bandwidth** to determine the maximum bandwidth of your internet connection.
Enable Automatic Update	StreamBoost provides a cloud-based service to learn any new type of traffic which is not in its database and update the table in the NBG6716 for traffic detection and policies. Select this option to have theNBG6716 automatically receives the StreamBoost table updates. When there is a new type of traffic which is not in the NBG6716's table, the NBG6716 will capture some packets and send them to the StreamBoost cloud for analysis and database update.
Apply	Click **Apply** to save your customized settings.
Cancel	Click **Cancel** to begin configuring this screen afresh.

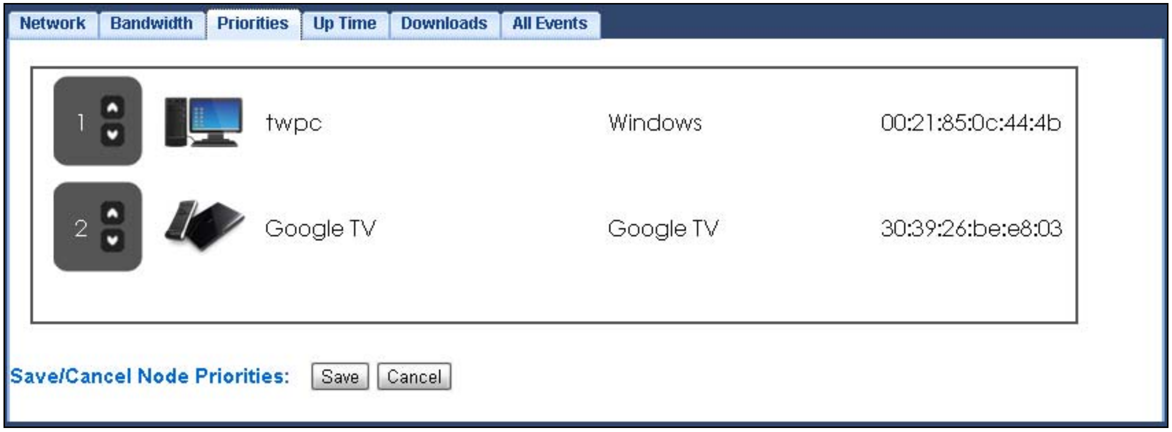
19.5 Priorities Screen

The StreamBoost engine on the NBG6716 can identify the types of connected devices (such as PC, smart phone, tablet, TV or game console) in your network. When there is not enough bandwidth to support traffic of the same priority, the NBG6716 refers to the connected device priority. Traffic from the device with the lowest priority is classified as best-effort traffic.

Use this screen to prioritize the connected devices by clicking a device’s arrow button to change its position in the list. Click **Save** to apply your settings. Otherwise, click **Cancel** to return the screen to its last-saved settings.

Click **Management > StreamBoost MGMT** to open the **Priorities** screen.

Figure 96 Management > StreamBoost Management > Priorities



1	twpc	Windows	00:21:85:0c:44:4b
2	Google TV	Google TV	30:39:26:be:e8:03

Save/Cancel Node Priorities:

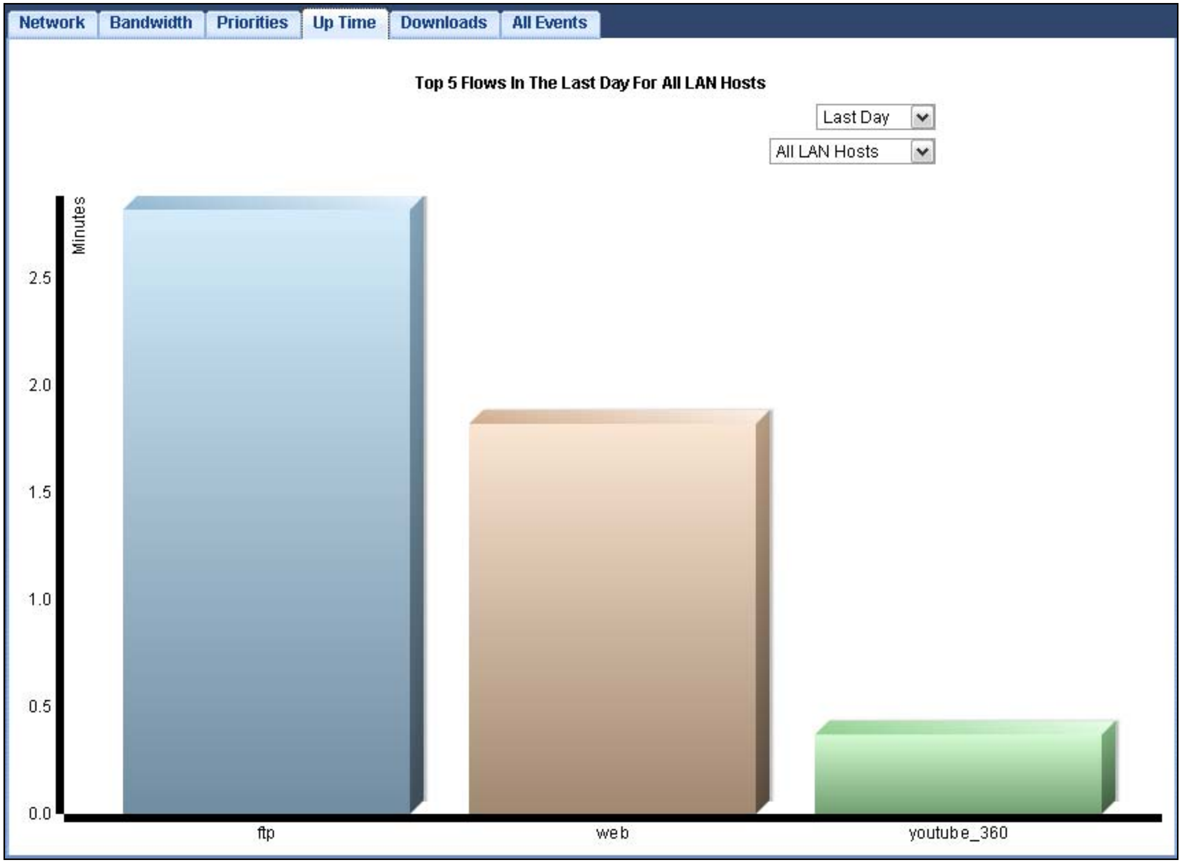
19.6 Up Time Screen

Use this screen to view the top five traffic flows transmitting from/to the selected LAN device(s) in the past one day, one week or one month.

Click **Management > StreamBoost MGMT > Up Time** to open the **Priorities** screen.

The y-axis shows the time period over which the traffic flow occurred. The x-axis shows the type of the traffic flow.

Figure 97   Management > StreamBoost Management > Up Time

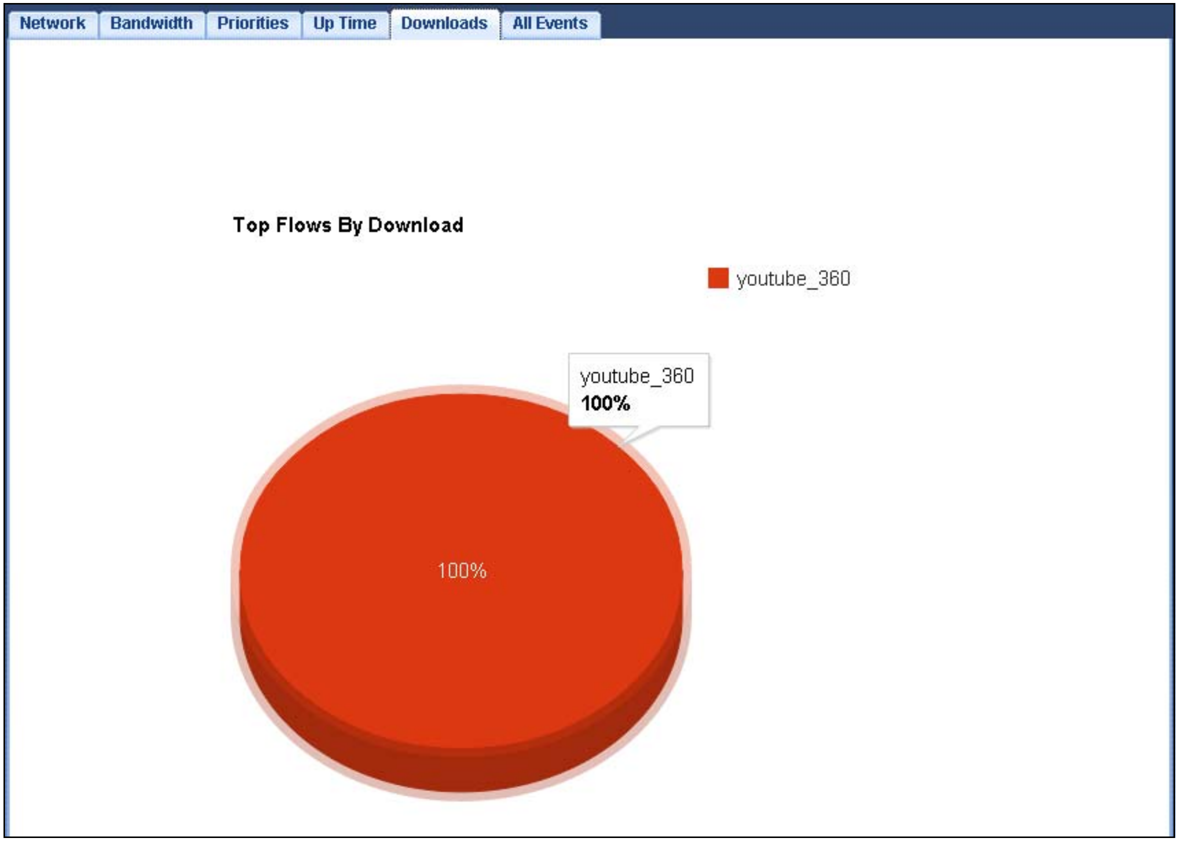


19.7 Downloads Screen

Use this screen to view the type and percentage of most download traffic on the NBG6716.

