14

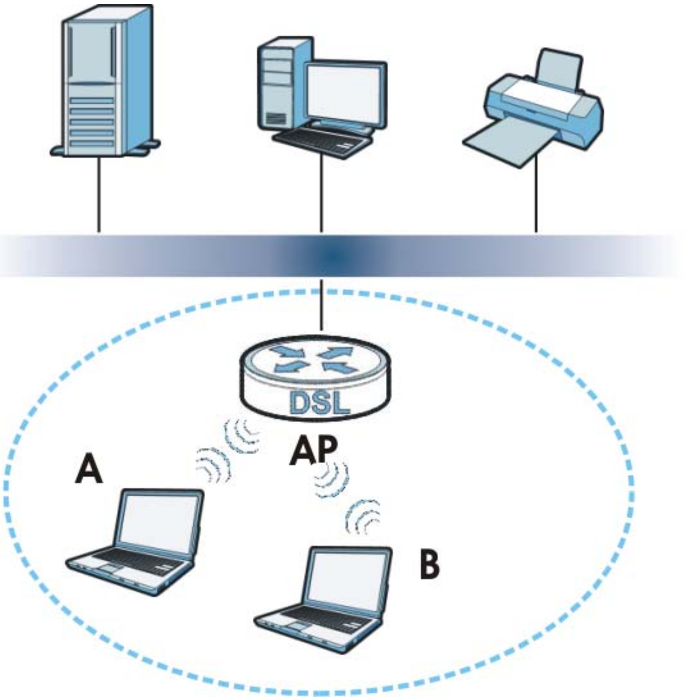
Wireless LAN

14.1 Overview

This chapter discusses how to configure the wireless network settings in your NBG4615. See the appendices for more detailed information about wireless networks.

The following figure provides an example of a wireless network.

Figure 74 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 NBG4615 is the AP.

14.1.1 What You Can Do

- Use the **General** screen to enter the SSID, enable intra-BSS traffic and select the channel. (Section 14.2 on page 133).
- Use the **Security** screen to configure wireless security between the NBG4615 and the wireless clients.
- Use the **MAC Filter** screen to allow or deny wireless stations based on their MAC addresses from connecting to the NBG4615 (Section 14.4 on page 139).
- Use the **Advanced** screen to allow intra-BSS networking and set the RTS/CTS Threshold (Section 14.5 on page 140).
- Use the **QoS** screen to ensure Quality of Service (QoS) in your wireless network (Section 14.6 on page 141).
- Use the **WPS** screen to quickly set up a wireless network with strong security, without having to configure security settings manually (Section 14.7 on page 142).
- Use the **WPS Station** screen to add a wireless station using WPS (Section 14.8 on page 143).
- Use the **Scheduling** screen to set the times your wireless LAN is turned on and off (Section 14.9 on page 144).
- Use the **WDS** screen to configure Wireless Distribution System on your NBG4615 (Section 14.10 on page 146).

14.1.2 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.

[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.

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.

The types of encryption you can choose depend on the type of user authentication. (See page 131 for information about this.)

Table 41 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 NBG4615, you can also select an option (**WPA Compatible**) to support WPA 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 Compatible** option in the NBG4615.

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.

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 13.2 on page 111.

WDS

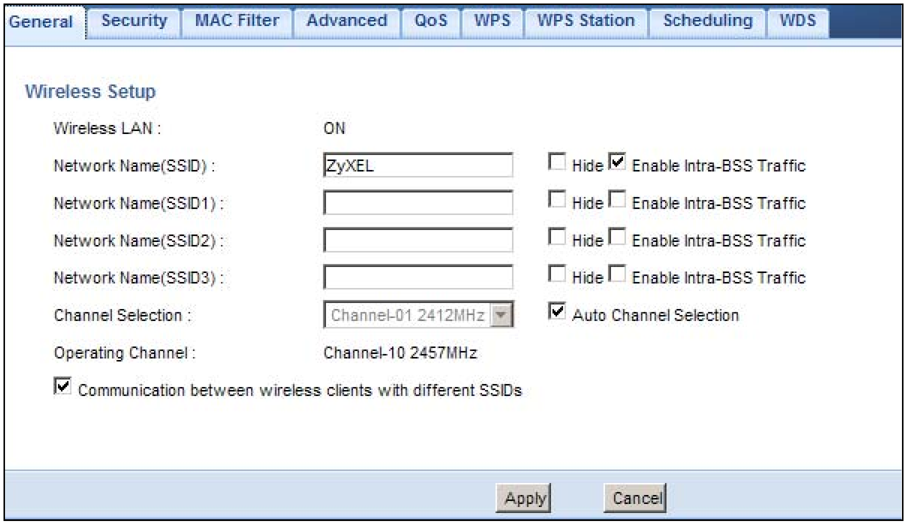
Wireless Distribution System or WDS security is used between bridged APs. It is independent of the security between the wired networks and their respective APs. If you do not enable WDS security, traffic between APs is not encrypted. When WDS security is enabled, both APs must use the same pre-shared key.

14.2 General Wireless LAN Screen

Use this screen to configure the SSIDs of the wireless LAN.

Note: If you are configuring the NBG4615 from a computer connected to the wireless LAN and you change the NBG4615'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 NBG4615's new settings.

Click **Network** > **Wireless LAN** to open the **General** screen.



Wireless Setup

Wireless LAN : ON

Network Name(SSID) : ZyXEL □ Hide ☑ Enable Intra-BSS Traffic

Network Name(SSID1) : □ Hide □ Enable Intra-BSS Traffic

Network Name(SSID2) : □ Hide □ Enable Intra-BSS Traffic

Network Name(SSID3) : □ Hide □ Enable Intra-BSS Traffic

Channel Selection : Channel-01 2412MHz ☑ Auto Channel Selection

Operating Channel : Channel-10 2457MHz

☑ Communication between wireless clients with different SSIDs

Figure 75 Network > Wireless LAN > General

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

Table 42 Network > Wireless LAN > General

LABEL	DESCRIPTION
Wireless LAN	This shows whether the wireless LAN is **ON** or **OFF**. You can enable or disable the wireless LAN by using the **WLAN** switch located on the back panel of the NBG4615.
Network Name(SSID) or Name(SSID1 ~3)	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. You can configure up to four SSIDs to enable multiple BSSs (Basic Service Sets) on the NBG4615. 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.
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.
Enable 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.

Table 42 Network > Wireless LAN > 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 NBG4615 to automatically choose the channel with the least interference. Deselect this check box if you wish to manually select the channel using the **Channel Section** field.
Operating Channel	This displays the channel the NBG4615 is currently using.
Communication between wireless clients with different SSIDs	Select the check box to allow communication between wireless clients of different SSIDs. Do not select the check box if you do not want to enable this function.
Apply	Click **Apply** to save your changes back to the NBG4615.
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.

14.3 Wireless Security Screen

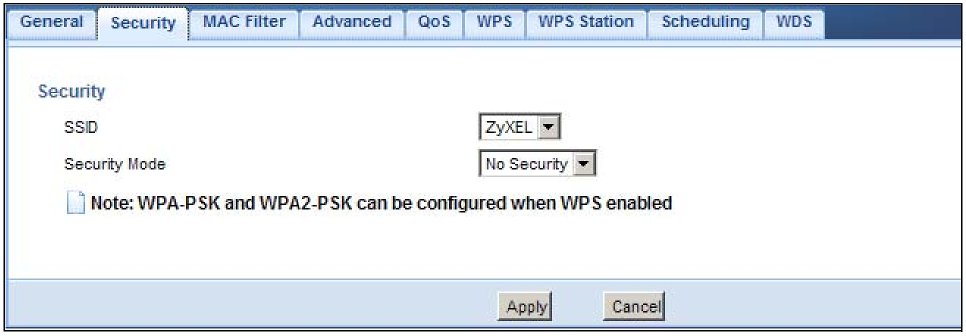
Use this screen to select the wireless security mode for each SSID. Click **Network** > **Wireless LAN** > **Security** to open the **Security** screen. The screen varies depending on what you select in the **Security Mode** field.

14.3.1 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 NBG4615, your network is accessible to any wireless networking device that is within range.

Figure 76 Network > Wireless LAN > Security: No Security



Security

SSID: ZyXEL

Security Mode: No Security

Note: WPA-PSK and WPA2-PSK can be configured when WPS enabled

The following table describes the labels in this screen.

Table 43 Network > Wireless LAN > Security: No Security

LABEL	DESCRIPTION
SSID	Select the SSID for which you want to configure the security.
Security Mode	Choose **No Security** from the drop-down list box.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

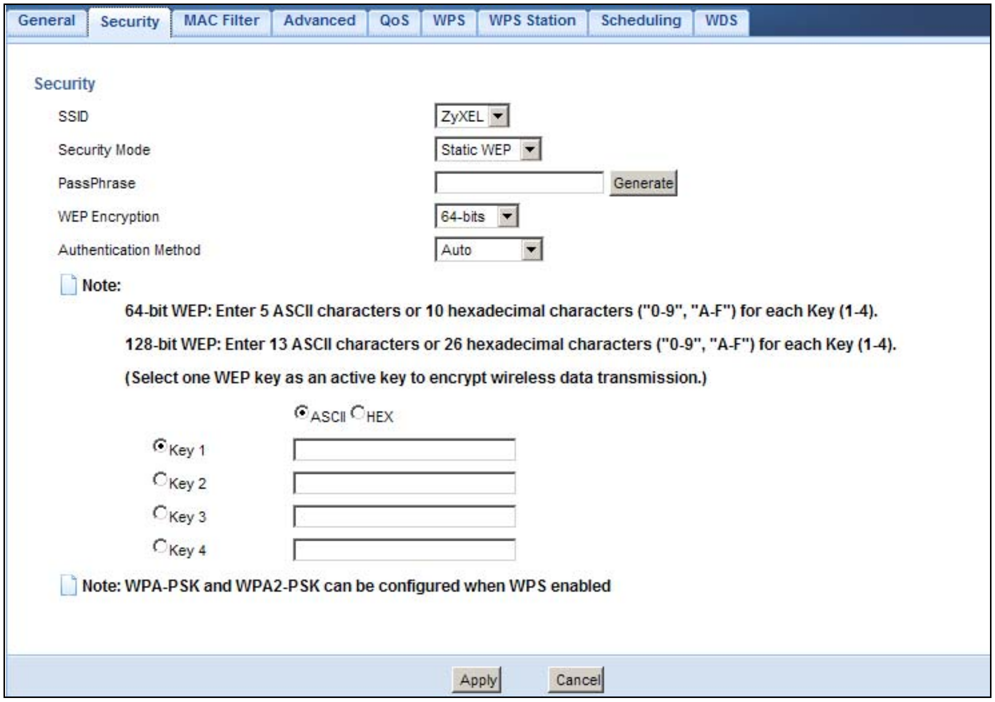
14.3.2 WEP Encryption

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 NBG4615 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 77 Network > Wireless LAN > Security: Static WEP



Security

SSID: ZyXEL

Security Mode: Static WEP

PassPhrase:

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

○ Key 2

○ Key 3

○ Key 4

Note: WPA-PSK and WPA2-PSK can be configured when WPS enabled

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

Table 44 Network > Wireless LAN > Security: Static WEP

LABEL	DESCRIPTION
SSID	Select the SSID for which you want to configure the security.
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 NBG4615 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 NBG4615 occurs. Select **Shared Key** to force the clients to provide the WEP key prior to communication.
ASCII	Select this option in order to enter ASCII characters as WEP key.

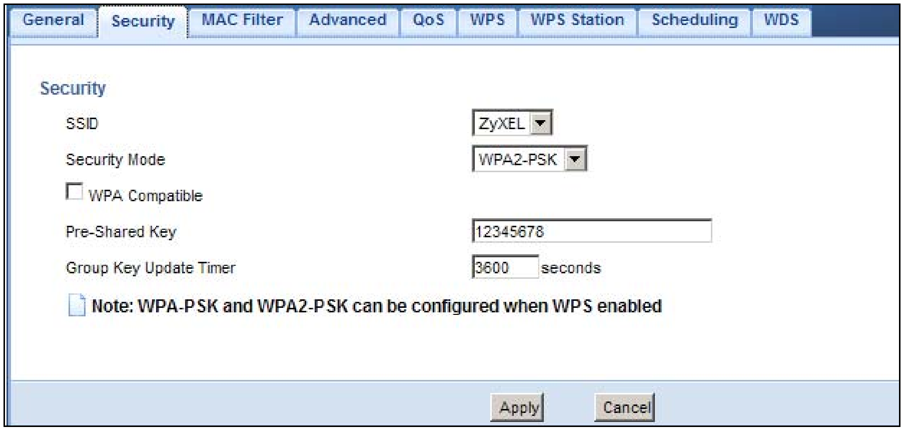
Table 44 Network > Wireless LAN > Security: Static WEP (continued)

LABEL	DESCRIPTION
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 NBG4615 and the wireless stations must use the same WEP key for data transmission. If you chose **64-bit WEP**, then enter any 5 ASCII characters or 10 hexadecimal characters ("0-9", "A-F"). If you chose **128-bit WEP**, 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 NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14.3.3 WPA-PSK/WPA2-PSK

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

Figure 78 Network > Wireless LAN > Security: WPA-PSK/WPA2-PSK



Security

SSID: ZyXEL

Security Mode: WPA2-PSK

□ WPA Compatible

Pre-Shared Key: 12345678

Group Key Update Timer: 3600 seconds

Note: WPA-PSK and WPA2-PSK can be configured when WPS enabled

The following table describes the labels in this screen.

Table 45 Network > Wireless LAN > Security: WPA-PSK/WPA2-PSK

LABEL	DESCRIPTION
SSID	Select the SSID for which you want to configure the security.
Security Mode	Select **WPA-PSK** or **WPA2-PSK** to enable data encryption.
WPA 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 NBG4615.

Table 45 Network > Wireless LAN > Security: WPA-PSK/WPA2-PSK (continued)

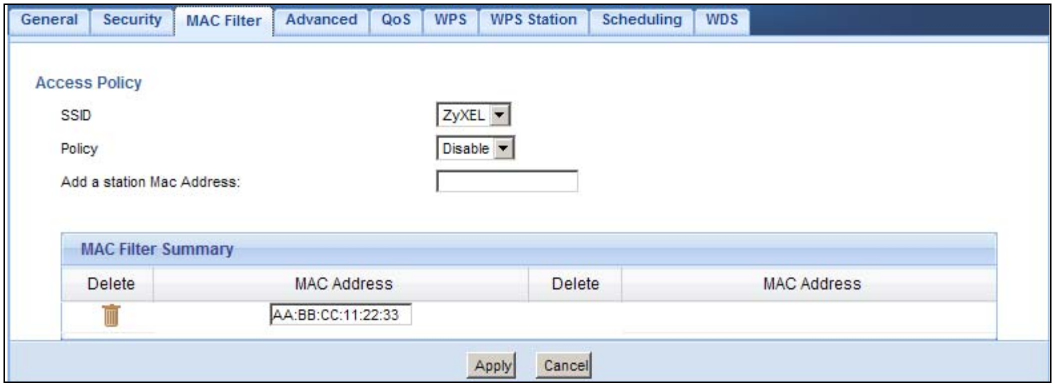
LABEL	DESCRIPTION
Pre-Shared Key	**WPA-PSK/WPA2-PSK** uses a simple common password for authentication. Type a pre-shared key from 8 to 63 case-sensitive keyboard characters.
Group Key Update Timer	The **Group Key Update Timer** is the rate at which the AP sends a new group key out to all clients. The default is **3600** seconds (60 minutes).
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14.4 MAC Filter

The MAC filter screen allows you to configure the NBG4615 to give exclusive access to devices (Allow) or exclude devices from accessing the NBG4615 (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 NBG4615's MAC filter settings, click **Network** > **Wireless LAN** > **MAC Filter**. The screen appears as shown.

Figure 79 Network > Wireless LAN > MAC Filter



Access Policy

SSID: ZyXEL

Policy: Disable

Add a station Mac Address:

MAC Filter Summary

Delete	MAC Address	Delete	MAC Address
🗑	AA:BB:CC:11:22:33		

The following table describes the labels in this menu.

Table 46 Network > Wireless LAN > MAC Filter

LABEL	DESCRIPTION
Access Policy	
SSID	Select the SSID for which you want to configure MAC filtering.

Table 46 Network > Wireless LAN > MAC Filter (continued)

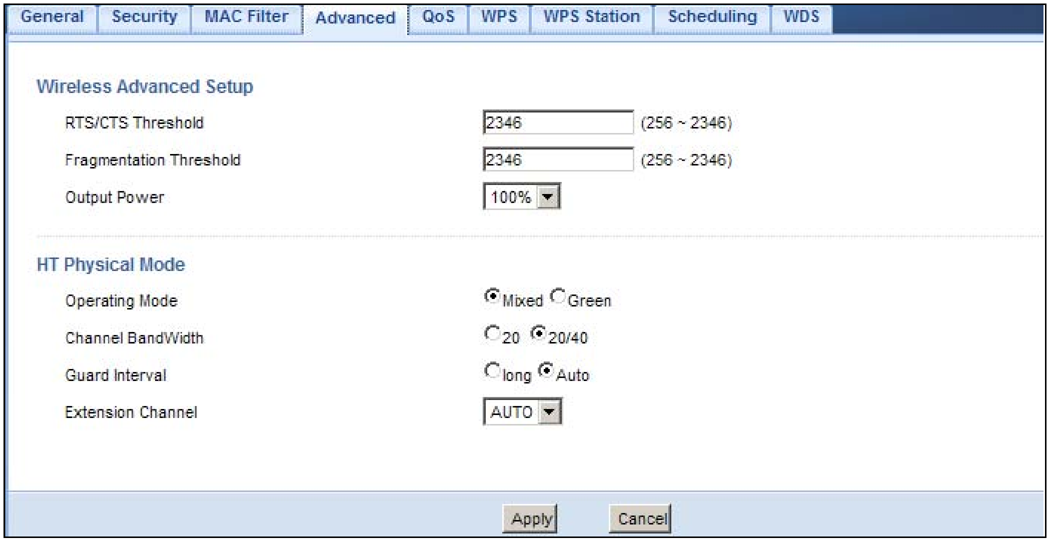
LABEL	DESCRIPTION
Policy	Define the filter action for the list of MAC addresses in the **MAC Address** table. Select **Disable** to deactivate the MAC filtering rule you configure below. Select **Allow** to permit access to the NBG4615, MAC addresses not listed will be denied access to the NBG4615. Select **Reject** to block access to the NBG4615, MAC addresses not listed will be allowed to access the NBG4615
Add a station Mac Address	Enter the MAC addresses of the wireless station that are allowed or denied access to the NBG4615 in these address fields. Enter the MAC addresses in a valid MAC address format, that is, six hexadecimal character pairs, for example, 12:34:56:78:9a:bc. Click **Add**.
MAC Filter Summary	
Delete	Click the delete icon to remove the MAC address from the list.
MAC Address	This is the MAC address of the wireless station that are allowed or denied access to the NBG4615.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14.5 Wireless LAN Advanced Screen

Use this screen to allow wireless advanced features, such as the output power, RTS/CTS Threshold and high-throughput physical mode settings.

Click **Network** > **Wireless LAN** > **Advanced**. The screen appears as shown.

Figure 80 Network > Wireless LAN > Advanced



Wireless Advanced Setup

RTS/CTS Threshold 2346 (256 ~ 2346)

Fragmentation Threshold 2346 (256 ~ 2346)

Output Power 100%

HT Physical Mode

Operating Mode ● Mixed ○ Green

Channel BandWidth ○ 20 ● 20/40

Guard Interval ○ long ● Auto

Extension Channel AUTO

The following table describes the labels in this screen.

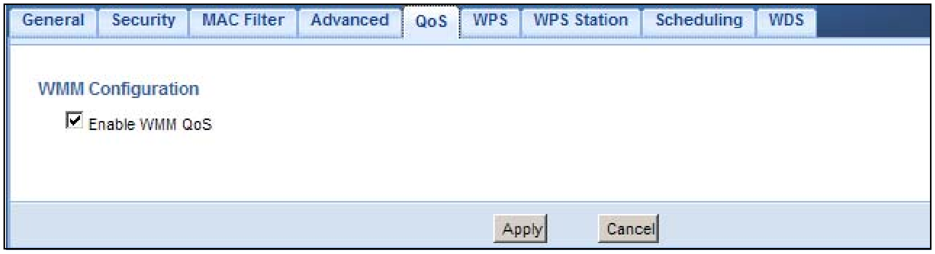
Table 47 Network > Wireless LAN > Advanced

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. Enter a value between 256 and 2432.
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. Enter an even number between **256** and **2346**.
Output Power	Set the output power of the NBG4615 in this field. If there is a high density of APs in an area, decrease the output power of the NBG4615 to reduce interference with other APs. Select one of the following **100%**, **90%**, **75%**, **50%**, **25%** or **10%**. See the product specifications for more information on your NBG4615's output power.
HT (High Throughput) Physical Mode - Use the fields below to configure the 802.11 wireless environment of your NBG4615.	
Operating Mode	Choose this according to the wireless mode(s) used in your network. **Mixed** - Select this if the wireless clients in your network use different wireless modes (for example, IEEE 802.11b/g and IEEE 802.1n modes) **Green** - Select this if the wireless clients in your network uses only one type of wireless mode (for example, IEEEE 802.11 n only)
Channel Bandwidth	Select the channel bandwidth you want to use for your wireless network. It is recommended that you select **20/40** (20/40 MHz). Select **20** MHz if you want to lessen radio interference with other wireless devices in your neighborhood.
Guard Interval	Select **Auto** to increase data throughput. However, this may make data transfer more prone to errors. Select **Long** to prioritize data integrity. This may be because your wireless network is busy and congested or the NBG4615 is located in an environment prone to radio interference.
Extension Channel	This is set to **Auto** by default. If you select **20/40** as your **Channel Bandwidth**, the extension channel enables the NBG4615 to get higher data throughput. This also lowers radio interference and traffic.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14.6 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** > **QoS**. The following screen appears.



WMM Configuration

☑ Enable WMM QoS

Figure 81 Network > Wireless LAN > QoS

The following table describes the labels in this screen.

Table 48 Network > Wireless LAN > QoS

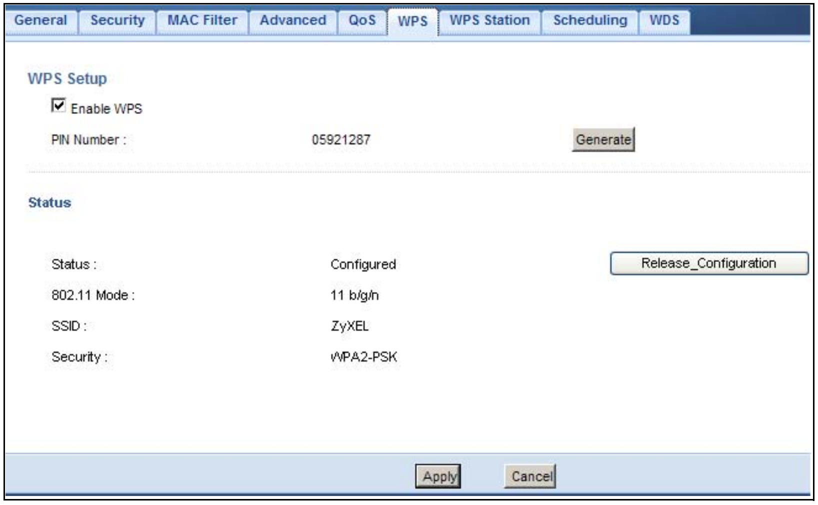
LABEL	DESCRIPTION
Enable WMM QoS	Check this to have the NBG4615 automatically give a service a priority level according to the ToS value in the IP header of packets it sends. WMM QoS (Wifi MultiMedia Quality of Service) gives high priority to voice and video, which makes them run more smoothly.
Apply	Click **Apply** to save your changes to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14.7 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** > **WPS** tab.

Note: With WPS, wireless clients can only connect to the wireless network using the first SSID on the NBG4615.

Figure 82 Network > Wireless LAN > WPS



WPS Setup

☑ Enable WPS

PIN Number : 05921287

Status

Status : Configured

802.11 Mode : 11 b/g/n

SSID : ZyXEL

Security : WPA2-PSK

The following table describes the labels in this screen.

