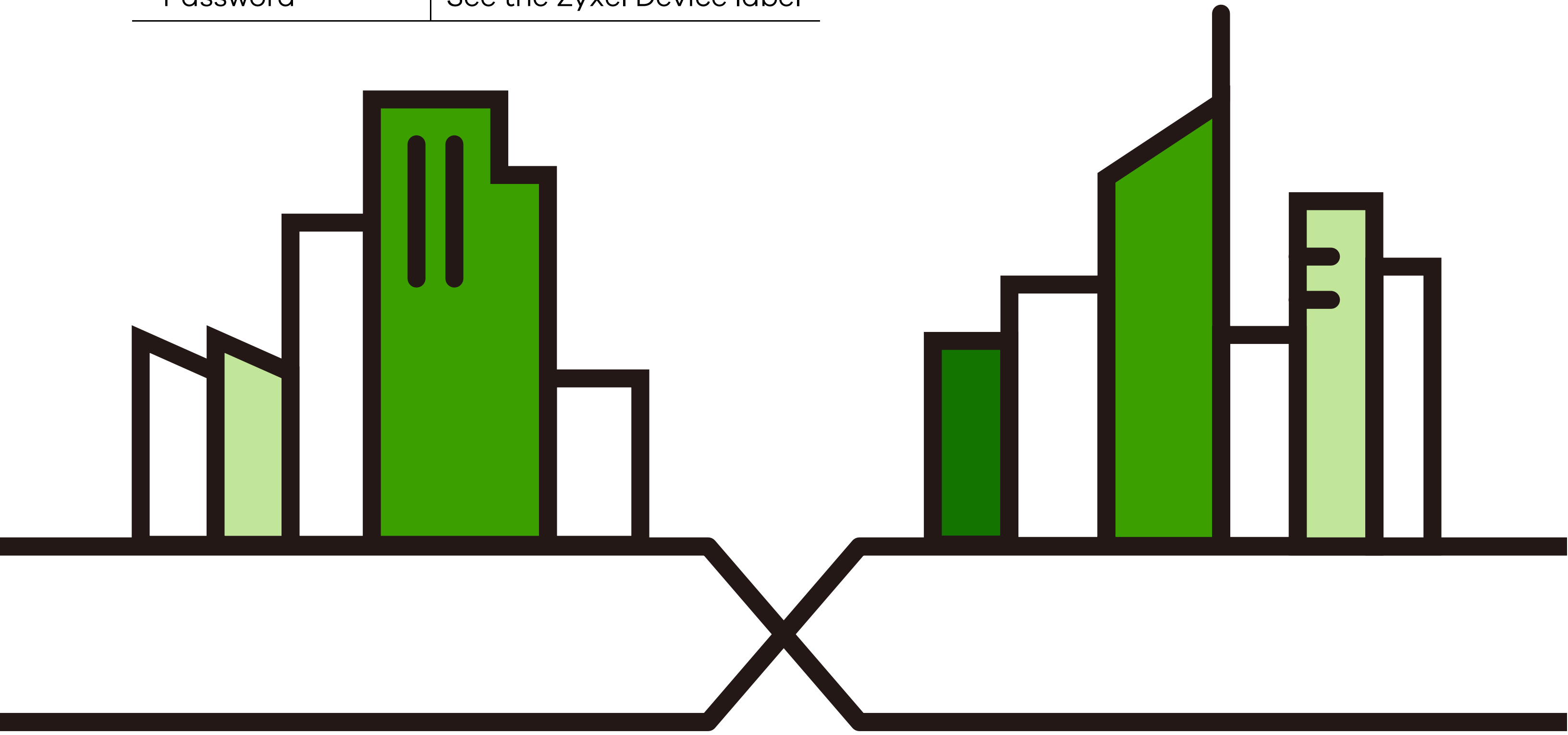
User's Guide

NBG7510

Dual-Band WiFi 6 AX1800 Router

Default Login Details	
LAN IP Address Standard (Router) Mode	http://192.168.123.1
AP Mode	http://192.168.123.2 OR http://DHCP-assigned IP
Password	See the Zyxel Device label

Version 1.00 Ed 6, 12/2023



IMPORTANT!

READ CAREFULLY BEFORE USE.

KEEP THIS GUIDE FOR FUTURE REFERENCE.

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

Related Documentation

- Quick Start Guide

  The Quick Start Guide shows how to connect the Zyxel Device.

- Rover App Help
  Go to the *Rover Online App Help* to see the online Rover app introduction and tutorials for managing your Zyxel Device through the Rover app.

- More Information

- Go to *support.zyxel.com* to find other information on the Zyxel Device.

Document Conventions

Warnings and Notes

These are how warnings and notes are shown in this guide.

Warnings tell you about things that could harm you or your Zyxel Device.

Note: Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.

Syntax Conventions

- Product labels, screen names, field labels and field choices are all in **bold** font.
- A right angle bracket (>) within a screen name denotes a mouse click. For example, **Network Setting** > **Routing** > **DNS Route** means you first click **Network Setting** in the navigation panel, then the **Routing** submenu, and then finally the **DNS Route** tab to get to that screen.

Icons Used in Figures

Figures in this user guide may use the following generic icons. The Zyxel Device icon is not an exact representation of your Zyxel Device.

Zyxel Device 	Generic Router 	Switch
Server 	Firewall 	USB Storage Device
Printer 	4G LTE/5G NR Base Station 	

Contents Overview

Table of Contents

PART I
User's Guide

CHAPTER 1
Introducing the Zyxel Device

1.1 Overview

This chapter introduces the main features and applications of the Zyxel Device. The Zyxel Device is an Ethernet router, which provides fast Internet access.

The Zyxel Device supports WiFi6 that is most suitable in areas with a high concentration of users. You can schedule WiFi usage using Parental Control.

This table summarizes some of the features that are available at the time of writing.

Table 1 Features Supported

FEATURE	NBG7510
WiFi6 Standard	YES
Supported WiFi Frequency Bands	2.4 GHz 5 GHz
Parental Control Schedule	YES
Wall-mount	YES
Operating Mode	YES
Zyxel Rover App	YES
Virtual Local Area Network (VLAN)	YES
Guest WiFi	YES
Firewall	YES
NAT and Port Forwarding	YES
Application Layer Gateway (ALG)	YES
Port Triggering	YES
Dynamic Domain Name System (DDNS)	YES
IPv6 Support	YES
Universal Plug-and-Play (UPnP)	YES
Save Configuration	YES
Firmware Version	1.00

1.2 Applications for the Zyxel Device

The Zyxel Device supports the following features.