Click **Management > StreamBoost MGMT > Downloads** to open the **Downloads** screen.

Figure 98 Management > StreamBoost Management > Downloads



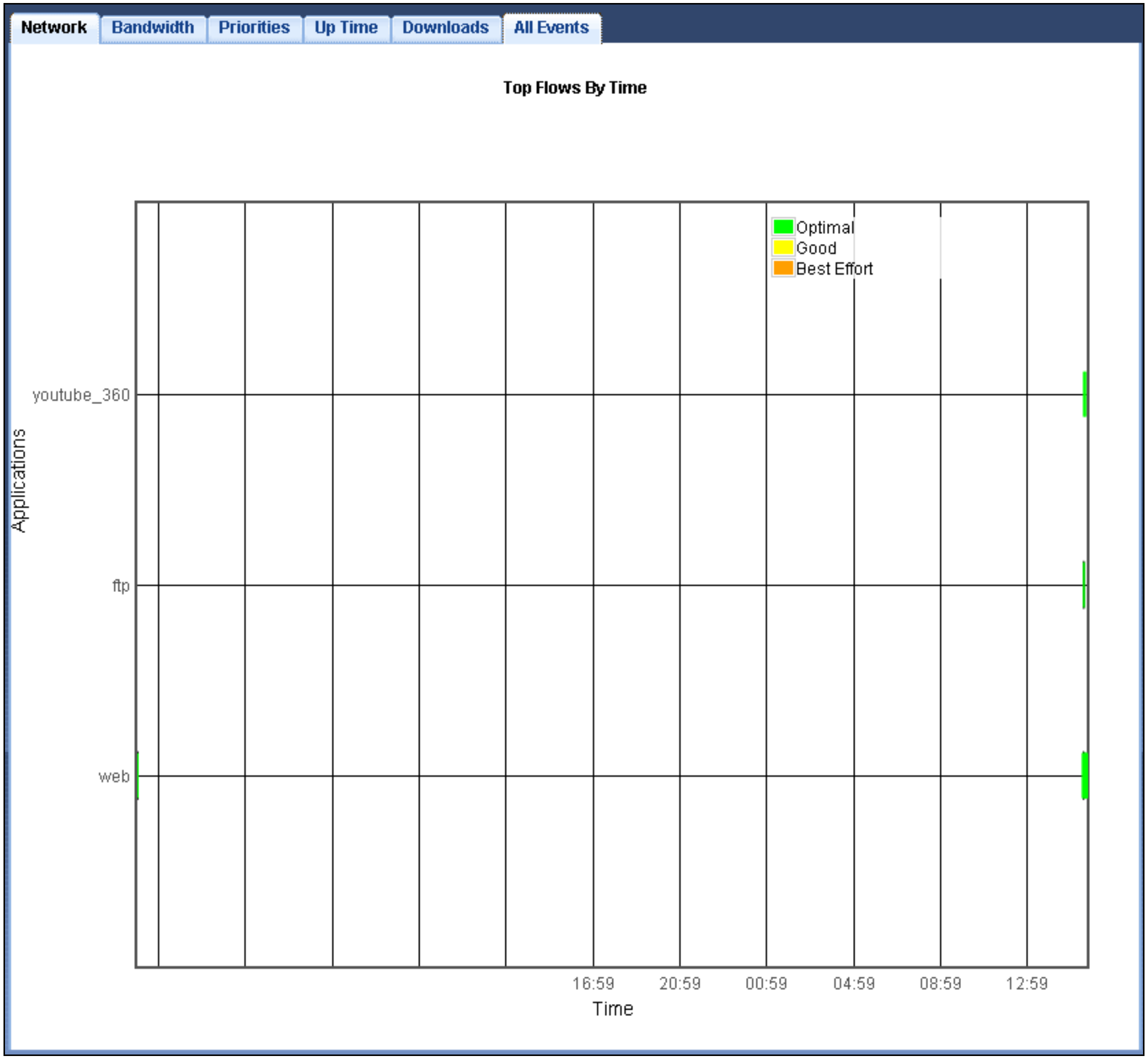
19.8 All Events Screen

Use this screen to view the time at which a traffic flow is given enough bandwidth for optimal, good or best-effort performance.

Click **Management > StreamBoost MGMT > All Events** to open the **All Events** screen.

The y-axis shows the type of the traffic flow. The x-axis shows the time period over which the traffic flow got the required bandwidth.

Figure 99 Management > StreamBoost Management > All Events



20

Remote Management

20.1 Overview

This chapter provides information on the Remote Management screens.

Remote Management allows you to manage your NBG6716 from a remote location through the following interfaces:

- LAN and WAN
- LAN only
- WAN only

Note: The NBG6716 is managed using the Web Configurator.

20.2 What You Can Do in this Chapter

- Use the **WWW** screen to define the interface/s from which the NBG6716 can be managed remotely using the web and specify a secure client that can manage the NBG6716 (Section 20.4 on page 147).
- Use the **Telnet** screen to define the interface/s from which the NBG6716 can be managed remotely using Telnet service and specify a secure client that can manage the NBG6716 (Section 20.5 on page 148).
- Use the **Wake On LAN** screen to enable Wake on LAN and remotely turn on a device on the local network (Section 20.6 on page 148).

20.3 What You Need to Know

Remote management over LAN or WAN will not work when:

1. The IP address in the **Secured Client IP Address** field (Section 20.4 on page 147) does not match the client IP address. If it does not match, the NBG6716 will disconnect the session immediately.
2. There is already another remote management session. You may only have one remote management session running at one time.
3. There is a firewall rule that blocks it.

20.3.1 Remote Management and NAT

When NAT is enabled:

- Use the NBG6716’s WAN IP address when configuring from the WAN.
- Use the NBG6716’s LAN IP address when configuring from the LAN.

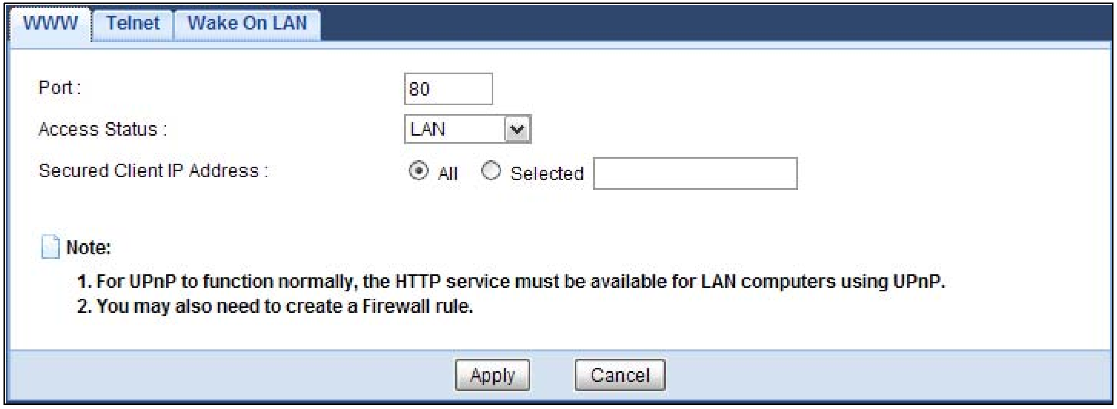
20.3.2 System Timeout

There is a default system management idle timeout of five minutes (three hundred seconds). The NBG6716 automatically logs you out if the management session remains idle for longer than this timeout period. The management session does not time out when a statistics screen is polling. You can change the timeout period in the **Maintenance > General** screen

20.4 WWW Screen

To change your NBG6716’s remote management settings, click **Management > Remote MGMT > WWW**.

Figure 100 Management > Remote Management > WWW



Port : 80

Access Status : LAN

Secured Client IP Address : ● All ○ Selected

Note:

1. For UPnP to function normally, the HTTP service must be available for LAN computers using UPnP.
2. You may also need to create a Firewall rule.

The following table describes the labels in this screen.

