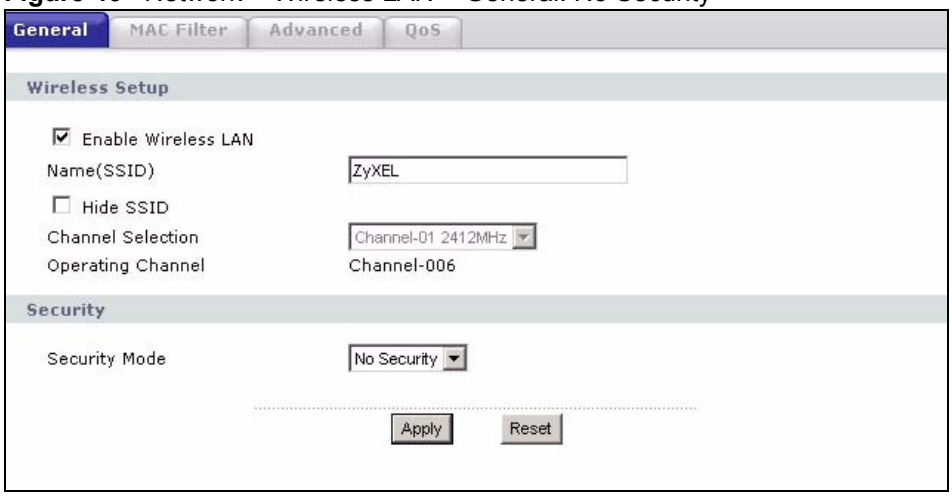
Figure 46 Network > Wireless LAN > General: No Security



The following table describes the labels in this screen.

Table 25 Wireless No Security

LABEL	DESCRIPTION
Security Mode	Choose **No Security** from the drop-down list box.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to reload the previous configuration for this screen.

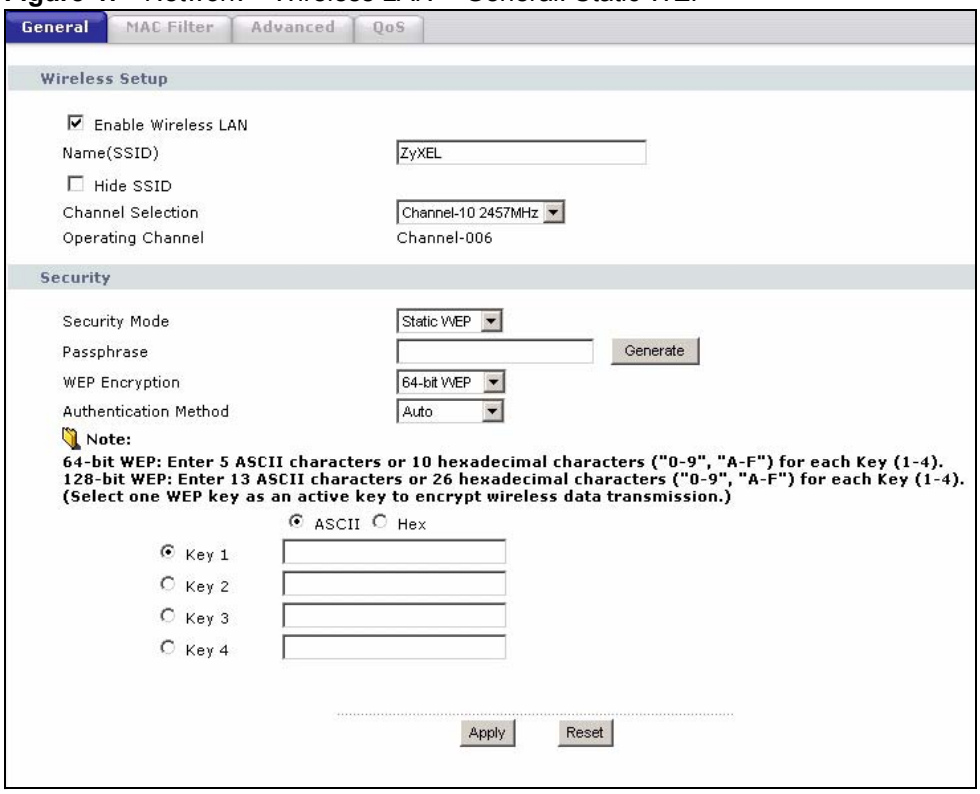
5.5.2 WEP Encryption

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 NBG318S 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.

In order to configure and enable WEP encryption; click **Network** > **Wireless LAN** to display the **General** screen. Select **Static WEP** from the **Security Mode** list.

Figure 47 Network > Wireless LAN > General: Static WEP



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

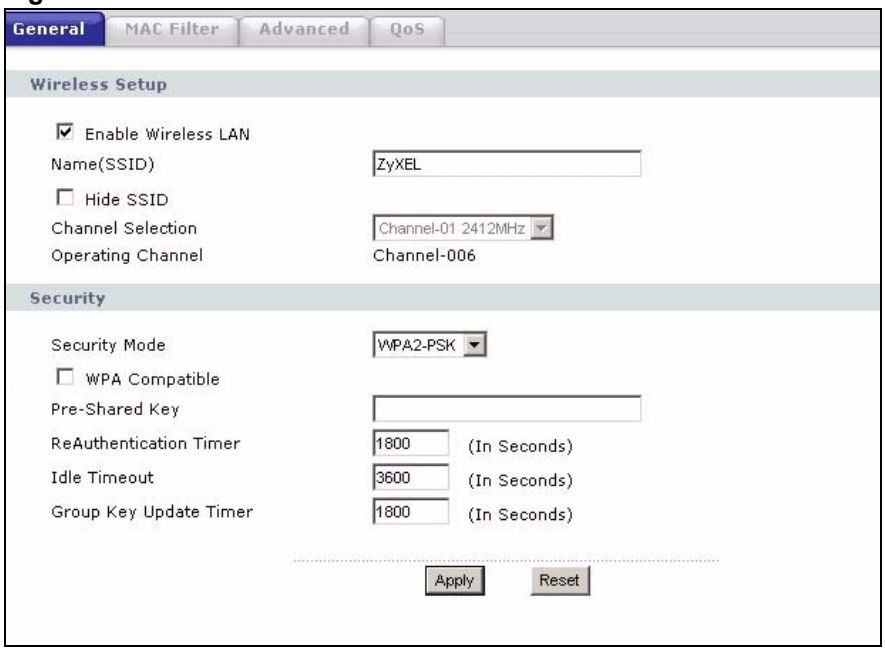
Table 26 Network > Wireless LAN > General: Static WEP

LABEL	DESCRIPTION
Passphrase	Enter a passphrase (password phrase) of up to 32 printable characters and click **Generate**. The NBG318S automatically generates four different WEP keys and displays them in the **Key** fields below.
WEP Encryption	Select **64-bit WEP** or **128-bit WEP** to enable data encryption.
Authentication Method	This field is activated when you select **64-bit WEP** or **128-bit WEP** in the **WEP Encryption** field. Select **Auto**, **Open System** or **Shared Key** from the drop-down list box.
ASCII	Select this option in order to enter ASCII characters as WEP key.
Hex	Select this option in order to enter hexadecimal characters as a WEP key. The preceding "0x", that identifies a hexadecimal key, is entered automatically.
Key 1 to Key 4	The WEP keys are used to encrypt data. Both the NBG318S 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 NBG318S.
Reset	Click **Reset** to reload the previous configuration for this screen.

5.5.3 WPA-PSK/WPA2-PSK

Click **Network** > **Wireless LAN** to display the **General** screen. Select **WPA-PSK** or **WPA2-PSK** from the **Security Mode** list.

Figure 48 Network > Wireless LAN > General: WPA-PSK/WPA2-PSK



The following table describes the labels in this screen.

Table 27 Network > Wireless LAN > General: WPA-PSK/WPA2-PSK

LABEL	DESCRIPTION
WPA Compatible	This check box is available only when you select **WPA2-PSK** or **WPA2** in the **Security Mode** field. Select the check box to have both WPA2 and WPA wireless clients be able to communicate with the NBG318S even when the NBG318S is using WPA2-PSK or WPA2.
Pre-Shared Key	The encryption mechanisms used for **WPA/WPA2** and **WPA-PSK/WPA2-PSK** are the same. The only difference between the two is that **WPA-PSK/WPA2-PSK** uses a simple common password, instead of user-specific credentials. Type a pre-shared key from 8 to 63 case-sensitive ASCII characters (including spaces and symbols).
ReAuthentication Timer (in seconds)	Specify how often wireless stations have to resend usernames and passwords in order to stay connected. Enter a time interval between 10 and 9999 seconds. The default time interval is 1800 seconds (30 minutes). Note: If wireless station authentication is done using a RADIUS server, the reauthentication timer on the RADIUS server has priority.
Idle Timeout	The NBG318S automatically disconnects a wireless station from the wired network after a period of inactivity. The wireless station needs to enter the username and password again before access to the wired network is allowed. The default time interval is 3600 seconds (or 1 hour).

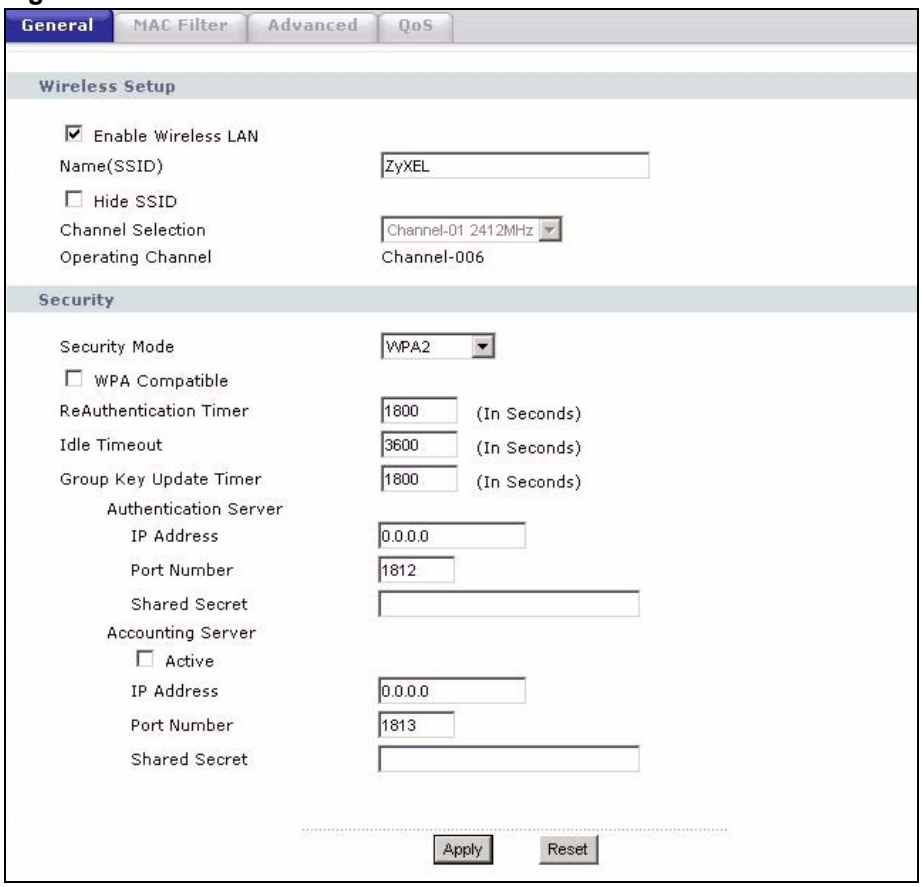
Table 27 Network > Wireless LAN > General: WPA-PSK/WPA2-PSK

LABEL	DESCRIPTION
Group Key Update Timer	The **Group Key Update Timer** is the rate at which the AP (if using **WPA-PSK/ WPA2-PSK** key management) or RADIUS server (if using **WPA/WPA2** key management) sends a new group key out to all clients. The re-keying process is the WPA/WPA2 equivalent of automatically changing the WEP key for an AP and all stations in a WLAN on a periodic basis. Setting of the **Group Key Update Timer** is also supported in **WPA-PSK/WPA2-PSK** mode. The default is **1800** seconds (30 minutes).
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to reload the previous configuration for this screen.

5.5.4 WPA/WPA2

Click **Network** > **Wireless LAN** to display the **General** screen. Select **WPA** or **WPA2** from the **Security Mode** list.

Figure 49 Network > Wireless LAN > General: WPA/WPA2



The following table describes the labels in this screen.

Table 28 Network > Wireless LAN > General: WPA/WPA2

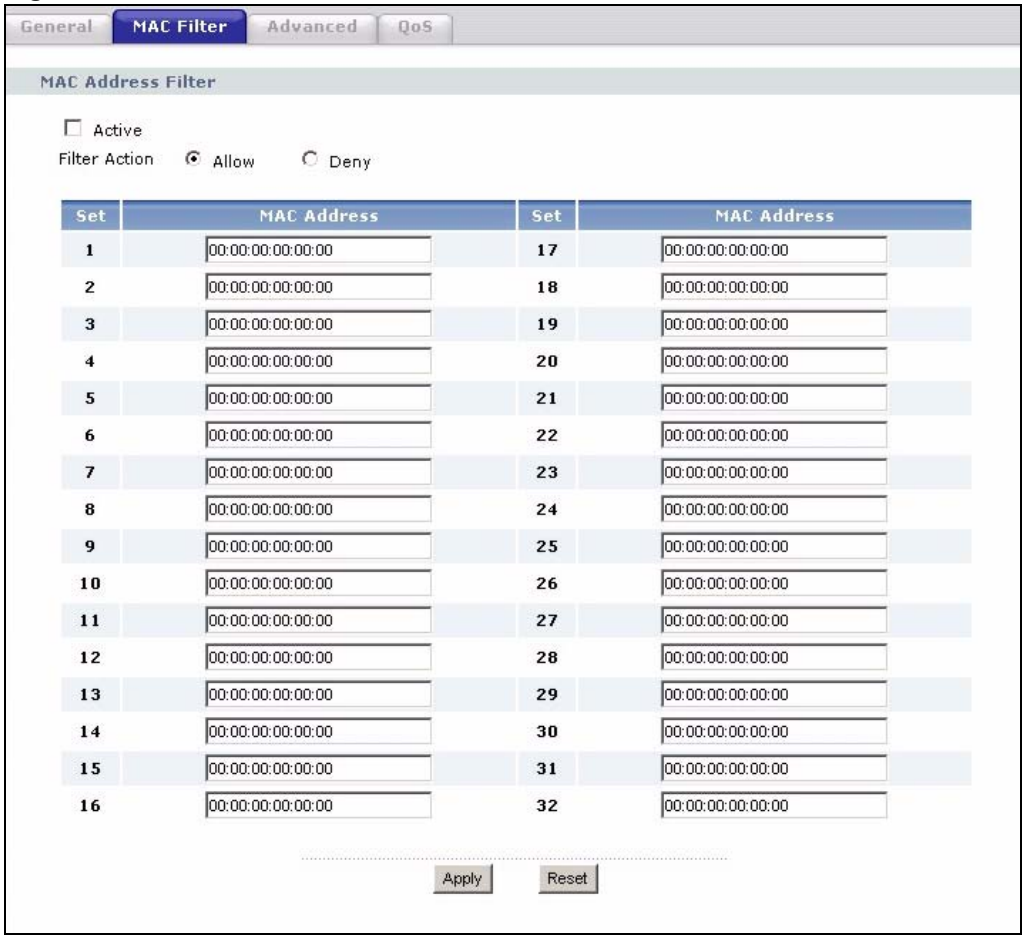
LABEL	DESCRIPTION
WPA Compatible	This check box is available only when you select **WPA2-PSK** or **WPA2** in the **Security Mode** field. Select the check box to have both WPA2 and WPA wireless clients be able to communicate with the NBG318S even when the NBG318S is using WPA2-PSK or WPA2.
ReAuthentication Timer (in seconds)	Specify how often wireless stations have to resend usernames and passwords in order to stay connected. Enter a time interval between 10 and 9999 seconds. The default time interval is 1800 seconds (30 minutes). Note: If wireless station authentication is done using a RADIUS server, the reauthentication timer on the RADIUS server has priority.
Idle Timeout	The NBG318S automatically disconnects a wireless station from the wired network after a period of inactivity. The wireless station needs to enter the username and password again before access to the wired network is allowed. The default time interval is 3600 seconds (or 1 hour).
Group Key Update Timer	The **Group Key Update Timer** is the rate at which the AP (if using **WPA-PSK/ WPA2-PSK** key management) or RADIUS server (if using **WPA/WPA2** key management) sends a new group key out to all clients. The re-keying process is the WPA/WPA2 equivalent of automatically changing the WEP key for an AP and all stations in a WLAN on a periodic basis. Setting of the **Group Key Update Timer** is also supported in **WPA-PSK/WPA2-PSK** mode. The NBG318S default is **1800** seconds (30 minutes).
Authentication Server	
IP Address	Enter the IP address of the external authentication server in dotted decimal notation.
Port Number	Enter the port number of the external authentication server. The default port number is **1812**. You need not change this value unless your network administrator instructs you to do so with additional information.
Shared Secret	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the NBG318S. The key must be the same on the external authentication server and your NBG318S. The key is not sent over the network.
Accounting Server	
Active	Select **Yes** from the drop down list box to enable user accounting through an external authentication server.
IP Address	Enter the IP address of the external accounting server in dotted decimal notation.
Port Number	Enter the port number of the external accounting server. The default port number is **1813**. You need not change this value unless your network administrator instructs you to do so with additional information.
Shared Secret	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external accounting server and the NBG318S. The key must be the same on the external accounting server and your NBG318S. The key is not sent over the network.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to reload the previous configuration for this screen.

5.6 MAC Filter

The MAC filter screen allows you to configure the NBG318S to give exclusive access to up to 32 devices (Allow) or exclude up to 32 devices from accessing the NBG318S (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 NBG318S's MAC filter settings, click **Network** > **Wireless LAN** > **MAC Filter**. The screen appears as shown.

Figure 50 Network > Wireless LAN > MAC Filter



The following table describes the labels in this menu.

Table 29 Network > Wireless LAN > MAC Filter

LABEL	DESCRIPTION
Active	Select **Yes** from the drop down list box to enable MAC address filtering.
Filter Action	Define the filter action for the list of MAC addresses in the **MAC Address** table. Select **Deny** to block access to the NBG318S, MAC addresses not listed will be allowed to access the NBG318S Select **Allow** to permit access to the NBG318S, MAC addresses not listed will be denied access to the NBG318S.

