CHAPTER 5
Web Interface Tutorials

5.1 Web Interface Overview

This chapter shows you how to use the Zyxel Device's various features.

- Wired Network Setup
- WiFi Network Setup
- USB Applications
- Network Security
- Internet Calls
- Device Maintenance

5.2 Wired Network Setup

This section shows you how to set up a DSL or Ethernet Internet connection with the **Broadband** screens. The screens vary by the connection mode, encapsulation type and IP mode (IPv6 or IPv4) you select.

Set the Zyxel Device to **Routing** mode or **Bridge** mode on this connection as follows:

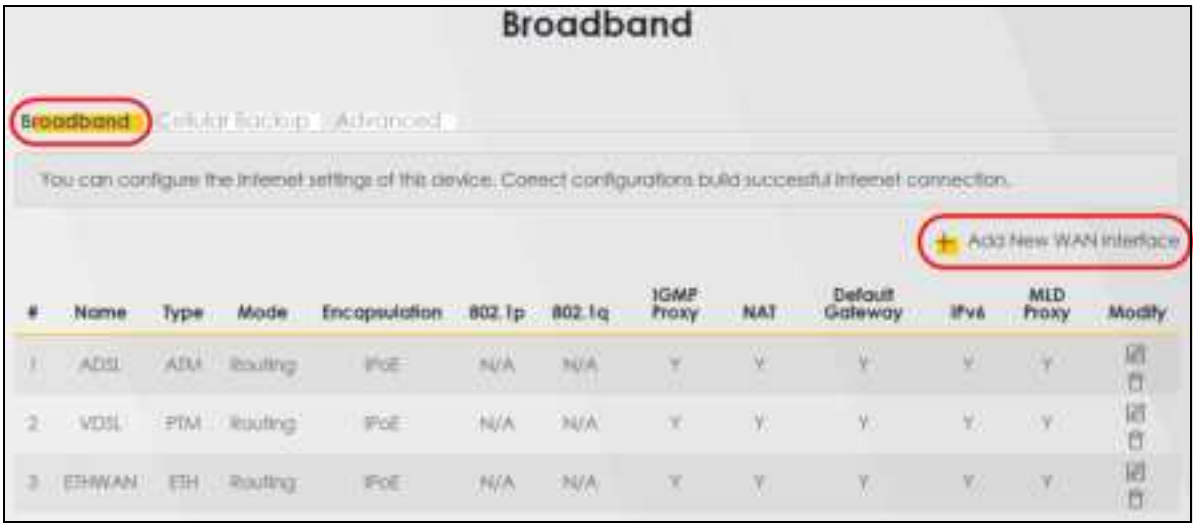
- Use **Routing** mode if you want the Zyxel Device to use routing mode functions such as **NAT**, **Firewall**, or **DHCP Server**. You will need to reconfigure your network if you have an existing router.
- Use **Bridge** mode to pass the ISP-assigned IP address(es) to your devices connected to the LAN port. All traffic from the Internet passes through the Zyxel Device directly to devices connected to the LAN port. Use this mode if you already have a router with complete routing functions in your network.

5.2.1 Setting Up a DSL Connection

This tutorial shows you how to set up a DSL Internet connection using the Web Configurator on DSL routers (see Section 1.1 on page 20).

If you connect to the Internet through a DSL connection, use the information from your Internet Service Provider (ISP) to configure the **Broadband** screens.

1 Go to **Network Setting** > **Broadband** and then the following screen appears. Click **Add New WAN Interface**.



2 To set the Zyxel Device to **Routing** mode, see Section 1 on page 94.
To set the Zyxel Device to **Bridge** mode, see Section 1 on page 97.

Routing Mode

1 In this routing mode example, the DSL WAN connection has the following information.

General	
Name	MyDSLConnection
Type	ADSL over ATM
Connection Mode	Routing
Encapsulation	PPPoE
IPv6/IPv4 Mode	IPv4
ATM PVC Configuration	
VPI/VCI	36/48
Encapsulation Mode	LLC/SNAP-Bridging
Service Category	UBR without PCR
Account Information	
PPP User Name	1234@DSL-Ex.com
PPP Password	ABCDEF!
Static IP Address	192.168.1.32
Gateway IP Address	192.168.1.254
Primary DNS server	192.168.5.2

Secondary DNS server	192.168.5.1
Others	Authentication Method: AUTO PPPoE Passthrough: Disabled NAT: Enabled IGMP Multicast Proxy: Enabled Apply as Default Gateway: Enabled VLAN: Disabled

2 Enter the **General** and **ATM PVC Configuration** settings as provided above.

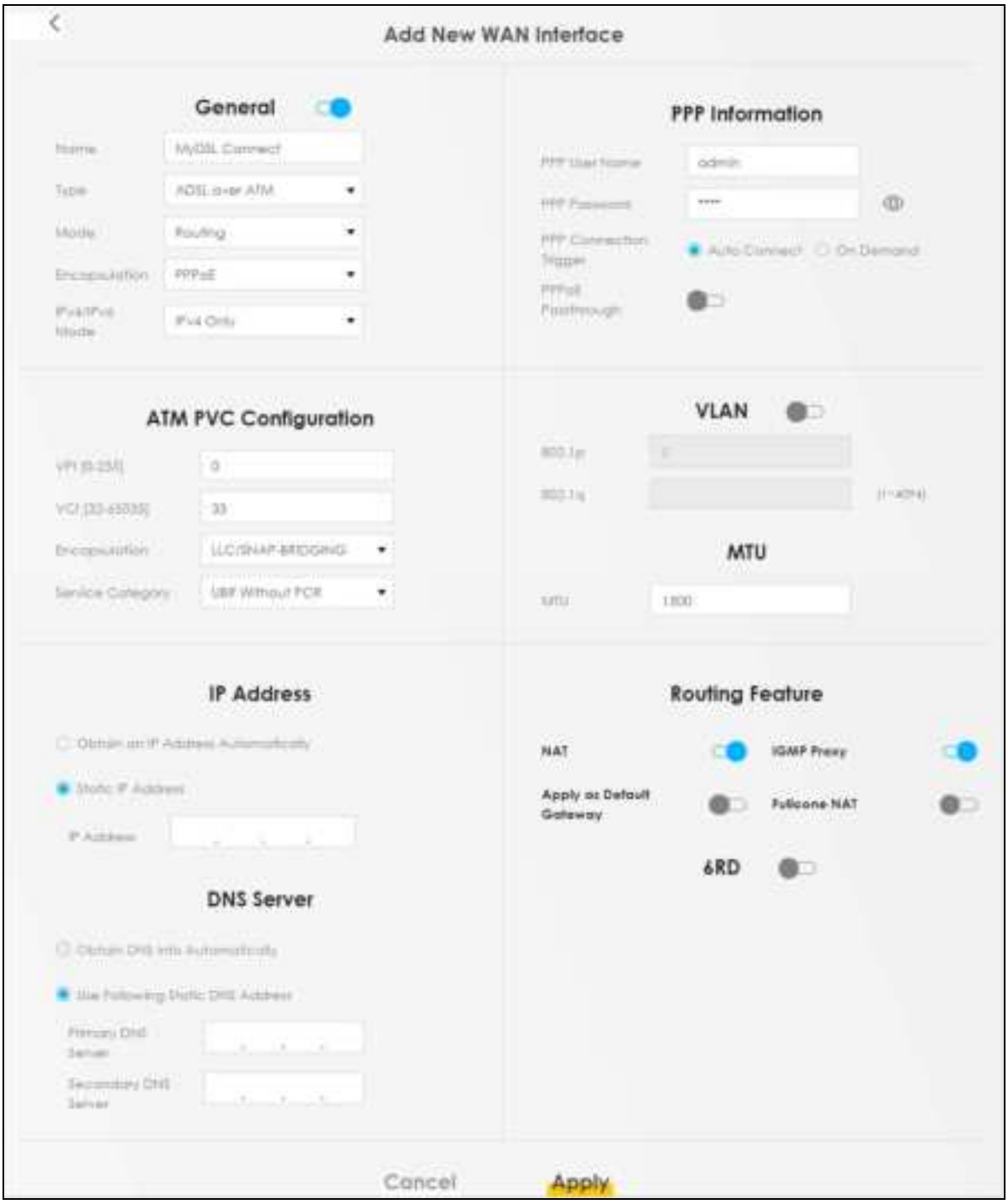
- Set the **Type** to **ADSL over ATM**.
- Choose the **Encapsulation** specified by your DSL service provider. For this example, the service provider requires a username and password to establish an Internet connection. Therefore, select **PPPoE** as the WAN encapsulation type.
- Set the **IPv4/IPv6 Mode** to **IPv4 Only**.

3 Enter the account information provided by your DSL servic e provider.

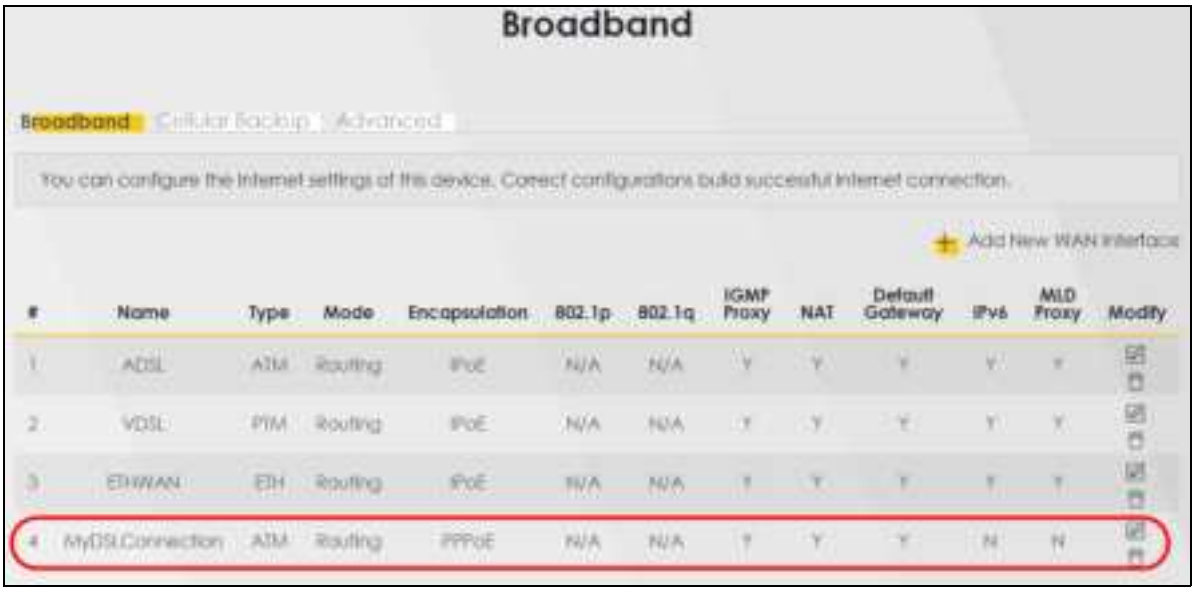
4 Enable **Apply as Default Gateway** to use this rule as your default Internet connection. Then select **Use Following Static DNS Address** and enter the DNS server addresses provided by your DSL servic e provider.

5 For the rest of the fields, use the default settings.

6 Click **Apply** to save your settings.



7 Try to connect to a website to see if you have correctly set up your Internet connection.



The new connection is displayed on the **Broadband** screen.

Bridge Mode

1 In this bridge mode example, the DSL WAN connection has the following information.

General	
Name	MyDSLConnection
Type	ADSL over ATM
Connection Mode	Bridge
ATM PVC Configuration	
VPI/VCI	36/48
Encapsulation Mode	LLC/SNAP-BRIDGING
Service Category	UBR without PCR

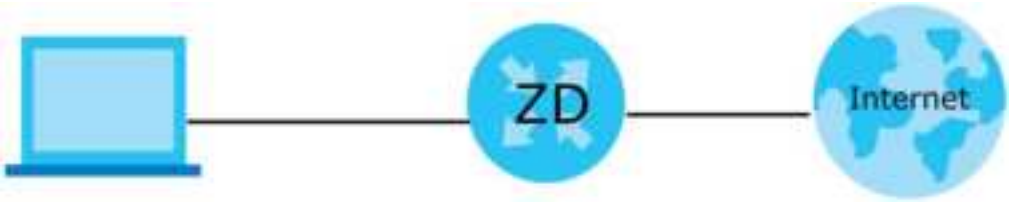
2 Enter the **General** and **ATM PVC Configuration** settings as provided above.

3 For the rest of the fields, use the default settings.

4 Click **Apply** to save your settings.

5.2.2 Setting Up an Ethernet Connection

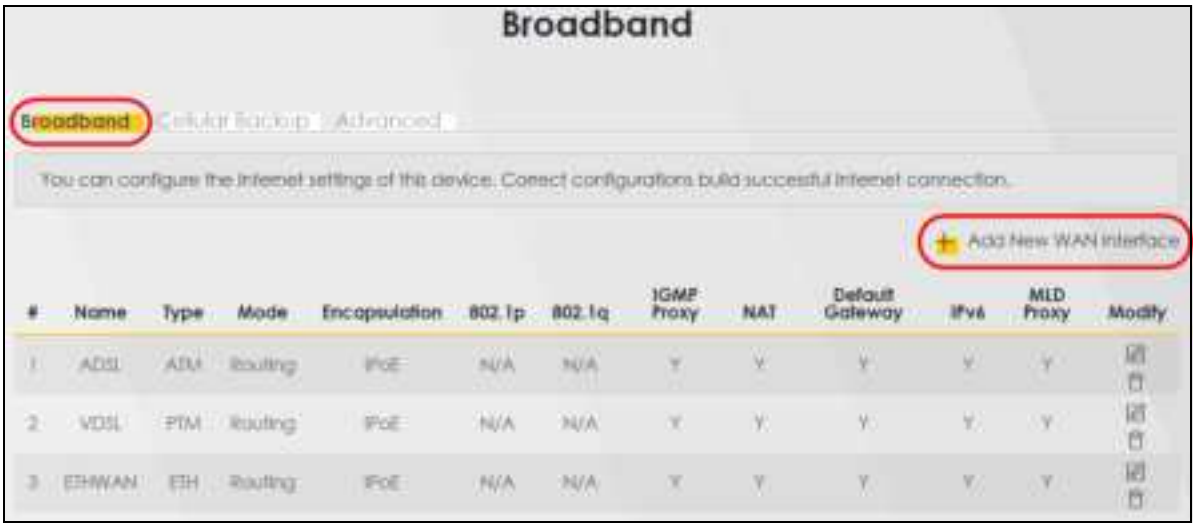
If you connect to the Internet through an Ethernet connection, you need to connect a broadband modem or router with Internet access to the WAN Ethernet port on the Zyxel Device. You need to configure the Internet settings from the broadband modem or router on the Zyxel Device. First, make sure you have Internet access through the broadband modem or router by connecting directly to it.



This example shows you how to configure an Ethernet WAN connection.

1 Make sure you have the Ethernet WAN port connect to a modem or router.

2 Go to **Network Setting > Broadband** and then the following screen appears. Click **Add New WAN Interface** to add a WAN connection.



3 To set the Zyxel Device to **Routing** mode, see Section 1 on page 99.
To set the Zyxel Device to **Bridge** mode, see Section 1 on page 101.

Routing Mode

1 In this routing mode example, configure the following information for the Ethernet WAN connection.

General	
Name	My ETH Connecti
Type	Ethernet
Connection Mode	Routing
Encapsulation (Internet Type)	IPoE
IPv6/IPv4 Mode	IPv4 Only

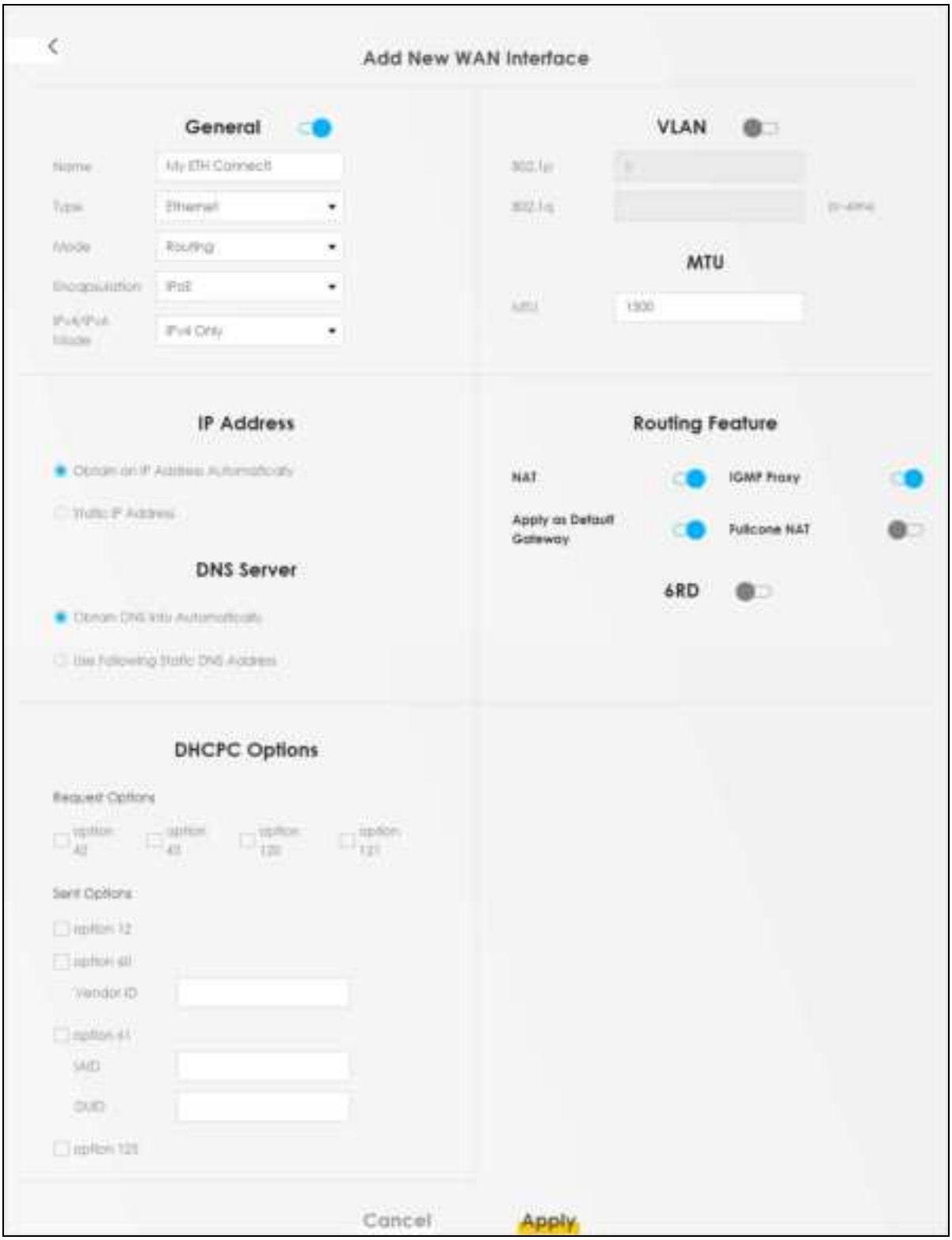
2 Enter the **General** settings provided by your Internet service provider.

- Enter a **Name** to identify your WAN connection.
- Set the **Type** to **Ethernet**.
- Set your Ethernet connection **Mode** to **Routing**.
- Choose the **Encapsulation** specified by your Internet service provider. For this example, select **IPoE** as the WAN encapsulation type.
- Set the **IPv4/IPv6 Mode** to **IPv4 Only**.

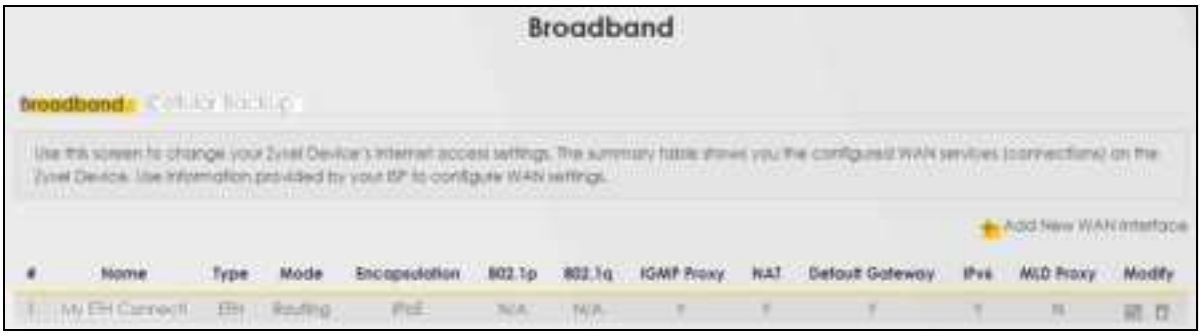
3 Under **Routing Feature**, enable **NAT** and **Apply as Default Gateway**.

4 For the rest of the fields, use the default settings.

5 Click **Apply** to save your settings.



6 Go to the **Network Setting** > **Broadband** screen to view the established Ethernet connection. The new connection is displayed on the **Broadband** screen.



Bridge Mode

1 In this bridge mode example, configure the following information for the Ethernet WAN connection.

General	
Name	My ETH Connecti
Type	Ethernet
Connection Mode	Bridge

2 Enter the **General** settings provided by your Internet service provider.

- Enter a **Name** to identify your WAN connection.
- Set the **Type** to **Ethernet**.
- Set your Ethernet connection **Mode** to **Bridge**.

3 For the rest of the fields, use the default settings.

4 Click **Apply** to save your settings.

5.3 WiFi Network Setup

For Zyxel Devices that support MPro Mesh, you can use the MPro Mesh app to configure your WiFi network. See Section 6.1 on page 143 for setting up your WiFi network with the Zyxel MPro Mesh app.

In this example, you want to set up a WiFi network so that you can use your notebook to access the Internet. In this WiFi network, the Zyxel Device is an access point (AP), and the notebook is a WiFi client. The WiFi client can access the Internet through the AP.

Figure 74 WiFi Network Setup

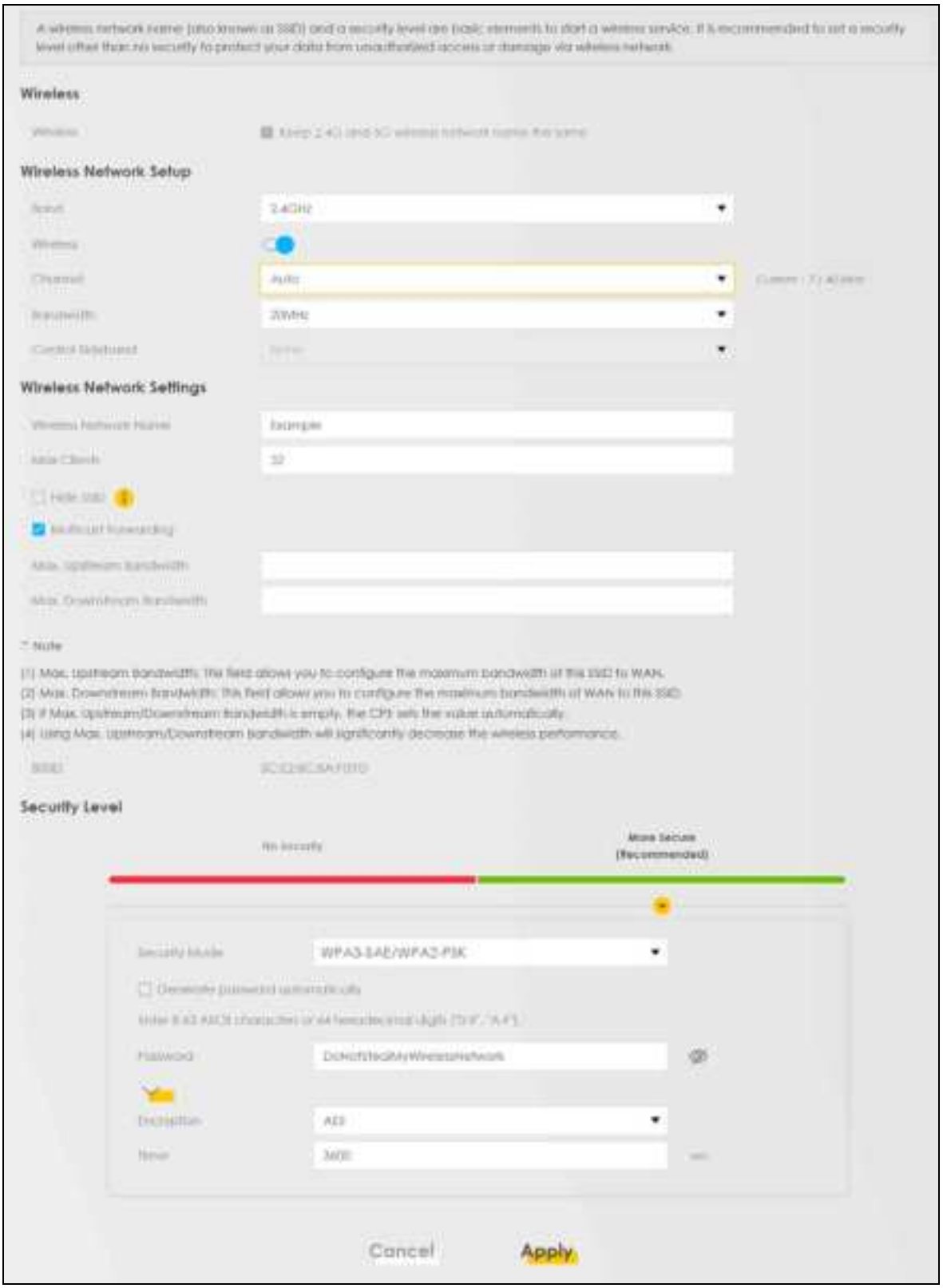
See the label on the Zyxel Device for the WiFi network settings and then connect manually to the Zyxel Device. Alternatively, you can connect to the Zyxel Device WiFi network using WPS. See Section 5.3.3 on page 104.

5.3.1 Changing Security on a WiFi Network

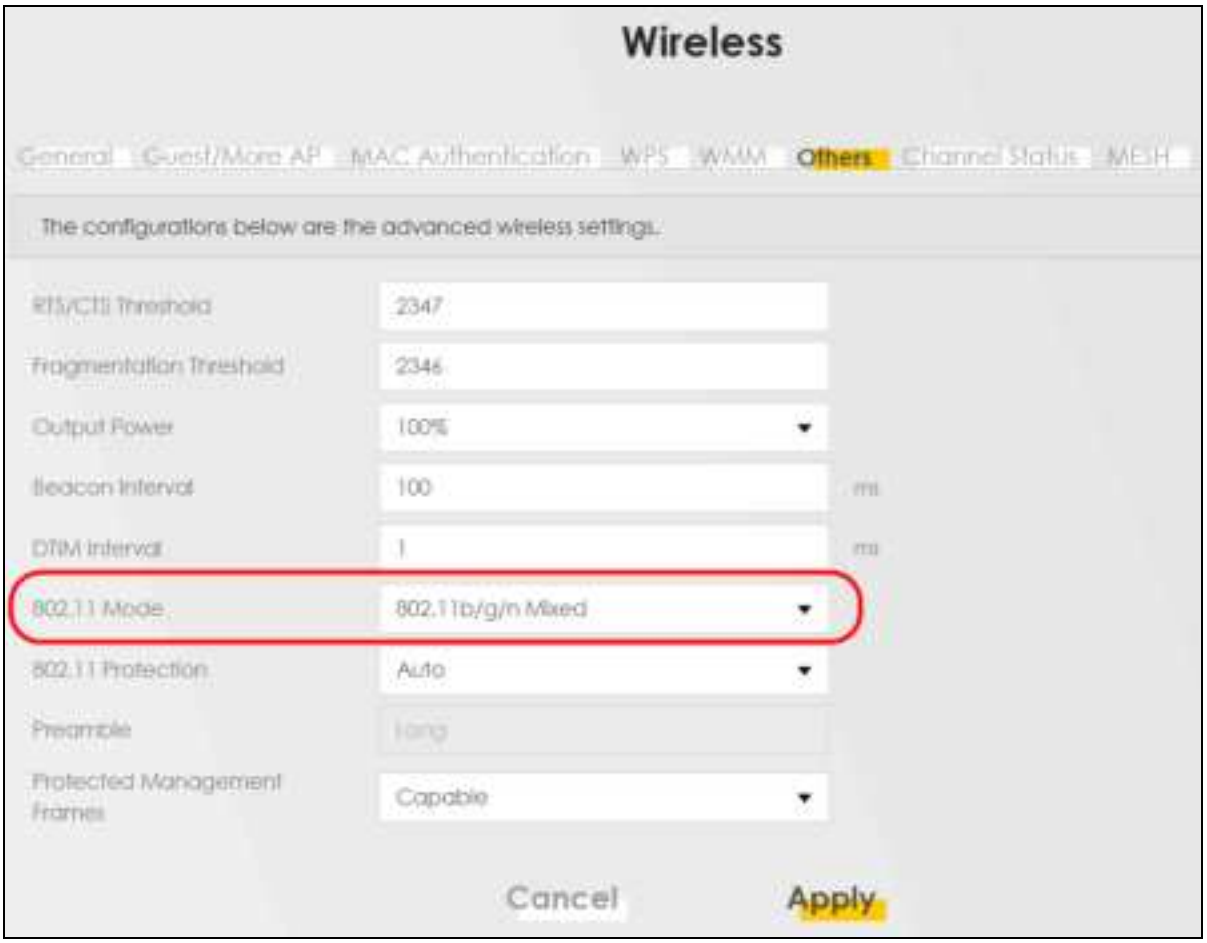
This example changes the default security settings of a WiFi network to the following:

SSID	Example
Security Mode	WPA3-SAE/WPA2-PSK
Pre-Shared Key	DoNotStealMyWirelessNetwork
802.11 Mode	802.11b/g/n Mixed

1 Go to the **Network Setting > Wireless > General** screen. Select **More Secure** as the security level and **WPA3-SAE/WPA2-PSK** as the security mode. Configure the screen using the provided parameters. Click **Apply**.



2 Go to the **Wireless > Others** screen. Set **802.11 Mode** to **802.11b/g/n Mixed**, and then click **Apply**.



You can now use the WPS feature to establish a WiFi connection between your notebook and the Zyxel Device (see Section 5.3.3 on page 104). Now use the new security settings to connect to the Internet through the Zyxel Device using WiFi.

5.3.2 Connecting to the Zyxel Device's WiFi Network Using WPS

This section shows you how to connect a WiFi device to the Zyxel Device's WiFi network using WPS. WPS (Wi-Fi Protected Setup) is a security standard that allows devices to connect to a router securely without you having to enter a password. There are two methods:

- **Push Button Configuration (PBC)** – Connect to the WiFi network by pressing a button. This is the simplest method.

5.3.3 WPS Push Button Configuration (PBC)

This example shows how to connect to the Zyxel Device's WiFi network from a notebook computer running Windows 10.

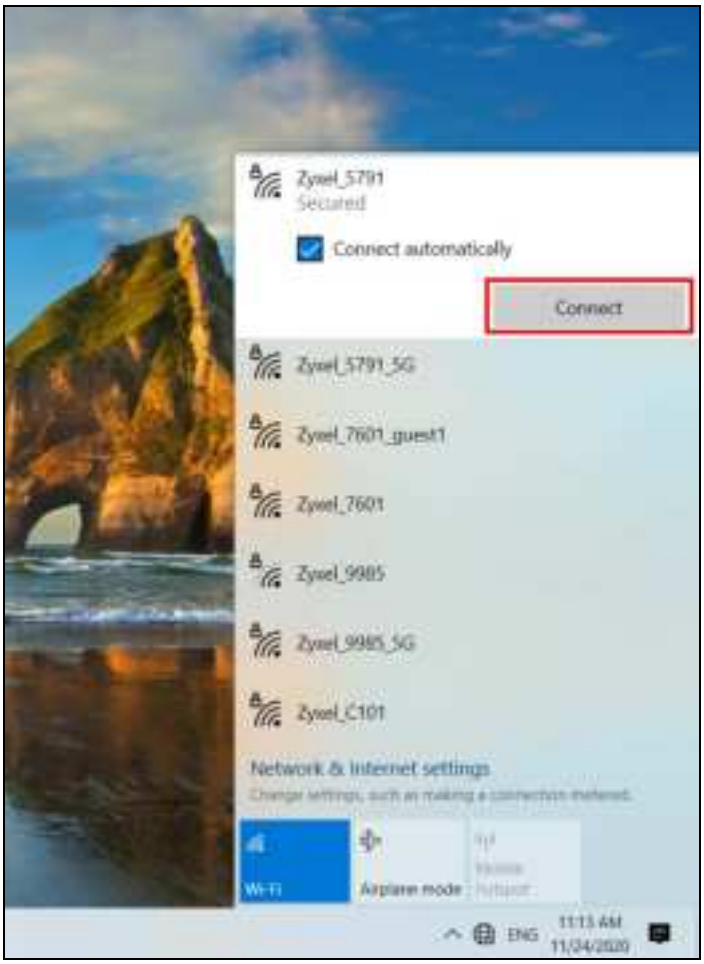
1 Make sure that your Zyxel Device is turned on, and your notebook is within range of the Zyxel Device's WiFi signal.

2 Push and hold the **WPS** button located on the Zyxel Device until the **WiFi** or **WPS** LED starts blinking slowly. Alternatively, log into the Zyxel Device's Web Configurator, and then go to the **Network Setting > Wireless > WPS** screen. Enable **WPS** and **Method 1 PBC**, click **Apply**, and then click the **WPS button**.

3 Log into the Zyxel Device's Web Configurator, and then go to the **Network Setting > Wireless > WPS** screen. Enable **WPS** and **Method 1 PBC**, click **Apply**, and then click the **WPS button**.

4 In Windows 10, click on the Network icon in the system tray to open the list of available WiFi networks.

5 Locate the WiFi network of the Zyxel Device. The default WiFi network name is "Zyxel_XXXX" (2.4G) or "Zyxel_XXXX_5G" (5G). Then click **Connect**.



The Zyxel Device sends the WiFi network settings to Windows using WPS. Windows displays "Getting settings from the router".

The WiFi device is then able to connect to the WiFi network securely.

5.3.4 Setting Up a Guest Network

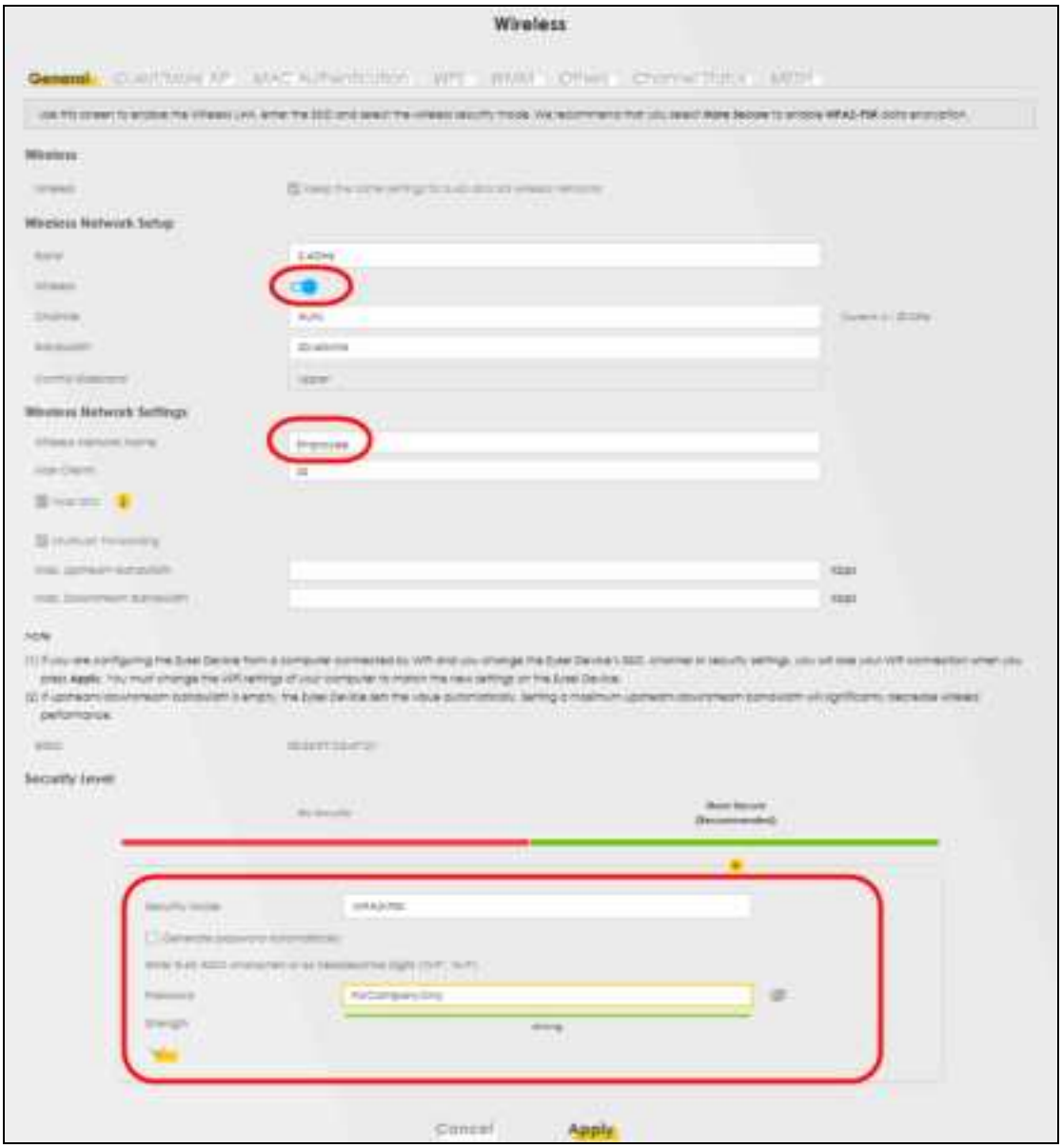
The Zyxel Device authenticates the WiFi device using the PIN, and then sends the WiFi network settings to the device using WPS. This process may take up to 2 minutes. The WiFi device is then able to connect to the WiFi network securely.A company wants to create two WiFi networks for different groups of users as shown in the following figure. Each WiFi network has its own SSID and security mode. Both networks are accessible on both 2.4G and 5G WiFi bands.

- Employees using the **General** WiFi network group will have access to the local network and the Internet.
- Visitors using the **Guest** WiFi network group with a different SSID and password will have access to the Internet only.

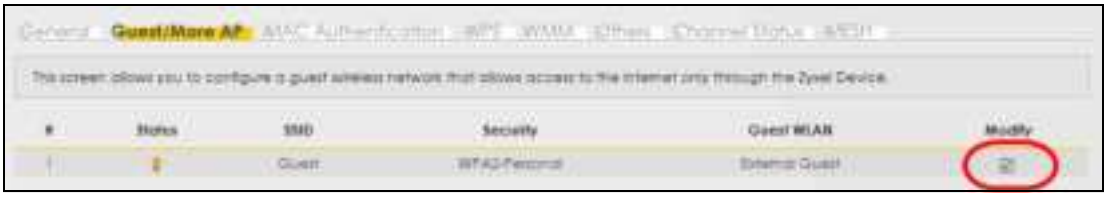
Use the following parameters to set up the WiFi network groups.

	GENERAL	GUEST
2.4/5G SSID	Employee	Guest
Security Level	More Secure	More Secure
Security Mode	WPA2-PSK	WPA2-PSK
Pre-Shared Key	ForCompanyOnly	guest123

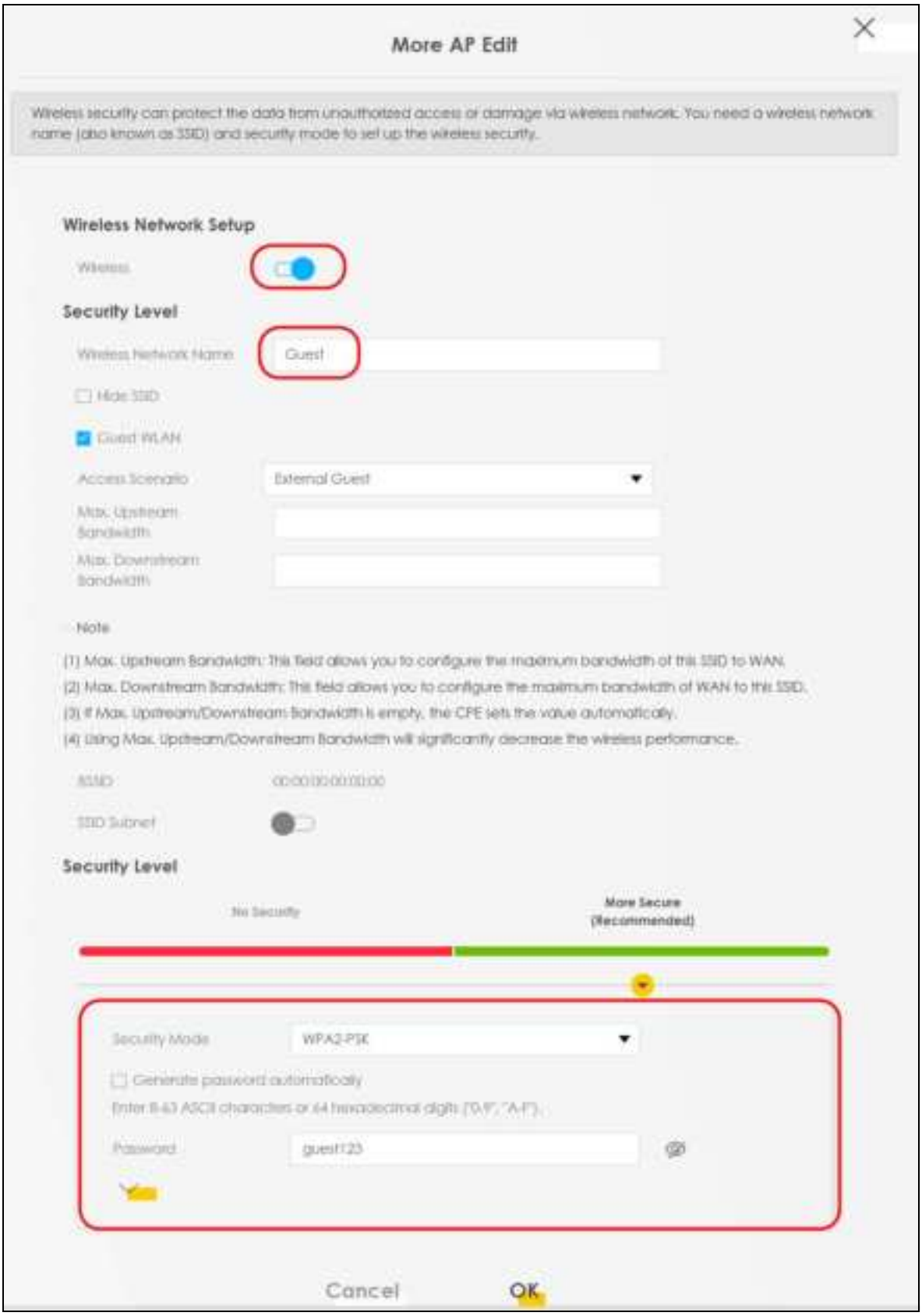
Go to the **Network Setting > Wireless > General** screen. Use this screen to set up the company's general WiFi network group. Configure the screen using the provided parameters and click **Apply**. Note that if you have employees using 2.4G and 5G devices, enable **Keep the same settings for 2.4G and 5G wireless networks** to use the same SSID and password. Clear it if you want to configure different SSIDs and passwords for 2.4G and 5G bands.