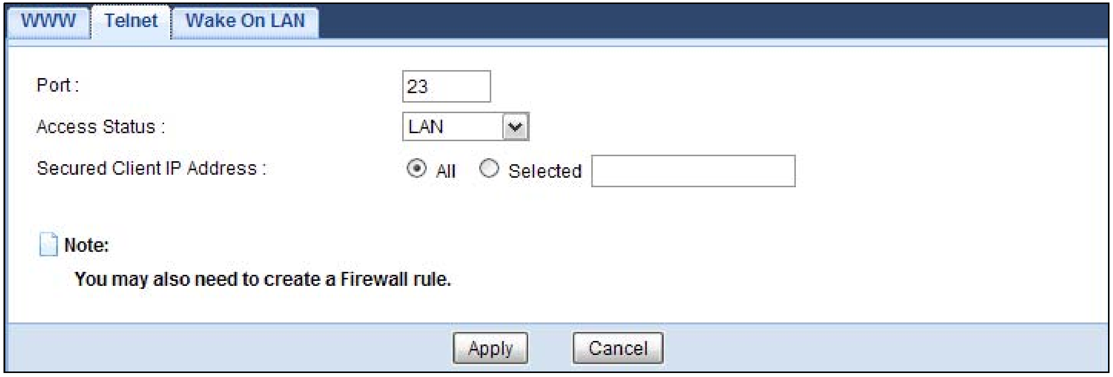
Table 61 Management > Remote Management > WWW

LABEL	DESCRIPTION
Port	You may change the server port number for a service if needed, however you must use the same port number in order to use that service for remote management.
Access Status	Select the interface(s) through which a computer may access the NBG6716 using this service.
Secured Client IP Address	Select **All** to allow all computes to access the NBG6716. Otherwise, check **Selected** and specify the IP address of the computer that can access the NBG6716.
Apply	Click **Apply** to save your customized settings.
Cancel	Click **Cancel** to begin configuring this screen afresh.

20.5 Telnet Screen

To change your NBG6716's remote management settings, click **Management > Remote MGMT > Telnet** to open the **Telnet** screen.

Figure 101 Management > Remote MGMT > Telnet



Port : 23

Access Status : LAN

Secured Client IP Address : ● All ○ Selected

Note:
You may also need to create a Firewall rule.

The following table describes the labels in this screen.

Table 62 Management > Remote MGMT > Telnet

LABEL	DESCRIPTION
Port	You may change the server port number for a service if needed, however you must use the same port number in order to use that service for remote management.
Access Status	Select the interface(s) through which a computer may access the NBG6716 using this service.
Secured Client IP Address	Select **All** to allow all computes to access the NBG6716. Otherwise, check **Selected** and specify the IP address of the computer that can access the NBG6716.
Apply	Click **Apply** to save your customized settings.
Cancel	Click **Cancel** to begin configuring this screen afresh.

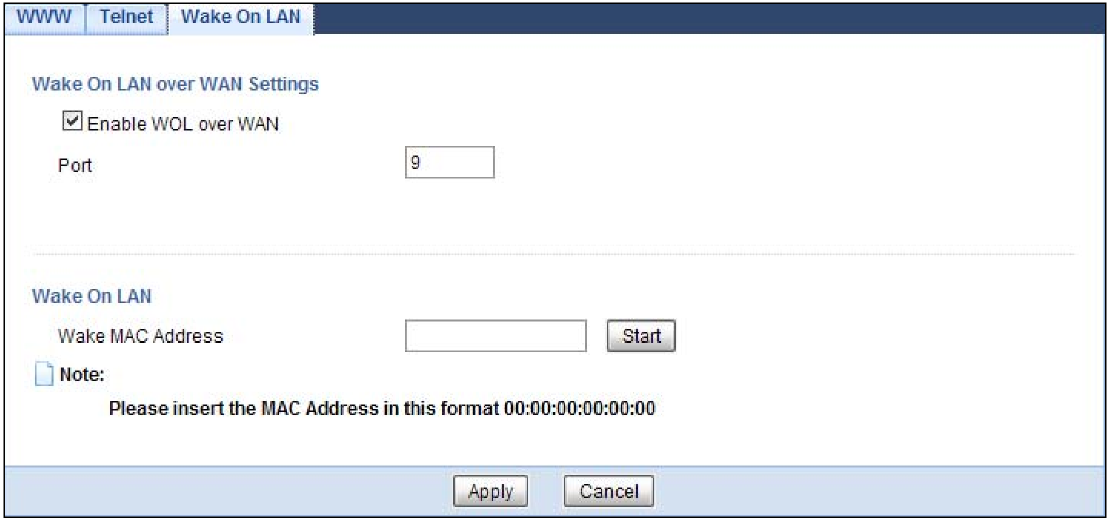
20.6 Wake On LAN Screen

Wake On LAN (WoL) allows you to remotely turn on a device on the network, such as a computer, storage device or media server. To use this feature the remote hardware (for example the network adapter on a computer) must support Wake On LAN using the "Magic Packet" method.

You need to know the MAC address of the remote device. It may be on a label on the device.

Use this screen to remotely turn on a device on the network. Click the **Management > Remote MGMT > Wake On LAN** to open the following screen.

Figure 102 Management > Remote MGMT > Wake On LAN



Wake On LAN over WAN Settings

☑ Enable WOL over WAN

Port: 9

Wake On LAN

Wake MAC Address: [ ] Start

Note:

Please insert the MAC Address in this format 00:00:00:00:00:00

The following table describes the labels in this screen.

Table 63 Management > Remote MGMT > Wake On LAN

LABEL	DESCRIPTION
Wake On LAN over WAN Settings	
Enable WOL over WAN	Select this option to have the NBG6716 forward a WoL “Magic Packet” to all devices on the LAN if the packet comes from the WAN or remote network and uses the port number specified in the **Port** field. A LAN device whose hardware supports Wake on LAN then will be powered on if it is turned off previously.
Port	Type a port number from which a WoL packet is forwarded to the LAN.
Wake On LAN	
Wake MAC Address	Enter the MAC Address of the device on the network that will be turned on. A MAC address consists of six hexadecimal character pairs.
Start	Click this to have the NBG6716 generate a WoL packet and forward it to turn the specified device on. A screen pops up displaying MAC address error if you input the MAC address incorrectly.
Apply	Click **Apply** to save the setting to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

21

Universal Plug-and-Play (UPnP)

21.1 Overview

This chapter introduces the UPnP feature in the web configurator.

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.

21.2 What You Need to Know

UPnP hardware is identified as an icon in the Network Connections folder (Windows XP). Each UPnP compatible device installed on your network will appear as a separate icon. Selecting the icon of a UPnP device will allow you to access the information and properties of that device.

21.2.1 NAT Traversal

UPnP NAT traversal automates the process of allowing an application to operate through NAT. UPnP network devices can automatically configure network addressing, announce their presence in the network to other UPnP devices and enable exchange of simple product and service descriptions. NAT traversal allows the following:

- Dynamic port mapping
- Learning public IP addresses
- Assigning lease times to mappings

Windows Messenger is an example of an application that supports NAT traversal and UPnP.

See the NAT chapter for more information on NAT.

21.2.2 Cautions with UPnP

The automated nature of NAT traversal applications in establishing their own services and opening firewall ports may present network security issues. Network information and configuration may also be obtained and modified by users in some network environments.

When a UPnP device joins a network, it announces its presence with a multicast message. For security reasons, the NBG6716 allows multicast messages on the LAN only.

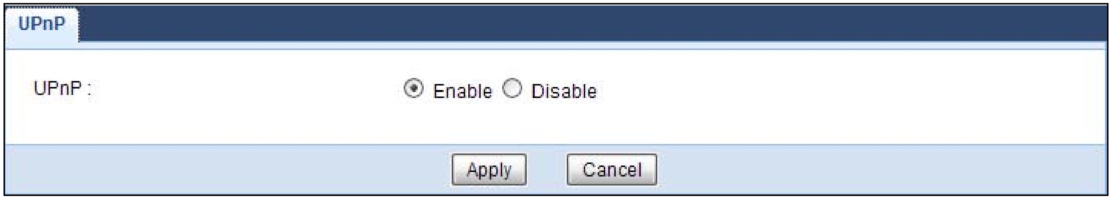
All UPnP-enabled devices may communicate freely with each other without additional configuration. Disable UPnP if this is not your intention.

21.3 UPnP Screen

Use this screen to enable UPnP on your NBG6716.

Click **Management > UPnP** to display the screen shown next.

Figure 103 Management > UPnP



UPnP : ● Enable ○ Disable

The following table describes the fields in this screen.

Table 64 Management > UPnP

LABEL	DESCRIPTION
UPnP	Select **Enable** to activate UPnP. Be aware that anyone could use a UPnP application to open the web configurator's login screen without entering the NBG6716's IP address (although you must still enter the password to access the web configurator).
Apply	Click **Apply** to save the setting to the NBG6716.
Cancel	Click **Cancel** to return to the previously saved settings.

21.4 Technical Reference

The sections show examples of using UPnP.