Internet Access

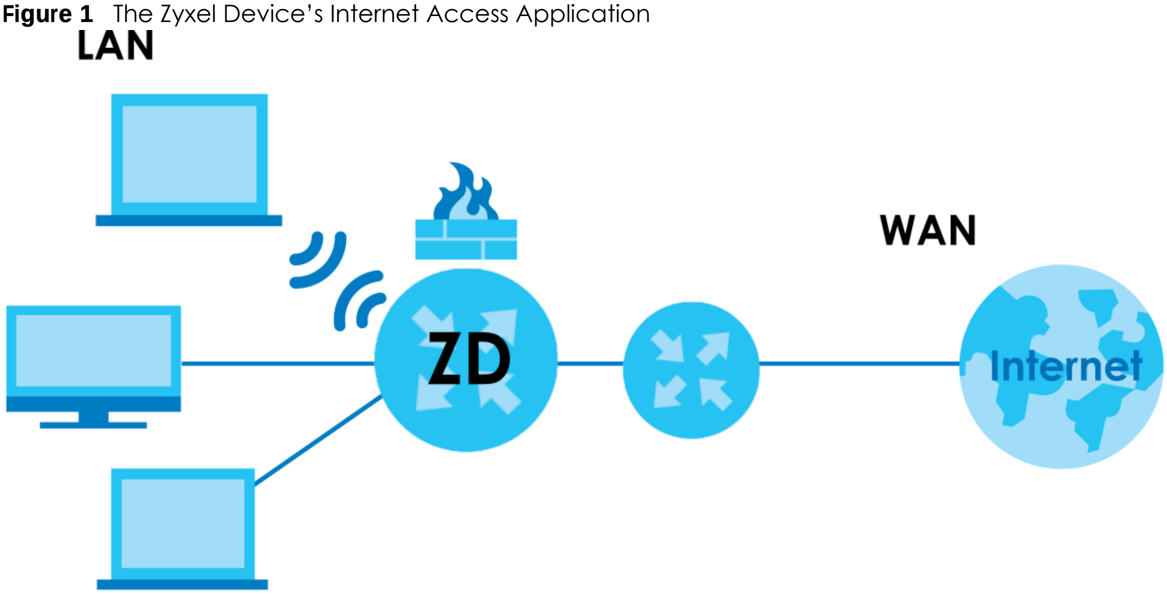
The Zyxel Device provides Internet access by connecting the WAN port to your ISP through an Ethernet cable.

Connect computers to the Zyxel Device’s LAN ports or wirelessly to access the Internet.

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

Connect the WAN port to the broadband modem or router. This way, you can access the Internet through an Ethernet connection and use the firewall and parental control functions on the Zyxel Device.

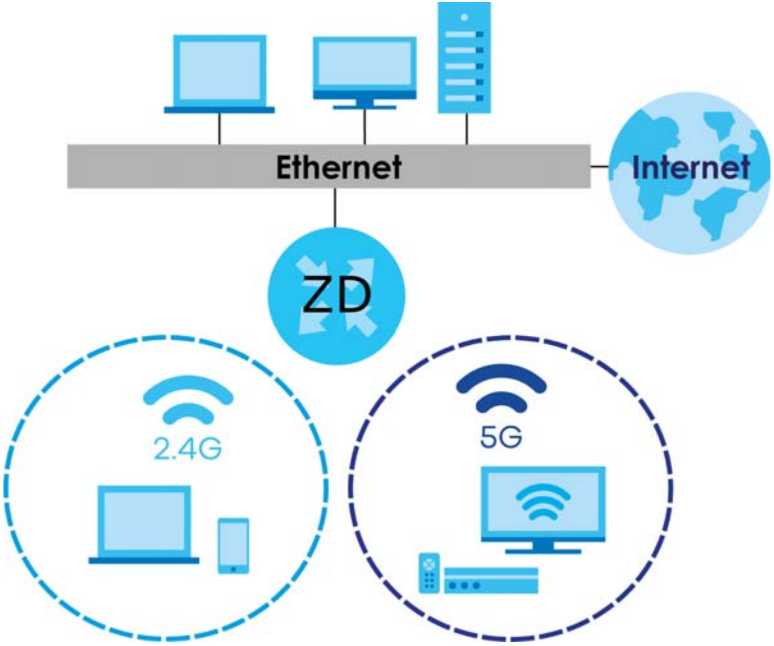
Figure 1 The Zyxel Device’s Internet Access Application



Dual-Band WiFi

The Zyxel Device supports dual-band 2.4 GHz and 5 GHz WiFi. IEEE 80211a/b/g/n/ac/ax compliant clients, such as notebooks, tablets, and smartphones can wirelessly connect to the Zyxel Device to access network resources. WiFi clients can use the 2.4 GHz band for regular Internet surfing and downloading while using the 5 GHz band for time sensitive traffic like high-definition video, music, and gaming.

Figure 2 Dual-Band Application



WPS

The Zyxel Device supports WiFi Protected Setup (WPS), which allows you to quickly set up a WiFi network with strong security. You can use WPS (WiFi Protected Setup) to create an instant WiFi network connection with another WPS-compatible device.

Guest WiFi

The Zyxel Device allows you to set up a guest WiFi network where users can access the Internet through the Zyxel Device, but not to other networks connected to it.

IPv6 and IPv6 Firewall

IPv6 (Internet Protocol version 6), is designed to enhance IP address size and features. The increase in IPv6 address size to 128 bits (from the 32-bit IPv4 address) allows up to 3.4 x 1038 IP addresses. The Zyxel Device can use IPv4/IPv6 dual stack to connect to IPv4 and IPv6 networks, and support IPv6 rapid deployment (6RD).

Consequently, you can enable and create IPv6 firewall rules to filter IPv6 traffic.

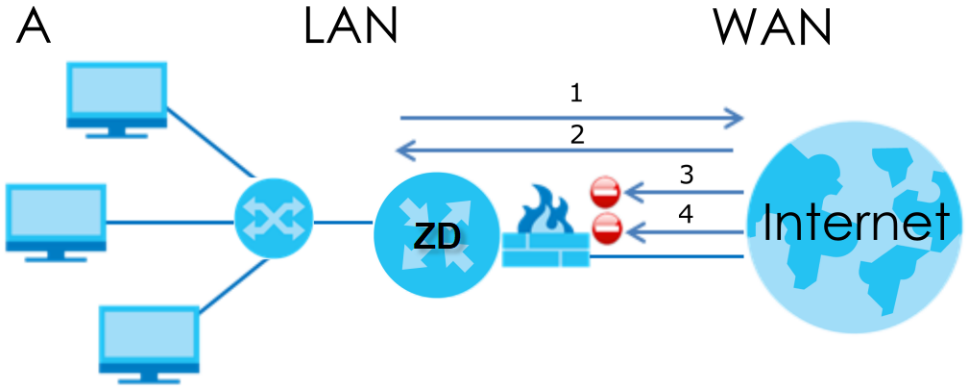
Firewall protects your Zyxel Device and network from attacks by hackers on the Internet and control access to it. The firewall:

- allows traffic that originates from your LAN computers to go to all other networks

- blocks traffic that originates on other networks from going to the LAN

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

Figure 3 Firewall Default Action



1.3 Mesh

A Mesh network is composed of three key components.

(A) A router works as a controller to manage and optimize the Mesh network.

(B) One or more devices in the Mesh network function as APs or WiFi Extenders to extend the WiFi communication range.

(C) Multiple client devices connect to the Mesh network for Internet connections.