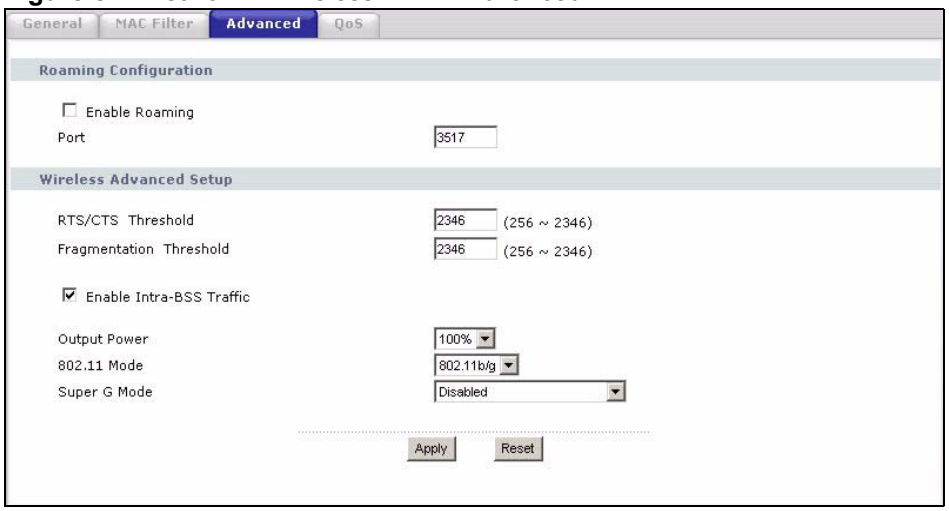
Table 29 Network > Wireless LAN > MAC Filter

LABEL	DESCRIPTION
Set	This is the index number of the MAC address.
MAC Address	Enter the MAC addresses of the wireless station that are allowed or denied access to the NBG318S 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.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to reload the previous configuration for this screen.

5.7 Wireless LAN Advanced Screen

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

Figure 51 Network > Wireless LAN > Advanced



The following table describes the labels in this screen.

Table 30 Network > Wireless LAN > Advanced

LABEL	DESCRIPTION
Roaming Configuration	
Enable Roaming	Select this option if your network environment has multiple APs and you want your wireless device to be able to access the network as you move between wireless networks.
Wireless Advanced Setup	
RTS/CTS Threshold	Data with its frame size larger than this value will perform the RTS (Request To Send)/CTS (Clear To Send) handshake. If the RTS/CTS value is greater than the **Fragmentation Threshold** value, then the RTS/CTS handshake will never occur as data frames will be fragmented before they reach RTS/CTS size. Enter a value between 0 and 2432.
Fragmentation Threshold	It is the maximum data fragment size that can be sent. Enter a value between 256 and 2432.

Table 30 Network > Wireless LAN > Advanced

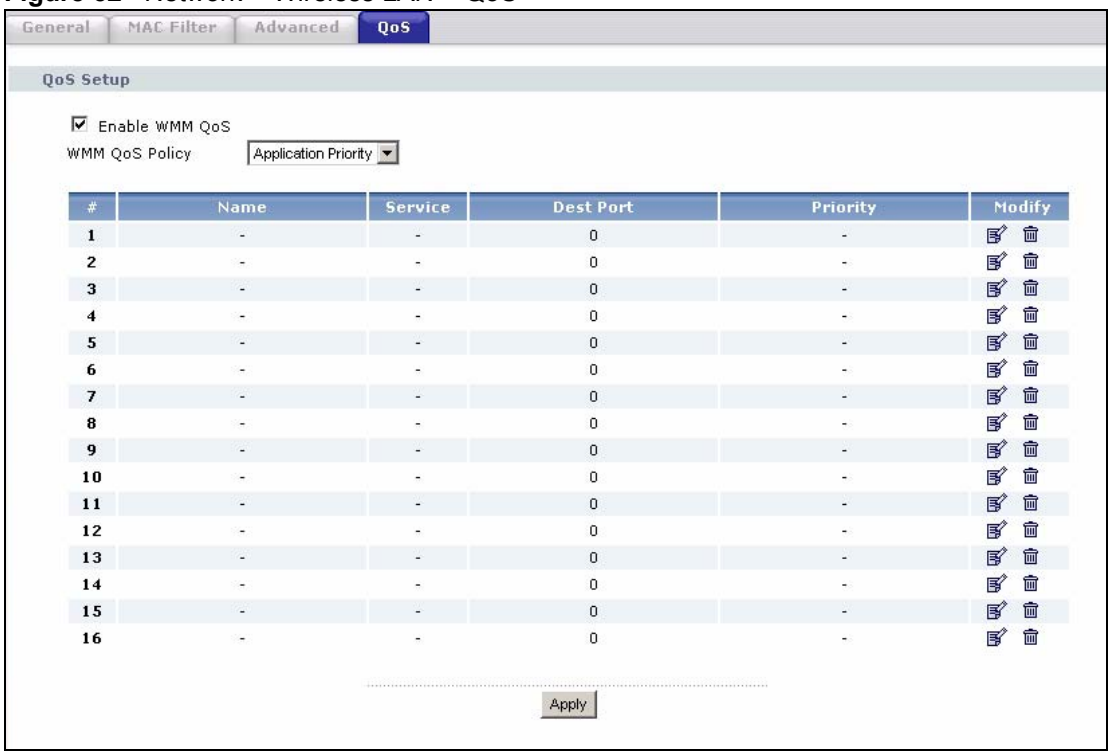
LABEL	DESCRIPTION
Enable Intra-BSS Traffic	A Basic Service Set (BSS) exists when all communications between wireless clients or between a wireless client and a wired network client go through one access point (AP). Intra-BSS traffic is traffic between wireless clients in the BSS. When Intra-BSS is enabled, wireless client **A** and **B** can access the wired network and communicate with each other. When Intra-BSS is disabled, wireless client **A** and **B** can still access the wired network but cannot communicate with each other.
Output Power	Set the output power of the NBG318S in this field. If there is a high density of APs within an area, decrease the output power of the NBG318S to reduce interference with other APs.
802.11 Mode	Select **802.11b** to allow only IEEE 802.11b compliant WLAN devices to associate with the NBG318S. Select **802.11g** to allow only IEEE 802.11g compliant WLAN devices to associate with the NBG318S. Select **802.11b/g** to allow either IEEE802.11b or IEEE802.11g compliant WLAN devices to associate with the NBG318S. The transmission rate of your NBG318S might be reduced.
Super G Mode	Use this field to enable or disable the Super G function. Super G mode is available only if you select **802.11g** or **802.11b/g** in the **802.11 Mode** field. Super G provides higher data transmission rates than 802.11g. Select **Disabled** if your wireless clients do not support Super G. Select **Super G with Dynamic Turbo** if some or all of your wireless clients support Super G with Dynamic Turbo. Dynamic Turbo uses two channels bonded together to achieve higher transmission rates than 802.11g or Super G without Dynamic Turbo. Dynamic turbo is on only when all wireless devices on the network support it. The wireless channel is automatically fixed at 6 if you select this mode. Select **Super G without Turbo** if the wireless clients on your network support Super G but do not support dynamic turbo.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to reload the previous configuration for this screen.

5.8 Quality of Service (QoS) Screen

The QoS screen allows you to automatically give a service (such as e-mail, VoIP or FTP) a priority level.

Click **Network** > **Wireless LAN** > **QoS**. The following screen appears.

Figure 52 Network > Wireless LAN > QoS



The following table describes the labels in this screen.

Table 31 Network > Wireless LAN > QoS

LABEL	DESCRIPTION
Enable WMM QoS	Select this to turn on WMM QoS (Wireless MultiMedia Quality of Service). The NBG318S assigns priority to packets based on the 802.1q or DSCP information in their headers. If a packet has no WMM information in its header, it is assigned the default priority.
WMM QoS Policy	Select **Default** to have the NBG318S 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. Select **Application Priority** from the drop-down list box to display a table of application names, services, ports and priorities to which you want to apply WMM QoS.
	The table appears only if you select **Application Priority** in **WMM QoS Policy**.
#	This is the number of an individual application entry.
Name	This field displays a description given to an application entry.
Service	This field displays either **FTP**, **WWW**, **E-mail** or a **User Defined** service to which you want to apply WMM QoS.
Dest Port	This field displays the destination port number to which the application sends traffic.

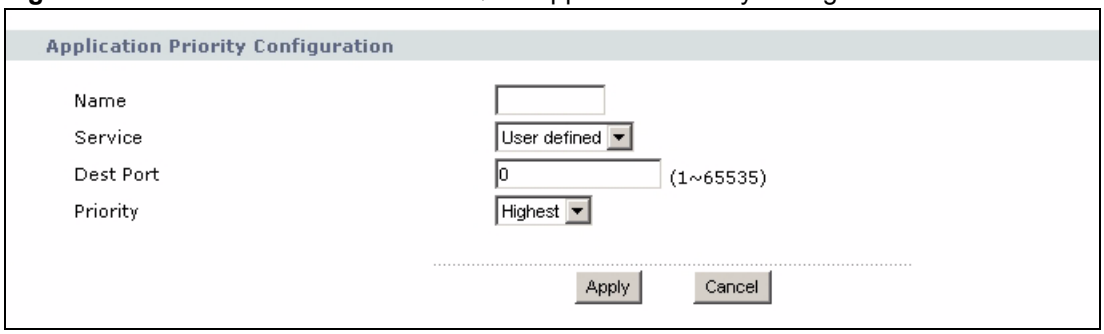
Table 31 Network > Wireless LAN > QoS (continued)

LABEL	DESCRIPTION
Priority	This field displays the priority of the application. **Highest** - Typically used for voice or video that should be high-quality. **High** - Typically used for voice or video that can be medium-quality. **Mid** - Typically used for applications that do not fit into another priority. For example, Internet surfing. **Low** - Typically used for non-critical "background" applications, such as large file transfers and print jobs that should not affect other applications.
Modify	Click the **Edit** icon to open the **Application Priority Configuration** screen. Modify an existing application entry or create a application entry in the **Application Priority Configuration** screen. Click the **Remove** icon to delete an application entry.
Apply	Click **Apply** to save your changes to the NBG318S.

5.8.1 Application Priority Configuration

Use this screen to edit a WMM QoS application entry. Click the edit icon under **Modify**. The following screen displays.

Figure 53 Network > Wireless LAN > QoS: Application Priority Configuration



See Appendix F on page 271 for a list of commonly-used services and destination ports. The following table describes the fields in this screen.

Table 32 Network > Wireless LAN > QoS: Application Priority Configuration

LABEL	DESCRIPTION
Application Priority Configuration	
Name	Type a description of the application priority.

Table 32 Network > Wireless LAN > QoS: Application Priority Configuration (continued)

LABEL	DESCRIPTION
Service	The following is a description of the applications you can prioritize with WMM QoS. Select a service from the drop-down list box. • **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: POP3 - port 110 IMAP - port 143 SMTP - port 25 HTTP - port 80 • **FTP** File Transfer Protocol enables fast transfer of files, including large files that it may not be possible to send via e-mail. FTP uses port number 21. • **WWW** The World Wide Web 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. • **User-Defined** User-defined services are user specific services configured using known ports and applications.
Dest Port	This displays the port the selected service uses. Type a port number in the field provided if you want to use a different port to the default port.
Priority	Select a priority from the drop-down list box.
Apply	Click **Apply** to save your changes back to the NBG318S.
Cancel	Click **Cancel** to return to the previous screen.

6

WAN

This chapter describes how to configure WAN settings.

6.1 WAN Overview

See the chapter about the connection wizard for more information on the fields in the WAN screens.

6.2 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 the rom file (ZyNOS configuration file). It will not change unless you change the setting or upload a different ROM file. It is recommended that you clone the MAC address prior to hooking up the WAN Port.

6.3 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.

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. IGMP version 2 (RFC 2236) is an improvement over version 1 (RFC 1112) but IGMP version 1 is still in wide use. If you would like to read more detailed information about interoperability between IGMP version 2 and version 1, please see sections 4 and 5 of RFC 2236. The class D IP address is used to identify host groups and can be in the range 224.0.0.0 to 239.255.255.255. The address 224.0.0.0 is not assigned to any group and is used by IP multicast computers. The address 224.0.0.1 is used for query messages and is assigned to the permanent group of all IP hosts (including gateways). All hosts must join the 224.0.0.1 group in order to participate in IGMP. The address 224.0.0.2 is assigned to the multicast routers group.

The NBG318S supports both IGMP version 1 (**IGMP-v1**) and IGMP version 2 (**IGMP-v2**). At start up, the NBG318S queries all directly connected networks to gather group membership. After that, the NBG318S periodically updates this information. IP multicasting can be enabled/disabled on the NBG318S LAN and/or WAN interfaces in the web configurator (**LAN**; **WAN**). Select **None** to disable IP multicasting on these interfaces.

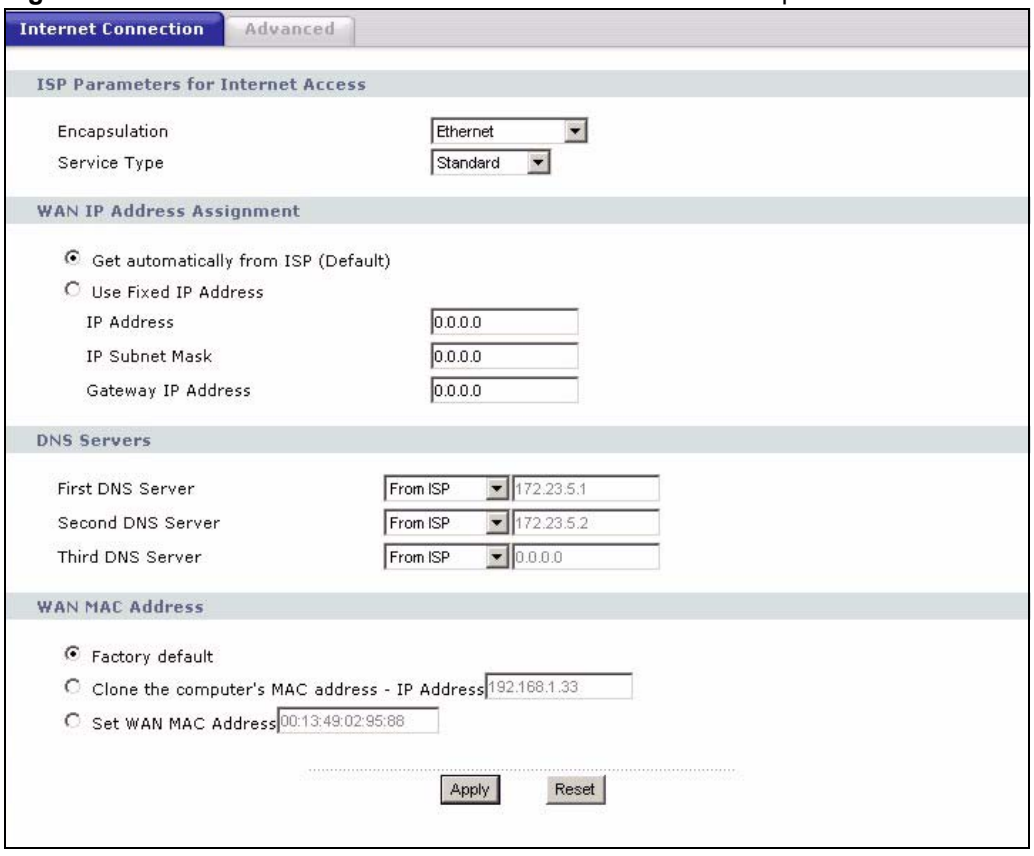
6.4 Internet Connection

Use this screen to change your NBG318S's Internet access settings. Click **Network** > **WAN**. The screen differs according to the encapsulation you choose.

6.4.1 Ethernet Encapsulation

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

Figure 54 Network > WAN > Internet Connection: Ethernet Encapsulation



The following table describes the labels in this screen.

Table 33 Network > WAN > Internet Connection: Ethernet Encapsulation

LABEL	DESCRIPTION
Encapsulation	You must choose the Ethernet option when the WAN port is used as a regular Ethernet.
Service Type	Choose from **Standard**, **RR-Telstra** (RoadRunner Telstra authentication method), **RR-Manager** (Roadrunner Manager authentication method), **RR-Toshiba** (Roadrunner Toshiba authentication method) or **Telia Login**. The following fields do not appear with the **Standard** service type.
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.
Login Server IP Address	Type the authentication server IP address here if your ISP gave you one. This field is not available for **Telia Login**.
Login Server (Telia Login only)	Type the domain name of the Telia login server, for example login1.telia.com.
Relogin Every(min) (Telia Login only)	The Telia server logs the NBG318S out if the NBG318S does not log in periodically. Type the number of minutes from 1 to 59 (30 default) for the NBG318S to wait between logins.
WAN IP Address Assignment	
Get automatically from ISP	Select this option If your ISP did not assign you a fixed IP address. This is the default selection.
Use Fixed IP Address	Select this option If the ISP assigned a fixed IP address.
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.
DNS Servers	
First DNS Server Second DNS Server Third DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG318S'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 NBG318S'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	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. Once it is successfully configured, the address will be copied to the rom file (ZyNOS configuration file). It will not change unless you change the setting or upload a different ROM file.

Table 33 Network > WAN > Internet Connection: Ethernet Encapsulation

LABEL	DESCRIPTION
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 NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

6.4.2 PPPoE Encapsulation

The NBG318S 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).