6 Go to the **Network Setting > Wireless > Guest/More AP** screen. Click the **Modify** icon to configure the second WiFi network group.



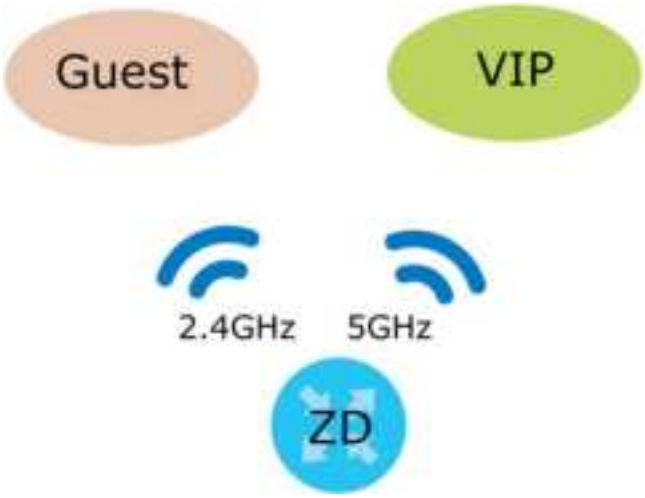
7 On the **Guest/More AP** screen, click the **Modify** icon to configure the other Guest WiFi network group. Configure the screen using the provided parameters and click **OK**.


More AP Edit
Wireless security can protect the data from unauthorized access or damage via wireless network. You need a wireless network name (also known as SSID) and security mode to set up the wireless security.
Wireless Network Setup
Wireless
Security Level
Wireless Network Name
Guest
Hide SSID
Guest WLAN
Access Scenario
External Guest
Max. Upstream Bandwidth
Max. Downstream Bandwidth
Note
(1) Max. Upstream Bandwidth: This field allows you to configure the maximum bandwidth of this SSID to WAN.
(2) Max. Downstream Bandwidth: This field allows you to configure the maximum bandwidth of WAN to this SSID.
(3) If Max. Upstream/Downstream Bandwidth is empty, the CPE sets the value automatically.
(4) Using Max. Upstream/Downstream Bandwidth will significantly decrease the wireless performance.
SSID
SSID Subnet
Security Level
No Security
More Secure (Recommended)
Security Mode
WPA2-PSK
Generate password automatically
Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").
Password
guest123
Cancel
OK

8 Check the status of **Guest** in the **Guest/More AP** screen. A yellow bulb under **Status** means the SSID is active and ready for WiFi access.

5.3.5 Setting Up Two Guest WiFi Networks on Different WiFi Bands

In this example, a company wants to create two Guest WiFi networks: one for the **Guest** group and the other for the **VIP** group as shown in the following figure. Each network will have its SSID and security mode to access the internet.



- The **Guest** group will use the 2.4G band.
- The **VIP** group will use the 5G band.

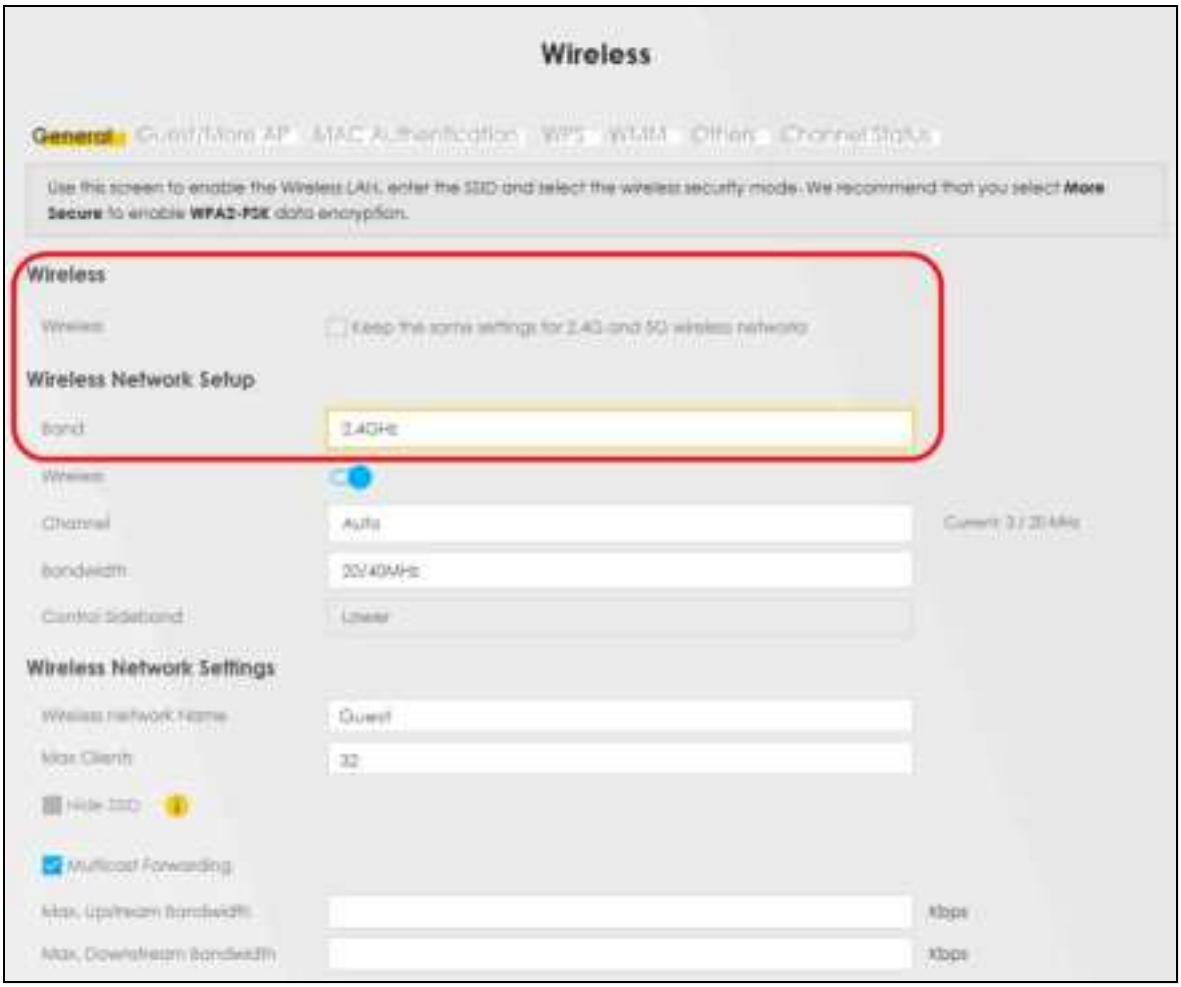
The Company will use the following parameters to set up the WiFi network groups.

Table 32 WiFi Settings Parameters Example

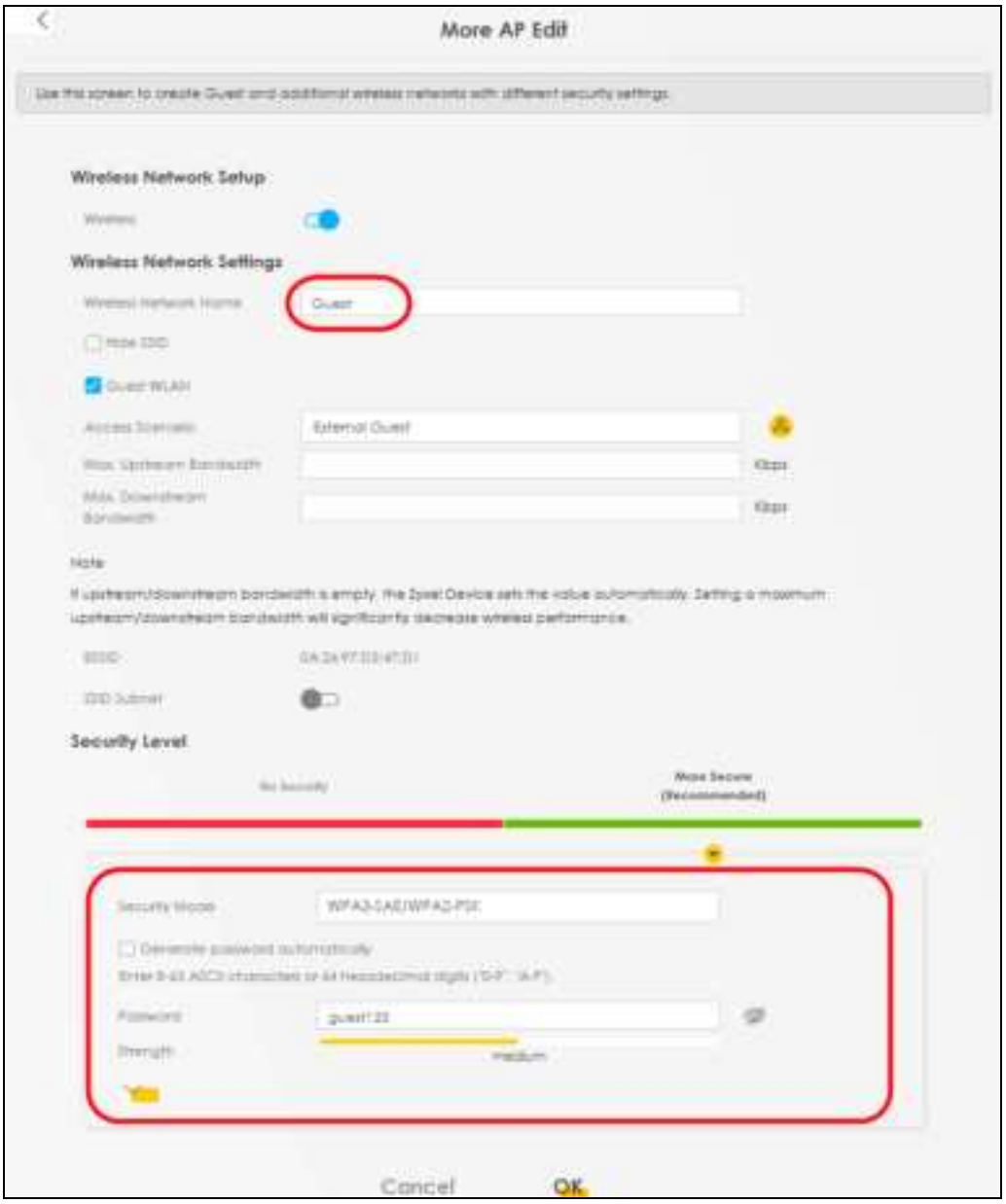
BAND	2.4G	5G
SSID	Guest	VIP
Security Mode	WPA3-SAE/WPA2-PSK	WPA3-SAE/WPA2-PSK
Pre-Shared Key	guest123	123456789

1 Go to the **Wireless > General** screen and set **Band** to **2.4GHz** to configure 2.4G Guest WiFi settings for **Guest**. Click **Apply**.

Note: You will not be able to configure the 2.4G and 5G Guest WiFi settings separately if **Keep the same settings for 2.4G and 5G wireless network** is enabled.

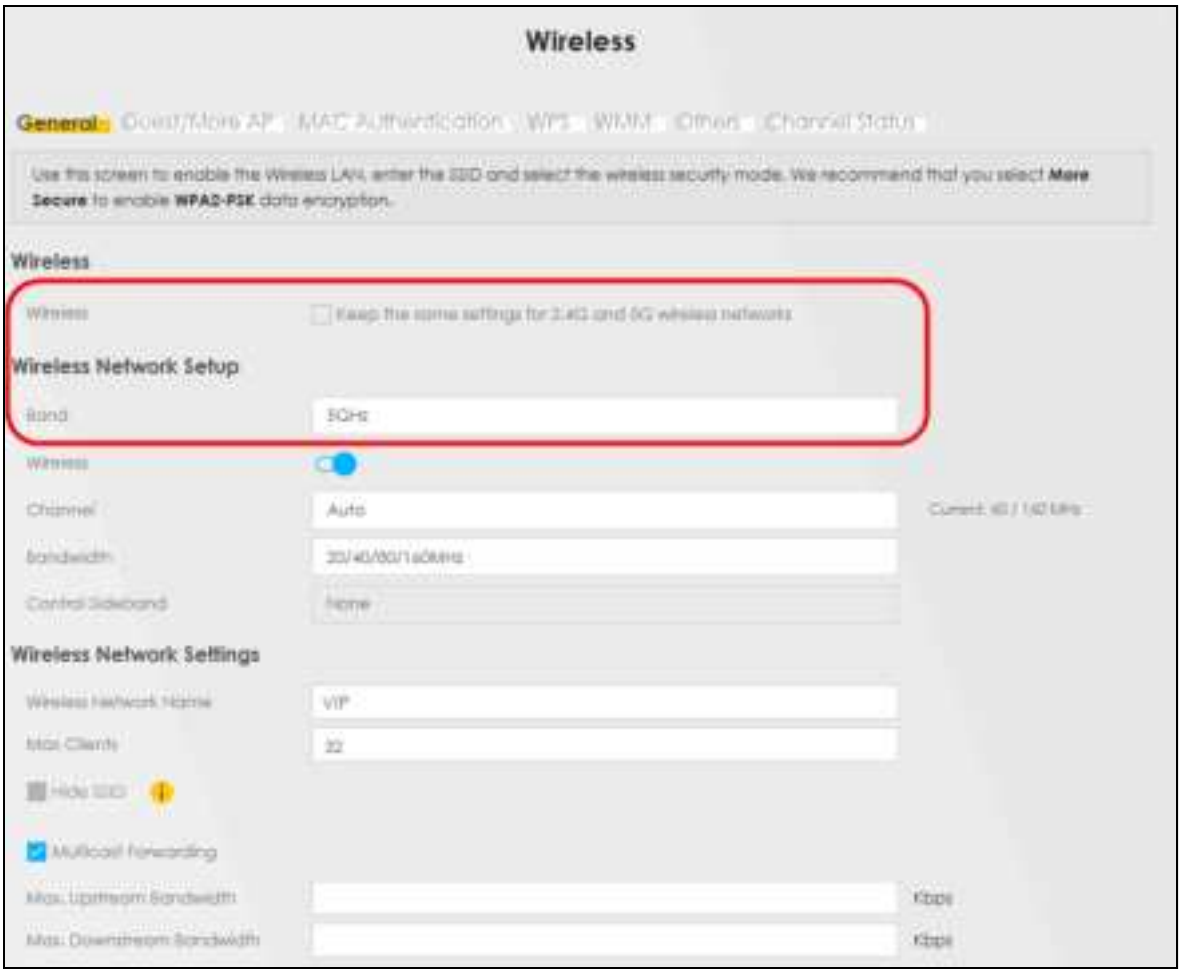


2 Go to the **Wireless > Guest/More AP** screen and click the **Modify** icon. The following screen appears. Configure the **Security Mode** and **Password** using the provided parameters and click **OK**.

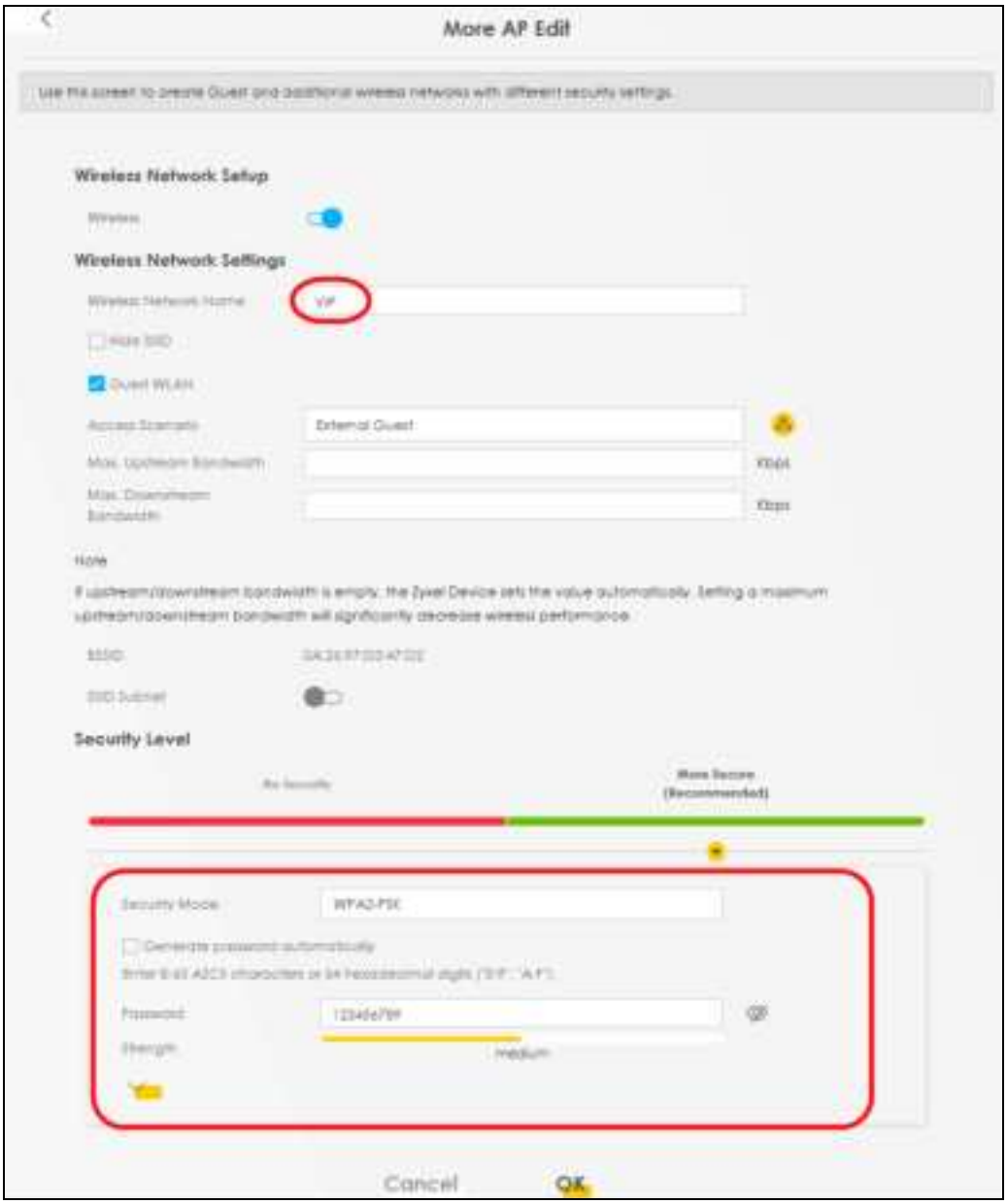


The 2.4 GHz **Guest** WiFi network is now configured.

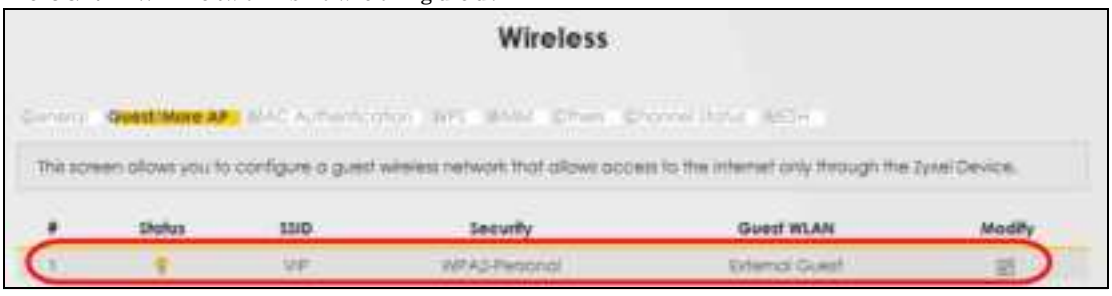
3 Go to the **Wireless > General** screen and set **Band** to **5GHz** to configure the 5G Guest WiFi settings for **VIP**. Click **OK**.



4 Go to the **Wireless > Guest/More AP** screen and click the **Modify** icon. The following screen appears. Configure the **Security Mode** and **Password** using the provided parameters and click **OK**.



The 5G **VIP** WiFi network is now configured.



5.4 USB Applications

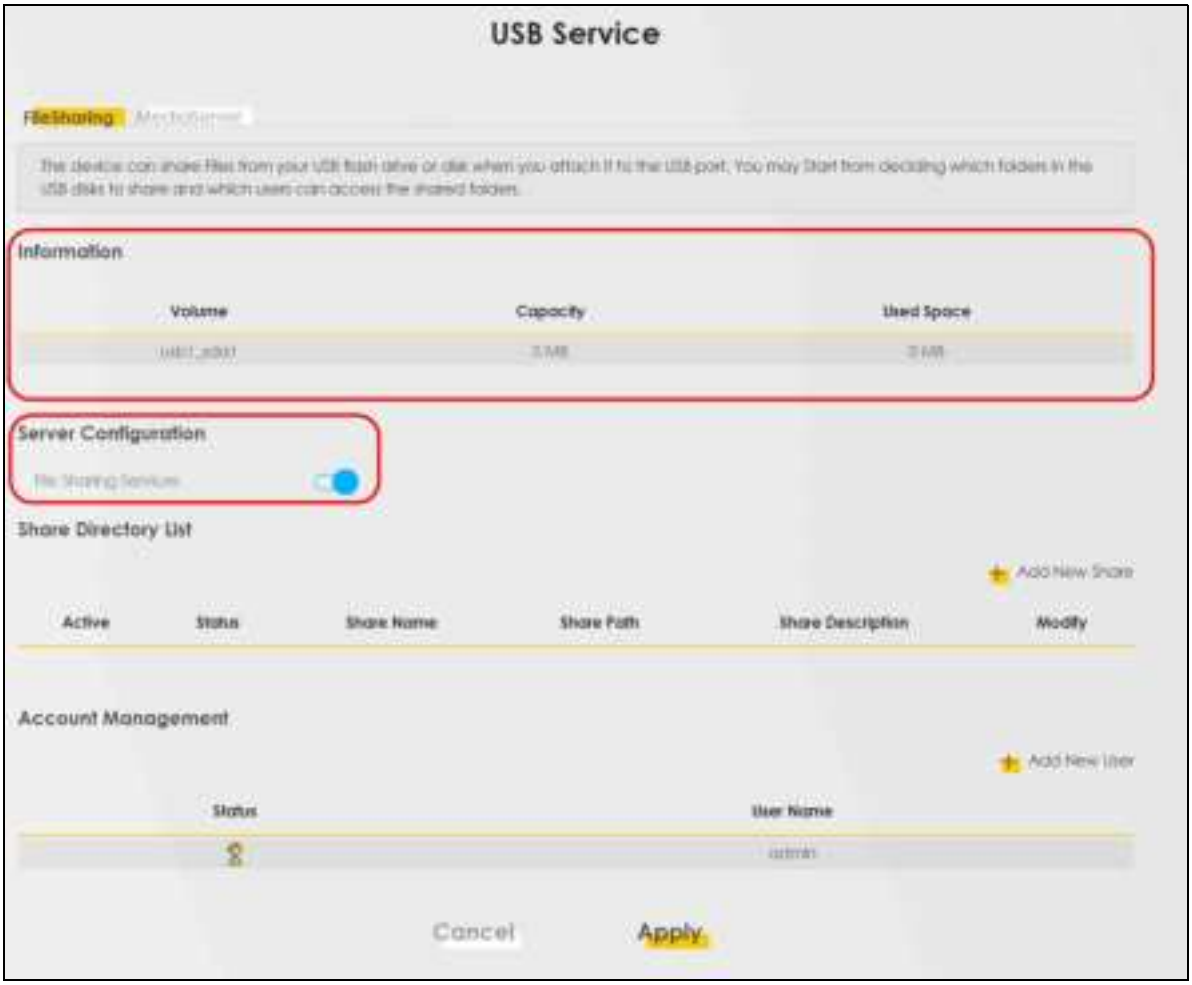
This section shows you how to set up a cellular backup network, access shared folders and play files through Window Media using a USB device.

5.4.1 File Sharing

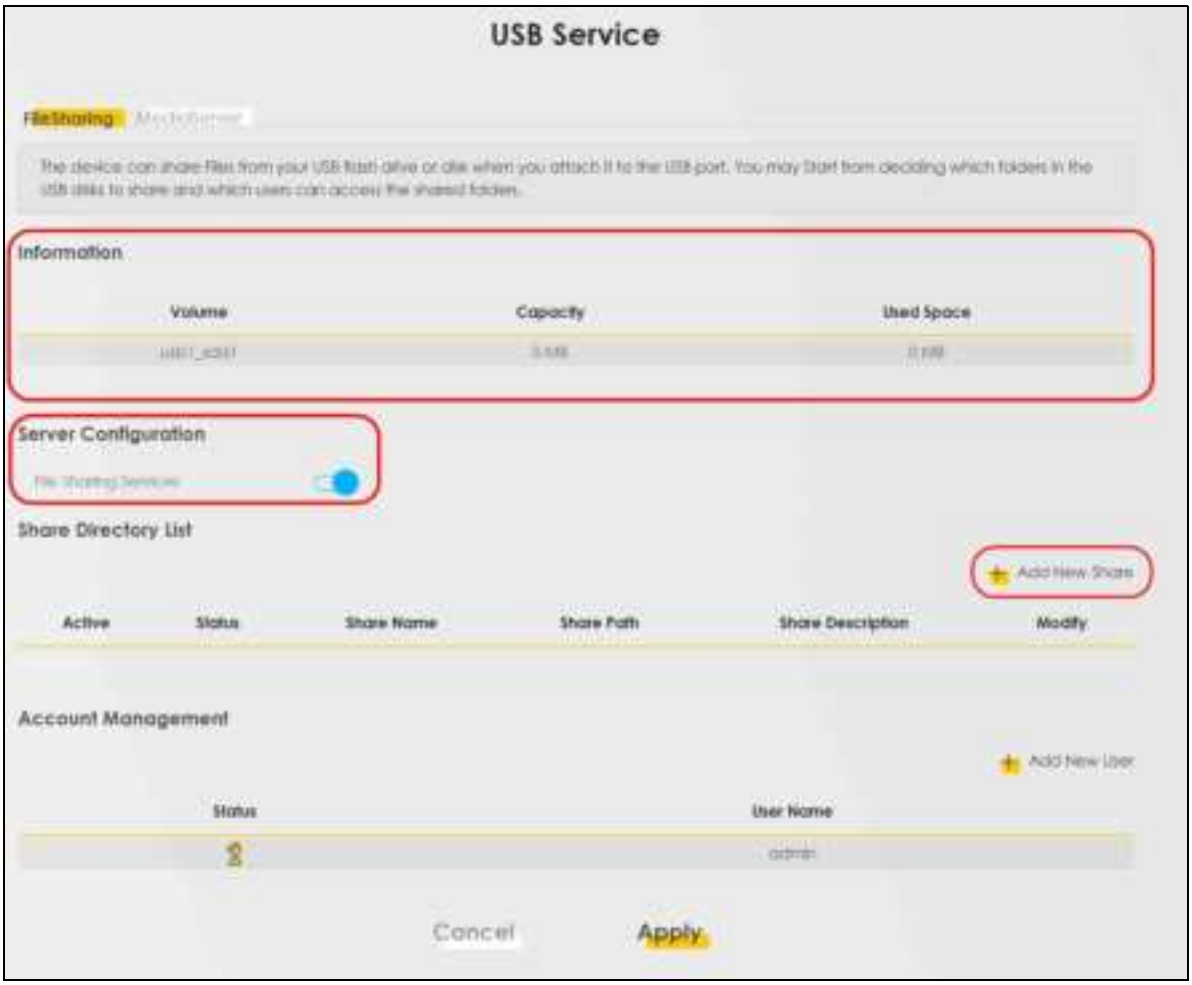
This section shows you how to create a shared folder on your Zyxel Device through a USB device and allow others to access the shared folder with File Sharing services.

5.4.1.1 Setting up File Sharing on Your Zyxel Device

1. Before enabling file sharing in the Zyxel Device, please set up your shared folders beforehand in your USB device.
2. Connect your USB device to the USB port of the Zyxel Device.
3. Go to the **Network Setting > USB Service > File Sharing** screen. Enable **File Sharing Services** and click **Apply** to activate the file sharing function. The Zyxel Device automatically adds your USB device to the **Information** table.



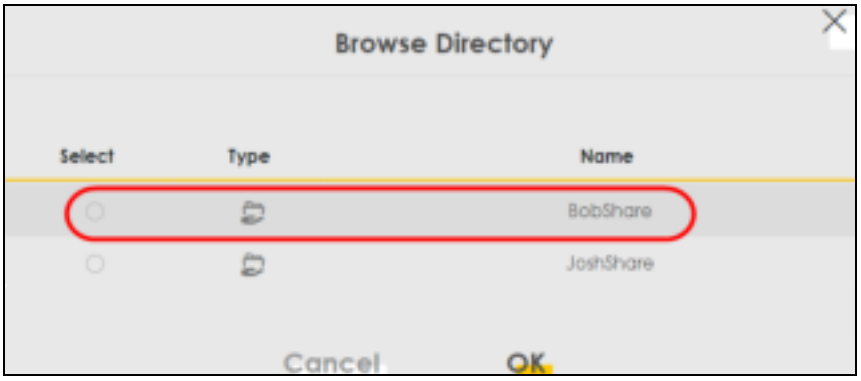
4 Click **Add New Share** to add a new share.



5 The **Add New Share** screen appears.

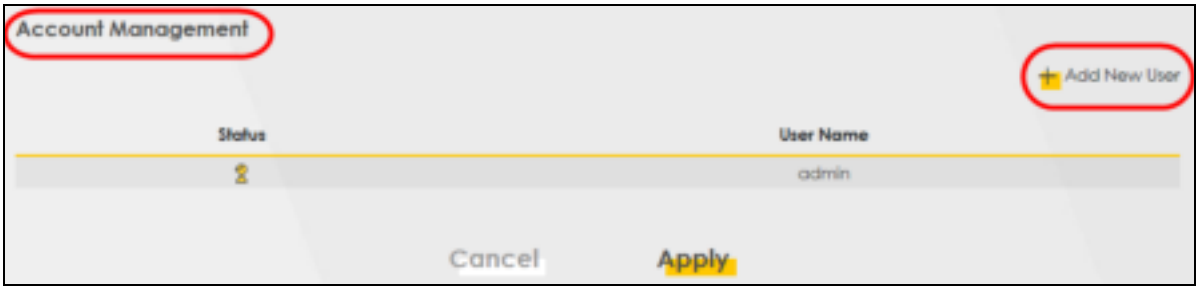
- Select your USB device from the **Volume** drop-down list box.
- Enter a **Description** name for the added share to identify the device.
- Click **Browse** and the **Browse Directory** screen appears.

- On the **Browse Directory** screen, select the folder that you want to add as a share. In this example, select **BobShare** and then click **OK**.

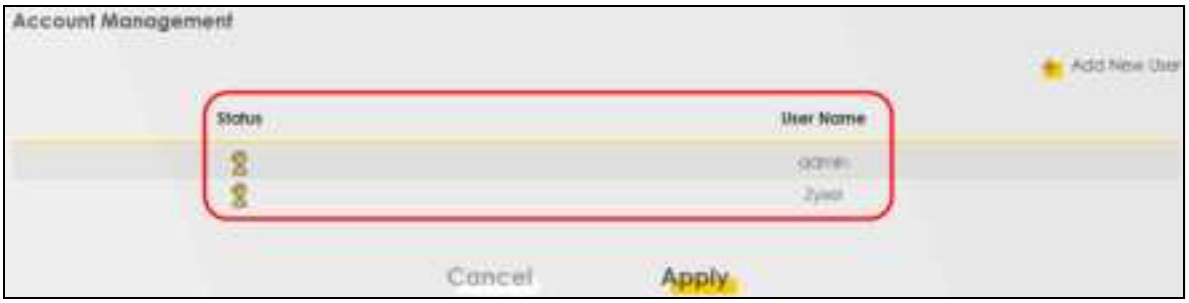


- In **Access Level**, select **Public** to let the share to be accessed by all users connected to the Zyxel Device. Otherwise, select **Security** to let the share to be accessed by specific users to access only. Click **OK** to save the settings.

6 To set **Access level** to **Security**, you need to create one or more users accounts. Under **Account Management**, click **Add New User** to open the **User Account** screen.



7 After you create a new user account, the screen looks like the following.



8 File sharing is now configured. You can see the USB storage device listed in the table below.

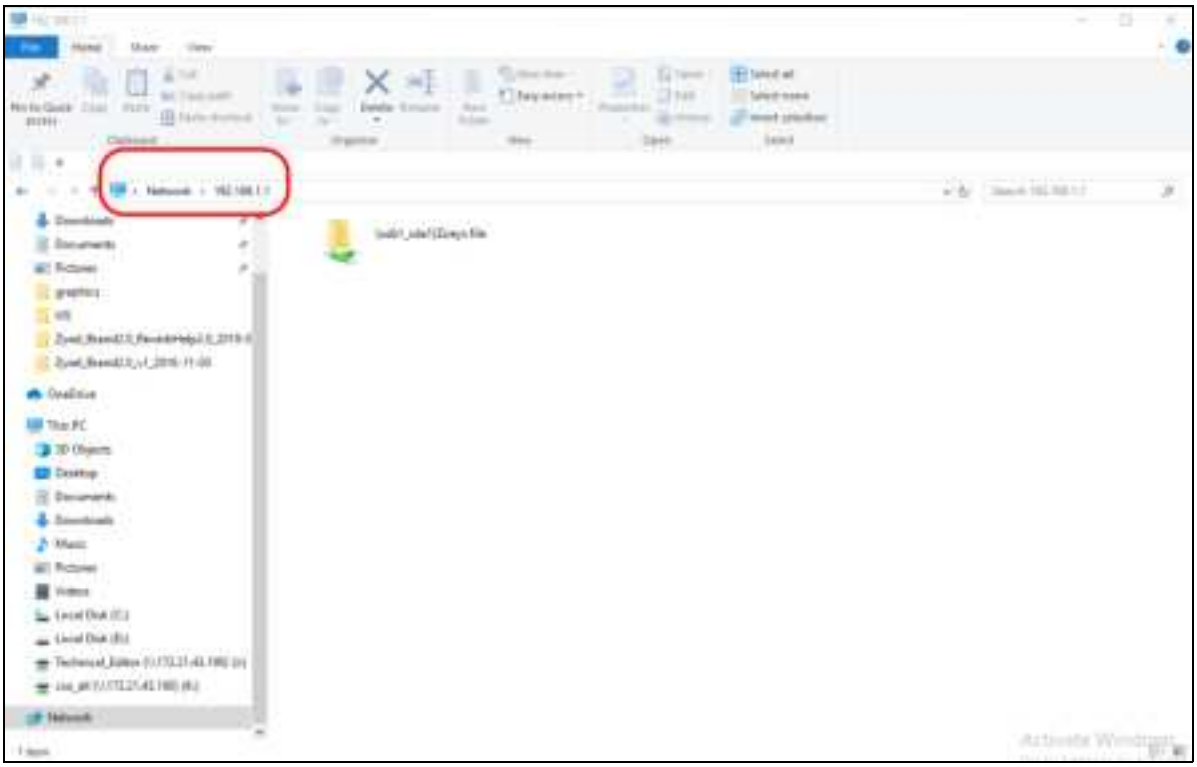
5.4.1.2 Accessing Your Shared Files From a Computer

You can use Windows Explorer to access the USB storage devices connected to the Zyxel Device.

Note: This example shows you how to use Microsoft Windows 10 to browse shared files in a share called (usb1_sda)Zoeys file. Refer to your operating system's documentation for how to browse your file structure.

1 Open Windows Explorer.

2 In the Windows Explorer's address bar, enter a double backslash "\\" followed by the IP address of the Zyxel Device (the default IP address of the Zyxel Device is 192.168.1.1



3 Double-click on **(usb1_sda)Zoeys file**, and then enter the share's username and password if prompted.

4 After you access **(usb1_sda)Zoeys file** through your Zyxel Device, you do not have to log in again unless you restart your computer.

5.4.2 Media Server

Use the media server feature to play files on a computer or on your television.

This section shows you how the media server feature works using the following:

- Microsoft (MS) Windows Media Player
  Media Server works with Windows 10. Make sure your computer is able to play media files (music, videos and pictures).
- A digital media adapter
  You need to set up the media adapter to work with your television (TV).

Before you begin, connect the USB storage device containing the media files you want to play to the USB port of your Zyxel Device.

5.4.2.1 Configuring the Zyxel Device

To use your Zyxel Device as a media server, follow the steps below.

1 Go to the **Network Setting > USB Service > Media Server** screen.

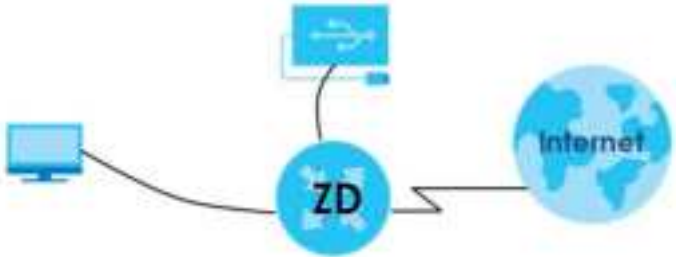
2 Enable **Media Server**, and then select an interface on which you want to enable the media server function.

3 Enter the path clients use to access the media files on a USB storage device connected to the Zyxel Device, and click **Apply**.

This enables DLNA-compliant media clients to play the video, music and image files in your USB storage device.

5.4.2.2 Playing Media Using Windows Media Player on Windows 10

This section shows you how to play the media files on the USB storage device connected to your Zyxel Device using Windows Media Player.



1 Open Windows Media Player. It automatically detects the Zyxel Device.

2 If you cannot see the Zyxel Device in the left panel as shown above, go to **Organize > Manage Libraries > Music > Add** on the Windows Media Player Home screen. In the Windows Explorer's address bar, enter **\\192.168.1.1**. The following screen appears. Select the folder containing the media you wish to upload to Windows Media Player, and then click **Include Folder**.

3 Select the shared folder, and then click **Add** to add it to your Media Library. Click **OK** to save the settings.

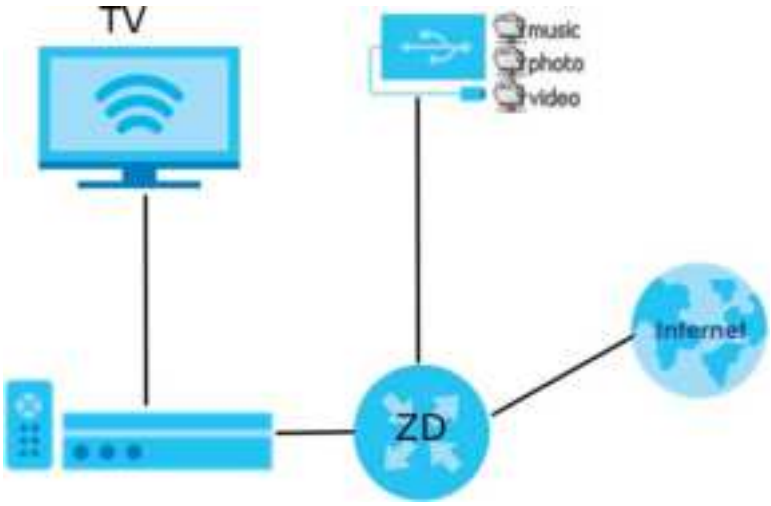
4 In the right panel, you can browse and play the files available in the USB storage device based on the category (**Music**, **Video**, **Pictures**, **Recorded TV**) you selected.

5.4.2.3 Using a Digital Media Player

This section shows you how you can use the Zyxel Device with a hardware digital media player to play media files stored in the USB storage device on your TV screen.

Note: For this tutorial, your digital media player is already connected to the TV.

1 Connect the digital media player to an available LAN port on your Zyxel Device.



2 Turn on the TV and wait for the digital media player **Home** screen to appear. Select the Zyxel Device as your media server.