Table 49 Network > Wireless LAN > WPS

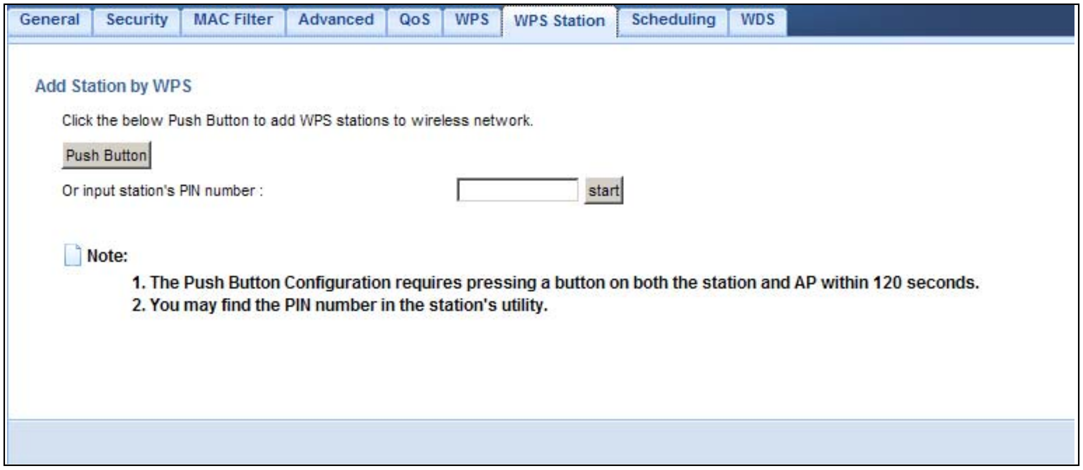
LABEL	DESCRIPTION
WPS Setup	
Enable WPS	Select this to enable the WPS feature.
PIN Number	This displays a PIN number last time system generated. Click **Generate** to generate a new PIN number.
Status	
Status	This displays **Configured** when the NBG4615 has connected to a wireless network using WPS or when **Enable WPS** 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 NBG4615 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 NBG4615.
802.11 Mode	This is the 802.11 mode used. Only compliant WLAN devices can associate with the NBG4615.
SSID	This is the name of the wireless network (the NBG4615's first SSID).
Security	This is the type of wireless security employed by the network.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

14.8 WPS Station Screen

Use this screen when you want to add a wireless station using WPS. To open this screen, click **Network** > **Wireless LAN** > **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 83 Network > Wireless LAN > WPS Station



Add Station by WPS

Click the below 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.

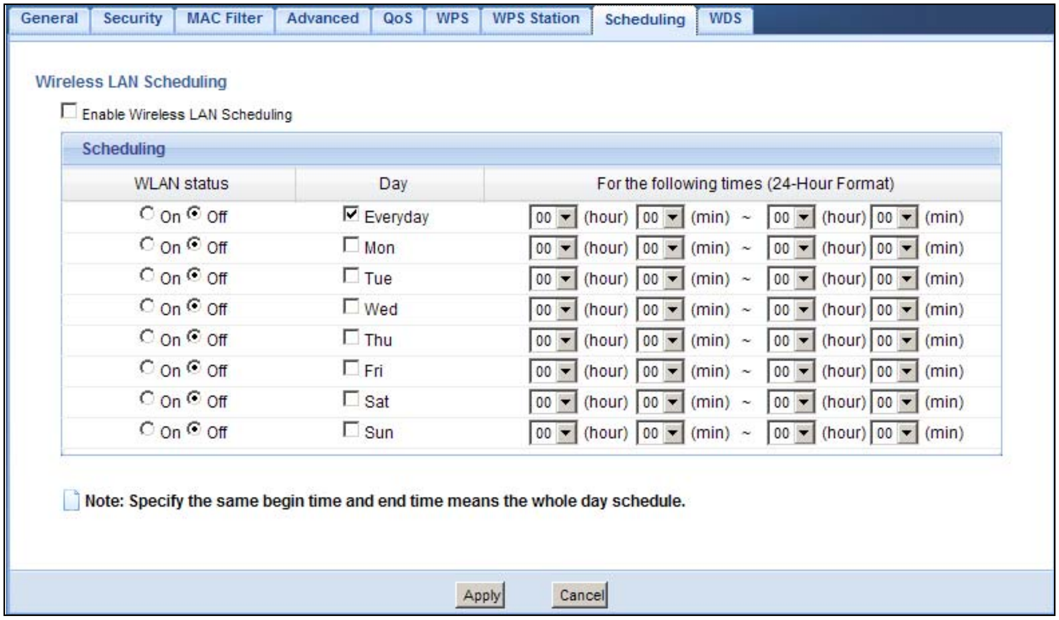
Table 50 Network > Wireless LAN > WPS Station

LABEL	DESCRIPTION
Push Button	Use this button when you use the PBC (Push Button Configuration) method to configure wireless stations's wireless settings. See Section 4.3.1 on page 32. 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. See Section 4.3.2 on page 33. 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.

14.9 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** > **Scheduling** tab.

Figure 84 Network > Wireless LAN > Scheduling



Wireless LAN Scheduling

□ Enable Wireless LAN Scheduling

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 51 Network > Wireless LAN > Scheduling

LABEL	DESCRIPTION
Wireless LAN Scheduling	
Enable Wireless LAN Scheduling	Select this to enable Wireless LAN scheduling.
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 NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

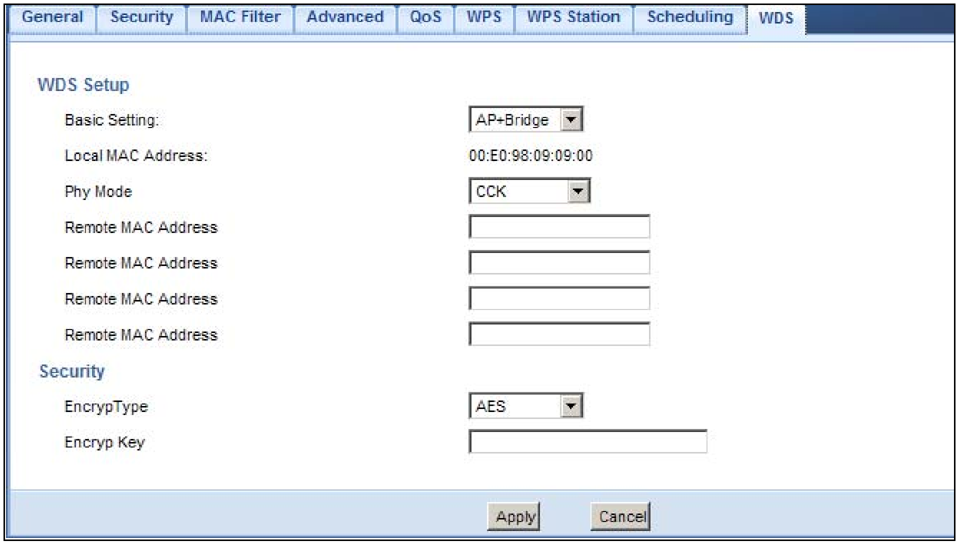
14.10 WDS Screen

A Wireless Distribution System (WDS) is a wireless connection between two or more APs. Use this screen to set the operating mode of your NBG4615 to **AP + Bridge** or **Bridge** and establish wireless links with other APs. You need to know the MAC address of the peer device, which also must be in bridge mode.

Note: You must enable the same wireless security settings on the NBG4615 and on all wireless clients that you want to associate with it.

Click **Network** > **Wireless LAN** > **WDS** tab. The following screen opens with the **Basic Setting** set to **Disabled**, and **Security Mode** set to **No Security**.

Figure 85 Network > Wireless LAN > WDS



WDS Setup

Basic Setting: AP+Bridge

Local MAC Address: 00:E0:98:09:09:00

Phy Mode: CCK

Remote MAC Address

Remote MAC Address

Remote MAC Address

Remote MAC Address

Security

EncrypType: AES

Encryp Key

The following table describes the labels in this screen.

Table 52 Network > Wireless LAN > WDS

LABEL	DESCRIPTION
WDS Setup	
Basic Settings	Select the operating mode for your NBG4615. • **Disable** - The NBG4615 works as an access point only and cannot establish wireless links with other APs. • **AP + Bridge -** The NBG4615 functions as a bridge and access point simultaneously. • **Bridge** - The NBG4615 acts as a wireless network bridge and establishes wireless links with other APs. You need to know the MAC address of the peer device, which also must be in bridge mode. The NBG4615 can establish up to five wireless links with other APs.
Local MAC Address	This is the MAC address of your NBG4615.

Table 52 Network > Wireless LAN > WDS (continued)

LABEL	DESCRIPTION
Phy Mode	Select the Phy mode you want the NBG4615 to use. This dictates the maximum size of packets during data transmission. This field is not available when you select **Disable** in the **Basic Setting** field.
Remote MAC Address	This is the MAC address of the peer device that your NBG4615 wants to make a bridge connection with. You can connect to up to 4 peer devices.
Security	
EncrypType	Select whether to use **WEP**, **TKIP** or **AES** encryption for your WDS connection in this field. Otherwise, select **No Security**.
EncrypKey	The **Encryp Key** is used to encrypt data. Peers must use the same key for data transmission.
Apply	Click **Apply** to save your changes to NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

15

IPv6

15.1 Overview

IPv6 (Internet Protocol version 6), is designed to enhance IP address size and features. The increase in IPv6 address size to 128 bits (from the 32-bit IPv4 address) allows up to 3.4 x 1038 IP addresses.

- See Appendix G on page 325 for more information on IPv6.

15.1.1 What You Need to Know

IPv6 Addressing

The 128-bit IPv6 address is written as eight 16-bit hexadecimal blocks separated by colons (:). This is an example IPv6 address `2001:0db8:1a2b:0015:0000:0000:1a2f:0000`.

IPv6 addresses can be abbreviated in two ways:

- Leading zeros in a block can be omitted. So `2001:0db8:1a2b:0015:0000:0000:1a2f:0000` can be written as `2001:db8:1a2b:15:0:0:1a2f:0`.
- Any number of consecutive blocks of zeros can be replaced by a double colon. A double colon can only appear once in an IPv6 address. So `2001:0db8:0000:0000:1a2f:0000:0000:0015` can be written as `2001:0db8::1a2f:0000:0000:0015`, `2001:0db8:0000:0000:1a2f::0015`, `2001:db8::1a2f:0:0:15` or `2001:db8:0:0:1a2f::15`.

IPv6 Prefix and Prefix Length

Similar to an IPv4 subnet mask, IPv6 uses an address prefix to represent the network address. An IPv6 prefix length specifies how many most significant bits (start from the left) in the address compose the network address. The prefix length is written as "/x" where x is a number. For example,

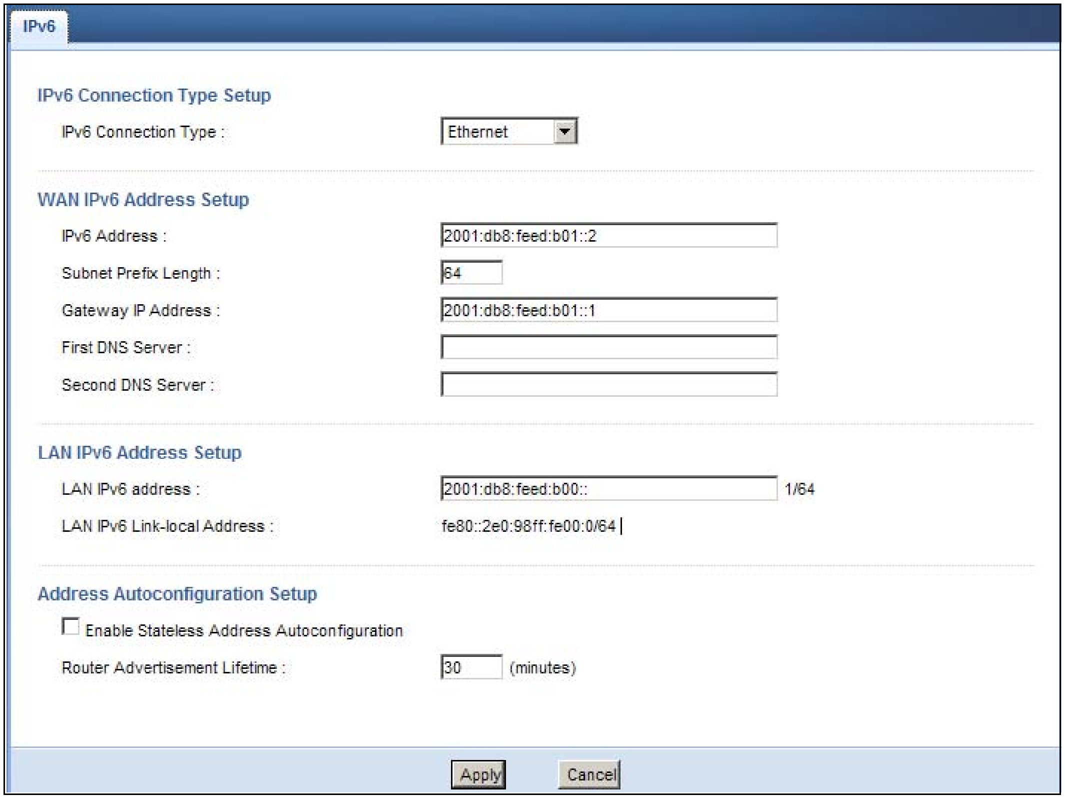
```
2001:db8:1a2b:15::1a2f:0/32
```

means that the first 32 bits (`2001:db8`) is the subnet prefix.

15.2 The IPv6 Screen

Click **Network > IPv6** to open the **IPv6** screen. Use this screen to configure the IPv6 settings for your NBG4615.

Figure 86 Network > IPv6



IPv6 Connection Type Setup

IPv6 Connection Type : Ethernet

WAN IPv6 Address Setup

IPv6 Address : 2001:db8:feed:b01::2

Subnet Prefix Length : 64

Gateway IP Address : 2001:db8:feed:b01::1

First DNS Server :

Second DNS Server :

LAN IPv6 Address Setup

LAN IPv6 address : 2001:db8:feed:b00:: 1/64

LAN IPv6 Link-local Address : fe80::2e0:98ff:fe00:0/64

Address Autoconfiguration Setup

☐ Enable Stateless Address Autoconfiguration

Router Advertisement Lifetime : 30 (minutes)

The following table describes the fields in this screen.

Table 53 Network > IPv6

LABEL	DESCRIPTION
IPv6 Connection Type Setup	
IPv6 Connection Type	Select the IPv6 connection type: • **Ethernet:** Select this if your ISP provides you a static IPv6 address. You need to enter the IPv6 information below according to what your ISP provided. • **Link-local only:** Use this connection mode for the NBG4615 to communicate with other IPv6 devices on the LAN side. You do not need to configure the settings below if you choose this mode.
WAN IPv6 Address Setup	
IPv6 Address	Enter the static IPv6 address provided by your ISP using colon (:) hexadecimal notation.
Subnet Prefix Length	Enter the bit number of the IPv6 subnet mask provided by your ISP.
Gateway IP Address	Enter the IPv6 address of the default outgoing gateway using a colon (:) hexadecimal notation.

Table 53 Network > IPv6 (continued)

LABEL	DESCRIPTION
First DNS Server	Enter the primary DNS server's IP address in this field.
Second DNS Server	Enter the secondary DNS server's IP address in this field.
LAN IPv6 Address Setup	
LAN IPv6 address	Enter a valid IPv6 address for the LAN using colon (:) hexadecimal notation.
LAN IPv6 Link-local Address	This shows the IPv6 link-local address that the NBG4615 generates automatically.
Address Autoconfiguration Setup	
Enable Stateless Address Autoconfiguration	Select the checkbox to enable Stateless Address Autoconfiguration on the NBG4615. If this function is enabled, IP addresses are not generated by a DHCP server. They are formed by combining network prefixes with an interface identifier, which are derived from embedded IEEE Identifiers.
Router Advertisement Lifetime	Specify the lifetime of the router advertisement. Router advertisement is a response to a router solicitation or a periodical multicast advertisement from a router to advertise its presence and other parameters, such as IPv6 prefix and DNS information.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to reload the previous configuration for this screen.

16

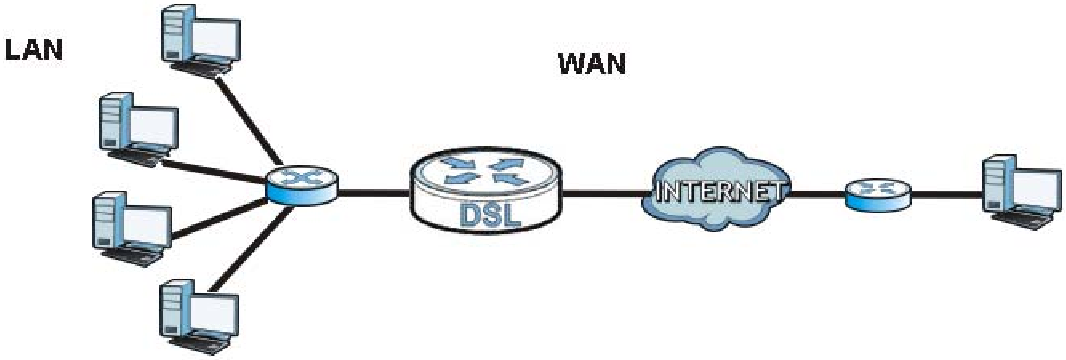
WAN

16.1 Overview

This chapter discusses the NBG4615's **WAN** screens. Use these screens to configure your NBG4615 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 87 LAN and WAN



16.2 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 16.4 on page 156).
- Use the **Advanced** screen to enable multicasting, configure Windows networking and bridge (Section 16.5 on page 166).
- Use **IGMP Snooping** screen to enable IGMP snooping in the LAN ports (Section 16.6 on page 167).

16.3 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 NBG4615.

16.3.1 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 NBG4615, which makes it accessible from an outside network. It is used by the NBG4615 to communicate with other devices in other networks. It can be static (fixed) or dynamically assigned by the ISP each time the NBG4615 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 NBG4615 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 NBG4615's WAN IP address), set the DNS server fields to get the DNS server address from the ISP.

WAN MAC Address

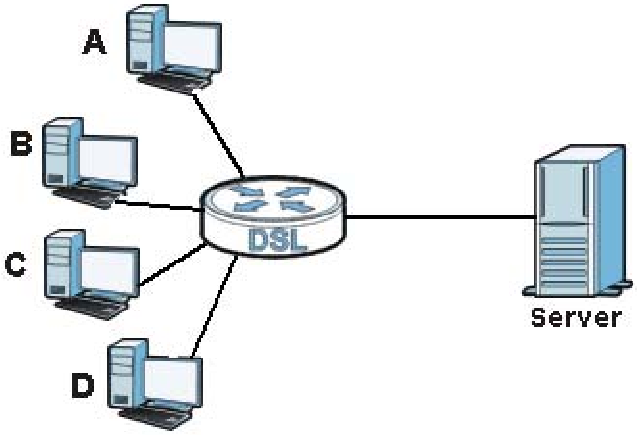
The MAC address screen allows users to configure the WAN port's MAC address by either using the factory default or cloning the MAC address from a computer on your LAN. Choose **Factory Default** to select the factory assigned default MAC Address.

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.

16.3.2 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 88 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 NBG4615 supports both IGMP version 1 (**IGMP-v1**) and IGMP version 2 (**IGMP-v2**).

At start up, the NBG4615 queries all directly connected networks to gather group membership. After that, the NBG4615 periodically updates this information. IP multicasting can be enabled/disabled on the NBG4615 LAN and/or WAN interfaces in the Web Configurator (**LAN**; **WAN**). Select **None** to disable IP multicasting on these interfaces.

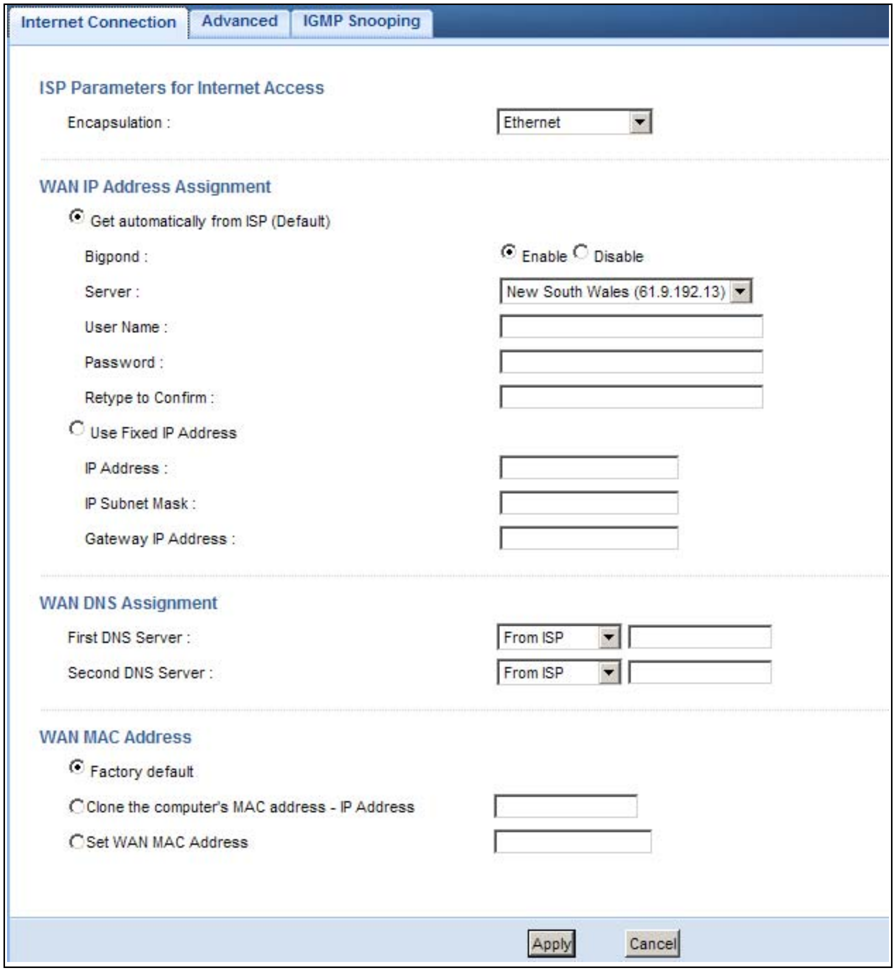
16.4 Internet Connection

Use this screen to change your NBG4615's Internet access settings. Click **WAN** from the **Configuration** menu. The screen differs according to the encapsulation you choose.

16.4.1 Ethernet Encapsulation

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

Figure 89 Network > WAN > Internet Connection: Ethernet Encapsulation



ISP Parameters for Internet Access

Encapsulation : Ethernet

WAN IP Address Assignment

● Get automatically from ISP (Default)

Bigpond : ● Enable ○ Disable

Server : New South Wales (61.9.192.13)

User Name :

Password :

Retype to Confirm :

○ Use Fixed IP Address

IP Address :

IP Subnet Mask :

Gateway IP Address :

WAN DNS Assignment

First DNS Server : From ISP

Second DNS Server : 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 54 Network > WAN > Internet Connection: Ethernet Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Encapsulation	You must choose the **Ethernet** option when the WAN port is used as a regular Ethernet.
WAN IP Address Assignment	
Get automatically from ISP (Default)	Select this option If your ISP did not assign you a fixed IP address. This is the default selection.
Bigpond	Select **Enable** if you subscribe to Internet service from BigPond in Australia. Then configure the fields below with the information provided.
Server	Type the IP address of the BigPond server.
User Name	Type the user name given to you by your ISP. You can use alphanumeric and -_@$./ characters, and it can be up to 31 characters long.
Password	Type the password associated with the user name above. Use up to 64 ASCII characters except [,] and ?. This field can be blank.
Retype to Confirm	Type your password again for confirmation.
Use Fixed 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 **Use Fixed IP Address**.
IP Subnet Mask	Enter the **IP Subnet Mask** in this field.
Gateway IP Address	Enter a **Gateway IP Address** (if your ISP gave you one) in this field.
WAN DNS Assignment	
First DNS Server Second DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG4615'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 NBG4615's MAC address, copying the MAC address from a computer on your LAN or manually entering a MAC address.

Table 54 Network > WAN > Internet Connection: Ethernet Encapsulation (continued)

LABEL	DESCRIPTION
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 NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

16.4.2 PPPoE Encapsulation

The NBG4615 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).