21.4.1 Using UPnP in Windows XP Example

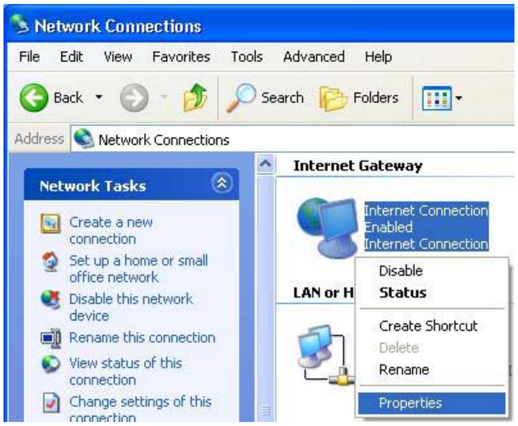
This section shows you how to use the UPnP feature in Windows XP. You must already have UPnP installed in Windows XP and UPnP activated on the NBG6716.

Make sure the computer is connected to a LAN port of the NBG6716. Turn on your computer and the NBG6716.

21.4.1.1 Auto-discover Your UPnP-enabled Network Device

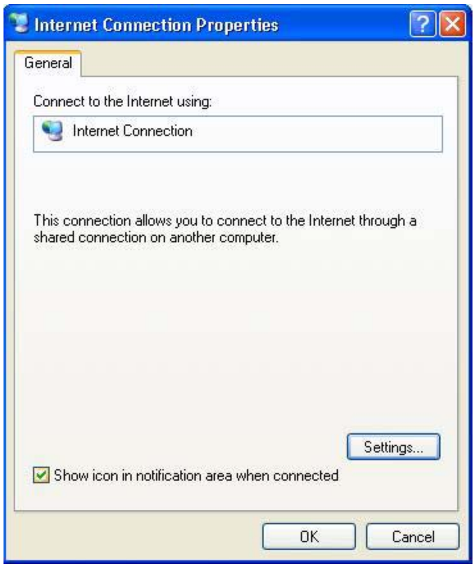
1. Click **start** and **Control Panel**. Double-click **Network Connections**. An icon displays under Internet Gateway.
2. Right-click the icon and select **Properties**.

Figure 104 Network Connections



3 In the **Internet Connection Properties** window, click **Settings** to see the port mappings there were automatically created.

Figure 105 Internet Connection Properties



Connect to the Internet using:

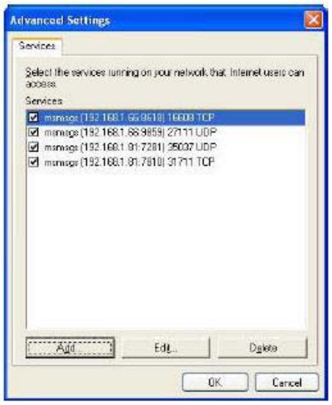
Internet Connection

This connection allows you to connect to the Internet through a shared connection on another computer.

☑ Show icon in notification area when connected

4 You may edit or delete the port mappings or click **Add** to manually add port mappings.

Figure 106 Internet Connection Properties: Advanced Settings

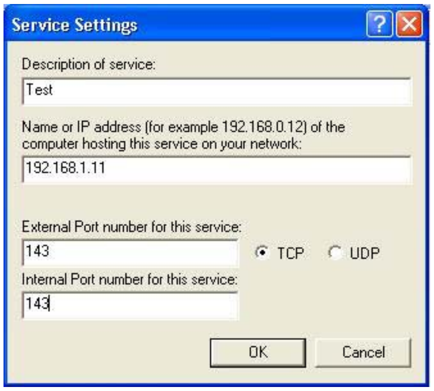


Select the services running on your network that Internet users can access.

Services

☑ msmsgs (192.168.1.66:8618) 16608 TCP
☑ msmsgs (192.168.1.66:9859) 27111 UDP
☑ msmsgs (192.168.1.81:7281) 35037 UDP
☑ msmsgs (192.168.1.81:7810) 31711 TCP

Figure 107 Internet Connection Properties: Advanced Settings: Add



Service Settings

Description of service:
Test

Name or IP address (for example 192.168.0.12) of the computer hosting this service on your network:
192.168.1.11

External Port number for this service:
143

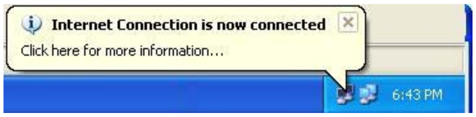
● TCP ○ UDP

Internal Port number for this service:
143

Note: When the UPnP-enabled device is disconnected from your computer, all port mappings will be deleted automatically.

5 Select **Show icon in notification area when connected** option and click **OK**. An icon displays in the system tray.

Figure 108 System Tray Icon

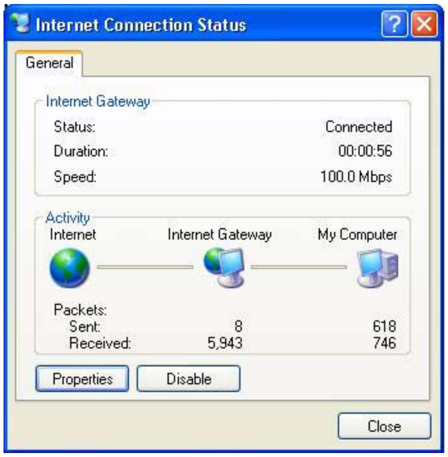


Internet Connection is now connected

Click here for more information...

6 Double-click on the icon to display your current Internet connection status.

Figure 109 Internet Connection Status



Internet Connection Status

General

Internet Gateway

Status:	Connected
Duration:	00:00:56
Speed:	100.0 Mbps

Activity

	Internet Gateway	My Computer
Packets:		
Sent:	8	618
Received:	5,943	746

21.4.2 Web Configurator Easy Access

With UPnP, you can access the web-based configurator on the NBG6716 without finding out the IP address of the NBG6716 first. This comes helpful if you do not know the IP address of the NBG6716.

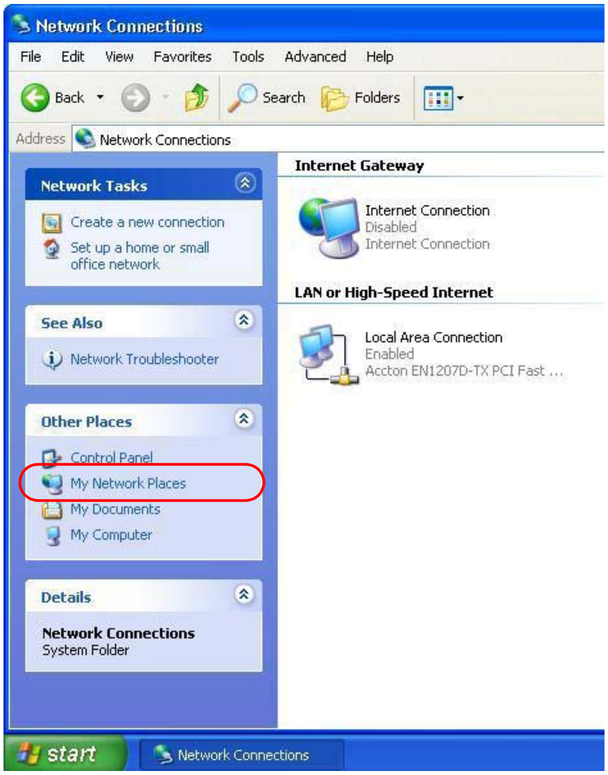
Follow the steps below to access the web configurator.

1 Click **Start** and then **Control Panel**.

2 Double-click **Network Connections**.

3 Select **My Network Places** under **Other Places**.

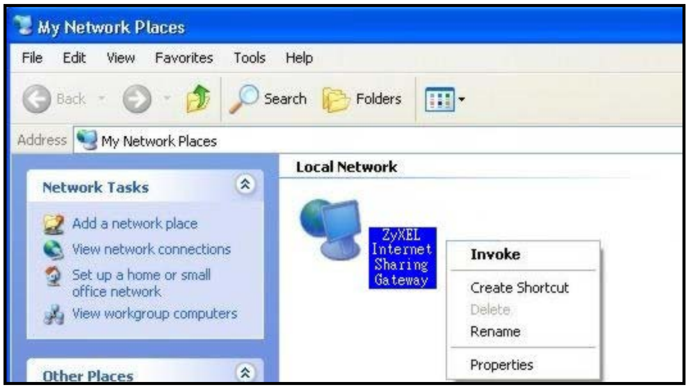
Figure 110 Network Connections



4 An icon with the description for each UPnP-enabled device displays under **Local Network**.

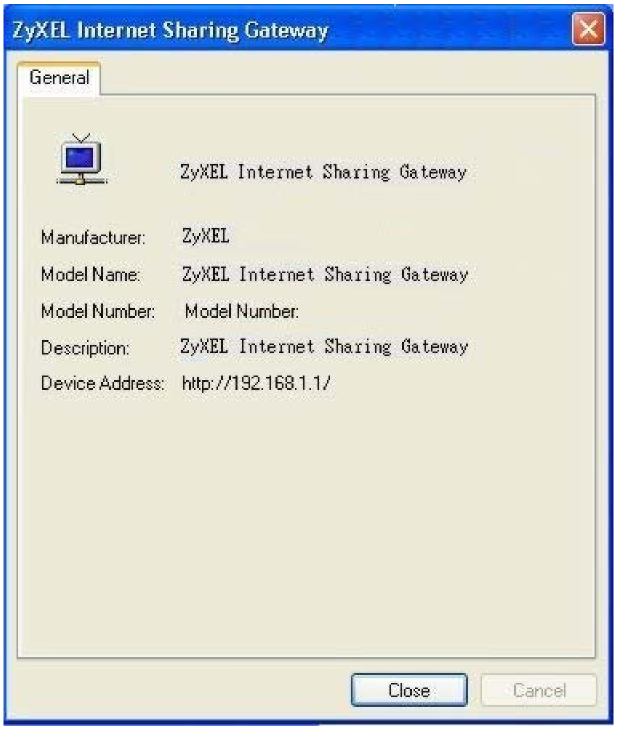
5 Right-click on the icon for your NBG6716 and select **Invoke**. The web configurator login screen displays.