1.3.1 Network Controller

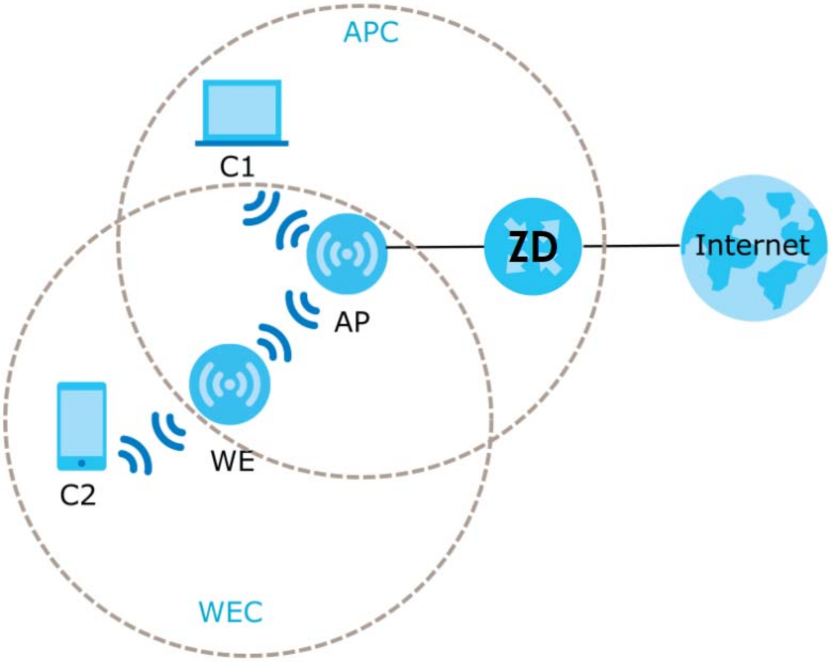
The Mesh Router is the Network Controller and the Extender is also known as a Satellite.

The Zyxel Device functions as a controller to coordinate and optimize WiFi activity In the Mesh network. The controller collects Channel Availability Check responses and scan reports from the APs or WiFi Extenders. Then, the controller selects the best channel and the final optimized topology based on the current situation.

The Mesh network uses AP steering and Band steering mechanisms to improve WiFi performance. AP steering allows WiFi clients to roam seamlessly in an Mesh network. Band steering allows 2.4 GHz / 5 GHz dual-band WiFi clients to move from one band to another less busy band. For AP steering to work, the controller and the devices in the Mesh network must use the same SSID and password. For band steering to work, the SSIDs and passwords of 2.4 GHz and 5 GHz must be identical. See Section 1.3.2 on page 18 and Section 1.3.3 on page 19 for more information. The controller synchronizes the SSIDs and passwords during auto-configuration.

- The Zyxel Device connects to an AP using an Ethernet cable to expand the WiFi coverage.
- The Zyxel Device connects to a WiFi extender using WiFi. You can place the WiFi extender between the Zyxel Device and the WiFi clients who require WiFi but are not in the coverage of the Zyxel Device.

Figure 4 Mesh Application



The following table describes the icons used in the figure.

Table 2 Mesh Application

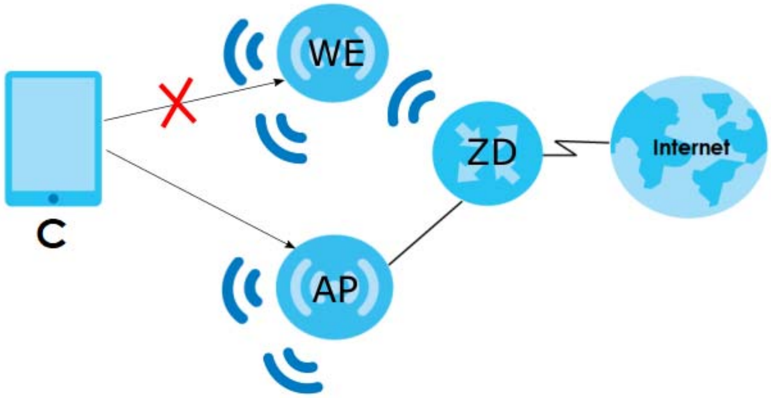
LABEL	DESCRIPTION
ZD	Router Controller
AP	Access Point
WE	WiFi Extender
C1	Client1
C2	Client2
APC	Access Point coverage area
WEC	WiFi Extender coverage area

1.3.2 AP Steering

AP steering allows WiFi clients to roam seamlessly in the Mesh network. AP steering helps monitor WiFi clients and drops their connections to optimize the Zyxel Device 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 AP or WiFi Extender with a stronger signal.

In the following example, the controller (**ZD**) drops the connection between the client device (**C**) and the WiFi Extender (**WE**) so that the client device (**C**) can connect to the Access Point (**AP**), which has a stronger signal.

Figure 5 AP Steering Application

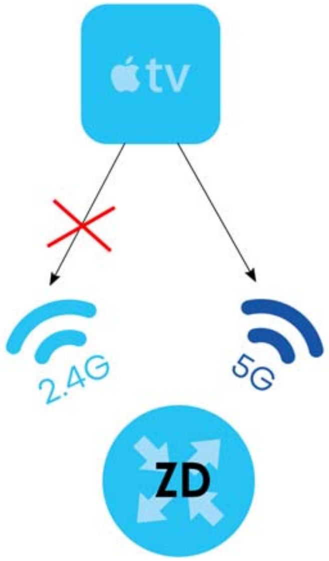


1.3.3 Band Steering

Band steering allows 2.4 GHz/5 GHz dual-band WiFi clients to move from one band to another. The controller detects if the client device are dual-band compatible. If a client device supports dual-band WiFi and the 2.4 GHZ band is congested, its 2.4 GHz connection is dropped so that it can connect to the less congested 5 GHz band.

In the following example, the Apple TV is a dual-band client device that uses the 5 GHz band.

Figure 6 Band Steering Application



1.3.4 Daisy Chain

You can add more APs or WiFi Extenders to your Mesh network to form a daisy chain. Daisy chain refers to the connection from the Zyxel Device to up to three APs or WiFi Extenders to extend the WiFi connection from the router to the client.

- If the Zyxel Device has a wired downlink connection, the device connected to the Zyxel Device must be an AP.
- If the Zyxel Device has a WiFi downlink connection, the device connected to the Zyxel Device must be a WiFi Extender.

Here are some example scenarios of the Zyxel Device's daisy chain connection:

Figure 7 Scenario 1: Three APs

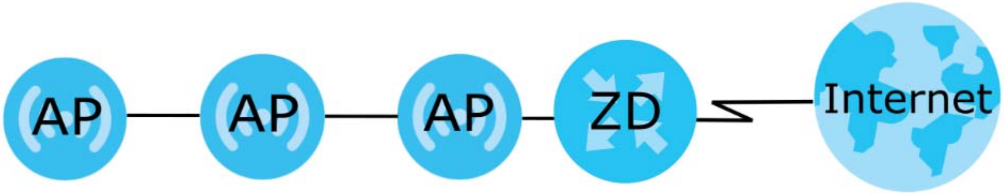


Figure 8 Scenario 2: Two APs and one WE

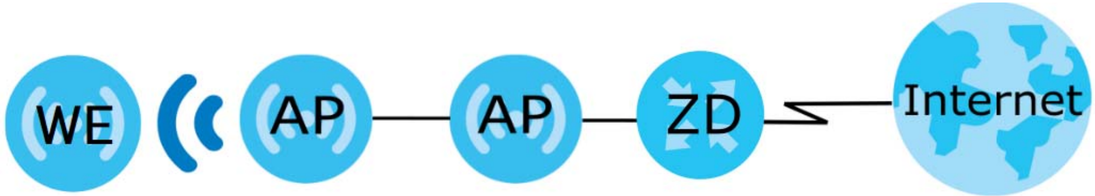


Figure 9 Scenario 3: One AP and two WEs

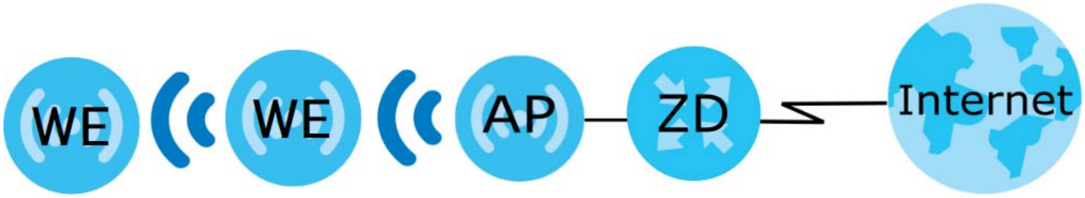
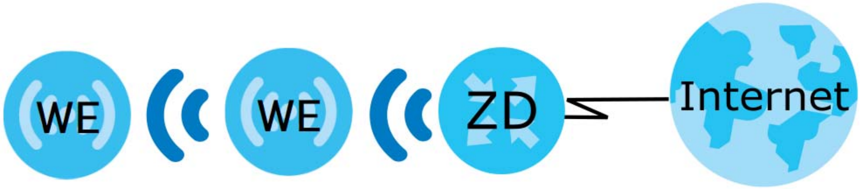


Figure 10 Scenario 4: Two WEs



Note: We do not recommend connecting more than three APs or WiFi Extenders in your daisy chain network.