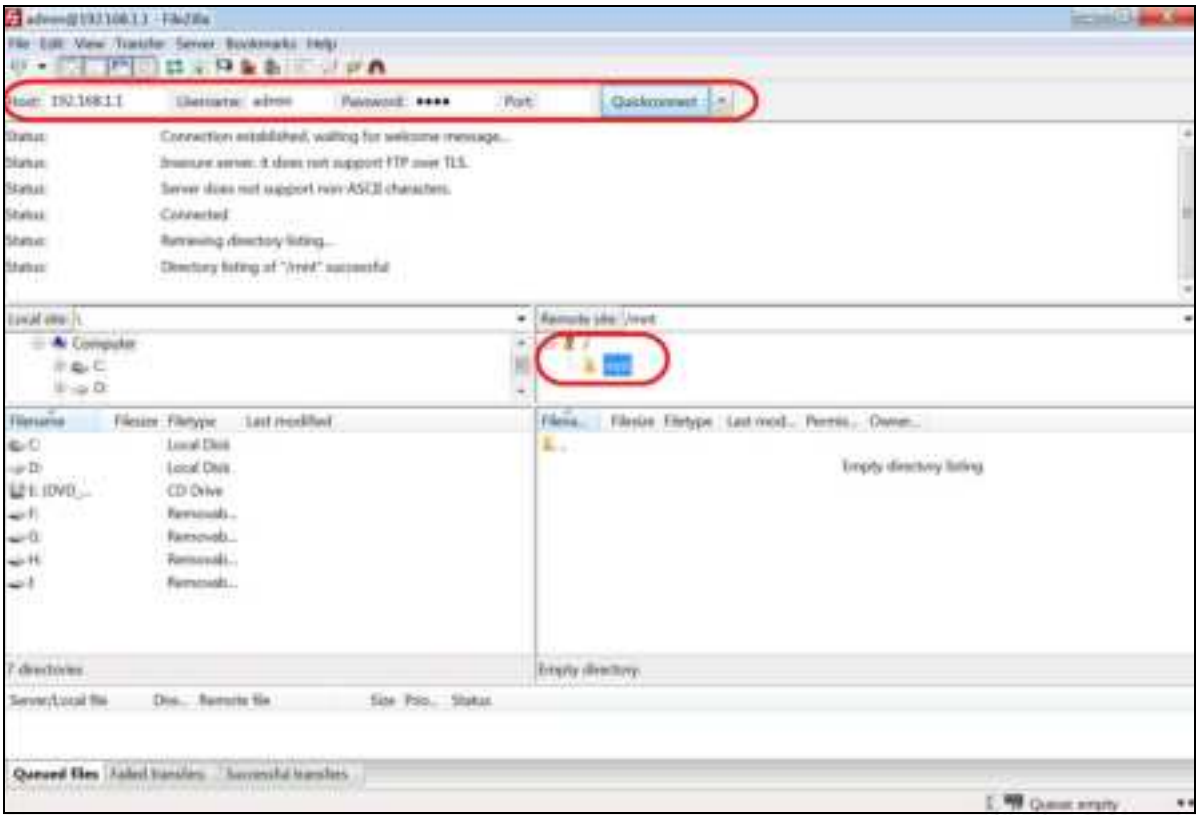
3 The screen shows you the list of available media files in the USB storage device. Select the file you want to open and push the **Play** button on the remote control.

5.4.3 Using FTP

This section shows how to use an FTP program to access files on an USB storage device connected to the Zyxel Device.

Note: This example uses the FileZilla FTP program to browse your shared files.

1 In FileZilla, enter the IP address of the Zyxel Device (The default IP is **192.168.1.1**), your account's **Username**, **Password** and **Port** number, and then click **Quickconnect**. A screen asking for password authentication appears.



2 After you log in, the **mnt** folder is displayed as shown.

5.5 Network Security

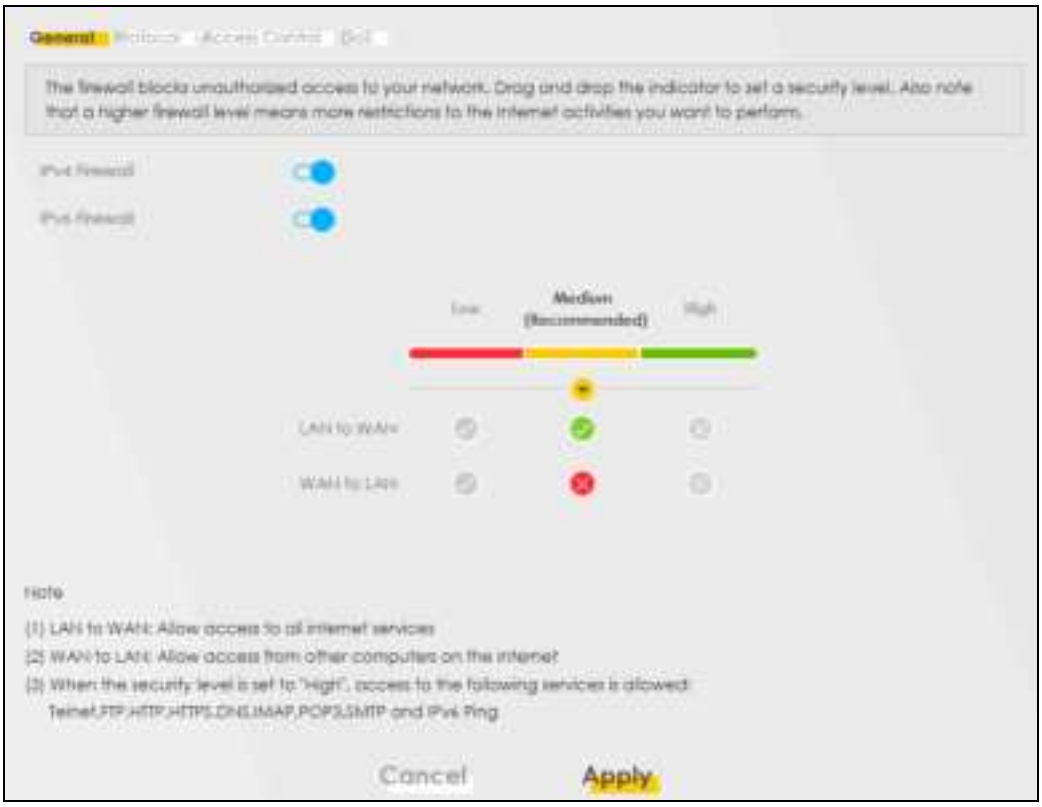
This section shows you how to configure a Firewall rule, Parental Control rule, and MAC Filter rule.

5.5.1 Configuring a Firewall Rule

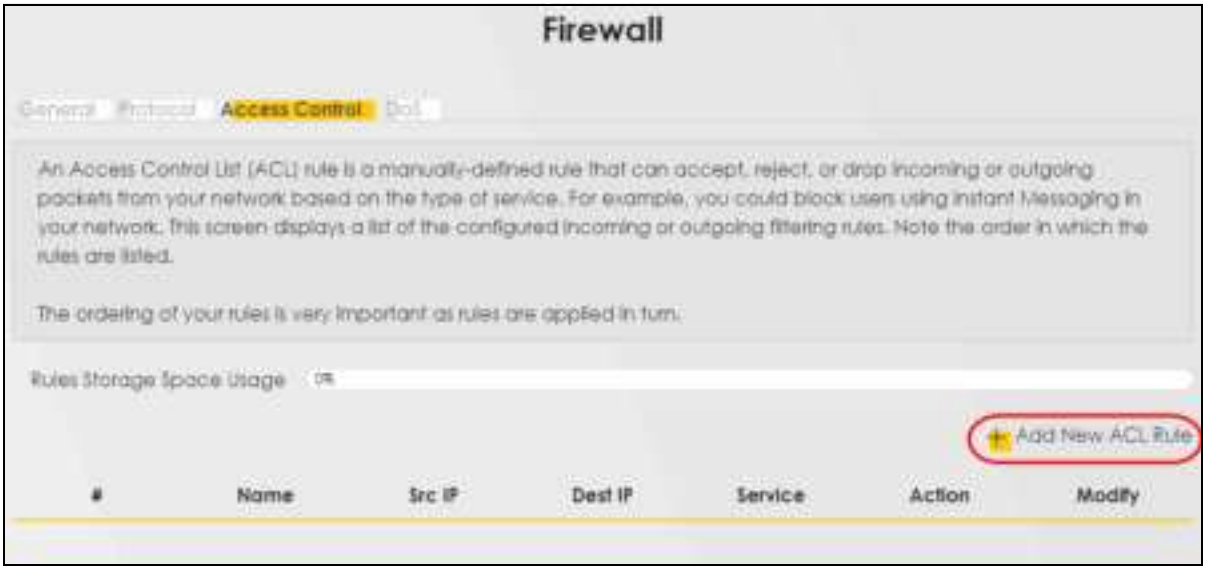
You can enable the firewall to protect your LAN computers from malicious attacks from the Internet.

1 Go to the **Security > Firewall > General** screen.

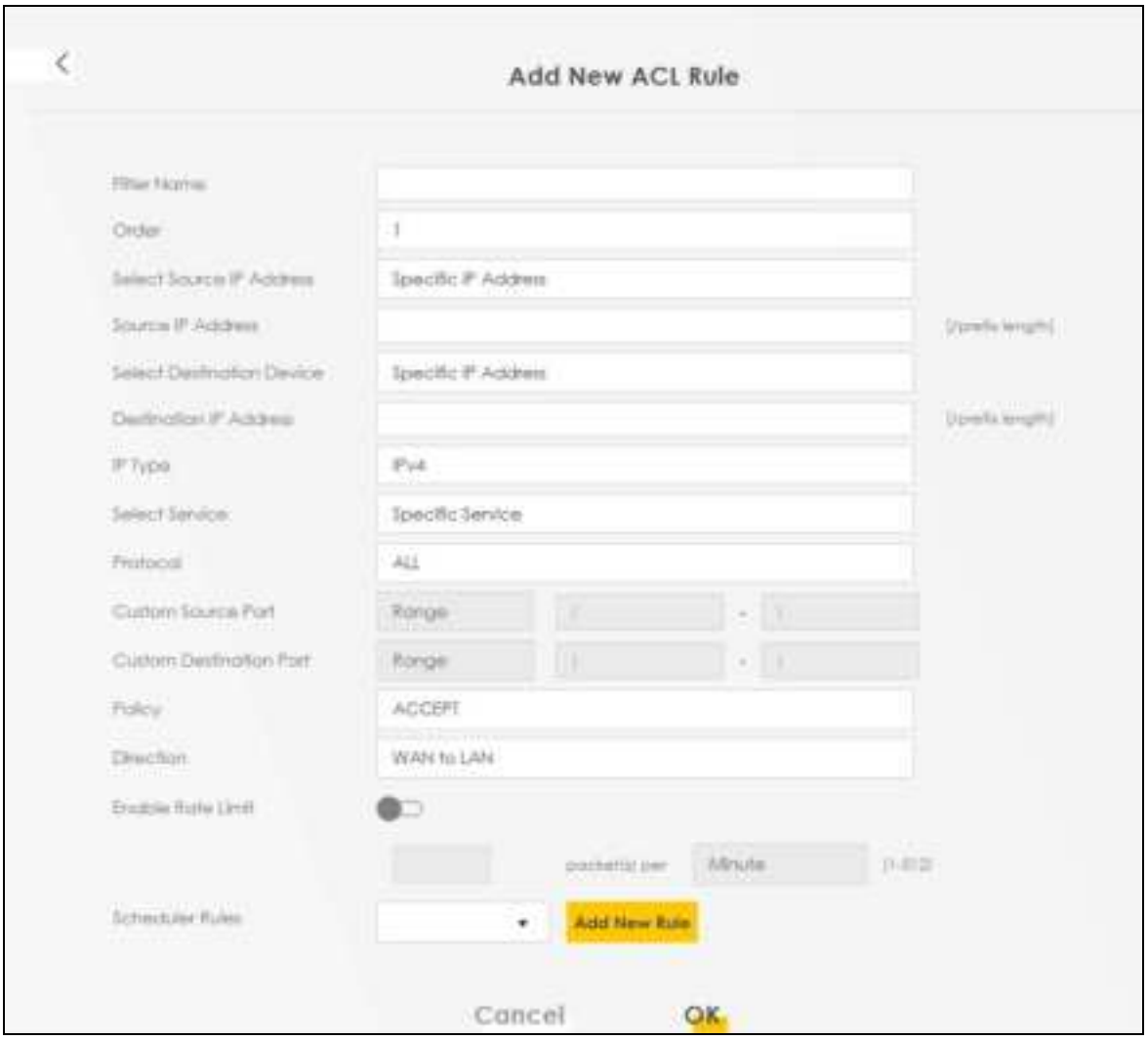
2 Select **IPv4 Firewall**/**IPv6 Firewall** to enable the firewall, and then click **Apply**.



3 Open the **Access Control** screen, click **Add New ACL Rule** to create a rule.



4 Use the following fields to configure and apply a new ACL(Access Control List) rule.



- **Filter Name**: Enter a name to identify the firewall rule.:
- **Source IP Address**: Enter the IP address of the computer that initializes traffic for the application or service.
- **Destination IP Address**: Enter the IP address of the computer to which traffic for the application or service is entering.
- **Protocol**: Select the protocol (**ALL**, **TCP/UDP**, **TCP**, **UDP**, **ICMP** or **ICMPv6**) used to transport the packets.
- **Policy**: Select whether to (**ACCEPT**, **DROP**, or **REJECT**) the packets.
- **Direction**: Select the direction (**WAN to LAN**, **LAN to WAN**, **WAN to ROUTER**, or **LAN to ROUTER**) of the traffic to which this rule applies.

5 Select **Enable Rate Limit** to activate the rules you created. Click **OK**.

5.5.2 Parental Control

This section shows you how to configure rules for accessing the Internet using parental control.

Note: The style and features of your parental control vary depending on the Zyxel Device you are using.

5.5.2.1 Configuring Parental Control Schedule and Filter

Parental Control Profile (**PCP**) allows you to set up a rule for:

- Internet usage scheduling.
- Websites and URL keyword blocking.

Use this feature to:

- Limit the days and times a user can access the Internet.
- Limit the websites a user can access on the Internet.

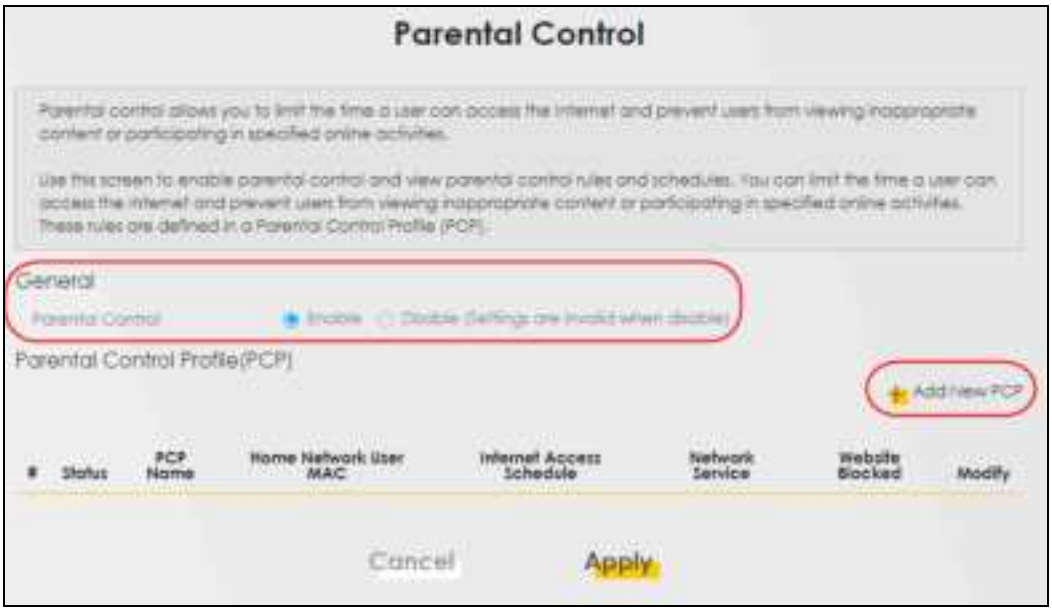
This example shows you how to block a user from accessing the Internet during time for studying. It also shows you how to stop a user from accessing specific websites.

Use the parameters below to configure a schedule rule and a URL keyword blocking rule.

PROFILE NAME	INTERNET ACCESS SCHEDULE	NETWORK SERVICE	SITE/URL KEYWORD
Study	**Day**: Monday to Friday **Time**: 8:00 to 11:00 13:00 to 17:00	**Network Service Setting**: Block **Service Name**: HTTP **Protocol**: TCP **Port**: 80	**Block or Allow the Web Site**: Block the web URLs **Website**: gambling

Parental Control Screen

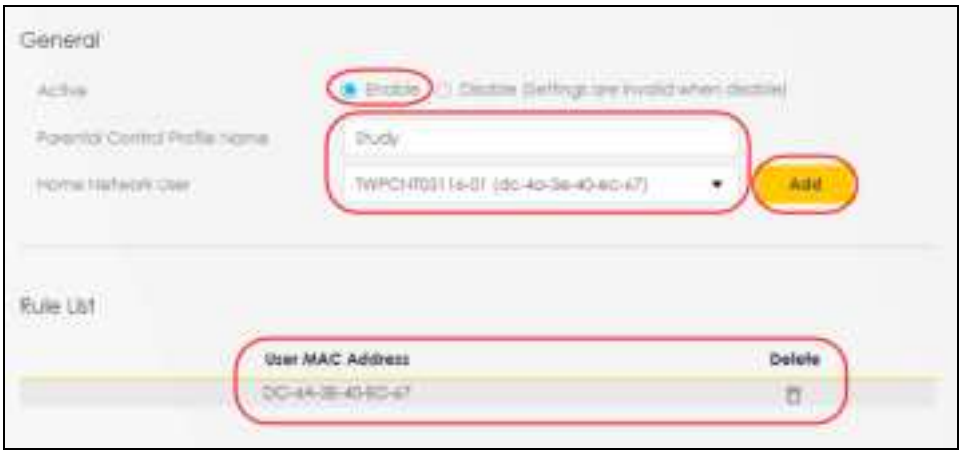
Open the **Parental Control** screen. Select **Enable** under **General** to enable parental control. Then click **Add New PCP** to add a rule.



Add New PCP Screen

1 Go to **Parental Control > Add New PCP**. Under **General**:

- Select **Enable** to enable the rule you are configuring.
- Enter the **Parental Control Profile Name** given in the above parameter.
- Select an user this rule applies to in **Home Network User**, then click **Add**. You will see the MAC address of the user you just select in **Rule List**.



2 Under **Internet Access Schedule**:

- Click **Add New Time** to add a second schedule.
- Use the parameter given above to configure the time settings of your schedule.

3 Under **Network Service**:

- In **Network Service Setting,** select **Block**.
- Click **Add New Service**, then use the parameter given above to configure settings for the Internet service you are blocking.

4 Under **Site / URL Keyword**:

- Select **Block the web URLs** in **Block or Allow the Web Site**.
- Click **Add**, then use the parameter given above to configure settings for the URL keyword you are blocking.
- Select **Redirect blocked site to Zyxel Family Safety page** to redirect the web browser to the Zyxel Family Safety page if he or she tries to access a website with the blocked URL keyword.

5 Click **OK** to save your settings.

5.5.2.2 Configuring a Parental Control Schedule

Parental Control Profile allows you to set up a schedule rule for Internet usage. Use this feature to limit the days and times a user can access the Internet.

This example shows you how to block an user from accessing the Internet during time for studying. Use the parameter below to configure a schedule rule.

PROFILE NAME	START BLOCKING	END BLOCKING	REPEAT ON
Study	8:00 am	11:00 am	from Monday to Friday
	1:00 pm	5:00 pm	from Monday to Friday

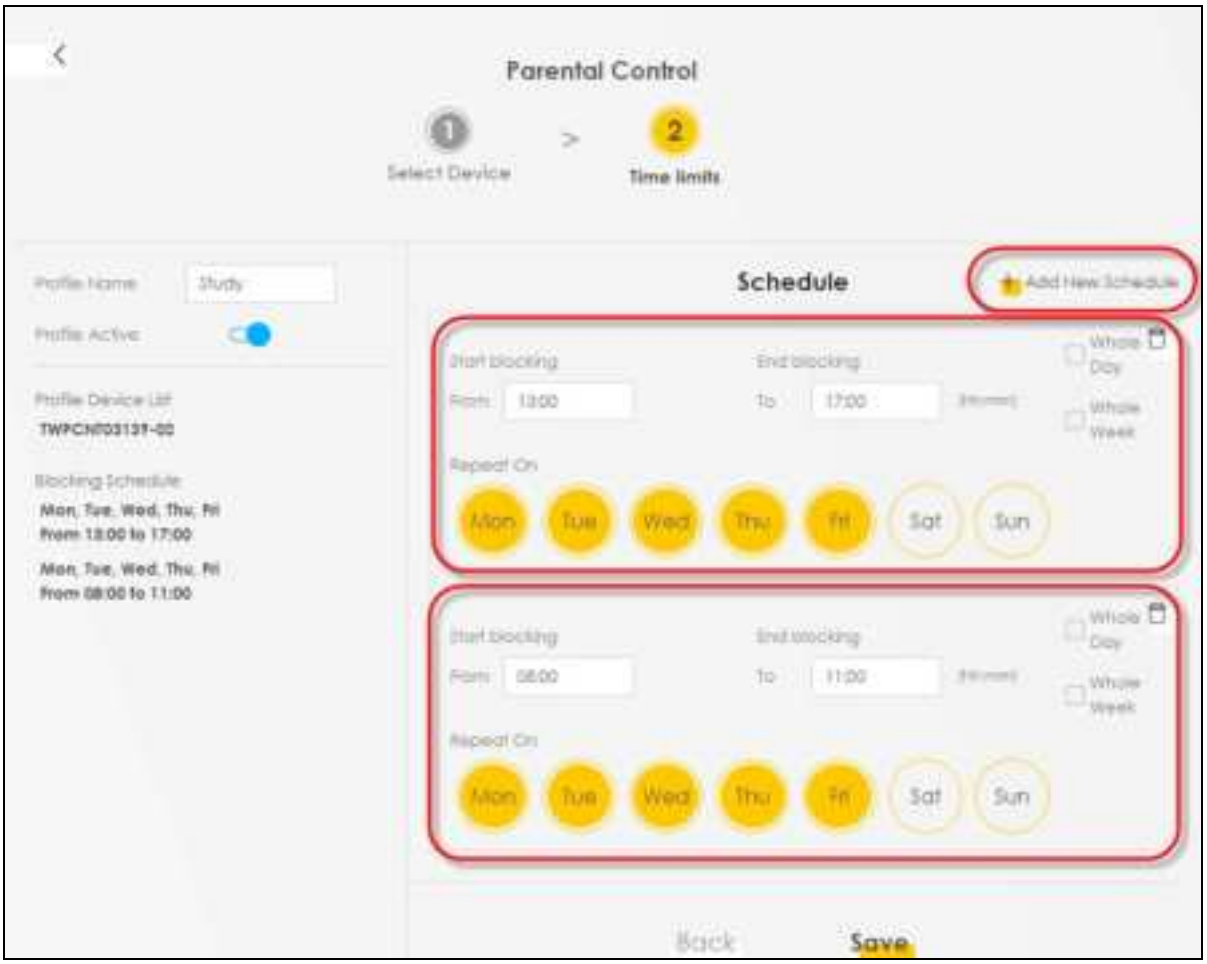
1 Click **Add more Profile** to open the **Parental Control** screen.

2 Use this screen to add a Parental Control rule.

- Enter the **Profile Name** given in the above parameter.
- Click on the switch to enable **Profile Active**.
- Select a device, and then click **Next** to proceed.

3 Use this screen to edit the Parental Control schedule.

- Click **Add New Schedule** to add a second schedule.
- Use the parameter given above to configure the time settings of your schedules.
- Click **Save** to save the settings.

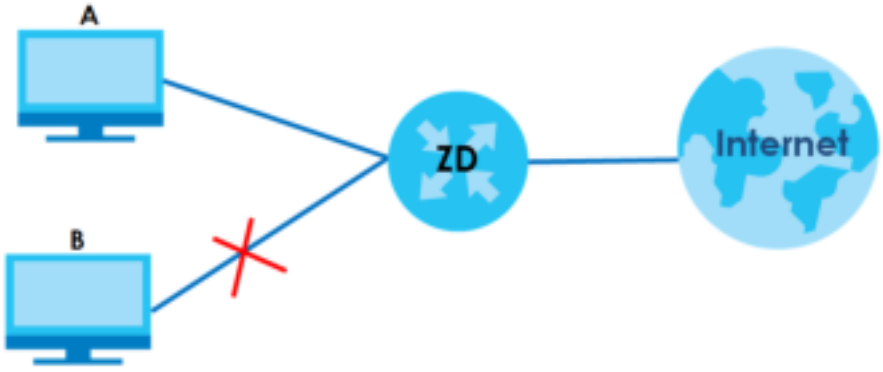


5.5.3 Configuring a MAC Address Filter for Wired LAN Connections

You can use a MAC address filter to exclusively allow or permanently block someone from the wired LAN network.

This example shows that computer B is not allowed access to the wired LAN network.

Figure 75 Configure a MAC Address Filter Example



1 Go to the **Security > MAC Filter > MAC Filter** screen. Under **MAC Address Filter**, select **Enable**.

2 Click **Add New Rule** to add a new entry. Select **Active**, and then enter the **Host Name** and **MAC Address** of computer B. Click **Apply**.

5.6 Internet Calls

This section shows you how to make Internet calls.

5.6.1 Configuring VoIP

To make voice calls over the Internet, you must set up a Session Initiation Protocol (SIP) provider and SIP account on the Zyxel Device. You should have an account with a SIP service provider already set up.

5.6.2 Adding a SIP Service Provider

Follow the steps below to add a SIP service provider.

1 Make sure your Zyxel Device is connected to the Internet.

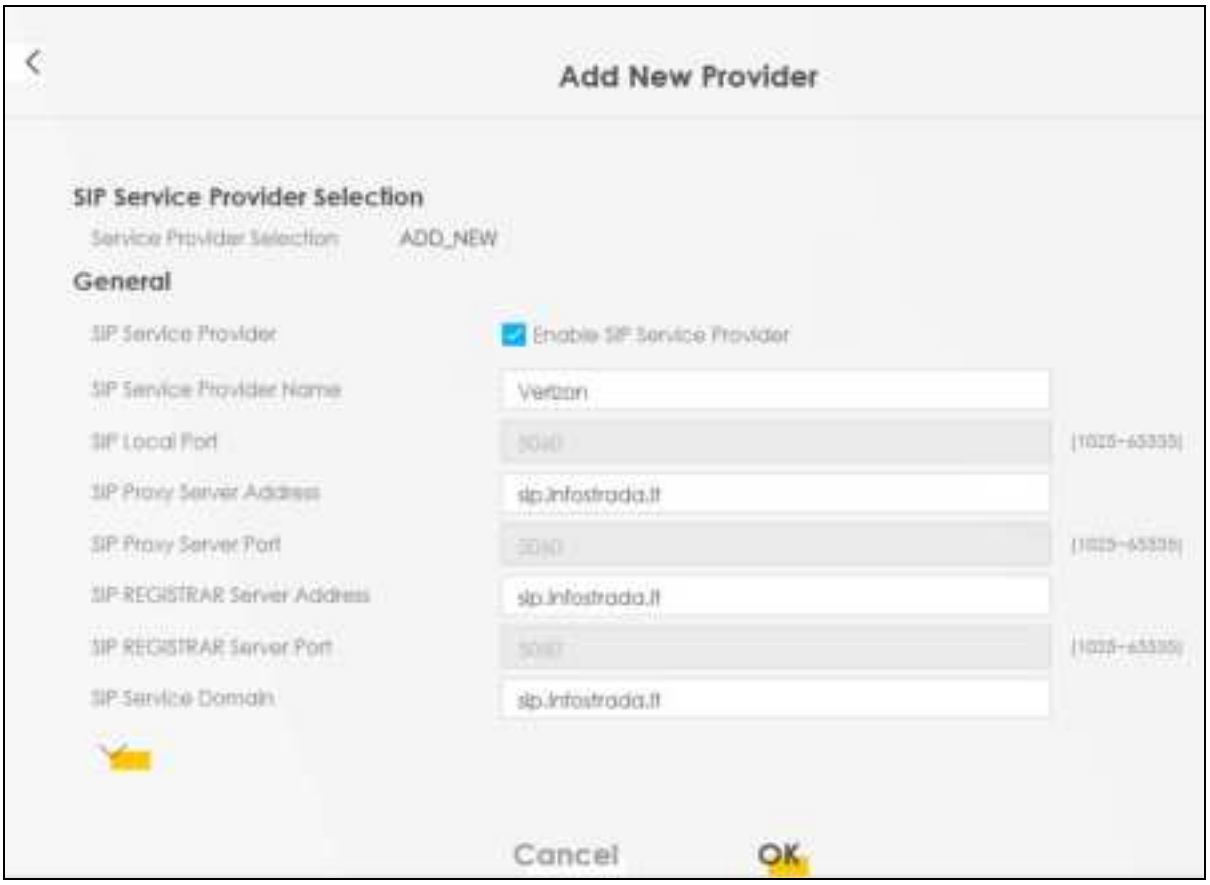
2 Open the Web Configurator.

3 Go to the **VoIP > SIP > SIP Service Provider** screen. Click the **Add New Provider** button to add the SIP Service Provider.

4 On the **Add New Provider** screen, select **Enable SIP Service Provider**.

5 Enter the **SIP Service Provider Name** of up to 64 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;].

6 Enter **SIP Proxy Server Address**, **SIP REGISTRAR Server Address**, and **SIP Service Domain** provided by your SIP service provider. Click **OK** to save your settings.



5.6.3 Adding a SIP Account

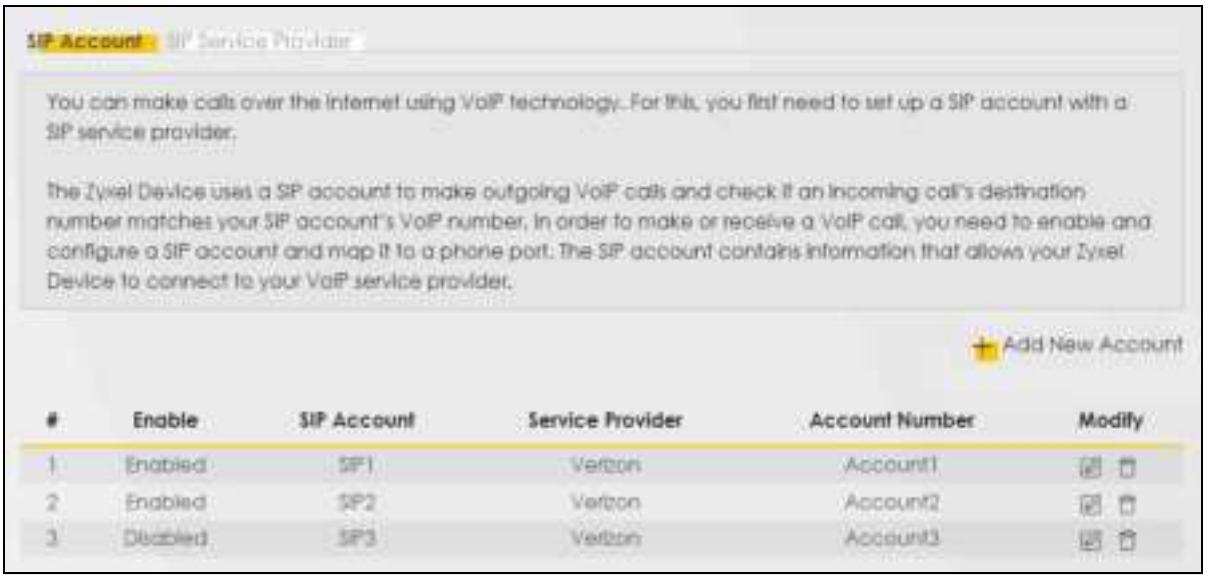
The SIP account must be associated with the SIP service provider configured above. You may configure several SIP accounts for the same service provider. Follow the steps below to set up your SIP account:

1 Make sure your Zyxel Device is connected to the Internet.

2 Open the Web Configurator.

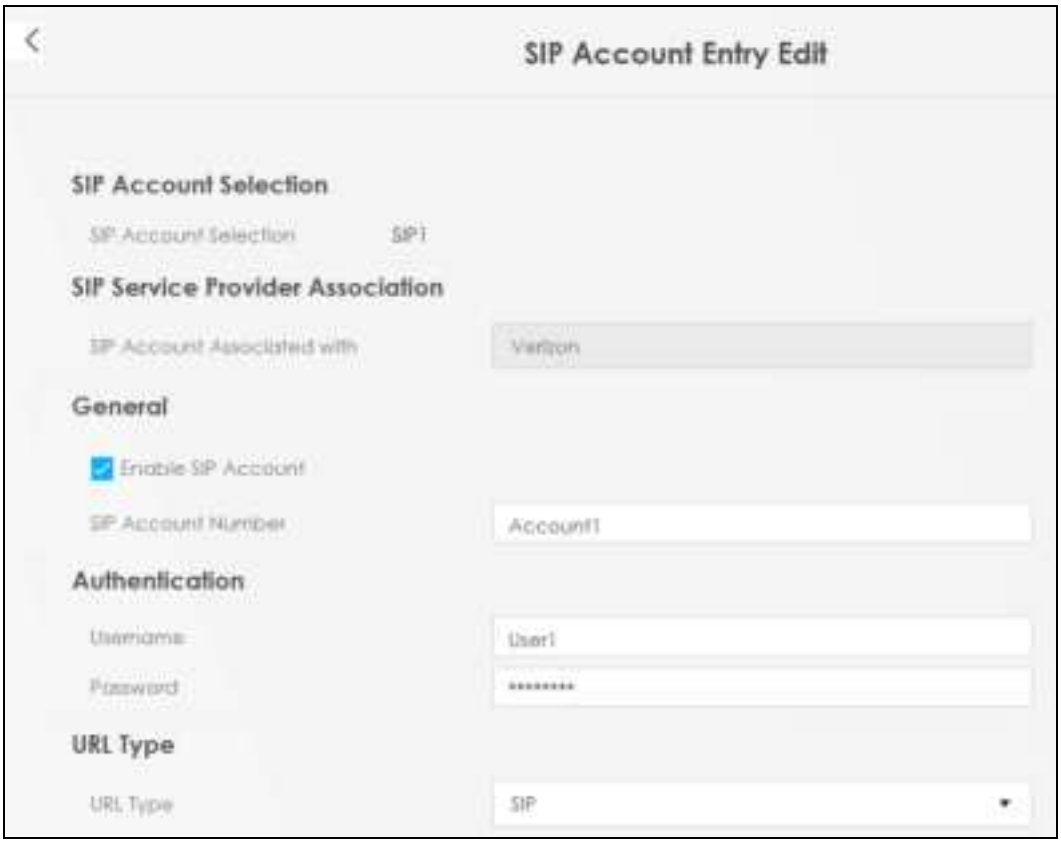
3 Go to the **VoIP > SIP > SIP Account** screen.

4 Click the **Add New Account** button on the **SIP Account** screen to add a SIP account and map it to a phone port.



5 Under **General,** select **Enable SIP Account**, and then enter the **SIP Account Number**.

6 Under **Authentication,** enter **Username** and **Password**. Leave the other settings as default. Click **OK** to save your settings.



5.6.4 Configuring a Phone

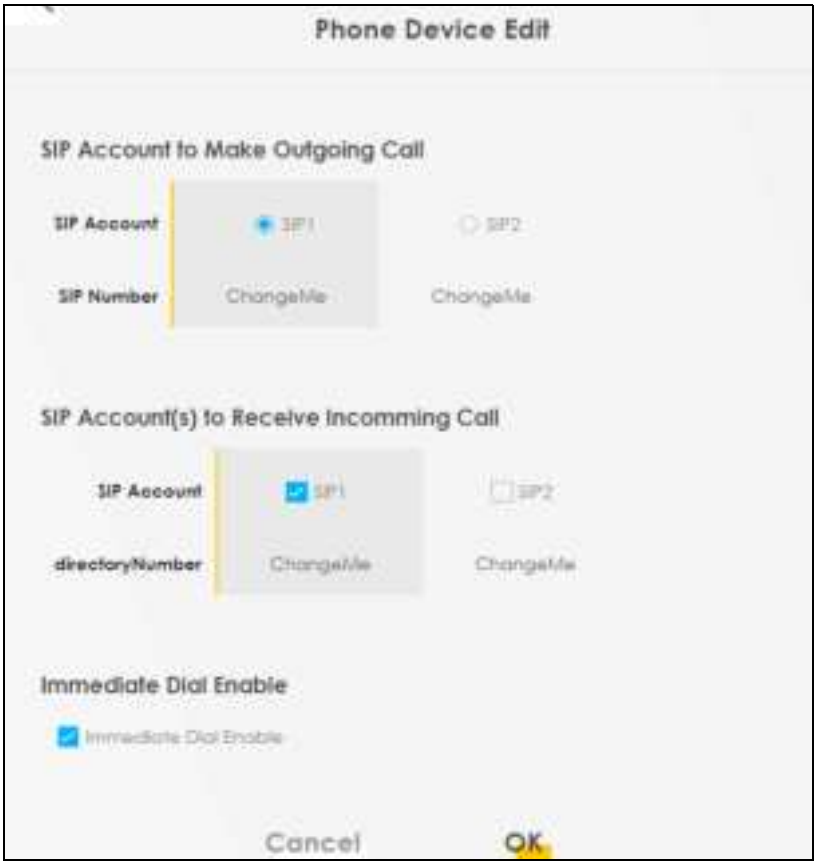
You must now configure the phone port to use the SIP account you just configured.

1 Go to the **VoIP > Phone > Phone Device** screen.

2 Click the **Modify** icon of **PHONE1** to configure PHONE1 on your Zyxel Device. The following screen appears.

3 Under **SIP1 SIP Account to Make Outgoing Call,** select **SIP1** to have the phone connected to the first phone port use the registered SIP1 account to make outgoing calls.

4 Under **SIP Account(s) to Receive Incoming Call,** select **SIP1** to have the phone connected to the first phone port receive phone calls for the SIP1 account. Click **OK** to save your changes.



5.6.5 Making a VoIP Call

Follow these steps to make a phone call using Voice over IP (VoIP).

1. Make sure you connect a telephone to phone port 1 on the ZyxelDevice.
2. Make sure the ZyxelDevice is turned on and connected to the Internet.
3. Pick up the phone receiver.
4. Dial the VoIP phone number you want to call.

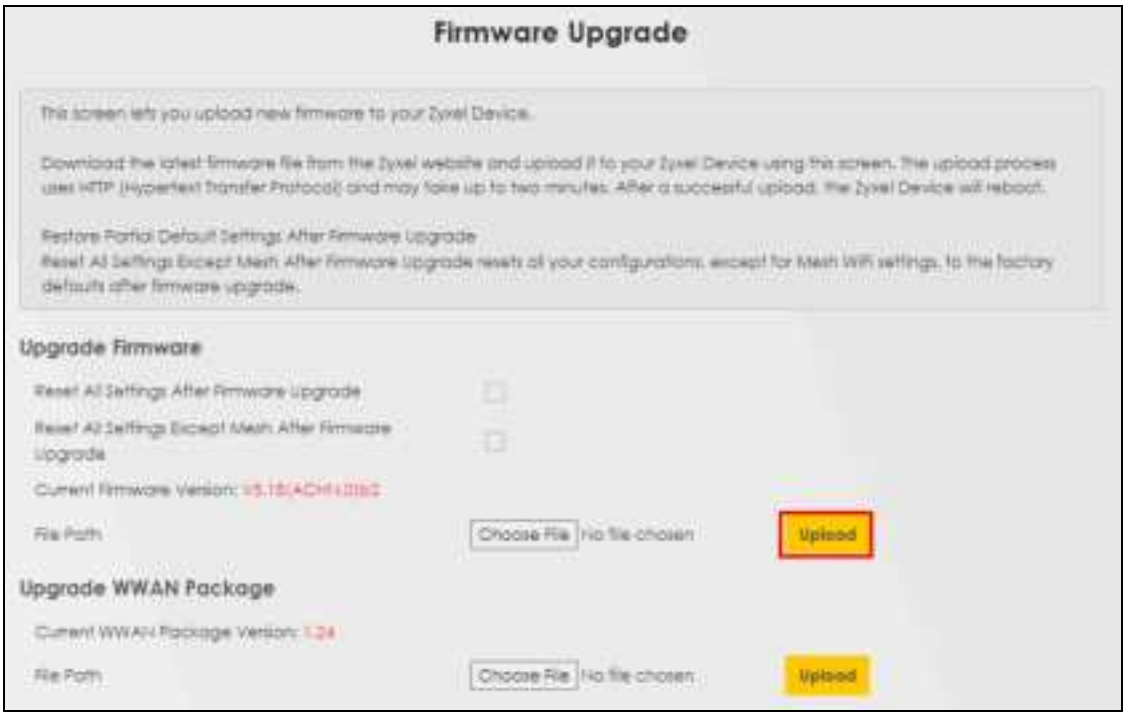
5.7 Device Maintenance

This section shows you how to upgrade the ZyxelDevice firmware, back up the configuration and restore the ZyxelDevice to its previous or default settings.

5.7.1 Upgrading the Firmware

Upload the router firmware to the ZyxelDevice for feature enhancements.

1. Download the correct firmware file from the download library at the Zyxel website. The model code for the ZyxelDevice in this example is v5.13(ABLZ.1) Note the model code for your ZyxelDevice. Unzip the file.
2. Go to the **Maintenance > Firmware Upgrade** screen.
3. Click **Browse/Choose File** and select the file with a ".bin" extension to upload. Click **Upload**.