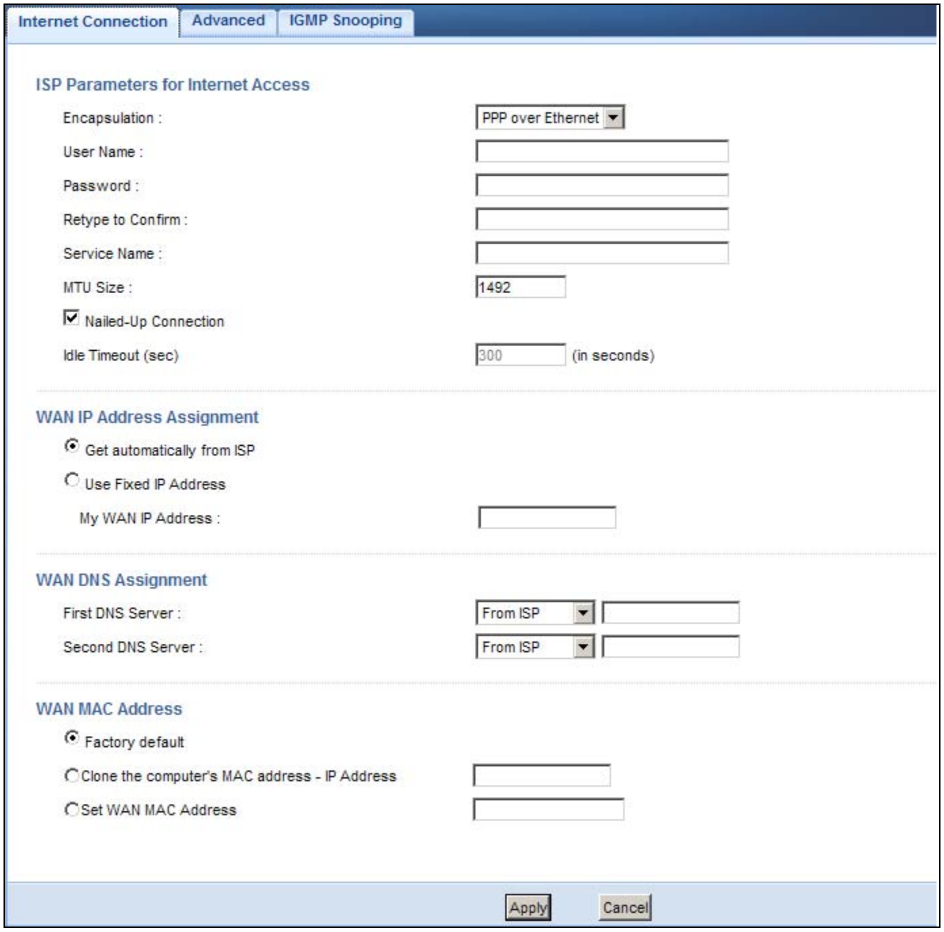
One of the benefits of PPPoE is the ability to let you access one of multiple network services, a function known as dynamic service selection. This enables the service provider to easily create and offer new IP services for individuals.

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 NBG4615 (rather than individual computers), the computers on the LAN do not need PPPoE software installed, since the NBG4615 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 90 Network > WAN > Internet Connection: PPPoE Encapsulation



ISP Parameters for Internet Access

Encapsulation : PPP over Ethernet

User Name :

Password :

Retype to Confirm :

Service Name :

MTU Size : 1492

☑ Nailed-Up Connection

Idle Timeout (sec) 300 (in seconds)

WAN IP Address Assignment

● Get automatically from ISP

○ Use Fixed IP Address

My WAN IP Address :

WAN DNS Assignment

First DNS Server : From ISP

Second DNS Server : 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 55 Network > WAN > Internet Connection: PPPoE Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Encapsulation	Select **PPP over Ethernet** if you connect to your Internet via dial-up.
User Name	Type the user name given to you by your ISP.
Password	Type the password associated with the user name above.
Retype to Confirm	Type your password again to make sure that you have entered is correctly.
MTU Size	Enter the Maximum Transmission Unit (MTU) or the largest packet size per frame that your NBG4615 can receive and process.
Nailed-Up Connection	Select **Nailed-Up Connection** if you do not want the connection to time out.
Idle Timeout (sec)	This value specifies the time in minutes that elapses before the router automatically disconnects from the PPPoE server.
WAN IP Address Assignment	

Table 55 Network > WAN > Internet Connection: PPPoE Encapsulation (continued)

LABEL	DESCRIPTION
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**.
WAN DNS Assignment	
First DNS Server Second DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG4615'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 NBG4615'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 NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

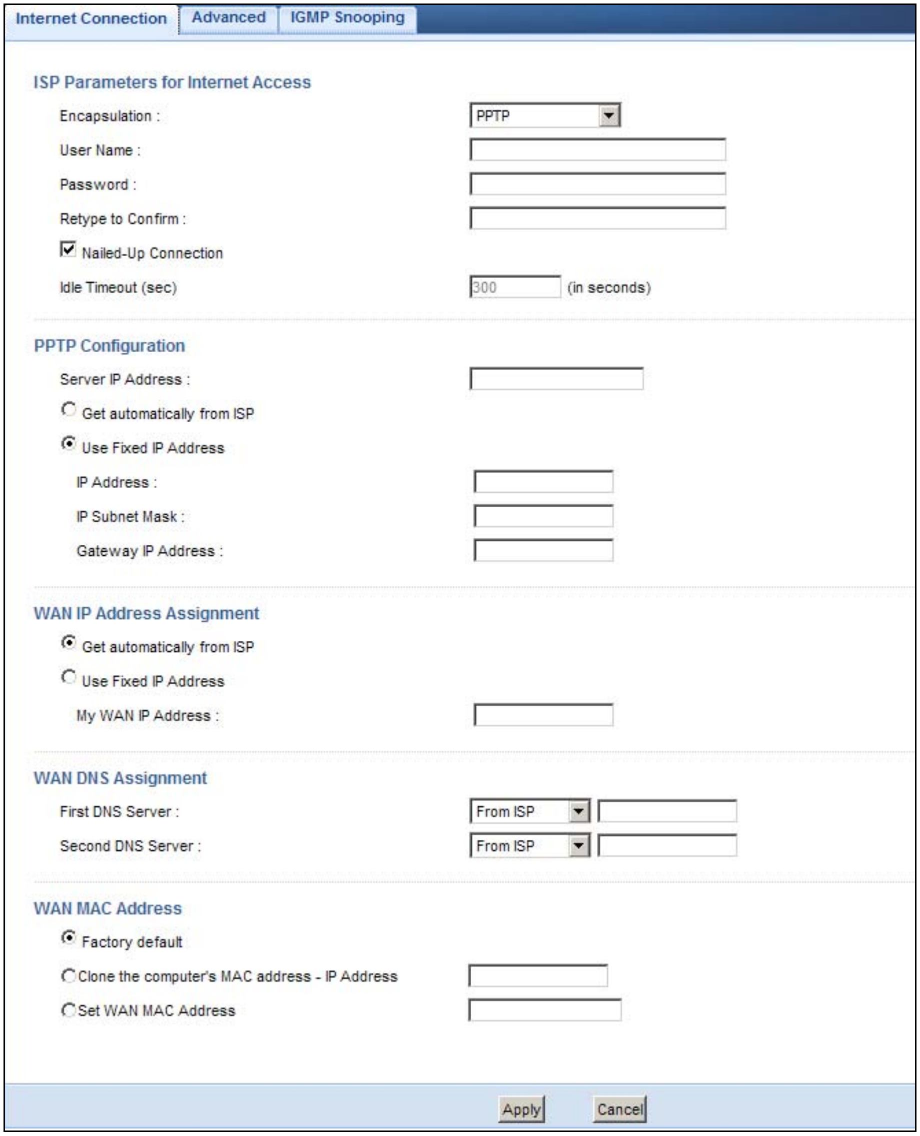
16.4.3 PPTP Encapsulation

Point-to-Point Tunneling Protocol (PPTP) is a network protocol that enables secure transfer of data from a remote client to a private server, creating a Virtual Private Network (VPN) using TCP/IP-based networks.

PPTP supports on-demand, multi-protocol and virtual private networking over public networks, such as the Internet.

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

Figure 91 Network > WAN > Internet Connection: PPTP Encapsulation



ISP Parameters for Internet Access

Encapsulation : PPTP

User Name :

Password :

Retype to Confirm :

☑ Nailed-Up Connection

Idle Timeout (sec) 300 (in seconds)

PPTP Configuration

Server IP Address :

○ Get automatically from ISP

● Use Fixed IP Address

IP Address :

IP Subnet Mask :

Gateway IP Address :

WAN IP Address Assignment

● Get automatically from ISP

○ Use Fixed IP Address

My WAN IP Address :

WAN DNS Assignment

First DNS Server : From ISP

Second DNS Server : 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 56 Network > WAN > Internet Connection: PPTP Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Connection Type	To configure a PPTP client, you must configure the **User Name** and **Password** fields for a PPP connection and the PPTP parameters for a PPTP connection.
User Name	Type the user name given to you by your ISP.
Password	Type the password associated with the User Name above.
Retype to Confirm	Type your password again to make sure that you have entered is correctly.

Table 56 Network > WAN > Internet Connection: PPTP Encapsulation (continued)

LABEL	DESCRIPTION
Nailed-up Connection	Select **Nailed-Up Connection** if you do not want the connection to time out.
Idle Timeout	This value specifies the time in minutes that elapses before the NBG4615 automatically disconnects from the PPTP server.
PPTP Configuration	
Server IP Address	Type the IP address of the PPTP server.
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.
IP Address	Enter your WAN IP address in this field if you selected **Use Fixed IP Address**.
IP Subnet Mask	Your NBG4615 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 NBG4615.
Gateway IP Address	Enter a **Gateway IP Address** (if your ISP gave you one) in this field.
WAN IP Address Assignment	
Get automatically from ISP	Select this to get your WAN IP address from your ISP.
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**.
WAN DNS Assignment	
First DNS Server Second DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG4615'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 NBG4615’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.

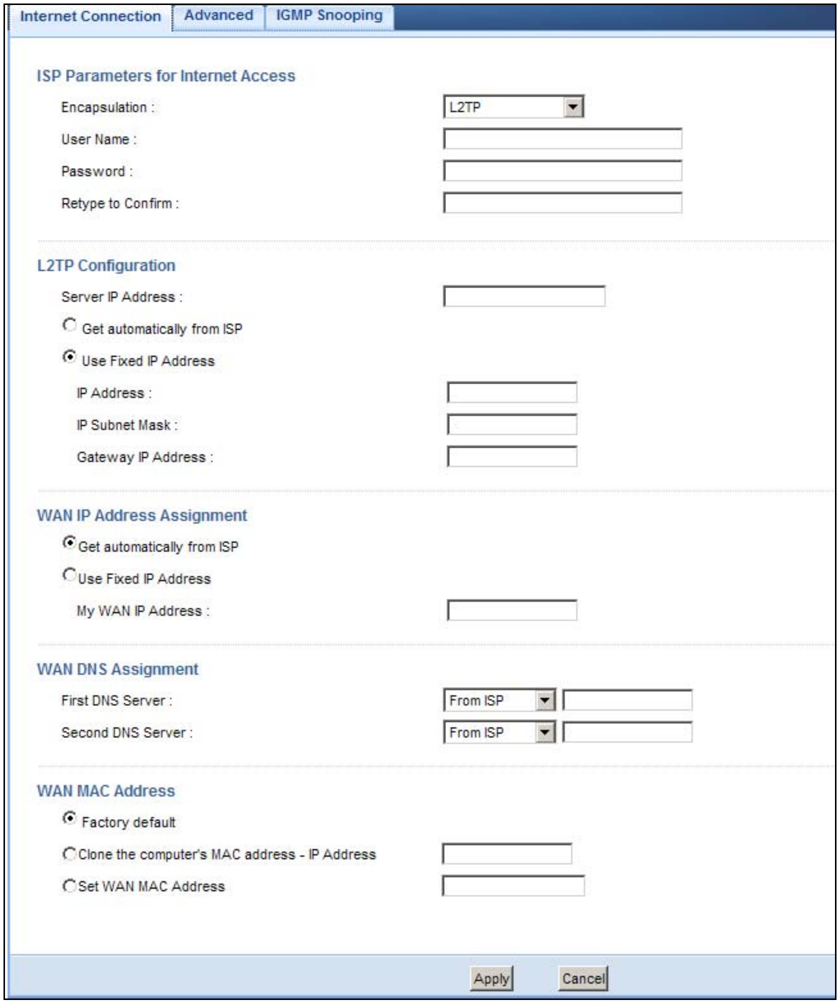
Table 56 Network > WAN > Internet Connection: PPTP Encapsulation (continued)

LABEL	DESCRIPTION
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 NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

16.4.4 L2TP Encapsulation

The Layer 2 Tunneling Protocol (L2TP) works at layer 2 (the data link layer) to tunnel network traffic between two peer devices over another network (like the Internet).

This screen displays when you select **L2TP** encapsulation.



ISP Parameters for Internet Access

Encapsulation : L2TP

User Name :

Password :

Retype to Confirm :

L2TP Configuration

Server IP Address :

○ Get automatically from ISP

● Use Fixed IP Address

IP Address :

IP Subnet Mask :

Gateway IP Address :

WAN IP Address Assignment

● Get automatically from ISP

○ Use Fixed IP Address

My WAN IP Address :

WAN DNS Assignment

First DNS Server : From ISP

Second DNS Server : From ISP

WAN MAC Address

● Factory default

○ Clone the computer's MAC address - IP Address

○ Set WAN MAC Address

Figure 92 Network > WAN > Internet Connection: L2TP Encapsulation

The following table describes the labels in this screen.

Table 57 Network > WAN > Internet Connection: L2TP Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Connection Type	To configure a L2TP client, you must configure the **User Name** and **Password** fields for a layer-2 connection and the L2TP parameters for an L2TP connection.
User Name	Type the user name given to you by your ISP.
Password	Type the password associated with the **User Name** above.
Retype to Confirm	Type your password again to make sure that you have entered is correctly.
L2TP Configuration	
Server IP Address	Type the IP address of the L2TP server.

Table 57 Network > WAN > Internet Connection: L2TP Encapsulation (continued)

LABEL	DESCRIPTION
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.
IP Address	Enter your WAN IP address in this field if you selected **Use Fixed IP Address**.
IP Subnet Mask	Your NBG4615 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 NBG4615.
Gateway IP Address	Enter a **Gateway IP Address** (if your ISP gave you one) in this field.
WAN IP Address Assignment	
Get automatically from ISP	Select this to get your WAN IP address from your ISP.
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**.
WAN DNS Assignment	
First DNS Server Second DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG4615'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 NBG4615'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 NBG4615.
Reset	Click **Reset** to begin configuring this screen afresh.

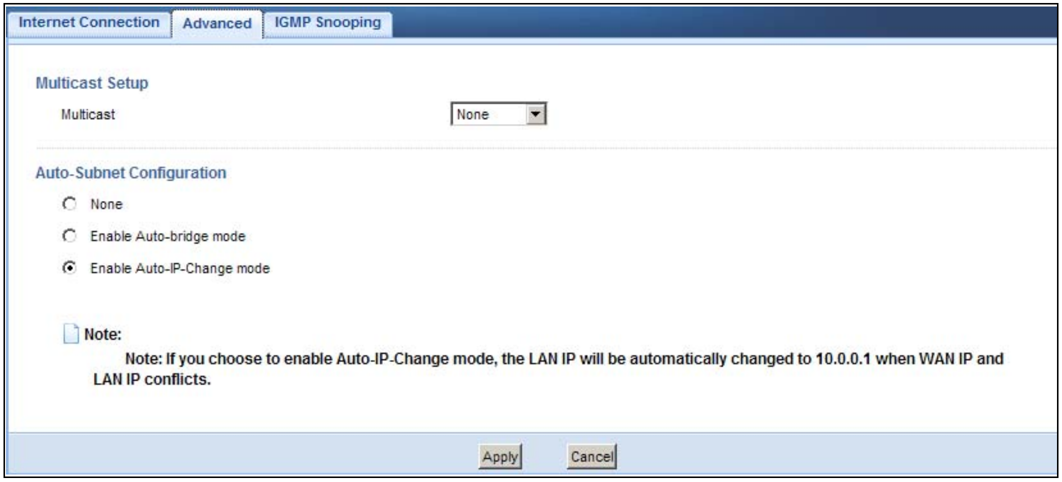
16.5 Advanced WAN Screen

Use this screen to enable **Multicast** and enable **Auto-bridge**.

Note: The categories shown in this screen are independent of each other.

To change your NBG4615's advanced WAN settings, click **Network** > **WAN** > **Advanced**. The screen appears as shown.

Figure 93 Network > WAN > Advanced



Multicast Setup

Multicast: None

Auto-Subnet Configuration

○ None

○ Enable Auto-bridge mode

● Enable Auto-IP-Change mode

Note:

Note: If you choose to enable Auto-IP-Change mode, the LAN IP will be automatically changed to 10.0.0.1 when WAN IP and LAN IP conflicts.

The following table describes the labels in this screen.

Table 58 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	
None	Select this option to have the NBG4615 do nothing when it gets a WAN IP address in the range of 192.168.x.y (where x and y are from zero to nine) or in the same subnet as the LAN IP address.
Enable Auto-bridge mode	Select this option to have the NBG4615 switch to bridge mode automatically when the NBG4615 gets a WAN IP address in the range of 192.168.x.y (where x and y are from zero to nine) no matter what the LAN IP address is.
Enable Auto-IP-Change mode	Select this option to have the NBG4615 change its LAN IP address to 10.0.0.1 or 192.168.1.1 accordingly when the NBG4615 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 NBG4615 are still available in this mode.

Table 58 Network > WAN > Advanced (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

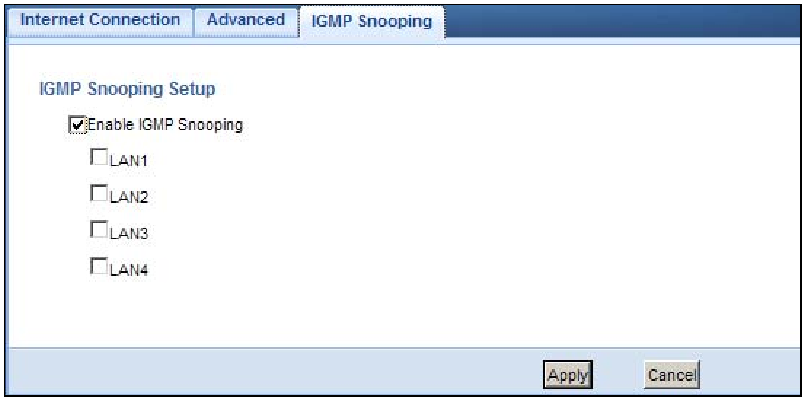
16.6 IGMP Snooping Screen

Use this screen to enable IGMP snooping if you have LAN users that subscribe to multicast services.

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.

Click **Network > WAN > IGMP Snooping**. The screen appears as shown.

Figure 94 Network > WAN > IGMP Snooping



IGMP Snooping Setup

☑ Enable IGMP Snooping

□ LAN1

□ LAN2

□ LAN3

□ LAN4

The following table describes the labels in this screen.

Table 59 Network > WAN > IGMP Snooping

LABEL	DESCRIPTION
Enable IGMP Snooping	Select this option to have the NBG4615 use IGMP snooping. Check the LAN port/s to which IGMP snooping applies.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

17

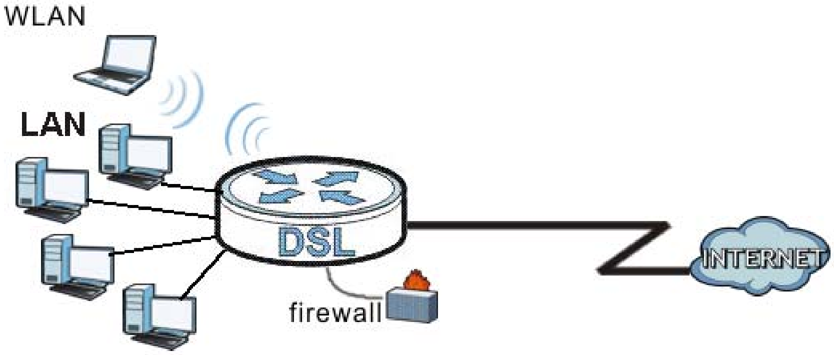
LAN

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

Figure 95 LAN Example



The LAN screens can help you manage IP addresses.

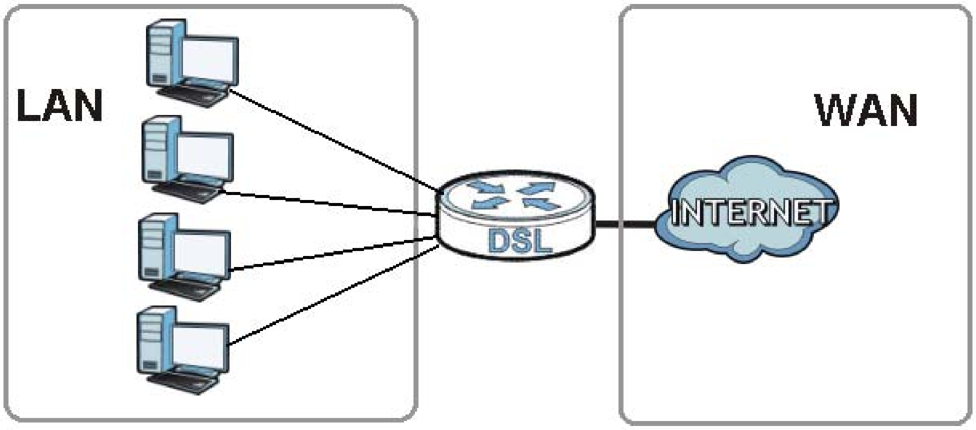
17.2 What You Can Do

- Use the **IP** screen to change the IP address for your (Section 17.4 on page 171).
- Use the **IP Alias** screen to have the NBG4615 apply IP alias to create LAN subnets (Section 17.5 on page 172).

17.3 What You Need To Know

The actual physical connection determines whether the NBG4615 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 96 LAN and WAN IP Addresses



The LAN parameters of the NBG4615 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.

17.3.1 IP Pool Setup

The NBG4615 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 NBG4615 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.

17.3.2 LAN TCP/IP

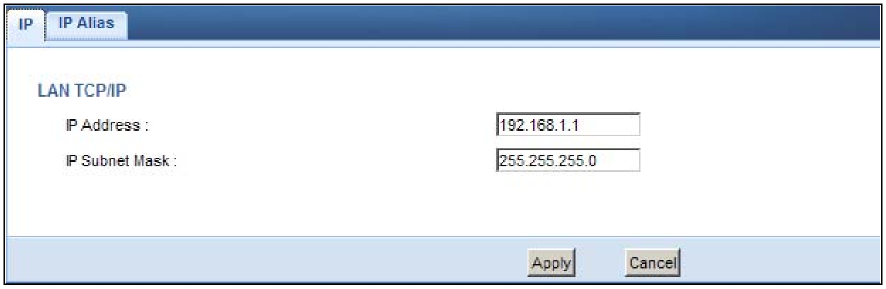
The NBG4615 has built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

17.3.3 IP Alias

17.4 LAN IP Screen

Use this screen to change the IP address for your NBG4615. Click **Network > LAN > IP**.

Figure 97 Network > LAN > IP



IP Address : 192.168.1.1

IP Subnet Mask : 255.255.255.0

The following table describes the labels in this screen.

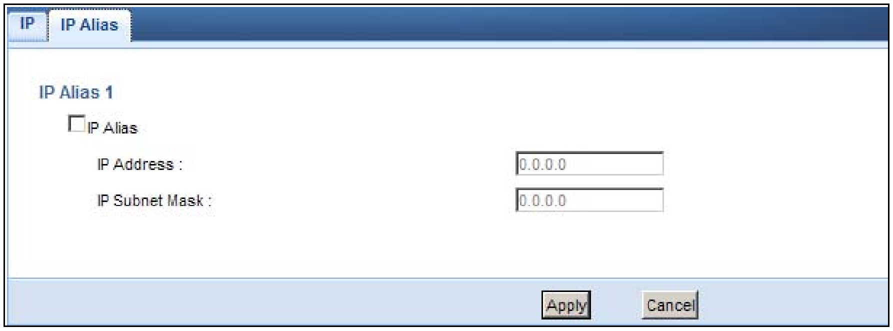
Table 60 Network > LAN > IP

LABEL	DESCRIPTION
IP Address	Type the IP address of your NBG4615 in dotted decimal notation.
IP Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your NBG4615 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 NBG4615.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

17.5 IP Alias Screen

Use this screen to have the NBG4615 apply IP alias to create LAN subnets. Click **LAN** > **IP Alias**.