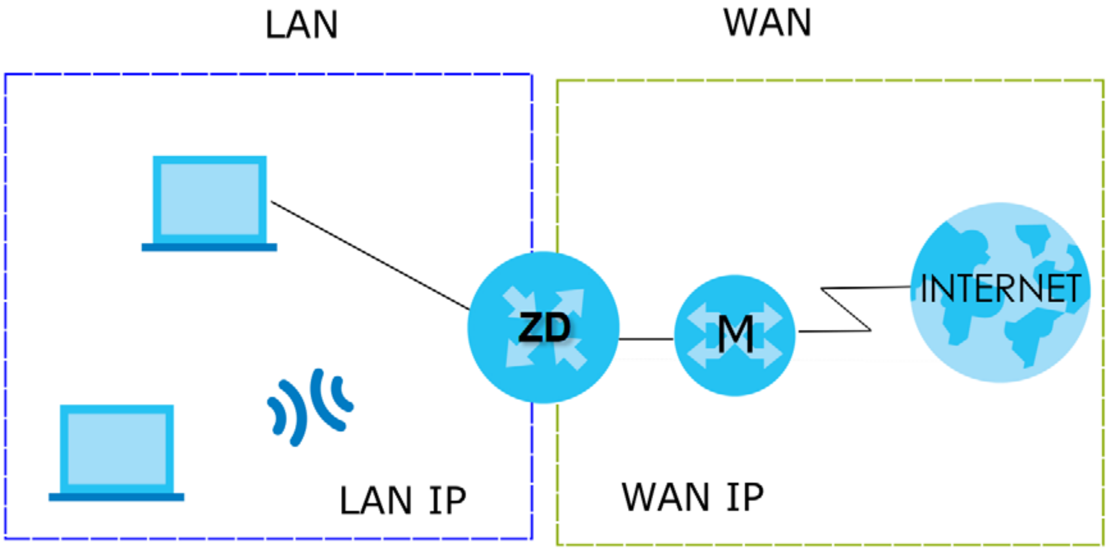
1.4 Operating Modes for the Zyxel Device

The Zyxel Device is available in both Standard (router) mode and AP (bridge) mode.

1.4.1 Standard (Router) Mode

The Zyxel Device is set to standard (router) mode by default. The Zyxel Device is used to connect the local network to another network (for example, the Internet). In standard mode Zyxel Device has two IP addresses, a LAN IP address and a WAN IP address. It also has more routing features. In the example scenario below, Zyxel Device connects the local network to the Internet through a modem (**M**).

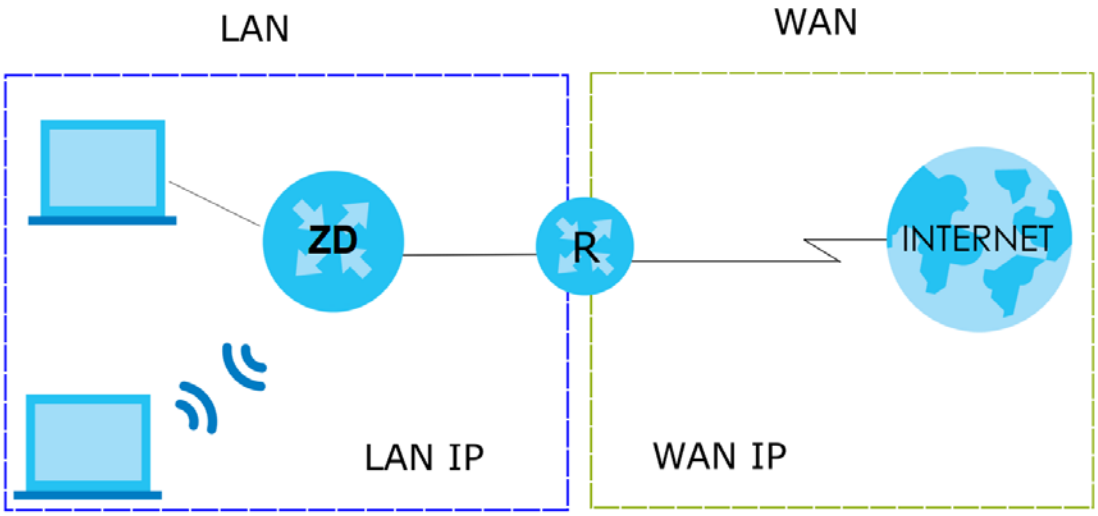
Figure 11 Standard Mode Example



1.4.2 AP (Bridge) Mode

Use your Zyxel Device as a bridge if you already have a router or gateway on your network. In this mode your Zyxel Device bridges a wired network (LAN) and WiFi in the same subnet. In AP mode, Zyxel Device has one IP address and Zyxel Device interfaces are bridged together in the same network. In the example scenario below, Zyxel Device connects the local network to the Internet through a router (**R**).

Figure 12 AP Mode Example



1.5 Ways to Manage the Zyxel Device

Use any of the following methods to manage the Zyxel Device.

- Web Configurator. This is recommended for management of the Zyxel Device using a supported web browser.

- Secure Shell (SSH), Telnet. Use for troubleshooting the Zyxel Device by qualified personnel.