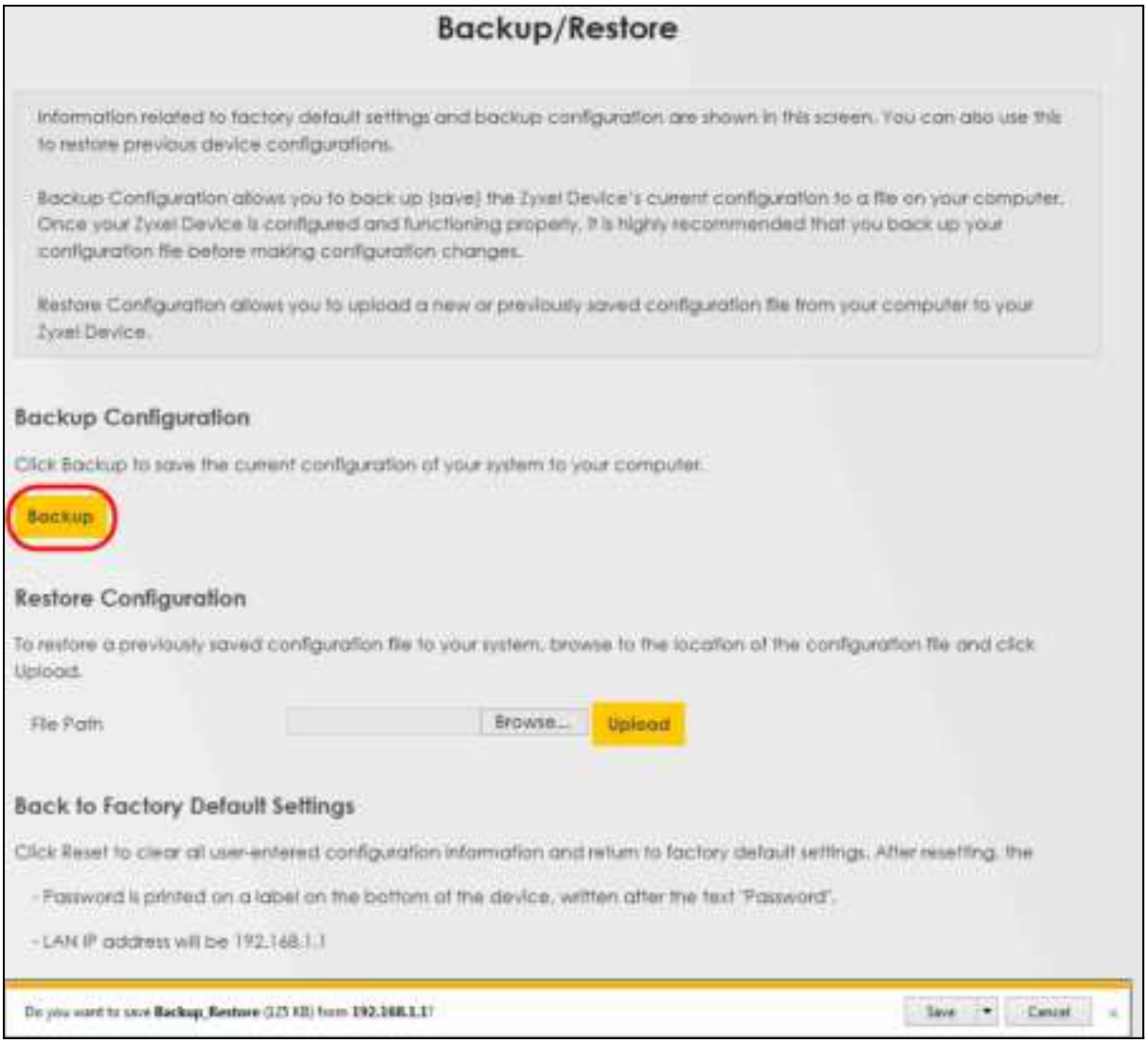
4 This process may take up to 2 minutes to finish. After 2 minutes, log in again and check your new firmware version in the **Connection Status** screen.

5.7.2 Backing up the Device Configuration

Back up a configuration file allows you to return to your previous settings.

1 Go to the **Maintenance > Backup/Restore** screen.

2 Under **Backup Configuration,** click **Backup.** A configuration file is saved to your computer. In this case, the **Backup/Restore** file is saved.

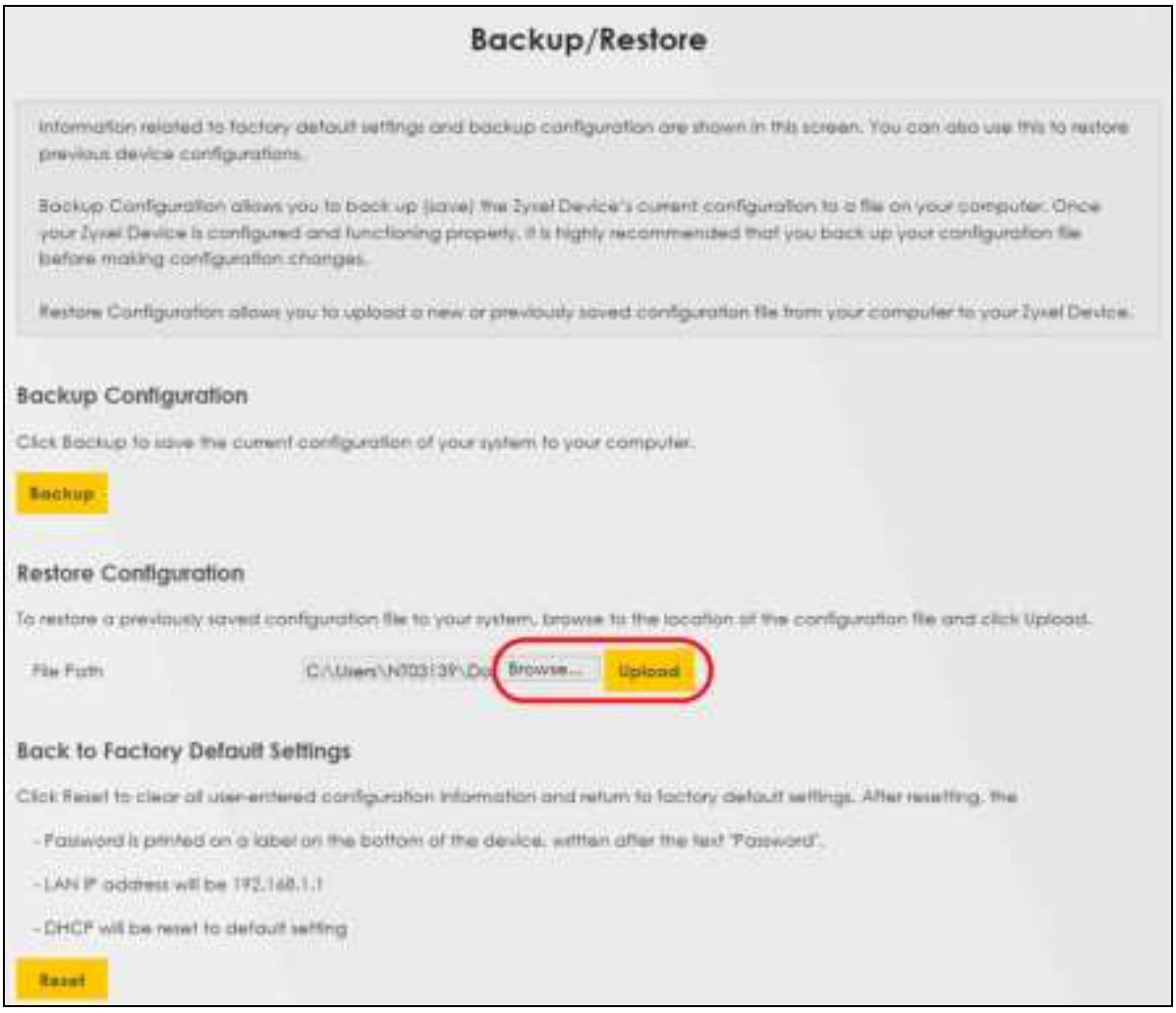


5.7.3 Restoring the Device Configuration

This section shows you how to restore a previously-saved configuration file from your computer to your Zyxel Device.

1 Go to the **Maintenance > Backup/Restore** screen.

2 Under **Restore Configuration,** click **Browse/Choose File**, and then select the configuration file that you want to upload. Click **Upload**.



3 The Zyxel Device automatically restarts after the configuration file is successfully uploaded. Wait for one minute before logging into the Zyxel Device again. Go to the **Connection Status** page to check the firmware version after the reboot.

CHAPTER 6
App Tutorials

6.1 App Tutorials Overview

This part shows you how to use the MPro Mesh app to manage the Zyxel Device and the MPro Mesh network.

Note: To enjoy the latest features of the MPro Mesh app, make sure you have installed the latest version on your smartphone or tablet. Check the MPro Mesh app page on Apple App Store or Google Play Store to see if there is an update.

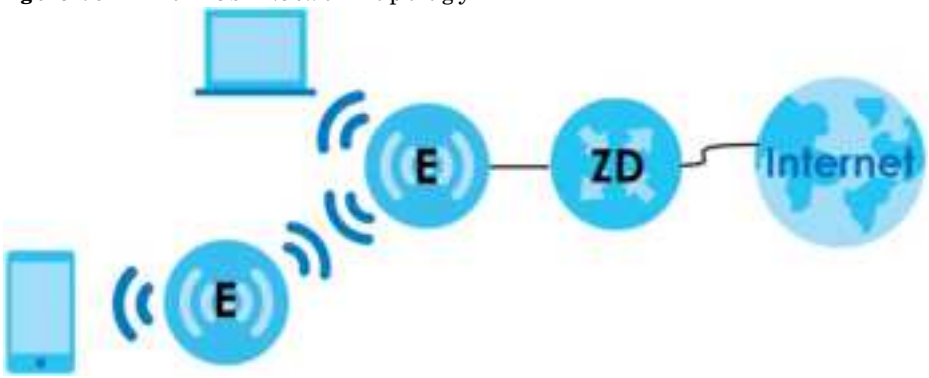
The table below explains the terms used in this chapter.

Table 33 Tutorial Terms Definition

TERM	DEFINITION
MPro Mesh Router (**ZD**)	Zyxel routers that support MPro Mesh, or a Zyxel Device in **Router** mode
Non-MPro Mesh Router (**R**)	Routers that do not support MPro Mesh
MPro Mesh Extender (**E**)	Zyxel extenders (satellites) that support MPro Mesh, or a Zyxel Device in **Extender** mode

In the MPro Mesh app, the extenders are known as "satellites".

Figure 76 MPro Mesh Network Topology



See Section 1.1 on page 20 to see which Zyxel Device models support MPro Mesh.

6.2 What You Can Do

- Deciding the Network Controller
- Setting up an MPro Mesh Router and MPro Mesh Extender with a WiFi or Wired Connection.
- Setting up a non-MPro Mesh Router and MPro Mesh Extenders with a Wired Connection.
- Finding the Best Location for the Extenders

6.3 MPro Mesh Network

The Zyxel Device supports MPro Mesh to manage your WiFi network. You need one router for Internet access and at least one extender, also known as a satellite, in a Mesh network. An extender increases WiFi coverage by repeating WiFi signals from the router to WiFi clients far from the router. An extender can also repeat WiFi signals from another extender to further increase WiFi coverage.

Deciding the Network Controller

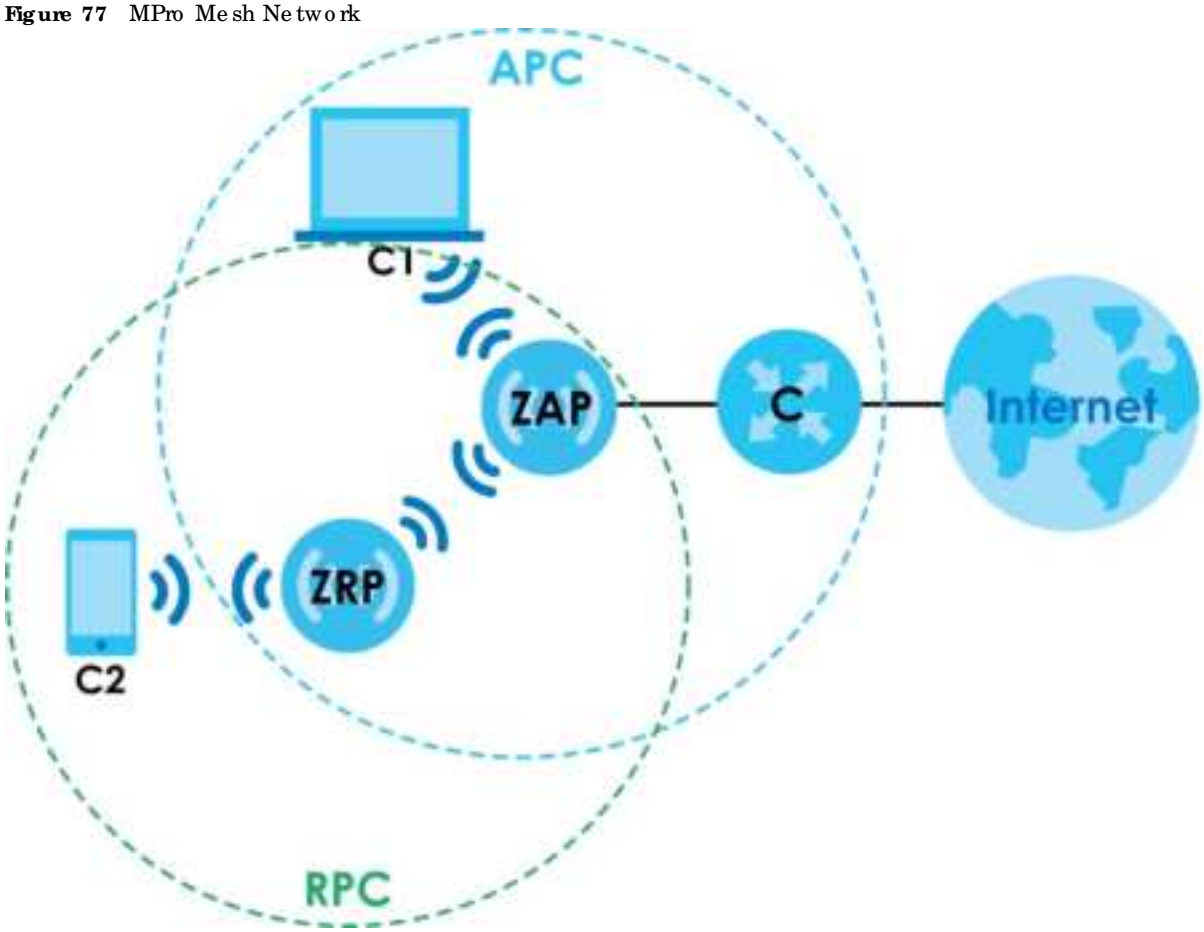
To set up an MPro Mesh network, you need a Zyxel Device that can function as a Controller. The Controller can be an MPro Mesh Router or an MPro Mesh Extender. The Controller manages and coordinates WiFi activity in a network and can steer clients to the best extender, and to the best band (2.4G/5G) to maximize network efficiency. The Controller manages the SSIDs and passwords on all access points (APs), namely your MPro Mesh Router/Extenders, in a network (auto-configuration). For example, if you change the SSID on the Controller, the SSID of each AP in the network will also change.

If your Zyxel router supports MPro Mesh, then the router is the Controller. See the Zyxel website product page.

If your router does not support MPro Mesh, then the extender is the Controller if it supports MPro Mesh. See the Zyxel website product page.

Note: For AP steering and band steering to work, the Controller (MPro Mesh Router/Extender) and all the APs in the network need to have the same SSID and password. Therefore, you must use the Controller to configure the SSID and password.

Figure 77 MPro Mesh Network



The following table describes the icons used in the figure.

Table 34 Icons used in MPro Mesh Network

ICON	DESCRIPTION
C	Zyxel Device – MPro Mesh Router or Non-MPro Mesh Router Note: Your router must have an Internet connection.
ZAP	MPro Mesh Extender in AP (Access Point) mode.
ZRP	MPro Mesh Extender in Repeater mode.
C1	Client1
C2	Client2
APC	Access Point coverage area
RPC	Repeater coverage area

AP Steering and Band Steering

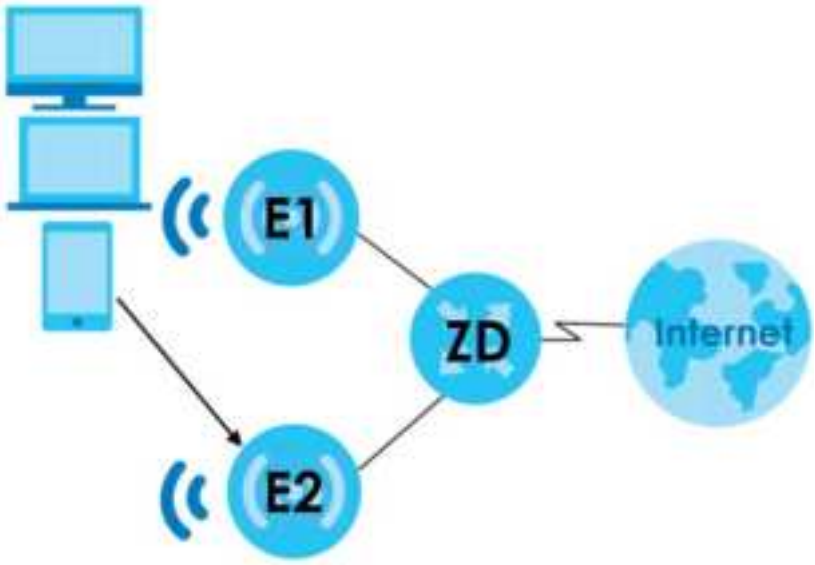
Zyxel MPro Mesh supports AP steering and Band steering.

- AP steering allows WiFi clients to roam seamlessly between APs (MPro Mesh Router/Extenders) in your MPro Mesh network by using the same SSID and WiFi password. Also, AP steering monitors WiFi clients and drops their connections to optimize the extender bandwidth when the clients are idle or have a low signal. When a WiFi client is dropped, it has the opportunity to reconnect to an MPro Mesh

Extender with a strong signal.

MPro Mesh Router (**ZD**)
MPro Mesh Extenders (**E1**, **E2**)

Figure 78 AP Steering Application



- Band steering allows 2.4 GHz/5 GHz dual-band WiFi clients to move from one band to another. For example, if the 2.4 GHz channel is congested, WiFi clients that support 5 GHz can move to the 5 GHz band.

Figure 79 Band Steering Application

6.4 MPro Mesh Network Connection

If you are setting up the MPro Mesh network with an MPro Mesh Router and an MPro Mesh Extender, you can connect your MPro Mesh Router (**ZD**) with an MPro Mesh Extender (**E**) using a WiFi or wired connection.

Figure 80 Wi-Fi Connection

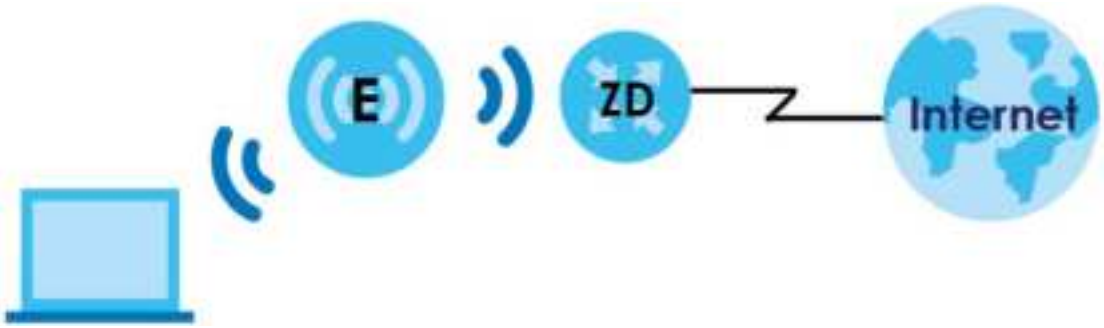


Figure 81 Wired Connection

If you are setting up the MPro Mesh network with a non-MPro Mesh Router and an MPro Mesh Extender, connect your non-MPro Mesh Router (**R**) with an MPro Mesh Extender (**E**) using a wired connection.

Figure 82 Wired Connection

6.4.1 Preparing your Zyxel Device

Make sure MPro Mesh is enabled on both the MPro Mesh Router and the MPro Mesh Extender. If not, follow the steps below to enable MPro Mesh.

Note: MPro Mesh is enabled on the MPro Mesh Router and MPro Mesh Extender by default.

Enable MPro Mesh on your MPro Mesh Router:

1 In **Network Setting > Wireless > MESH**, click the switch button to enable **MPro Mesh**.

2 Click **Apply**.

Enable MPro Mesh on the MPro Mesh Extender:

1 Turn on your MPro Mesh Extender.

2 Enable MPro Mesh in the MPro Mesh Extender's Web Configurator. See your MPro Mesh Extender's User's Guide for how to enable MPro Mesh.

6.4.2 Setting up an MPro Mesh Router and MPro Mesh Extender with a WiFi or Wired Connection

Connect the MPro Mesh Extender to the MPro Mesh Router

Follow the steps below to set up your MPro Mesh Router with an MPro Mesh Extender.

Table 35 Device Roles

DEVICE	ROLE
MPro Mesh Router (**ZD**)	Internet Access & Mesh Network Controller
MPro Mesh Extender (**E**)	Mesh Network Repeater/AP

1 Turn on both devices near each other. Note the power LEDs when you're done. The power LEDs should be steady green.

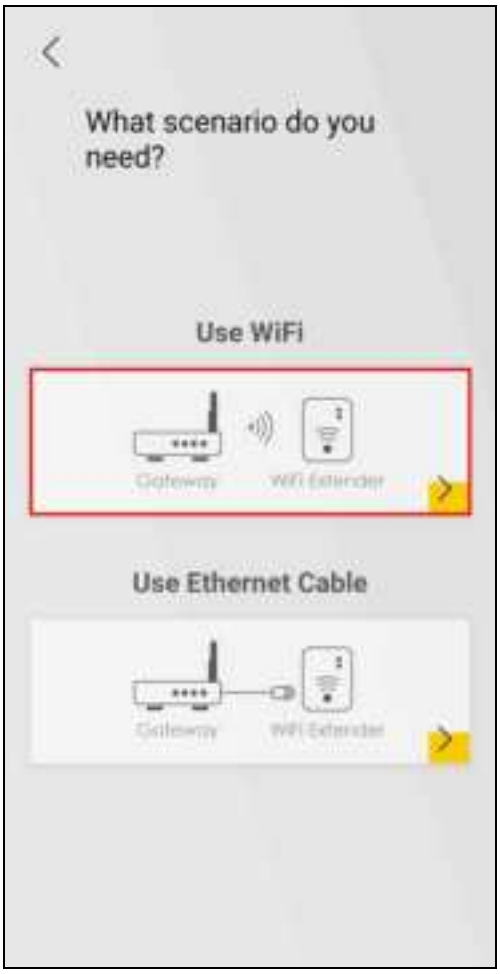
2 Download the MPro Mesh app on your smartphone. Scan the WiFi QR code or manually enter the SSID and password to connect to the MPro Mesh Router WiFi network. The QR code, SSID and password are on the MPro Mesh Router back label.

3 Open the MPro Mesh app. Enter the username and password to log in to the MPro Mesh Router (Controller). The default **User Name** and **Login Password** are on the MPro Mesh Router back label. Tap **Login**.

4 The **Home** screen displays. The Controller (MPro Mesh Router) displays on top of the **Home** screen.

5 Tap the Add (+) icon in the **Mesh Devices** field to add an MPro Mesh Extender to the Mesh network.

6 Select a connection scenario to pair the MPro Mesh Extender to the MPro Mesh Router (Controller). In this example, select the **Use WiFi** scenario.

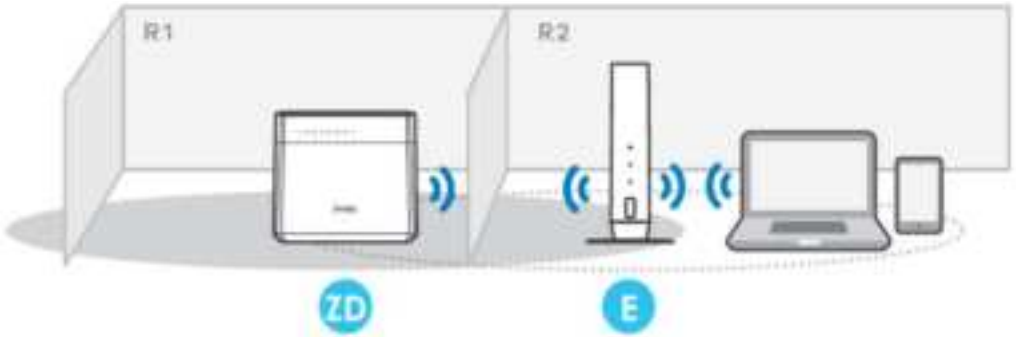


7 Follow the instructions and tap the WPS button on the MPro Mesh Extender. Within 2 minutes, tap **Start Pairing** to start pairing the MPro Mesh Extender to the MPro Mesh Router (Controller). A 2-minute countdown starts after you tap **Start Pairing**.

8 The following screen displays when the pairing process is done. Tap **Done** to finish pairing.

9 You can now check and manage the paired MPro Mesh Extender on the **Home** screen.

10 Place the MPro Mesh Extender where you need to extend WiFi coverage. Use the app to see if the extender is too far from the router, see Section 6.5 on page 164 for more information.



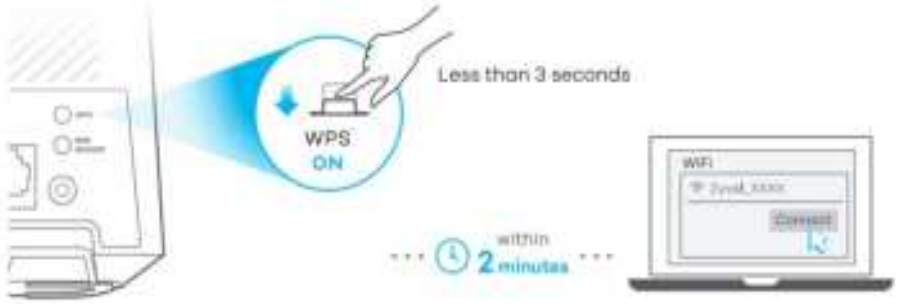
Connect a WiFi Client to the MPro Mesh Extender Using WPS

1 Make sure the MPro Mesh extender is connected to the MPro Mesh router.

2 Press the WPS button on the MPro Mesh extender once for less than 3 seconds.

Note: When your MPro Mesh extender already has a WiFi or wired uplink connection, pressing the WPS button on the MPro Mesh extender begins a downlink WPS pairing with a WiFi client.

3 Within 2 minutes, press the WPS button on the WiFi client.



4 See the LED descriptions on Section 2.2 on page 33 to check if the WPS pairing is successful.

6.4.3 Setting up a non-MPro Mesh Router and MPro Mesh Extenders with a Wired Connection

This scenario describes the process to create an MPro Mesh network with a wired connection from the non-MPro Mesh router to two extenders.

Make sure the non-MPro Mesh router is connected to the Internet. The first extender must be connected to your router using an Ethernet cable. Then, connect the second extender wirelessly to the first extender

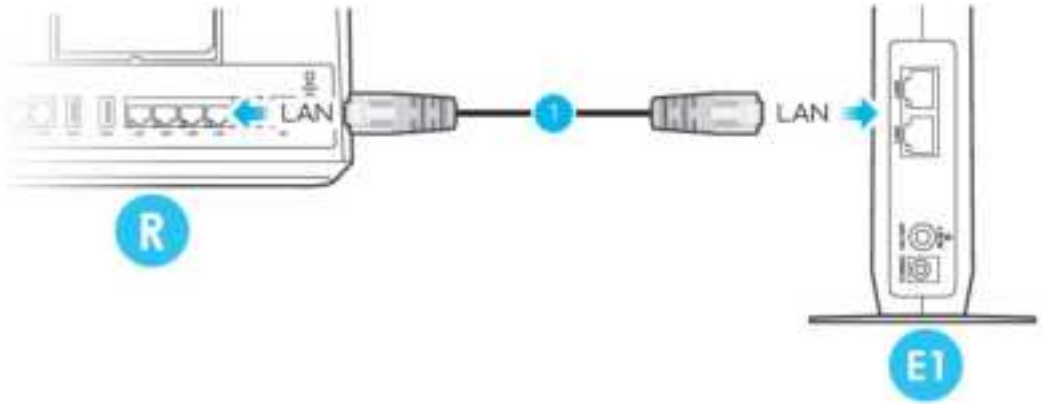
Follow the steps below to set up your non-MPro Mesh router with the Zyxel MPro Mesh extender.

Table 36 Device Role

DEVICE	ROLE
Non-MPro Mesh Router (R)	Internet Access
MPro Mesh Extender 1 (E1)	Mesh Network Controller & Repeater/AP
MPro Mesh Extender 2 (E2)	Mesh Network Repeater/AP

1 Turn on the router. Note the power LEDs when you're done.

2 Connect an Ethernet cable from the router to Extender 1. Place Extender 1 where you want WiFi coverage.



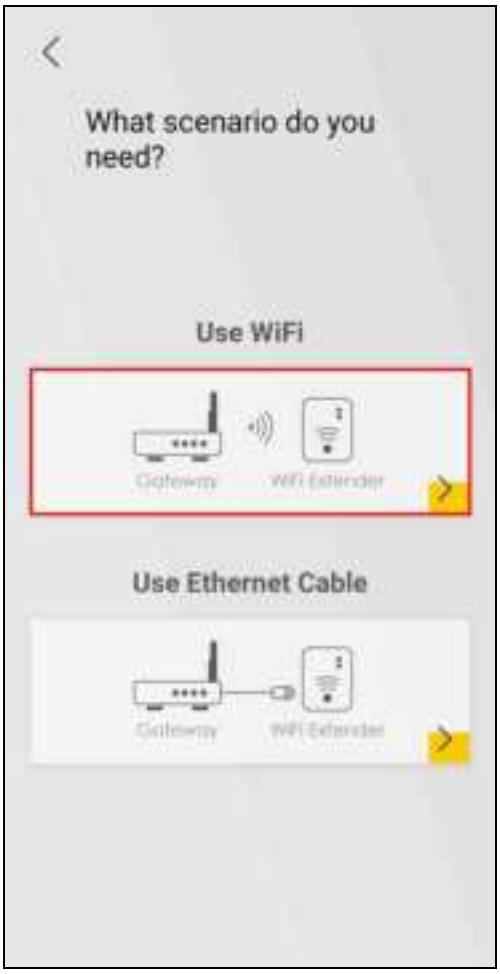
3 Download the MPro Mesh app on your smartphone. Scan the WiFi QR code or manually enter the SSID and password to connect to Extender 1 (Controller) WiFi network. The QR code, SSID and password are on Extender 1 back label.

4 Open the MPro Mesh app. Enter the username and password to log in to Extender 1 (Controller). The default **User Name** and **Login Password** are also on the Extender 1 back label. Tap **Login**.

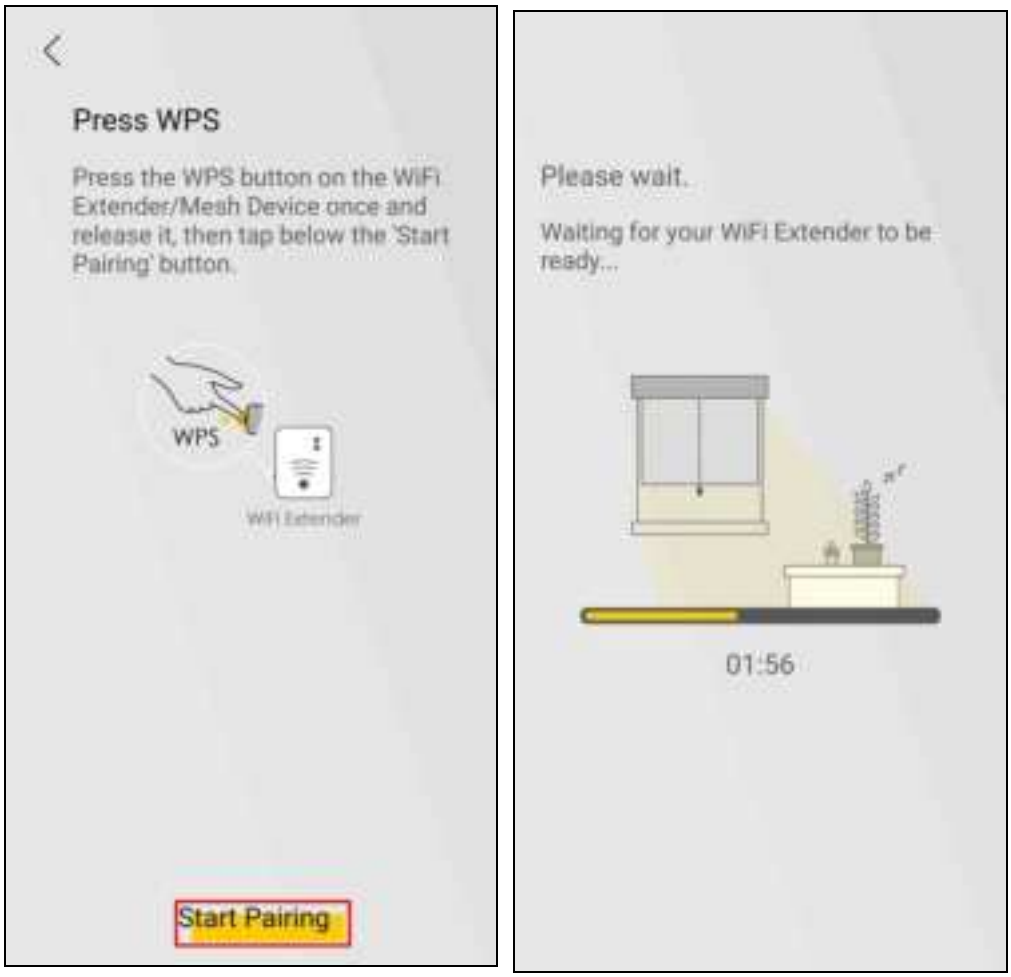
5 The **Home** screen displays. The Controller (Extender 1) displays on top of the screen.

6 Tap the Add ( ) icon in the **Mesh Devices** field to add Extender 2 to the Mesh network.

7 Select a connection scenario to pair Extender 2 to Extender 1 (Controller). In this example, select the **Use WiFi** scenario.



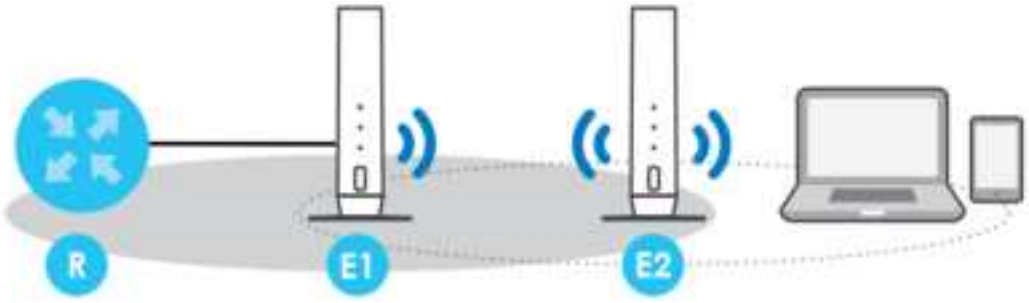
8 Follow the instructions and press the WPS button on the Extender 2. Within 2 minutes, tap **Start Pairing** to start pairing Extender 2 to Extender 1 (Controller). A 2-minute countdown starts after you tap **Start Pairing**.



9 The following screen displays when the pairing process is done. Tap **Done** to finish pairing.

10 You can now check and manage the paired Extender 2 on the **Home** screen.

11 Place Extender 2 where you need to extend WiFi coverage. Use the app to see if Extender 2 is too far from Extender 1; see Section 6.5 on page 164 for more information.



6.5 Finding the Best Location for the Extenders

Follow the steps below to check the signal icons to see which extenders are too far from or too close to the Controller. Find the best location of your extenders for a better WiFi signal.

1 Tap on **Home** in the navigation panel.

2 Look for the extender with a red WiFi signal icon ( ) or amber WiFi signal icon ( ) in front of it. Move the extender closer to or farther from the Zyxel Device according to the WiFi signal icon. See the link quality table below.

3 Tap the refresh button ( ) at the top right corner to check the updated status of your extenders. The WiFi signal icons in front of your extenders should be green ( ) if they are placed in appropriate locations. See the table below for the Zyxel Device connection status.

Table 37 Link Quality

ICON	CONNECTION TYPE	CONNECTION STATUS	ACTION TO DO
	Wired	Wired Connection	None.
	Wireless	Good to Go	None.
	Wireless	Too Close to the Router	Move the Extender farther away from the Router/ uplink Extender.

Table 37 Link Quality (continued)

ICON	CONNECTION TYPE	CONNECTION STATUS	ACTION TO DO
	Wireless	Too Far from the Router	• Move the Extender closer to the Router/uplink Extender. • Avoid obstacles, such as walls or doors in between.
	Wired/Wireless	No Connection	• Make sure the Extender is still powered on. • Wired: Make sure the Extender's LAN port is correctly connected to the Router/uplink Extender's LAN port through an Ethernet cable. • Wireless: Move the Extender closer to the Router/uplink Extender where the Extender can receive the Router/uplink Extender's WiFi signal.

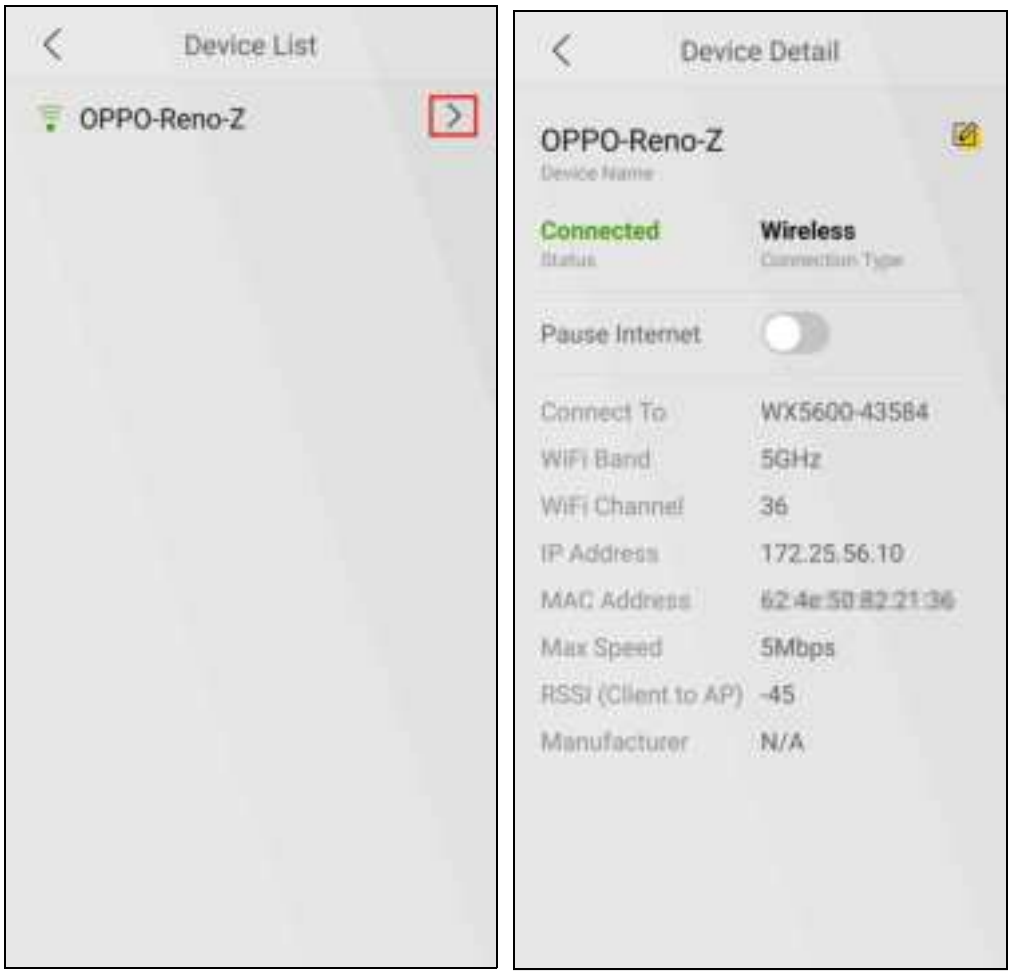
6.6 Checking Your Network Topology

Network topology displays how your Zyxel Devices are connected in the same MPro Mesh network. An MPro Mesh network consists of a Controller and one or more extenders. Follow the steps below to see the current topology of your MPro Mesh network and the status of the Zyxel Devices in this network.

1 Tap the ( ) icon to check the MPro Mesh network topology.

2 The number of connected clients display near the Zyxel Device icon. Tap a Zyxel Device icon to check and manage its connected clients.

3 Tap the ( ) icon of a client to see the client's detailed information.



6.7 Changing the Default Home WiFi Network Name and Password

It is advisable to change the default WiFi settings as they are printed on the label on the Controller. Note that you need to reconnect your phone to this network with the new settings.

Changing Home WiFi Settings

Change the SSID and key for your Home WiFi for better security.

Use the following parameters to change the Home WiFi SSID and key.

For the SSID, you can use 1 – 32 alphanumeric (0-9, a-z, A-Z), single-byte special characters and spaces.

For the WiFi password, you can use 8 – 63 alphanumeric (0-9, a-z, A-Z) and single-byte special characters and spaces.

Table 38 Home WiFi Settings Parameters Example

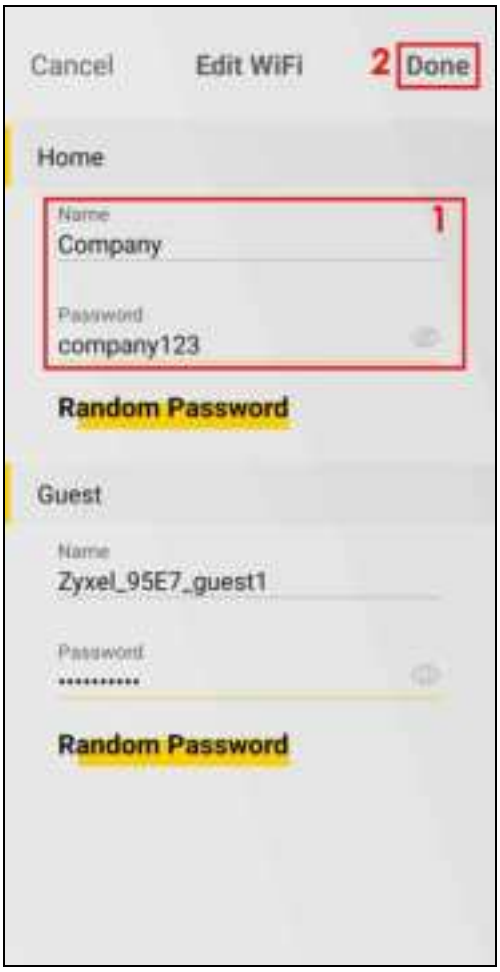
HOME WIFI	
SSID	Company
Password	company123

Setting Up Home WiFi

Follow the steps below to change your Home WiFi settings.

1 Tap the **WiFi** icon in the navigation panel.

2 Tap the edit icon ( ) to edit the Home WiFi network SSID and password using the parameters given above. If you want to use a randomly generated password instead, tap **Random Password** to have the MPro Mesh app generate a random password for this WiFi network. Click **Done** to save and apply the changes.