Figure 98 Network > LAN > IP Alias



The following table describes the labels in this screen.

Table 61 Network > LAN > IP Alias

LABEL	DESCRIPTION
IP Alias	Check this to enable IP alias.
IP Address	Type the IP alias address of your NBG4615 in dotted decimal notation.
IP Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your NBG4615 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 NBG4615.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

18

DHCP Server

18.1 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 NBG4615's LAN as a DHCP server or disable it. When configured as a server, the NBG4615 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.

18.1.1 What You Can Do

- Use the **General** screen to enable the DHCP server (Section 18.2 on page 174).
- Use the **Advanced** screen to assign IP addresses on the LAN to specific individual computers based on their MAC Addresses (Section 18.3 on page 175).

18.1.2 What You Need To Know

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

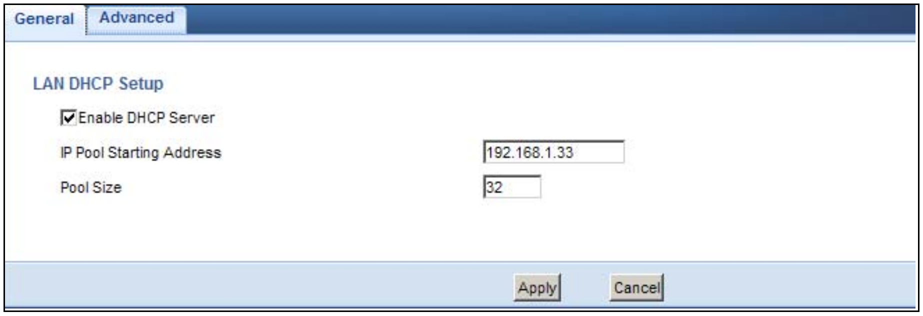
MAC Addresses

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.

18.2 General

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

Figure 99 Network > DHCP Server > General



☑ Enable DHCP Server

IP Pool Starting Address 192.168.1.33

Pool Size 32

The following table describes the labels in this screen.

Table 62 Network > DHCP Server > General

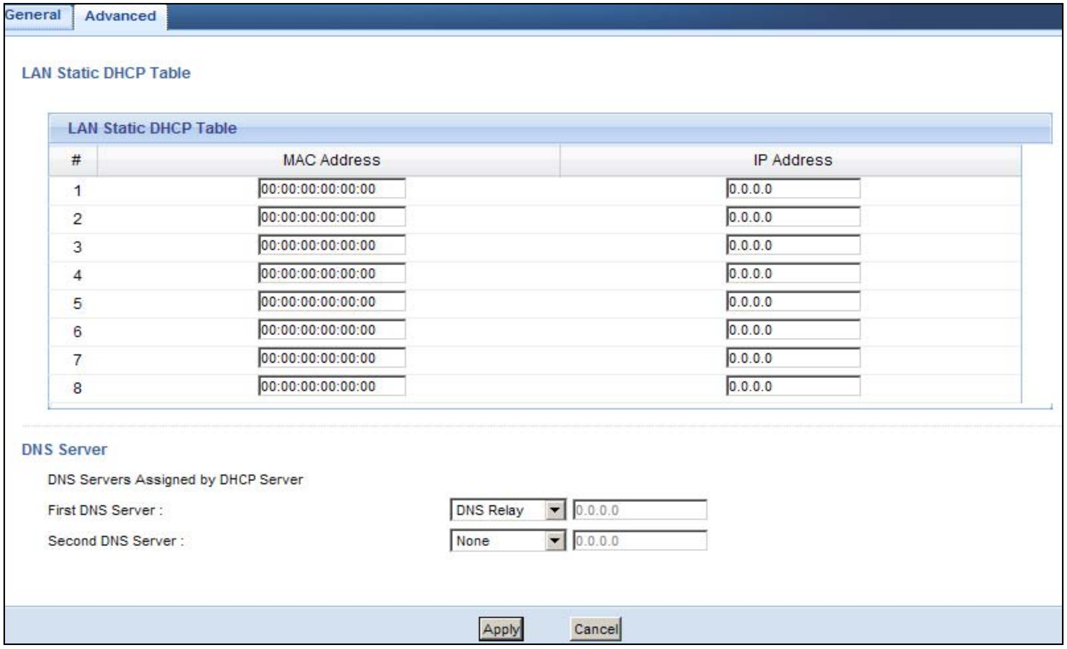
LABEL	DESCRIPTION
Enable DHCP Server	Select the checkbox to enable DHCP for LAN. DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients (computers) to obtain TCP/IP configuration at startup from a server. Leave the **Enable DHCP Server** check box selected unless your ISP instructs you to do otherwise. Clear it to disable the NBG4615 acting as a DHCP server. When configured as a server, the NBG4615 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 NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

18.3 Advanced

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 NBG4615 sends to the DHCP clients.

To change your NBG4615's static DHCP settings, click **Network** > **DHCP Server** > **Advanced**. The following screen displays.

Figure 100 Network > DHCP Server > Advanced



LAN 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 0.0.0.0

Second DNS Server : None 0.0.0.0

The following table describes the labels in this screen.

Table 63 Network > DHCP Server > Advanced

LABEL	DESCRIPTION
LAN 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 NBG4615 passes a DNS (Domain Name System) server IP address (in the order you specify here) to the DHCP clients. The NBG4615 only passes this information to the LAN DHCP clients when you select the **Enable DHCP Server** check box. When you clear the **Enable DHCP Server** check box, 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 63 Network > DHCP Server > Advanced (continued)

LABEL	DESCRIPTION
First DNS Server Second DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG4615'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 NBG4615 act as a DNS proxy. The NBG4615's LAN IP address displays in the field to the right (read-only). The NBG4615 tells the DHCP clients on the LAN that the NBG4615 itself is the DNS server. When a computer on the LAN sends a DNS query to the NBG4615, the NBG4615 forwards the query to the NBG4615'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 NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

19

NAT

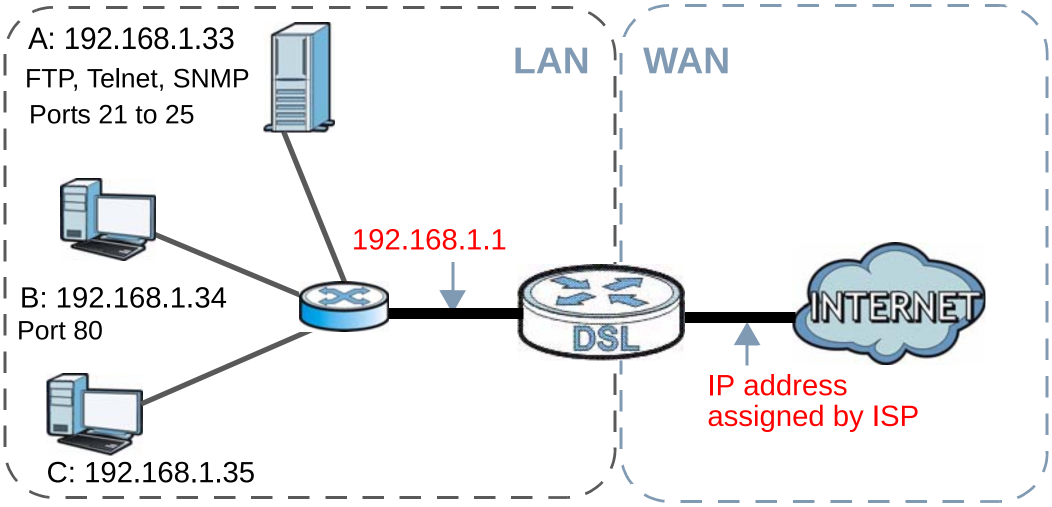
19.1 Overview

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 NBG4615. 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 NBG4615, which is 192.168.1.1.

Figure 101 NAT Example



This chapter discusses how to configure NAT on the NBG4615.

Note: You must create a firewall rule in addition to setting up NAT, to allow traffic from the WAN to be forwarded through the NBG4615.

19.1.1 What You Can Do

- Use the **General** screen to enable NAT and set a default server (Section 19.2 on page 180).
- Use the **Application** screen to change your NBG4615’s port forwarding settings (Section 19.3 on page 181).
- Use the **Advanced** screen to change your NBG4615’s trigger port settings (Section 19.5.3 on page 185).

19.1.2 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 NBG4615, 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 64 NAT Definitions

ITEM	DESCRIPTION
Inside	This refers to the host on the LAN.
Outside	This refers to the host on the WAN.

Table 64 NAT Definitions (continued)

ITEM	DESCRIPTION
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

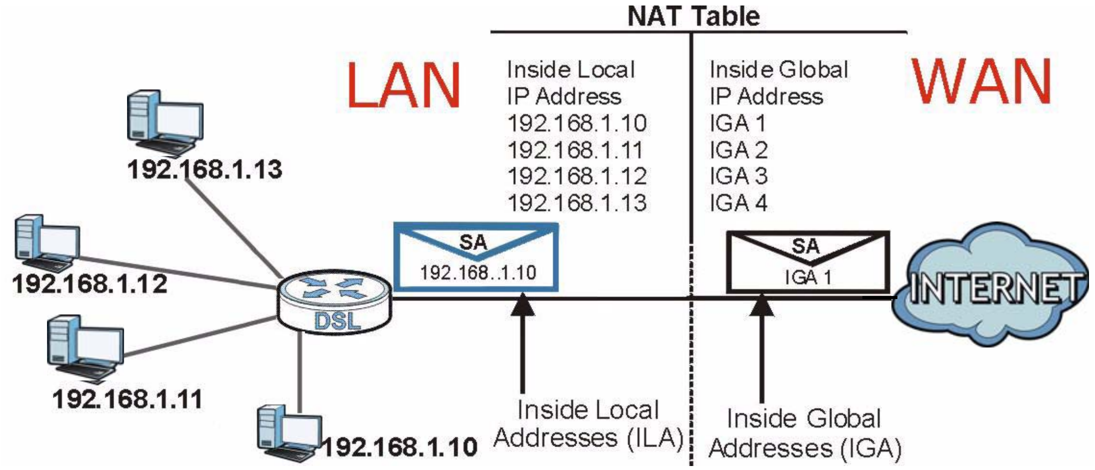
In the simplest form, NAT changes the source IP address in a packet received from a subscriber (the inside local address) to another (the inside global address) before forwarding the packet to the WAN side. When the response comes back, NAT translates the destination address (the inside global address) 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 NBG4615 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 NBG4615 keeps track of the original addresses and port numbers so incoming reply packets can have their original values restored. The following figure illustrates this.

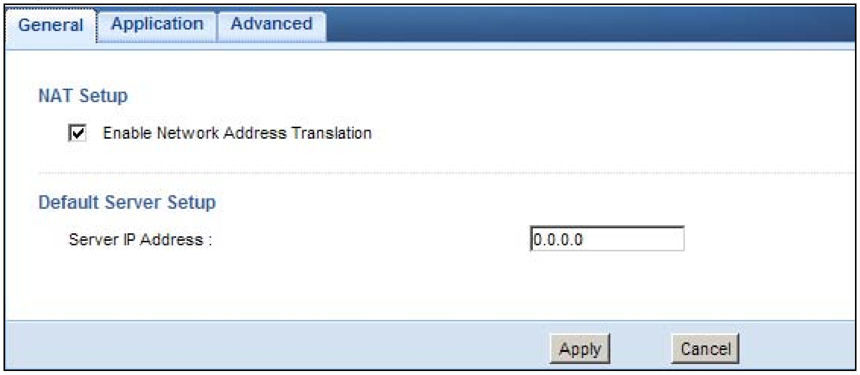
Figure 102 How NAT Works



19.2 General

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

Figure 103 Network > NAT > General



NAT Setup

☑ Enable Network Address Translation

Default Server Setup

Server IP Address : 0.0.0.0

The following table describes the labels in this screen.

Table 65 Network > NAT > General

LABEL	DESCRIPTION
NAT Setup	
Enable Network Address Translation	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 the check box to enable NAT.

Table 65 Network > NAT > General (continued)

LABEL	DESCRIPTION
Default Server Setup	
Server IP Address	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 **Application** screen. If you do not assign a **Default Server IP address**, the NBG4615 discards all packets received for ports that are not specified in the **Application** screen or remote management.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

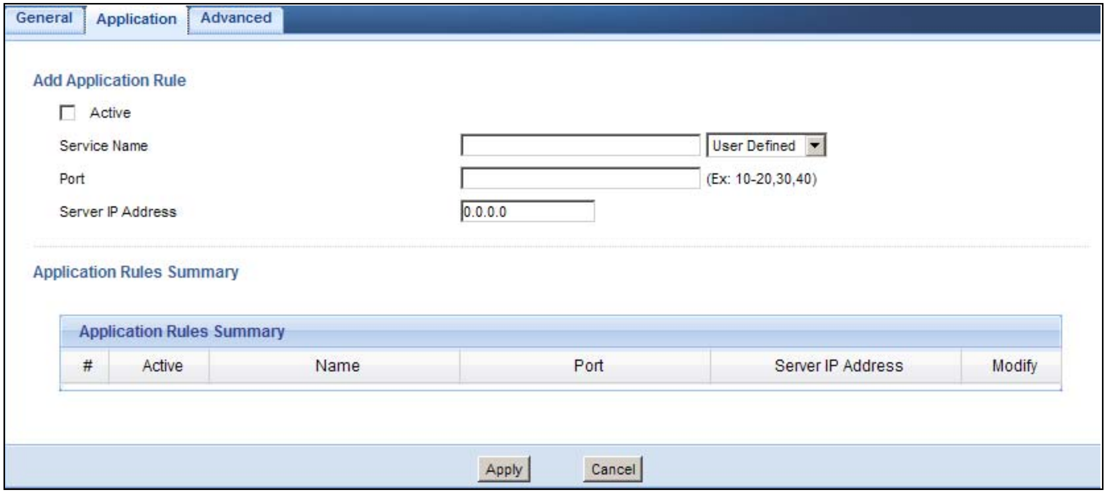
19.3 Application

Port forwarding allows you to define the local servers to which the incoming services will be forwarded. To change your NBG4615's port forwarding settings, click **Network > NAT** > **Application**. The screen appears as shown.

Note: If you do not assign a **Default Server IP address** in the **NAT > General** screen, the NBG4615 discards all packets received for ports that are not specified in this screen or remote management.

Refer to Appendix F on page 321 for port numbers commonly used for particular services.

Figure 104 Network > NAT > Application



Add Application Rule

□ Active

Service Name [ ] [User Defined ▾]

Port [ ] (Ex: 10-20,30,40)

Server IP Address [0.0.0.0]

Application Rules Summary

Application Rules Summary

#	Active	Name	Port	Server IP Address	Modify

The following table describes the labels in this screen.

Table 66 Network > NAT > Application

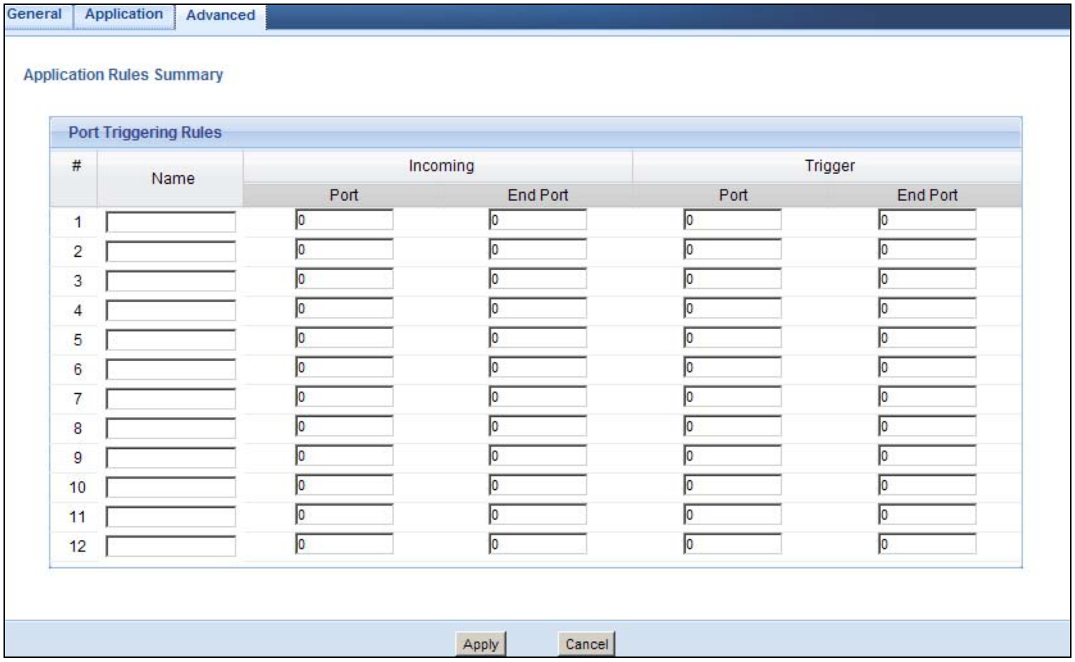
LABEL	DESCRIPTION
Add Application Rule	
Active	Select the check box to enable this rule and the requested service can be forwarded to the host with a specified internal IP address. Clear the checkbox to disallow forwarding of these ports to an inside server without having to delete the entry.
Service 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.
Port	Enter the start and end port(s) to be forwarded.
Server IP Address	Type the inside IP address of the server that receives packets from the port(s) specified in the **Port** field.
Application Rules Summary	
#	This is the number of an individual port forwarding server entry.
Active	This icon is turned on when the rule is enabled.
Name	This field displays a name to identify this rule.
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 display and modify an existing rule setting in the fields under **Add Application Rule**. Click the **Remove** icon to delete a rule.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

19.4 Advanced

To change your NBG4615’s trigger port settings, click **Network > NAT > Advanced**. The screen appears as shown.

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

Figure 105 Network > NAT > Advanced



Application Rules Summary

Port Triggering 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 67 Network > NAT > Advanced

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 NBG4615 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 NBG4615 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.

Table 67 Network > NAT > Advanced (continued)

LABEL	DESCRIPTION
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 NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

19.5 Technical Reference

The following section contains additional technical information about the NBG4615 features described in this chapter.

19.5.1 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 **Application** 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.

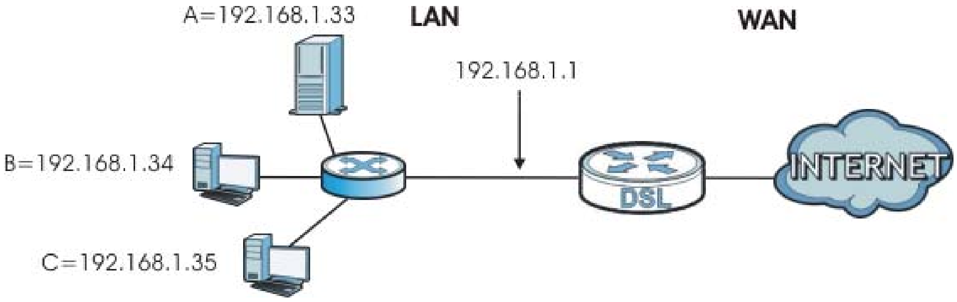
In addition to the servers for specified services, NAT supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default is not defined, the service request is simply discarded.

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.

19.5.2 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 106 Multiple Servers Behind NAT Example



19.5.3 Trigger Port Forwarding

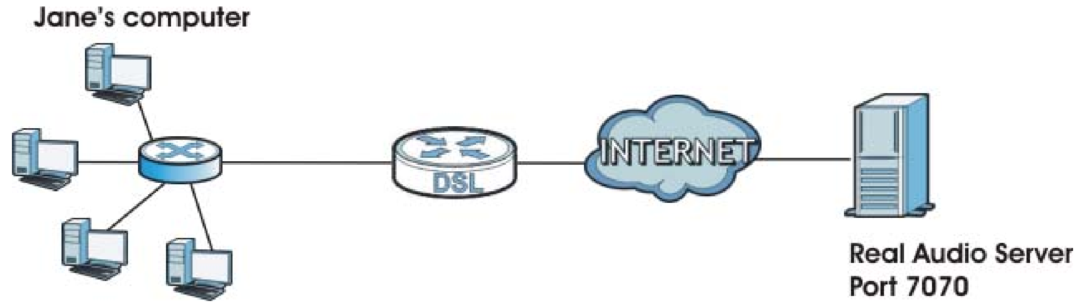
Some services use a dedicated range of ports on the client side and a dedicated range of ports on the server side. With regular port forwarding you set a forwarding port in NAT to forward a service (coming in from the server on the WAN) to the IP address of a computer on the client side (LAN). The problem 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 NBG4615 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 NBG4615's WAN port receives a response with a specific port number and protocol ("incoming" port), the NBG4615 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.

19.5.4 Trigger Port Forwarding Example

The following is an example of trigger port forwarding.

Figure 107 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 NBG4615 to record Jane’s computer IP address. The NBG4615 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 NBG4615 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 NBG4615 times out in three minutes with UDP (User Datagram Protocol), or two hours with TCP/IP (Transfer Control Protocol/Internet Protocol).

19.5.5 Two Points To Remember About Trigger Ports

1 Trigger events only happen on data that is going coming from inside the NBG4615 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.

20

DDNS

20.1 Overview

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

20.1.1 What You Need To Know

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

What is DDNS?

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

DynDNS Wildcard

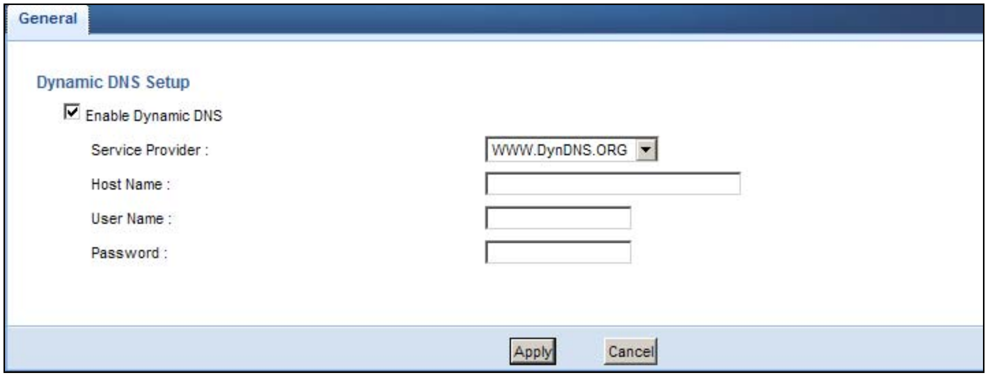
Enabling the wildcard feature for your host causes *.yourhost.dyndns.org to be aliased to the same IP address as yourhost.dyndns.org. This feature is useful if you want to be able to use, for example, www.yourhost.dyndns.org and still reach your hostname.

Note: If you have a private WAN IP address, then you cannot use Dynamic DNS. You must have a public WAN IP address.

20.2 General

To change your NBG4615's DDNS, click **Network > DDNS**. The screen appears as shown.

Figure 108 Dynamic DNS



General

Dynamic DNS Setup

☑ Enable Dynamic DNS

Service Provider : WWW.DynDNS.ORG

Host Name :

User Name :

Password :

The following table describes the labels in this screen.

Table 68 Dynamic DNS

LABEL	DESCRIPTION
Dynamic DNS Setup	
Enable Dynamic DNS	Select this check box to use dynamic DNS.
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 (",").
User Name	Enter your user name.
Password	Enter the password assigned to you.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

21

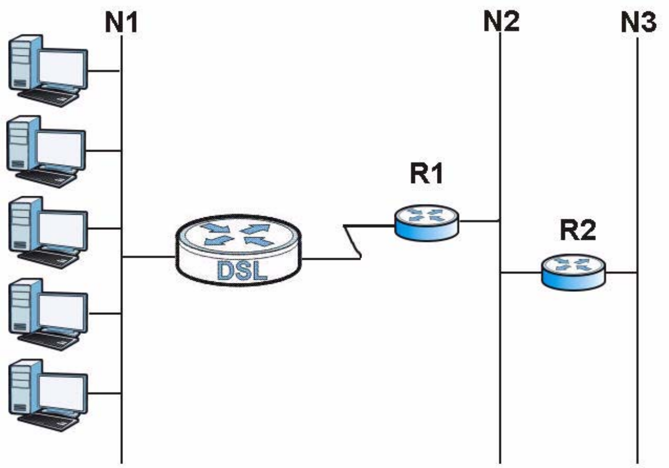
Static Route

21.1 Overview

This chapter shows you how to configure static routes for your NBG4615.