Figure 111 Network Connections: My Network Places



6 Right-click on the icon for your NBG6716 and select **Properties**. A properties window displays with basic information about the NBG6716.

Figure 112 Network Connections: My Network Places: Properties: Example



ZyXEL Internet Sharing Gateway

Manufacturer: ZyXEL

Model Name: ZyXEL Internet Sharing Gateway

Model Number: Model Number:

Description: ZyXEL Internet Sharing Gateway

Device Address: http://192.168.1.1/

22

USB Media Sharing

22.1 Overview

This chapter describes how to configure the media sharing settings on the NBG6716.

Note: The read and write performance may be affected by amount of file-sharing traffic on your network, type of connected USB device and your USB version (1.1 or 2.0).

Media Server

You can set up your NBG6716 to act as a media server to provide media (like video) to DLNA-compliant players, such as Windows Media Player, ZyXEL DMAs (Digital Media Adapters), Xboxes or PS3s. The media server and clients must have IP addresses in the same subnet.

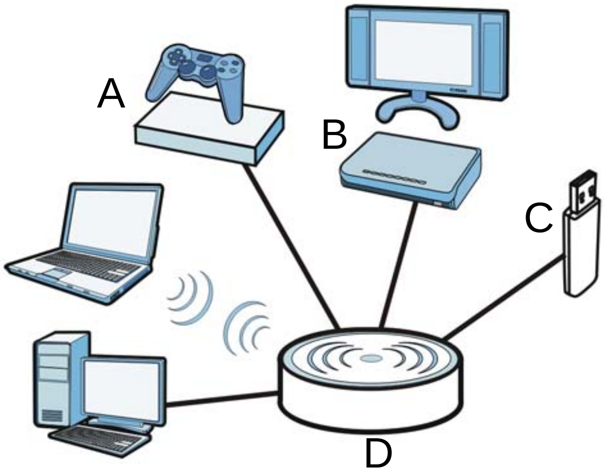
The NBG6716 media server enables you to:

- Publish all folders for everyone to play media files in the USB storage device connected to the NBG6716.
- Use hardware-based media clients like the DMA-2500 to play the files.

Note: Anyone on your network can play the media files in the published folders. No user name and password nor other form of security is required.

The following figure is an overview of the NBG6716's media server feature. DLNA devices **A** and **B** can access and play files on a USB device (**C**) which is connected to the NBG6716 (**D**).

Figure 113 Media Server Overview

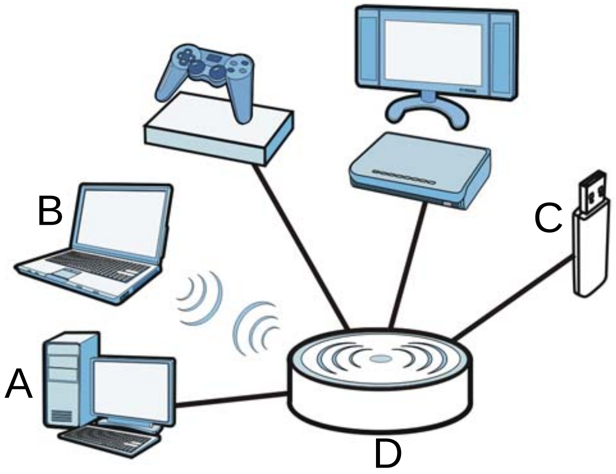


File-Sharing Server

You can also share files on a USB memory stick or hard drive connected to your NBG6716 with users on your network.

The following figure is an overview of the NBG6716's file-sharing server feature. Computers **A** and **B** can access files on a USB device (**C**) which is connected to the NBG6716 (**D**).

Figure 114 File Sharing Overview



22.2 What You Can Do

- Use the **DLNA** screen to use the NBG6716 as a media server and allow DLNA-compliant devices to play media files stored in the attached USB device (Section 22.5 on page 159).
- Use the **SAMBA** screen to enable file-sharing via the NBG6716 using Windows Explorer or the workgroup name. This screen also allow you to configure the workgroup name and create user accounts (Section 22.6 on page 159).
- Use the **FTP** screen to allow file sharing via the NBG6716 using FTP and create user accounts (Section 22.7 on page 161).

22.3 What You Need To Know

DLNA

The Digital Living Network Alliance (DLNA) is a group of personal computer and electronics companies that works to make products compatible in a home network. DLNA clients play files stored on DLNA servers. The NBG6716 can function as a DLNA-compliant media server and stream files to DLNA-compliant media clients without any configuration.

Workgroup name

This is the name given to a set of computers that are connected on a network and share resources such as a printer or files. Windows automatically assigns the workgroup name when you set up a network.

File Systems

A file system is a way of storing and organizing files on your hard drive and storage device. Often different operating systems such as Windows or Linux have different file systems. The file-sharing feature on your NBG6716 supports New Technology File System (NTFS), File Allocation Table (FAT) and FAT32 file systems.

Windows/CIFS

Common Internet File System (CIFS) is a standard protocol supported by most operating systems in order to share files across the network.

CIFS runs over TCP/IP but uses the SMB (Server Message Block) protocol found in Microsoft Windows for file and printer access; therefore, CIFS will allow all applications, not just Web browsers, to open and share files across the Internet.

The NBG6716 uses Common Internet File System (CIFS) protocol for its file sharing functions. CIFS compatible computers can access the USB file storage devices connected to the NBG6716. CIFS protocol is supported on Microsoft Windows, Linux Samba and other operating systems (refer to your systems specifications for CIFS compatibility).

Samba

SMB is a client-server protocol used by Microsoft Windows systems for sharing files, printers, and so on.

Samba is a free SMB server that runs on most Unix and Unix-like systems. It provides an implementation of an SMB client and server for use with non-Microsoft operating systems.

File Transfer Protocol

This is a method of transferring data from one computer to another over a network such as the Internet.

22.4 Before You Begin

Make sure the NBG6716 is connected to your network and turned on.

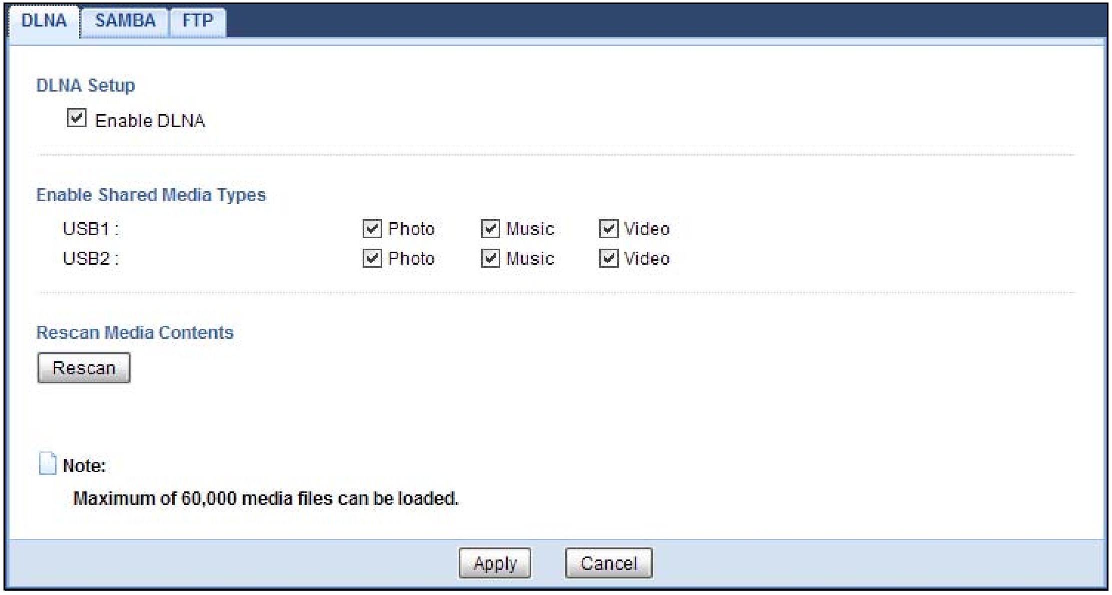
1. Connect the USB device to one of the NBG6716’s USB ports.
2. The NBG6716 detects the USB device and makes its contents available for browsing. If you are connecting a USB hard drive that comes with an external power supply, make sure it is connected to an appropriate power source that is on.