1.6 Good Habits for Managing the Zyxel Device

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

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

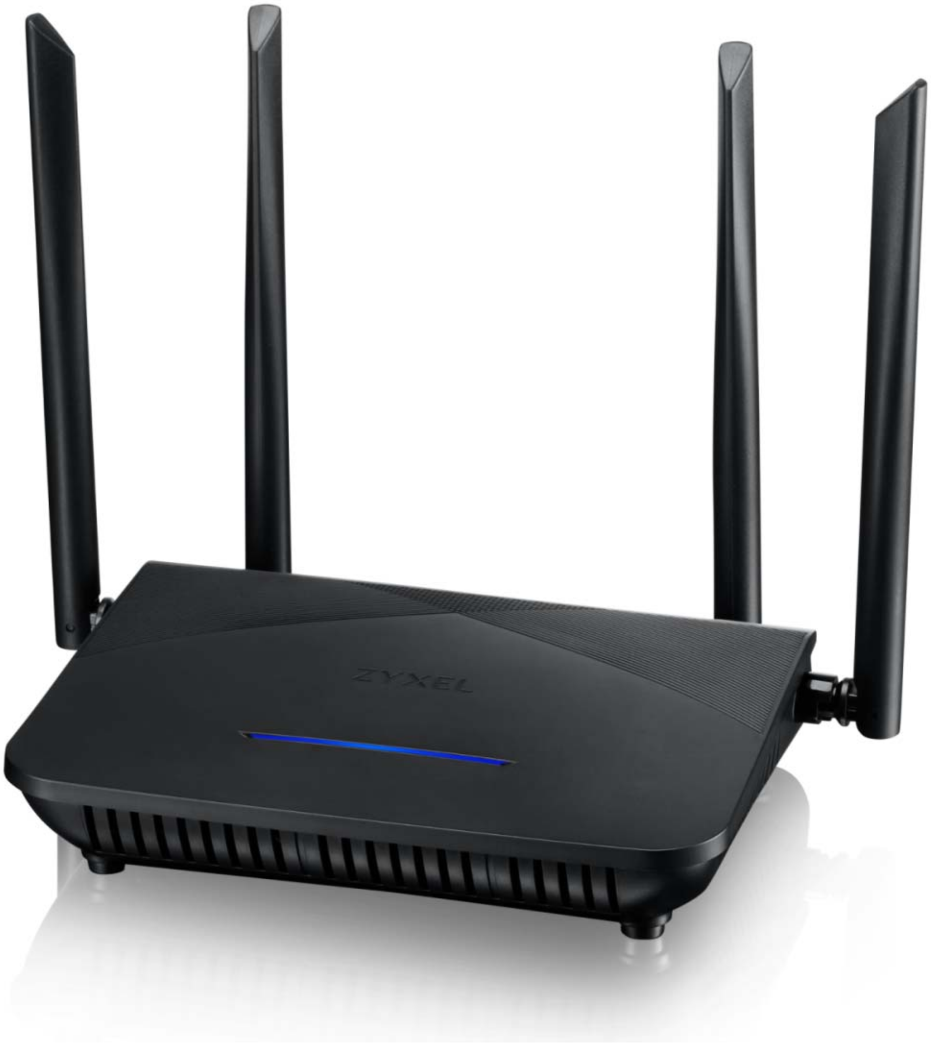
CHAPTER 2
Hardware

This chapter describes the LED and Ports and Buttons on the Zyxel Device.

2.1 LED

After you connect the power to the Zyxel Device, view the LED to ensure proper functioning of the Zyxel Device and as an aid to troubleshooting.

Figure 13 LED



The following table describes the LED behavior on the top panel.

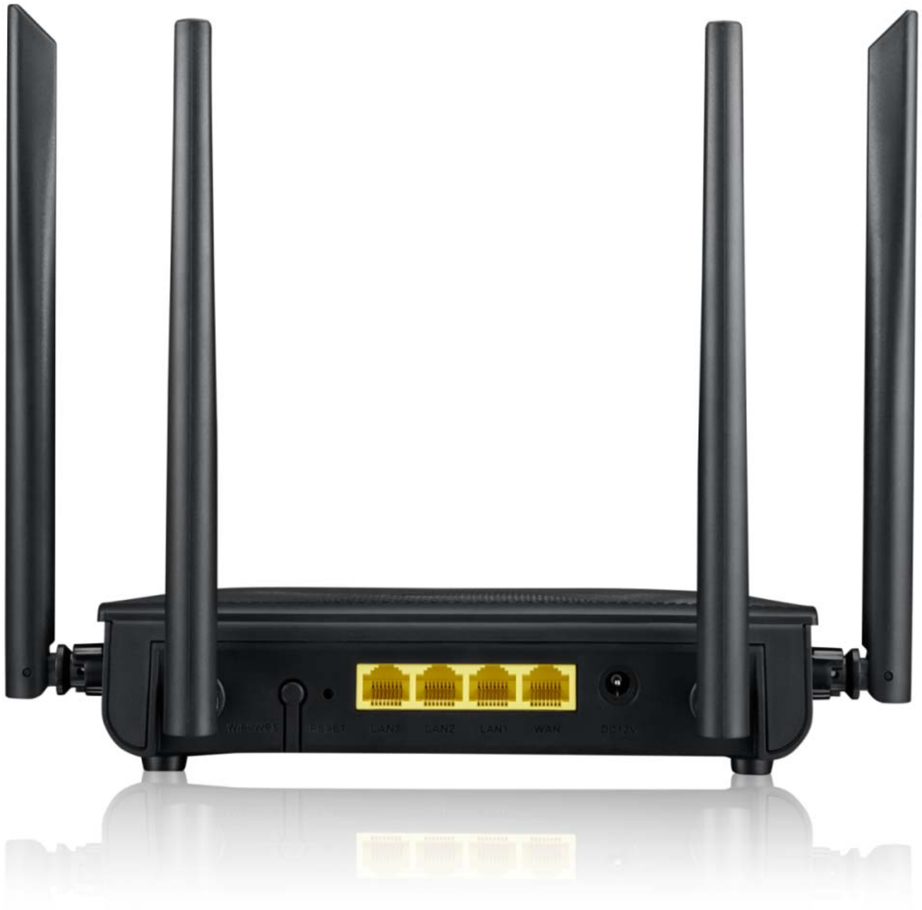
Table 3 LED Behavior

LED	COLOR	STATUS	DESCRIPTION
The LED Indicator	Red	Blinking	There is no Internet connection.
	Blue	On	The Internet is ready.
		Blinking	The Zyxel Device is booting up.
		Off	Power is off.
	Red/Blue	Blinking	The Zyxel Device is in the process of resetting to factory defaults.
	Purple	On	The Zyxel Device is updating firmware.
		Blinking	WPS is in progress.

2.2 Ports and Buttons

The following figure shows the ports and buttons on the Zyxel Device.

Figure 14 Ports and Buttons



The following table describes the items on the side panel of the Zyxel Device.

Table 4 Panel Ports and Buttons

LABEL	DESCRIPTION
WIFI/WPS	Press the **WIFI/WPS** button for 1.5 - 4 seconds to quickly setup a secure WiFi connection between the Zyxel Device and a WPS-compatible client device.
RESET	Press the button for more than 5 seconds to return the Zyxel Device to the factory defaults.
LAN1 – LAN3	Connect computers or other Ethernet devices to Ethernet LAN ports for Internet access.
WAN	For the Zyxel Device, connect an Ethernet cable to the WAN port for Internet access.
DC12V	Connect a power adapter to start the Zyxel Device.

2.3 How to Reset the Zyxel Device

If you forget your password or cannot access the Web Configurator, insert a thin object into the RESET hole to reload the factory-default configuration file. This means that you will lose all configurations that you had previously. The password will be reset to the factory default (see the Zyxel Device label), and the LAN IP address will be “192.168.123.1”.

1 Make sure the LED lights blue (not blinking).

2 Locate the RESET hole.

3 Insert a thin object into the RESET hole for more than 5 seconds or until the LED begins to blink red and blue and then release it. The LED will blink blue when the defaults have been restored and the Zyxel Device restarts.

2.4 How to Enable WiFi/WPS

You can use the **WiFi/WPS** button to quickly set up a secure WiFi connection between the Zyxel Device and a WPS-compatible client device by adding one device at a time.

To activate WiFi/WPS:

1 Make sure the **POWER** LED lights blue and not blinking.

2 Press the **WiFi/WPS** button for 1.5-4 seconds and release it.

3 Press the WPS button on another WPS-enabled client device within range of the Zyxel Device within 120 seconds. The LED flashes purple while the Zyxel Device sets up a WPS connection with the client device.