Each remote node specifies only the network to which the gateway is directly connected, and the NBG4615 has no knowledge of the networks beyond. For instance, the NBG4615 knows about network N2 in the following figure through remote node Router 1. However, the NBG4615 is unable to route a packet to network N3 because it doesn't know that there is a route through the same remote node Router 1 (via gateway Router 2). The static routes are for you to tell the NBG4615 about the networks beyond the remote nodes.

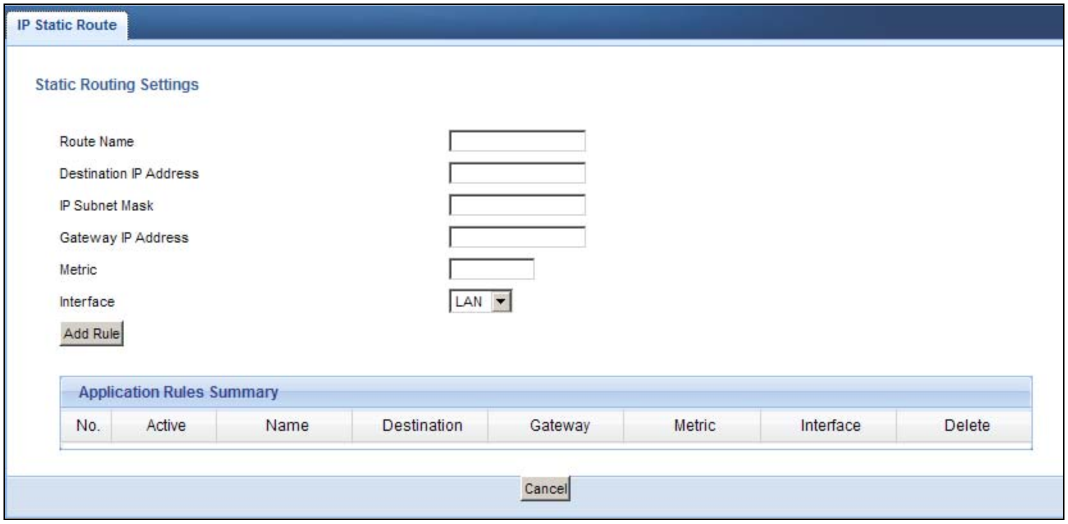
Figure 109 Example of Static Routing Topology



21.2 IP Static Route Screen

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

Figure 110 Network > Static Route



IP Static Route

Static Routing Settings

Route Name

Destination IP Address

IP Subnet Mask

Gateway IP Address

Metric

Interface LAN

Add Rule

Application Rules Summary

No.	Active	Name	Destination	Gateway	Metric	Interface	Delete

Cancel

The following table describes the labels in this screen.

Table 69 Network > Static Route

LABEL	DESCRIPTION
Static Routing Settings	
Route Name	Enter a the name that describes or identifies this route.
Destination IP Address	Enter the IP network address of the final destination.
IP Subnet Netmask	This is the subnet to which the route's final destination belongs.
Gateway IP Address	Enter the IP address of the gateway.
Metric	Assign a number to identify the route.
Interface	Select the interface through which the traffic is routed.
Add Rule	Click this to add the IP static route.
Application Rules Summary	
No.	This is the number of an individual static route.
Active	The rules are always on and this is indicated by the icon.
Name	This is the name that describes or identifies this route.
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.
Metric	This is the number assigned to the route.

Table 69 Network > Static Route (continued)

LABEL	DESCRIPTION
Delete	Click the **Delete** icon to remove a static route from the NBG4615. A window displays asking you to confirm that you want to delete the route.
Cancel	Click **Cancel** to begin configuring this screen afresh.

22

RIP

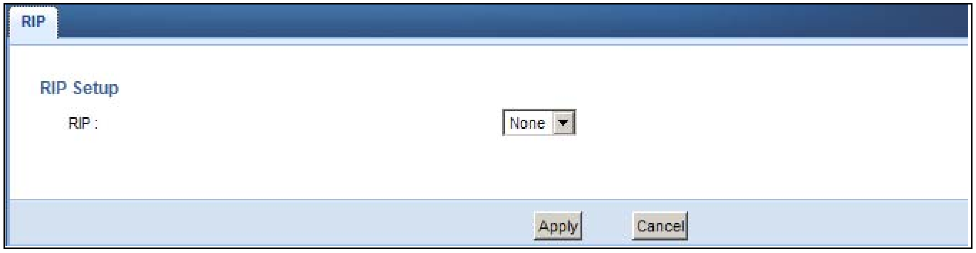
22.1 Overview

Routing Information Protocol (RIP) is an interior or intra-domain routing protocol that uses distance-vector routing algorithms. RIP is used on the Internet and is common in the NetWare environment as a method for exchanging routing information between routers.

22.2 RIP Screen

Use this screen to enable RIPv1 or RIPv2, which are LAN broadcast protocols. Click **Network > RIP**. The screen appears as shown.

Figure 111 Network > RIP



The following table describes the labels in this screen.

Table 70 Network > RIP

LABEL	DESCRIPTION
RIP	Select the **RIPv1** or **RIPv2** you want the NBG4615 to use. Otherwise select **None**.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

23

Firewall

23.1 Overview

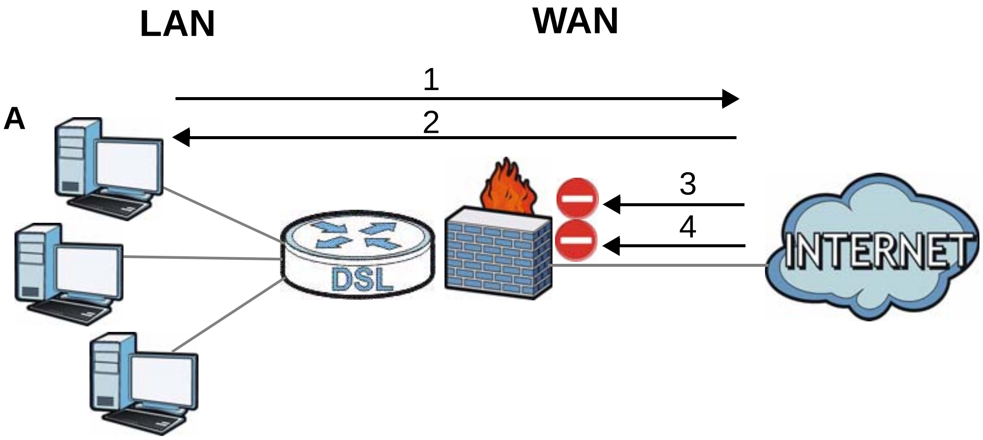
Use these screens to enable and configure the firewall that protects your NBG4615 and your LAN from unwanted or malicious traffic.

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 112 Default Firewall Action



23.1.1 What You Can Do

- Use the **General** screen to enable or disable the NBG4615's firewall (Section 23.2 on page 198).

- 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 23.3 on page 198).

23.1.2 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 NBG4615 Firewall

The NBG4615’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 NBG4615's purpose is to allow a private Local Area Network (LAN) to be securely connected to the Internet. The NBG4615 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 NBG4615 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 NBG4615 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.

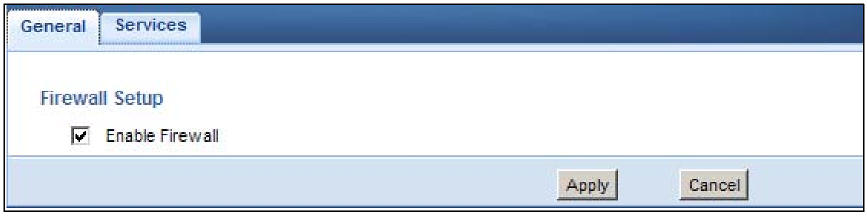
Guidelines For Enhancing Security With Your Firewall

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.

23.2 General

Use this screen to enable or disable the NBG4615's firewall, and set up firewall logs. Click **Security** > **Firewall** to open the **General** screen.

Figure 113 Security > Firewall > General l



The following table describes the labels in this screen.

Table 71 Security > Firewall > General

LABEL	DESCRIPTION
Enable Firewall	Select this check box to activate the firewall. The NBG4615 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.

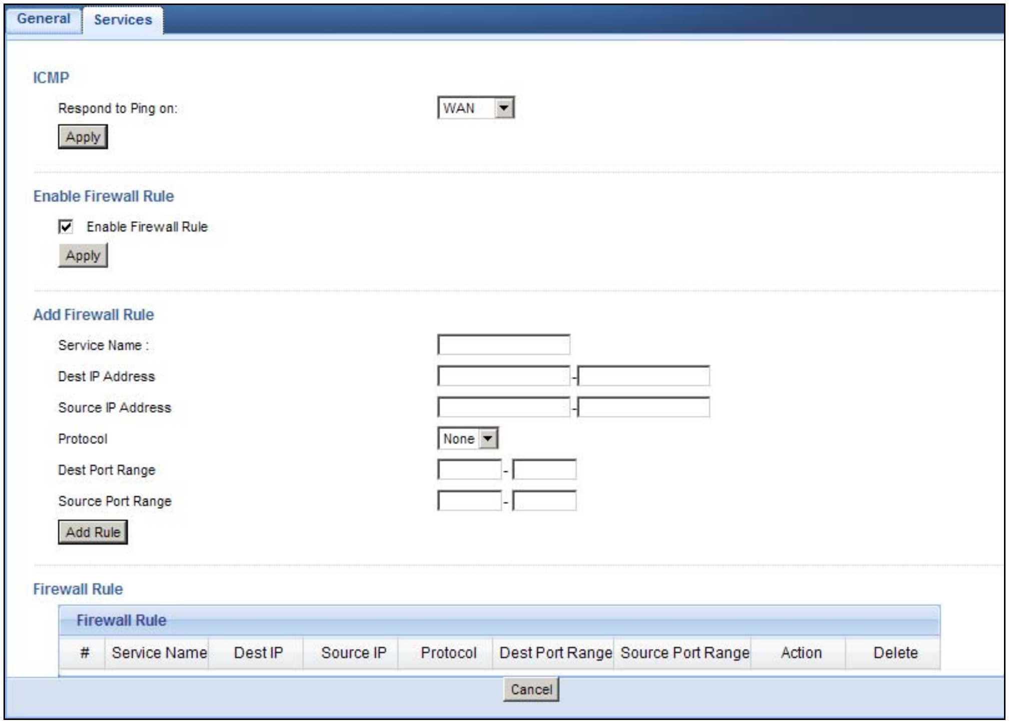
23.3 Services

If an outside user attempts to probe an unsupported port on your NBG4615, an ICMP response packet is automatically returned. This allows the outside user to know the NBG4615 exists. Use this screen to prevent the ICMP response packet from being sent. This keeps outsiders from discovering your NBG4615 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 114 Security > Firewall > Services I



ICMP

Respond to Ping on: WAN

Apply

Enable Firewall Rule

☑ Enable Firewall Rule

Apply

Add Firewall Rule

Service Name :

Dest IP Address -

Source IP Address -

Protocol None

Dest Port Range -

Source Port Range -

Add Rule

Firewall Rule

Firewall Rule

#	Service Name	Dest IP	Source IP	Protocol	Dest Port Range	Source Port Range	Action	Delete

Cancel

The following table describes the labels in this screen.

Table 72 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 NBG4615 will not respond to any incoming Ping requests when **Disable** is selected. Select **WAN** to reply to incoming 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.

Table 72 Security > Firewall > Services (continued)

LABEL	DESCRIPTION
Dest IP Address	Enter the IP address of the computer to which traffic for the application or service is entering. The NBG4615 applies the firewall rule to traffic initiating from this computer.
Source IP Address	Enter the IP address of the computer that initializes traffic for the application or service. The NBG4615 applies the firewall rule to traffic initiating from this computer.
Protocol	Select the protocol (**ALL**,**TCP**, **UDP** or **BOTH**) 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.
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 (**ALL**,**TCP**, **UDP** or **BOTH**) 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 F on page 321 for commonly used services and port numbers.

24

Content Filtering

24.1 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.

24.1.1 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 NBG4615 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.

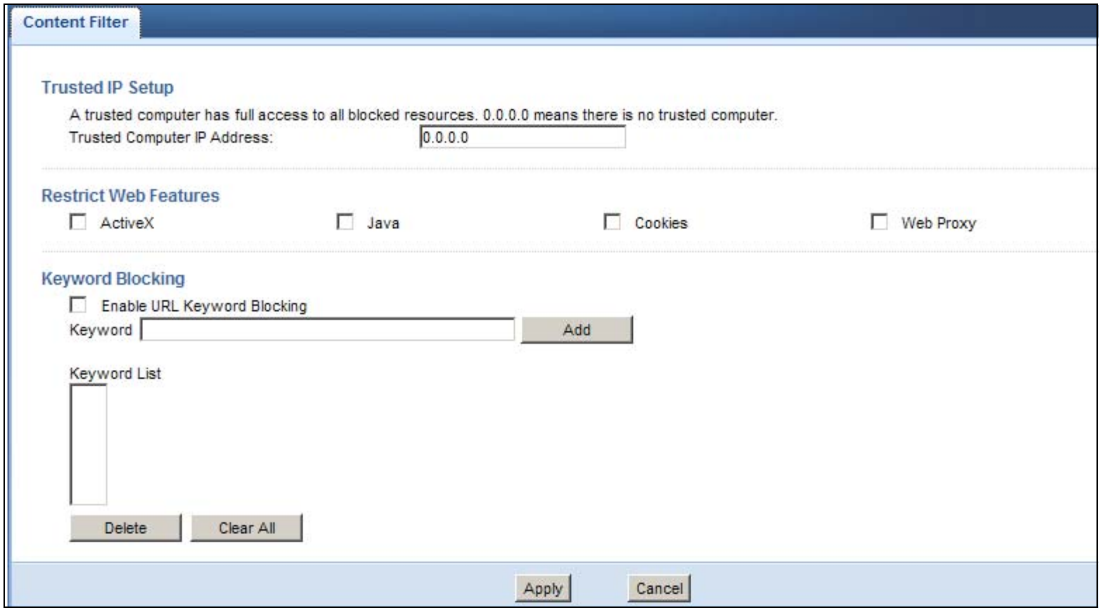
The file path is the characters that come after the first slash in the URL. For example, with the URL www.zyxel.com.tw/news/pressroom.php, the file path is news/pressroom.php.

Since the NBG4615 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 NBG4615 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”.

24.2 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 115 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 73 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.

Table 73 Security > Content Filter (continued)

LABEL	DESCRIPTION
Enable URL Keyword Blocking	The NBG4615 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.
Keyword List	This list displays the keywords already added.
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.
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

24.3 Technical Reference

The following section contains additional technical information about the NBG4615 features described in this chapter.

24.3.1 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 NBG4615 checks the URL’s domain name or IP address when performing keyword blocking.

This means that the NBG4615 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 NBG4615 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 NBG4615 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.

25

Bandwidth Management

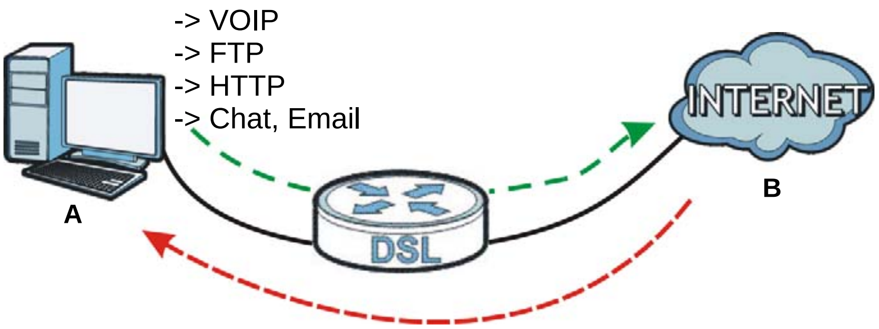
25.1 Overview

This chapter contains information about configuring bandwidth management and editing rules.

ZyXEL's Bandwidth Management allows you to specify bandwidth management rules based on an application.

In the figure below, uplink traffic goes from the LAN device (**A**) to the WAN device (**B**). Bandwidth management is applied before sending the packets out to the WAN. Downlink traffic comes back from the WAN device (**B**) to the LAN device (**A**). Bandwidth management is applied before sending the traffic out to LAN.

Figure 116 Bandwidth Management Example



You can allocate specific amounts of bandwidth capacity (bandwidth budgets) to individual applications (like VoIP, Web, FTP, and E-mail for example).

25.2 What You Can Do

- Use the **General** screen to enable bandwidth management and assign bandwidth values (Section 25.4 on page 206).
- Use the **Advanced** screen to configure bandwidth managements rule for the pre-defined services and applications (Section 25.5 on page 207).

- Use the **Monitor** screen to view the amount of network bandwidth that applications running in the network are using (Section 25.6 on page 211).

25.3 What You Need To Know

The sum of the bandwidth allotments that apply to the WAN interface (LAN to WAN, WLAN to WAN) must be less than or equal to the **Upstream Bandwidth** that you configure in the **Bandwidth Management Advanced** screen (Section 25.5 on page 207).

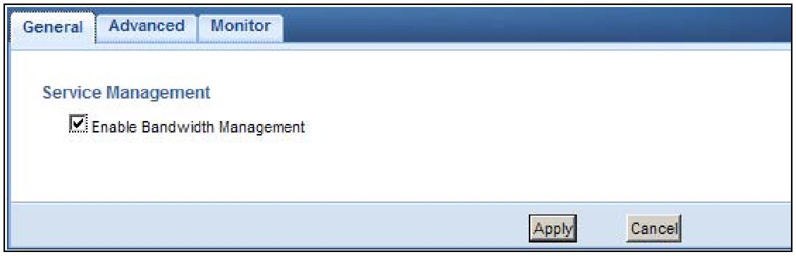
The sum of the bandwidth allotments that apply to the LAN interface (WAN to LAN, WAN to WLAN) must be less than or equal to the **Downstream Bandwidth** that you configure in the **Bandwidth Management Advanced** screen Section 25.5 on page 207.

25.4 General Screen

Use this screen to have the NBG4615 apply bandwidth management.

Click **Management > Bandwidth MGMT** to open the bandwidth management **General** screen.

Figure 117 Management > Bandwidth Management > General



Service Management

☑ Enable Bandwidth Management

The following table describes the labels in this screen.

Table 74 Management > Bandwidth Management > General

LABEL	DESCRIPTION
Enable Bandwidth Management	This field allows you to have NBG4615 apply bandwidth management. Enable bandwidth management to give traffic that matches a bandwidth rule priority over traffic that does not match a bandwidth rule. Enabling bandwidth management also allows you to control the maximum or minimum amounts of bandwidth that can be used by traffic that matches a bandwidth rule.

Table 74 Management > Bandwidth Management > General (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save your customized settings.
Cancel	Click **Cancel** to begin configuring this screen afresh.

25.5 Advanced Screen

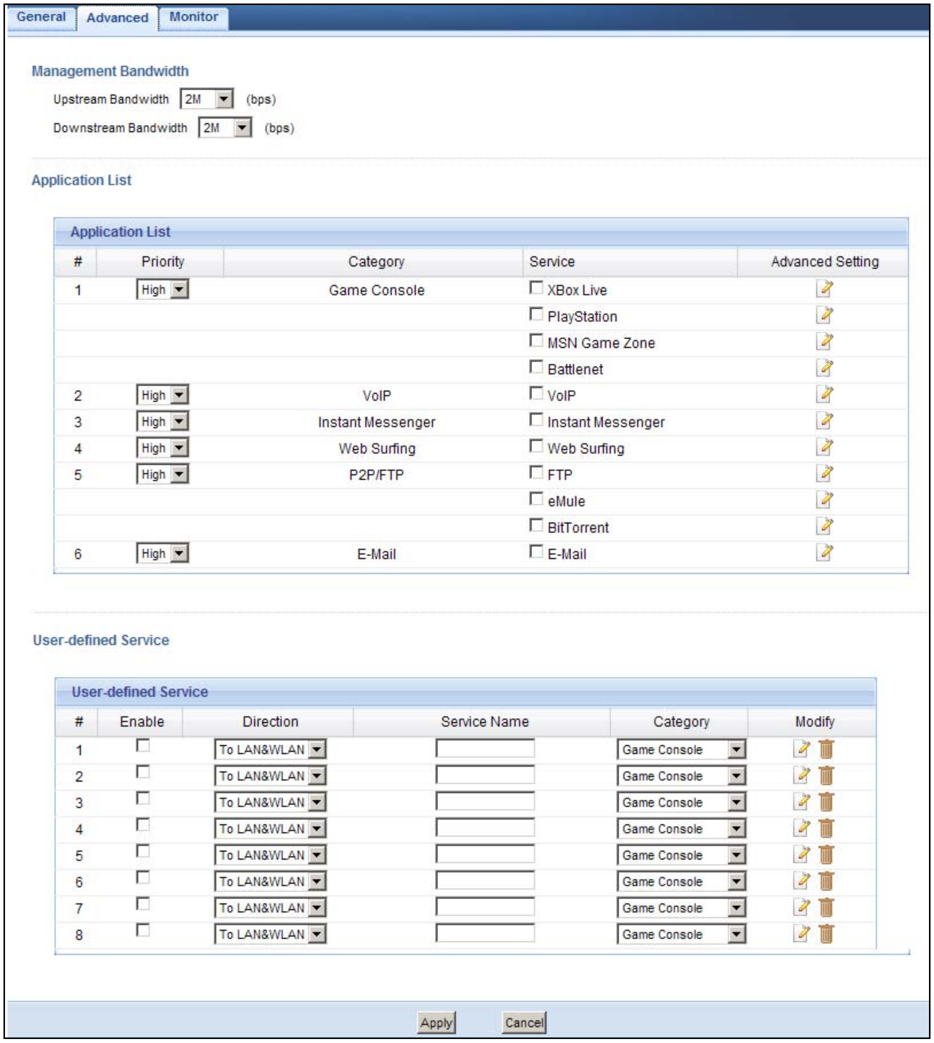
Use this screen to configure bandwidth management rules for the pre-defined services or applications.

You can also use this screen to configure bandwidth management rule for other services or applications that are not on the pre-defined list of NBG4615. Additionally, you can define the source and destination IP addresses and port for a service or application.

Note: The two tables shown in this screen can be configured and applied at the same time.

Click **Management** > **Bandwidth Management** > **Advanced** to open the bandwidth management **Advanced** screen.

Figure 118 Management > Bandwidth Management > Advanced



Management Bandwidth

Upstream Bandwidth 2M (bps)

Downstream Bandwidth 2M (bps)

Application List

#	Priority	Category	Service	Advanced Setting
1	High	Game Console	□ XBox Live	✎
			□ PlayStation	✎
			□ MSN Game Zone	✎
			□ Battlenet	✎
2	High	VoIP	□ VoIP	✎
3	High	Instant Messenger	□ Instant Messenger	✎
4	High	Web Surfing	□ Web Surfing	✎
5	High	P2P/FTP	□ FTP	✎
			□ eMule	✎
			□ BitTorrent	✎
6	High	E-Mail	□ E-Mail	✎

User-defined Service

#	Enable	Direction	Service Name	Category	Modify
1	□	To LAN&WLAN		Game Console	✎ 🗑
2	□	To LAN&WLAN		Game Console	✎ 🗑
3	□	To LAN&WLAN		Game Console	✎ 🗑
4	□	To LAN&WLAN		Game Console	✎ 🗑
5	□	To LAN&WLAN		Game Console	✎ 🗑
6	□	To LAN&WLAN		Game Console	✎ 🗑
7	□	To LAN&WLAN		Game Console	✎ 🗑
8	□	To LAN&WLAN		Game Console	✎ 🗑

The following table describes the labels in this screen.