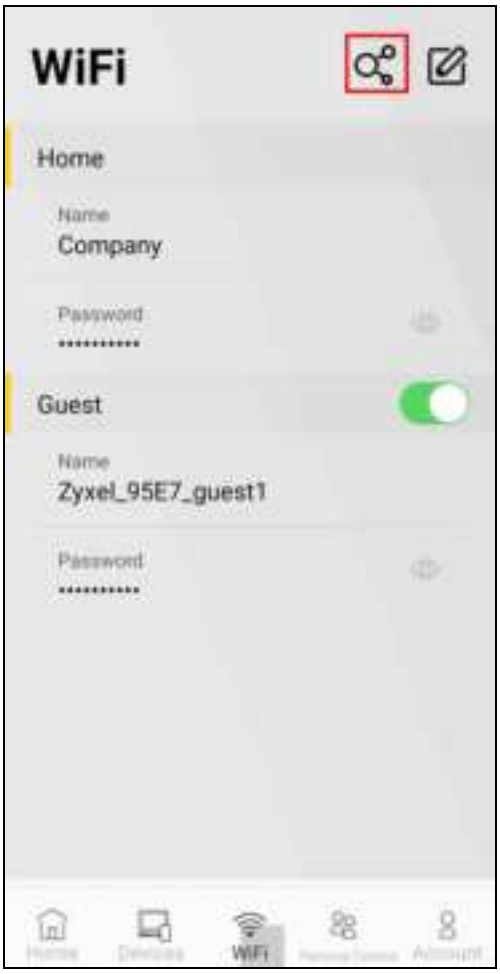


Note: It takes 2-3 minutes for the Zyxel Device to apply the new WiFi settings to the whole MPro Mesh network. You will need to reconnect to the WiFi network using the new SSID and password.

6.7.1 Letting WiFi Clients Connect to the WiFi Network

Take a screenshot of the QR code and share it with the WiFi clients that you want to access the WiFi network. Note that these WiFi clients can also access other devices such as servers with wired connections to the router.

1 Tap the ( ) icon to show the QR code for connecting to the Zyxel Device Home WiFi. Scan the QR code with your device to connect to the Home WiFi network.


WiFi
Home
Name
Company
Password
Guest
Name
Zyxel_95E7_guest1
Password
WiFi


Share Home WiFi
Scan the QR code to connect to the WiFi.
Done

6.8 Blocking Internet Access at Specific Times

Use the **Parental Control** screen to configure Internet access schedule profiles to limit the days and times current client devices can access the Internet. You can create up to 20 schedules in a profile. Clients in a profile will be blocked from the Internet during the time periods you schedule.

Note: A client device can only be in one profile.

Use the following parameters to configure your parental control profile.

For the profile name, you can use 1 – 20 alphanumeric (0-9, a-z, A-Z), single-byte special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.

Table 39 Parental Control Profile Example

PROFILE NAME	START TIME	END TIME	REPEAT DAYS
Profile 1	23:00	23:59	Monday to Friday
	00:00	6:30	Monday to Friday

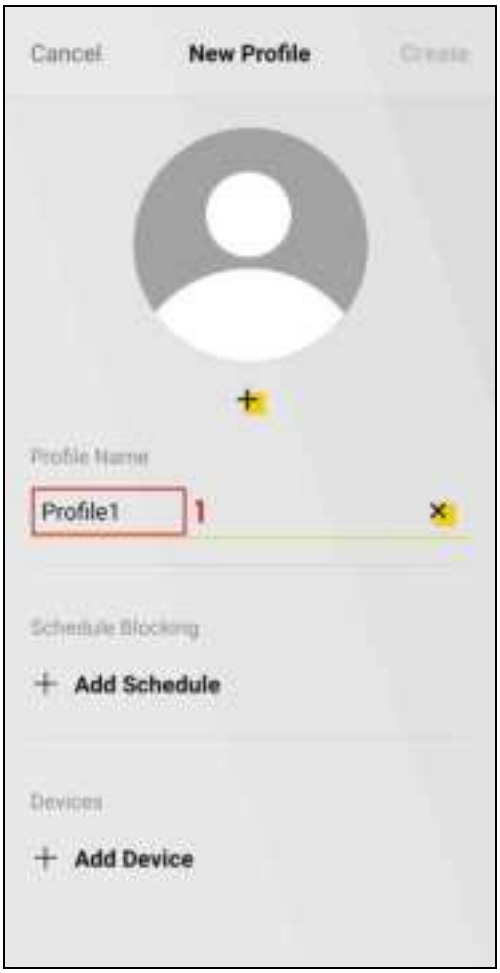
Creating a Parental Control Profile

Follow the steps below to create a parental control profile.

1 Tap **Parental Control** in the navigation panel.

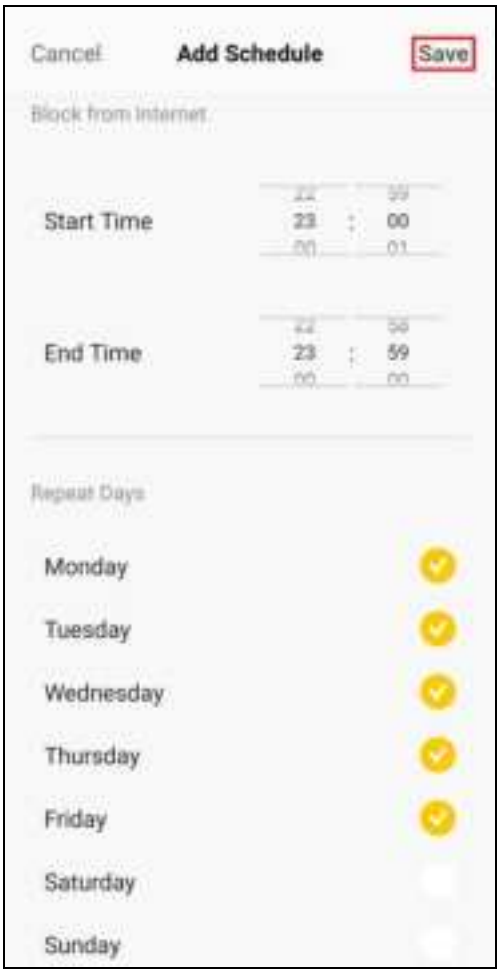
2 Tap the add icon ( ) or **Create Profile** to create a parental control profile.

3 Enter the **Profile Name**.

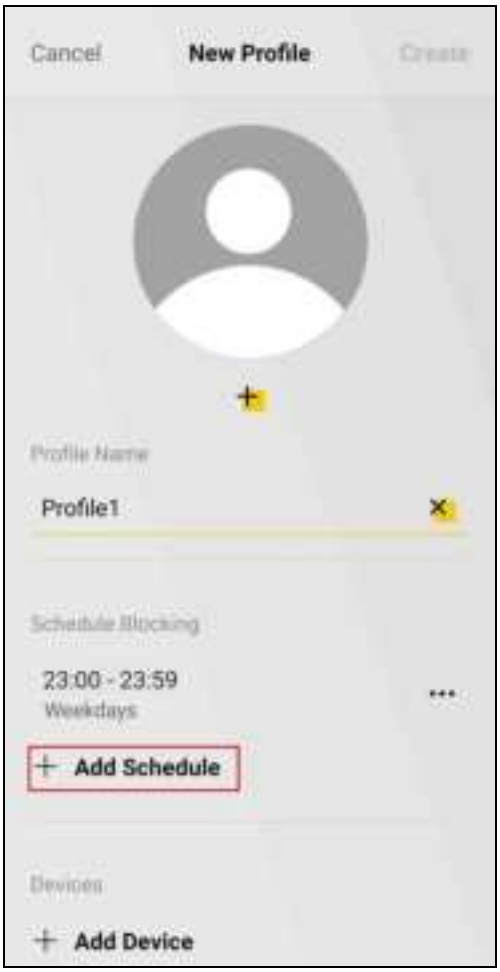


4 Tap **Add Schedule** to add a schedule for this profile.

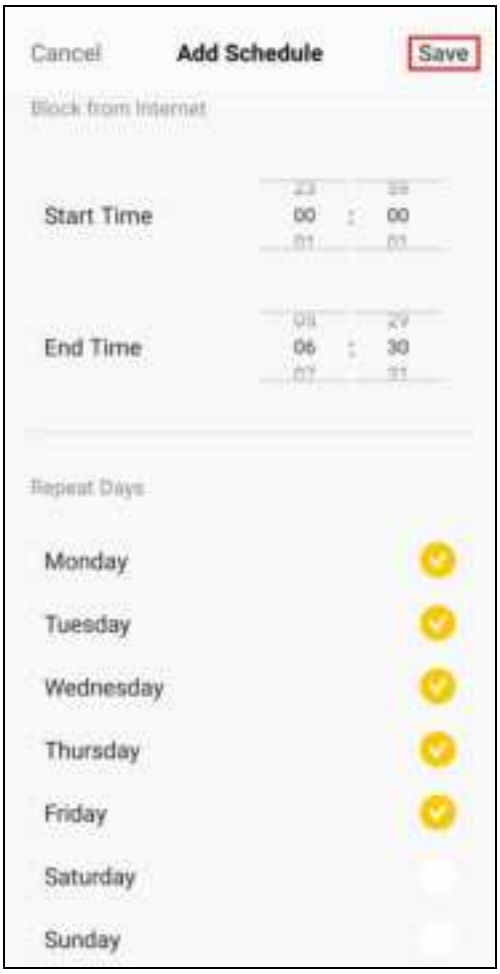
5 Configure the first schedule using the parameters given above. Tap **Save**.



6 Tap **Add schedule** to add the second schedule.



7 Configure the second schedule using the parameters given above. Tap **Save**.



8 Tap **Add Device** to select the client devices for which you want to apply this profile.

9 Tap the ( ) icon of the client devices you want to select. Tap **Add**.

10 Tap **Create** to finish creating the parental control profile.

11 Tap the switch to enable **Parental Control**. The profiles are active when you enable **Parental Control**. If a profile is currently blocking clients from Internet access during the scheduled period, the status displays **Block from Internet**. Otherwise, it displays **Allow to Internet**.

6.9 Seeing Currently Connected Client Devices

Follow the steps below to view clients that are currently connected to your MPro Mesh network and their link quality and device details, such as the IP address, MAC address, and the connection status of a client device.

1 Tap **Connected Devices** in the **Home** screen or **Devices** in the navigation panel to view the connected devices. It shows **Unknown** if the client device does not have a recognizable host name or if the Zyxel Device is still getting the client device information. For the client device's connection status, see the table below.

Table 40 Client Device Connection Status

ICON	CONNECTION TYPE	CONNECTION STATUS	ACTION TO DO
	Wired	Wired Connection	None.
	Wireless	Good to Go	None.
	Wireless	Too Far from the Zyxel Device	• Move the client device closer to the Zyxel Device. • Avoid obstacles, such as walls or doors in between.
	Wired/Wireless	No Connection	• Wired: Make sure the client device is correctly connected to the Zyxel Device's LAN port through an Ethernet cable. • Wireless: Move the client device closer to the Zyxel Device where the client device can receive the Zyxel Device's WiFi signal.
	Wired/Wireless	Blocked from the Internet	You have previously blocked the client device from the Internet. To resume the client device's Internet access, disable **Pause Internet** and make sure the client device is not blocked by any parental control profile. See Section 6.8 on page 173 and Section 6.11 on page 186 for more information.

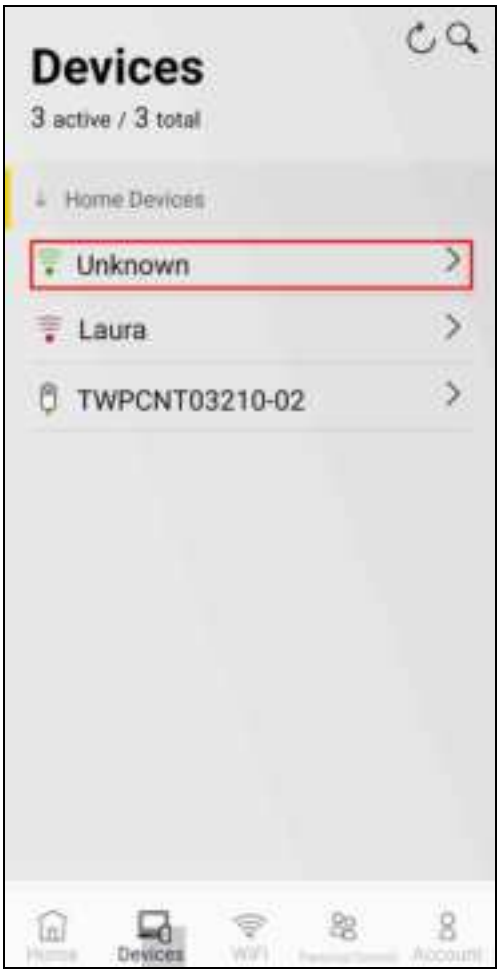
2 Tap to select a client device to view the device's IP address, MAC address, Internet access schedule profile, and the connection status.

6.10 Changing the Client Device Names

Follow the steps below to change your client device's name displayed on the app.

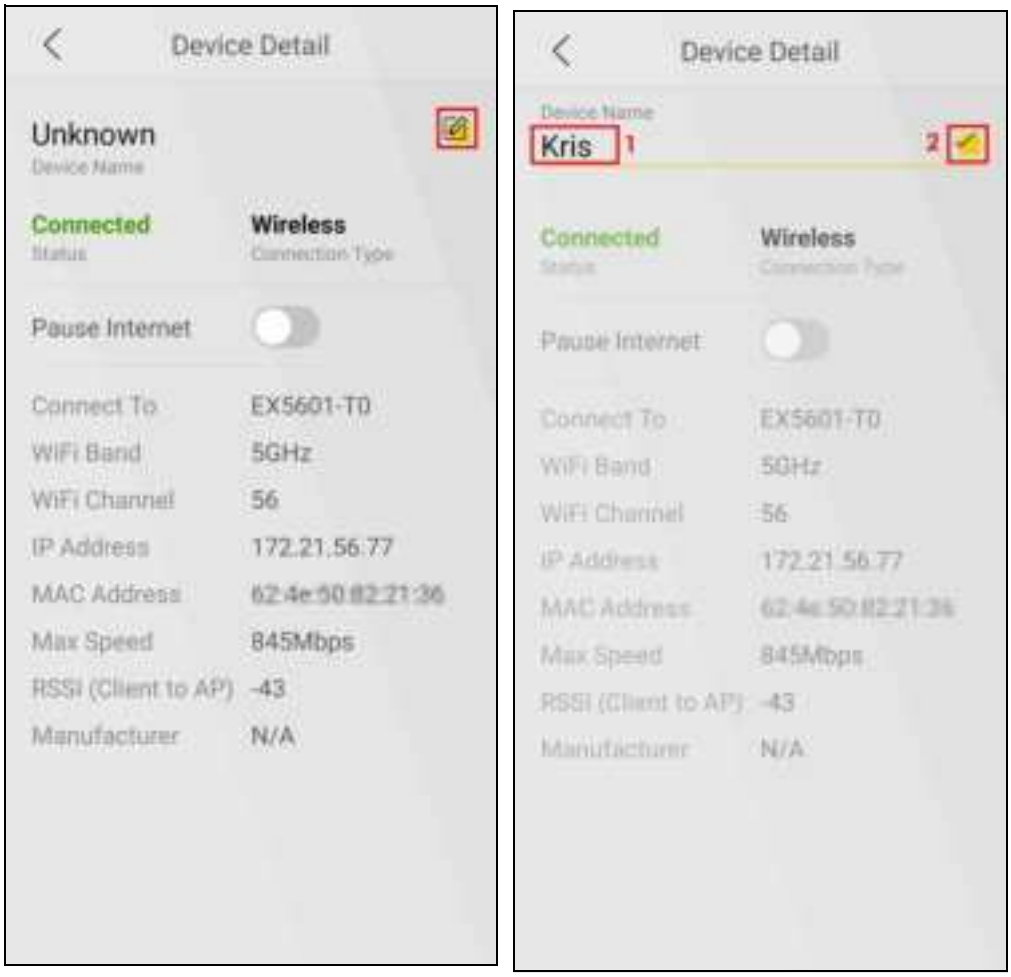
1 Tap the **Devices** icon in the navigation panel.

2 Tap to select a client to go to the **Device Details** screen.



3 Tap the edit icon ( ) to edit the device name.

4 Enter a descriptive name for the device and tap the ( ) icon. You can use 1 – 20 alphanumeric (0-9, a-z, A-Z) and single-byte special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.



6.11 Blocking Internet Access for Specific Clients Immediately

Follow the steps below to block a specific client named **Laura** from accessing the Internet using the **Pause Internet** function.

Note: If you enable **Pause Internet** for a client device, the client device will be blocked from the Internet immediately regardless of your **Parental Control** profile schedules. It will continue to be blocked until you disable **Pause Internet**.

1 Tap the **Devices** icon in the navigation panel.

2 Tap the search icon ( ). Enter **Laura** in the field.

3 Tap the ( ) icon to show the **Device Detail** screen.

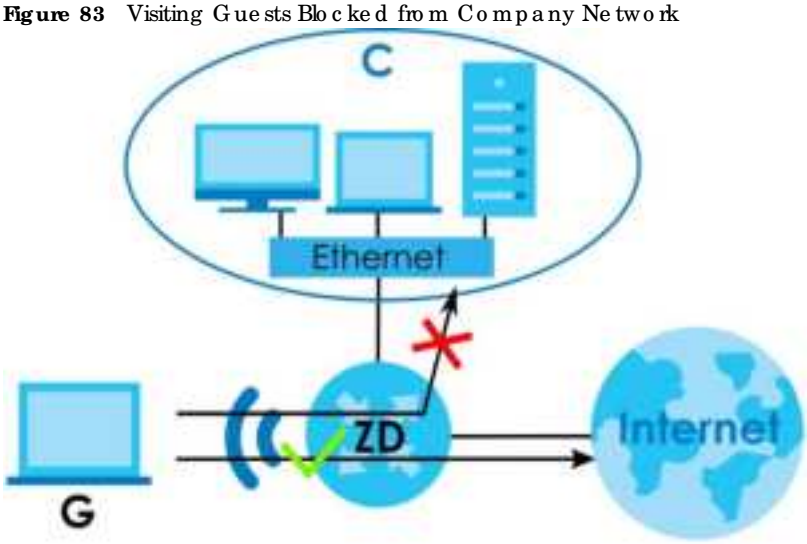
4 Tap to enable the switch in the **Pause Internet** field. **Laura** will not be able to access the Internet until you disable **Pause Internet**.

6.12 Setting Up the Guest WiFi Network

You can set up a Guest WiFi network for your Zyxel Device. Company A wants to create a different WiFi network group for different types of users as shown in the following figure. This group has its own SSID and password.

- Employees in Company A will use a general **Company** WiFi network group.
- Visiting guests will use the **Guest** WiFi network group, which has a different SSID and password. Visiting guests (**G**) can access the Internet but cannot access the company internal network (**C**) using Guest WiFi.

Figure 83 Visiting Guests Blocked from Company Network



Use the following parameters to set up the Guest WiFi network group.

For the SSID, you can use 1 – 32 alphanumeric (0-9, a-z, A-Z), single-byte special characters and spaces. For the WiFi password, you can use 8 – 63 alphanumeric (0-9, a-z, A-Z), single-byte special characters and spaces.

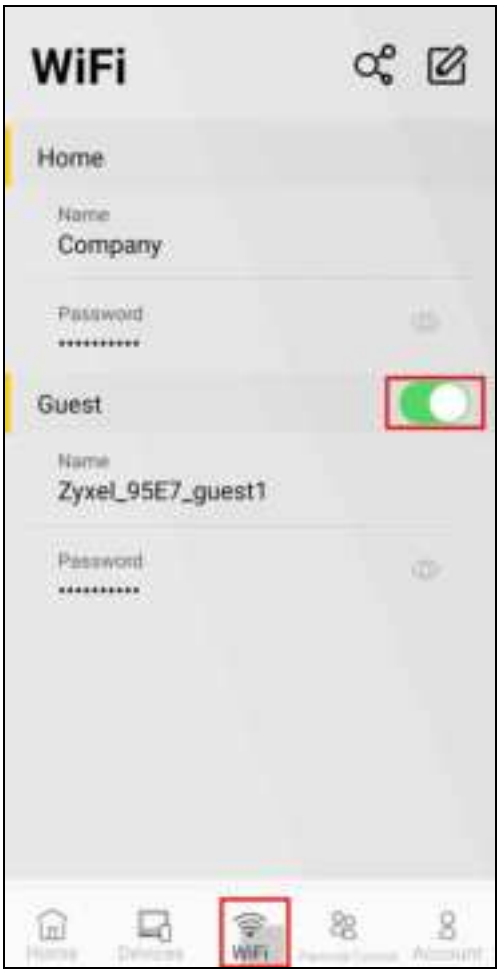
Table 41 Guest WiFi Settings Parameters Example

GUESTWIFI	
SSID	Guest
Password	guest123

Setting Up Guest WiFi

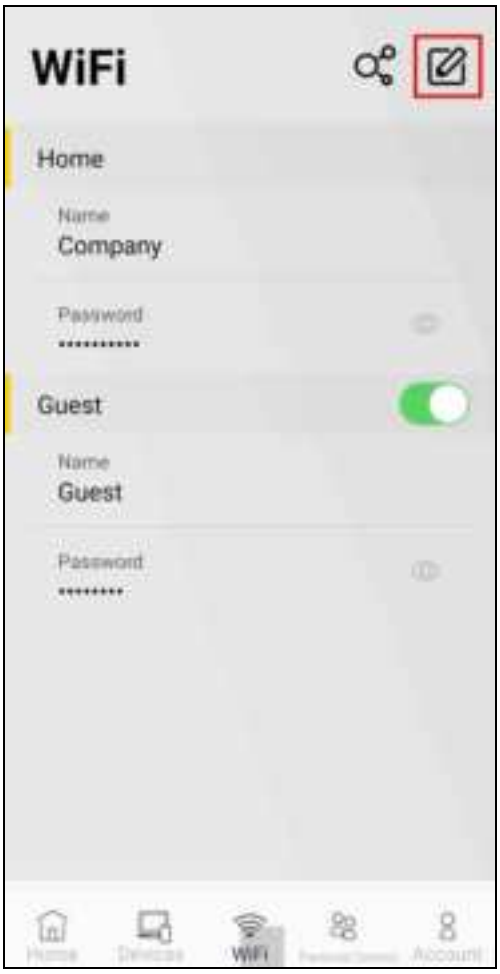
Follow the steps below to set up a Guest WiFi network group.

1 Tap **WiFi** in the navigation panel. Tap the switch in the **Guest** field to enable the Guest WiFi.



2 Your phone will temporarily disconnect from the Main WiFi network when you enable Guest WiFi. It takes 2 – 3 minutes for the Zyxel Device to apply the new settings to the whole MPro Mesh network. Make sure your phone reconnects to the Zyxel Main WiFi network. After your phone reconnects to the Main WiFi network, tap **Retry** to find the Zyxel Device and log in again.

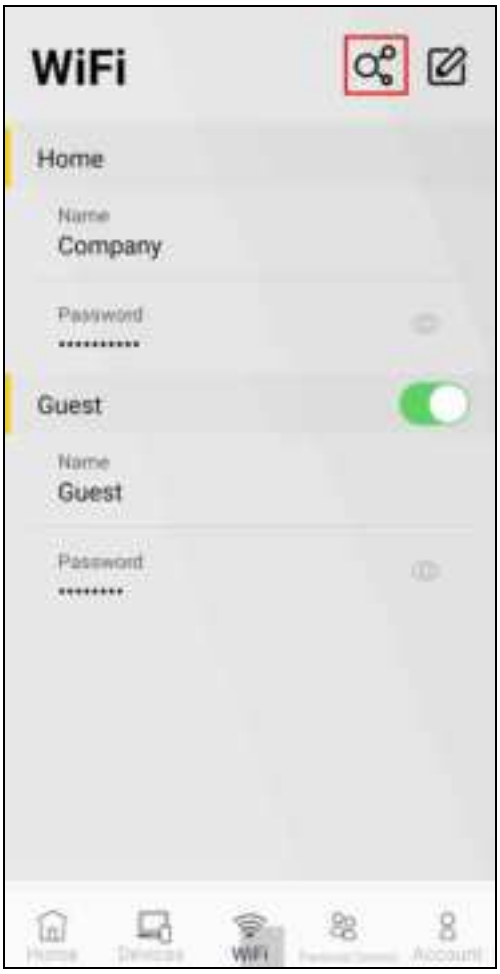
3 Tap the edit icon ( ) to edit the Guest WiFi network.



4 Set the Guest WiFi group SSID and password using the parameters given above. Tap **Done** to save and apply the settings. Your phone will temporarily disconnect from the Main WiFi network when you change the Guest WiFi settings. Make sure it reconnects to the Zyxel Main WiFi network.

6.12.1 Letting WiFi Clients Only Connect to the Internet Through the Guest WiFi Network

1 Tap the **WiFi** icon in the navigation panel. Tap the ( ) icon to show the QR code.

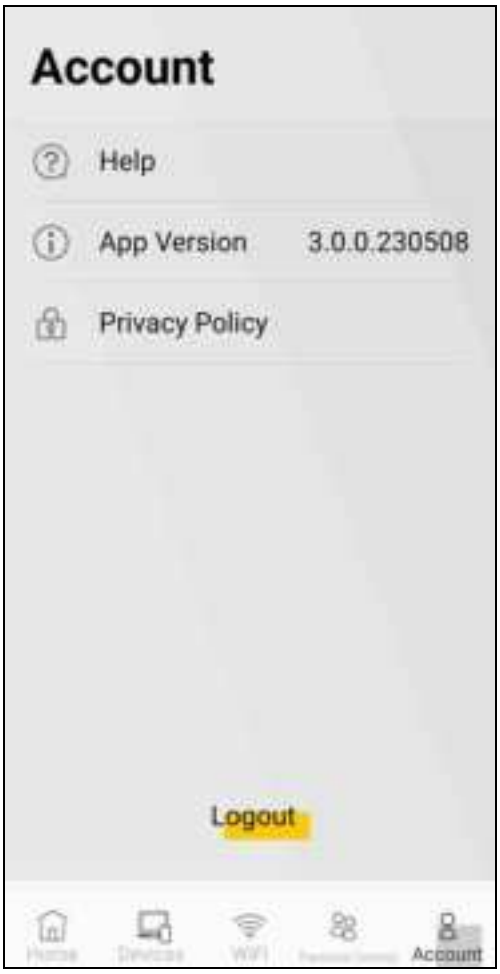


2 Swipe to the left to see the **Share Guest WiFi** QR code for connecting to the Zyxel Device Guest WiFi. Take a screenshot of the QR code and share it with the WiFi clients that you let access the Internet (only) through this WiFi network. These WiFi clients cannot access other devices on your network such as servers connected to the router.

6.13 Viewing More App Information and the Online Help

You can view the following information about the app:

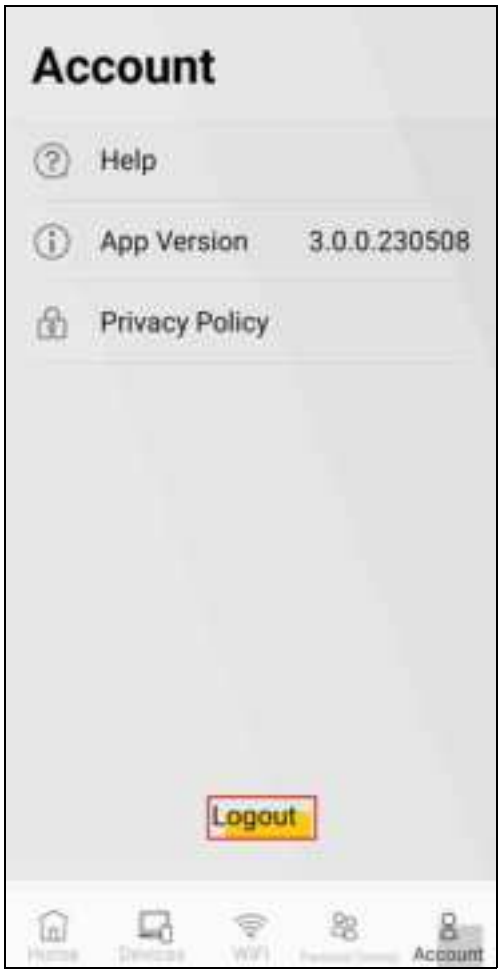
- The app online help page
- The app version
- The privacy policy.

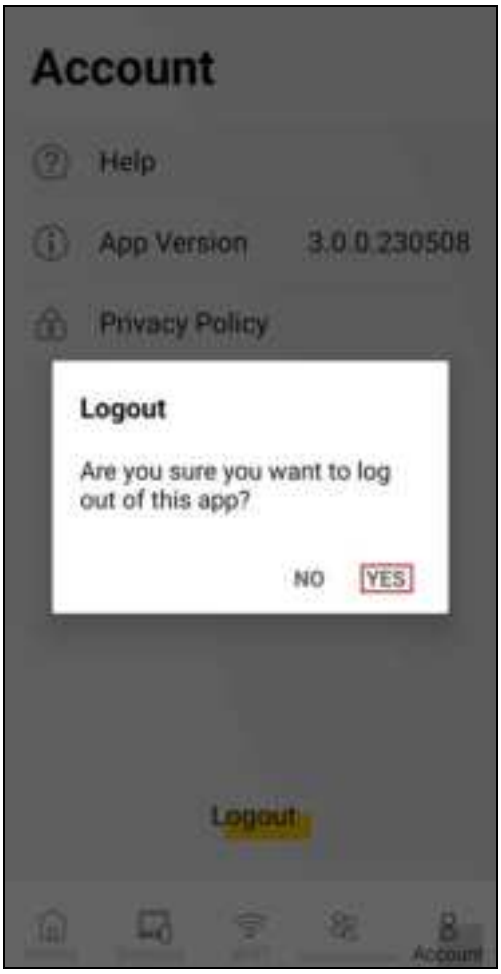


6.13.1 Logging Out of the Controller Device

To log out of the current Controller device (the MPro Mesh router or extender) of this MPro Mesh network:

Tap the **Account** icon in the navigation panel. Tap **Logout**, then tap **YES**.


Account
Help
App Version
3.0.0.230508
Privacy Policy
Logout
Account


Account
Help
App Version
3.0.0.230508
Privacy Policy
Logout
Are you sure you want to log out of this app?
NO
YES
Logout
Account

PART II
Technical Reference

CHAPTER 7
Connection Status

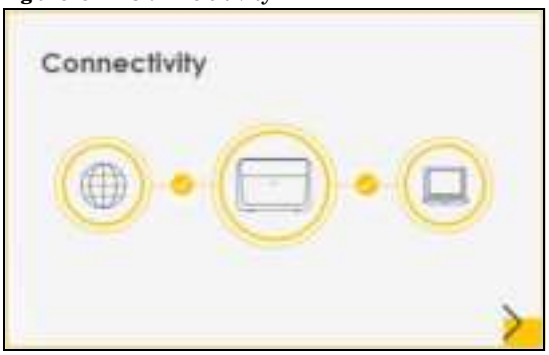
7.1 Connection Status Overview

After you log into the Web Configurator, the **Connection Status** screen appears. You can configure basic Internet access and WiFi settings in this screen. It also shows the network status of the Zyxel Device and computers or devices connected to it.

7.1.1 Connectivity

Use this screen to view the network connection status of the Zyxel Device and its clients.

Figure 84 Connectivity



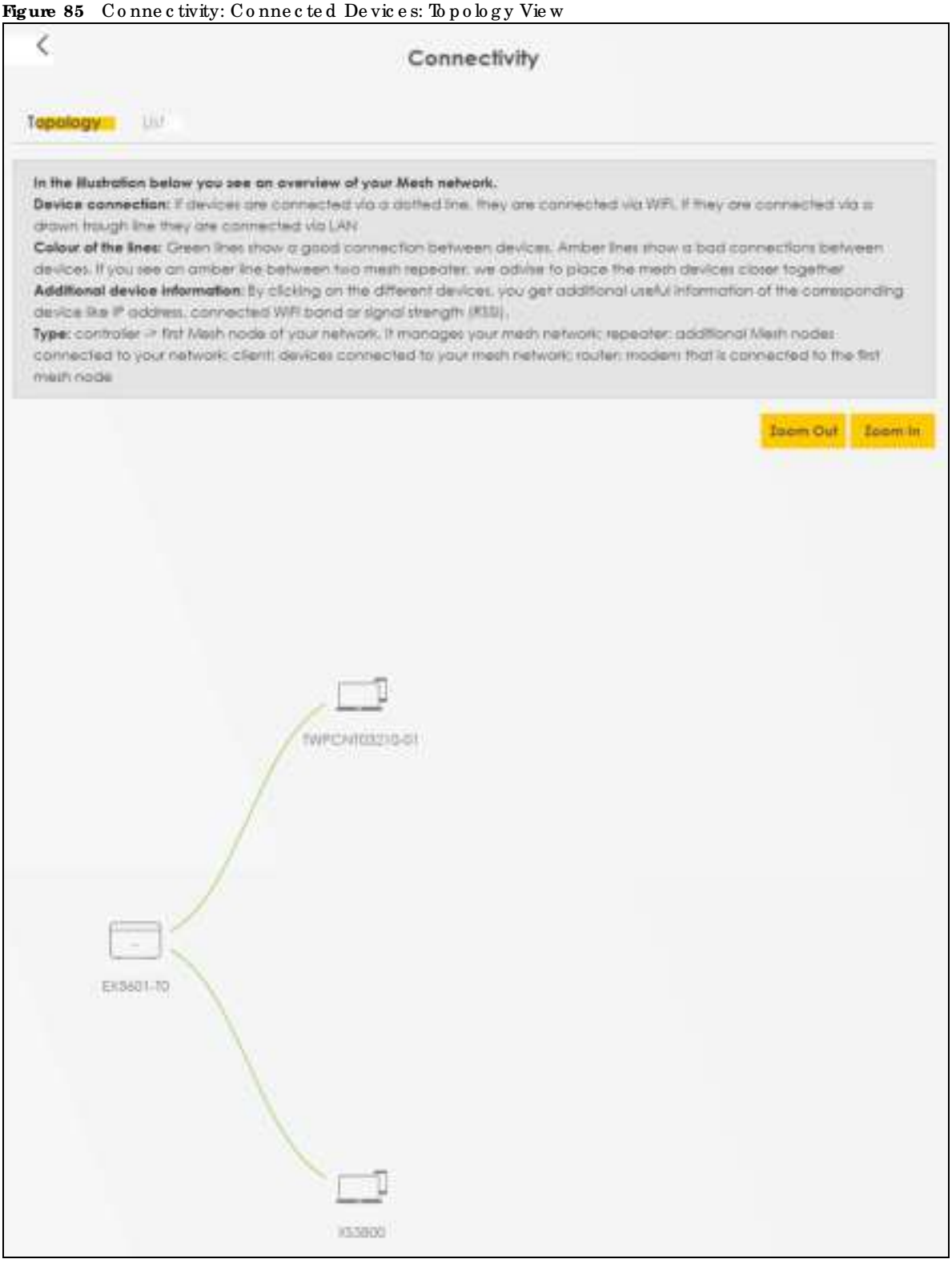
Click the Arrow icon ( ) to view IP addresses and MAC addresses of the wireless and wired devices connected to the Zyxel Device.

You can change the icon and name of a connected device. Place your mouse within the device block, and an Edit icon ( ) will appear. Click the Edit icon, and you will see there are several icon choices for you to select. Enter a name in the **Device Name** field for a connected device. Click to enable ( ) **Internet Blocking** for a connected WiFi client.

The following screen appears when you enable **MPro Mesh** in the **Network Setting > Wireless > MESH** screen. Check Section 1.1 on page 20 to see if your Zyxel Device supports MPro Mesh.

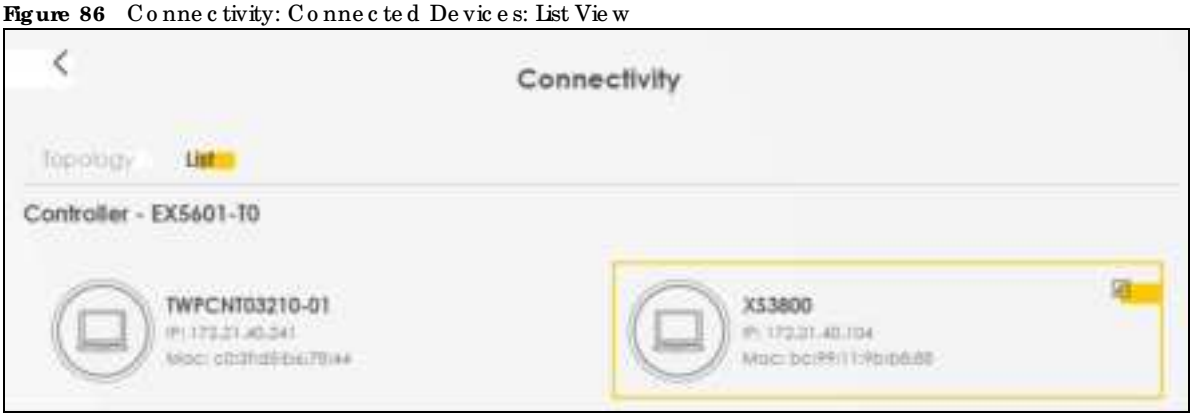
Use the **Topology** view screen to display an overview of your Mesh network.

Figure 85 Connectivity: Connected Devices: Topology View



Use the **List** view screen to view IP addresses and MAC addresses of the WiFi and wired devices connected to the Zyxel Device. Place your mouse within the device block, and an **Edit** icon ( ) will appear. Click the **Edit** icon to change the icon and name of a connected device.

Figure 86 Connectivity: Connected Devices: List View



7.1.2 Icon and Device Name

Select an icon and/or enter a name in the **Device Name** field for a connected device. Click to enable ( ) **Internet Blocking** (or **Active**) for a connected WiFi client. Click **Save** to save your changes.

Figure 87 Connectivity: Edit

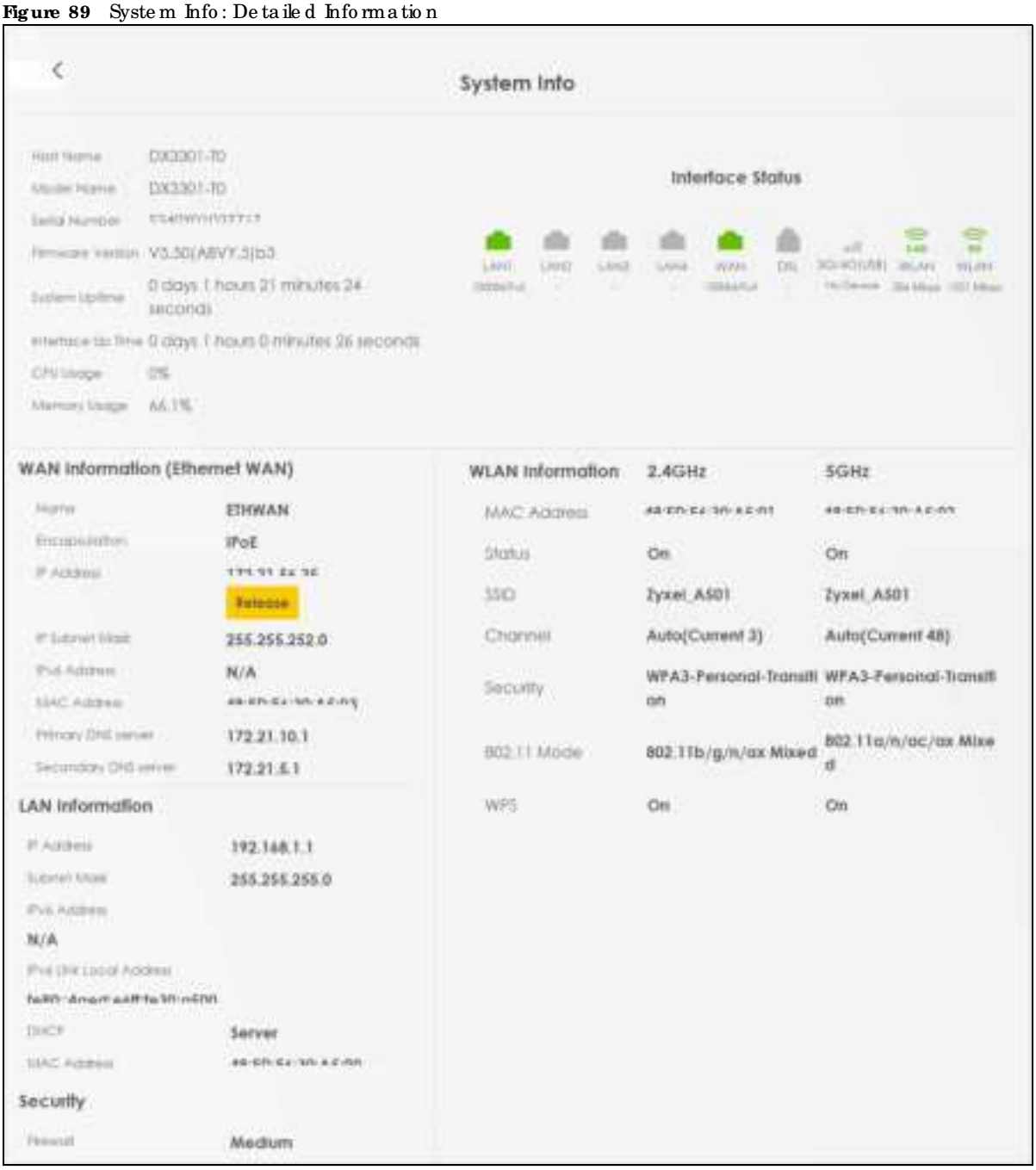
7.1.3 System Info

Use this screen to view the basic system information of the Zyxel Device.

Figure 88 System Info

Click the Arrow icon ( ) to view more information on the status of your firewall and interfaces (WAN, LAN, and WLAN).

Figure 89 System Info: Detailed Information



Each field is described in the following table.

Table 42 System Info: Detailed Information

LABEL	DESCRIPTION
Host Name	This field displays the Zyxel Device system name. It is used for identification.
Model Name	This shows the model number of your Zyxel Device.
Serial Number	This field displays the serial number of the Zyxel Device.
Firmware Version	This is the current version of the firmware inside the Zyxel Device.