4 Once the connection is successfully made, the LED will light up in blue.

2.5 Wall Mounting

Please refer to the installation guide below for the wall mounting procedures of the Zyxel Device. You may need screw anchors if mounting on a concrete or brick wall.

Figure 15 Wall Mounting Screw Specifications

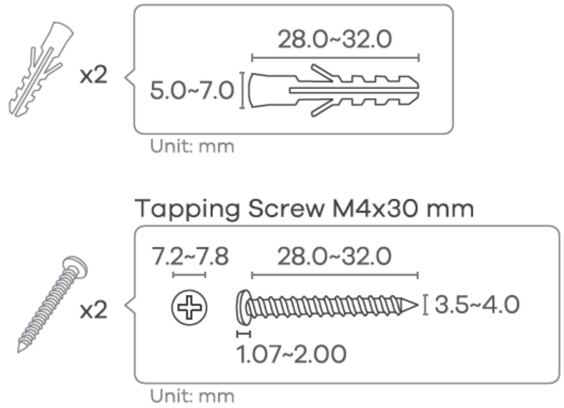


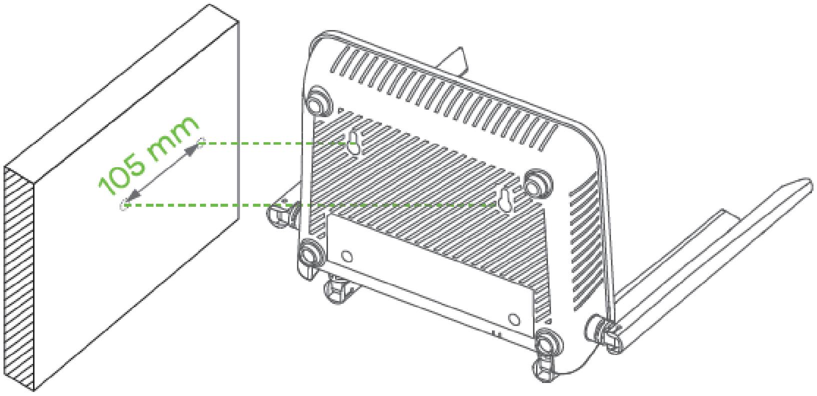
Table 5 Wall Mounting Information

Distances between holes	105 mm
M4 Screws	Two
Screw Anchors	Two

Do the following to attach your Zyxel Device to a wall.

1. Select a position free of obstructions on a wall strong enough to hold the weight of the Zyxel Device.
2. Mark two holes on the wall at the appropriate distance apart for the screws.

Figure 16 Wall Mounting Distance

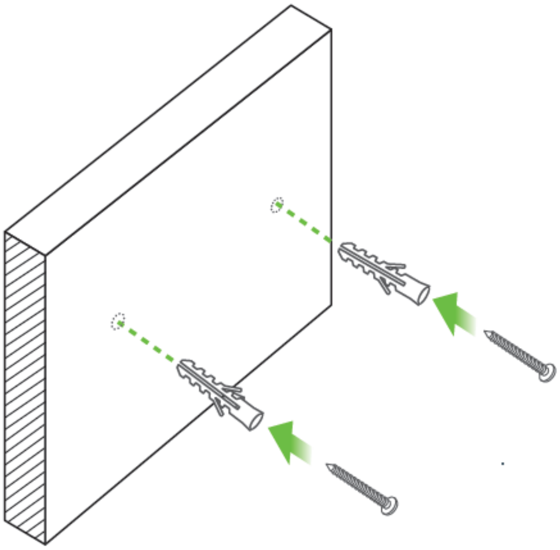


Be careful to avoid damaging pipes or cables located inside the wall when drilling holes for the screws.

Do not wall mount the Zyxel Device over a height of 2 m.

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

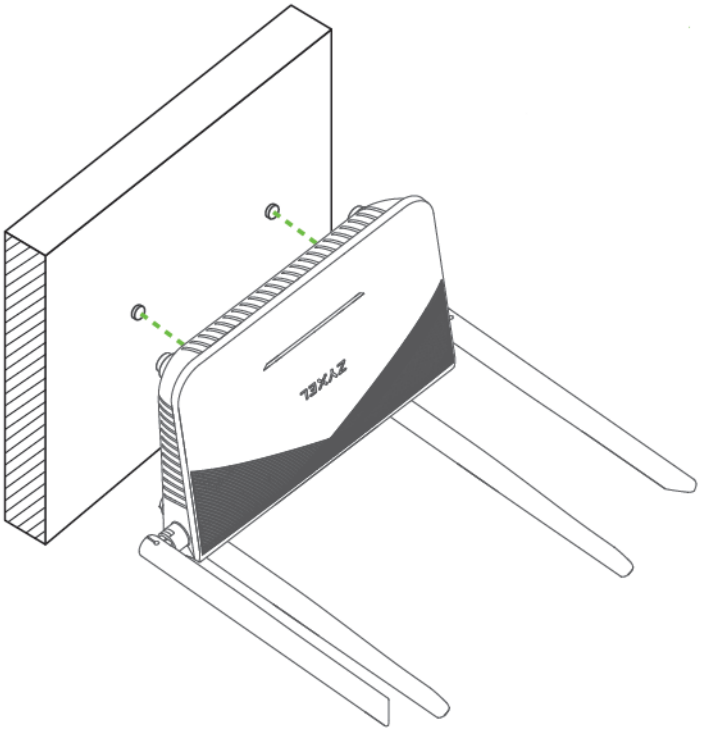
Figure 17 Wall Mounting Anchors



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

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

Figure 18 Wall Mounting Device



CHAPTER 31W
Web Configurator

3.1 Overview

The Web Configurator is an HTML-based management interface that allows easy system setup and management through Internet browser. Use a browser that supports HTML5, such as Microsoft Edge, Mozilla Firefox, or Google Chrome. The recommended minimum screen resolution is 1024 by 768 pixels.

In order to use the Web Configurator you need to allow:

- Web browser pop-up windows from your computer.
- JavaScript (enabled by default).
- Java permissions (enabled by default).

3.1.1 Access the Web Configurator

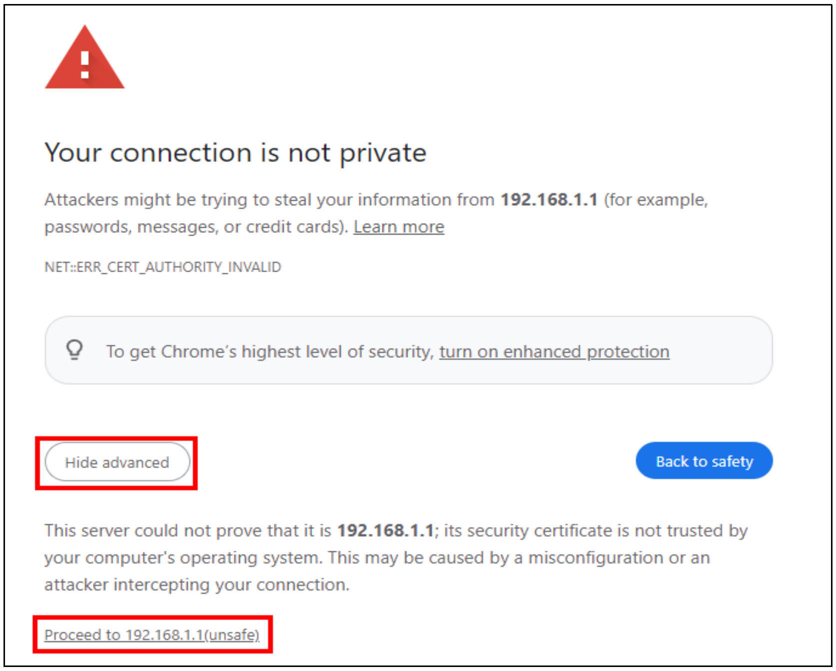
1 Make sure your Zyxel Device hardware is properly connected (refer to the Quick Start Guide).