Note: If your USB device cannot be detected by the NBG6716, see the troubleshooting for suggestions.

22.5 DLNA Screen

Use this screen to have the NBG6716 act as a DLNA-compliant media server that lets DLNA-compliant media clients on your network play video, music, and photos from the NBG6716 (without having to copy them to another computer). Click **Management > USB Media Sharing > DLNA**.

Figure 115 Management > USB Media Sharing > DLNA



DLNA Setup

☑ Enable DLNA

Enable Shared Media Types

USB1 :	☑ Photo	☑ Music	☑ Video
USB2 :	☑ Photo	☑ Music	☑ Video

Rescan Media Contents

Note:

Maximum of 60,000 media files can be loaded.

The following table describes the labels in this screen.

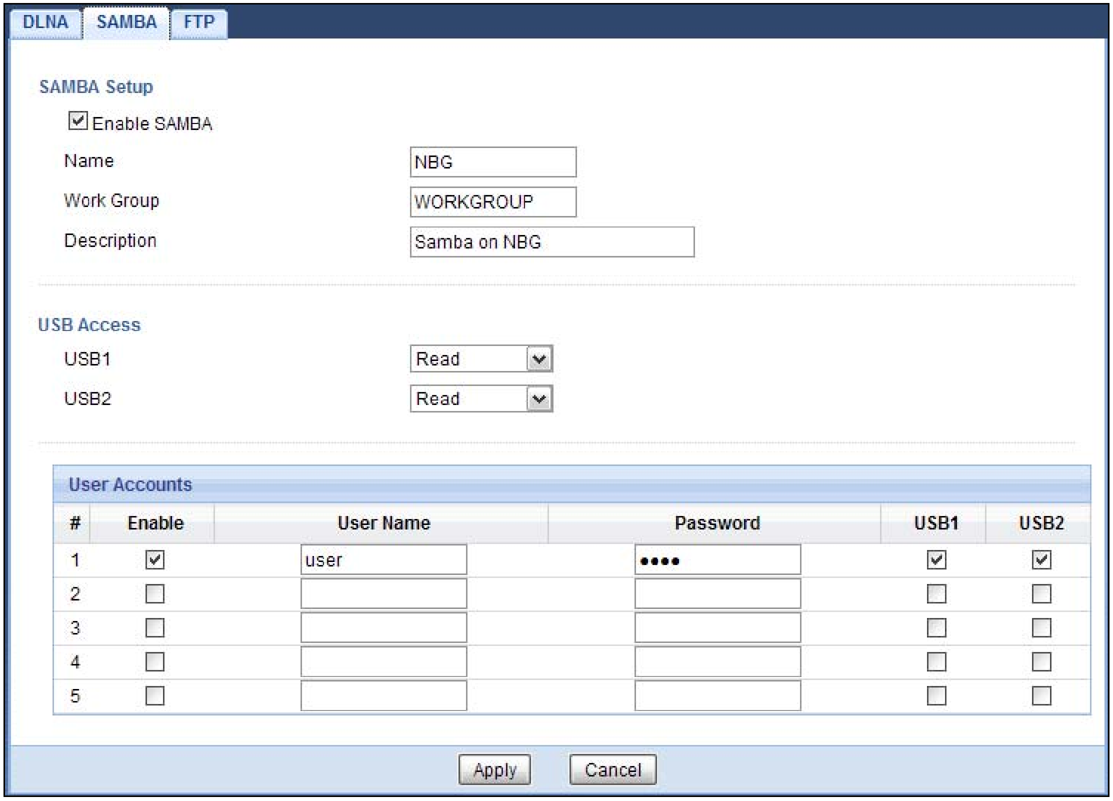
Table 65 Management > USB Media Sharing > DLNA

LABEL	DESCRIPTION
Enable DLNA	Select this to have the NBG6716 function as a DLNA-compliant media server.
USB1/2	Select the media type that you want to share on the USB device connected to the NBG6716's USB port.
Rescan	Click this button to have the NBG6716 scan the media files on the connected USB device and do indexing of the file list again so that DLNA clients can find the new files if any.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

22.6 SAMBA Screen

Use this screen to set up file-sharing via the NBG6716 using Windows Explorer or the workgroup name. You can also configure the workgroup name and create file-sharing user accounts. Click **Management > USB Media Sharing > SAMBA**.

Figure 116 Management > USB Media Sharing > SAMBA



SAMBA Setup

☑ Enable SAMBA

Name: NBG

Work Group: WORKGROUP

Description: Samba on NBG

USB Access

USB1: Read

USB2: Read

User Accounts

#	Enable	User Name	Password	USB1	USB2
1	☑	user	••••	☑	☑
2	□			□	□
3	□			□	□
4	□			□	□
5	□			□	□

The following table describes the labels in this screen.

Table 66 Management > USB Media Sharing > SAMBA

LABEL	DESCRIPTION
Enable SAMBA	Select this to enable file sharing through the NBG6716 using Windows Explorer or by browsing to your work group.
Name	Specify the name to identify the NBG6716 in a work group.
Work Group	You can add the NBG6716 to an existing or a new workgroup on your network. Enter the name of the workgroup which your NBG6716 automatically joins. You can set the NBG6716's workgroup name to be exactly the same as the workgroup name to which your computer belongs to. Note: The NBG6716 will not be able to join the workgroup if your local area network has restrictions set up that do not allow devices to join a workgroup. In this case, contact your network administrator.
Decription	Enter the description of the NBG6716 in a work group.
USB1/2	Specify the user's access rights to the USB storage device which is connected to the NBG6716's USB port. **Read & Write** - The user has read and write rights, meaning that the user can create and edit the files on the connected USB device. **Read** - The user has read rights only and can not create or edit the files on the connected USB device.
User Accounts	Before you can share files you need a user account. Configure the following fields to set up a file-sharing account.
#	This is the index number of the user account.

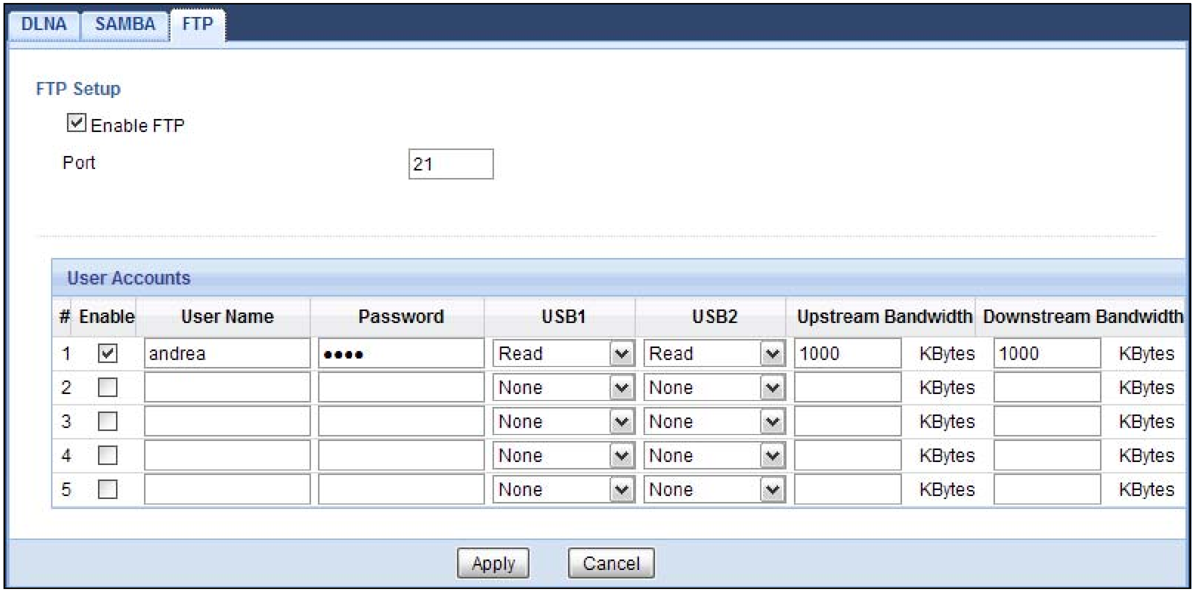
Table 66 Management > USB Media Sharing > SAMBA (continued)

LABEL	DESCRIPTION
Enable	This field displays whether a user account is activated or not. Select the check box to enable the account. Clear the check box to disable the account.
User Name	Enter a user name that will be allowed to access the shared files. You can enter up to 20 characters. Only letters and numbers allowed.
Password	Enter the password used to access the shared files. You can enter up to 20 characters. Only letters and numbers are allowed. The password is case sensitive.
USB1/2	Select the USB port(s) of the NBG6716. The configured user can access the files on the USB device(s) connected to the selected USB port(s) only.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

22.7 FTP Screen

Use this screen to set up file sharing via the NBG6716 using FTP and create user accounts. Click **Management > USB Media Sharing > FTP**.