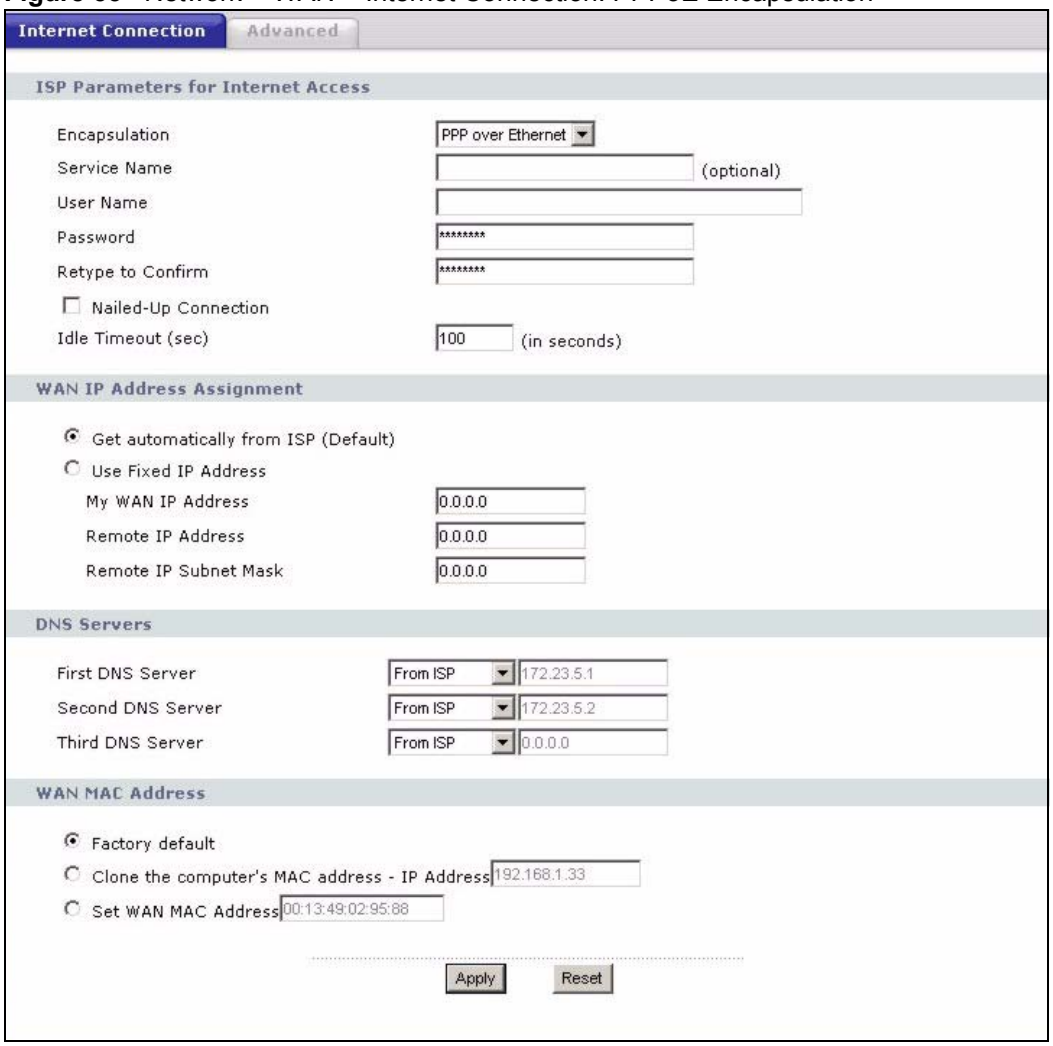
One of the benefits of PPPoE is the ability to let you access one of multiple network services, a function known as dynamic service selection. This enables the service provider to easily create and offer new IP services for individuals.

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 NBG318S (rather than individual computers), the computers on the LAN do not need PPPoE software installed, since the NBG318S 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 55 Network > WAN > Internet Connection: PPPoE Encapsulation



The following table describes the labels in this screen.

Table 34 Network > WAN > Internet Connection: PPPoE Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
Encapsulation	The **PPP over Ethernet** choice is for a dial-up connection using PPPoE. The NBG318S supports PPPoE (Point-to-Point Protocol over Ethernet). PPPoE is an IETF Draft standard (RFC 2516) specifying how a personal computer (PC) interacts with a broadband modem (i.e. xDSL, cable, wireless, etc.) connection. Operationally, PPPoE saves significant effort for both the end user and ISP/carrier, as it requires no specific configuration of the broadband modem at the customer site. By implementing PPPoE directly on the router rather than individual computers, the computers on the LAN do not need PPPoE software installed, since the router does that part of the task. Further, with NAT, all of the LAN's computers will have access.
Service Name	Type the PPPoE service name provided to you. PPPoE uses a service name to identify and reach the PPPoE server.
User Name	Type the user name given to you by your ISP.
Password	Type the password associated with the user name above.

Table 34 Network > WAN > Internet Connection: PPPoE Encapsulation

LABEL	DESCRIPTION
Retype to Confirm	Type your password again to make sure that you have entered is correctly.
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 seconds that elapses before the router automatically disconnects from the PPPoE server.
WAN IP Address Assignment	
Get automatically from ISP	Select this option If your ISP did not assign you a fixed IP address. This is the default selection.
Use Fixed IP Address	Select this option If the ISP assigned a fixed IP address.
My WAN IP Address	Enter your WAN IP address in this field if you selected **Use Fixed IP Address**.
Remote IP Address	Enter the remote IP address (if your ISP gave you one) in this field.
Remote IP Subnet Mask	Enter the remote IP subnet mask in this field.
DNS Servers	
First DNS Server Second DNS Server Third DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG318S'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 NBG318S'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	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. Once it is successfully configured, the address will be copied to the rom file (ZyNOS configuration file). It will not change unless you change the setting or upload a different ROM file.
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 NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

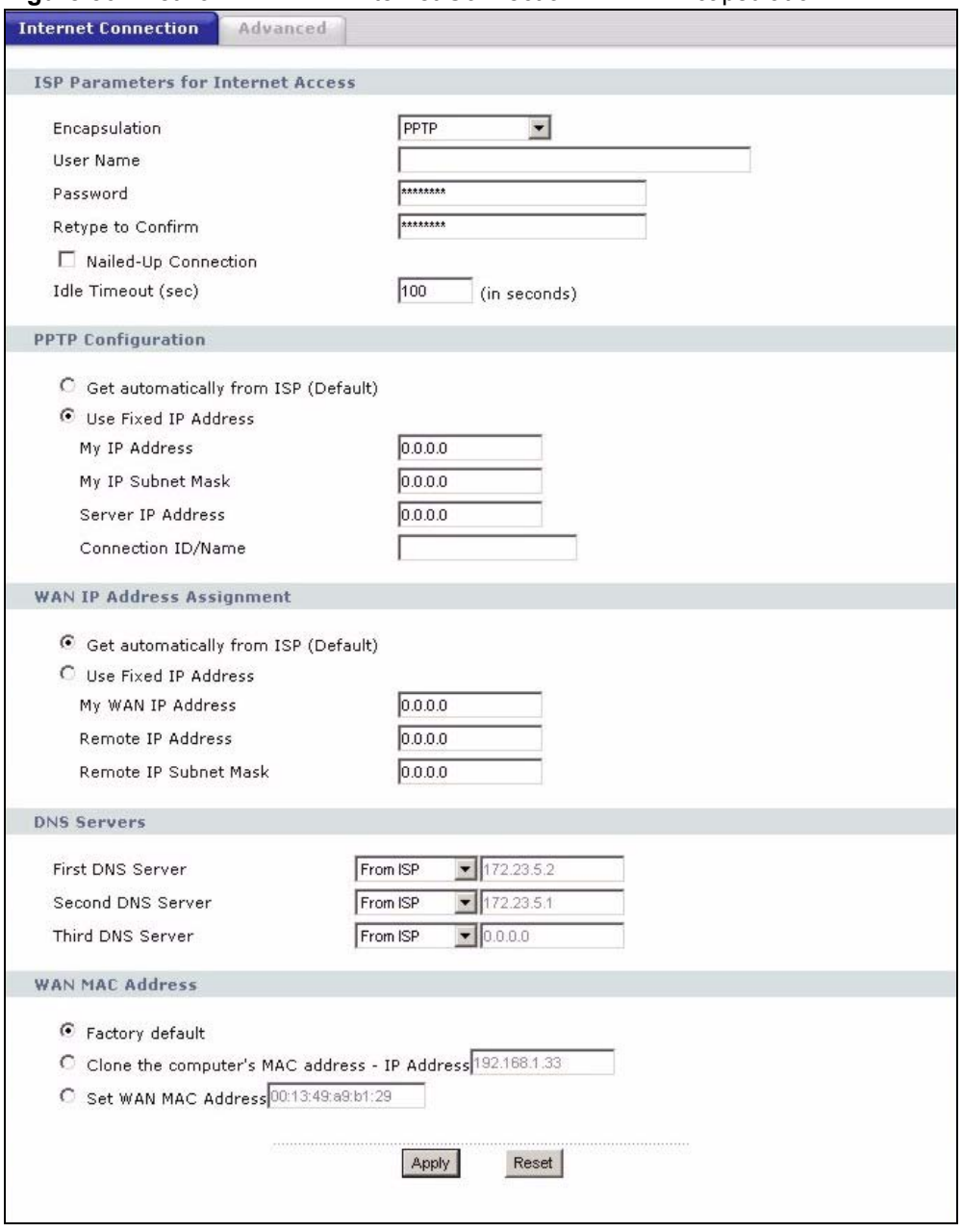
6.4.3 PPTP Encapsulation

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 56 Network > WAN > Internet Connection: PPTP Encapsulation



The following table describes the labels in this screen.

Table 35 Network > WAN > Internet Connection: PPTP Encapsulation

LABEL	DESCRIPTION
ISP Parameters for Internet Access	
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. The NBG318S supports only one PPTP server connection at any given time. 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.
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 seconds that elapses before the NBG318S automatically disconnects from the PPTP server.
PPTP Configuration	
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 IP Address	Type the (static) IP address assigned to you by your ISP.
My IP Subnet Mask	Your NBG318S 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 NBG318S.
Server IP Address	Type the IP address of the PPTP server.
Connection ID/ Name	Type your identification name for the PPTP server.
WAN IP Address Assignment	
Get automatically from ISP	Select this option If your ISP did not assign you a fixed IP address. This is the default selection.
Use Fixed IP Address	Select this option If the ISP assigned a fixed IP address.
My WAN IP Address	Enter your WAN IP address in this field if you selected **Use Fixed IP Address**.
Remote IP Address	Enter the remote IP address (if your ISP gave you one) in this field.
Remote IP Subnet Mask	Enter the remote IP subnet mask in this field.
DNS Servers	

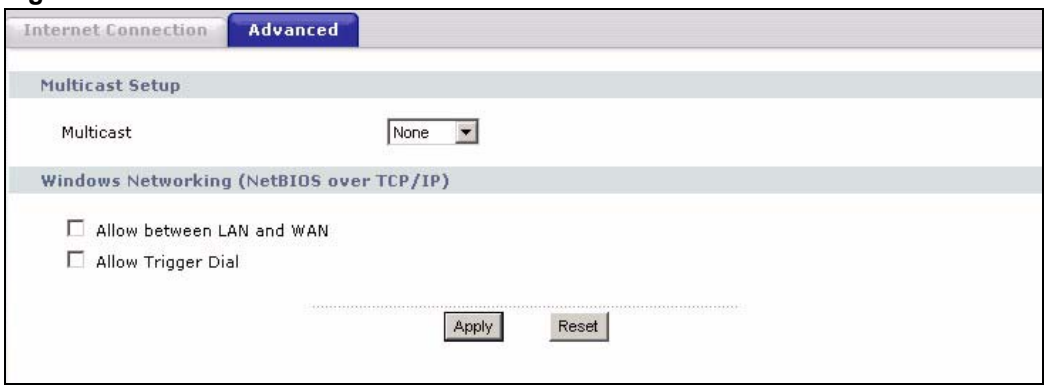
Table 35 Network > WAN > Internet Connection: PPTP Encapsulation

LABEL	DESCRIPTION
First DNS Server Second DNS Server Third DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG318S'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 NBG318S'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	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. Once it is successfully configured, the address will be copied to the rom file (ZyNOS configuration file). It will not change unless you change the setting or upload a different ROM file.
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 NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

6.5 Advanced WAN Screen

To change your NBG318S's advanced WAN settings, click **Network** > **WAN** > **Advanced**. The screen appears as shown.

Figure 57 Network > WAN > Advanced



The following table describes the labels in this screen.

Table 36 WAN > Advanced

LABEL	DESCRIPTION
Multicast Setup	
Multicast	Select **IGMP V-1**, **IGMP V-2** or **None**. 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. IGMP version 2 (RFC 2236) is an improvement over version 1 (RFC 1112) but IGMP version 1 is still in wide use. If you would like to read more detailed information about interoperability between IGMP version 2 and version 1, please see sections 4 and 5 of RFC 2236.
Windows Networking (NetBIOS over TCP/IP): NetBIOS (Network Basic Input/Output System) are TCP or UDP broadcast packets that enable a computer to connect to and communicate with a LAN. For some dial-up services such as PPPoE or PPTP, NetBIOS packets cause unwanted calls. However it may sometimes be necessary to allow NetBIOS packets to pass through to the WAN in order to find a computer on the WAN.	
Allow between LAN and WAN	Select this check box to forward NetBIOS packets from the LAN to the WAN and from the WAN to the LAN. If your firewall is enabled with the default policy set to block WAN to LAN traffic, you also need to enable the default WAN to LAN firewall rule that forwards NetBIOS traffic. Clear this check box to block all NetBIOS packets going from the LAN to the WAN and from the WAN to the LAN.
Allow Trigger Dial	Select this option to allow NetBIOS packets to initiate calls.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

7

LAN

This chapter describes how to configure LAN settings.

7.1 LAN Overview

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.

7.1.1 IP Pool Setup

The NBG318S 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 NBG318S 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.

7.1.2 System DNS Servers

Refer to the IP address and subnet mask section in the **Connection Wizard** chapter.

7.2 LAN TCP/IP

The NBG318S has built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

7.2.1 Factory LAN Defaults

The LAN parameters of the NBG318S 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.

7.2.2 IP Address and Subnet Mask

Refer to the IP address and subnet mask section in the **Connection Wizard** chapter for this information.

7.2.3 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.

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. IGMP version 2 (RFC 2236) is an improvement over version 1 (RFC 1112) but IGMP version 1 is still in wide use. If you would like to read more detailed information about interoperability between IGMP version 2 and version 1, please see sections 4 and 5 of RFC 2236. The class D IP address is used to identify host groups and can be in the range 224.0.0.0 to 239.255.255.255. The address 224.0.0.0 is not assigned to any group and is used by IP multicast computers. The address 224.0.0.1 is used for query messages and is assigned to the permanent group of all IP hosts (including gateways). All hosts must join the 224.0.0.1 group in order to participate in IGMP. The address 224.0.0.2 is assigned to the multicast routers group.

The NBG318S supports both IGMP version 1 (**IGMP-v1**) and IGMP version 2 (**IGMP-v2**). At start up, the NBG318S queries all directly connected networks to gather group membership. After that, the NBG318S periodically updates this information. IP multicasting can be enabled/disabled on the NBG318S LAN and/or WAN interfaces in the web configurator (**LAN**; **WAN**). Select **None** to disable IP multicasting on these interfaces.

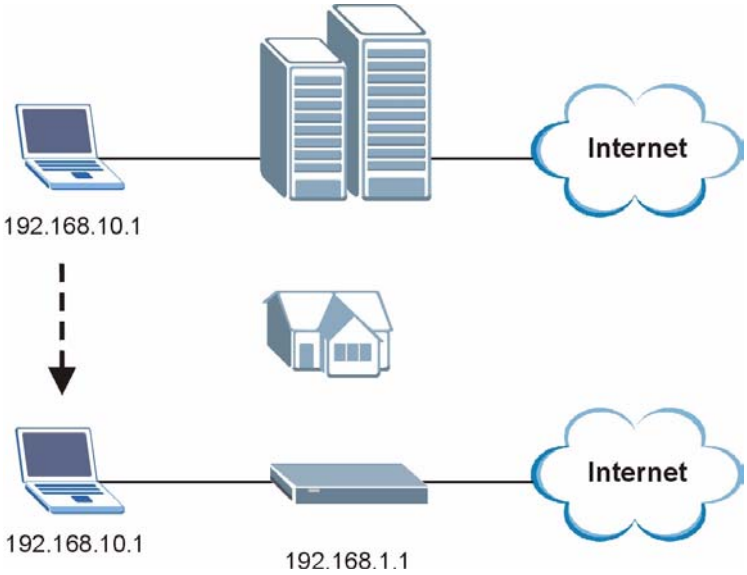
7.2.4 Any IP

Traditionally, you must set the IP addresses and the subnet masks of a computer and the NBG318S to be in the same subnet to allow the computer to access the Internet (through the NBG318S). In cases where your computer is required to use a static IP address in another network, you may need to manually configure the network settings of the computer every time you want to access the Internet via the NBG318S.

With the Any IP feature and NAT enabled, the NBG318S allows a computer to access the Internet without changing the network settings (such as IP address and subnet mask) of the computer, when the IP addresses of the computer and the NBG318S are not in the same subnet. Whether a computer is set to use a dynamic or static (fixed) IP address, you can simply connect the computer to the NBG318S and access the Internet.

The following figure depicts a scenario where a computer is set to use a static private IP address in the corporate environment. In a residential house where a NBG318S is installed, you can still use the computer to access the Internet without changing the network settings, even when the IP addresses of the computer and the NBG318S are not in the same subnet.

Figure 58 Any IP Example



The Any IP feature does not apply to a computer using either a dynamic IP address or a static IP address that is in the same subnet as the NBG318S's IP address.

You *must* enable NAT to use the Any IP feature on the NBG318S.

Address Resolution Protocol (ARP) is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address, also known as a Media Access Control or MAC address, on the local area network. IP routing table is defined on IP Ethernet devices (the NBG318S) to decide which hop to use, to help forward data along to its specified destination.

The following lists out the steps taken, when a computer tries to access the Internet for the first time through the NBG318S.

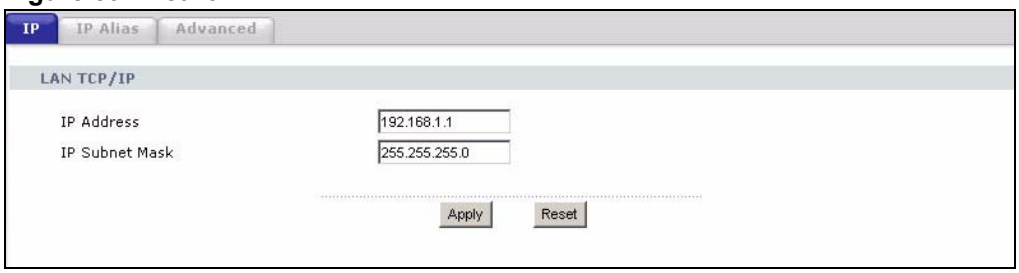
1. When a computer (which is in a different subnet) first attempts to access the Internet, it sends packets to its default gateway (which is not the NBG318S) by looking at the MAC address in its ARP table.
2. When the computer cannot locate the default gateway, an ARP request is broadcast on the LAN.
3. The NBG318S receives the ARP request and replies to the computer with its own MAC address.
4. The computer updates the MAC address for the default gateway to the ARP table. Once the ARP table is updated, the computer is able to access the Internet through the NBG318S.
5. When the NBG318S receives packets from the computer, it creates an entry in the IP routing table so it can properly forward packets intended for the computer.