Table 42 System Info: Detailed Information (continued)

LABEL	DESCRIPTION
System Uptime	This field displays how long the Zyxel Device has been running since it last started up. The Zyxel Device starts up when you plug it in, when you restart it (**Maintenance > Reboot**), or when you reset it.
Interface Up Time/ WAN Interface Uptime	This field displays the length of time of the Ethernet WAN connection.
CPU Usage	This displays the current CPU usage percentage.
Memory Usage	This displays the current RAM usage percentage.
WAN Information (These fields display when you have a WAN connection.)	
Name	This field displays the name given to the Internet connection.
Encapsulation	This field displays the current encapsulation method.
IP Address	This field displays the current IP address of the Zyxel Device in the WAN. Click the **Release**/ **Renew** button if you want to release/renew your WAN IP address.
IP Subnet Mask	This field displays the current IPv4 subnet mask of the Zyxel Device in the WAN.
IPv6 Address	This field displays the current IPv6 address of the Zyxel Device in the WAN.
MAC Address	This field displays the WAN Ethernet adapter MAC (Media Access Control) address of your Zyxel Device.
Primary DNS server	This field displays the first DNS server address assigned by the ISP.
Secondary DNS server	This field displays the second DNS server address assigned by the ISP.
Primary DNSv6 server	This field displays the first DNS server IPv6 address assigned by the ISP.
Secondary DNSv6 server	This field displays the second DNS server IPv6 address assigned by the ISP.
LAN Information	
IP Address	This is the current IP address of the Zyxel Device in the LAN.
Subnet Mask	This is the current subnet mask in the LAN.
IPv6 Address	This is the current IPv6 address of the Zyxel Device in the LAN.
IPv6 Link Local Address	This field displays the current link-local address of the Zyxel Device for the LAN interface. A link-local address is a special type of the IP address that is only valid for communication within the local network segment or broadcast domain of the device. Typically, link-local addresses are used for automatic address configuration and neighbor discovery protocols.
DHCP	This field displays what DHCP services the Zyxel Device is providing to the LAN. The possible values are: **Server** – The Zyxel Device is a DHCP server in the LAN. It assigns IP addresses to other computers in the LAN. **Relay** – The Zyxel Device acts as a surrogate DHCP server and relays DHCP requests and responses between the remote server and the clients. **Disable** – The Zyxel Device is not providing any DHCP services to the LAN.
MAC Address	This shows the network adapter MAC (Media Access Control) Address of the LAN interface.
Security	
Firewall	This displays the firewall's current security level (**High**, **Medium**, **Low**, or **Disabled**).
WLAN Information	
MAC Address	This shows the WiFi adapter MAC (Media Access Control) Address of the WiFi interface.
Status	This displays whether the WLAN is activated.

Table 42 System Info: Detailed Information (continued)

LABEL	DESCRIPTION
SSID	This is the descriptive name used to identify the Zyxel Device in a WLAN.
Channel	This is the channel number currently used by the WiFi interface.
Security	This displays the type of security mode the WiFi interface is using in the WLAN.
802.11 Mode	This displays the type of 802.11 mode the WiFi interface is using in the WLAN.
WPS	This displays whether WPS is activated on the WiFi interface.

7.1.4 WiFi Settings

Use this screen to enable or disable the main WiFi network. When the switch turns blue, the function is enabled. You can use this screen or the QR code on the upper right corner to check the SSIDs (WiFi network name) and passwords of the main WiFi networks. If you want to show or hide your WiFi passwords, click the Eye icon ( ).

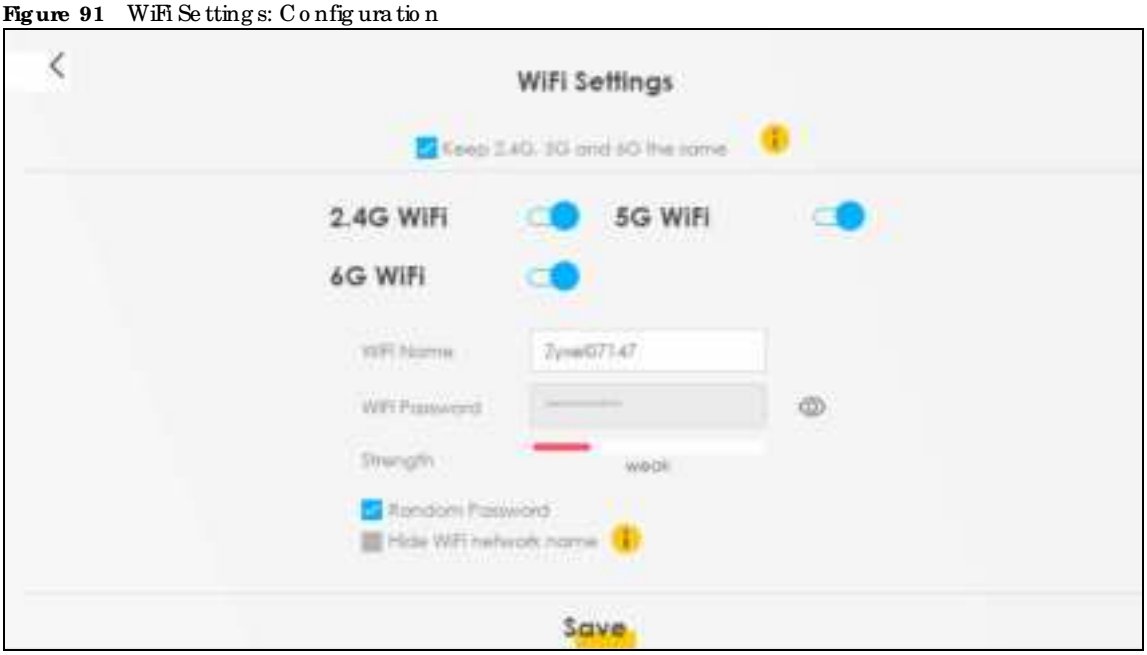
Figure 90 WiFi Settings

Click the Arrow icon ( ) to configure the SSIDs and/or passwords for your main WiFi networks. Click the Eye icon ( ) to display the characters as you enter the WiFi Password.

Scanning the QR code is an alternative way to connect your WiFi client to the WiFi network.

Note: When you enable MPro Mesh in the **Network > Wireless > MESH** screen, **Keep 2.4G, 5G and 6G the same** will be enabled and cannot be disabled.

Figure 91 WiFi Settings: Configuration



Each field is described in the following table.

Table 43 WiFi Settings: Configuration

LABEL	DESCRIPTION
Keep 2.4G, 5G and 6G the same	Select this and the 2.4 GHz, 5 GHz and 6GHz wireless networks will use the same SSID. If you deselect this, the screen will change. You need to assign different SSIDs for the 2.4 GHz and 5 GHz wireless networks.
2.4G / 5G / 6G WiFi	Click this switch to enable or disable the 2.4G / 5G / 6G WiFi network. When the switch turns blue, the function is enabled.
WiFi Name	The SSID (Service Set IDentity) identifies the service set with which a WiFi device is associated. WiFi devices associating to the access point (AP) must have the same SSID. Enter a descriptive name for the WiFi. You can use up to 32 printable characters, including spaces.
WiFi Password	If you selected **Random Password**, this field displays a pre-shared key generated by the Zyxel Device. If you did not select **Random Password**, you can manually enter a pre-shared key from 8 to 63 alphanumeric (0-9, a-z, A-Z) and special characters, including spaces. Click the Eye icon to show or hide the password for your WiFi network. When the Eye icon is slashed, you will see the password in plain text. Otherwise, it is hidden.
Random Password	Select this to have the Zyxel Device automatically generate a password. The **WiFi Password** field will not be configurable when you select this option.
Hide WiFi network name	Select this to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool. Note: Disable WPS in the **Network Setting > Wireless > WPS** screen to hide the SSID.
Save	Click **Save** to save your changes.

7.2 Guest WiFi Settings

Use this screen to enable or disable the guest 2.4 GHz / 5 GHz / 6GHz WiFi networks. When the switch goes to the right ( ), the function is enabled. Otherwise, it is not. You can check their SSIDs (WiFi network name) and passwords from this screen. If you want to show or hide your WiFi passwords, click the Eye icon.

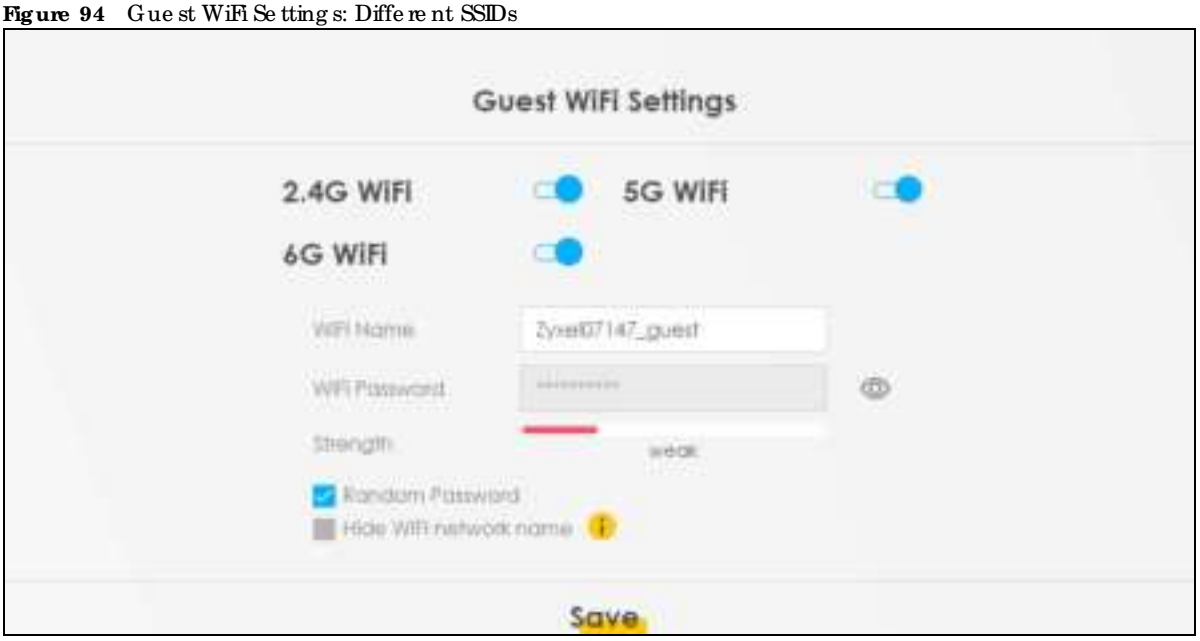
Figure 92 Guest WiFi Settings

Click the Arrow icon ( ) to open the following screen. Use this screen configure the SSIDs and/or passwords for your guest WiFi networks.

Figure 93 Guest WiFi Settings: Configuration

To assign different SSIDs to the 2.4 GHz and 5 GHz guest wireless networks, clear the **Keep 2.4G, 5G and 6G the same** checkbox in the **WiFi Settings** screen, and the **Guest WiFi Settings** screen will change.

Figure 94 Guest WiFi Settings: Different SSIDs



Each field is described in the following table.

Table 44 WiFi Settings: Configuration

LABEL	DESCRIPTION
2.4G/5G/6G WiFi	Click this switch to enable or disable the 2.4 GHz / 5 GHz / 6 GHz WiFi networks. When the switch goes to the right, the function is enabled. Otherwise, it is not.
WiFi Name	The SSID (Service Set IDentity) identifies the service set with which a wireless device is associated. Wireless devices associating to the access point (AP) must have the same SSID. Enter a descriptive name (up to 32 printable characters, including spaces) for the WiFi.
WiFi Password	If you selected **Random Password**, this field displays a pre-shared key generated by the Zyxel Device. If you did not select **Random Password**, you can manually enter a pre-shared key from 8 to 64 alphanumeric (0-9, a-z, A-Z) and special characters, including spaces.
Strength	This displays the current password strength – **weak**, **medium**, **strong**.
	Click the Eye icon to show or hide the password of your WiFi network. When the Eye icon is slashed, you will see the password in plain text. Otherwise, it is hidden.
Random Password	Select this option to have the Zyxel Device automatically generate a password. The **WiFi Password** field will not be configurable when you select this option.
Hide WiFi network name	Select this checkbox to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool. Note: Disable WPS in the **Network Setting > Wireless > WPS** screen to hide the SSID.
Save	Click **Save** to save your changes.

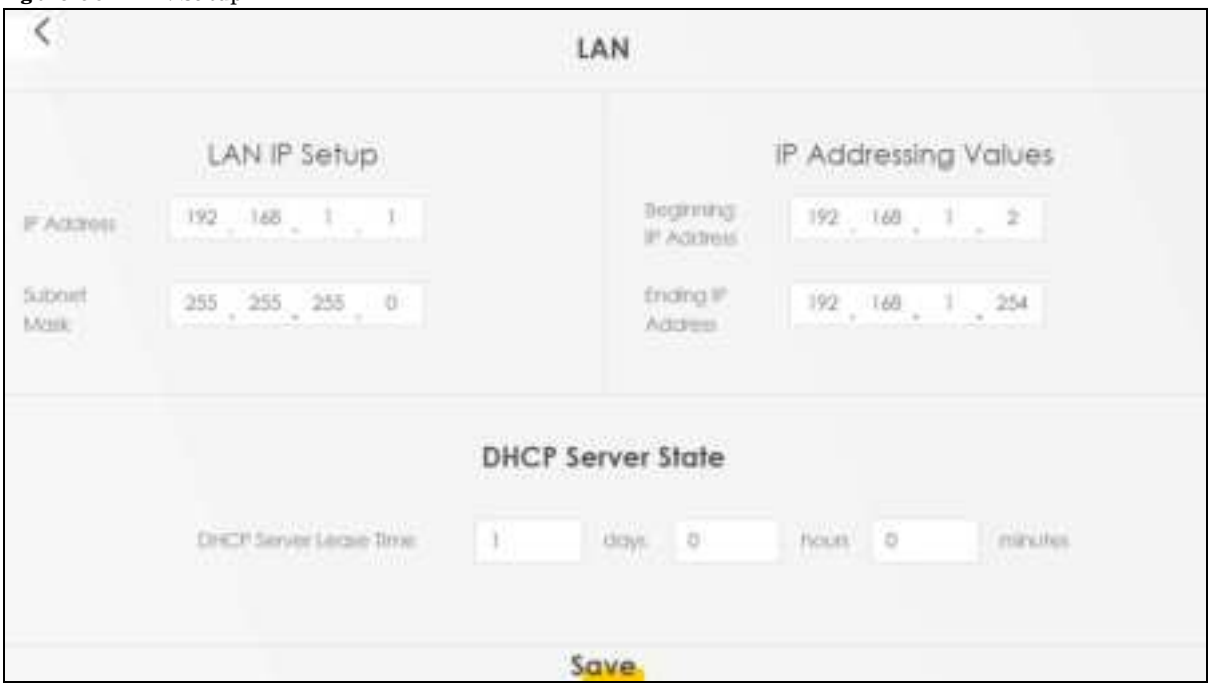
7.2.1 LAN

Use this screen to view the LAN IP address, subnet mask, and DHCP settings of your Zyxel Device. Click the switch button to turn on/off the DHCP server.

Figure 95 LAN

Click the Arrow icon ( ) to configure the LAN IP settings and DHCP setting for your Zyxel Device.

Figure 96 LAN Setup



Each field is described in the following table.

Table 45 LAN Setup

LABEL	DESCRIPTION
LAN IP Setup	
IP Address	Enter the LAN IPv4 IP address you want to assign to your Zyxel Device in dotted decimal notation, for example, (factory default).
Subnet Mask	Enter the subnet mask of your network in dotted decimal notation, for example 255.255.255.0 (factory default). Your Zyxel Device automatically computes the subnet mask based on the IP Address you enter, so do not change this field unless you are instructed to do so.
IP Addressing Values	
Beginning IP Address	This field specifies the first of the contiguous addresses in the IP address pool.
Ending IP Address	This field specifies the last of the contiguous addresses in the IP address pool.

Table 45 LAN Setup (continued)

LABEL	DESCRIPTION
DHCP Server State	
DHCP Server Lease Time	This is the period of time a DHCP-assigned address is valid, before it expires. When a client connects to the Zyxel Device, DHCP automatically assigns the client an IP addresses from the IP address pool. DHCP leases each addresses for a limited period of time, which means that past addresses are "recycled" and made available for future reassignment to other devices.
Days/Hours/ Minutes	Enter the lease time of the DHCP server.

7.3 The Parental Control Screen

Use this screen to view the number of profiles that were created for parental control.

Figure 97 Parental Control

Click the yellow Arrow icon to open the following screen. Use this screen to enable parental control and add more profiles. Add a profile to create restricted access schedules. Go to the **Security > Parental Control > Add New PCP/Edit** screen to configure URL filtering settings to block the users on your network from accessing certain web sites.

Figure 98 Parental Control

Each field is described in the following table.

Table 46 Parental Control: Schedule

LABEL	DESCRIPTION
Parental Control	Click this switch to enable parental control.
Scheduled Profile	This screen shows all the created profiles.
Add More Profile	Click this to create a new profile.

7.3.1 Create a Parental Control Profile

Click **Add more Profile** to create a profile. Use this screen to add a devices in a profile and block Internet access on the profile devices.

Figure 99 Parental Control: Add More Profile

Each field is described in the following table.

Table 47 Parental Control: Add More Profile

LABEL	DESCRIPTION
Profile Name	Enter a descriptive name for the profile.
Profile Active	Click this switch to enable or disable Internet access. When the switch goes to the right , the function is enabled. Otherwise, it is not.
Profile Device List	This field shows the devices selected on the right for this profile.
Blocking Schedule	This field shows the time during which Internet access is blocked on the profile device(s).
	Select a device(s) on your network for this profile.

Figure 100 Parental Control: Schedule

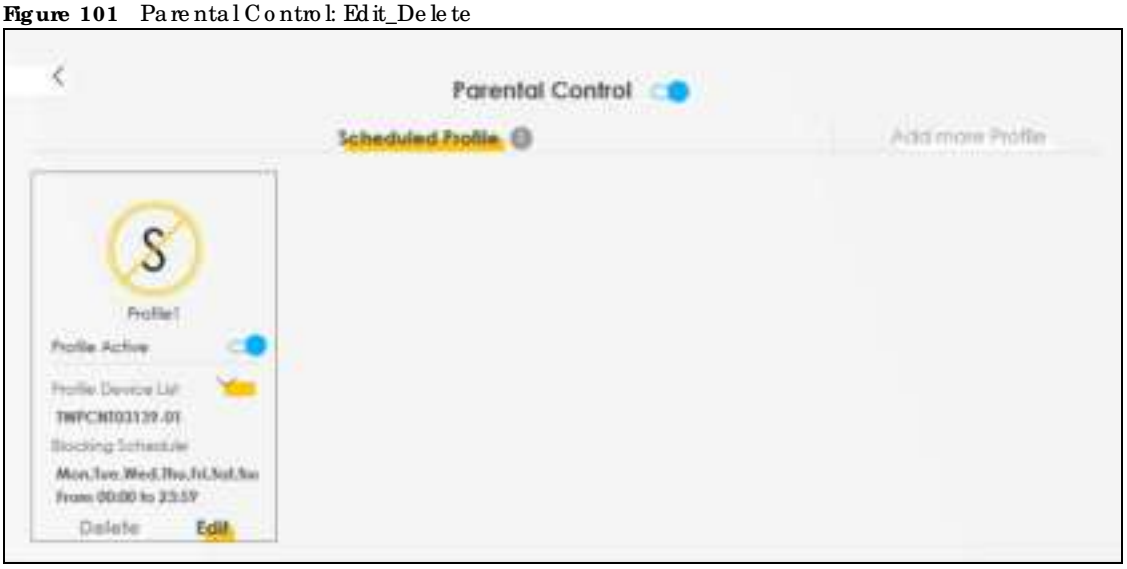
Each field is described in the following table.

Table 48 Parental Control: Schedule

LABEL	DESCRIPTION
Profile Name	Enter a descriptive name for the profile. You can use up to 17 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Profile Active	Click this switch to enable this profile.
Profile Device List	This field shows the devices selected on the right for this profile.
Blocking Schedule	This field shows the time during which Internet access is blocked on the profile devices.
Schedule	
Add New Schedule	Click this to add a new block for scheduling.
Start/End blocking	Select the time period when Internet access is blocked on the profile devices.
Repeat On	Select the days when Internet access is blocked on the profile devices. Select **Whole Week** to make the profile schedule repeat on everyday.
Back	Click **Back** to return to the previous screen.
Save	Click **Save** to save your changes.

Once a profile is created, it will show in the following screen. Click this to **Delete** or **Edit** a profile.

Figure 101 Parental Control: Edit_Delete



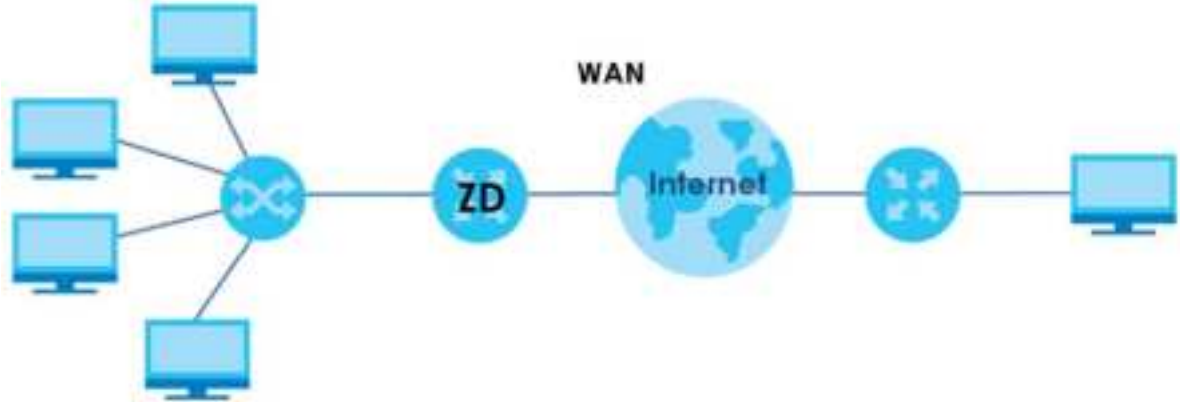
CHAPTER 8
Broadband

8.1 Broadband Overview

This chapter discusses the Zyxel Device's **Broadband** screens. Use these screens to configure your Zyxel Device for Internet access.

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

Figure 102 LAN and WAN



8.1.1 What You Can Do in this Chapter

- Use **Broadband** screens to view, remove or add a WAN interface. You can also configure the WAN settings on the Zyxel Device for Internet access.

  The **Broadband** screens for DSL routers and Ethernet/AON/PON routers are slightly different.
  For DSL routers, see Section 8.2 on page 219.
  For Ethernet, AON and PON routers, see Section 8.3 on page 228.
  See Section 1.1 on page 20 to see which router type your Zyxel Device belongs to.
- Use the **Cellular Backup** screen to configure cellular WAN connection (Section 8.4 on page 237).
- Use the **Advanced** screen to enable or disable PTM over ADSL, Annex M/Annex J, and DSL PhyR functions (Section 8.5 on page 243).
- Use the **Backup WAN** screen to convert the fourth LAN port as a WAN port or reset the Ethernet WAN port to a LAN port (Section 8.6 on page 247).

Table 49 WAN Setup Overview

LAYER-2 INTERFACE	INTERNET CONNECTION		
CONNECTION	MODE	ENCAPSULATION	CONNECTION SETTINGS
Ethernet	Routing	PPPoE	PPP username and password, WAN IPv4/IPv6 IP address, routing feature, DNS server, VLAN, QoS, and MTU
		IPoE	WAN IPv4/IPv6 IP address, NAT, DNS server and routing feature
	Bridge	N/A	VLAN
Note: This table is for the Ethernet, AON and PON routers. See Section 1.1 on page 20 for more information.			

Table 50 WAN Setup Overview

LAYER-2 INTERFACE		INTERNET CONNECTION		
CONNECTION	DSL LINK TYPE	MODE	ENCAPSULATION	CONNECTION SETTINGS
ADSL/VDSL over PTM	N/A	Routing	PPPoE	PPP information, IPv4/IPv6 IP address, routing feature, DNS server, VLAN, QoS, and MTU
			IPoE	IPv4/IPv6 IP address, routing feature, DNS server, VLAN, QoS, and MTU
		Bridge	N/A	VLAN and QoS
ADSL over ATM	EoA	Routing	PPPoE/PPPoA	ATM PVC configuration, PPP information, IPv4/IPv6 IP address, routing feature, DNS server, VLAN, QoS, and MTU
			IPoE/IPoA	ATM PVC configuration, IPv4/IPv6 IP address, routing feature, DNS server, VLAN, QoS, and MTU
		Bridge	N/A	ATM PVC configuration, and QoS
Ethernet	N/A	Routing	PPPoE	PPP username and password, WAN IPv4/IPv6 IP address, routing feature, DNS server, VLAN, QoS, and MTU
			IPoE	WAN IPv4/IPv6 IP address, NAT, DNS server and routing feature
		Bridge	N/A	VLAN and QoS
Note: This table is for the DSL routers. See Section 1.1 on page 20 for more information.				

8.1.2 What You Need to Know

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

WAN IP Address

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

If your ISP assigns you a static WAN IP address, they should also assign you the subnet mask and DNS server IP addresses.

ATM

Asynchronous Transfer Mode (ATM) is a WAN networking technology that provides high-speed data transfer. ATM uses fixed-size packets of information called cells. With ATM, a high QoS (Quality of Service) can be guaranteed. ATM uses a connection-oriented model and establishes a virtual circuit (VC).

PTM

Packet Transfer Mode (PTM) is packet-oriented and supported by the VDSL2 standard. In PTM, packets are encapsulated directly in the High-level Data Link Control (HDLC) frames. It is designed to provide a low-overhead, transparent way of transporting packets over DSL links, as an alternative to ATM.

IPv6 Introduction

IPv6 (Internet Protocol version 6), is designed to enhance IP address size and features. The increase in IPv6 address size to 128 bits (from the 32-bit IPv4 address) allows up to 3.4×10^{38} IP addresses. The Zyxel Device can use IPv4/IPv6 dual stack to connect to IPv4 and IPv6 networks, and supports IPv6 rapid deployment (6RD).

IPv6 Addressing

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

IPv6 addresses can be abbreviated in two ways:

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

IPv6 Prefix and Prefix Length

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

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

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

IPv6 Subnet Masking

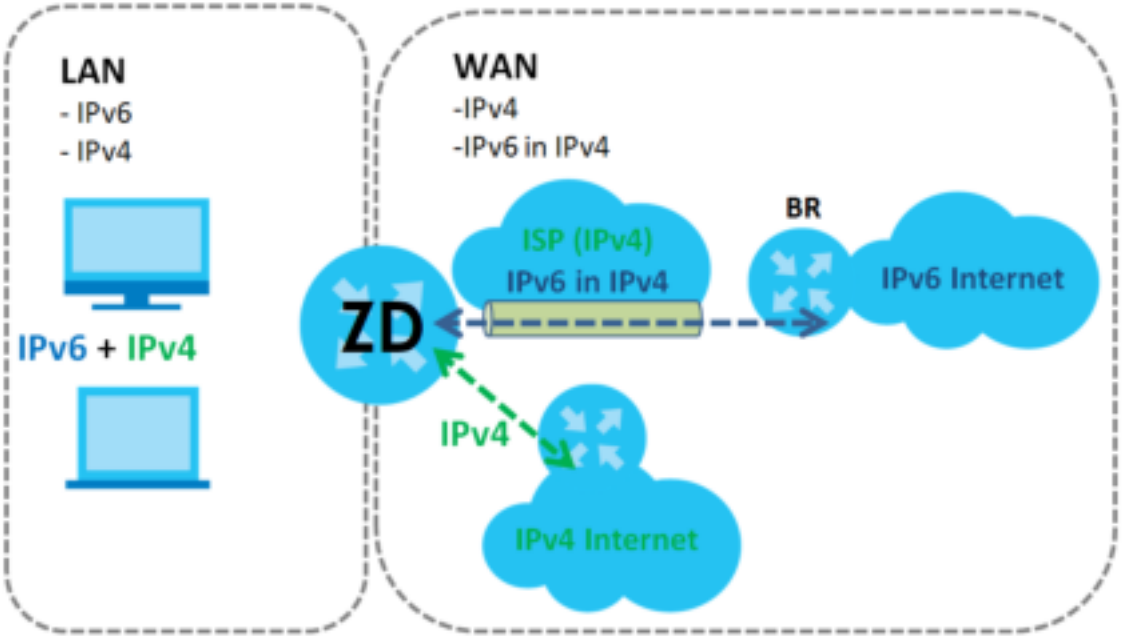
Both an IPv6 address and IPv6 subnet mask compose of 128-bit binary digits, which are divided into eight 16-bit blocks and written in hexadecimal notation. Hexadecimal uses four bits for each character (1 – 10, A – F). Each block's 16 bits are then represented by four hexadecimal characters. For example, FFFF:FFFF:FFFF:FFFF:FC00:0000:0000:0000.

IPv6 Rapid Deployment

Use IPv6 Rapid Deployment (6rd) when the local network uses IPv6 and the ISP has an IPv4 network. When the Zyxel Device has an IPv4 WAN address and you set **IPv6/IPv4 Mode** to **IPv4 Only**, you can enable 6rd to encapsulate IPv6 packets in IPv4 packets to cross the ISP's IPv4 network.

The Zyxel Device generates a global IPv6 prefix from its IPv4 WAN address and tunnels IPv6 traffic to the ISP's Border Relay router (BR in the figure) to connect to the native IPv6 Internet. The local network can also use IPv4 services. The Zyxel Device uses its configured IPv4 WAN IP to route IPv4 traffic to the IPv4 Internet.

Figure 103 IPv6 Rapid Deployment

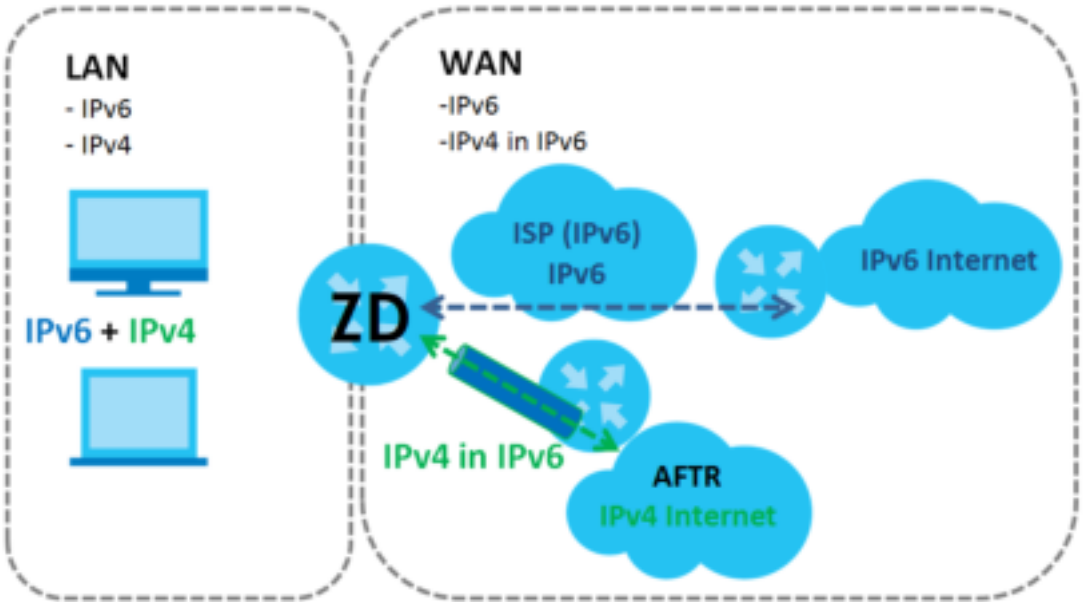


Dual Stack Lite

Use Dual Stack Lite when local network computers use IPv4 and the ISP has an IPv6 network. When the Zyxel Device has an IPv6 WAN address and you set **IPv6/IPv4 Mode** to **IPv6 Only**, you can enable Dual Stack Lite to use IPv4 computers and services.

The Zyxel Device tunnels IPv4 packets inside IPv6 encapsulation packets to the ISP's Address Family Transition Router (AFTR in the graphic) to connect to the IPv4 Internet. The local network can also use IPv6 services. The Zyxel Device uses its configured IPv6 WAN IP to route IPv6 traffic to the IPv6 Internet.

Figure 104 Dual Stack Lite



8.1.3 Before You Begin

You need to know your Internet access settings such as encapsulation and WAN IP address. Get this information from your ISP.

8.2 Broadband Settings for DSL Routers

Use this screen to change your Zyxel Device's Internet access settings. The summary table shows you the configured WAN services (connections) on the Zyxel Device. Use information provided by your ISP to configure WAN settings.

Click **Network Setting > Broadband** to access this screen.

Figure 105 Network Setting > Broadband

The following table describes the labels in this screen.

Table 51 Network Setting > Broadband

LABEL	DESCRIPTION
Add New WAN Interface	Click this button to create a new connection.
#	This is the index number of the entry.
Name	This is the service name of the connection.
Type	This shows types of connections the router has.
Mode	This shows whether the connection is in routing or bridge mode.
Encapsulation	This is the method of encapsulation used by this connection.
802.1p	This indicates the 802.1p priority level assigned to traffic sent through this connection. This displays **N/A** when there is no priority level assigned.
802.1q	This indicates the VLAN ID number assigned to traffic sent through this connection. This displays **N/A** when there is no VLAN ID number assigned.
IGMP Proxy	This shows whether the Zyxel Device acts as an IGMP proxy on this connection.
NAT	This shows whether NAT is activated or not for this connection.
Default Gateway	This shows whether the Zyxel Device use the WAN interface of this connection as the system default gateway.
IPv6	This shows whether IPv6 is activated or not for this connection. IPv6 is not available when the connection uses the bridging service.
MLD Proxy	This shows whether Multicast Listener Discovery (MLD) is activated or not for this connection. MLD is not available when the connection uses the bridging service.
Modify	Click the **Edit** icon to configure the WAN connection. Click the **Delete** icon to remove the WAN connection.

8.2.1 Add or Edit Internet Connection

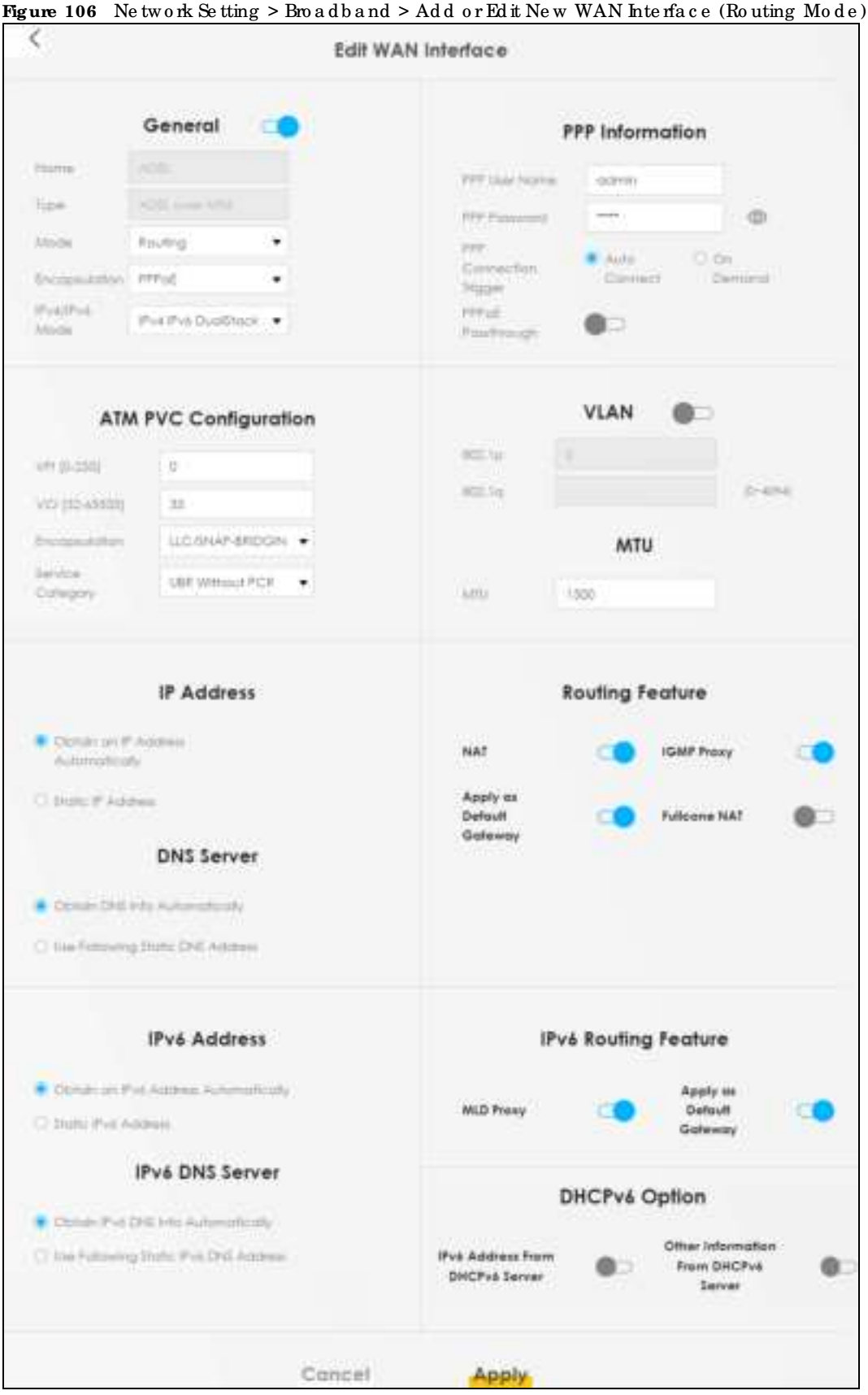
Click **Add New WAN Interface** in the **Broadband** screen or the Edit icon next to an existing WAN interface to open the following screen. Use this screen to configure a WAN connection. The screen varies depending on the mode, encapsulation, and IPv6 or IPv4 mode you select.

Routing Mode

Use **Routing** mode if your ISP give you one IP address only and you want multiple computers to share an Internet account.

The following example screen displays when you select the **Routing** mode and **PPPoE** encapsulation. The screen varies when you select other encapsulation and IPv6 or IPv4 mode.

Figure 106 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode)



The following table describes the labels in this screen.

Table 52 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode)

LABEL	DESCRIPTION
General Click the switch to enable this WAN interface.	
Name	Specify a descriptive name for this connection. You can use up to 15 alphanumeric (0-9, a-z, A-Z) and special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. This field is read-only if you are editing the WAN interface.
Type	This field shows the types of available connections. This field is read-only if you are editing the WAN interface.
Mode	Select **Routing** if your ISP give you one IP address only and you want multiple computers to share an Internet account.
Encapsulation	Select the method of encapsulation used by your ISP from the drop-down list box. This option is available only when you select **Routing** in the **Mode** field. When you select **ADSL/VDSL over ATM** or **Ethernet**, the choices are **PPPoE** and **IPoE**. When you select **ADSL over ATM**, the choices are **PPPoE**, **IPoE**, **PPPoA** and **IPoA**.
IPv4/IPv6 Mode	Select **IPv4 Only** if you want the Zyxel Device to run IPv4 only. Select **IPv4 IPv6 DualStack** to allow the Zyxel Device to run IPv4 and IPv6 at the same time. Select **IPv6 Only** if you want the Zyxel Device to run IPv6 only.
PPP Information (This is available only when you select **Routing** in the **Mode** field and **PPPoE** or **PPPoA** in the **Encapsulation** field.)	
PPP User Name	Enter the user name exactly as your ISP assigned. If assigned a name in the form user@domain where domain identifies a service name, then enter both components exactly as given.
PPP Password	Enter the password associated with the user name above. Select **password unmask** to show your entered password in plain text.
PPP Connection Trigger	Select when to have the Zyxel Device establish the PPP connection. **Auto Connect** – select this to not let the connection time out. **On Demand** – select this to automatically bring up the connection when the Zyxel Device receives packets destined for the Internet.
Idle Timeout	This value specifies the time in minutes that elapses before the router automatically disconnects from the PPPoE server. This field is not available if you select **Auto Connect** in the **PPP Connection Trigger** field.
PPPoE Passthrough	This field is available when you select **PPPoE** encapsulation. In addition to the Zyxel Device's built-in PPPoE client, you can enable PPPoE pass through to allow up to ten hosts on the LAN to use PPPoE client software on their computers to connect to the ISP through the Zyxel Device. Each host can have a separate account and a public WAN IP address. PPPoE pass through is an alternative to NAT for application where NAT is not appropriate. Disable PPPoE pass through if you do not need to allow hosts on the LAN to use PPPoE client software on their computers to connect to the ISP.
ATM PVC Configuration (This is available only when you select **ADSL over ATM** in the **Type** field.)	
VPI[0-255]	The valid range for the VPI is 0 to 255. Enter the VPI assigned to you.
VCI[32-65535]	The valid range for the VCI is 32 to 65535 (0 to 31 is reserved for local management of ATM traffic). Enter the VCI assigned to you.