Figure 117 Management > USB Media Sharing > FTP



FTP Setup

☑ Enable FTP

Port 21

User Accounts

#	Enable	User Name	Password	USB1	USB2	Upstream Bandwidth		Downstream Bandwidth	
1	☑	andrea	••••	Read	Read	1000	KBytes	1000	KBytes
2	☐			None	None		KBytes		KBytes
3	☐			None	None		KBytes		KBytes
4	☐			None	None		KBytes		KBytes
5	☐			None	None		KBytes		KBytes

The following table describes the labels in this screen.

Table 67 Management > USB Media Sharing > FTP

LABEL	DESCRIPTION
Enable FTP	Select this to enable the FTP server on the NBG6716 for file sharing using FTP.
Port	You may change the server port number for FTP if needed, however you must use the same port number in order to use that service for file sharing.
User Accounts	Before you can share files you need a user account. Configure the following fields to set up a file-sharing account.
#	This is the index number of the user account.

Table 67 Management > USB Media Sharing > FTP (continued)

LABEL	DESCRIPTION
Enable	This field displays whether a user account is activated or not. Select the check box to enable the account. Clear the check box to disable the account.
User Name	Enter a user name that will be allowed to access the shared files. You can enter up to 20 characters. Only letters and numbers allowed.
Password	Enter the password used to access the shared files. You can enter up to 20 characters. Only letters and numbers are allowed. The password is case sensitive.
USB1/2	Specify the user's access rights to the USB storage device which is connected to the NBG6716's USB port. **Read & Write** - The user has read and write rights, meaning that the user can create and edit the files on the connected USB device. **Read** - The user has read rights only and can not create or edit the files on the connected USB device. **None** - The user cannot access the files on the USB device(s) connected to the USB port.
Upstream Bandwidth	Enter the maximum bandwidth (in Kbps) allowed for incoming FTP traffic.
Downstream Bandwidth	Enter the maximum bandwidth (in Kbps) allowed for outgoing FTP traffic.
Apply	Click **Apply** to save your changes back to the NBG6716.
Cancel	Click **Cancel** to begin configuring this screen afresh.

22.8 Example of Accessing Your Shared Files From a Computer

You can use Windows Explorer or FTP to access the USB storage devices connected to the NBG6716.

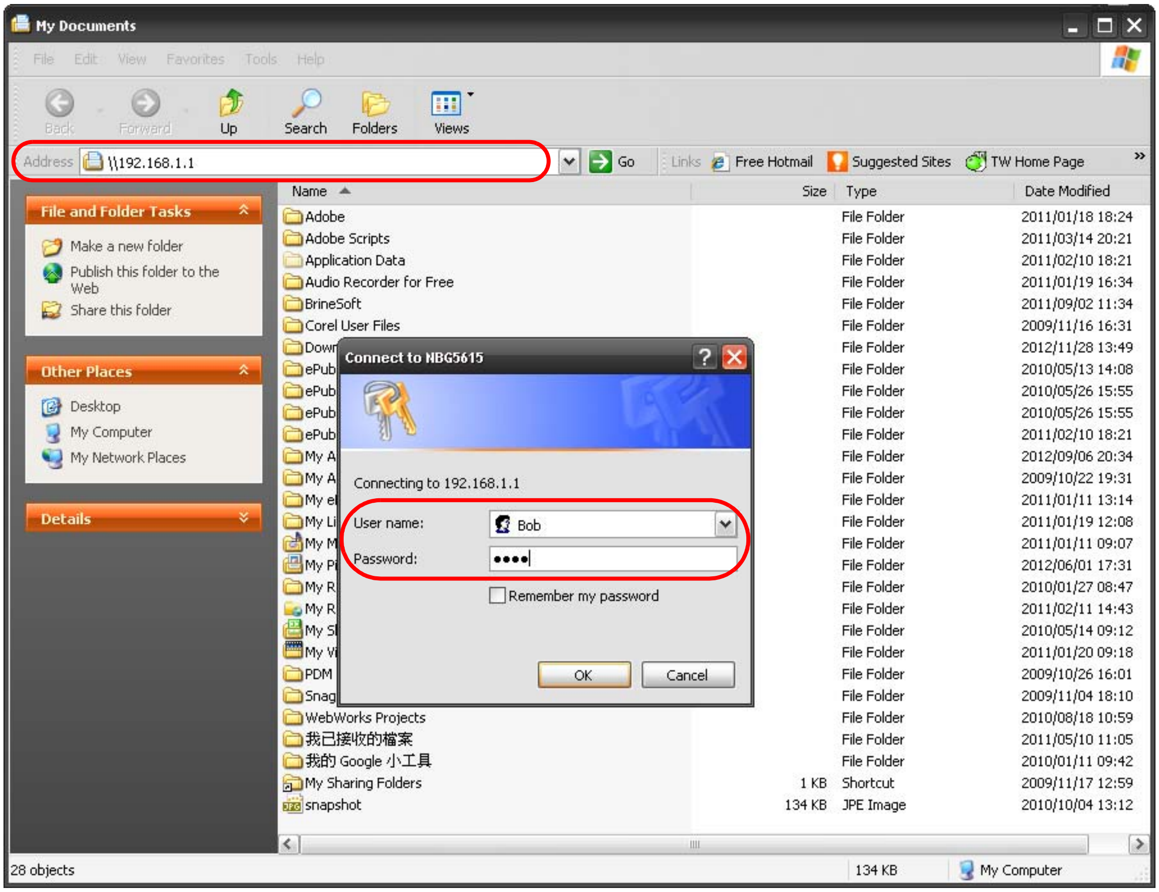
This example shows you how to use Microsoft's Windows XP to browse your shared files. Refer to your operating system's documentation for how to browse your file structure.

22.8.1 Use Windows Explorer to Share Files

You should have enabled file sharing and create a user account (Bob/1234 for example) with read and write access to USB 1 in the **USB Media Sharing > SAMBA** screen.

Open Windows Explorer to access the connected USB device using either Windows Explorer browser or by browsing to your workgroup.

1 In Windows Explorer’s Address bar type a double backslash “\\” followed by the IP address of the NBG6716 (the default IP address of the NBG6716 in router mode is 192.168.1.1) and press [ENTER]. A screen asking for password authentication appears. Type the user name and password (Bob and 1234 in this example) and click **OK**.



Address \\192.168.1.1

Name	Size	Type	Date Modified
Adobe		File Folder	2011/01/18 18:24
Adobe Scripts		File Folder	2011/03/14 20:21
Application Data		File Folder	2011/02/10 18:21
Audio Recorder for Free		File Folder	2011/01/19 16:34
BrineSoft		File Folder	2011/09/02 11:34
Corel User Files		File Folder	2009/11/16 16:31
Dowr		File Folder	2012/11/28 13:49
ePub		File Folder	2010/05/13 14:08
ePub		File Folder	2010/05/26 15:55
ePub		File Folder	2010/05/26 15:55
ePub		File Folder	2011/02/10 18:21
My A		File Folder	2012/09/06 20:34
My A		File Folder	2009/10/22 19:31
My el		File Folder	2011/01/11 13:14
My Li		File Folder	2011/01/19 12:08
My M		File Folder	2011/01/11 09:07
My Pi		File Folder	2012/06/01 17:31
My R		File Folder	2010/01/27 08:47
My R		File Folder	2011/02/11 14:43
My Sl		File Folder	2010/05/14 09:12
My Vi		File Folder	2011/01/20 09:18
PDM		File Folder	2009/10/26 16:01
Snag		File Folder	2009/11/04 18:10
WebWorks Projects		File Folder	2010/08/18 10:59
我已接收的檔案		File Folder	2011/05/10 11:05
我的 Google 小工具		File Folder	2010/01/11 09:42
My Sharing Folders	1 KB	Shortcut	2009/11/17 12:59
snapshot	134 KB	JPE Image	2010/10/04 13:12