After all the routing information is updated, the computer can access the NBG318S and the Internet as if it is in the same subnet as the NBG318S.

7.3 LAN IP Screen

Use this screen to change your basic LAN settings. Click **Network** > **LAN**.

Figure 59 Network > LAN > IP



The following table describes the labels in this screen.

Table 37 Network > LAN > IP

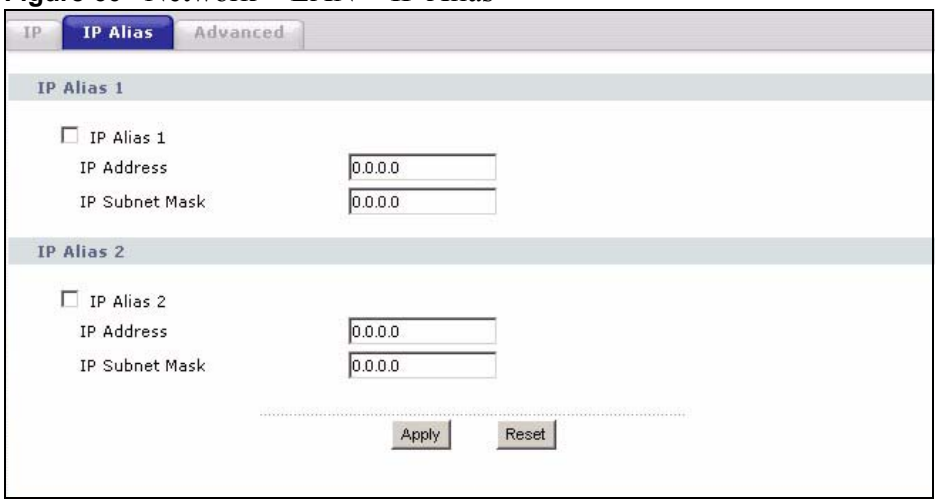
LABEL	DESCRIPTION
LAN TCP/IP	
IP Address	Type the IP address of your NBG318S in dotted decimal notation 192.168.1.1 (factory default).
IP Subnet Mask	The subnet mask specifies the network number portion of an IP address. Your NBG318S will automatically calculate the subnet mask based on the IP address that you assign. Unless you are implementing subnetting, use the subnet mask computed by the NBG318S.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

7.4 LAN IP Alias

IP alias allows you to partition a physical network into different logical networks over the same Ethernet interface. The NBG318S supports three logical LAN interfaces via its single physical Ethernet interface with the NBG318S itself as the gateway for each LAN network.

To change your NBG318S's IP alias settings, click **Network** > **LAN** > **IP Alias**. The screen appears as shown.

Figure 60 Network > LAN > IP Alias



The following table describes the labels in this screen.

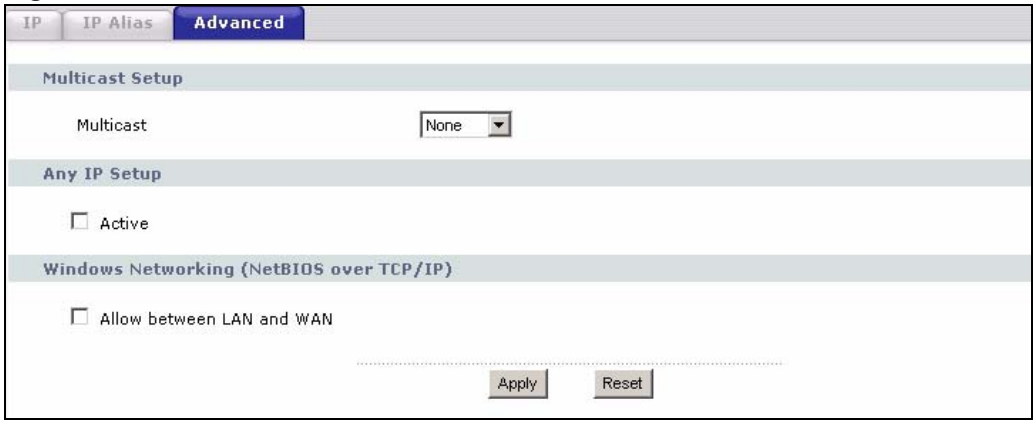
Table 38 Network > LAN > IP Alias

LABEL	DESCRIPTION
IP Alias 1,2	Select the check box to configure another LAN network for the NBG318S.
IP Address	Enter the IP address of your NBG318S in dotted decimal notation.
IP Subnet Mask	Your NBG318S 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 NBG318S.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

7.5 Advanced LAN Screen

To change your NBG318S's advanced IP settings, click **Network** > **LAN** > **Advanced**. The screen appears as shown.

Figure 61 Network > LAN > Advanced



The following table describes the labels in this screen.

Table 39 Network > LAN > Advanced

LABEL	DESCRIPTION
Multicast	Select **IGMP V-1** or **IGMP V-2** or **None**. 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. IGMP version 2 (RFC 2236) is an improvement over version 1 (RFC 1112) but IGMP version 1 is still in wide use. If you would like to read more detailed information about interoperability between IGMP version 2 and version 1, please see sections 4 and 5 of RFC 2236.
Any IP Setup	
Active	Select this if you want to let computers on different subnets use the NBG318S.
Windows Networking (NetBIOS over TCP/IP): NetBIOS (Network Basic Input/Output System) are TCP or UDP broadcast packets that enable a computer to connect to and communicate with a LAN. For some dial-up services such as PPPoE or PPTP, NetBIOS packets cause unwanted calls. However it may sometimes be necessary to allow NetBIOS packets to pass through to the WAN in order to find a computer on the WAN.	
Allow between LAN and WAN	Select this check box to forward NetBIOS packets from the LAN to the WAN and from the WAN to the LAN. If your firewall is enabled with the default policy set to block WAN to LAN traffic, you also need to enable the default WAN to LAN firewall rule that forwards NetBIOS traffic. Clear this check box to block all NetBIOS packets going from the LAN to the WAN and from the WAN to the LAN.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

8

HomePlug AV

This chapter introduces the main applications and management of the powerline feature.

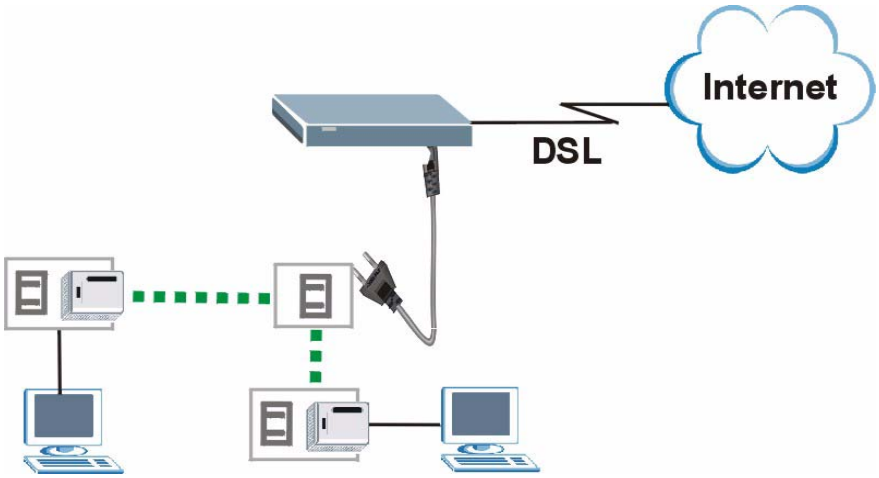
8.1 Overview

The NBG318S is a HomePlug AV compliant powerline Ethernet adapter. The NBG318S and other HomePlug AV powerline adapters in your network communicate with each other by sending and receiving information over your home's electrical wiring.

The NBG318S plugs into an ordinary outlet to create a new network which can extend to any other electrical outlet in any room of a house.

The following section shows you a typical application.

Figure 62 Expand Your Network



To set up your powerline network do the following.

1. Connect your NBG318S to the Internet.
2. Then plug your NBG318S into a power outlet.

The NBG318S is ready for connection on a powerline network.

3. Connect another HomePlug AV compatible adapter to a computer and then plug it in on the same home or office wiring.

After configuring the settings on all adapters (see Section 8.3 on page 112) your computer can now connect to the powerline network and to the Internet. Your powerline network can be further expanded by plugging additional powerline adapters into other outlets in your home and connecting other computers or network devices (for example, a printer) to them.

In this User's Guide the electrical wiring network may be referred to as the "powerline network".

8.2 Privacy and Powerline Adapters

When the NBG318S communicates with each other HomePlug AV compliant powerline adapters, they use encryption to scramble the information that is sent in the powerline network. Encryption is like a secret code. If you do not know the secret code, you cannot understand the message. The HomePlug AV standard uses 128-bit AES (Advanced Encryption Standard) to safely transmit data between powerline adapters.

For the NBG318S and powerline adapters to communicate with each other they all need to use the same Network Membership Key (NMK). Otherwise, they cannot unscramble the encrypted data sent in the powerline network.

The NMK is derived from the network password you assign to the NBG318S and powerline adapters. By default all HomePlug powerline adapters are configured with the network password **HomePlugAV**. This allows all HomePlug powerline adapters and the NBG318S to communicate with each other without any software configuration. This also means that if you don't change the network password, any HomePlug AV powerline adapter connected to your powerline circuit can see your network data.

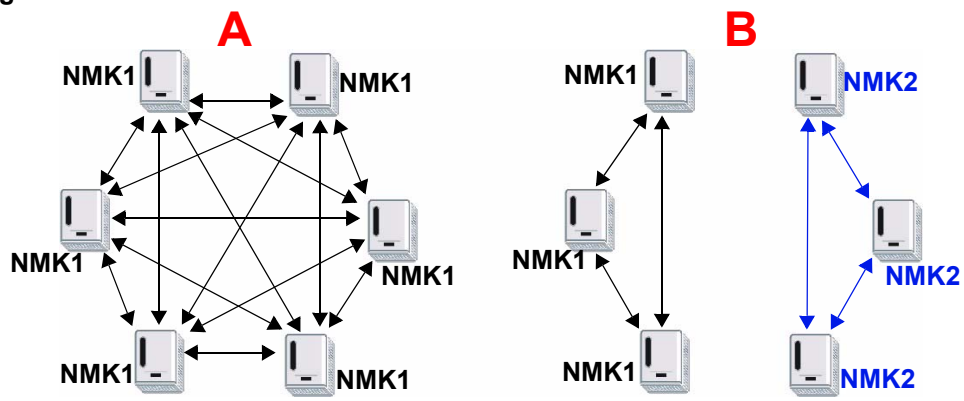
Change the network password on your powerline adapters to ensure secure data transmission on your powerline network.

8.2.1 Setting Up a Private Powerline Network

To prevent others compromising your network security, you can create a private network. Create a private network by changing the network password only on the powerline adapters you want to communicate in your network. The NBG318S and powerline adapters convert the network password to a Network Membership Key (NMK). Only the powerline adapters with the same NMK can communicate in your network.

The following figure shows a scenario **A** - where all the powerline adapters have the same NMK (**NMK1**) and scenario **B** - where some adapters use **NMK1** and some use **NMK2**.

Figure 63 Powerline Network Scenario



In both cases the powerline adapters reside on the same electrical circuit. In scenario **A** all the powerline adapters can communicate with each other. In scenario **B** only the adapters with the same NMK can receive and unscramble communication between each other.

8.2.2 Setting Up Multiple Powerline Networks.

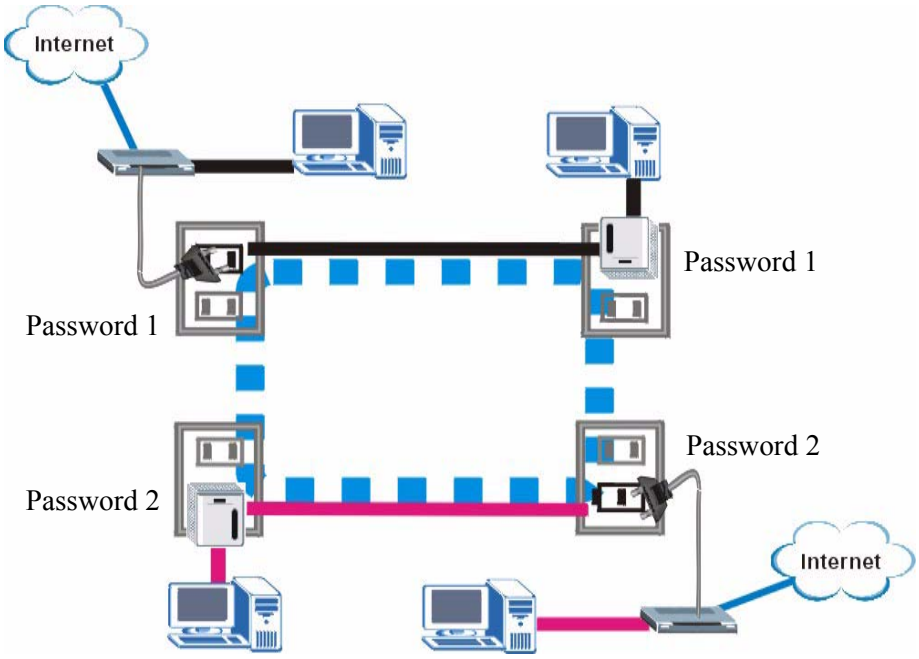
Multiple powerline networks can coexist on a single powerline circuit. You might want to implement multiple powerline networks in a small office environment where you have two separate Ethernet networks.

Connect one powerline adapter to a router or switch on the first Ethernet network and assign a network password (for example, “Password1”) to this powerline adapter. Add additional powerline adapters to your network by plugging them into your powerline outlets and assigning them the same network password, “Password1”. This completes the configuration of your first powerline network.

Connect another powerline adapter to a router or switch on the second Ethernet network and assign a different network password (for example “Password2”) to this powerline adapter. Again, add additional powerline adapters and assign them the same second network password, “Password2”.

You now have two private networks on your powerline circuit. Information is not shared between the two networks as only powerline adapters with the same password can communicate with each other. The following figure shows two private powerline networks on the same electrical circuit.

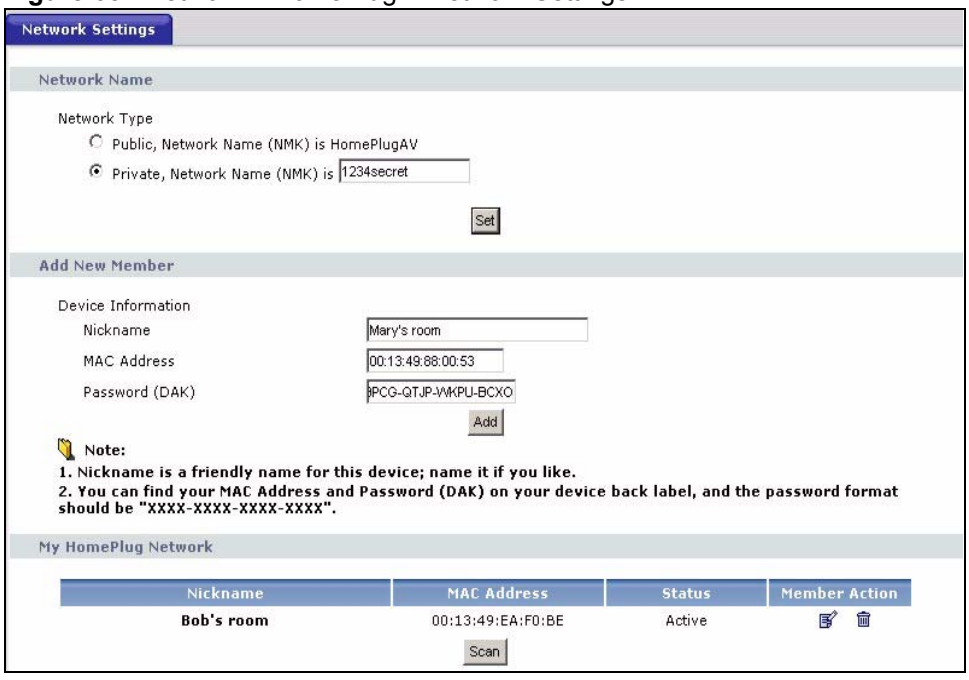
Figure 64 Two Private Powerline Networks on One Circuit



8.3 Configuring Your HomePlug AV Devices

Click on **Network > HomePlug** to see the screen below. Use this screen to set up a HomePlug AV network and to check the status of HomePlug AV devices on your electrical circuit.

Figure 65 Network > HomePlug > Network Settings



The following table describes the labels in the screen.