Table 75 Management > Bandwidth Management > Advanced

LABEL	DESCRIPTION
Management Bandwidth	
Upstream Bandwidth	Select the total amount of bandwidth (from 64 Kilobits to 32 Megabits) that you want to dedicate to uplink traffic. This is traffic from LAN/WLAN to WAN.
Downstream Bandwidth	Select the total amount of bandwidth (from 64 Kilobits to 32 Megabits) that you want to dedicate to uplink traffic. This is traffic from WAN to LAN/WLAN.
Application List	Use this table to allocate specific amounts of bandwidth based on a pre-defined service.

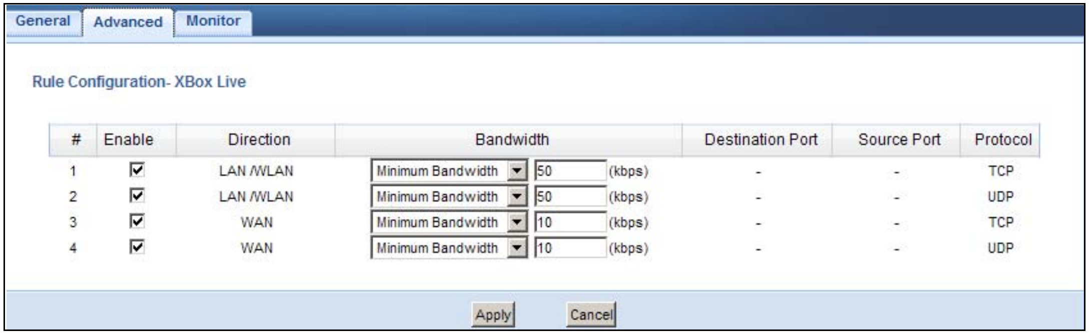
Table 75 Management > Bandwidth Management > Advanced (continued)

LABEL	DESCRIPTION
Priority	Select a priority from the drop down list box. Choose **High**, **Mid** or **Low**. • **High** - Select this for voice traffic or video that is especially sensitive to jitter (jitter is the variations in delay). • **Mid** - Select this for "excellent effort" or better than best effort and would include important business traffic that can tolerate some delay. • **Low** - Select this for non-critical "background" traffic such as bulk transfers that are allowed but that should not affect other applications and users.
Category	This is the category where a service belongs.
Service	This is the name of the service. Select the check box to have the NBG4615 apply this bandwidth management rule.
Advanced Setting	Click the **Edit** icon to open the **Rule Configuration** screen where you can modify the rule.
User-defined Service	Use this table to allocate specific amounts of bandwidth to specific applications or services you specify.
#	This is the number of an individual bandwidth management rule.
Enable	Select this check box to have the NBG4615 apply this bandwidth management rule.

25.5.1 Rule Configuration: Application Rule Configuration

If you want to edit a bandwidth management rule for a pre-defined service or application, click the **Edit** icon in the **Application List** table of the **Advanced** screen. The following screen displays.

Figure 119 Bandwidth Management Rule Configuration: Application List



Rule Configuration- XBox Live

#	Enable	Direction	Bandwidth	Destination Port	Source Port	Protocol
1	☑	LAN /WLAN	Minimum Bandwidth ▾ 50 (kbps)	-	-	TCP
2	☑	LAN /WLAN	Minimum Bandwidth ▾ 50 (kbps)	-	-	UDP
3	☑	WAN	Minimum Bandwidth ▾ 10 (kbps)	-	-	TCP
4	☑	WAN	Minimum Bandwidth ▾ 10 (kbps)	-	-	UDP

The following table describes the labels in this screen.

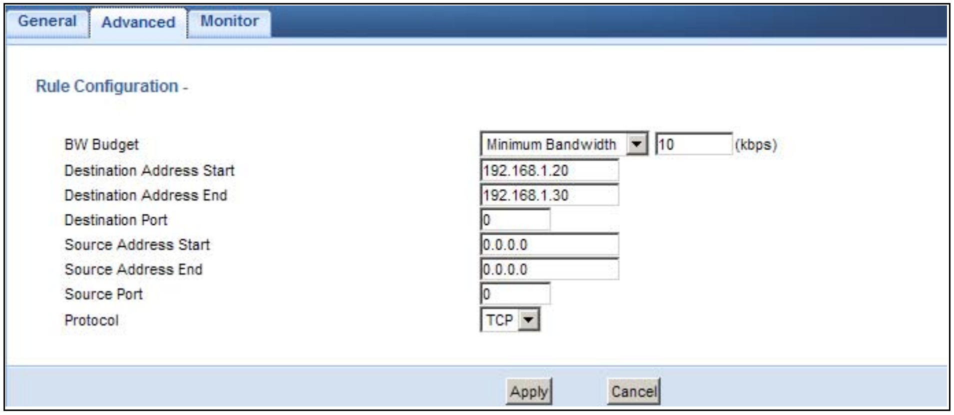
Table 76 Bandwidth Management Rule Configuration: Application List

LABEL	DESCRIPTION
	This is the port number of the destination that define the traffic type, for example TCP port 80 defines web traffic. See Appendix F on page 321 for some common services and port numbers.
	This is the port number of the source that define the traffic type, for example TCP port 80 defines web traffic. See Appendix F on page 321 for some common services and port numbers.

25.5.2 Rule Configuration: User Defined Service Rule Configuration

If you want to edit a bandwidth management rule for other applications or services, click the **Edit** icon in the **User-defined Service** table of the **Advanced** screen. The following screen displays.

Figure 120 Bandwidth Management Rule Configuration: User-defined Service



Rule Configuration -

BW Budget	Minimum Bandwidth 10 (kbps)
Destination Address Start	192.168.1.20
Destination Address End	192.168.1.30
Destination Port	0
Source Address Start	0.0.0.0
Source Address End	0.0.0.0
Source Port	0
Protocol	TCP

The following table describes the labels in this screen.

Table 77 Bandwidth Management Rule Configuration: User-defined Service

LABEL	DESCRIPTION
BW Budget	Select **Maximum Bandwidth** or **Minimum Bandwidth** and specify the maximum or minimum bandwidth allowed for the rule in kilobits per second.
Destination Address Start	Enter the starting IP address of the destination computer. The NBG4615 applies bandwidth management to the service or application that is entering this computer.

Table 77 Bandwidth Management Rule Configuration: User-defined Service

LABEL	DESCRIPTION
Destination Address End	Enter the ending IP address of the destination computer. The NBG4615 applies bandwidth management to the service or application that is entering this computer.
Destination Port	This is the port number of the destination that define the traffic type, for example TCP port 80 defines web traffic.
Source Address Start	Enter the starting IP address of the computer that initializes traffic for the application or service. The NBG4615 applies bandwidth management to traffic initiating from this computer.
Source Address End	Enter the ending IP address of the computer that initializes traffic for the application or service. The NBG4615 applies bandwidth management to traffic initiating from this computer.
Source Port	This is the port number of the source that define the traffic type, for example TCP port 80 defines web traffic.
Protocol	Select the protocol (**TCP**, **UDP**, **BOTH**) for which the bandwidth management rule applies. If you select **BOTH**, enter the protocol for which the bandwidth management rule applies. For example, ICMP for ping traffic.
Apply	Click **Apply** to save your customized settings.
Cancel	Click **Cancel** to exit this screen without saving.

See Appendix F on page 321 for commonly used services and port numbers.

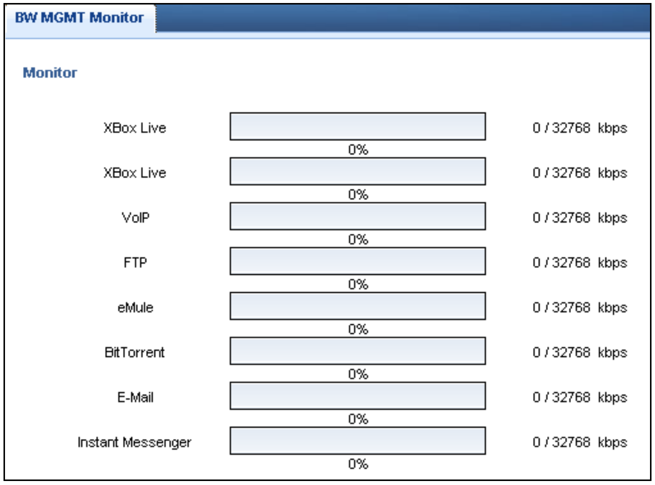
25.6 Monitor Screen

Use this screen to view the amount of network bandwidth that applications running in the network are using.

The bandwidth is measured in kilobits per second (kbps).

The monitor shows what kinds of applications are running in the network, the maximum kbps that each application can use, as well as the percentage of bandwidth it is using.

Figure 121 Management > Bandwidth Management > Monitor



BW MGMT Monitor

Monitor

XBox Live	0%	0 / 32768 kbps
XBox Live	0%	0 / 32768 kbps
VoIP	0%	0 / 32768 kbps
FTP	0%	0 / 32768 kbps
eMule	0%	0 / 32768 kbps
BitTorrent	0%	0 / 32768 kbps
E-Mail	0%	0 / 32768 kbps
Instant Messenger	0%	0 / 32768 kbps

25.6.1 Predefined Bandwidth Management Services

The following is a description of some services that you can select and to which you can apply media bandwidth management in the **Management** > **Bandwidth Management** > **Advanced** screen.

Table 78 Media Bandwidth Management Setup: Services

SERVICE	DESCRIPTION
FTP	File Transfer Program enables fast transfer of files, including large files that may not be possible by e-mail.
WWW	The World Wide Web (WWW) is an Internet system to distribute graphical, hyper-linked information, based on Hyper Text Transfer Protocol (HTTP) - a client/server protocol for the World Wide Web. The Web is not synonymous with the Internet; rather, it is just one service on the Internet. Other services on the Internet include Internet Relay Chat and Newsgroups. The Web is accessed through use of a browser.
E-Mail	Electronic mail consists of messages sent through a computer network to specific groups or individuals. Here are some default ports for e-mail:
VoIP (SIP)	Sending voice signals over the Internet is called Voice over IP or VoIP. Session Initiated Protocol (SIP) is an internationally recognized standard for implementing VoIP. SIP is an application-layer control (signaling) protocol that handles the setting up, altering and tearing down of voice and multimedia sessions over the Internet. SIP is transported primarily over UDP but can also be transported over TCP.

Table 78 Media Bandwidth Management Setup: Services (continued)

SERVICE	DESCRIPTION
BitTorrent	BitTorrent is a free P2P (peer-to-peer) sharing tool allowing you to distribute large software and media files. BitTorrent requires you to search for a file with a searching engine yourself. It distributes files by corporation and trading, that is, the client downloads the file in small pieces and share the pieces with other peers to get other half of the file.
Gaming	Online gaming services lets you play multiplayer games on the Internet via broadband technology. As of this writing, your NBG4615 supports Xbox, Playstation, Battlenet and MSN Game Zone.

26

Remote Management

26.1 Overview

This chapter provides information on the Remote Management screens.

Remote Management allows you to manage your NBG4615 from a remote location through the following interfaces:

- LAN and WAN
- LAN only
- WAN only

Note: The NBG4615 is managed using the Web Configurator.

26.2 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 26.3 on page 216) does not match the client IP address. If it does not match, the NBG4615 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.

26.2.1 Remote Management and NAT

When NAT is enabled:

- Use the NBG4615's WAN IP address when configuring from the WAN.
- Use the NBG4615's LAN IP address when configuring from the LAN.

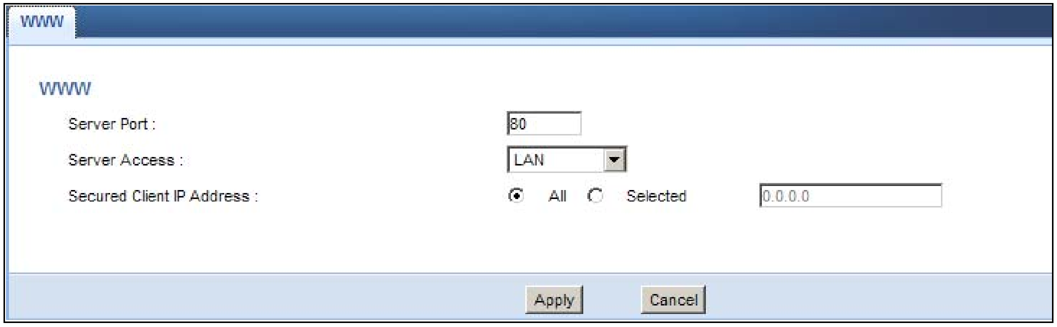
26.2.2 System Timeout

There is a default system management idle timeout of five minutes (three hundred seconds). The NBG4615 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 **System** screen

26.3 WWW Screen

To change your NBG4615's remote management settings, click **Management > Remote Management > WWW**.

Figure 122 Management > Remote Management > WWW



WWW

Server Port : 80

Server Access : LAN

Secured Client IP Address : ● All ○ Selected 0.0.0.0

The following table describes the labels in this screen.

Table 79 Management > Remote Management > WWW

LABEL	DESCRIPTION
Server 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.
Server Access	Select the interface(s) through which a computer may access the NBG4615 using this service.
Secured Client IP Address	Select **All** to allow all computes to access the NBG4615. Otherwise, check **Selected** and specify the IP address of the computer that can access the NBG4615.
Apply	Click **Apply** to save your customized settings and exit this screen.
Cancel	Click **Cancel** to begin configuring this screen afresh.

27

Universal Plug-and-Play (UPnP)

27.1 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.

27.2 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.

27.2.1 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.

27.2.2 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 NBG4615 allows multicast messages on the LAN only.

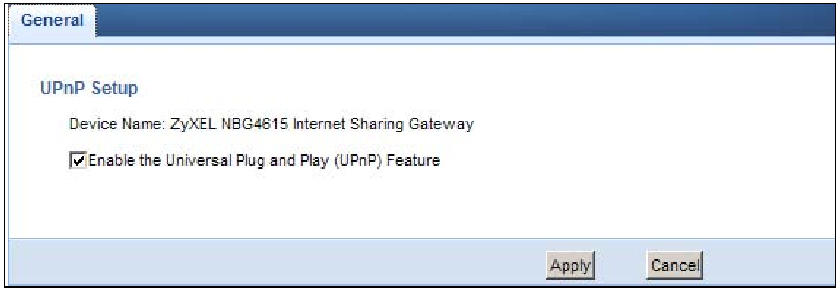
All UPnP-enabled devices may communicate freely with each other without additional configuration. Disable UPnP if this is not your intention.

27.3 UPnP Screen

Use this screen to enable UPnP on your NBG4615.

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

Figure 123 Management > UPnP



UPnP Setup

Device Name: ZyXEL NBG4615 Internet Sharing Gateway

☑ Enable the Universal Plug and Play (UPnP) Feature

The following table describes the fields in this screen.

Table 80 Management > UPnP

LABEL	DESCRIPTION
Enable the Universal Plug and Play (UPnP) Feature	Select this check box to activate UPnP. Be aware that anyone could use a UPnP application to open the web configurator's login screen without entering the NBG4615's IP address (although you must still enter the password to access the web configurator).
Apply	Click **Apply** to save the setting to the NBG4615.
Cancel	Click **Cancel** to return to the previously saved settings.

27.4 Technical Reference

The sections show examples of using UPnP.

27.4.1 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 NBG4615.

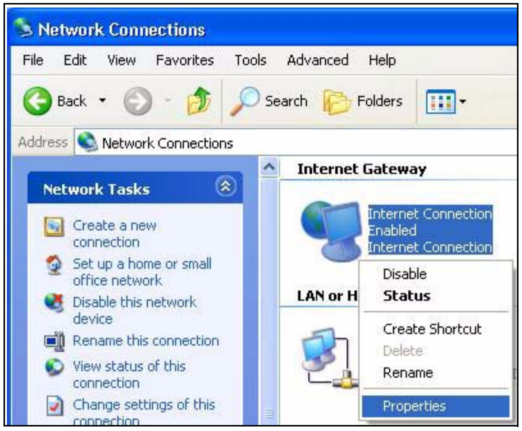
Make sure the computer is connected to a LAN port of the NBG4615. Turn on your computer and the NBG4615.

27.4.1.1 Auto-discover Your UPnP-enabled Network Device

1 Click **start** and **Control Panel**. Double-click **Network Connections**. An icon displays under Internet Gateway.

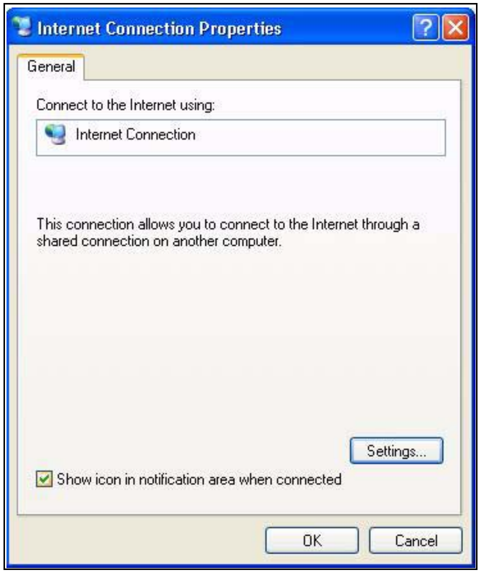
2 Right-click the icon and select **Properties**.

Figure 124 Network Connections



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

Figure 125 Internet Connection Properties



Internet Connection Properties

General

Connect to the Internet using:

Internet Connection

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

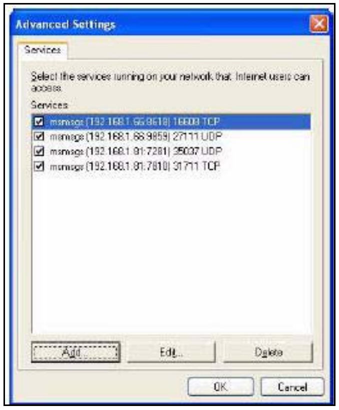
Settings...

☑ Show icon in notification area when connected

OK Cancel

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

Figure 126 Internet Connection Properties: Advanced Settings



Advanced Settings

Services

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

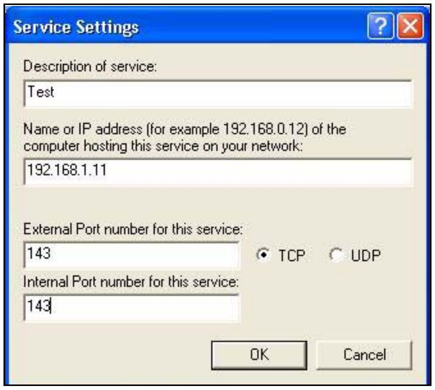
Services

☑ 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

Add... Edit... Delete

OK Cancel

Figure 127 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:

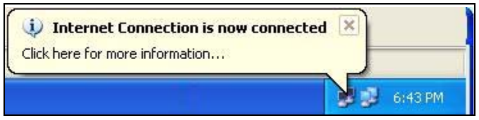
143

OK Cancel

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 128 System Tray Icon



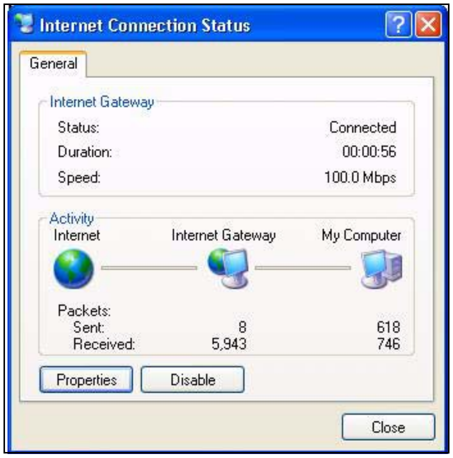
Internet Connection is now connected

Click here for more information...

6:43 PM

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

Figure 129 Internet Connection Status



Internet Connection Status

Internet Gateway

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

Activity

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

27.4.2 Web Configurator Easy Access

With UPnP, you can access the web-based configurator on the NBG4615 without finding out the IP address of the NBG4615 first. This comes helpful if you do not know the IP address of the NBG4615.

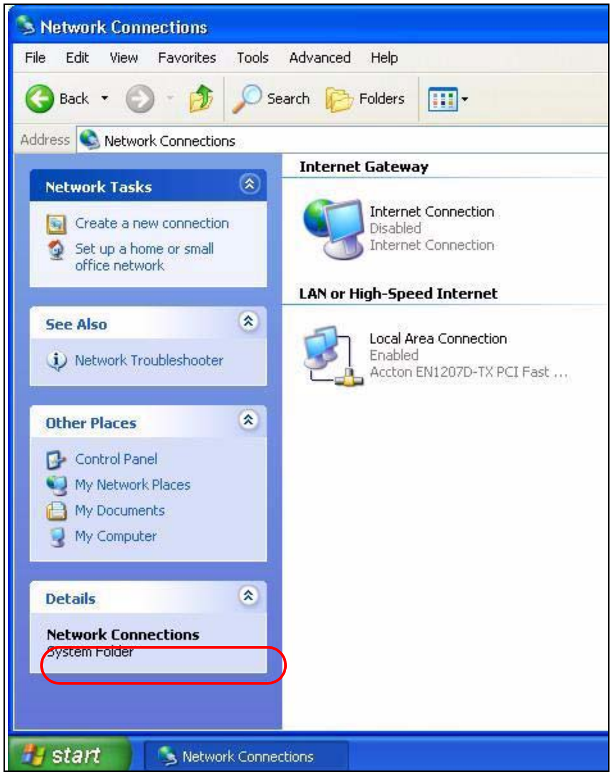
Follow the steps below to access the web configurator.

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

2 Double-click **Network Connections**.

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

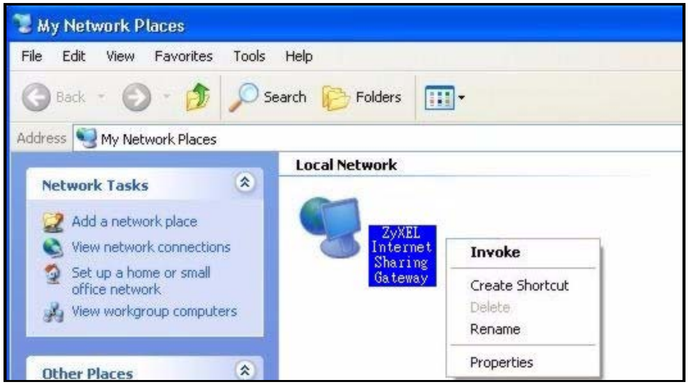
Figure 130 Network Connections



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

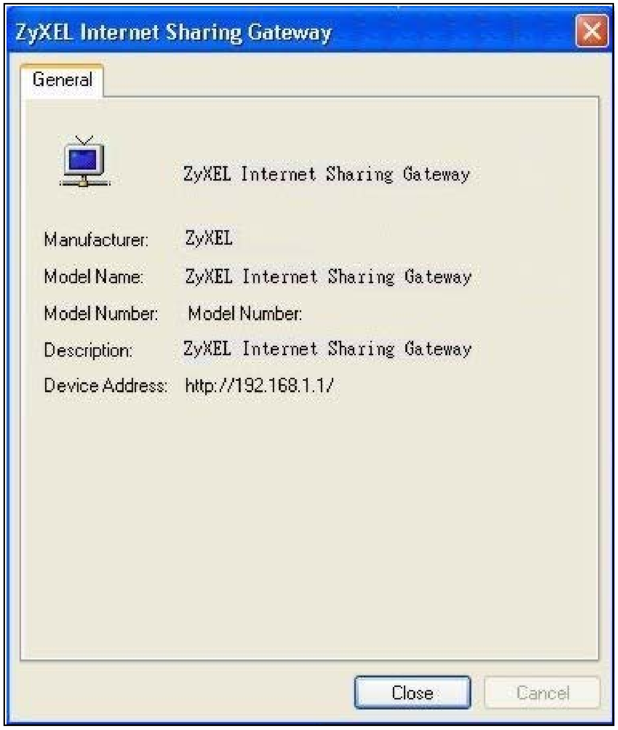
5 Right-click on the icon for your NBG4615 and select **Invoke**. The web configurator login screen displays.

Figure 131 Network Connections: My Network Places



6 Right-click on the icon for your NBG4615 and select **Properties**. A properties window displays with basic information about the NBG4615.

Figure 132 Network Connections: My Network Places: Properties: Example



ZyXEL Internet Sharing Gateway

General

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/

28

Maintenance

28.1 Overview

This chapter provides information on the **Maintenance** screens.