Table 52 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
Encapsulation	Select the method of multiplexing used by your ISP from the drop-down list box. Choices are: • **LLC/SNAP-BRIDGING:** In LCC encapsulation, bridged PDUs are encapsulated by identifying the type of the bridged media in the SNAP header. • **VC/MUX:** In VC multiplexing, each protocol is carried on a single ATM virtual circuit (VC). To transport multiple protocols, the Zyxel Device needs separate VCs. There is a binding between a VC and the type of the network protocol carried on the VC. This reduces payload overhead since there is no need to carry protocol information in each Protocol Data Unit (PDU) payload.
Service Category	Select **UBR Without PCR** for applications that are non-time sensitive, such as email. Select **CBR** (Continuous Bit Rate) to specify fixed (always-on) bandwidth for voice or data traffic. Select **Non Realtime VBR** (non real-time Variable Bit Rate) for connections that do not require closely controlled delay and delay variation. Select **Realtime VBR** (real-time Variable Bit Rate) for applications with bursty connections that require closely controlled delay and delay variation.
Peak Cell Rate [cells/s]	Divide the DSL line rate (bps) by 424 (the size of an ATM cell) to find the Peak Cell Rate (PCR). This is the maximum rate at which the sender can send cells. Type the PCR here.
Sustainable Cell Rate	The Sustain Cell Rate (SCR) sets the average cell rate (long-term) that can be transmitted. Type the SCR, which must be less than the PCR. Note that system default is 0 cells/sec.
Maximum Burst Size [cells]	Maximum Burst Size (MBS) refers to the maximum number of cells that can be sent at the peak rate. Type the MBS, which is less than 65535.
VIAN Click this switch to enable VLAN on this WAN interface. This field is not available if you select **ADSL over ATM** in the **Type** field and **PPPoA** or **IPoA** in the **Encapsulation** field.	
802.1p	IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Select the IEEE 802.1p priority level (from 0 to 7) to add to traffic through this connection. The greater the number, the higher the priority level.
802.1q	Type the VLAN ID number (from 0 to 4094) for traffic through this connection.
MTU (This is not available if you select **ADSL over ATM** in the **Type** field and **PPPoA** or **IPoA** in the **Encapsulation** field.)	
MTU	Enter the MTU (Maximum Transfer Unit) size for traffic through this connection.
IP Address (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
Obtain an IP Address Automatically	A static IP address is a fixed IP that your ISP gives you. A dynamic IP address is not fixed; the ISP assigns you a different one each time you connect to the Internet. Select this if you have a dynamic IP address.
Static IP Address	Select this option If the ISP assigned a fixed IP address.
IP Address	Enter the static IP address provided by your ISP.
Subnet Mask	Enter the subnet mask provided by your ISP. This is available only when you set the **Encapsulation** to **IPoE** or **IPoA**.
Gateway IP Address	Enter the gateway IP address provided by your ISP. This is available only when you set the **Encapsulation** to **IPoE**.
DNS Server (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
Obtain DNS Info Automatically	Select **Obtain DNS Info Automatically** if you want the Zyxel Device to use the DNS server addresses assigned by your ISP.
Use Following Static DNS Address	Select **Use Following Static DNS Address** if you want the Zyxel Device to use the DNS server addresses you configure manually.

Table 52 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
Primary DNS Server	Enter the first DNS server address assigned by the ISP.
Secondary DNS Server	Enter the second DNS server address assigned by the ISP.
Routing Feature (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
NAT	Click this switch to activate NAT on this connection.
IGMP Proxy	Internet Group Multicast Protocol (IGMP) is a network-layer protocol used to establish membership in a multicast group – it is not used to carry user data. Click this switch to have the Zyxel Device act as an IGMP proxy on this connection. This allows the Zyxel Device to get subscribing information and maintain a joined member list for each multicast group. It can reduce multicast traffic significantly.
Apply as Default Gateway	Click this switch to have the Zyxel Device use this WAN interface of this connection as the system default gateway.
Fullcone NAT	Click this switch to enable fullcone NAT on this WAN connection. This field is available only when you activate **NAT**. In fullcone NAT, the Zyxel Device maps all outgoing packets from an internal IP address and port to a single IP address and port on the external network. The Zyxel Device also maps packets coming to that external IP address and port to the internal IP address and port.
6RD The 6RD (IPv6 rapid deployment) fields display when you set the **IPv6/IPv4 Mode** field to **IPv4 Only**. See IPv6 Rapid Deployment on page 218 for more information. Click this switch to tunnel IPv6 traffic from the local network through the ISP's IPv4 network.	
Automatically configured by DHCPC	The **Automatically configured by DHCPC** option is configurable only when you set the method of encapsulation to **IPoE**.
Manually Configured	Select **Manually Configured** if you have the IPv4 address of the relay server. Otherwise, select **Automatically configured by DHCPC** to have the Zyxel Device detect it automatically through DHCP.
Service Provider IPv6 Prefix	Enter an IPv6 prefix for tunneling IPv6 traffic to the ISP's border relay router and connecting to the native IPv6 Internet.
IPv4 Mask Length	Enter the subnet mask number (1 – 32) for the IPv4 network.
Border Relay IPv4 Address	When you select **Manually Configured**, specify the relay server's IPv4 address in this field.
DHCPC Options (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field and **IPoE** in the **Encapsulation** field.) Note: The available DHCP options may differ by model.	
Request Options	Select **Option 42** to have the Zyxel Device get NTP time server information from DHCP packets sent from the DHCP server. Select **Option 43** to have the Zyxel Device get vendor specific information from DHCP packets sent from the DHCP server. Select **Option 120** to have the Zyxel Device get static route information from DHCP packets sent from the DHCP server. Select **Option 121** to have the Zyxel Device get SIP server information from DHCP packets sent from the DHCP server.
Sent Options	

Table 52 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
option 12	To identify the Zyxel Device to the DHCP server, select this to automatically add the hostname of the Zyxel Device in the DHCP discovery packets that go to the DHCP server.
option 60	Select this and enter the device identity you want the Zyxel Device to add in the DHCP discovery packets that go to the DHCP server.
Vendor ID	Enter the Vendor Class Identifier, such as the type of the hardware or firmware.
option 61	Select this and enter any string that identifies the device.
IAID	Enter the Identity Association Identifier (IAID) of the device, for example, the WAN connection index number.
DUID	Enter the hardware type, a time value and the MAC address of the device.
option 125	Select this to have the Zyxel Device automatically generate and add vendor specific parameters in the DHCP discovery packets that go to the DHCP server.
IPv6 Address (This is available only when you select **IPv4 IPv6 DualStack** or **IPv6 Only** in the **IPv4/IPv6 Mode** field.)	
Obtain an IPv6 Address Automatically	Select **Obtain an IPv6 Address Automatically** if you want to have the Zyxel Device use the IPv6 prefix from the connected router's Router Advertisement (RA) to generate an IPv6 address.
Static IPv6 Address	Select **Static IPv6 Address** if you have a fixed IPv6 address assigned by your ISP. When you select this, the following fields appear.
IPv6 Address	Enter an IPv6 IP address that your ISP gave to you for this WAN interface.
Prefix Length	Enter the address prefix length to specify how many most significant bits in an IPv6 address compose the network address.
IPv6 Default Gateway	Enter the IP address of the next-hop gateway. The gateway is a router or switch on the same segment as your Zyxel Device's interfaces. The gateway helps forward packets to their destinations.
IPv6 DNS Server (This is available only when you select **IPv4 IPv6 DualStack** or **IPv6 Only** in the **IPv4/IPv6 Mode** field. Configure the IPv6 DNS server in the following section.)	
Obtain IPv6 DNS Info Automatically	Select **Obtain IPv6 DNS Info Automatically** to have the Zyxel Device get the IPv6 DNS server addresses from the ISP automatically.
Use Following Static IPv6 DNS Address	Select **Use Following Static IPv6 DNS Address** to have the Zyxel Device use the IPv6 DNS server addresses you configure manually.
Primary DNS Server	Enter the first IPv6 DNS server address assigned by the ISP.
Secondary DNS Server	Enter the second IPv6 DNS server address assigned by the ISP.
IPv6 Routing Feature (This is available only when you select **IPv4 IPv6 DualStack** or **IPv6 Only** in the **IPv4/IPv6 Mode** field. You can enable IPv6 routing features in the following section.)	
MLD Proxy Enable	Select this checkbox to have the Zyxel Device act as an MLD proxy on this connection. This allows the Zyxel Device to get subscription information and maintain a joined member list for each multicast group. It can reduce multicast traffic significantly.
Apply as Default Gateway	Select this option to have the Zyxel Device use the WAN interface of this connection as the system default gateway.
DS-Lite	This is available only when you select **IPv6 Only** in the **IPv4/IPv6 Mode** field. Enable Dual Stack Lite to let local computers use IPv4 through an ISP's IPv6 network. See Dual Stack Lite on page 218 for more information. Click this switch to enable DS-Lite to let local computers use IPv4 through an ISP's IPv6 network.
Automatically configured by DHCPC	Select this to have the Zyxel Device detect the relay server automatically through DHCP.

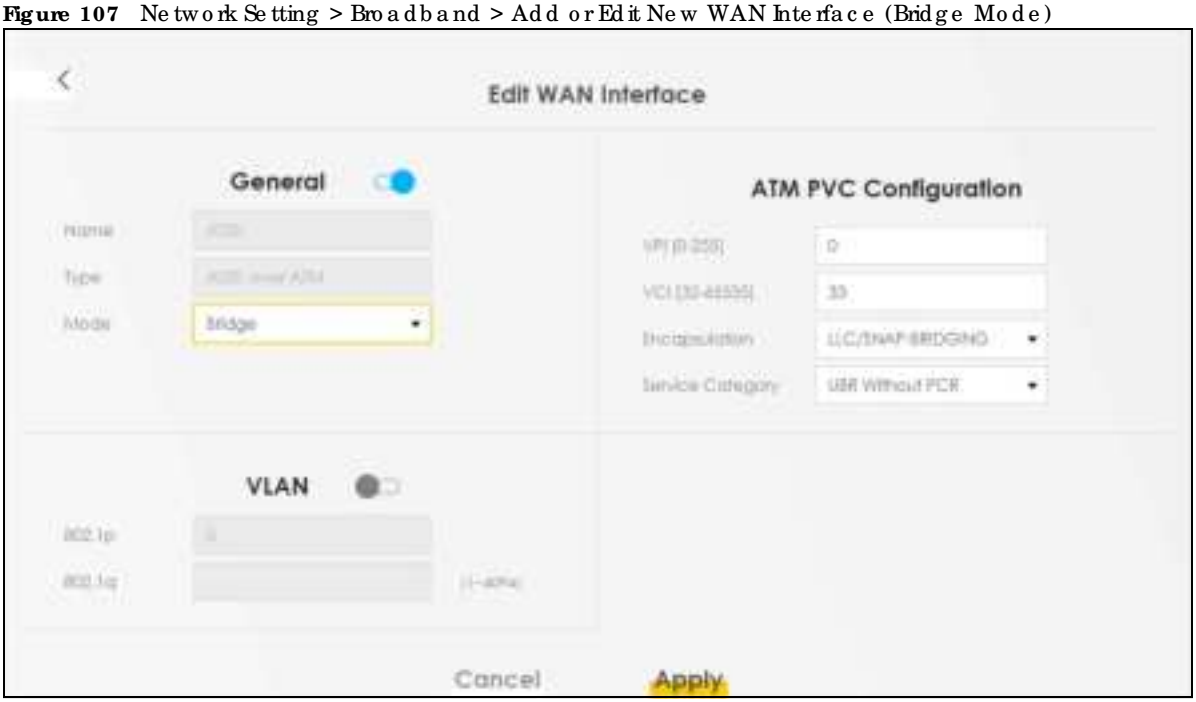
Table 52 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
Manually Configured	Select **Manually Configured** if you have the IPv6 address of the relay server. Otherwise, select **Automatically configured by DHCPC** to have the Zyxel Device detect it automatically through DHCP.
DS-Lite Relay Server IP	Specify the transition router's IPv6 address.
DHCPv6 Option (This is available only when you select **IPv6 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
IPv6 Address From DHCPv6 Server	Click the switch to let the Zyxel Device send DHCP requests to the DHCPv6 server to obtain an IPv6 address.
Other Information From DHCPv6 Server	Click the switch to have the Zyxel Device get other information, such as DNS information, from DHCPv6 packets sent from the DHCPv6 server. This will be enabled if **IPv6 Address From DHCPv6 Server** is enabled.
IPv6 MAP	This is available when you edit an IPv6 WAN interface. Slide the switch to the right to create an IPv6 map domain.
Transport Mode	Select **MAP-T** (Translation) or **MAP-E** (Encapsulation) based on the ISP deployment.
Setting Mode	Select **DHCPS46** or **Manual** to configure the following fields.
Note: The following Prefix/Address fields are used for the address mapping rule of MAP-T or MAP-E.	
BR IPv6 Prefix	This is the IPv6 network address/prefix assigned to the BR, including the prefix length.
Rule IPv6 Prefix	This is the IPv6 network prefix, including the prefix length.
Rule IPv4 Prefix	This is the IPv4 network prefix, including the prefix length.
Note: The following PSID fields are used for the port mapping rule of MAP-T or MAP-E.	
PSID Offset	The Port Set Identifier (PSID) offset specifies the excluded port range. The default **PSID Offset** is 6; port 0~1023 will be reserved for the system to use.
PSID Length	This specifies the number of sharing ratio. When **PSID Length** is set to 8, the ports will be separated and assigned for 2^8 MAP CEs to use.
PSID	A Port Set ID (**PSID**) identifies a set of ports assigned to a CE for mapping. **PSID** should be unique for each CE sharing the IPv4 address.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

Bridge Mode

Click the **Add new WAN Interface** in the **Network Setting > Broadband** screen or the **Edit** icon next to the connection you want to configure. The following example screen displays when you select **Bridge** mode.

Figure 107 Network Setting > Broadband > Add or Edit New WAN Interface (Bridge Mode)



The following table describes the fields in this screen.

Table 53 Network Setting > Broadband > Add/Edit New WAN Interface (Bridge Mode)

LABEL	DESCRIPTION
General Click this switch to enable the WAN interface.	
Name	Enter a service name of the connection. You can use up to 15 alphanumeric (0-9, a-z, A-Z) and special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. This field is read-only is you are editing the WAN interface.
Type	Select **VDSL over PTM**, **ADSL over ATM** or **Ethernet** as the WAN interface type. This field is read-only if you are editing the WAN interface.
Mode	Select **Bridge** when your ISP provides you more than one IP address and you want the connected computers to get individual IP address from ISP's DHCP server directly. If you select **Bridge**, you cannot use routing functions, such as QoS, Firewall, DHCP server and NAT on traffic from the selected LAN ports.
VLAN Click this switch to enable VLAN on this WAN interface.	
802.1p	IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Select the IEEE 802.1p priority level (from 0 to 7) to add to traffic through this connection. The greater the number, the higher the priority level.
802.1q	Type the VLAN ID number (from 0 to 4094) for traffic through this connection.
MTU	
MTU	Enter the MTU (Maximum Transfer Unit) size for traffic through this connection.
ATM PVC Configuration (This is available only when you select **ADSL over ATM** in the **Type** field.)	
VPI [0–255]	The valid range for the VPI is 0 to 255. Enter the VPI assigned to you.

Table 53 Network Setting > Broadband > Add/Edit New WAN Interface (Bridge Mode) (continued)

LABEL	DESCRIPTION
VCI[32–65535]	The valid range for the VCI is 32 to 65535 (0 to 31 is reserved for local management of ATM traffic). Enter the VCI assigned to you.
Encapsulation	Select the method of multiplexing used by your ISP from the drop-down list box. Choices are: • **LLC/SNAP-BRIDGING:** In LCC encapsulation, bridged PDUs are encapsulated by identifying the type of the bridged media in the SNAP header. • **VC/MUX:** In VC multiplexing, each protocol is carried on a single ATM virtual circuit (VC). To transport multiple protocols, the Zyxel Device needs separate VCs. There is a binding between a VC and the type of the network protocol carried on the VC. This reduces payload overhead since there is no need to carry protocol information in each Protocol Data Unit (PDU) payload.
Service Category	Select **UBR Without PCR** for applications that are non-time sensitive, such as email. Select **CBR** (Continuous Bit Rate) to specify fixed (always-on) bandwidth for voice or data traffic. Select **Non Realtime VBR** (non real-time Variable Bit Rate) for connections that do not require closely controlled delay and delay variation. Select **Realtime VBR** (real-time Variable Bit Rate) for applications with bursty connections that require closely controlled delay and delay variation.
Peak Cell Rate [cells/s]	Divide the DSL line rate (bps) by 424 (the size of an ATM cell) to find the Peak Cell Rate (PCR). This is the maximum rate at which the sender can send cells. Enter the PCR here. This is not available when you set the **Service Category** to **UBR Without PCR**.
Sustainable Cell Rate	The Sustain Cell Rate (SCR) sets the average cell rate (long-term) that can be transmitted. Enter the SCR, which must be less than the PCR. Note that system default is 0 cells/sec. This is not available when you set the **Service Category** to **UBR Without PCR** or **CBR**.
Maximum Burst Size [cells]	Maximum Burst Size (MBS) refers to the maximum number of cells that can be sent at the peak rate. Enter the MBS, which is less than 65535. This is not available when you set the **Service Category** to **UBR Without PCR** or **CBR**.
Cancel	Click **Cancel** to exit this screen without saving any changes.
Apply	Click **Apply** to save your changes.

8.3 Broadband Settings for Ethernet, AON and PON Routers

Use this screen to change your Zyxel Device's Internet access settings. The summary table shows you the configured WAN services (connections) on the Zyxel Device. Use information provided by your ISP to configure WAN settings.

Note: The differences of the broadband screens between Ethernet, AON and PON routers are the type of connections available.

Click **Network Setting > Broadband** to access this screen.

Figure 108 Network Setting > Broadband (Ethernet Routers)

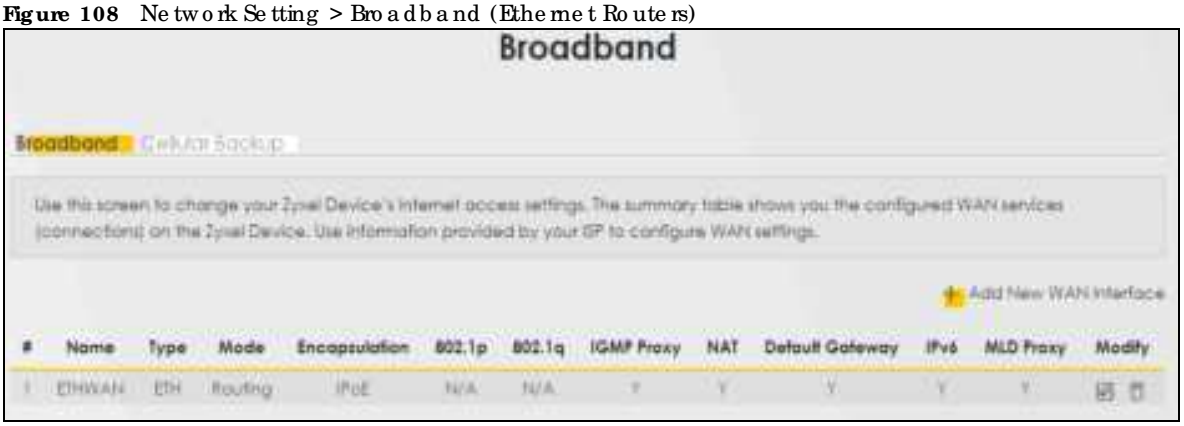
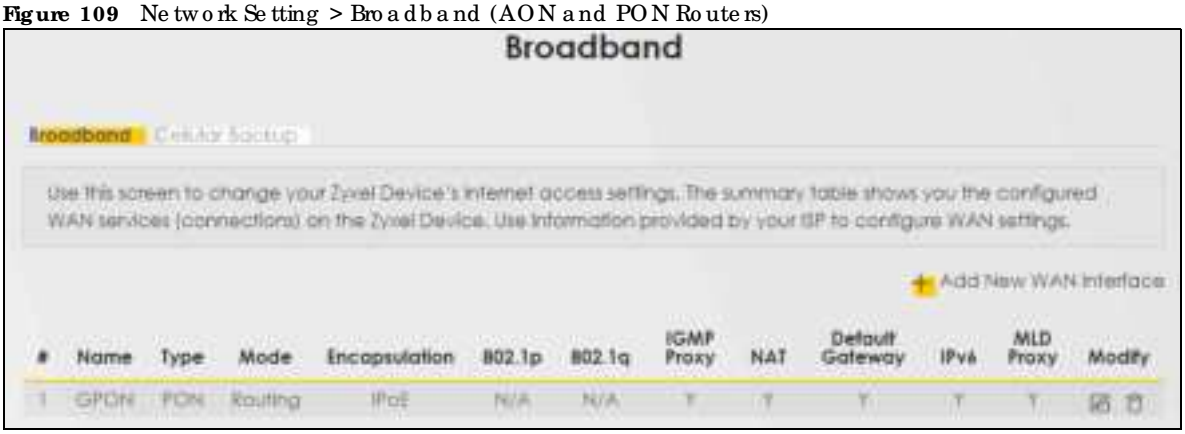


Figure 109 Network Setting > Broadband (AON and PON Routers)



The following table describes the labels in this screen.

Table 54 Network Setting > Broadband

LABEL	DESCRIPTION
Add New WAN Interface	Click this button to create a new connection.
#	This is the index number of the entry.
Name	This is the service name of the connection.
Type	This displays the type of connections available.
Mode	This shows whether the connection is in routing or bridge mode.
Encapsulation	This is the method of encapsulation used by this connection.
802.1p	This indicates the 802.1p priority level assigned to traffic sent through this connection. This displays **N/A** when there is no priority level assigned.
802.1q	This indicates the VLAN ID number assigned to traffic sent through this connection. This displays **N/A** when there is no VLAN ID number assigned.
IGMP Proxy	This shows whether the Zyxel Device act as an IGMP proxy on this connection.
NAT	This shows whether NAT is activated or not for this connection.
Default Gateway	This shows whether the Zyxel Device use the WAN interface of this connection as the system default gateway.
IPv6	This shows whether IPv6 is activated or not for this connection. IPv6 is not available when the connection uses the bridging service.

Table 54 Network Setting > Broadband (continued)

LABEL	DESCRIPTION
MLD Proxy	This shows whether Multicast Listener Discovery (MLD) is activated or not for this connection. MLD is not available when the connection uses the bridging service.
Modify	Click the **Edit** icon to configure the WAN connection. Click the **Delete** icon to remove the WAN connection.

8.3.1 Add or Edit Internet Connection

Click **Add New WAN Interface** in the **Broadband** screen or the Edit icon next to an existing WAN interface to open the following screen. Use this screen to configure a WAN connection. The screen varies depending on the mode, encapsulation, and IPv6 or IPv4 mode you select.

Routing Mode

Use **Routing** mode if your ISP give you one IP address only and you want multiple computers to share an Internet account.

The following example screen displays when you select the **Routing** mode and **PPPoE** encapsulation. The screen varies when you select other encapsulation and IPv6 or IPv4 mode.

Figure 110 Network Setting > Broadband > Add or Edit New WAN Interface (Ethernet Routers Routing Mode)

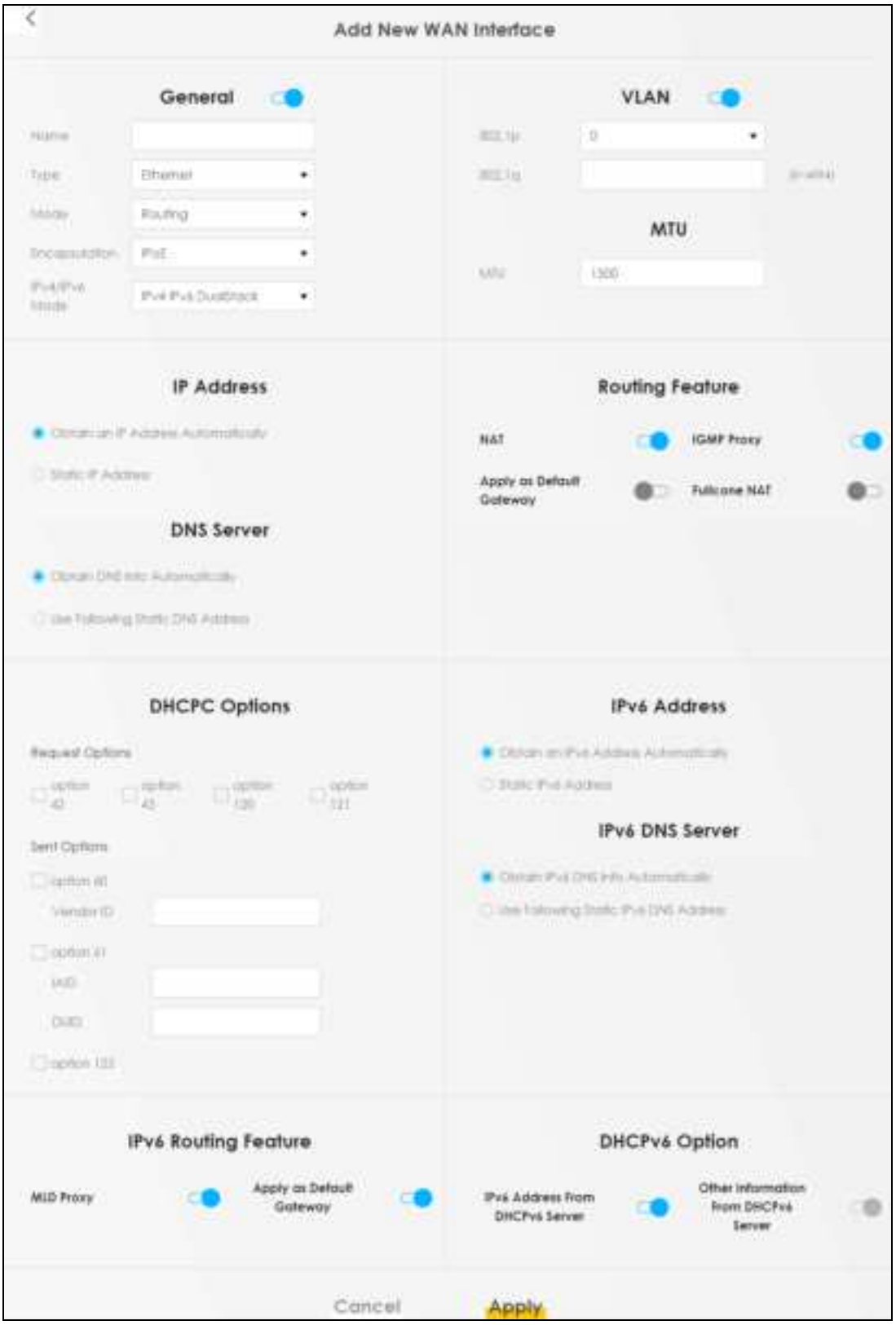
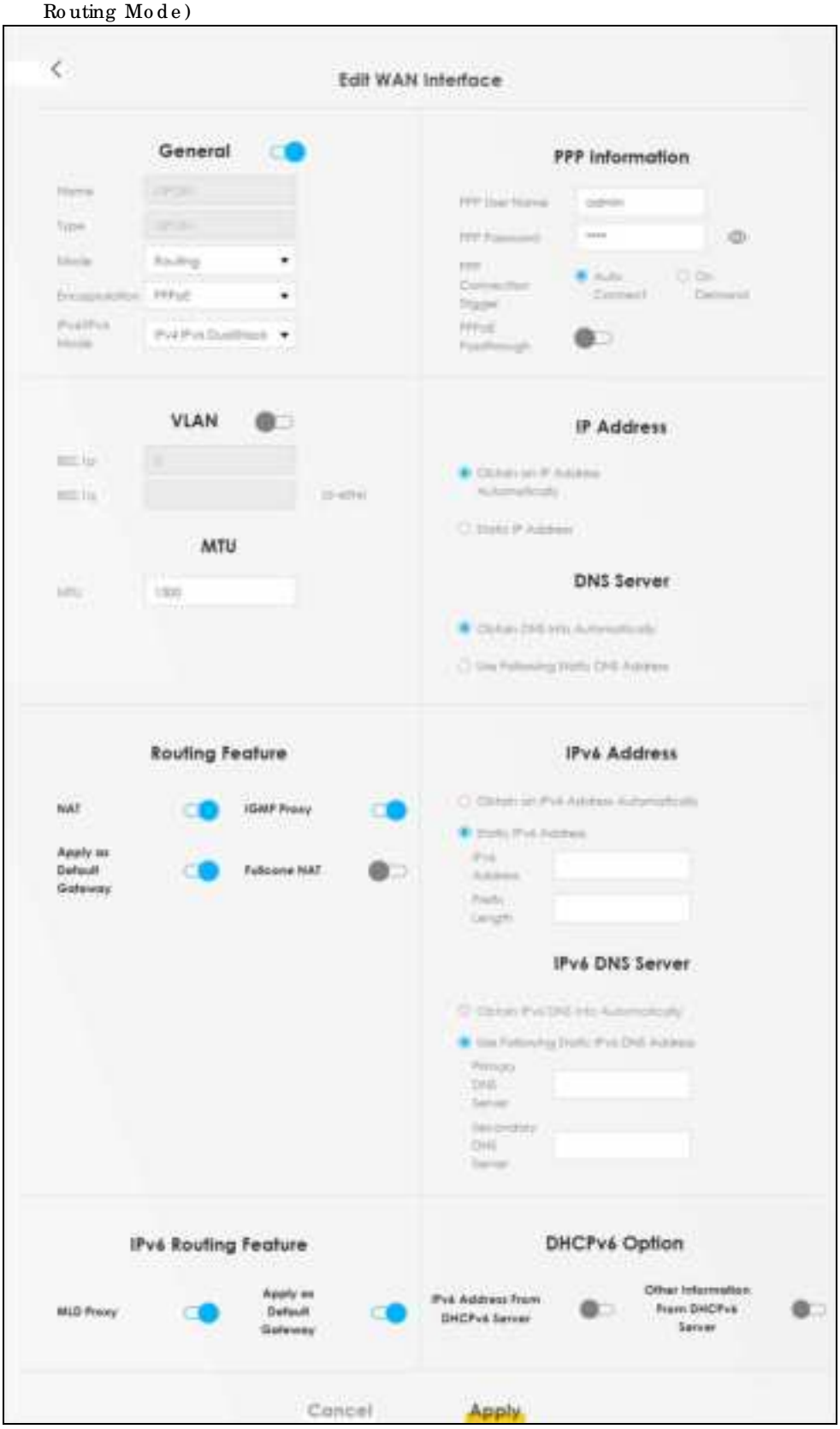


Figure 111 Network Setting > Broadband > Add or Edit New WAN Interface (AON and PON Routers Routing Mode)



The following table describes the labels in this screen.

Table 55 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode)

LABEL	DESCRIPTION
General	Click this switch to enable the WAN interface.
Name	Specify a descriptive name for this connection. You can use up to 15 alphanumeric (0-9, a-z, A-Z) and special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. This field is read-only is you are editing the WAN interface.
Type	This field shows **Ethernet** and indicates an Ethernet connection. This field is read-only is you are editing the WAN interface.
Mode	Select **Routing** if your ISP give you one IP address only and you want multiple computers to share an Internet account.
Encapsulation	Select the method of encapsulation used by your ISP from the drop-down list box. This option is available only when you select **Routing** in the **Mode** field. The choices are **PPPoE** and **IPoE**.
IPv4/IPv6 Mode	Select **IPv4 Only** if you want the Zyxel Device to run IPv4 only. Select **IPv4 IPv6 DualStack** to allow the Zyxel Device to run IPv4 and IPv6 at the same time. Select **IPv6 Only** if you want the Zyxel Device to run IPv6 only.
PPP Information (This is available only when you select **PPPoE** in the **Encapsulation** field.)	
PPP User Name	Enter the username exactly as your ISP assigned. If assigned a name in the form user@domain where domain identifies a service name, then enter both components exactly as given.
PPP Password	Enter the password associated with the username above. Select **password unmask** to show your entered password in plain text.
PPP Connection Trigger	Select when to have the Zyxel Device establish the PPP connection. **Auto Connect** – select this to not let the connection time out. **On Demand** – select this to automatically bring up the connection when the Zyxel Device receives packets destined for the Internet.
Idle Timeout	This value specifies the time in minutes that elapses before the router automatically disconnects from the PPPoE server. This field is only available if you select **On Demand** in the **PPP Connection Trigger** field.
PPPoE Passthrough	This field is available when you select **PPPoE** encapsulation. In addition to the Zyxel Device's built-in PPPoE client, you can enable PPPoE pass through to allow up to ten hosts on the LAN to use PPPoE client software on their computers to connect to the ISP through the Zyxel Device. Each host can have a separate account and a public WAN IP address. PPPoE pass through is an alternative to NAT for application where NAT is not appropriate. Disable PPPoE pass through if you do not need to allow hosts on the LAN to use PPPoE client software on their computers to connect to the ISP.
VLAN	Click this switch to enable or disable VLAN on this WAN interface. When the switch goes to the right, the function is enabled. Otherwise, it is not.
802.1p	IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Select the IEEE 802.1p priority level (from 0 to 7) to add to traffic through this connection. The greater the number, the higher the priority level.
802.1q	Type the VLAN ID number (from 0 to 4094) for traffic through this connection.
MTU	

Table 55 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
MTU	Enter the MTU (Maximum Transfer Unit) size for traffic through this connection.
IP Address (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
Obtain an IP Address Automatically	A static IP address is a fixed IP that your ISP gives you. A dynamic IP address is not fixed; the ISP assigns you a different one each time you connect to the Internet. Select this if you have a dynamic IP address.
Static IP Address	Select this option If the ISP assigned a fixed IP address.
IP Address	Enter the static IP address provided by your ISP.
Subnet Mask	Enter the subnet mask provided by your ISP. This is available only when you set the **Encapsulation** to **IPoE**.
Gateway IP Address	Enter the gateway IP address provided by your ISP. This is available only when you set the **Encapsulation** to **IPoE**.
DNS Server (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
	Select **Obtain DNS Info Automically** if you want the Zyxel Device to use the DNS server addresses assigned by your ISP. Select **Use Following Static DNS Address** if you want the Zyxel Device to use the DNS server addresses you configure manually.
Primary DNS Server	Enter the first DNS server address assigned by the ISP.
Secondary DNS Server	Enter the second DNS server address assigned by the ISP.
Routing Feature (This is available only when you select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
NAT	Click this switch to activate or deactivate NAT on this connection. When the switch goes to the right, the function is enabled. Otherwise, it is not.
IGMP Proxy	Internet Group Multicast Protocol (IGMP) is a network-layer protocol used to establish membership in a Multicast group - it is not used to carry user data. Click this switch to have the Zyxel Device act as an IGMP proxy on this connection. When the switch goes to the right, the function is enabled. Otherwise, it is not. This allows the Zyxel Device to get subscribing information and maintain a joined member list for each multicast group. It can reduce multicast traffic significantly.
Apply as Default Gateway	Click this switch to have the Zyxel Device use the WAN interface of this connection as the system default gateway. When the switch goes to the right, the function is enabled. Otherwise, it is not.
Fullcone NAT Enable	Click this switch to enable or disable full cone NAT on this connection. When the switch goes to the right, the function is enabled. Otherwise, it is not. This field is available only when you activate **NAT**. In full cone NAT, the Zyxel Device maps all outgoing packets from an internal IP address and port to a single IP address and port on the external network. The Zyxel Device also maps packets coming to that external IP address and port to the internal IP address and port.
DHCPC Options (This is available only when you set the **Encapsulation** to **IPoE** and select **IPv4 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.) Note: The available DHCP options may differ by model.	

Table 55 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
Request Options	Select **Option 42** to have the Zyxel Device get NTP time server information from DHCP packets sent from the DHCP server. Select **Option 43** to have the Zyxel Device get vendor specific information from DHCP packets sent from the DHCP server. Select **Option 120** to have the Zyxel Device get static route information from DHCP packets sent from the DHCP server. Select **Option 121** to have the Zyxel Device get SIP server information from DHCP packets sent from the DHCP server.
Sent Options	
option 60	Select this and enter the device identity you want the Zyxel Device to add in the DHCP discovery packets that go to the DHCP server.
Vendor ID	Enter the Vendor Class Identifier, such as the type of the hardware or firmware.
option 61	Select this and enter any string that identifies the device.
IAID	Enter the Identity Association Identifier (IAID) of the device, for example, the WAN connection index number.
DUID	Enter the hardware type, a time value and the MAC address of the device.
option 125	Select this to have the Zyxel Device automatically generate and add vendor specific parameters in the DHCP discovery packets that go to the DHCP server.
IPv6 Address (This is available only when you select **IPv4 IPv6 DualStack** or **IPv6 Only** in the **IPv4/IPv6 Mode** field.)	
Obtain an IPv6 Address Automatically	Select **Obtain an IPv6 Address Automatically** if you want to have the Zyxel Device use the IPv6 prefix from the connected router's Router Advertisement (RA) to generate an IPv6 address.
Static IPv6 Address	Select **Static IPv6 Address** if you have a fixed IPv6 address assigned by your ISP. When you select this, the following fields appear.
IPv6 Address	Enter an IPv6 IP address that your ISP gave to you for this WAN interface.
Prefix Length	Enter the address prefix length to specify how many most significant bits in an IPv6 address compose the network address.
IPv6 Default Gateway	Enter the IP address of the next-hop gateway. The gateway is a router or switch on the same segment as your Zyxel Device's interfaces. The gateway helps forward packets to their destinations.
IPv6 DNS Server (This is available only when you select **IPv4 IPv6 DualStack** or **IPv6 Only** in the **IPv4/IPv6 Mode** field. Configure the IPv6 DNS server in the following section.)	
Obtain IPv6 DNS Info Automatically	Select **Obtain IPv6 DNS Info Automatically** to have the Zyxel Device get the IPv6 DNS server addresses from the ISP automatically.
Use Following Static IPv6 DNS Address	Select **Use Following Static IPv6 DNS Address** to have the Zyxel Device use the IPv6 DNS server addresses you configure manually.
Primary DNS Server	Enter the first IPv6 DNS server address assigned by the ISP.
Secondary DNS Server	Enter the second IPv6 DNS server address assigned by the ISP.
IPv6 Routing Feature (This is available only when you select **IPv4 IPv6 DualStack** or **IPv6 Only** in the **IPv4/IPv6 Mode** field. You can enable IPv6 routing features in the following section.)	
MLD Proxy Enable	Select this checkbox to have the Zyxel Device act as an MLD proxy on this connection. This allows the Zyxel Device to get subscription information and maintain a joined member list for each multicast group. It can reduce multicast traffic significantly.
Apply as Default Gateway	Select this option to have the Zyxel Device use the WAN interface of this connection as the system default gateway.

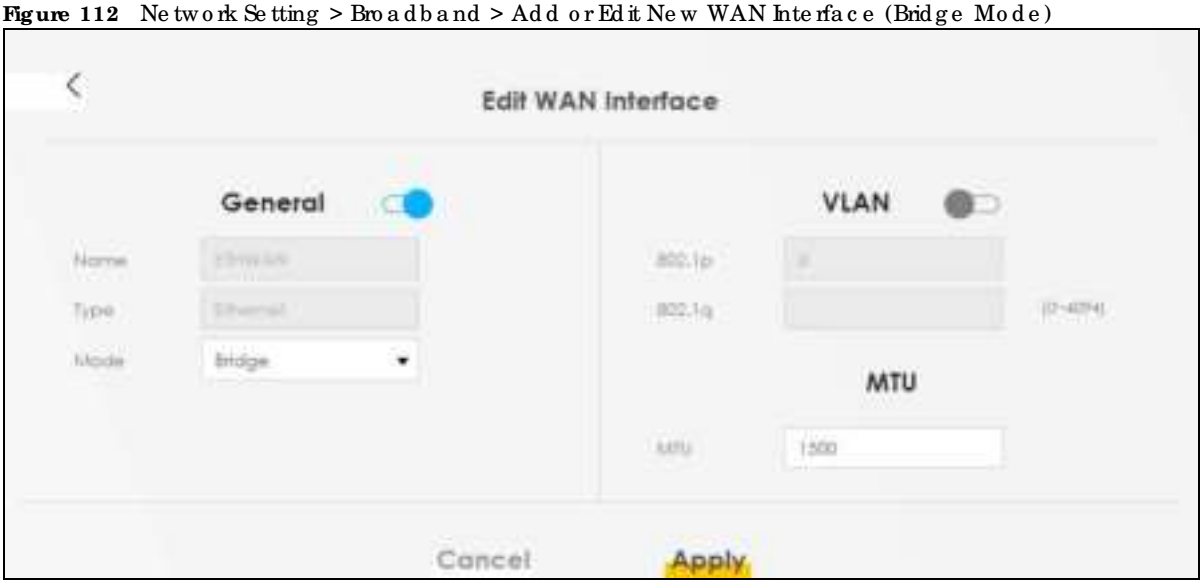
Table 55 Network Setting > Broadband > Add or Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
DS-Lite	This is available only when you select **IPv6 Only** in the **IPv4/IPv6 Mode** field. Enable DualStack Lite to let local computers use IPv4 through an ISP's IPv6 network. See DualStack Lite on page 218 for more information. Click this switch to enable DS-Lite to let local computers use IPv4 through an ISP's IPv6 network.
DS-Lite Relay Server IP	Specify the transition router's IPv6 address.
6RD The 6RD (IPv6 rapid deployment) fields display when you set the **IPv6/IPv4 Mode** field to **IPv4 Only**. See IPv6 Rapid Deployment on page 218 for more information. Click this switch to tunnel IPv6 traffic from the local network through the ISP's IPv4 network.	
	Select **Manually Configured** if you have the IPv4 address of the relay server. Otherwise, select **Automatically configured by DHCPC** to have the Zyxel Device detect it automatically through DHCP. The **Automatically configured by DHCPC** option is configurable only when you set the method of encapsulation to **IPoE**.
Service Provider IPv6 Prefix	Enter an IPv6 prefix for tunneling IPv6 traffic to the ISP's border relay router and connecting to the native IPv6 Internet.
IPv4 Mask Length	Enter the subnet mask number (1 – 32) for the IPv4 network.
Border Relay IPv4 Address	When you select **Manually Configured**, specify the relay server's IPv4 address in this field.
DHCPv6 Option (This is available only when you select **IPv6 Only** or **IPv4 IPv6 DualStack** in the **IPv4/IPv6 Mode** field.)	
IPv6 Address From DHCPv6 Server	Click the switch (to the right) to let the Zyxel Device send DHCP requests to the DHCPv6 server to obtain an IPv6 address.
Other Information From DHCPv6 Server	Click the switch (to the right) to have the Zyxel Device get other information, such as DNS information, from DHCPv6 packets sent from the DHCPv6 server. This will be enabled if **IPv6 Address From DHCPv6 Server** is enabled.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

Bridge Mode

Click the **Add new WAN Interface** in the **Network Setting > Broadband** screen or the **Edit** icon next to the connection you want to configure. The following example screen displays when you select **Bridge** mode.

Figure 112 Network Setting > Broadband > Add or Edit New WAN Interface (Bridge Mode)



The following table describes the fields in this screen.