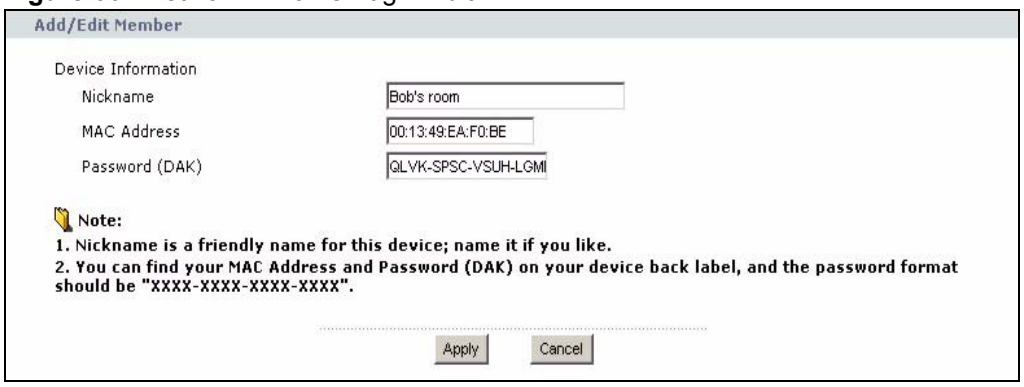
Table 40 Network > HomePlug > Network Settings

LABEL	DESCRIPTION
Network Name	This section lets you set the name of your network and to make it either public or private. The **Network Name** performs the same function as a network password. All devices on your HomePlug network have the same **Network Name.** A device with a different **Network Name** cannot be on your network. You can add other HomePlugAV devices to your network by giving them the same **Network Name**.
Network Type	The network may be either public or private.
Public, Network Name (NMK) is HomePlug AV	Select this option if you want to make your powerline network public with the default **Network Name** of “HomePlug AV”. Since this is a well known **NMK** it is less secure than a private **NMK**.
Private, Network Name (NMK) is	Select this option if you wish to make your powerline network more secure with a private **Network Name**. Type the name of your private powerline network in the field. You may enter up to 64 alphanumeric characters for the **Network Name**.
Set	Click **Set** to change the **Network Name** of all the devices currently in your network.
Add New Member	This section lets you add new Home Plug AV enabled devices to your powerline network. When you add the device it is given the current **Network Name**.
Device Information	In this section type information to identify the new powerline device you are adding on your network.
Nickname	Type a name you wish to use to identify a specific powerline adapter, for example, “Mary’s room”.
MAC Address	Type the MAC address of the adapter you wish to add. The MAC address of your powerline adapter can be found by looking at the label on your device. It consists of six pairs of hexadecimal characters (hexadecimal characters are “0-9” and “a-f”). In the case of the NBG318S, this label is on the bottom of the device.
Password (DAK)	The **Password (DAK)** (DAK stands for Device Access Key), is used to verify that you are authorized to perform changes on a device. You can find the **DAK** printed on a sticker on the bottom of a HomePlug enabled device.
My Homeplug Network	This section provides information on the HomePlug AV devices in your network (or that were previously connected on it but are currently disconnected).
Nickname	This is the nickname you gave to the HomePlug AV device.
MAC Address	This is the MAC address of the HomePlug AV device.
Status	This field shows the status of the device. If the field shows **Active**, then the device is connected to your network. If the field shows **Out of Network,** the device has been added to the network but it is not ready. Check whether it is turned on and connected. If the field shows **Not Member**, it is not on the network. The NBG318S is aware of it, but cannot manage the device. If you click **Set**, the device’s **Network Name** will not change. You can add it to the network by clicking on **Edit** or entering its details in the **Add New member section**.

LABEL	DESCRIPTION
Member Action	This field shows the **Edit** icon and the **Delete** icon. Click on **Edit** to add a device to the network or to edit details such as the device's **Nickname**. Click on **Delete** to remove the device from the network. If you want to set up a second network, remove the devices from **My HomePlug Network** that you want to keep in your first network before you set the new **Network Name** for the second network.
Scan	Click **Scan** to detect devices on the same electrical circuit as the NBG318S.

Click on **Network > HomePlug > Edit** to see the screen below. Use this screen to add a new HomePlug AV device to the network. You can also edit a device's details.

Figure 66 Network > HomePlug > Edit



The following table describes the labels in the screen.

Table 41 Network > HomePlug > Edit

LABEL	DESCRIPTION
Device Information	
Nickname	Type a name you wish to use to identify a specific powerline adapter, for example, "Bob's room".
MAC Address	This is the MAC address of the HomePlug AV device. The MAC Address will appear in this field if the device's status is either **Active** or **Not Member**. If the device's status is **Out of Network** or your NBG318S can not detect it, type the MAC Address here.
Password (DAK)	The **Password (DAK)** (DAK stands for Device Access Key), is used to verify that you are authorized to perform changes on a device. You can find the **DAK** printed on a sticker on the bottom of a HomePlug enabled device.
Apply	Click this button to apply add the device to the network or to apply your changes.
Cancel	Click this button to return to the previous screen.

9

DHCP

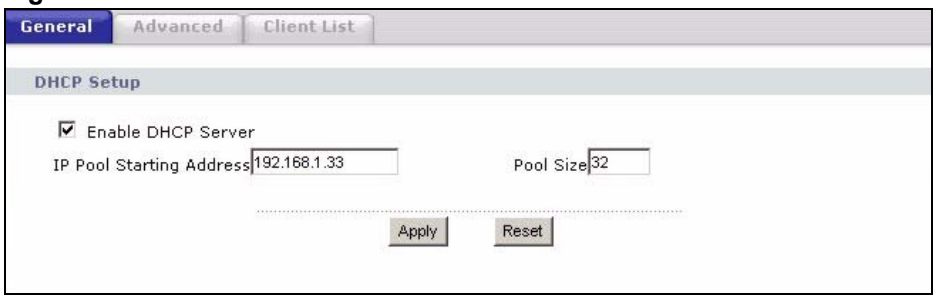
9.1 DHCP

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 NBG318S as a DHCP server or disable it. When configured as a server, the NBG318S 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.

9.2 DHCP Server General Screen

Click **Network** > **DHCP Server**. The following screen displays.

Figure 67 Network > DHCP Server > General



The following table describes the labels in this screen.

Table 42 Network > DHCP Server > General

LABEL	DESCRIPTION
Enable DHCP Server	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 NBG318S acting as a DHCP server. When configured as a server, the NBG318S 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.
Pool Size	This field specifies the size, or count of the IP address pool.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

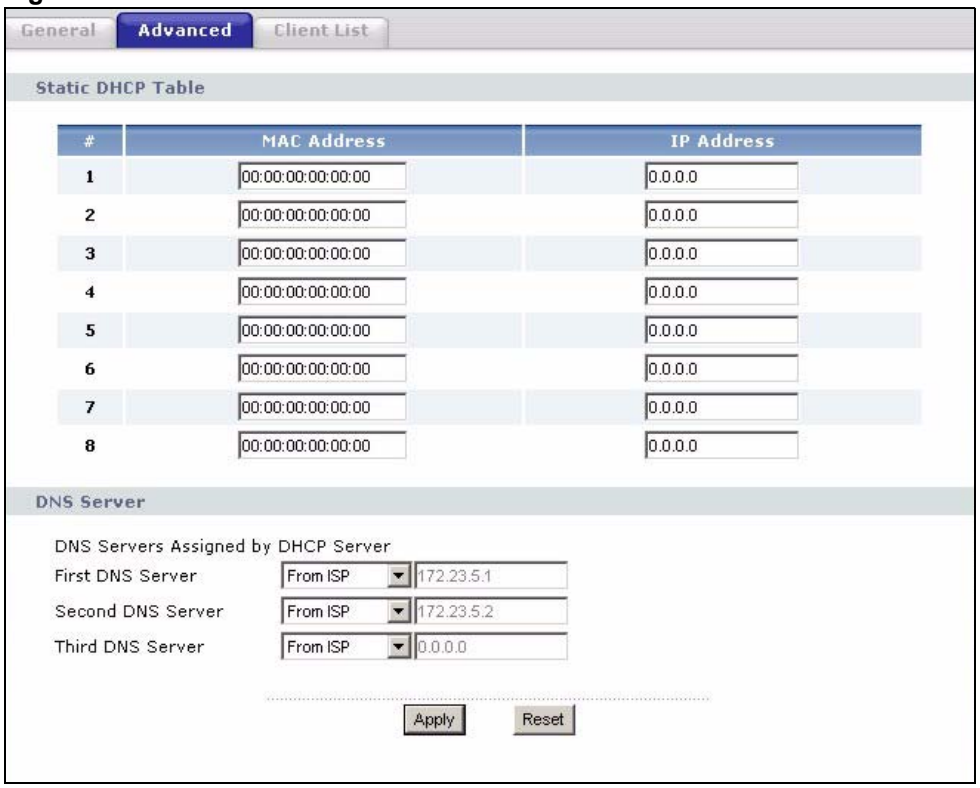
9.3 DHCP Server Advanced Screen

This screen allows you to assign IP addresses on the LAN to specific individual computers based on their MAC addresses. You can also use this screen to configure the DNS server information that the NBG318S sends to the DHCP clients.

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.

To change your NBG318S's static DHCP settings, click **Network** > **DHCP Server** > **Advanced**. The following screen displays.

Figure 68 Network > DHCP Server > Advanced



The following table describes the labels in this screen.

Table 43 Network > DHCP Server > Advanced

LABEL	DESCRIPTION
#	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 Servers Assigned by DHCP Server The NBG318S passes a DNS (Domain Name System) server IP address (in the order you specify here) to the DHCP clients. The NBG318S 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 43 Network > DHCP Server > Advanced

LABEL	DESCRIPTION
First DNS Server Second DNS Server Third DNS Server	Select **From ISP** if your ISP dynamically assigns DNS server information (and the NBG318S'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 NBG318S act as a DNS proxy. The NBG318S's LAN IP address displays in the field to the right (read-only). The NBG318S tells the DHCP clients on the LAN that the NBG318S itself is the DNS server. When a computer on the LAN sends a DNS query to the NBG318S, the NBG318S forwards the query to the NBG318S'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 NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

9.4 Client List Screen

The DHCP table shows current DHCP client information (including **IP Address**, **Host Name** and **MAC Address**) of all network clients using the NBG318S's DHCP server.

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

You can also view a read-only client list by clicking the **DHCP Table (Details...)** hyperlink in the **Status** screen.

The following screen displays.

Figure 69 Network > DHCP Server > Client List

The following table describes the labels in this screen.

Table 44 Network > DHCP Server > Client List

LABEL	DESCRIPTION
#	This is the index number of the host computer.
IP Address	This field displays the IP address relative to the # field listed above.
Host Name	This field displays the computer host name.
MAC Address	The MAC (Media Access Control) or Ethernet address on a LAN (Local Area Network) is unique to your computer (six pairs of hexadecimal notation). A network interface card such as an Ethernet adapter has a hardwired address that is assigned at the factory. This address follows an industry standard that ensures no other adapter has a similar address.
Reserve	Select this check box to have the NBG318S always assign this IP address to this MAC address (and host name). After you click **Apply**, the MAC address and IP address also display in the **Advanced** screen (where you can edit them).
Refresh	Click **Refresh** to reload the DHCP table.

10

Network Address Translation (NAT)

This chapter discusses how to configure NAT on the NBG318S.

10.1 NAT 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.

10.2 Using NAT

You must create a firewall rule in addition to setting up NAT, to allow traffic from the WAN to be forwarded through the NBG318S.

10.2.1 Port 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.

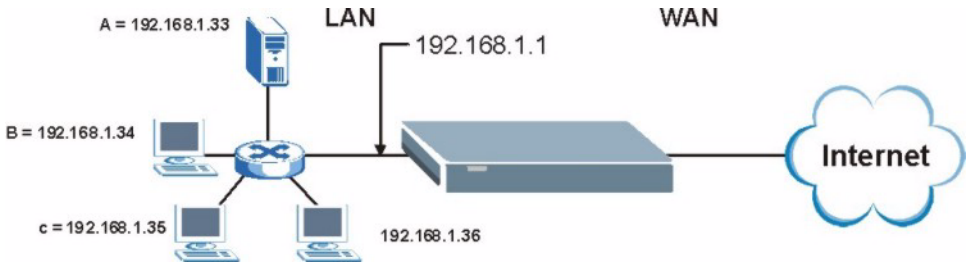
In addition to the servers for specified services, NAT supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default is not defined, the service request is simply discarded.

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.

10.2.2 Configuring Servers Behind 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

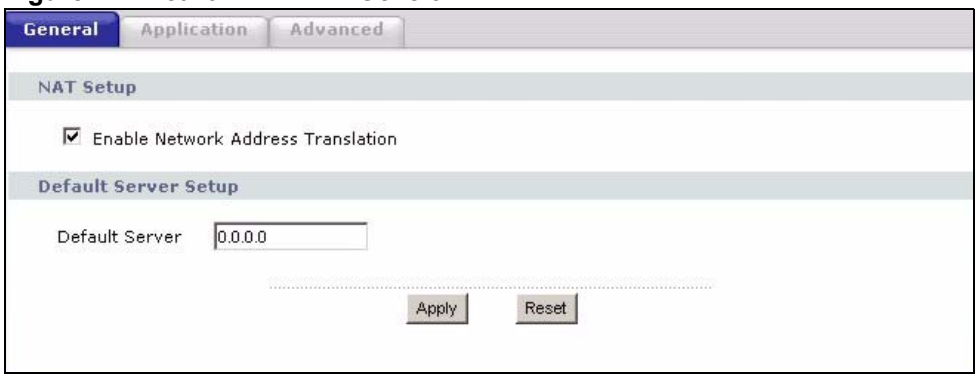
Figure 70 Multiple Servers Behind NAT Example



10.3 General NAT Screen

Click **Network > NAT** to open the **General** screen.

Figure 71 Network > NAT > General



The following table describes the labels in this screen.

Table 45 Network > NAT > General

LABEL	DESCRIPTION
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.
Default Server Setup	
Default Server	In addition to the servers for specified services, NAT supports a default server. A default server receives packets from ports that are not specified in the **Application** screen. If you do not assign a **Default Server** IP address, the NBG318S 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 NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

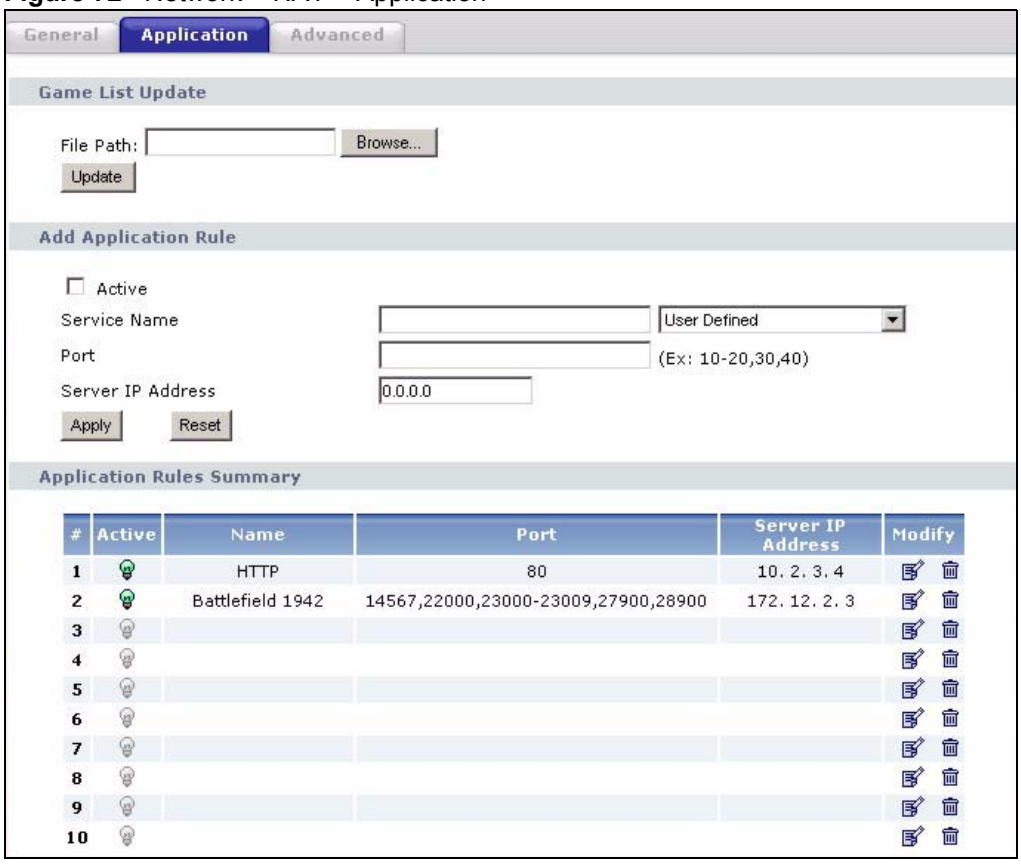
10.4 NAT Application Screen

Port forwarding allows you to define the local servers to which the incoming services will be forwarded. To change your NBG318S's port forwarding settings, click **Network > NAT** > **Application**. The screen appears as shown.

If you do not assign a **Default Server** IP address in the **NAT > General** screen, the NBG318S discards all packets received for ports that are not specified in this screen or remote management.

Refer to Appendix F on page 271 for port numbers commonly used for particular services.

Figure 72 Network > NAT > Application



The following table describes the labels in this screen.

Table 46 NAT Application

LABEL	DESCRIPTION
Game List Update	A game list includes the pre-defined service name(s) and port number(s). You can edit and upload it to the NBG318S to replace the existing entries in the second field next to **Service Name**.
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.txt file you want to upload. Remember that you must decompress compressed (.zip) files before you can upload them.
Update	Click **Update** to begin the upload process. This process may take up to two minutes.
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.

Table 46 NAT Application (continued)

LABEL	DESCRIPTION
Port	Type a port number(s) to be forwarded. To specify a range of ports, enter a hyphen (-) between the first port and the last port, such as 10-20. To specify two or more non-consecutive port numbers, separate them by a comma without spaces, such as 123,567.
Server IP Address	Type the inside IP address of the server that receives packets from the port(s) specified in the **Port** field.
Apply	Click **Apply** to save your changes to the **Application Rules Summary** table.
Reset	Click **Reset** to not save and return your new changes in the **Service Name** and **Port** fields to the previous one.
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.

10.4.1 Game List Example

Here is an example game list text file. The index number, service name and associated port(s) are specified by semi-colons (no spaces). Use the name=xxx (where xxx is the service name) to create a new service. Port range can be separated with a hyphen (-) (no spaces). Multiple (non-consecutive) ports can be separated by commas.