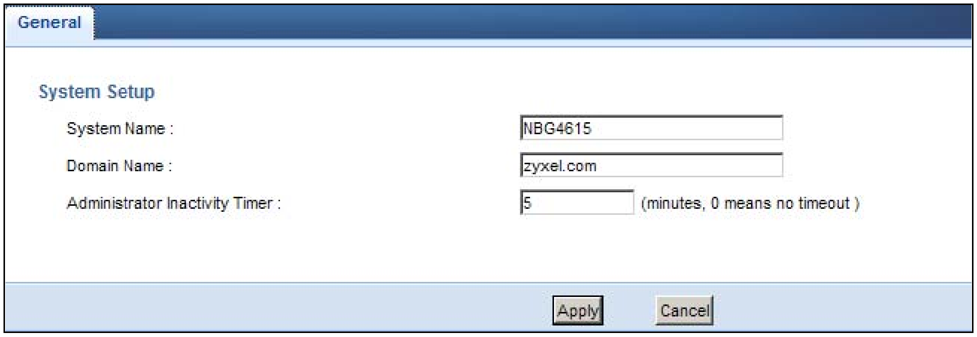
28.2 What You Can Do

- Use the **General** screen to set the timeout period of the management session (Section 28.3 on page 226).
- Use the **Password** screen to change your NBG4615's system password (Section 28.4 on page 226).
- Use the **Time** screen to change your NBG4615's time and date (Section 28.5 on page 228).
- Use the **Firmware Upgrade** screen to upload firmware to your NBG4615 (Section 28.6 on page 230).
- Use the **Backup/Restore** screen to view information related to factory defaults, backup configuration, and restoring configuration (Section 28.8 on page 233).
- Use the **Reset/Restart** screen to reboot the NBG4615 without turning the power off (Section 28.8 on page 233).
- Use the **Sys OP Mode** screen to select how you want to use your NBG4615 (Section 28.10 on page 236).

28.3 General Screen

Use this screen to set the management session timeout period. Click **Maintenance** > **General**. The following screen displays.

Figure 133 Maintenance > General



System Name : NBG4615
Domain Name : zyxel.com
Administrator Inactivity Timer : 5 (minutes, 0 means no timeout)

The following table describes the labels in this screen.

Table 81 Maintenance > General

LABEL	DESCRIPTION
System Setup	
System Name	System Name is a unique name to identify the NBG4615 in an Ethernet network.
Domain Name	Enter the domain name you want to give to the NBG4615.
Administrator Inactivity Timer	Type how many minutes a management session can be left idle before the session times out. The default is 5 minutes. After it times out you have to log in with your password again. Very long idle timeouts may have security risks. A value of "0" means a management session never times out, no matter how long it has been left idle (not recommended).
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

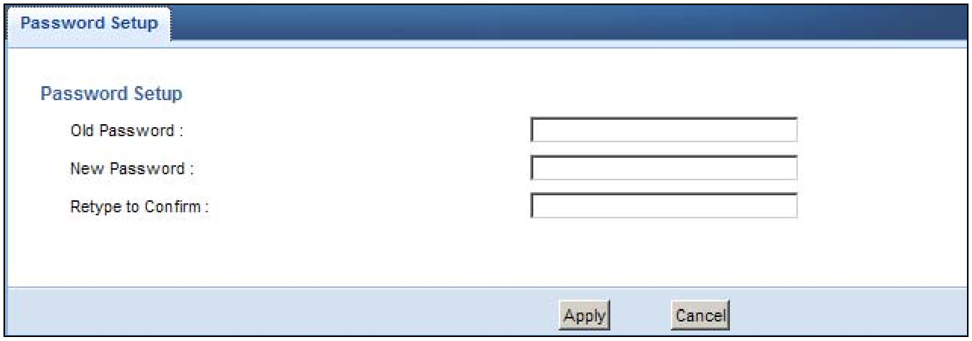
28.4 Password Screen

It is strongly recommended that you change your NBG4615's password.

If you forget your NBG4615's password (or IP address), you will need to reset the device. See Section 28.8 on page 233 for details.

Click **Maintenance** > **Password**. The screen appears as shown.

Figure 134 Maintenance > Password



Password Setup

Password Setup

Old Password :

New Password :

Retype to Confirm :

The following table describes the labels in this screen.

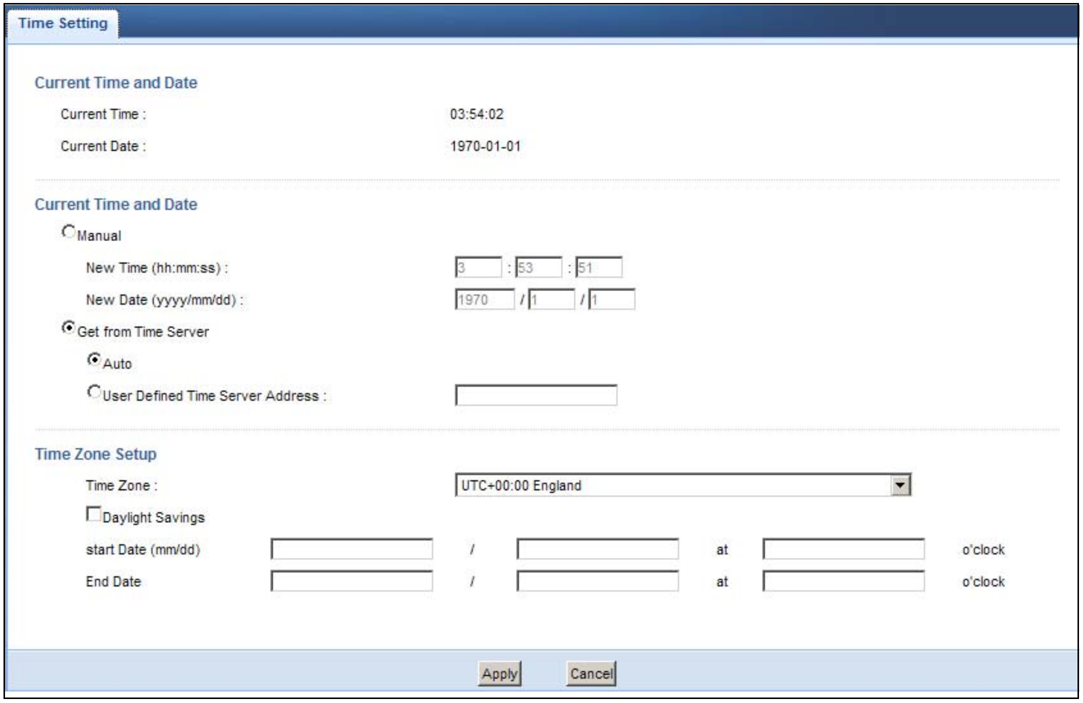
Table 82 Maintenance > Password

LABEL	DESCRIPTION
Password Setup	Change your NBG4615's password (recommended) using the fields as shown.
Old Password	Type the default password or the existing password you use to access the system in this field.
New Password	Type your new system password (up to 30 characters). Note that as you type a password, the screen displays an asterisk (*) for each character you type.
Retype to Confirm	Type the new password again in this field.
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

28.5 Time Setting Screen

Use this screen to configure the NBG4615's time based on your local time zone. To change your NBG4615's time and date, click **Maintenance** > **Time**. The screen appears as shown.

Figure 135 Maintenance > Time



Time Setting

Current Time and Date

Current Time : 03:54:02

Current Date : 1970-01-01

Current Time and Date

○ Manual

New Time (hh:mm:ss) : 3 : 53 : 51

New Date (yyyy/mm/dd) : 1970 / 1 / 1

● Get from Time Server

● Auto

○ User Defined Time Server Address :

Time Zone Setup

Time Zone : UTC+00:00 England

□ Daylight Savings

start Date (mm/dd) / at o'clock

End Date / at o'clock

Apply Cancel

The following table describes the labels in this screen.

Table 83 Maintenance > Time

LABEL	DESCRIPTION
Current Time and Date	
Current Time	This field displays the time of your NBG4615. Each time you reload this page, the NBG4615 synchronizes the time with the time server.
Current Date	This field displays the date of your NBG4615. Each time you reload this page, the NBG4615 synchronizes the date with the time server.
Current Time and Date	
Manual	Select this radio button to enter the time and date manually. If you configure a new time and date, Time Zone and Daylight Saving at the same time, the new time and date you entered has priority and the Time Zone and Daylight Saving settings do not affect it.

Table 83 Maintenance > Time (continued)

LABEL	DESCRIPTION
New Time (hh:mm:ss)	This field displays the last updated time from the time server or the last time configured manually. When you select **Manual**, enter the new time in this field and then click **Apply**.
New Date (yyyy/mm/dd)	This field displays the last updated date from the time server or the last date configured manually. When you select **Manual**, enter the new date in this field and then click **Apply**.
Get from Time Server	Select this radio button to have the NBG4615 get the time and date from the time server you specified below.
Auto	Select **Auto** to have the NBG4615 automatically search for an available time server and synchronize the date and time with the time server after you click **Apply**.
User Defined Time Server Address	Select **User Defined Time Server Address** and enter the IP address or URL (up to 20 extended ASCII characters in length) of your time server. Check with your ISP/network administrator if you are unsure of this information.
Time Zone Setup	
Time Zone	Choose the time zone of your location. This will set the time difference between your time zone and Greenwich Mean Time (GMT).
Daylight Savings	Daylight saving is a period from late spring to early fall when many countries set their clocks ahead of normal local time by one hour to give more daytime light in the evening. Select this option if you use Daylight Saving Time.
Start Date	Configure the day and time when Daylight Saving Time starts if you selected **Daylight Savings**. The **o'clock** field uses the 24 hour format. Here are a couple of examples: Daylight Saving Time starts in most parts of the United States on the first Sunday of April. Each time zone in the United States starts using Daylight Saving Time at 2 A.M. local time. So in the United States you would select **First**, **Sunday**, **April** and type 2 in the **o'clock** field. Daylight Saving Time starts in the European Union on the last Sunday of March. All of the time zones in the European Union start using Daylight Saving Time at the same moment (1 A.M. GMT or UTC). So in the European Union you would select **Last**, **Sunday**, **March**. The time you type in the **o'clock** field depends on your time zone. In Germany for instance, you would type 2 because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).

Table 83 Maintenance > Time (continued)

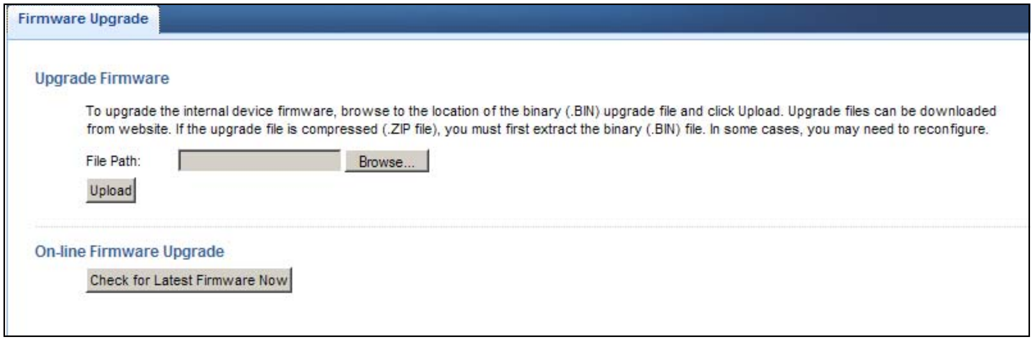
LABEL	DESCRIPTION
End Date	Configure the day and time when Daylight Saving Time ends if you selected **Daylight Savings**. The **o'clock** field uses the 24 hour format. Here are a couple of examples: Daylight Saving Time ends in the United States on the last Sunday of October. Each time zone in the United States stops using Daylight Saving Time at 2 A.M. local time. So in the United States you would select **Last**, **Sunday**, **October** and type 2 in the **o'clock** field. Daylight Saving Time ends in the European Union on the last Sunday of October. All of the time zones in the European Union stop using Daylight Saving Time at the same moment (1 A.M. GMT or UTC). So in the European Union you would select **Last**, **Sunday**, **October**. The time you type in the **o'clock** field depends on your time zone. In Germany for instance, you would type 2 because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
Apply	Click **Apply** to save your changes back to the NBG4615.
Cancel	Click **Cancel** to begin configuring this screen afresh.

28.6 Firmware Upgrade Screen

Find firmware at www.zyxel.com in a file that (usually) uses the system model name with a "*.bin" extension, e.g., "NBG4615.bin". The upload process uses HTTP (Hypertext Transfer Protocol) and may take up to two minutes. After a successful upload, the system will reboot.

Click **Maintenance > Firmware Upgrade**. Follow the instructions in this screen to upload firmware to your NBG4615.

Figure 136 Maintenance > Firmware Upgrade



Upgrade Firmware

To upgrade the internal device firmware, browse to the location of the binary (.BIN) upgrade file and click Upload. Upgrade files can be downloaded from website. If the upgrade file is compressed (.ZIP file), you must first extract the binary (.BIN) file. In some cases, you may need to reconfigure.

On-line Firmware Upgrade

The following table describes the labels in this screen.

Table 84 Maintenance > Firmware Upgrade

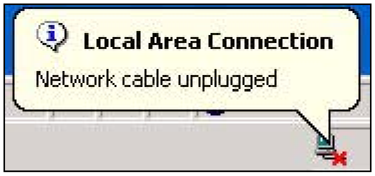
LABEL	DESCRIPTION
File Path	Type in the location of the file you want to upload in this field or click **Browse...** to find it.
Browse...	Click **Browse...** to find the .bin file you want to upload. Remember that you must decompress compressed (.zip) files before you can upload them.
Upload	Click **Upload** to begin the upload process. This process may take up to two minutes.
Check for Latest Firmware Now	Click this to check for the latest updated firmware.

Note: Do not turn off the NBG4615 while firmware upload is in progress!

After you see the **Firmware Upload In Process** screen, wait two minutes before logging into the NBG4615 again.

The NBG4615 automatically restarts in this time causing a temporary network disconnect. In some operating systems, you may see the following icon on your desktop.

Figure 137 Network Temporarily Disconnected



Local Area Connection

Network cable unplugged

After two minutes, log in again and check your new firmware version in the **Status** screen.

If the upload was not successful, an error message appears. Click **Return** to go back to the **Firmware Upgrade** screen.

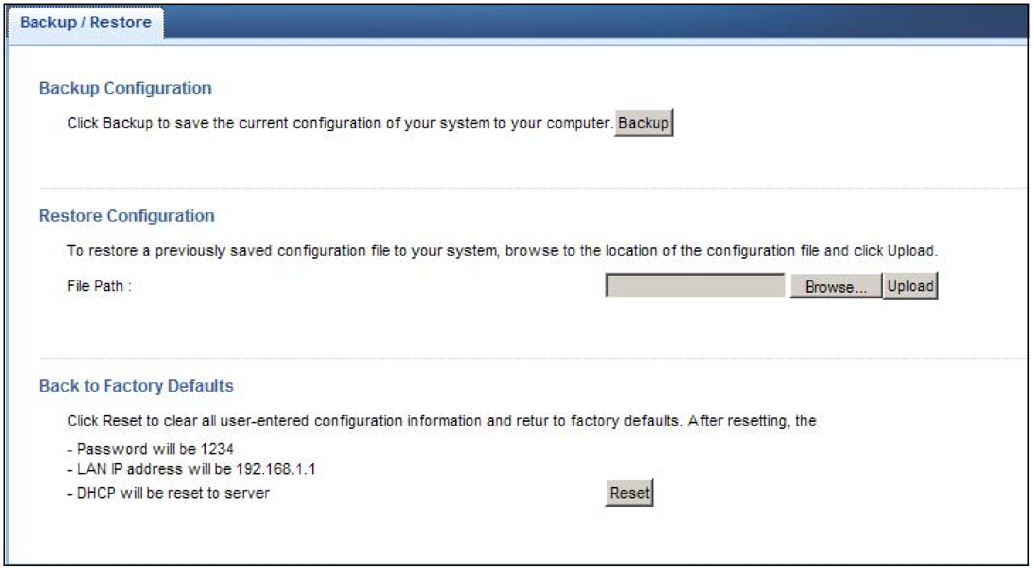
28.7 Configuration Backup/Restore Screen

Backup configuration allows you to back up (save) the NBG4615's current configuration to a file on your computer. Once your NBG4615 is configured and functioning properly, it is highly recommended that you back up your configuration file before making configuration changes. The backup configuration file will be useful in case you need to return to your previous settings.

Restore configuration allows you to upload a new or previously saved configuration file from your computer to your NBG4615.

Click **Maintenance > Backup/Restore**. Information related to factory defaults, backup configuration, and restoring configuration appears as shown next.

Figure 138 Maintenance > Backup/Restore



Backup Configuration

Click Backup to save the current configuration of your system to your computer. Backup

Restore Configuration

To restore a previously saved configuration file to your system, browse to the location of the configuration file and click Upload.

File Path : Browse... Upload

Back to Factory Defaults

Click Reset to clear all user-entered configuration information and retur to factory defaults. After resetting, the

- Password will be 1234
- LAN IP address will be 192.168.1.1
- DHCP will be reset to server

Reset

The following table describes the labels in this screen.

Table 85 Maintenance > Backup/Restore

LABEL	DESCRIPTION
Backup	Click **Backup** to save the NBG4615's current configuration to your computer.
File Path	Type in the location of the file you want to upload in this field or click **Browse...** to find it.
Browse...	Click **Browse...** to find the file you want to upload. Remember that you must decompress compressed (.ZIP) files before you can upload them.

Table 85 Maintenance > Backup/Restore (continued)

LABEL	DESCRIPTION
Upload	Click **Upload** to begin the upload process. Note: Do not turn off the NBG4615 while configuration file upload is in progress. After you see a “configuration upload successful” screen, you must then wait one minute before logging into the NBG4615 again. The NBG4615 automatically restarts in this time causing a temporary network disconnect. If you see an error screen, click Back to return to the Backup/Restore screen.
Reset	Pressing the **Reset** button in this section clears all user-entered configuration information and returns the NBG4615 to its factory defaults. You can also press the **RESET** button on the rear panel to reset the factory defaults of your NBG4615. Refer to the chapter about introducing the Web Configurator for more information on the **RESET** button.

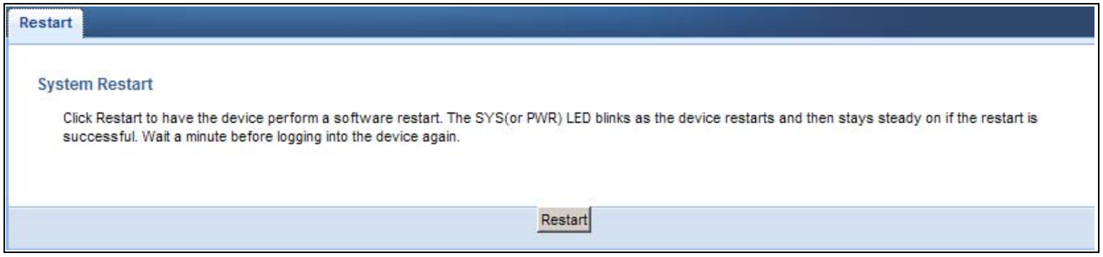
Note: If you uploaded the default configuration file you may need to change the IP address of your computer to be in the same subnet as that of the default NBG4615 IP address (192.168.1.2). See Appendix D on page 277 for details on how to set up your computer’s IP address.

28.8 Reset/Restart Screen

System restart allows you to reboot the NBG4615 without turning the power off.

Click **Maintenance > Reset/Restart** to open the following screen.

Figure 139 Maintenance > Reset/Restart



System Restart

Click Restart to have the device perform a software restart. The SYS(or PWR) LED blinks as the device restarts and then stays steady on if the restart is successful. Wait a minute before logging into the device again.

Click **Restart** to have the NBG4615 reboot. This does not affect the NBG4615's configuration.

28.9 System Operation Mode Overview

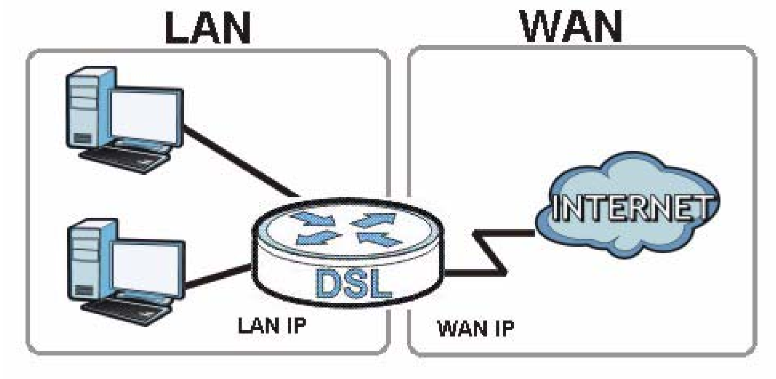
The **Sys OP Mode** (System Operation Mode) function lets you configure your NBG4615 as an access point, wireless client or both at the same time. You can choose between **Router, Access Point Mode**, **Universal Repeater Mode**, and **WISP Mode** depending on your network topology and the features you require from your device.

The following describes the device modes available in your NBG4615.

Router

A router connects your local network with another network, such as the Internet. The router has two IP addresses, the LAN IP address and the WAN IP address.

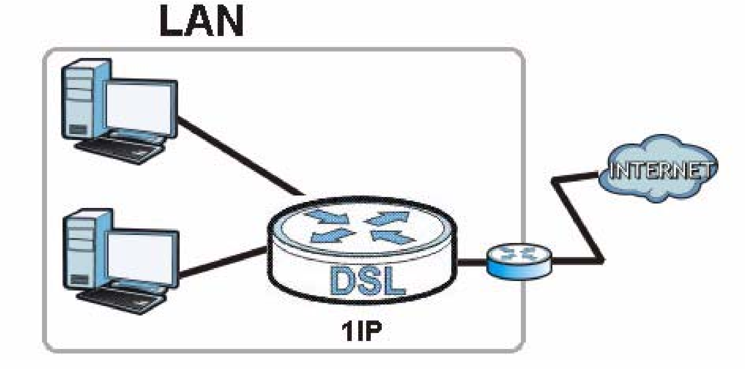
Figure 140 LAN and WAN IP Addresses in Router Mode



Access Point

An access point enabled all ethernet ports to be bridged together and be in the same subnet. To connect to the Internet, another device, such as a router, is required.

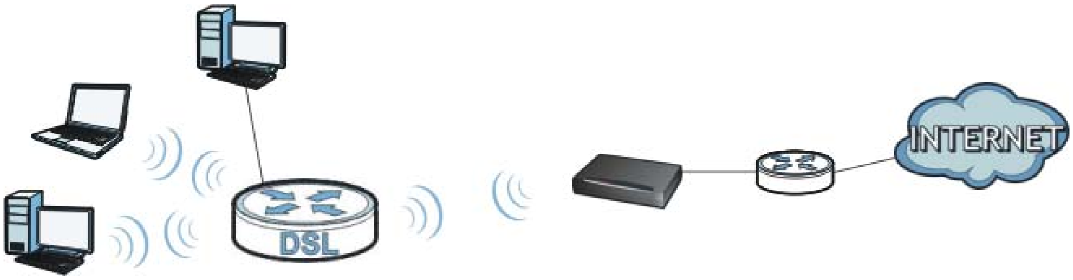
Figure 141 Access Point Mode



Universal Repeater

NBG4615 in Universal Repeater mode work as an access point and wireless client simultaneously.

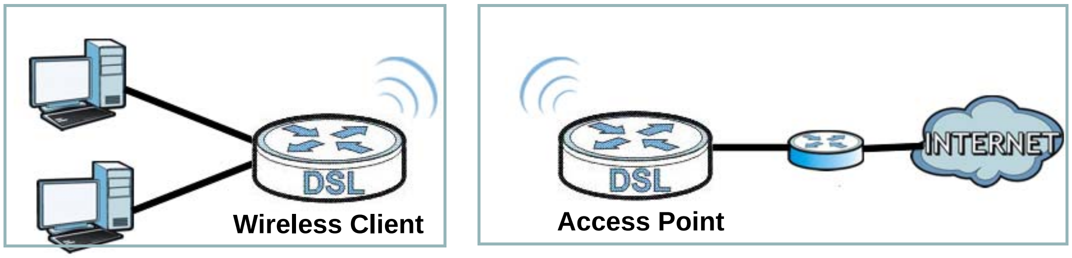
Figure 142 Universal Repeater Mode



WISP

A WISP client connects to an existing access point wirelessly. It acts just like a wireless client in notebooks/computers.