Connecting to 192.168.1.1

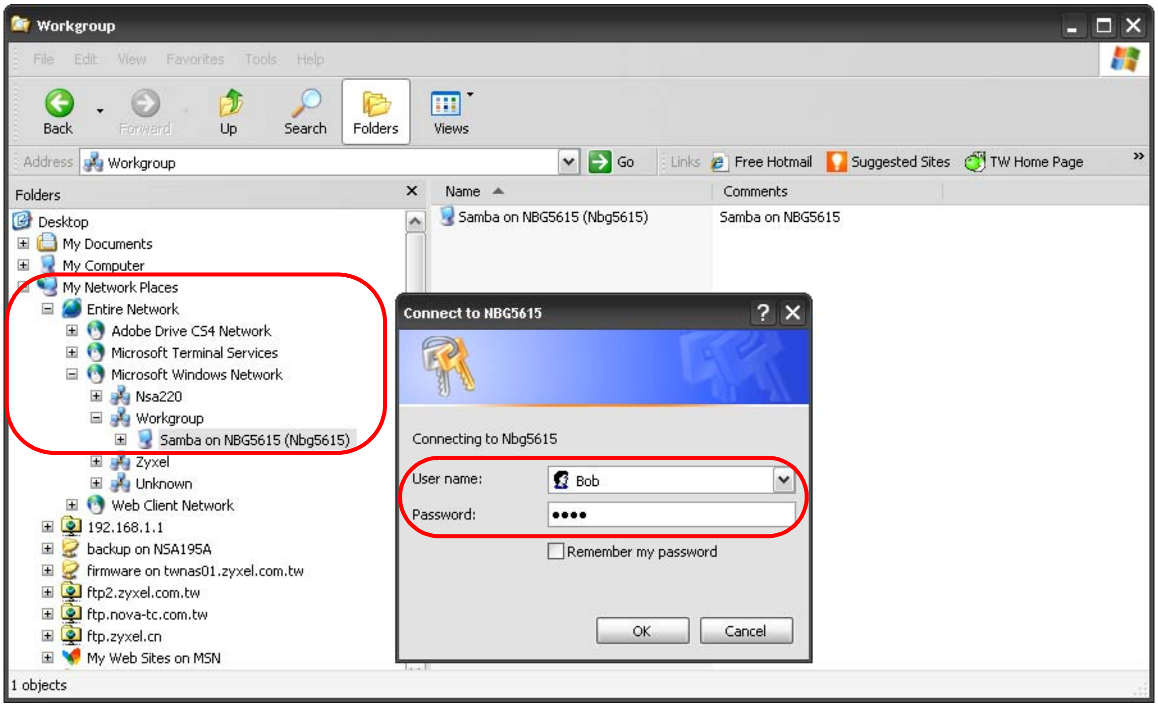
User name: Bob

Password: ••••

□ Remember my password

Note: Once you log into the shared folder via your NBG6716, you do not have to relogin unless you restart your computer.

2 You can also use the workgroup name to access files by browsing to the workgroup folder using the folder tree on the left side of the screen. It is located under **My Network Places**. In this example the workgroup name is the default "Workgroup".



Connecting to Nbg5615

User name: Bob

Password: ••••

□ Remember my password

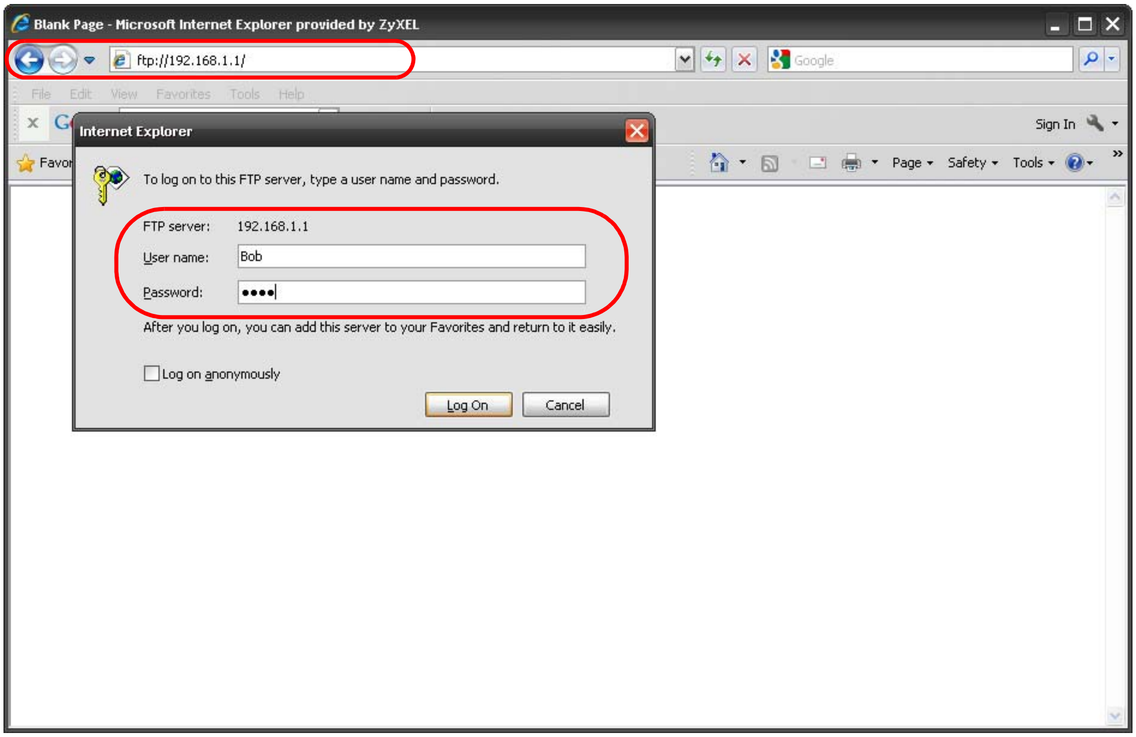
22.8.2 Use FTP to Share Files

You can use FTP to access the USB storage devices connected to the NBG6716. In this example, we use the web browser to share files via FTP from the LAN. The way or screen you log into the FTP server (on the NBG6716) varies depending on your FTP client. See your FTP client documentation for more information.

You should have enabled file sharing and create a user account (Bob/1234 for example) with read and write access to USB 1 in the **USB Media Sharing > FTP** screen.

1 In your web browser's address or URL bar type "ftp://" followed by the IP address of the NBG6716 (the default LAN IP address of the NBG6716 in router mode is 192.168.1.1) and click **Go** or press [ENTER].

2 A screen asking for password authentication appears. Enter the user name and password (you configured in the **USB Media Sharing > FTP** screen) and click **Log On**.


Blank Page - Microsoft Internet Explorer provided by ZyXEL
ftp://192.168.1.1/
Google
File Edit View Favorites Tools Help
Sign In
Favor
Page Safety Tools
Internet Explorer
Log On
Cancel

To log on to this FTP server, type a user name and password.

FTP server: 192.168.1.1

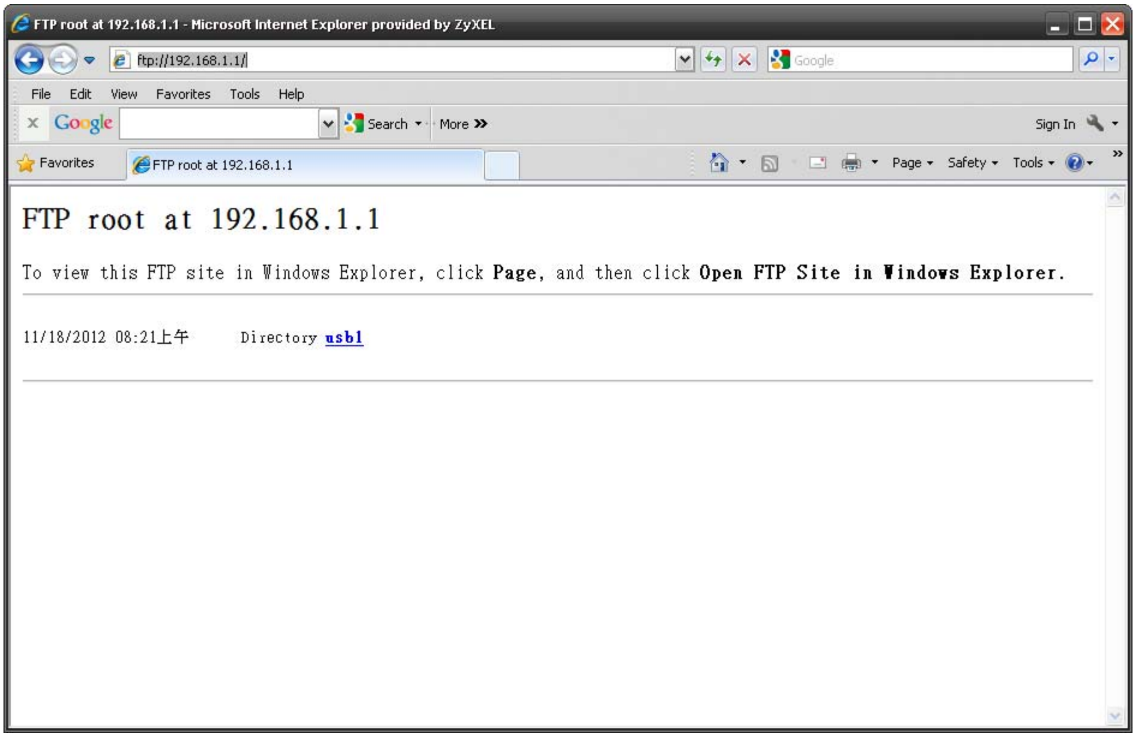
User name: Bob

Password: ••••

After you log on, you can add this server to your Favorites and return to it easily.

□ Log on anonymously

3 The screen changes and shows you the folder for the USB storage device connected to your NBG6716. Double-click the folder to display the contents in it.


FTP root at 192.168.1.1 - Microsoft Internet Explorer provided by ZyXEL
ftp://192.168.1.1/
Google
File Edit View Favorites Tools Help
Google
Search
More »
Sign In
Favorites
FTP root at 192.168.1.1
Page Safety Tools

FTP root at 192.168.1.1

To view this FTP site in Windows Explorer, click **Page**, and then click **Open FTP Site in Windows Explorer**.

11/18/2012 08:21上午 Directory **usb1**