Figure 73 Game List Example

```
version=1
1;name=Battlefield 1942;port=14567,22000,23000-23009,27900,28900
2;name=Call of Duty;port=28960
3;name=Civilization IV;port=2056
4;name=Diablo I and II;port=6112-6119,4000
5;name=Doom 3;port=27666
6;name=F.E.A.R;port=27888
7;name=Final Fantasy XI;port=25,80,110,443,50000-65535
8;name=Guild Wars;port=6112,80
9;name=Half Life;port=6003,7002,27005,27010,27011,27015
10;name=Jedi Knight III: Jedi Academy;port=28060-28062,28070-28081
11;name=Need for Speed: Hot Pursuit 2;port=1230,8511-
8512,27900,28900,61200-61230
12;name=Neverwinter Nights;port=5120-5300,6500,27900,28900
13;name=Quake 2;port=27910
14;name=Quake 3;port=27660,27960
15;name=Rainbow Six 3: Raven Shield;port=7777-7787,8777-8787
16;name=Serious Sam II;port=25600-25605
17;name=Silent Hunter III;port=17997-18003
18;name=Soldier of Fortune II;port=20100-20112
19;name=Starcraft;port=6112-6119,4000
20;name=Star Trek: Elite Force II;port=29250,29256
21;name=SWAT 4;port=10480-10483
22;name=Warcraft II and III;port=6112-6119,4000
23;name=World of Warcraft;port=3724
```

10.5 Trigger Port Forwarding

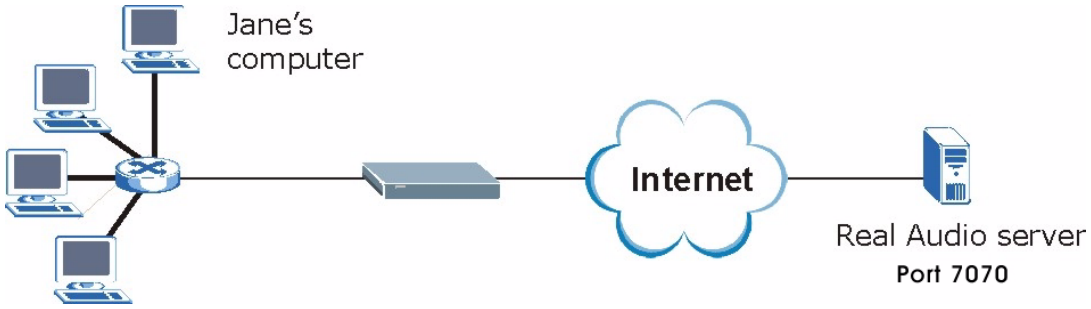
Some services use a dedicated range of ports on the client side and a dedicated range of ports on the server side. With regular port forwarding you set a forwarding port in NAT to forward a service (coming in from the server on the WAN) to the IP address of a computer on the client side (LAN). The problem 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 NBG318S 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 NBG318S's WAN port receives a response with a specific port number and protocol ("incoming" port), the NBG318S 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.

10.5.1 Trigger Port Forwarding Example

The following is an example of trigger port forwarding.

Figure 74 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 NBG318S to record Jane's computer IP address. The NBG318S 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 NBG318S 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 NBG318S times out in three minutes with UDP (User Datagram Protocol), or two hours with TCP/IP (Transfer Control Protocol/Internet Protocol).

10.5.2 Two Points To Remember About Trigger Ports

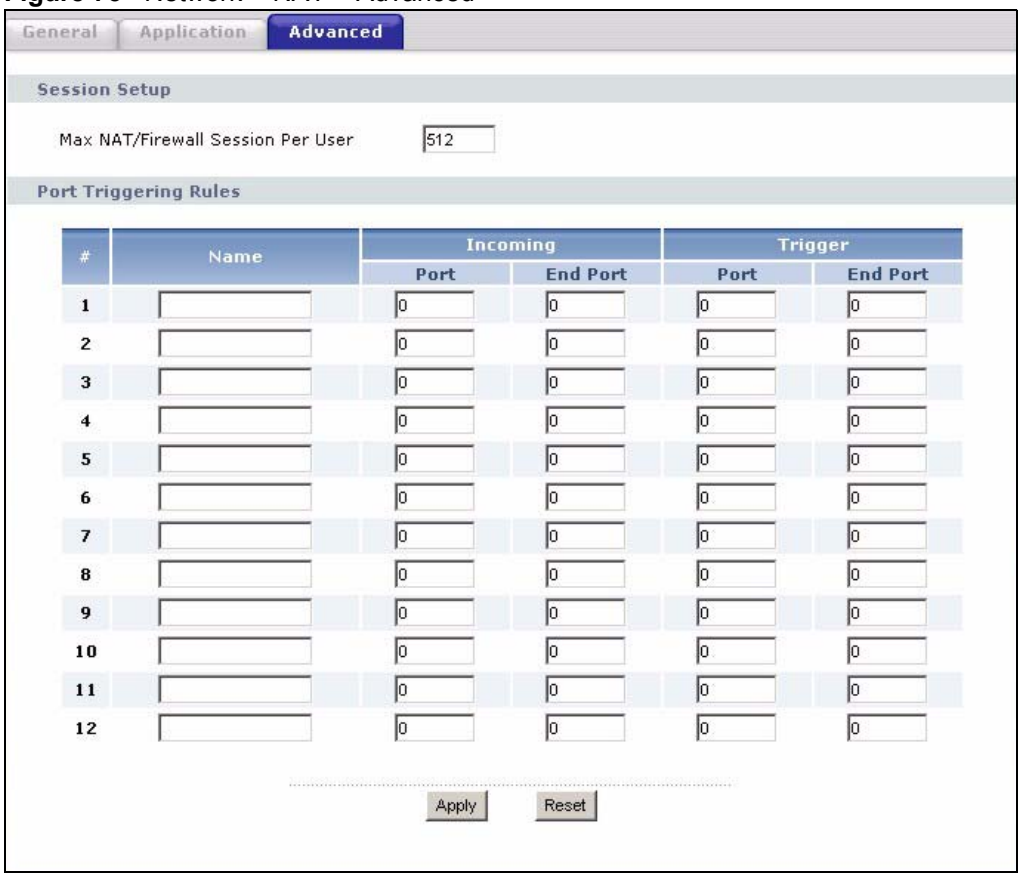
1. Trigger events only happen on data that is going coming from inside the NBG318S and going to the outside.
2. If an application needs a continuous data stream, that port (range) will be tied up so that another computer on the LAN can't trigger it.

10.6 NAT Advanced Screen

To change your NBG318S's trigger port settings, click **Network > NAT** > **Advanced**. The screen appears as shown.

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

Figure 75 Network > NAT > Advanced



The following table describes the labels in this screen.

Table 47 Network > NAT > Advanced

LABEL	DESCRIPTION
Max NAT/Firewall Session Per User	Type a number ranging from 1 to 2048 to limit the number of NAT/firewall sessions that a host can create. When computers use peer to peer applications, such as file sharing applications, they may use a large number of NAT sessions. If you do not limit the number of NAT sessions a single client can establish, this can result in all of the available NAT sessions being used. In this case, no additional NAT sessions can be established, and users may not be able to access the Internet. Each NAT session establishes a corresponding firewall session. Use this field to limit the number of NAT/firewall sessions each client computer can establish through the NBG318S. If your network has a small number of clients using peer to peer applications, you can raise this number to ensure that their performance is not degraded by the number of NAT sessions they can establish. If your network has a large number of users using peer to peer applications, you can lower this number to ensure no single client is using all of the available NAT sessions.
Port Triggering Rules	
#	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.

Table 47 Network > NAT > Advanced

LABEL	DESCRIPTION
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 NBG318S forwards the traffic with this port (or range of ports) to the client computer on the LAN that requested the service.
Start 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 NBG318S to record the IP address of the LAN computer that sent the traffic to a server on the WAN.
Start Port	Type a port number or the starting port number in a range of port numbers.
End Port	Type a port number or the ending port number in a range of port numbers.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

11

Dynamic DNS

11.1 Dynamic DNS Introduction

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.

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

11.1.1 DynDNS Wildcard

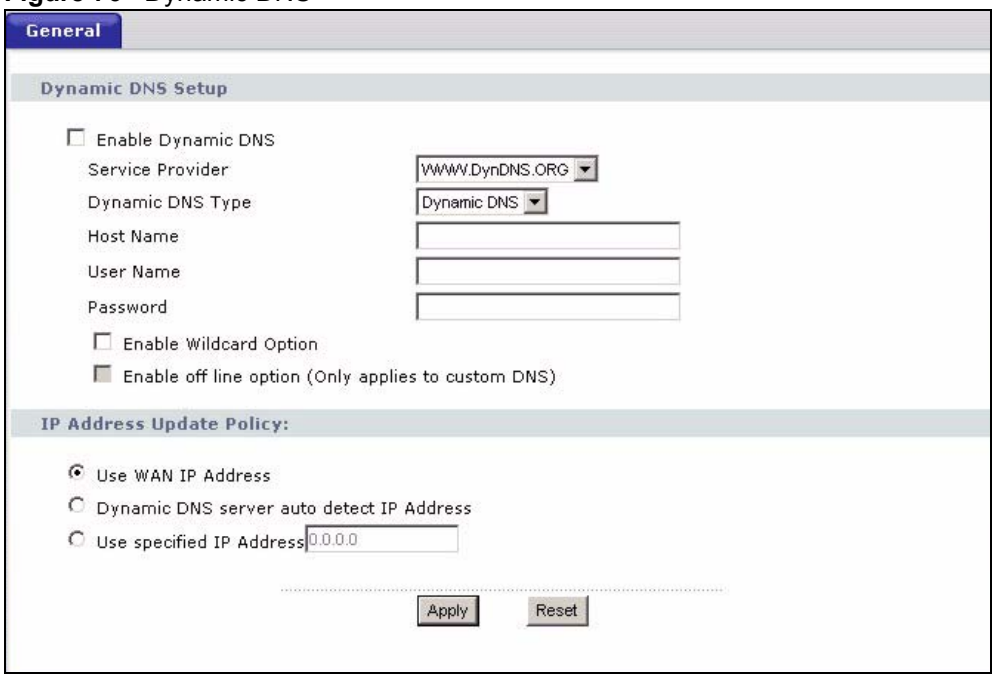
Enabling the wildcard feature for your host causes *.yourhost.dyndns.org to be aliased to the same IP address as yourhost.dyndns.org. This feature is useful if you want to be able to use, for example, www.yourhost.dyndns.org and still reach your hostname.

If you have a private WAN IP address, then you cannot use Dynamic DNS.

11.2 Dynamic DNS Screen

To change your NBG318S's DDNS, click **Network > DDNS**. The screen appears as shown.

Figure 76 Dynamic DNS



The following table describes the labels in this screen.

Table 48 Dynamic DNS

LABEL	DESCRIPTION
Enable Dynamic DNS	Select this check box to use dynamic DNS.
Service Provider	Select the name of your Dynamic DNS service provider.
Dynamic DNS Type	Select the type of service that you are registered for from 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.
Enable Wildcard Option	Select the check box to enable DynDNS Wildcard.
Enable off line option	This option is available when **CustomDNS** is selected in the **DDNS Type** field. Check with your Dynamic DNS service provider to have traffic redirected to a URL (that you can specify) while you are off line.
IP Address Update Policy:	
Use WAN IP Address	Select this option to update the IP address of the host name(s) to the WAN IP address.
Dynamic DNS server auto detect IP Address	Select this option to update the IP address of the host name(s) automatically by the DDNS server. It is recommended that you select this option.
Use specified IP Address	Type the IP address of the host name(s). Use this if you have a static IP address.
Apply	Click **Apply** to save your changes back to the NBG318S.
Reset	Click **Reset** to begin configuring this screen afresh.

PART III
Security

12

Firewall

This chapter gives some background information on firewalls and explains how to get started with the NBG318S's firewall.

12.1 Introduction to ZyXEL's Firewall

12.1.1 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.

12.1.2 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.

12.1.3 About the NBG318S Firewall

The NBG318S firewall 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 NBG318S's purpose is to allow a private Local Area Network (LAN) to be securely connected to the Internet. The NBG318S 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 NBG318S 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 NBG318S 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.

12.1.4 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 SNMP or 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.

12.2 Triangle Routes

If an alternate gateway on the LAN has an IP address in the same subnet as the NBG318S's LAN IP address, return traffic may not go through the NBG318S. This is called an asymmetrical or "triangle" route. This causes the NBG318S to reset the connection, as the connection has not been acknowledged.

You can have the NBG318S permit the use of asymmetrical route topology on the network (not reset the connection).

Allowing asymmetrical routes may let traffic from the WAN go directly to the LAN without passing through the NBG318S. A better solution is to use IP alias to put the NBG318S and the backup gateway on separate subnets.

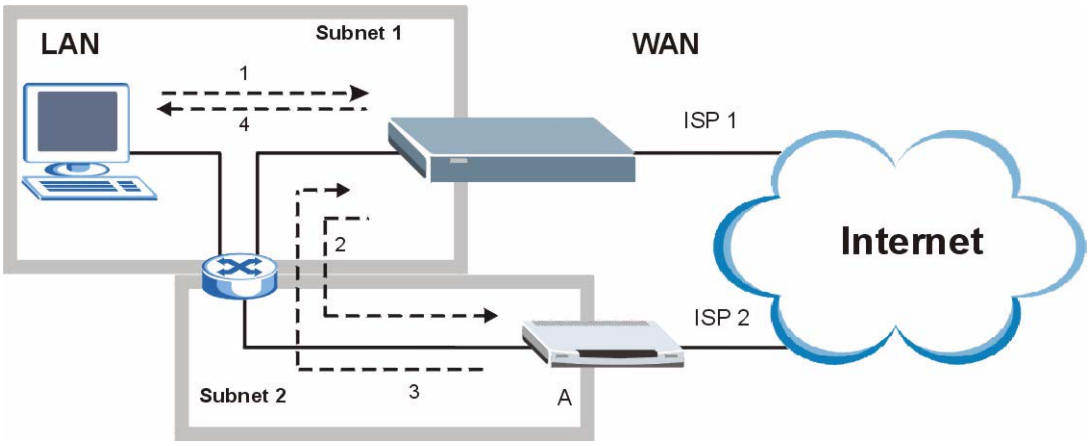
12.2.1 Triangle Routes and IP Alias

You can use IP alias instead of allowing triangle routes. IP Alias allow you to partition your network into logical sections over the same interface.

By putting your LAN and Gateway **A** in different subnets, all returning network traffic must pass through the NBG318S to your LAN. The following steps describe such a scenario.

1 A computer on the LAN initiates a connection by sending a SYN packet to a receiving server on the WAN.
2 The NBG318S reroutes the packet to Gateway **A**, which is in **Subnet 2**.
3 The reply from the WAN goes to the NBG318S.
4 The NBG318S then sends it to the computer on the LAN in **Subnet 1**.

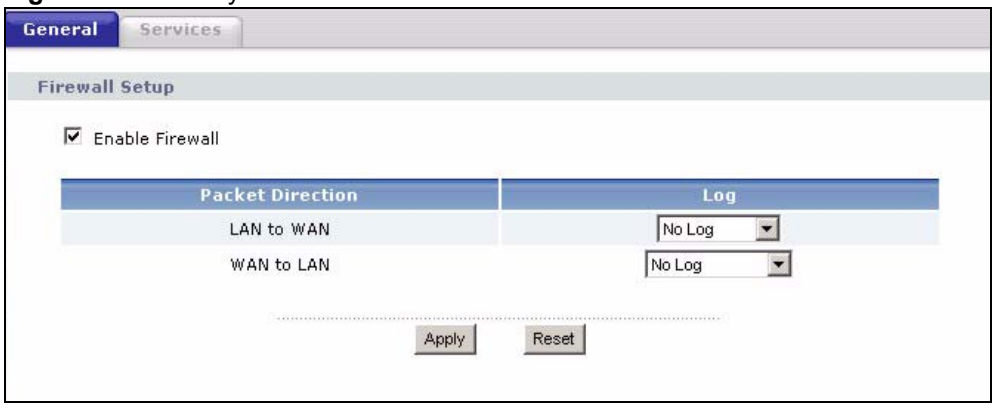
Figure 77 Using IP Alias to Solve the Triangle Route Problem



12.3 General Firewall Screen

Click **Security** > **Firewall** to open the **General** screen. Use this screen to enable or disable the NBG318S's firewall, and set up firewall logs.

Figure 78 Security > Firewall > General I



The following table describes the labels in this screen.

Table 49 Security > Firewall > General

LABEL	DESCRIPTION
Enable Firewall	Select this check box to activate the firewall. The NBG318S performs access control and protects against Denial of Service (DoS) attacks when the firewall is activated.
Packet Direction	This is the direction of travel of packets. Firewall rules are grouped based on the direction of travel of packets to which they apply.

Table 49 Security > Firewall > General

LABEL	DESCRIPTION
Log	Select whether to create a log for packets that are traveling in the selected direction when the packets are blocked or forwarded. To log packets related to firewall rules, make sure that **Access Control** under **Log** is selected in the **Logs** > **Log Settings** screen.
Apply	Click **Apply** to save the settings.
Reset	Click **Reset** to start configuring this screen again.

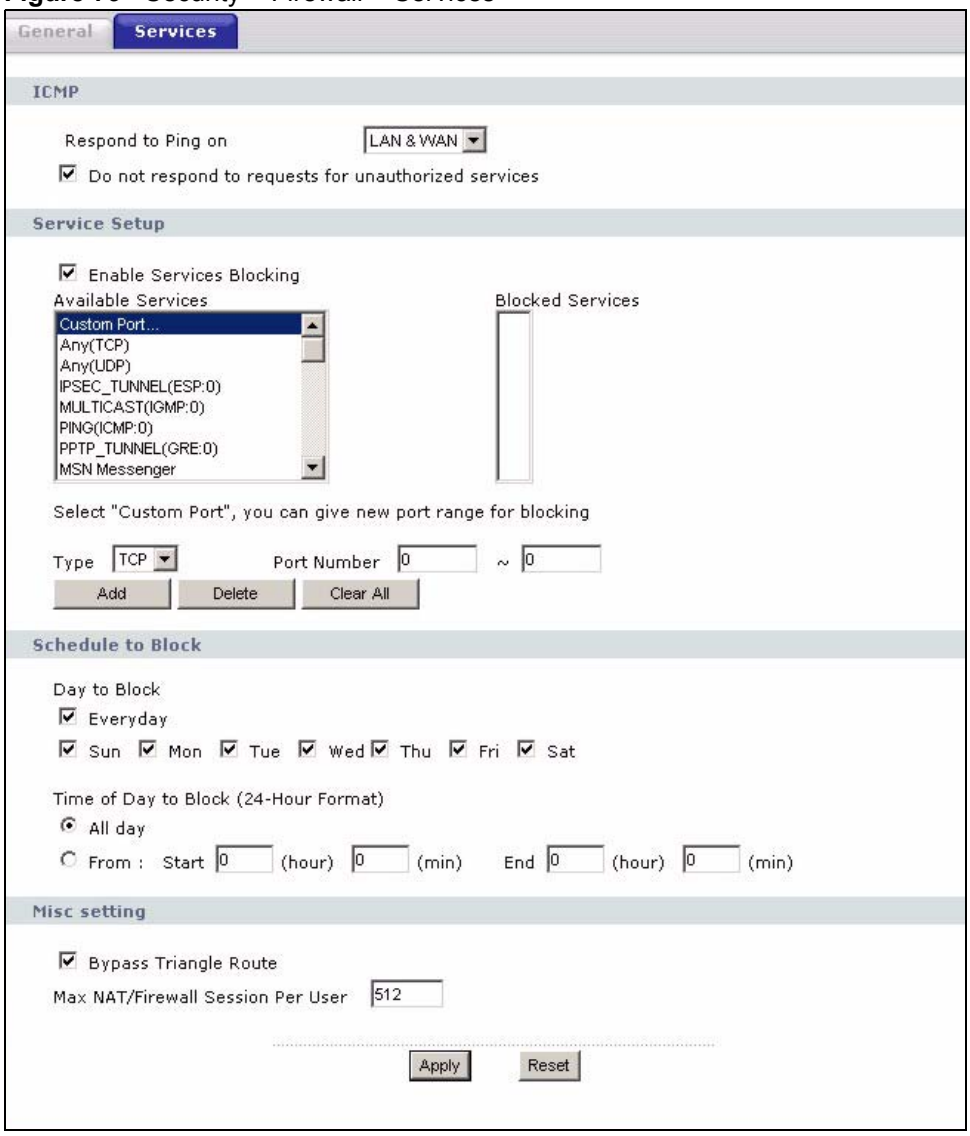
12.4 Services Screen

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

If an outside user attempts to probe an unsupported port on your NBG318S, an ICMP response packet is automatically returned. This allows the outside user to know the NBG318S exists. Use this screen to prevent the ICMP response packet from being sent. This keeps outsiders from discovering your NBG318S 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.