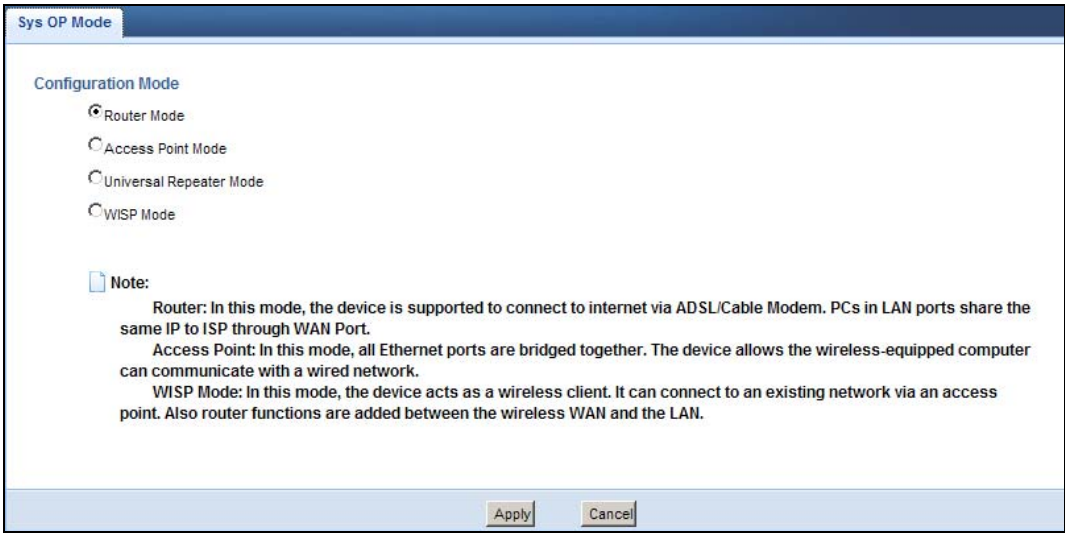
Figure 143 IP Address in Access Point Mode



28.10 Sys OP Mode Screen

Use this screen to select how you want to use your NBG4615.

Figure 144 Maintenance > Sys OP Mode



Configuration Mode

● Router Mode

○ Access Point Mode

○ Universal Repeater Mode

○ WISP 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.

WISP Mode: In this mode, the device acts as a wireless client. It can connect to an existing network via an access point. Also router functions are added between the wireless WAN and the LAN.

The following table describes the labels in the **General** screen.

Table 86 Maintenance > Sys OP Mode

LABEL	DESCRIPTION
System Operation Mode	
Router	Select **Router Mode** if your device routes traffic between a local network and another network such as the Internet. This mode offers services such as a firewall or bandwidth management. You can configure the IP address settings on your WAN port. Contact your ISP or system administrator for more information on appropriate settings.
Access Point	Select **Access Point Mode** if your device bridges traffic between clients on the same network. • In **Access Point Mode**, all Ethernet ports have the same IP address. • All ports on the rear panel of the device are LAN ports, including the port labeled WAN. There is no WAN port. • The DHCP server on your device is disabled. • The IP address of the device on the local network is set to 192.168.1.2.

Table 86 Maintenance > Sys OP Mode (continued)

LABEL	DESCRIPTION
Universal Repeater Mode	Select **Universal Repeater Mode** if you want to have wireless clients associate with the NBG4615 and also want to connect the NBG4615 to an existing access point. • In addition to wireless LAN settings between the NBG4615 and wireless clients, you also need to configure security and wireless settings between the NBG4615 and another access point. • WDS is not available when the NBG4615 is in **Universal Repeater Mode**. • The IP address of the device on the local network is the same as the IP address given to the NBG4615 while in **Access Point Mode** (default is 192.168.1.2).
WISP Mode	Select **WISP Mode** if your device needs a wireless client to connect to an existing access point. • You cannot configure Wireless LAN settings (including WPS) and scheduling in the **WISP Mode**. • The IP address of the device on the local network is the same as the IP address given to the NBG4615 while in router mode (default is 192.168.1.1).
Apply	Click **Apply** to save your settings.
Cancel	Click **Cancel** to return your settings to the default (**Router**).

Note: If you select the incorrect System Operation Mode you may not be able to connect to the Internet.

29

Troubleshooting

29.1 Overview

This chapter offers some suggestions to solve problems you might encounter. The potential problems are divided into the following categories.

- Power, Hardware Connections, and LEDs
- NBG4615 Access and Login
- Internet Access
- Resetting the NBG4615 to Its Factory Defaults
- Wireless Router/AP Troubleshooting
- ZyXEL Share Center Utility Problems

29.2 Power, Hardware Connections, and LEDs

The NBG4615 does not turn on. None of the LEDs turn on.

1. Make sure you are using the power adaptor or cord included with the NBG4615.
2. Make sure the power adaptor or cord is connected to the NBG4615 and plugged in to an appropriate power source. Make sure the power source is turned on.
3. Disconnect and re-connect the power adaptor or cord to the NBG4615.
4. If the problem continues, contact the vendor.

One of the LEDs does not behave as expected.

1 Make sure you understand the normal behavior of the LED. See Section 1.5 on page 22.

2 Check the hardware connections. See the Quick Start Guide.

3 Inspect your cables for damage. Contact the vendor to replace any damaged cables.

4 Disconnect and re-connect the power adaptor to the NBG4615.

5 If the problem continues, contact the vendor.

29.3 NBG4615 Access and Login

I don’t know the IP address of my NBG4615.

1 The default IP address is **192.168.1.1**.

2 If you changed the IP address and have forgotten it, you might get the IP address of the NBG4615 by looking up the IP address of the default gateway for your computer. To do this in most Windows computers, click **Start > Run**, enter **cmd**, and then enter **ipconfig**. The IP address of the **Default Gateway** might be the IP address of the NBG4615 (it depends on the network), so enter this IP address in your Internet browser.Set your device to **Router Mode**, login (see the Quick Start Guide for instructions) and go to the **Device Information** table in the **Status** screen. Your NBG4615’s IP address is available in the **Device Information** table.

- If the **DHCP** setting under **LAN information** is **None**, your device has a fixed IP address.
- If the **DHCP** setting under **LAN information** is **Client**, then your device receives an IP address from a DHCP server on the network.

3 If your NBG4615 is a DHCP client, you can find your IP address from the DHCP server. This information is only available from the DHCP server which allocates IP addresses on your network. Find this information directly from the DHCP server or contact your system administrator for more information.

4 Reset your NBG4615 to change all settings back to their default. This means your current settings are lost. See Section 29.5 on page 244 in the **Troubleshooting** for information on resetting your NBG4615.

I forgot the password.

1 The default password is **1234**.

2 If this does not work, you have to reset the device to its factory defaults. See Section 29.5 on page 244.

I cannot see or access the **Login** screen in the Web Configurator.

1 Make sure you are using the correct IP address.

- The default IP address is 192.168.1.1.
- If you changed the IP address (Section 7.3 on page 102), use the new IP address.
- If you changed the IP address and have forgotten it, see the troubleshooting suggestions for I don’t know the IP address of my NBG4615.

2 Check the hardware connections, and make sure the LEDs are behaving as expected. See the Quick Start Guide.

3 Make sure your Internet browser does not block pop-up windows and has JavaScript and Java enabled. See Appendix B on page 253.

4 Make sure your computer is in the same subnet as the NBG4615. (If you know that there are routers between your computer and the NBG4615, skip this step.)

- If there is a DHCP server on your network, make sure your computer is using a dynamic IP address. See Section 7.3 on page 102.
- If there is no DHCP server on your network, make sure your computer’s IP address is in the same subnet as the NBG4615. See Section 7.3 on page 102.

5 Reset the device to its factory defaults, and try to access the NBG4615 with the default IP address. See Section 7.3 on page 102.

6 If the problem continues, contact the network administrator or vendor, or try one of the advanced suggestions.

Advanced Suggestions

- Try to access the NBG4615 using another service, such as Telnet. If you can access the NBG4615, check the remote management settings and firewall rules to find out why the NBG4615 does not respond to HTTP.

- If your computer is connected to the **WAN** port or is connected wirelessly, use a computer that is connected to a **LAN**/**ETHERNET** port.

I can see the **Login** screen, but I cannot log in to the NBG4615.

1 Make sure you have entered the password correctly. The default password is **1234**. This field is case-sensitive, so make sure [Caps Lock] is not on.

2 You cannot log in to the Web Configurator while someone is using Telnet to access the NBG4615. Log out of the NBG4615 in the other session, or ask the person who is logged in to log out.

3 This can happen when you fail to log out properly from your last session. Try logging in again after 5 minutes.

4 Disconnect and re-connect the power adaptor or cord to the NBG4615.

5 If this does not work, you have to reset the device to its factory defaults. See Section 29.5 on page 244.

29.4 Internet Access

I cannot access the Internet.

1 Check the hardware connections, and make sure the LEDs are behaving as expected. See the Quick Start Guide.

2 Make sure you entered your ISP account information correctly in the wizard. These fields are case-sensitive, so make sure [Caps Lock] is not on.

3 If you are trying to access the Internet wirelessly, make sure the wireless settings in the wireless client are the same as the settings in the AP.

   - Go to Network > Wireless LAN > General > WDS and check if the NBG4615 is set to bridge mode. Select **Disable** and try to connect to the Internet again.

4 Disconnect all the cables from your device, and follow the directions in the Quick Start Guide again.

5 Go to Maintenance > Sys OP Mode > General. Check your System Operation Mode setting.

- Select **Router** if your device routes traffic between a local network and another network such as the Internet.
- Select **Access Point** if your device bridges traffic between clients on the same network.

6 If the problem continues, contact your ISP.

I cannot access the Internet anymore. I had access to the Internet (with the NBG4615), but my Internet connection is not available anymore.

1 Check the hardware connections, and make sure the LEDs are behaving as expected. See the Quick Start Guide and Section 1.5 on page 22.

2 Reboot the NBG4615.

3 If the problem continues, contact your ISP.

The Internet connection is slow or intermittent.

1 There might be a lot of traffic on the network. Look at the LEDs, and check Section 1.5 on page 22. If the NBG4615 is sending or receiving a lot of information, try closing some programs that use the Internet, especially peer-to-peer applications.

2 Check the signal strength. If the signal strength is low, try moving the NBG4615 closer to the AP if possible, and look around to see if there are any devices that might be interfering with the wireless network (for example, microwaves, other wireless networks, and so on).

3 Reboot the NBG4615.

4 If the problem continues, contact the network administrator or vendor, or try one of the advanced suggestions.

Advanced Suggestion

- Check the settings for QoS. If it is disabled, you might consider activating it.

29.5 Resetting the NBG4615 to Its Factory Defaults

If you reset the NBG4615, you lose all of the changes you have made. The NBG4615 re-loads its default settings, and the password resets to **1234**. You have to make all of your changes again.

You will lose all of your changes when you push the **RESET** button.

To reset the NBG4615:

1 Make sure the power LED is on.

2 Press the **RESET** button for longer than 1 second to restart/reboot the NBG4615.

3 Press the **RESET** button for longer than five seconds to set the NBG4615 back to its factory-default configurations.

If the NBG4615 restarts automatically, wait for the NBG4615 to finish restarting, and log in to the Web Configurator. The password is “1234”.

If the NBG4615 does not restart automatically, disconnect and reconnect the NBG4615’s power. Then, follow the directions above again.

29.6 Wireless Router/AP Troubleshooting

I cannot access the NBG4615 or ping any computer from the WLAN (wireless AP or router).

1 Make sure the wireless LAN is enabled on the NBG4615.

2 Make sure the wireless adapter on the wireless station is working properly.

3 Make sure the wireless adapter installed on your computer is IEEE 802.11 compatible and supports the same wireless standard as the NBG4615.

4 Make sure your computer (with a wireless adapter installed) is within the transmission range of the NBG4615.

5 Check that both the NBG4615 and your wireless station are using the same wireless and wireless security settings.

6 Make sure traffic between the WLAN and the LAN is not blocked by the firewall on the NBG4615.

7 Make sure you allow the NBG4615 to be remotely accessed through the WLAN interface. Check your remote management settings.

- See the chapter on Wireless LAN in the User's Guide for more information.

I set up URL keyword blocking, but I can still access a website that should be blocked.

Make sure that you select the **Enable URL Keyword Blocking** check box in the Content Filtering screen. Make sure that the keywords that you type are listed in the **Keyword List**.

If a keyword that is listed in the **Keyword List** is not blocked when it is found in a URL, customize the keyword blocking using commands. See the Customizing Keyword Blocking URL Checking section in the Content Filtering chapter.

I can access the Internet, but I cannot open my network folders.

In the **Network > LAN > Advanced** screen, make sure **Allow between LAN and WAN** is checked. This is not checked by default to keep the LAN secure.

If you still cannot access a network folder, make sure your account has access rights to the folder you are trying to open.

I cannot access the Web Configurator after I switched to AP mode.

When you change from router mode to AP mode, your computer must have an IP address in the range between "192.168.1.3" and "192.168.1.254".

Refer to Appendix D on page 277 for instructions on how to change your computer's IP address.

What factors may cause intermittent or unstabled wireless connection? How can I solve this problem?

The following factors may cause interference:

- Obstacles: walls, ceilings, furniture, and so on.
- Building Materials: metal doors, aluminum studs.
- Electrical devices: microwaves, monitors, electric motors, cordless phones, and other wireless devices.

To optimize the speed and quality of your wireless connection, you can:

- Move your wireless device closer to the AP if the signal strength is low.
- Reduce wireless interference that may be caused by other wireless networks or surrounding wireless electronics such as cordless phones.
- Place the AP where there are minimum obstacles (such as walls and ceilings) between the AP and the wireless client.
- Reduce the number of wireless clients connecting to the same AP simultaneously, or add additional APs if necessary.
- Try closing some programs that use the Internet, especially peer-to-peer applications. If the wireless client is sending or receiving a lot of information, it may have too many programs open that use the Internet.
- Position the antennas for best reception. If the AP is placed on a table or floor, point the antennas upwards. If the AP is placed at a high position, point the antennas downwards. Try pointing the antennas in different directions and check which provides the strongest signal to the wireless clients.

29.7 ZyXEL Share Center Utility Problems

I cannot access or see a USB device that is connected to the NBG4615.

1. Disconnect the problematic USB device, then reconnect it to the NBG4615.
2. Ensure that the USB device in question has power.
3. Check your cable connections.
4. Restart the NBG4615 by disconnecting the power and then reconnecting it.

5 If the USB device requires a special driver, install the driver from the installation disc that came with the device. After driver installation, reconnect the USB device to the NBG4615 and try to connect to it again with your computer.

6 If the problem persists, contact your vendor.

I cannot install the ZyXEL Share Center Utility.

1 Make sure that the set up program is one required for your operating system.

2 Install the latest patches and updates for your operating system.

3 Check the zyxel.com download site for a newer version of the utility.

A

Product Specifications

The following tables summarize the NBG4615's hardware and firmware features.

Table 87 Hardware Features

Dimensions	162 mm (W) x 106 mm (D) x 28 mm (H)
Weight	285g
SDRAM	32 MB
Flash Memory	8 MB
Power Specification	Input: 100~240 AC, 50~60 Hz Output: 12 V DC 1.5A
Ethernet ports	Auto-negotiating: 100 Mbps, 1000 Mbps in either half-duplex or full-duplex mode. Auto-crossover: Use either crossover or straight-through Ethernet cables.
Built-in Switch	A combination of switch and router makes your NBG4615 a cost-effective and viable network solution. You can add up to two computers to the NBG4615 without the cost of a hub when connecting to the Internet through the WAN port. You can add up to three computers to the NBG4615 when you connect to the Internet in AP mode. Add more than four computers to your LAN by using a hub.
LEDs	Power, LAN1-4, WAN, Internet/WPS, USB1-2
Reset button	The reset button is built into the rear panel. Use this button to restore the NBG4615 to its factory default settings. Press for 1 second to restart the device. Press for 5 seconds to restore to factory default settings.
WPS button	Press the WPS on two WPS enabled devices within 120 seconds for a security-enabled wireless connection.
Power switch	Turn on or turn off the power of the NBG4615 using this switch.
WLAN switch	Turn on or turn off the wireless function of the NBG4615 using this switch. There is no need to go into the Web Configurator.
Antenna	The NBG4615 is equipped with two 2dBi (or 5dBi) detachable antenna to provide clear radio transmission and reception on the wireless network.
USB Port	The NBG4615 has two built-in USB 2.0 type A for USB device connectivity and supports 3G USB dongle.

Table 87 Hardware Features (continued)

Operation Environment	Temperature: 0º C ~ 40º C / 32ºF ~ 104ºF Humidity: 10% ~ 90%
Storage Environment	Temperature: -30º C ~ 70º C / -22ºF ~ 158ºF Humidity: 10% ~ 95%

Table 88 Firmware Features

FEATURE	DESCRIPTION
Default LAN IP Address	192.168.1.1 (router) 192.168.1.2. (AP)
Default LAN Subnet Mask	255.255.255.0 (24 bits)
Default Password	1234
DHCP Pool	192.168.1.33 to 192.168.1.64
Wireless Interface	Wireless LAN
Default Wireless SSID	ZyXEL
Device Management	Use the Web Configurator to easily configure the rich range of features on the NBG4615.
Wireless Functionality	Allows IEEE 802.11b, IEEE 802.11g and/or IEEE 802.11n wireless clients to connect to the NBG4615 wirelessly. Enable wireless security (WPA(2)-PSK) and/or MAC filtering to protect your wireless network. Note: The NBG4615 may be prone to RF (Radio Frequency) interference from other 2.4 GHz devices such as microwave ovens, wireless phones, Bluetooth enabled devices, and other wireless LANs.
Firmware Upgrade	Download new firmware (when available) from the ZyXEL web site and use the Web Configurator to put it on the NBG4615. Note: Only upload firmware for your specific model!
Configuration Backup & Restoration	Make a copy of the NBG4615's configuration and put it back on the NBG4615 later if you decide you want to revert back to an earlier configuration.
Network Address Translation (NAT)	Each computer on your network must have its own unique IP address. Use NAT to convert a single public IP address to multiple private IP addresses for the computers on your network.
Firewall	You can configure firewall on the NBG4615 for secure Internet access. When the firewall is on, by default, all incoming traffic from the Internet to your network is blocked unless it is initiated from your network. This means that probes from the outside to your network are not allowed, but you can safely browse the Internet and download files for example.

Table 88 Firmware Features (continued)

FEATURE	DESCRIPTION
Content Filter	The NBG4615 blocks or allows access to web sites that you specify and blocks access to web sites with URLs that contain keywords that you specify.
Bandwidth Management	You can efficiently manage traffic on your network by reserving bandwidth and giving priority to certain types of traffic and/or to particular computers.
Remote Management	This allows you to decide whether a service (HTTP traffic for example) from a computer on a network (LAN or WAN for example) can access the NBG4615.
Wireless LAN Scheduler	You can schedule the times the Wireless LAN is enabled/disabled.
Time and Date	Get the current time and date from an external server when you turn on your NBG4615. You can also set the time manually. These dates and times are then used in logs.
Port Forwarding	If you have a server (mail or web server for example) on your network, then use this feature to let people access it from the Internet.
DHCP (Dynamic Host Configuration Protocol)	Use this feature to have the NBG4615 assign IP addresses, an IP default gateway and DNS servers to computers on your network.
Dynamic DNS Support	With Dynamic DNS (Domain Name System) support, you can use a fixed URL, www.zyxel.com for example, with a dynamic IP address. You must register for this service with a Dynamic DNS service provider.
IP Multicast	IP Multicast is used to send traffic to a specific group of computers. The NBG4615 supports versions 1 and 2 of IGMP (Internet Group Management Protocol) used to join multicast groups (see RFC 2236).
Logging	Use logs for troubleshooting. You can view logs in the Web Configurator.
PPPoE	PPPoE mimics a dial-up Internet access connection.
PPTP Encapsulation	Point-to-Point Tunneling Protocol (PPTP) enables secure transfer of data through a Virtual Private Network (VPN). The NBG4615 supports one PPTP connection at a time.
Universal Plug and Play (UPnP)	The NBG4615 can communicate with other UPnP enabled devices in a network.

29.8 Wall-mounting Instructions

Complete the following steps to hang your NBG4615 on a wall.

1. Select a position free of obstructions on a sturdy wall.
2. Drill two holes for the screws.

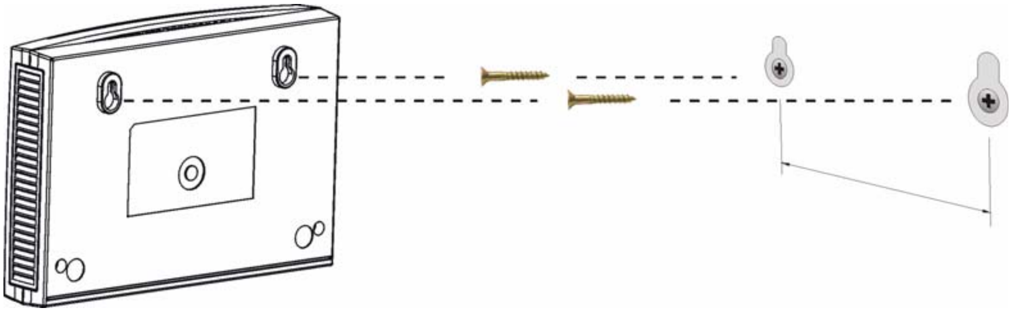
Be careful to avoid damaging pipes or cables located inside the wall when drilling holes for the screws.

3 Do not insert the screws all the way into the wall. Leave a small gap of about 0.5 cm between the heads of the screws and the wall.

4 Make sure the screws are snugly fastened to the wall. They need to hold the weight of the NBG4615 with the connection cables.

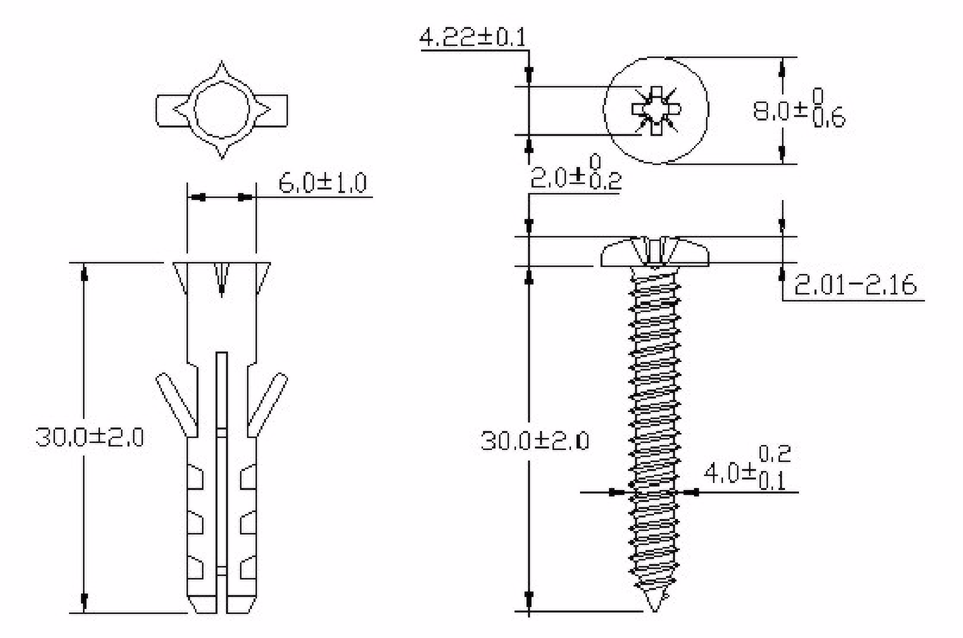
5 Align the holes on the back of the NBG4615 with the screws on the wall. Hang the NBG4615 on the screws.

Figure 145 Wall-mounting Example



The following are dimensions of an M4 tap screw and masonry plug used for wall mounting. All measurements are in millimeters (mm).

Figure 146 Masonry Plug and M4 Tap Screw


4.22±0.1
8.0±$^{0}_{0.6}$
6.0±1.0
2.0±$^{0}_{0.2}$
2.01–2.16
30.0±2.0
30.0±2.0
4.0±$^{0.2}_{0.1}$