2 Make sure your computer has an IP address in the same subnet as the Zyxel Device.

3 Launch your web browser. Type https://192.168.1.1 in your browser address bar.

4 Launch your web browser. If the Zyxel Device does not automatically re-direct you to the login screen, go to http://192.168.123.1.

5 If a “Your connection is not private” message appears, click **Advanced**, then click **Proceed to 192.168.1.1(unsafe)** to go to the login screen.



Your connection is not private

Attackers might be trying to steal your information from **192.168.1.1** (for example, passwords, messages, or credit cards). Learn more

NET::ERR_CERT_AUTHORITY_INVALID

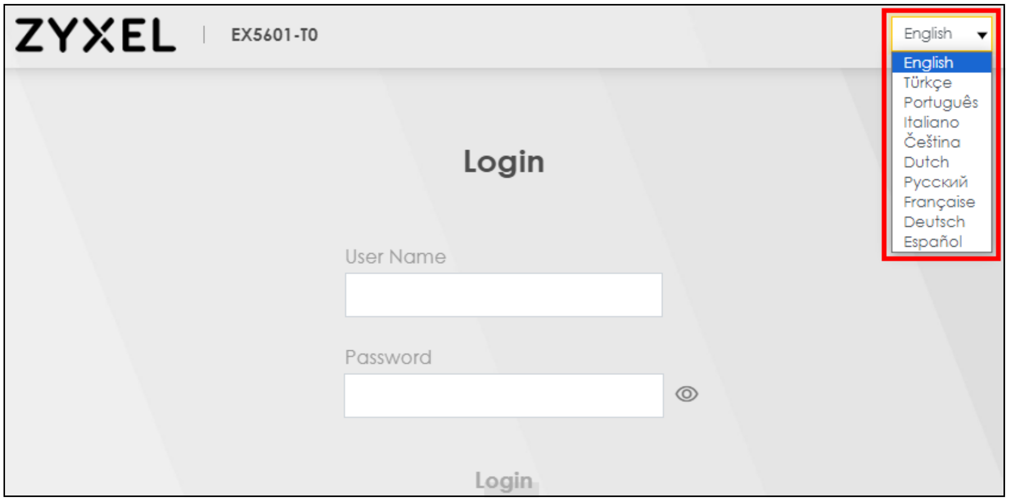
To get Chrome's highest level of security, turn on enhanced protection

This server could not prove that it is **192.168.1.1**; its security certificate is not trusted by your computer's operating system. This may be caused by a misconfiguration or an attacker intercepting your connection.

Proceed to 192.168.1.1(unsafe)

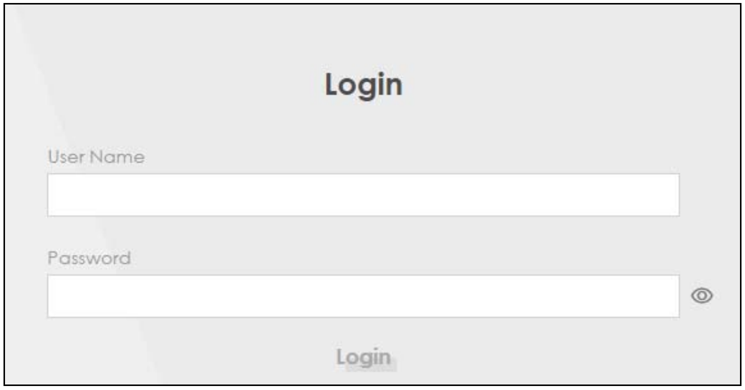
Note: If you see this warning page, it indicates that your browser has failed to verify the Secure Sockets Layer (SSL) certificate, which opens an encrypted connection. You can ignore this message and proceed to 192.168.1.1.

6 A login screen displays. Select the language you prefer (upper right).



7 To access the administrative Web Configurator and manage the Zyxel Device, enter the default user name **admin** and the randomly assigned default password (see the Zyxel Device label) in the **Login** screen and click **Login**. If you have changed the password, enter your password and click **Login**.

Figure 19 Login Screen



Login

User Name

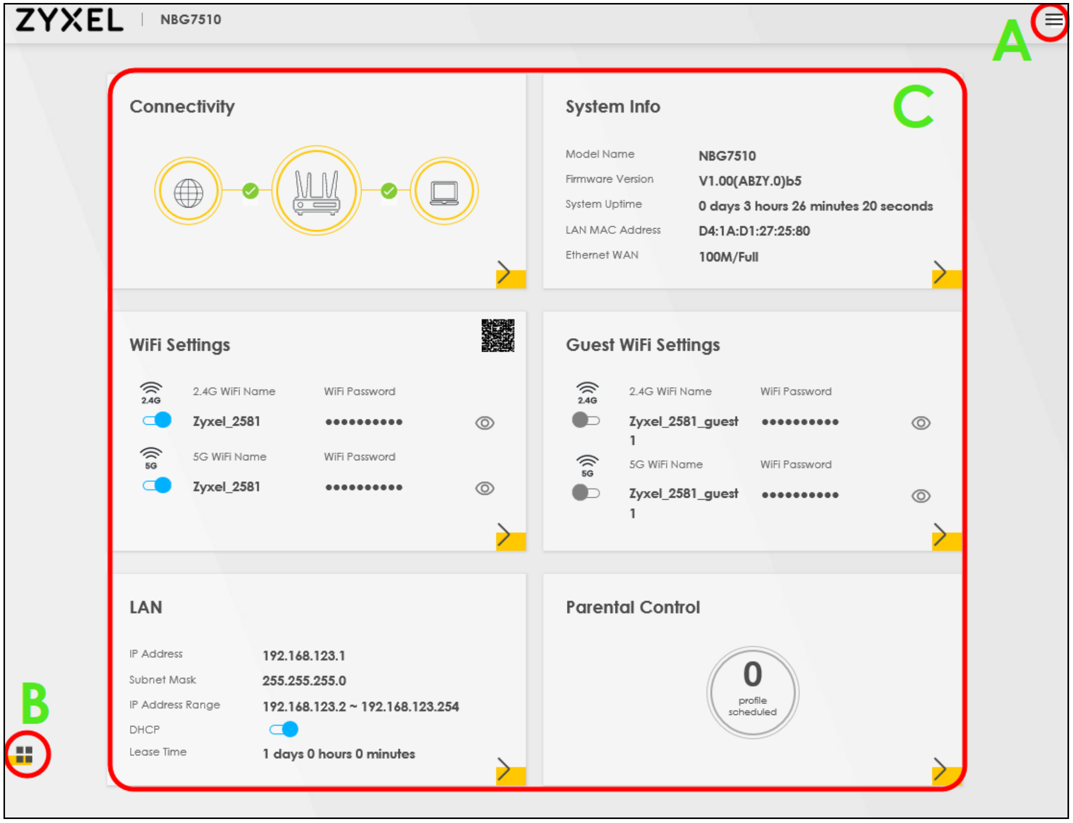
Password

Login

Note: The first time you enter the password, you will be asked to change it. Make sure the new password must contain at least one uppercase letter, one lowercase letter and one number. For some models, the password must contain at least one English character and one number. Please see the password requirement displayed on the screen.