Figure 79 Security > Firewall > Services



The following table describes the labels in this screen.

Table 50 Security > Firewall > Services

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 NBG318S will not respond to any incoming Ping requests when **Disable** is selected. Select **LAN** to reply to incoming LAN Ping requests. Select **WAN** to reply to incoming WAN Ping requests. Otherwise select **LAN & WAN** to reply to both incoming LAN and WAN Ping requests.

Table 50 Security > Firewall > Services

LABEL	DESCRIPTION
Do not respond to requests for unauthorized services	Select this option to prevent hackers from finding the NBG318S by probing for unused ports. If you select this option, the NBG318S will not respond to port request(s) for unused ports, thus leaving the unused ports and the NBG318S unseen. By default this option is not selected and the NBG318S will reply with an ICMP Port Unreachable packet for a port probe on its unused UDP ports, and a TCP Reset packet for a port probe on its unused TCP ports. Note that the probing packets must first traverse the NBG318S's firewall mechanism before reaching this anti-probing mechanism. Therefore if the firewall mechanism blocks a probing packet, the NBG318S reacts based on the firewall policy, which by default, is to send a TCP reset packet for a blocked TCP packet. You can use the command "sys firewall tcprst rst [on|off]" to change this policy. When the firewall mechanism blocks a UDP packet, it drops the packet without sending a response packet.
Service Setup	
Enable Services Blocking	Select this check box to enable this feature.
Available Services	This is a list of pre-defined services (ports) you may prohibit your LAN computers from using. Select the port you want to block using the drop-down list and click **Add** to add the port to the **Blocked Services** field.
Blocked Services	This is a list of services (ports) that will be inaccessible to computers on your LAN once you enable service blocking.
Custom Port	A custom port is a service that is not available in the pre-defined **Available Services** list and you must define using the next two fields.
Type	Choose the IP port (**TCP** or **UDP**) that defines your customized port from the drop down list box.
Port Number	Enter the port number range that defines the service. For example, if you want to define the Gnutella service, then select **TCP** type and enter a port range from 6345 to 6349.
Add	Select a service from the **Available Services** drop-down list and then click **Add** to add a service to the **Blocked Services**
Delete	Select a service from the **Blocked Services** list and then click **Delete** to remove this service from the list.
Clear All	Click **Clear All** to empty the **Blocked Services**.
Schedule to Block	
Day to Block:	Select a check box to configure which days of the week (or everyday) you want service blocking to be active.
Time of Day to Block (24-Hour Format)	Select the time of day you want service blocking to take effect. Configure blocking to take effect all day by selecting **All Day**. You can also configure specific times by selecting **From** and entering the start time in the **Start (hour)** and **Start (min)** fields and the end time in the **End (hour)** and **End (min)** fields. Enter times in 24-hour format, for example, "3:00pm" should be entered as "15:00".
Misc setting	
Bypass Triangle Route	Select this check box to have the NBG318S firewall ignore the use of triangle route topology on the network.
Max NAT/Firewall Session Per User	Type a number ranging from 1 to 2048 to limit the number of NAT/firewall sessions that a host can create.
Apply	Click **Apply** to save the settings.
Reset	Click **Reset** to start configuring this screen again.

13

Content Filtering

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

13.1 Introduction to Content Filtering

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.

13.2 Restrict Web Features

The NBG318S can block web features such as ActiveX controls, Java applets, cookies and disable web proxies.

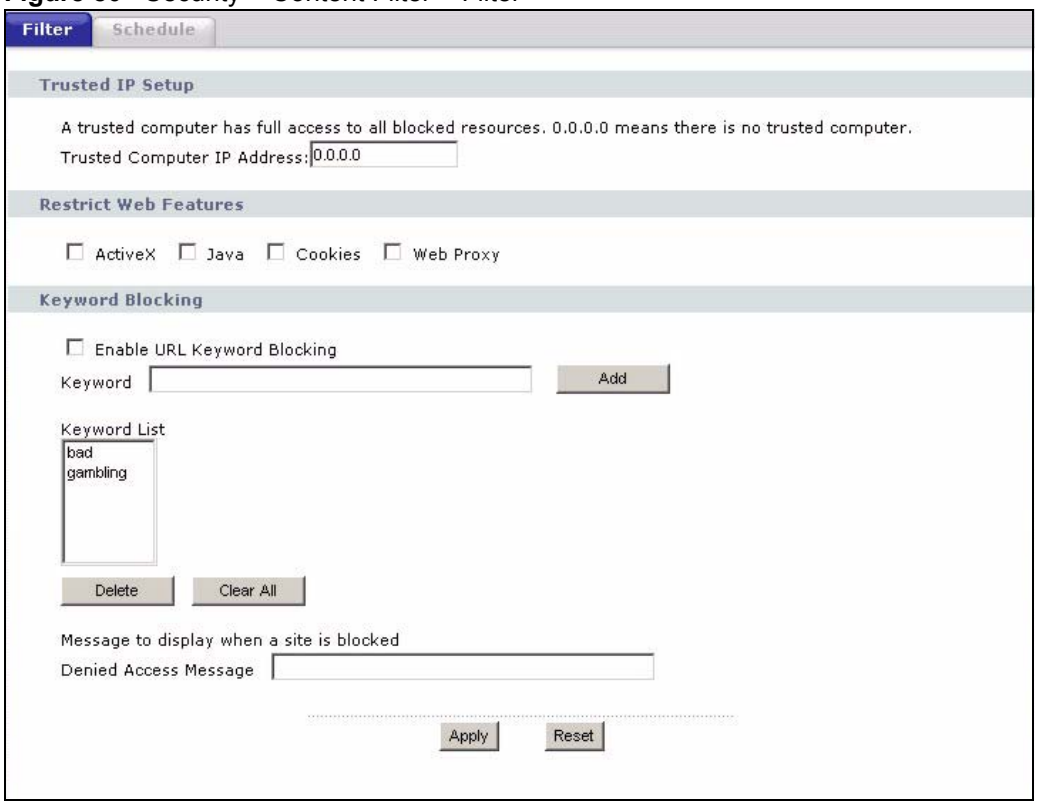
13.3 Days and Times

The NBG318S also allows you to define time periods and days during which the NBG318S performs content filtering.

13.4 Filter Screen

Click **Security** > **Content Filter** to open the **Filter** screen.

Figure 80 Security > Content Filter > Filter



The following table describes the labels in this screen.

Table 51 Security > Content Filter > Filter

LABEL	DESCRIPTION
Trusted Computer IP Address	To enable this feature, type an IP address of any one of the computers in your network that you want to have as a trusted computer. This allows the trusted computer to have full access to all features that are configured to be blocked by content filtering. Leave this field blank to have no trusted computers.
Restrict Web Features	Select the box(es) to restrict a feature. When you download a page containing a restricted feature, that part of the web page will appear blank or grayed out.
ActiveX	A tool for building dynamic and active Web pages and distributed object applications. When you visit an ActiveX Web site, ActiveX controls are downloaded to your browser, where they remain in case you visit the site again.
Java	A programming language and development environment for building downloadable Web components or Internet and intranet business applications of all kinds.
Cookies	Used by Web servers to track usage and provide service based on ID.
Web Proxy	A server that acts as an intermediary between a user and the Internet to provide security, administrative control, and caching service. When a proxy server is located on the WAN it is possible for LAN users to circumvent content filtering by pointing to this proxy server.
Keyword Blocking	
Enable URL Keyword Blocking	The NBG318S 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.

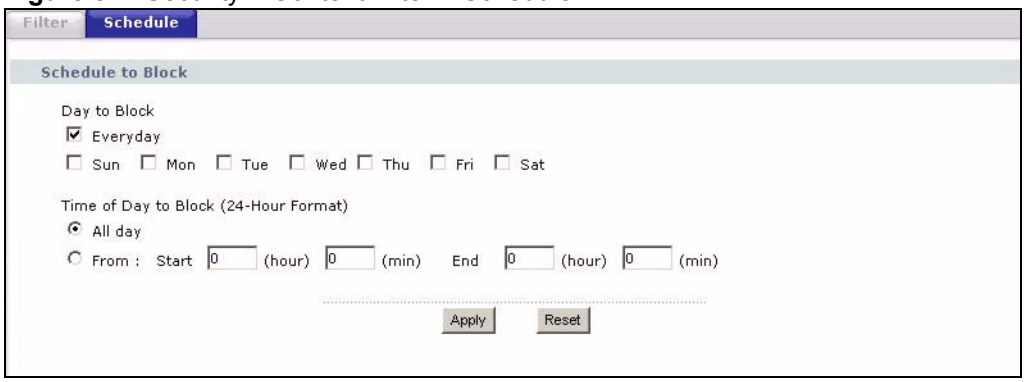
Table 51 Security > Content Filter > Filter

LABEL	DESCRIPTION
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.
Denied Access Message	Enter a message to be displayed when a user tries to access a restricted web site. The default message is “Please contact your network administrator!!”
Apply	Click **Apply** to save your changes.
Reset	Click **Reset** to begin configuring this screen afresh

13.5 Schedule

Use this screen to set the day(s) and time you want the NBG318S to use content filtering. Click **Security** > **Content Filter** > **Schedule**. The following screen displays.

Figure 81 Security > Content Filter > Schedule



The following table describes the labels in this screen.

Table 52 Security > Content Filter > Schedule

LABEL	DESCRIPTION
Day to Block	Select check boxes for the days that you want the NBG318S to perform content filtering. Select the **Everyday** check box to have content filtering turned on all days of the week.
Time of Day to Block (24-Hour Format)	**Time of Day to Block** allows the administrator to define during which time periods content filtering is enabled. **Time of Day to Block** restrictions only apply to the keywords (see above). Restrict web server data, such as ActiveX, Java, Cookies and Web Proxy are not affected. Select **All Day** to have content filtering always active on the days selected in **Day to Block** with time of day limitations not enforced. Select **From** and enter the time period, in 24-hour format, during which content filtering will be enforced.

Table 52 Security > Content Filter > Schedule

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

13.6 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.

13.6.1 Domain Name or IP Address URL Checking

By default, the NBG318S checks the URL's domain name or IP address when performing keyword blocking.

This means that the NBG318S 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.

13.6.2 Full Path URL Checking

Full path URL checking has the NBG318S 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.

13.6.3 File Name URL Checking

Filename URL checking has the NBG318S 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.

PART IV
Management

14

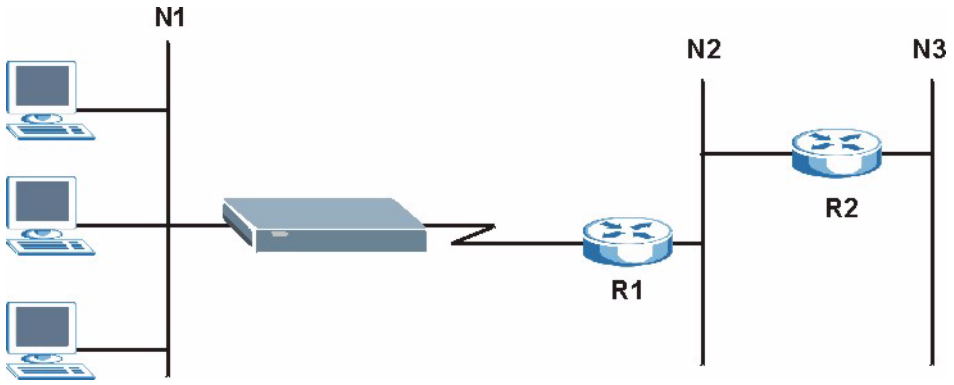
Static Route Screens

This chapter shows you how to configure static routes for your NBG318S.

14.1 Static Route Overview

Each remote node specifies only the network to which the gateway is directly connected, and the NBG318S has no knowledge of the networks beyond. For instance, the NBG318S knows about network **N2** in the following figure through remote node router **R1**. However, the NBG318S 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 **R1** (via gateway router **R2**). The static routes are for you to tell the NBG318S about the networks beyond the remote nodes.

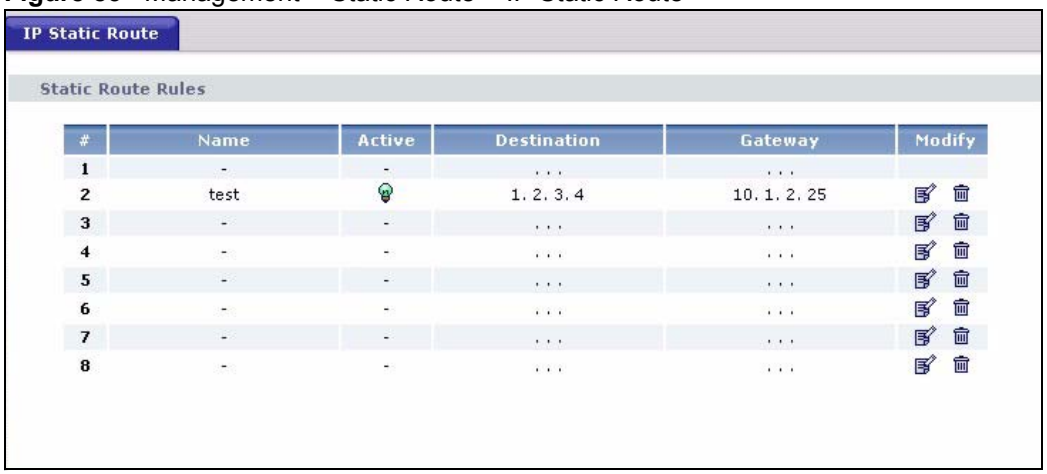
Figure 82 Example of Static Routing Topology



14.2 IP Static Route Screen

Click **Management** > **Static Route** to open the **IP Static Route** screen. The following screen displays.

Figure 83 Management > Static Route > IP Static Route



The following table describes the labels in this screen.

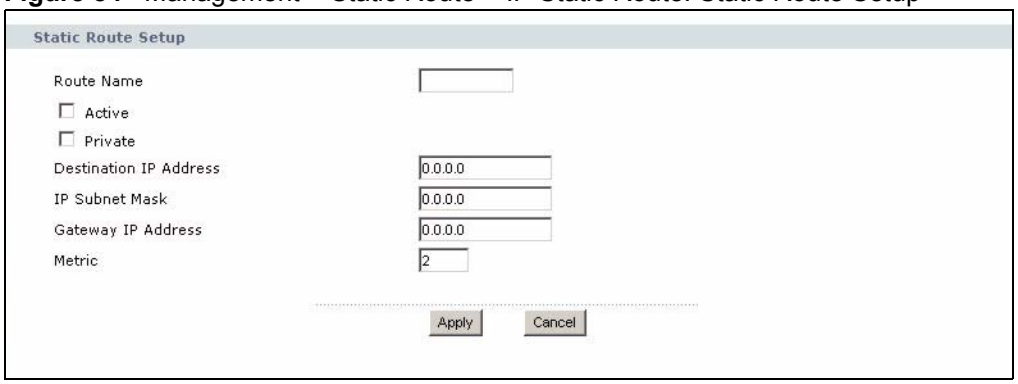
Table 53 Management > Static Route > IP Static Route

LABEL	DESCRIPTION
#	This is the index number of an individual static route. The first entry is for the default route and not editable.
Name	This is the name that describes or identifies this route.
Active	This icon is turned on when this static route is active. Click the **Edit** icon under **Modify** and select the **Active** checkbox in the **Static Route Setup** screen to enable the static route. Clear the checkbox to disable this static route without having to delete the entry.
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 an immediate neighbor of your NBG318S that will forward the packet to the destination. On the LAN, the gateway must be a router on the same segment as your NBG318S; over the WAN, the gateway must be the IP address of one of the remote nodes.
Modify	Click the **Edit** icon to open the static route setup screen. Modify a static route or create a new static route in the **Static Route Setup** screen. Click the **Remove** icon to delete a static route.

14.2.1 Static Route Setup Screen

To edit a static route, click the edit icon under **Modify**. The following screen displays. Fill in the required information for each static route.

Figure 84 Management > Static Route > IP Static Route: Static Route Setup



The following table describes the labels in this screen.