Table 56 Network Setting > Broadband > Add or Edit New WAN Interface (Bridge Mode)

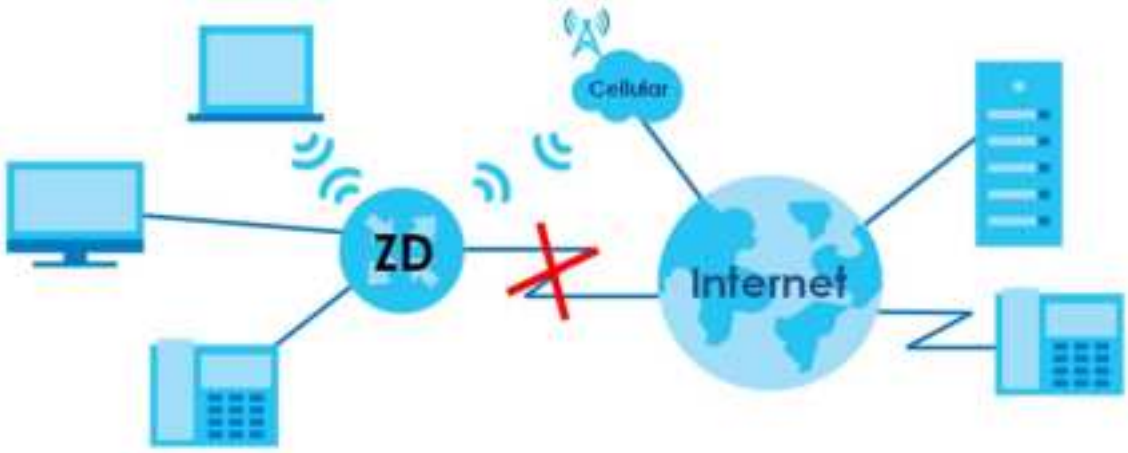
LABEL	DESCRIPTION
General	Click this switch to enable the interface.
Name	Enter a service name of the connection. You can use up to 15 alphanumeric (0-9, a-z, A-Z) and special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. This field is read-only is you are editing the WAN interface.
Type	This field shows **Ethernet** and indicates an Ethernet connection. This field is read-only is you are editing the WAN interface.
Mode	Select **Bridge** when your ISP provides you more than one IP address and you want the connected computers to get individual IP address from ISP's DHCP server directly. If you select **Bridge**, you cannot use routing functions, such as QoS, Firewall, DHCP server and NAT on traffic from the selected LAN ports.
VLAN	Click this switch to enable VLAN on this WAN interface.
802.1p	IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Select the IEEE 802.1p priority level (from 0 to 7) to add to traffic through this connection. The greater the number, the higher the priority level.
802.1q	Type the VLAN ID number (from 0 to 4094) for traffic through this connection.
MTU	
MTU	Enter the MTU (Maximum Transfer Unit) size for traffic through this connection.
Cancel	Click **Cancel** to exit this screen without saving any changes.
Apply	Click **Apply** to save your changes.

8.4 Cellular Backup

The USB port of the Zyxel Device allows you to attach a cellular dongle to wirelessly connect to a cellular network for Internet access. You can have the Zyxel Device use the cellular WAN connection as a

backup to keep you online if the primary WAN connection fails for **Consecutive Fail** times. Consult your cellular service provider to configure the settings in this screen. Disconnect the Fiber port to use the cellular dongle as your primary WAN connection, as the Zyxel Device automatically uses a wired WAN connection when available.

Figure 113 Internet Access Application: Cellular WAN



Use this screen to configure your cellular settings. Click **Network Setting > Broadband > Cellular Backup**.

The actual data rate you obtain varies depending on the cellular card you use, the signal strength to the service provider's base station, and so on.

Note: Entering a wrong PIN code three times will lock the SIM card in your cellular dongle.

Note: If you select **Drop** in the **Current Cellular Connection** field, the Zyxel Device will drop the cellular WAN connection when the **Time Budget** or **Data Budget** is reached. It may take some time for the cellular WAN connection to be disconnected when the **Time Budget** or **Data Budget** is reached.

Figure 114 Network Setting > Broadband > Cellular Backup

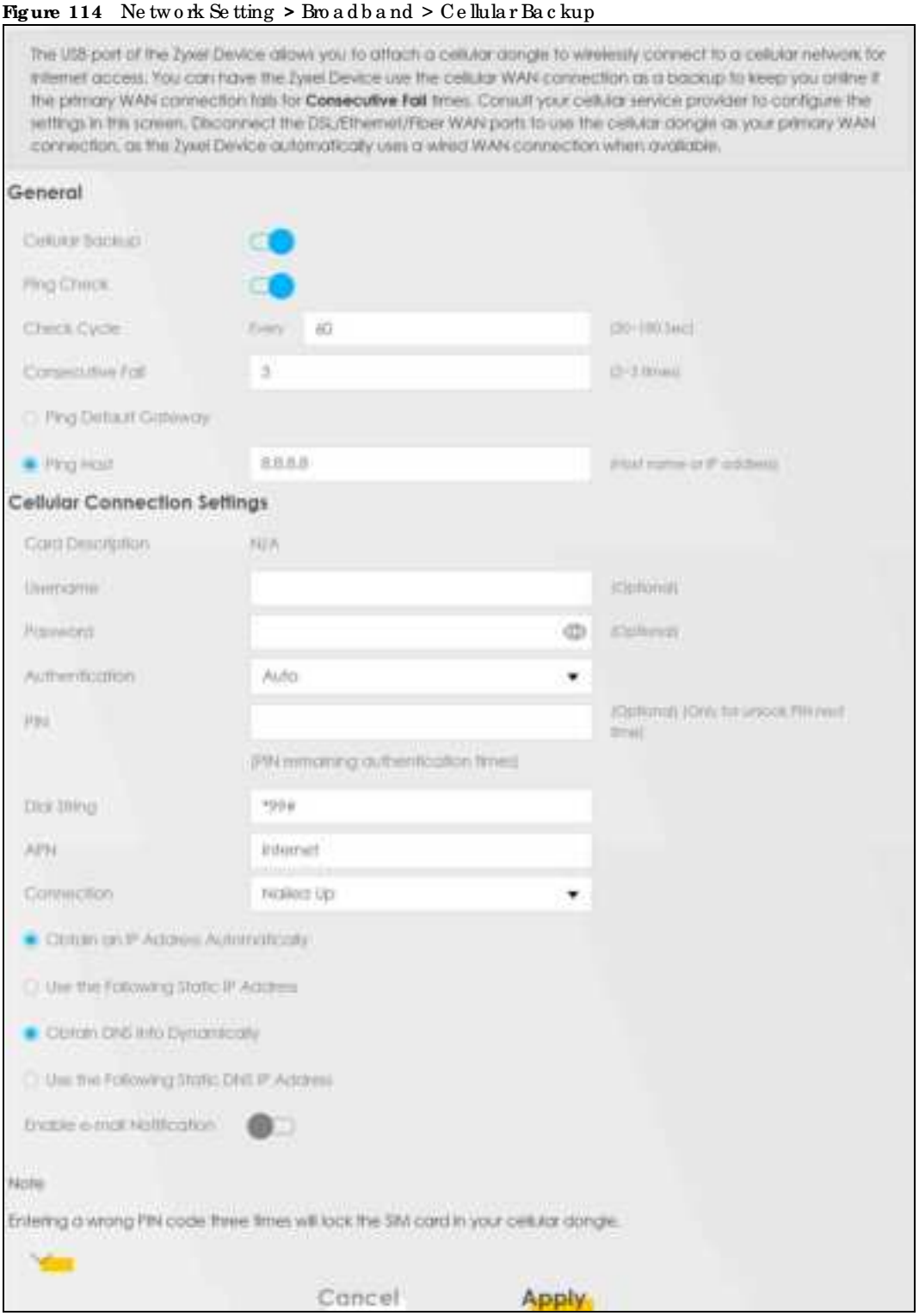
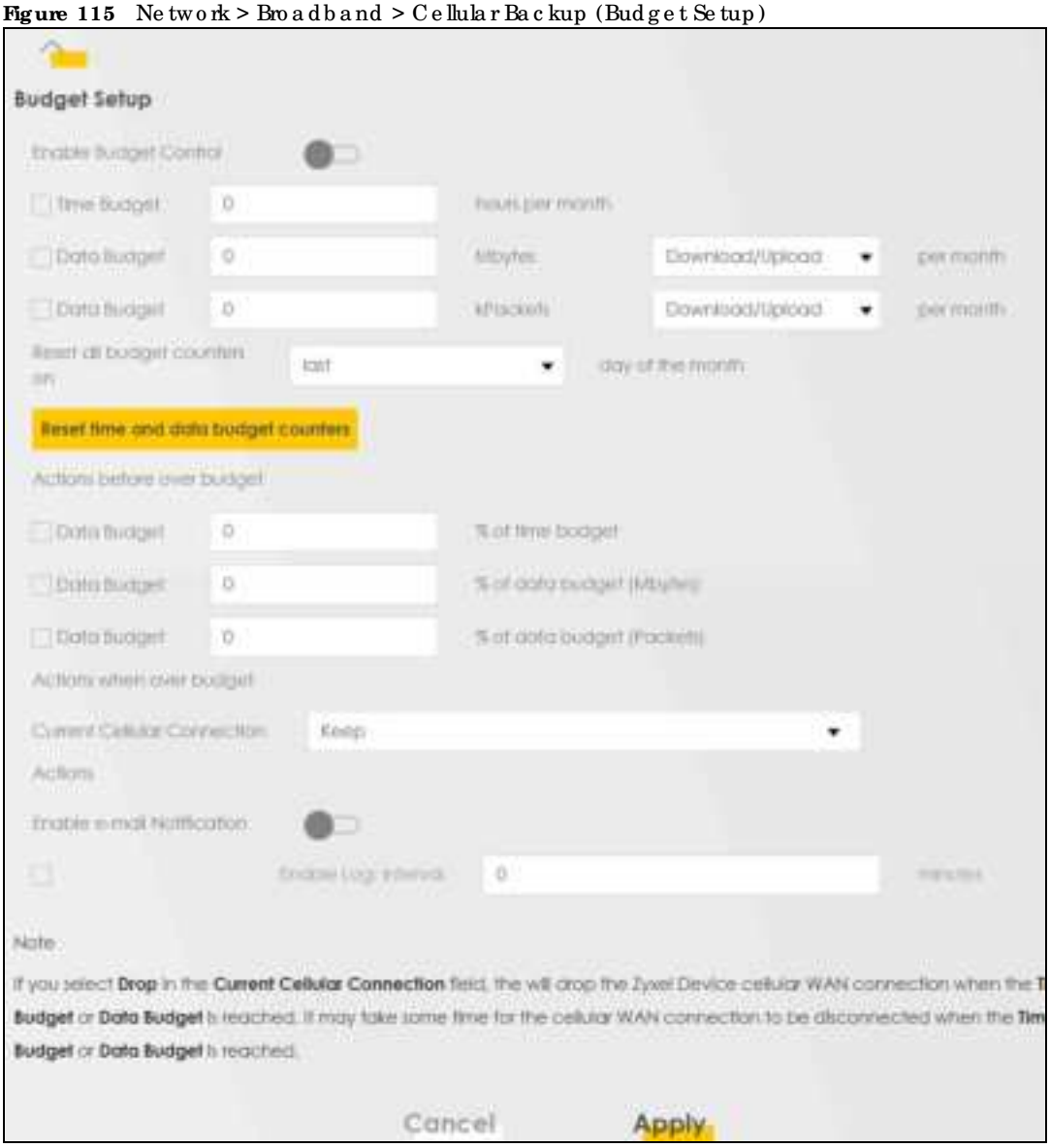


Figure 115 Network > Broadband > Cellular Backup (Budget Setup)



The following table describes the labels in this screen.

Table 57 Network Setting > Broadband > Cellular Backup

LABEL	DESCRIPTION
General	
Cellular Backup	Click this switch to have the Zyxel Device use the cellular connection as your WAN or a backup when the wired WAN connection fails.
Ping Check	Click this switch to ping check the connection status of your WAN. You can configure the frequency of the ping check and number of consecutive failures before triggering cellular backup.
Check Cycle	Enter the frequency of the ping check in this field.
Consecutive Fail	Enter how many consecutive failures are required before cellular backup is triggered.
Ping Default Gateway	Select this to have the Zyxel Device ping the WAN interface's default gateway IP address.

Table 57 Network Setting > Broadband > Cellular Backup (continued)

LABEL	DESCRIPTION
Ping Host	Select this to have the Zyxel Device ping the particular host name or IP address you typed in this field.
Cellular Connection Settings	
Card Description	This field displays the manufacturer and model name of your cellular card if you inserted one in the Zyxel Device. Otherwise, it displays **N/A**.
Username	Enter the user name (of up to 64 alphanumeric (0-9, a-z, A-Z) and special characters, including spaces) given to you by your service provider.
Password	Enter the password (of up to 64 alphanumeric (0-9, a-z, A-Z) and special characters, including spaces) associated with the user name above.
Authentication	The Zyxel Device supports PAP (Password Authentication Protocol) and CHAP (Challenge Type Handshake Authentication Protocol). In PAP, peers identify themselves with a user name and password. In CHAP, additionally to user name and password the Zyxel Device sends regular challenges to make sure an intruder has not replaced a peer. CHAP is more secure than PAP; however, PAP is available on more platforms. Select an authentication protocol (Auto, CHAP or PAP). Contact your service provider for the correct authentication type.
PIN	A PIN (Personal Identification Number) code is a key to a cellular card. Without the PIN code, you cannot use the cellular card. If your ISP enabled PIN code authentication, enter the 4-digit PIN code (0000 for example) provided by your ISP. If you enter the PIN code incorrectly, the cellular card may be blocked by your ISP and you cannot use the account to access the Internet. If your ISP disabled PIN code authentication, leave this field blank.
Dial String	Enter the phone number (dial string) used to dial up a connection to your service provider's base station. Your ISP should provide the phone number. For example, *99# is the dial string to establish a GPRS or cellular connection in Taiwan.
APN	Enter the APN (Access Point Name) provided by your service provider. Connections with different APNs may provide different services (such as Internet access or MMS (Multi-Media Messaging Service)) and charge method. You can enter up to 32 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Connection	Select **Nailed UP** if you do not want the connection to time out. Select **On Demand** if you do not want the connection up all the time and specify an idle time-out in the **Max Idle Timeout** field.
Max Idle Timeout	This value specifies the time in minutes that elapses before the Zyxel Device automatically disconnects from the ISP.
Obtain an IP Address Automatically	Select this option if your ISP did not assign you a fixed IP address.
Use the Following Static IP Address	Select this option if the ISP assigned a fixed IP address.
IP Address	Enter your WAN IP address in this field if you selected **Use the following static IP address**.
Subnet Mask	Enter the subnet mask of the IP address.
Obtain DNS Info Dynamically	Select this to have the Zyxel Device get the DNS server addresses from the ISP automatically.
Use the Following Static DNS IP Address	Select this to have the Zyxel Device use the DNS server addresses you configure manually.
Primary DNS Server	Enter the first DNS server address assigned by the ISP.

Table 57 Network Setting > Broadband > Cellular Backup (continued)

LABEL	DESCRIPTION
Secondary DNS Server	Enter the second DNS server address assigned by the ISP.
Enable e-mail Notification	Select this to enable the email notification function. The Zyxel Device will email you a notification when the cellular connection is up.
Mail Account	Select an email address you have configured in **Maintenance > E-mail Notification**. The Zyxel Device uses the corresponding mail server to send notifications. You must have configured a mail server already in the **Maintenance > E-mail Notification** screen.
Cellular Backup e-mail Title	Enter a title that you want to be in the subject line of the email notifications that the Zyxel Device sends.
Send Notification to E-mail	Notifications are sent to the email address specified in this field. If this field is left blank, notifications cannot be sent through email.
Click this to show the advanced cellular backup settings.	
Budget Setup	
Enable Budget Control	Click this switch to set a monthly limit for the user account of the installed cellular card. You can set a limit on the total traffic and/or call time. The Zyxel Device takes the actions you specified when a limit is exceeded during the month.
Time Budget	Select this and specify the amount of time (in hours) that the cellular connection can be used within one month. If you change the value after you configure and enable budget control, the Zyxel Device resets the statistics.
Data Budget (Mbytes)	Select this and specify how much downstream and/or upstream data (in Mega bytes) can be transmitted through the cellular connection within one month. Select **Download/Upload** to set a limit on the total traffic in both directions. Select **Download** to set a limit on the downstream traffic (from the ISP to the Zyxel Device). Select **Upload** to set a limit on the upstream traffic (from the Zyxel Device to the ISP). If you change the value after you configure and enable budget control, the Zyxel Device resets the statistics.
Data Budget (kPackets)	Select this and specify how much downstream and/or upstream data (in kPackets) can be transmitted through the cellular connection within one month. Select **Download/Upload** to set a limit on the total traffic in both directions. Select **Download** to set a limit on the downstream traffic (from the ISP to the Zyxel Device). Select **Upload** to set a limit on the upstream traffic (from the Zyxel Device to the ISP). If you change the value after you configure and enable budget control, the Zyxel Device resets the statistics.
Reset all budget counters on	Select the date on which the Zyxel Device resets the budget every month. Select **last** if you want the Zyxel Device to reset the budget on the last day of the month. Select **specific** and enter the number of the date you want the Zyxel Device to reset the budget.
Reset time and data budget counters	Click this button to reset the time and data budgets immediately. The count starts over with the cellular connection's full configured monthly time and data budgets. This does not affect the normal monthly budget restart; so if you configured the time and data budget counters to reset on the second day of the month and you use this button on the first, the time and data budget counters will still reset on the second.
Actions before over budget	Specify the actions the Zyxel Device takes before the time or data limit exceeds.

Table 57 Network Setting > Broadband > Cellular Backup (continued)

LABEL	DESCRIPTION
Data Budget % of time budget/data budget (Mbytes)/data budget (kPackets)	Select the checkboxes and enter a number from 1 to 99 in the percentage fields. If you change the value after you configure and enable budget control, the Zyxel Device resets the statistics.
Actions when over budget	Specify the actions the Zyxel Device takes when the time or data limit is exceeded.
Current Cellular Connection	Select **Keep** to maintain an existing cellular connection or **Drop** to disconnect it.
Actions	
Enable e-mail Notification	Click this switch to enable the email notification function. The Zyxel Device will email you a notification whenever over budget occurs.
Mail Account	Select an email address you have configured in **Maintenance > E-mail Notification**. The Zyxel Device uses the corresponding mail server to send notifications. You must have configured a mail server already in the **Maintenance > E-mail Notification** screen.
Cellular Backup e-mail Title	Enter a title that you want to be in the subject line of the email notifications that the Zyxel Device sends.
Send Notification to E-mail	Notifications are sent to the email address specified in this field. If this field is left blank, notifications cannot be sent through email.
Enable Log: Interval	Select this to and enter the **Interval** of how many minutes (1 – 9999) you want the Zyxel Device to email you.
Cancel	Click **Cancel** to discard any changes to the settings.
Apply	Click **Apply** to save your changes.

8.5 Broadband Advanced Screen

Use the **Advanced** screen to enable or disable ADSL over PTM, Annex M, DSL PhyR, and SRA (Seamless Rate Adaptation) functions. The Zyxel Device supports the PhyR retransmission scheme. PhyR is a retransmission scheme designed to provide protection against noise on the DSL line. It improves voice, video and data transmission resilience by utilizing a retransmission buffer. It also lists ITU-TG.993.2 standard VDSL profiles you can comply with.

ITU-TG.993.2 standard defines a wide range of settings for various parameters, some of which are encompassed in profiles as shown in the next table.

Note: This features is not available on all models. See Section 1.1 on page 20 for more information.

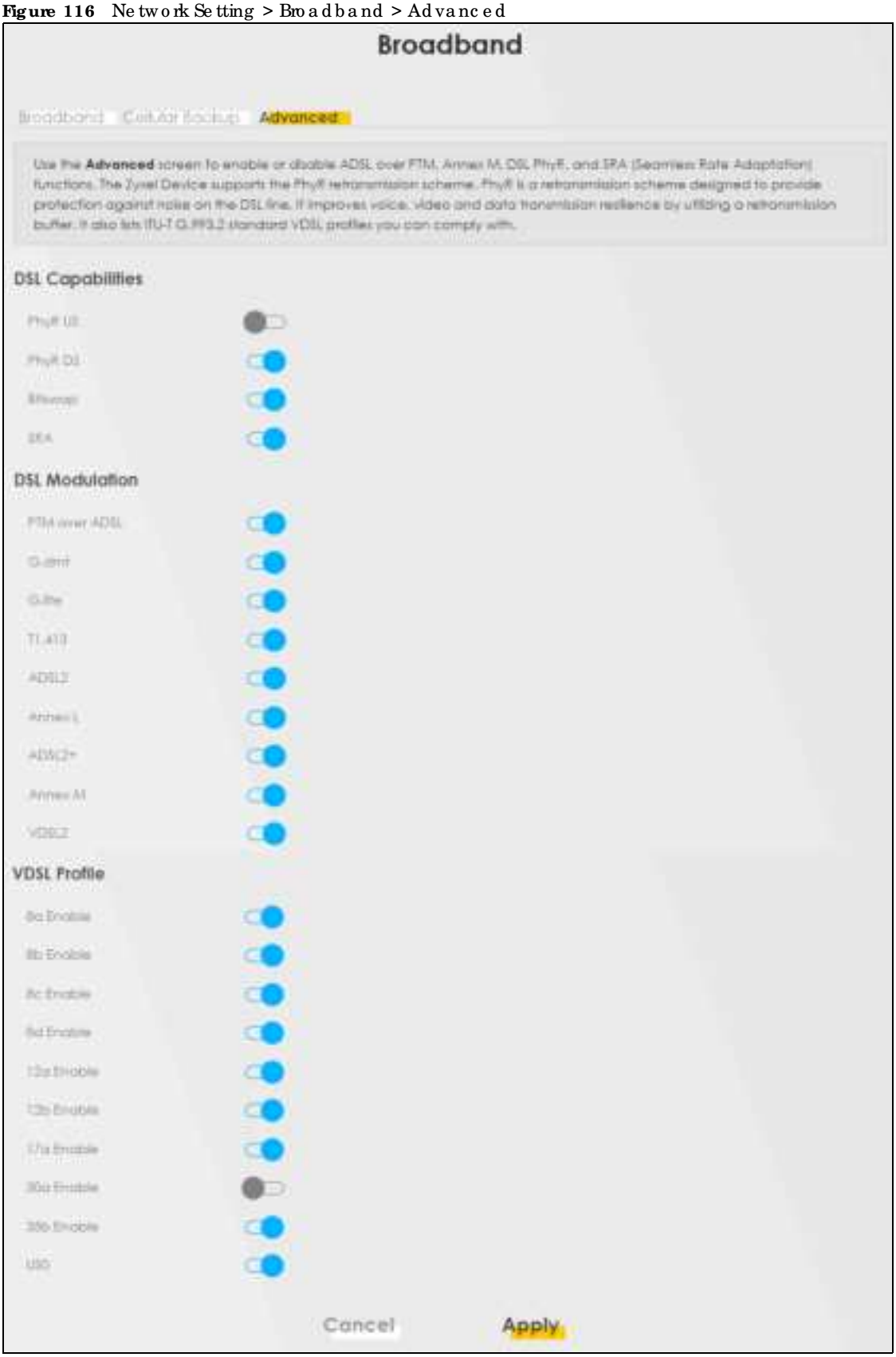
Note: If the settings in the screen are changed, the Zyxel Device will re-establish the DSL connections.

Table 58 VDSL Profiles

PROFILE	BANDWIDTH (MHZ)	NUMBER OF DOWNSTREAM CARRIERS	CARRIER BANDWIDTH (KHZ)	POWER (DBM)	MAX. DOWNSTREAM THROUGHPUT (MBIT/S)
8a	8.832	2048	4.3125	17.5	50
8b	8.832	2048	4.3125	20.5	50
8c	8.5	1972	4.3125	11.5	50
8d	8.832	2048	4.3125	14.5	50
12a	12	2783	4.3125	14.5	68
12b	12	2783	4.3125	14.5	68
17a	17.664	4096	4.3125	14.5	100
35a	30.000	3479	4.3125	14.5	100
35b	35.328	8192	4.3125	17.0	300

Click **Network Setting > Broadband > Advanced** to display the following screen.

Figure 116 Network Setting > Broadband > Advanced



The following table describes the labels in this screen.

Table 59 Network Setting > Broadband > Advanced

LABEL	DESCRIPTION
DSL Capabilities	
PhyR US	Enable or disable **PhyR US** (upstream) for upstream transmission to the WAN. PhyR US should be enabled if data being transmitted upstream is sensitive to noise. However, enabling PhyR US can decrease the US line rate. Enabling or disabling PhyR will require the CPE to retrain. For PhyR to function, the DSLAM must also support PhyR and have it enabled.
PhyR DS	Enable or disable **PhyR DS** (downstream) for downstream transmission from the WAN. PhyR DS should be enabled if data being transmitted downstream is sensitive to noise. However, enabling PhyR DS can decrease the DS line rate. Enabling or disabling PhyR will require the CPE to retrain. For PhyR to function, the DSLAM must also support PhyR and have it enabled.
PhyR US/DS	Enable or disable **PhyR US/DS** (upstream/downstream) for both upstream and downstream transmission to the WAN. PhyR US should be enabled if data being transmitted upstream is sensitive to noise. However, enabling PhyR US can decrease the US line rate. Enabling or disabling PhyR will require the CPE to retrain. For PhyR to function, the DSLAM must also support PhyR and have it enabled.
Bitswap	Select **Enable** to allow the Zyxel Device to adapt to line changes when you are using G.dmt. Bit-swapping is a way of keeping the line more stable by constantly monitoring and redistributing bits between channels.
SRA	Enable or disable Seamless Rate Adaption (SRA). Select **Enable** to have the Zyxel Device automatically adjust the connection's data rate according to line conditions without interrupting service.
DSL Modulation	
PTM over ADSL	Select **Enable** to use PTM over ADSL. Since PTM has less overhead than ATM, some ISPs use this for better performance.
G.Dmt	ITU G.992.1 (better known as G.dmt) is an ITU standard for ADSL using discrete multitone modulation. G.dmt full-rate ADSL expands the usable bandwidth of existing copper telephone lines, delivering high-speed data communications at rates up to 8 Mbit/s downstream and 1.3 Mbit/s upstream.
G.lite	ITU G.992.2 (better known as G.lite) is an ITU standard for ADSL using discrete multitone modulation. G.lite does not strictly require the use of DSL filters, but like all variants of ADSL generally functions better with splitters.
T1.413	ANSI T1.413 is a technical standard that defines the requirements for the single asymmetric digital subscriber line (ADSL) for the interface between the telecommunications network and the customer installation in terms of their interaction and electrical characteristics.
ADSL2	It optionally extends the capability of basic ADSL in data rates to 12 Mbit/s downstream and, depending on Annex version, up to 3.5 Mbit/s upstream (with a mandatory capability of ADSL2 transceivers of 8 Mbit/s downstream and 800 kbit/s upstream).
Annex L	Annex L is an optional specification in the ITU-T ADSL2 recommendation G.992.3 titled Specific requirements for a Reach Extended ADSL2 (READSL2) system operating in the frequency band above POTS, therefore it is often referred to as Reach Extended ADSL2 or READSL2. The main difference between this specification and commonly deployed Annex A is the maximum distance that can be used. The power of the lower frequencies used for transmitting data is boosted up to increase the reach of this signal up to 7 kilometers (23,000 ft).
ADSL2+	ADSL2+ extends the capability of basic ADSL by doubling the number of downstream channels. The data rates can be as high as 24 Mbit/s downstream and up to 1.4 Mbit/s upstream depending on the distance from the DSLAM to the customer's premises.
Annex M	Annex M is an optional specification in ITU-T recommendations G.992.3 (ADSL2) and G.992.5 (ADSL2+), also referred to as ADSL2 M and ADSL2+ M. This specification extends the capability of commonly deployed Annex A by more than doubling the number of upstream bits. The data rates can be as high as 12 or 24 Mbit/s downstream and 3 Mbit/s upstream depending on the distance from the DSLAM to the customer's premises.

Table 59 Network Setting > Broadband > Advanced (continued)

LABEL	DESCRIPTION
Annex M/J	Annex M and Annex J are specified in ITU-T recommendations G.992.3 (ADSL2) and G.992.5 (ADSL2+). Annex M and Annex J enhance the capabilities of Annex A and Annex B by increasing the upstream transmission data rate, but slightly reduce the downstream data rates as a trade-off. Annex M supports data rates of up to 12 Mbit/s downstream and 3.5 Mbit/s upstream for ADSL2, and up to 24 Mbit/s downstream and 2.5 Mbit/s upstream for ADSL2+. Annex J supports data rates of up to 12 Mbit/s downstream and 3.5 Mbit/s upstream for ADSL2, and up to 24 Mbit/s downstream and 3.5 Mbit/s upstream for ADSL2+. However, the actual downstream/upstream data rates depend on the distance from the ISP DSLAM to the Zyxel Device and the quality of your telephone line. Click the switch to enable the Zyxel Device to use Annex M for Zyxel Device models that use POTS WAN connection, and use Annex J for Zyxel Device models that use ISDN WAN connection.
VDSL2	VDSL2 (Very High Speed Digital Subscriber Line 2) is the second generation of the VDSL standard (which is currently denoted VDSL1). VDSL2 allows a frequency band of up to 30MHz and transmission rates of up to 100 Mbps in each direction. VDSL2 is defined in G.993.2.
VDSL Profile	VDSL2 profiles differ in the width of the frequency band used to transmit the broadband signal. Profiles that use a wider frequency band can deliver higher maximum speeds.
8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, 35b US0	The G.993.2 VDSL standard defines a wide range of profiles that can be used in different VDSL deployment settings, such as in a central office, a street cabinet or a building. The Zyxel Device must comply with at least one profile specified in G.993.2. but compliance with more than one profile is allowed.
Cancel	Click **Cancel** to return to the previous configuration.
Apply	Click **Apply** to save your changes back to the Zyxel Device.

8.6 Backup WAN

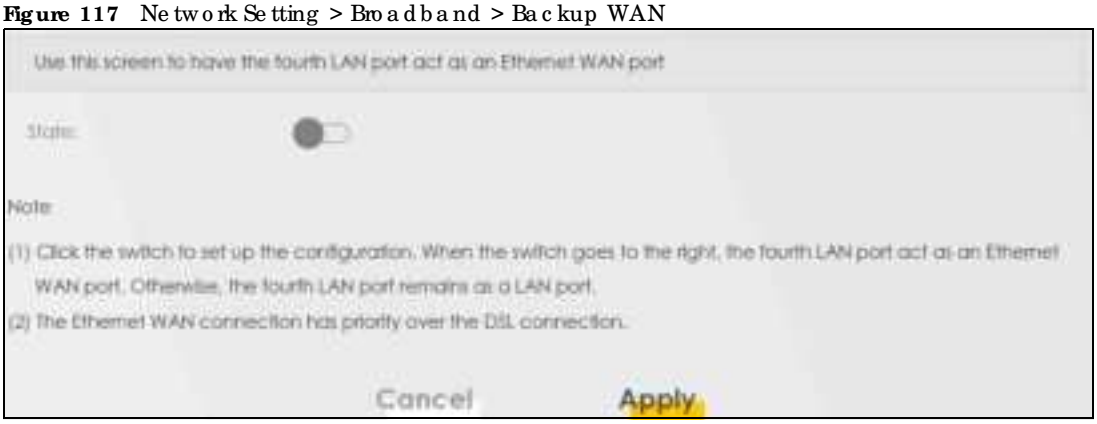
Use this screen to have the **LAN/WAN** port on the Zyxel Device ports panel to act as an Ethernet WAN port. The Ethernet WAN connection has priority over the DSL WAN connection.

It's not enough to just enable the fourth LAN port as a WAN port here. You must also go to **Network Setting > Broadband** screen and create a new interface for it with the **Type** as **Ethernet** and **Encapsulation** as **IPoE**. It's suggested to enable NAT.

Note: The Ethernet WAN connection has priority over the DSL connection. See Section 1.2.1 on page 25 for the Zyxel Device WAN priority.

Click **Network Setting > Broadband > Backup WAN** to display the following screen.

Figure 117 Network Setting > Broadband > Backup WAN



The following table describes the fields in this screen.

Table 60 Network Setting > Broadband > Backup WAN

LABEL	DESCRIPTION
State:	Click this switch to enable backup WAN to have the **LAN/WAN** port act as an Ethernet WAN port. Otherwise, the **LAN/WAN** port remains as a LAN port.
Cancel	Click **Cancel** to exit this screen without saving any changes.
Apply	Click **Apply** to save your changes.

8.7 Technical Reference

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

Encapsulation

Be sure to use the encapsulation method required by your ISP. The Zyxel Device can work in bridge mode or routing mode. When the Zyxel Device is in routing mode, it supports the following methods.

IP over Ethernet

IP over Ethernet (IPoE) is an alternative to PPPoE. IP packets are being delivered across an Ethernet network, without using PPP encapsulation. They are routed between the Ethernet interface and the WAN interface and then formatted so that they can be understood in a bridged environment. For instance, it encapsulates routed Ethernet frames into bridged Ethernet cells.

PPP over ATM (PPPoA)

PPPoA stands for Point to Point Protocol over ATM Adaptation Layer 5 (AAL5). A PPPoA connection functions like a dial-up Internet connection. The Zyxel Device encapsulates the PPP session based on RFC 1483 and sends it through an ATM PVC (Permanent Virtual Circuit) to the Internet Service Provider's (ISP) DSLAM (digital access multiplexer). Please refer to RFC 2364 for more information on PPPoA. Refer to RFC 1661 for more information on PPP.

PPP over Ethernet (PPPoE)

Point-to-Point Protocol over Ethernet (PPPoE) provides access control and billing functionality in a manner similar to dial-up services using PPP. PPPoE is an IETF standard (RFC 2516) specifying how a personal computer (PC) interacts with a broadband modem (DSL, cable, WiFi, and so on) connection.

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 Zyxel Device (rather than individual computers), the computers on the LAN do not need PPPoE software installed, since the Zyxel Device does that part of the task. Furthermore, with NAT, all of the LANs' computers will have access.

RFC 1483

RFC 1483 describes two methods for Multiprotocol Encapsulation over ATM Adaptation Layer 5 (AAL5). The first method allows multiplexing of multiple protocols over a single ATM virtual circuit (LLC-based multiplexing) and the second method assumes that each protocol is carried over a separate ATM virtual circuit (VC-based multiplexing). Please refer to RFC 1483 for more detailed information.

Multiplexing

There are two conventions to identify what protocols the virtual circuit (VC) is carrying. Be sure to use the multiplexing method required by your ISP.

VC-based Multiplexing

In this case, by prior mutual agreement, each protocol is assigned to a specific virtual circuit; for example, VC1 carries IP, etc. VC-based multiplexing may be dominant in environments where dynamic creation of large numbers of ATM VCs is fast and economical.

LLC-based Multiplexing

In this case one VC carries multiple protocols with protocol identifying information being contained in each packet header. Despite the extra bandwidth and processing overhead, this method may be advantageous if it is not practical to have a separate VC for each carried protocol, for example, if charging heavily depends on the number of simultaneous VCs.

Traffic Shaping

Traffic Shaping is an agreement between the carrier and the subscriber to regulate the average rate and fluctuations of data transmission over an ATM network. This agreement helps eliminate congestion, which is important for transmission of real time data such as audio and video connections.

Peak Cell Rate (PCR) is the maximum rate at which the sender can send cells. This parameter may be lower (but not higher) than the maximum line speed. 1 ATM cell is 53 bytes (424 bits), so a maximum

speed of 832Kbps gives a maximum PCR of 1962 cells/sec. This rate is not guaranteed because it is dependent on the line speed.

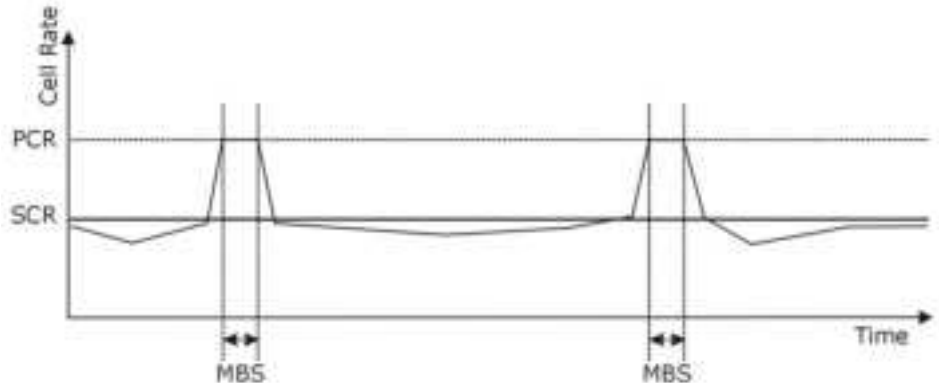
Sustained Cell Rate (SCR) is the mean cell rate of each bursty traffic source. It specifies the maximum average rate at which cells can be sent over the virtual connection. SCR may not be greater than the PCR.

Maximum Burst Size (MBS) is the maximum number of cells that can be sent at the PCR. After MBS is reached, cell rates fall below SCR until cell rate averages to the SCR again. At this time, more cells (up to the MBS) can be sent at the PCR again.

If the PCR, SCR or MBS is set to the default of "0", the system will assign a maximum value that correlates to your upstream line rate.

The following figure illustrates the relationship between PCR, SCR and MBS.

Figure 118 Example of Traffic Shaping



ATM Traffic Classes

These are the basic ATM traffic classes defined by the ATM Forum Traffic Management 4.0 Specification.

Constant Bit Rate (CBR)

Constant Bit Rate (CBR) provides fixed bandwidth that is always available even if no data is being sent. CBR traffic is generally time-sensitive (does not tolerate delay). CBR is used for connections that continuously require a specific amount of bandwidth. A PCR is specified and if traffic exceeds this rate, cells may be dropped. Examples of connections that need CBR would be high-resolution video and voice.

Variable Bit Rate (VBR)

The Variable Bit Rate (VBR) ATM traffic class is used with bursty connections. Connections that use the Variable Bit Rate (VBR) traffic class can be grouped into real time (VBR-RT) or non-real time (VBR-nRT) connections.

The VBR-RT (real-time Variable Bit Rate) type is used with bursty connections that require closely controlled delay and delay variation. It also provides a fixed amount of bandwidth (a PCR is specified) but is only available when data is being sent. An example of an VBR-RT connection would be video conferencing. Video conferencing requires real-time data transfers and the bandwidth requirement varies in proportion to the video image's changing dynamics.

The VBR-nRT (non real-time Variable Bit Rate) type is used with bursty connections that do not require closely controlled delay and delay variation. It is commonly used for "bursty" traffic typical on LANs. PCR and MBS define the burst levels, SCR defines the minimum level. An example of an VBR-nRT connection would be non-time sensitive data file transfers.

Unspecified Bit Rate (UBR)

The Unspecified Bit Rate (UBR) ATM traffic class is for bursty data transfers. However, UBR does not guarantee any bandwidth and only delivers traffic when the network has spare bandwidth. An example application is background file transfer.

IP Address Assignment

A static IP is a fixed IP that your ISP gives you. A dynamic IP is not fixed; the ISP assigns you a different one each time. The Single User Account feature can be enabled or disabled if you have either a dynamic or static IP. However, the encapsulation method assigned influences your choices for IP address and default gateway.

Introduction to VLANs

A Virtual Local Area Network (VLAN) allows a physical network to be partitioned into multiple logical networks. Devices on a logical network belong to one group. A device can belong to more than one group. With VLAN, a device cannot directly talk to or hear from devices that are not in the same groups; the traffic must first go through a router.

In Multi-Tenant Unit (MTU) applications, VLAN is vital in providing isolation and security among the subscribers. When properly configured, VLAN prevents one subscriber from accessing the network resources of another on the same LAN, thus a user will not see the printers and hard disks of another user in the same building.

VLAN also increases network performance by limiting broadcasts to a smaller and more manageable logical broadcast domain. In traditional switched environments, all broadcast packets go to each and every individual port. With VLAN, all broadcasts are confined to a specific broadcast domain.

Introduction to IEEE 802.1Q Tagged VLAN

A tagged VLAN uses an explicit tag (VLAN ID) in the MAC header to identify the VLAN membership of a frame across bridges – they are not confined to the switch on which they were created. The VLANs can be created statically by hand or dynamically through GVRP. The VLAN ID associates a frame with a specific VLAN and provides the information that switches need to process the frame across the network. A tagged frame is 4 bytes longer than an untagged frame and contains 2 bytes of TPID (Tag Protocol Identifier), residing within the type/length field of the Ethernet frame) and 2 bytes of TCI (Tag Control Information), starts after the source address field of the Ethernet frame).

The CFI (Canonical Format Indicator) is a single-bit flag, always set to zero for Ethernet switches. If a frame received at an Ethernet port has a CFI set to 1, then that frame should not be forwarded as it is to an untagged port. The remaining twelve bits define the VLAN ID, giving a possible maximum number of 4,096 VLANs. Note that user priority and VLAN ID are independent of each other. A frame with VID (VLAN Identifier) of null (0) is called a priority frame, meaning that only the priority level is significant and the default VID of the ingress port is given as the VID of the frame. Of the 4096 possible VIDs, a VID of 0 is

used to identify priority frames and value 4095 (FFF) is reserved, so the maximum possible VLAN configurations are 4,094.

TPID	User Priority	CFI	VLAN ID
2 Bytes	3 Bits	1 Bit	12 Bits

Multicast

IP packets are transmitted in either one of 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.

Internet Group Multicast Protocol (IGMP) 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.

At start up, the Zyxel Device queries all directly connected networks to gather group membership. After that, the Zyxel Device periodically updates this information.

DNS Server Address Assignment

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

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

1 The ISP tells you the DNS server addresses, usually in the form of an information sheet, when you sign up. If your ISP gives you DNS server addresses, manually enter them in the DNS server fields.

2 If your ISP dynamically assigns the DNS server IP addresses (along with the Zyxel Device's WAN IP address), set the DNS server fields to get the DNS server address from the ISP.

IPv6 Addressing

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

IPv6 addresses can be abbreviated in two ways:

- Leading zeros in a block can be omitted. So `2001:0db8:1a2b:0015:0000:0000:1a2f:0000` can be written as `2001:db8:1a2b:15:0:0:1a2f:0`.

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

IPv6 Prefix and Prefix Length

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

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

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