Table 54 Management > Static Route > IP Static Route: Static Route Setup

LABEL	DESCRIPTION
Route Name	Enter the name of the IP static route. Leave this field blank to delete this static route.
Active	This field allows you to activate/deactivate this static route.
Private	This parameter determines if the NBG318S will include this route to a remote node in its RIP broadcasts. Select this check box to keep this route private and not included in RIP broadcasts. Clear this checkbox to propagate this route to other hosts through RIP broadcasts.
Destination IP Address	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.
IP Subnet Mask	Enter the IP subnet mask here.
Gateway IP Address	Enter the IP address of the gateway. The gateway is an immediate neighbor of your NBG318S that will forward the packet to the destination. On the LAN, the gateway must be a router on the same segment as your NBG318S; over the WAN, the gateway must be the IP address of one of the Remote Nodes.
Metric	Metric represents the “cost” of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Enter a number that approximates the cost for this link. The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number.
Apply	Click **Apply** to save your changes back to the NBG318S.
Cancel	Click **Cancel** to return to the previous screen and not save your changes.

15

Bandwidth Management

This chapter contains information about configuring bandwidth management, editing rules and viewing the NBG318S's bandwidth management logs.

15.1 Bandwidth Management Overview

ZyXEL's Bandwidth Management allows you to specify bandwidth management rules based on an application and/or subnet. You can allocate specific amounts of bandwidth capacity (bandwidth budgets) to different bandwidth rules.

The NBG318S applies bandwidth management to traffic that it forwards out through an interface. The NBG318S does not control the bandwidth of traffic that comes into an interface.

Bandwidth management applies to all traffic flowing out of the router, regardless of the traffic's source.

Traffic redirect or IP alias may cause LAN-to-LAN traffic to pass through the NBG318S and be managed by bandwidth management.

- The sum of the bandwidth allotments that apply to the WAN interface (LAN to WAN, WLAN to WAN, WAN to WAN / NBG318S) must be less than or equal to the **Upstream Bandwidth** that you configure in the **Bandwidth Management Advanced** screen.
- The sum of the bandwidth allotments that apply to the LAN port (WAN to LAN, WLAN to LAN, LAN to LAN / NBG318S) must be less than or equal to 100,000 kbps (you cannot configure the bandwidth budget for the LAN port).
- The sum of the bandwidth allotments that apply to the WLAN port (LAN to WLAN, WAN to WLAN, WLAN to WLAN / NBG318S) must be less than or equal to 54,000 kbps (you cannot configure the bandwidth budget for the WLAN port).

15.2 Application-based Bandwidth Management

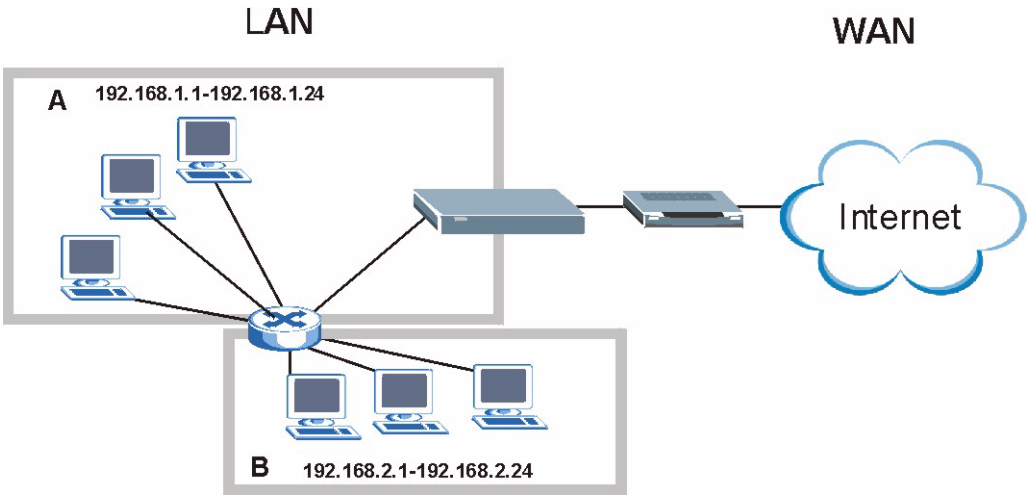
You can create bandwidth classes based on individual applications (like VoIP, Web, FTP, E-mail and Video for example).

15.3 Subnet-based Bandwidth Management

You can create bandwidth classes based on subnets.

The following figure shows LAN subnets. You could configure one bandwidth class for subnet **A** and another for subnet **B**.

Figure 85 Subnet-based Bandwidth Management Example



15.4 Application and Subnet-based Bandwidth Management

You could also create bandwidth classes based on a combination of a subnet and an application. The following example table shows bandwidth allocations for application specific traffic from separate LAN subnets.

Table 55 Application and Subnet-based Bandwidth Management Example

TRAFFIC TYPE	FROM SUBNET A	FROM SUBNET B
VoIP	64 Kbps	64 Kbps
Web	64 Kbps	64 Kbps
FTP	64 Kbps	64 Kbps
E-mail	64 Kbps	64 Kbps
Video	64 Kbps	64 Kbps

15.5 Bandwidth Management Priorities

The following table describes the priorities that you can apply to traffic that the NBG318S forwards out through an interface.

Table 56 Bandwidth Management Priorities

PRIORITY LEVELS: TRAFFIC WITH A HIGHER PRIORITY GETS THROUGH FASTER WHILE TRAFFIC WITH A LOWER PRIORITY IS DROPPED IF THE NETWORK IS CONGESTED.	
High	Typically used for voice traffic or video that is especially sensitive to jitter (jitter is the variations in delay).

Table 56 Bandwidth Management Priorities

PRIORITY LEVELS: TRAFFIC WITH A HIGHER PRIORITY GETS THROUGH FASTER WHILE TRAFFIC WITH A LOWER PRIORITY IS DROPPED IF THE NETWORK IS CONGESTED.	
Mid	Typically used for “excellent effort” or better than best effort and would include important business traffic that can tolerate some delay.
Low	This is typically used for non-critical “background” traffic such as bulk transfers that are allowed but that should not affect other applications and users.

15.6 Predefined Bandwidth Management Services

The following is a description of the services that you can select and to which you can apply media bandwidth management using the wizard screens.

Table 57 Media Bandwidth Management Setup: Services

SERVICE	DESCRIPTION
Xbox Live	This is Microsoft’s online gaming service that lets you play multiplayer Xbox games on the Internet via broadband technology. Xbox Live uses port 3074.
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, using the default port number 5060.
FTP	File Transfer Program enables fast transfer of files, including large files that may not be possible by e-mail. FTP uses port number 21.
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: POP3 - port 110 IMAP - port 143 SMTP - port 25 HTTP - port 80
BitTorrent	BitTorrent is a free P2P (peer-to-peer) sharing tool allowing you to distribute large software and media files using ports 6881 to 6889. 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.
MSN Webcam	MSN messenger allows you to chat online and send instant messages. If you use MSN messenger and also have a webcam, you can send your image/photo in real-time along with messages
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.

15.6.1 Services and Port Numbers

The commonly used services and port numbers are shown in the following table. Please refer to RFC 1700 for further information about port numbers. Next to the name of the service, two fields appear in brackets. The first field indicates the IP protocol type (TCP, UDP, or ICMP). The second field indicates the IP port number that defines the service. (Note that there may be more than one IP protocol type. For example, look at the **DNS** service. **(UDP/TCP:53)** means UDP port 53 and TCP port 53.

Table 58 Commonly Used Services

SERVICE	DESCRIPTION
AIM/New-ICQ(TCP:5190)	AOL's Internet Messenger service, used as a listening port by ICQ.
AUTH(TCP:113)	Authentication protocol used by some servers.
BGP(TCP:179)	Border Gateway Protocol.
BOOTP_CLIENT(UDP:68)	DHCP Client.
BOOTP_SERVER(UDP:67)	DHCP Server.
CU-SEEME(TCP/UDP:7648, 24032)	A popular videoconferencing solution from White Pines Software.
DNS(UDP/TCP:53)	Domain Name Server, a service that matches web names (e.g. www.zyxel.com) to IP numbers.
FINGER(TCP:79)	Finger is a UNIX or Internet related command that can be used to find out if a user is logged on.
FTP(TCP:20.21)	File Transfer Program, a program to enable fast transfer of files, including large files that may not be possible by e-mail.
H.323(TCP:1720)	NetMeeting uses this protocol.
HTTP(TCP:80)	Hyper Text Transfer Protocol - a client/server protocol for the world wide web.
HTTPS(TCP:443)	HTTPS is a secured http session often used in e-commerce.
ICQ(UDP:4000)	This is a popular Internet chat program.
IKE(UDP:500)	The Internet Key Exchange algorithm is used for key distribution and management.
IPSEC_TUNNEL(AH:0)	The IPSEC AH (Authentication Header) tunneling protocol uses this service.
IPSEC_TUNNEL(ESP:0)	The IPSEC ESP (Encapsulation Security Protocol) tunneling protocol uses this service.
IRC(TCP/UDP:6667)	This is another popular Internet chat program.
MSN Messenger(TCP:1863)	Microsoft Networks' messenger service uses this protocol.
MULTICAST(IGMP:0)	Internet Group Multicast Protocol is used when sending packets to a specific group of hosts.
NEW-ICQ(TCP:5190)	An Internet chat program.
NEWS(TCP:144)	A protocol for news groups.
NFS(UDP:2049)	Network File System - NFS is a client/server distributed file service that provides transparent file sharing for network environments.
NNTP(TCP:119)	Network News Transport Protocol is the delivery mechanism for the USENET newsgroup service.

Table 58 Commonly Used Services

SERVICE	DESCRIPTION
PING(ICMP:0)	Packet INternet Groper is a protocol that sends out ICMP echo requests to test whether or not a remote host is reachable.
POP3(TCP:110)	Post Office Protocol version 3 lets a client computer get e-mail from a POP3 server through a temporary connection (TCP/IP or other).
PPTP(TCP:1723)	Point-to-Point Tunneling Protocol enables secure transfer of data over public networks. This is the control channel.
PPTP_TUNNEL(GRE:0)	Point-to-Point Tunneling Protocol enables secure transfer of data over public networks. This is the data channel.
RCMD(TCP:512)	Remote Command Service.
REAL_AUDIO(TCP:7070)	A streaming audio service that enables real time sound over the web.
REXEC(TCP:514)	Remote Execution Daemon.
RLOGIN(TCP:513)	Remote Login.
RTELNET(TCP:107)	Remote Telnet.
RTSP(TCP/UDP:554)	The Real Time Streaming (media control) Protocol (RTSP) is a remote control for multimedia on the Internet.
SFTP(TCP:115)	Simple File Transfer Protocol.
SMTP(TCP:25)	Simple Mail Transfer Protocol is the message-exchange standard for the Internet. SMTP enables you to move messages from one e-mail server to another.
SNMP(TCP/UDP:161)	Simple Network Management Program.
SNMP-TRAPS(TCP/UDP:162)	Traps for use with the SNMP (RFC:1215).
SQL-NET(TCP:1521)	Structured Query Language is an interface to access data on many different types of database systems, including mainframes, midrange systems, UNIX systems and network servers.
SSH(TCP/UDP:22)	Secure Shell Remote Login Program.
STRM WORKS(UDP:1558)	Stream Works Protocol.
SYSLOG(UDP:514)	Syslog allows you to send system logs to a UNIX server.
TACACS(UDP:49)	Login Host Protocol used for (Terminal Access Controller Access Control System).
TELNET(TCP:23)	Telnet is the login and terminal emulation protocol common on the Internet and in UNIX environments. It operates over TCP/IP networks. Its primary function is to allow users to log into remote host systems.
TFTP(UDP:69)	Trivial File Transfer Protocol is an Internet file transfer protocol similar to FTP, but uses the UDP (User Datagram Protocol) rather than TCP (Transmission Control Protocol).
VDOLIVE(TCP:7000)	Another videoconferencing solution.

15.7 Default Bandwidth Management Classes and Priorities

If you enable bandwidth management but do not configure a rule for critical traffic like VoIP, the voice traffic may then get delayed due to insufficient bandwidth. With the automatic traffic classifier feature activated, the NBG318S automatically assigns a default bandwidth management class and priority to traffic that does not match any of the user-defined rules. The traffic is classified based on the traffic type. Real-time traffic always gets higher priority over other traffic.

The following table shows you the priorities between the three default classes (**AutoClass_H**, **AutoClass_M** and **Default Class**) and user-defined rules. 6 is the highest priority.

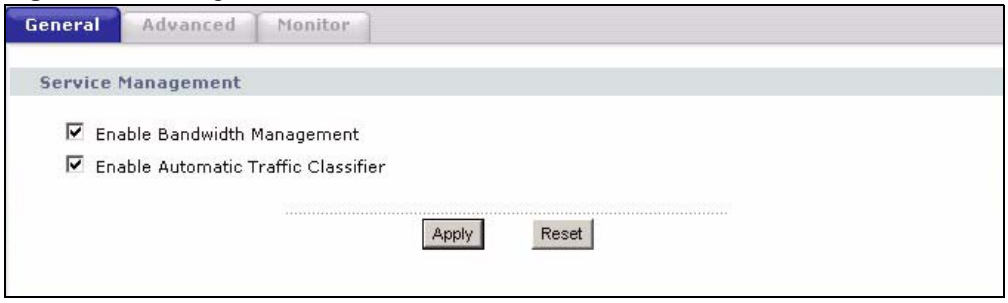
Table 59 Bandwidth Management Priority with Default Classes

CLASS TYPE	PRIORITY
User-defined with high priority	6
AutoClass_H	5
User-defined with medium priority	4
AutoClass_M	3
User-defined with low priority	2
Default Class	1

15.8 Bandwidth Management General Configuration

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

Figure 86 Management > Bandwidth MGMT > General



The following table describes the labels in this screen.

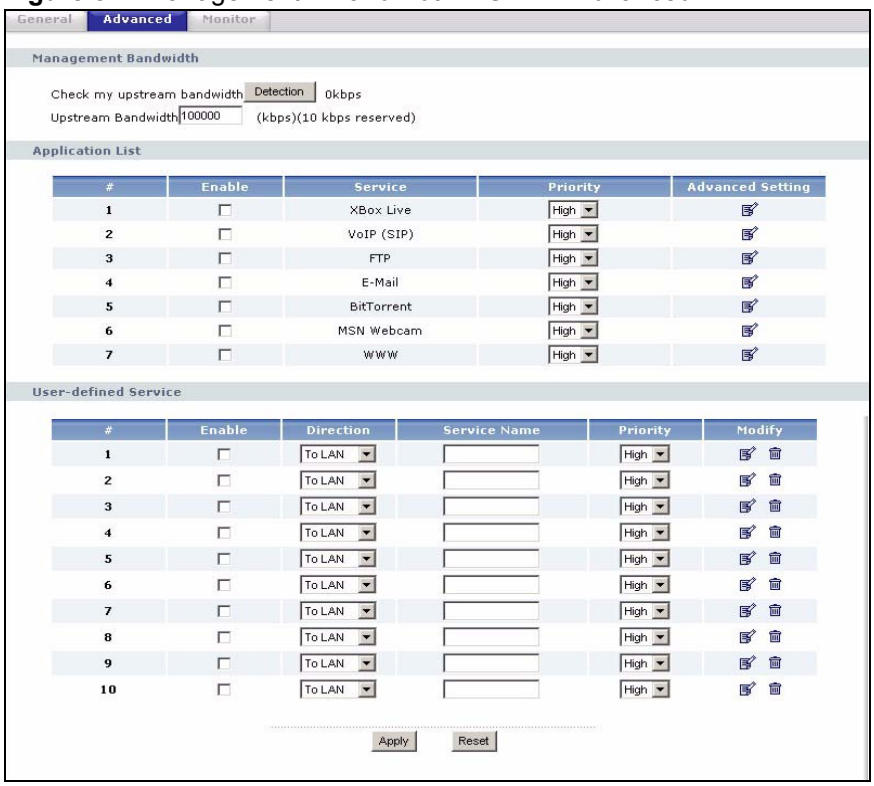
Table 60 Management > Bandwidth MGMT > General

LABEL	DESCRIPTION
Enable Bandwidth Management	Select this check box to have the NBG318S 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.
Enable Automatic Traffic Classifier	This field is only applicable when you select the **Enable Bandwidth Management** check box. Select this check box to have the NBG318S base on the default bandwidth classes to apply bandwidth management. Real-time packets, such as VoIP traffic always get higher priority.
Apply	Click **Apply** to save your customized settings.
Reset	Click **Reset** to begin configuring this screen afresh.

15.9 Bandwidth Management Advanced Configuration

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

Figure 87 Management > Bandwidth MGMT > Advanced



The following table describes the labels in this screen.

Table 61 Management > Bandwidth MGMT > Advanced

LABEL	DESCRIPTION
Check my upstream bandwidth	Click the **Detection** button to check the size of your upstream bandwidth.
Upstream Bandwidth (kbps)	Enter the amount of bandwidth in kbps (2 to 100,000) that you want to allocate for traffic. 20 kbps to 20,000 kbps is recommended. The recommendation is to set this speed to be equal to or less than the speed of the broadband device connected to the WAN port. For example, set the speed to 1000 Kbps (or less) if the broadband device connected to the WAN port has an upstream speed of 1000 Kbps.
Application List	Use this table to allocate specific amounts of bandwidth based on the pre-defined service.
#	This is the number of an individual bandwidth management rule.
Enable	Select this check box to have the NBG318S apply this bandwidth management rule.
Service	This is the name of the service.
Priority	Select a priority from the drop down list box. Choose **High**, **Mid** or **Low**.
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 and/or subnets.
#	This is the number of an individual bandwidth management rule.
Enable	Select this check box to have the NBG318S apply this bandwidth management rule.
Direction	Select **To LAN** to apply bandwidth management to traffic that the NBG318S forwards to the LAN. Select **To WAN** to apply bandwidth management to traffic that the NBG318S forwards to the WAN. Select **To WLAN** to apply bandwidth management to traffic that the NBG318S forwards to the WLAN.
Service Name	Enter a descriptive name of up to 19 alphanumeric characters, including spaces.
Priority	Select a priority from the drop down list box. Choose **High**, **Mid** or **Low**.
Modify	Click the **Edit** icon to open the **Rule Configuration** screen. Modify an existing rule or create a new rule in the **Rule Configuration** screen. See Section 15.9.2 on page 161 for more information. Click the **Remove** icon to delete a rule.
Apply	Click **Apply** to save your customized settings.
Reset	Click **Reset** to begin configuring this screen afresh.

15.9.1 Rule Configuration with the Pre-defined Service

To edit a bandwidth management rule for the pre-defined service in the NBG318S, click the **Edit** icon in the **Application List** table of the **Advanced** screen. The following screen displays.