8 The **Connection Status** screen appears. Use this screen to configure basic Internet access and WiFi settings.

Figure 20 Connection Status



Connectivity

System Info

Model Name	NBG7510
Firmware Version	V1.00(ABZY.0)b5
System Uptime	0 days 3 hours 26 minutes 20 seconds
LAN MAC Address	D4:1A:D1:27:25:80
Ethernet WAN	100M/Full

WiFi Settings

2.4G	2.4G WiFi Name	WiFi Password
	Zyxel_2581	••••••••••
5G	5G WiFi Name	WiFi Password
	Zyxel_2581	••••••••••

Guest WiFi Settings

2.4G	2.4G WiFi Name	WiFi Password
	Zyxel_2581_guest 1	••••••••••
5G	5G WiFi Name	WiFi Password
	Zyxel_2581_guest 1	••••••••••

LAN

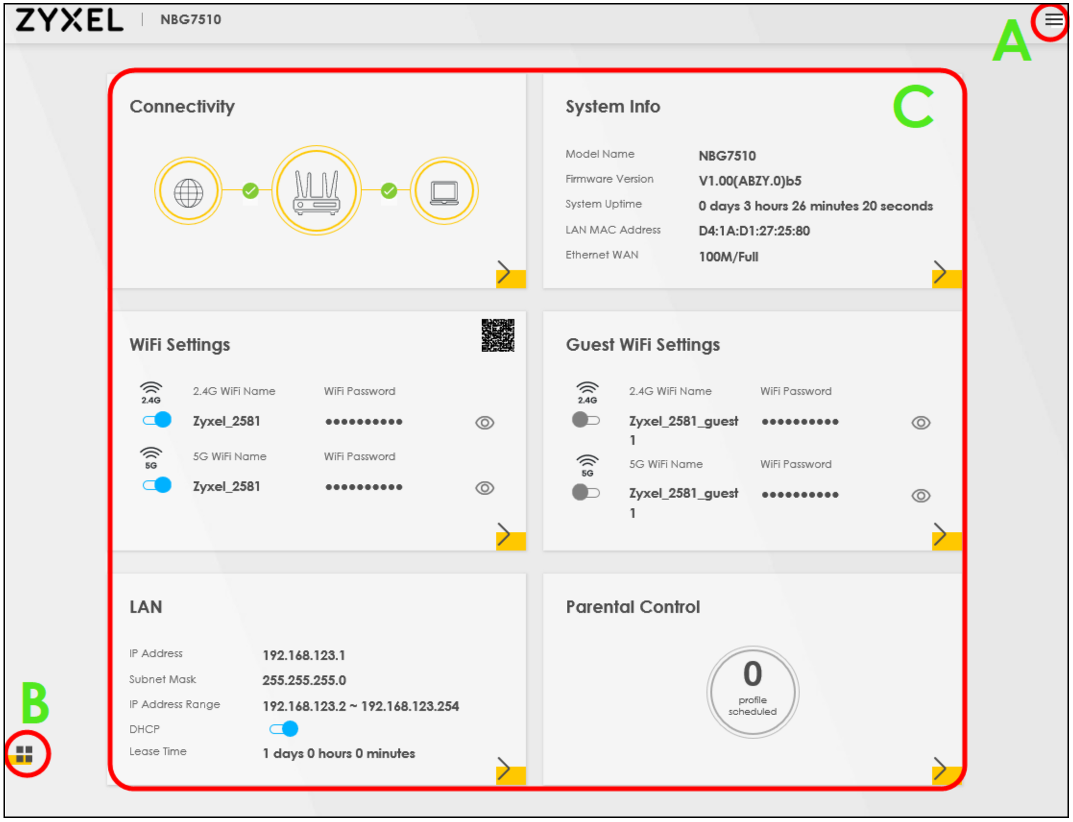
IP Address	192.168.123.1
Subnet Mask	255.255.255.0
IP Address Range	192.168.123.2 ~ 192.168.123.254
DHCP	
Lease Time	1 days 0 hours 0 minutes

Parental Control

0
profile
scheduled

3.2 Web Configurator Layout

Figure 21 Screen Layout



Connectivity

System Info

Model Name	NBG7510
Firmware Version	V1.00(ABZY.0)b5
System Uptime	0 days 3 hours 26 minutes 20 seconds
LAN MAC Address	D4:1A:D1:27:25:80
Ethernet WAN	100M/Full

WiFi Settings

	2.4G WiFi Name	WiFi Password
2.4G	Zyxel_2581	••••••••••
	5G WiFi Name	**WiFi Password**
5G	Zyxel_2581	••••••••••

Guest WiFi Settings

	2.4G WiFi Name	WiFi Password
2.4G	Zyxel_2581_guest1	••••••••••
	5G WiFi Name	**WiFi Password**
5G	Zyxel_2581_guest1	••••••••••

LAN

IP Address	192.168.123.1
Subnet Mask	255.255.255.0
IP Address Range	192.168.123.2 ~ 192.168.123.254
DHCP	●
Lease Time	1 days 0 hours 0 minutes

Parental Control

0 profile scheduled

As illustrated above, the main screen is divided into these parts:

- **A** – Settings Icon (Navigation Panel and Side Bar)
- **B** – Layout Icon
- **C** – Main Window

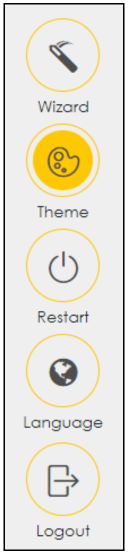
3.2.1 Settings Icon

Click this icon (☰) to see the side bar and navigation panel.

3.2.1.1 Side Bar

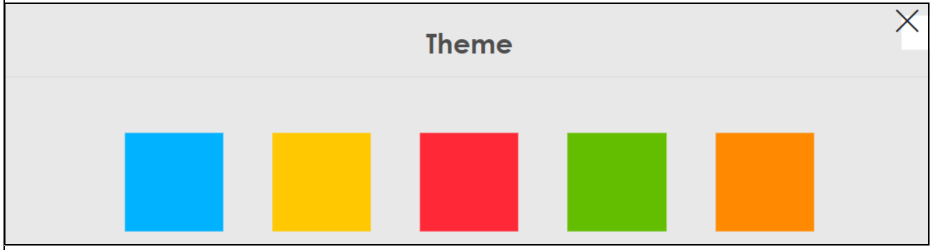
The side bar provides some icons on the right hand side.

Figure 22 Side Bar



The icons provide the following functions.

Table 6 Web Configurator Icons in the Title Bar

ICON	DESCRIPTION
Wizard	**Wizard**: Click this icon to open screens where you can configure the Zyxel Device's time zone and WiFi settings.
Theme	**Theme**: Click this icon to select a color that you prefer and apply it to the Web Configurator. 
Language	**Language**: Select the language you prefer.
Restart	**Restart**: Click this icon to reboot the Zyxel Device without turning the power off.
Logout	**Logout**: Click this icon to log out of the Web Configurator.

3.2.1.2 Navigation Panel

Click the menu icon (☰) to display the navigation panel that contains configuration menus and icons (quick links). Click **X** to close the navigation panel.

Use the menu items on the navigation panel to open screens to configure Zyxel Device features. The following tables describe each menu item.

Figure 23 Navigation Panel

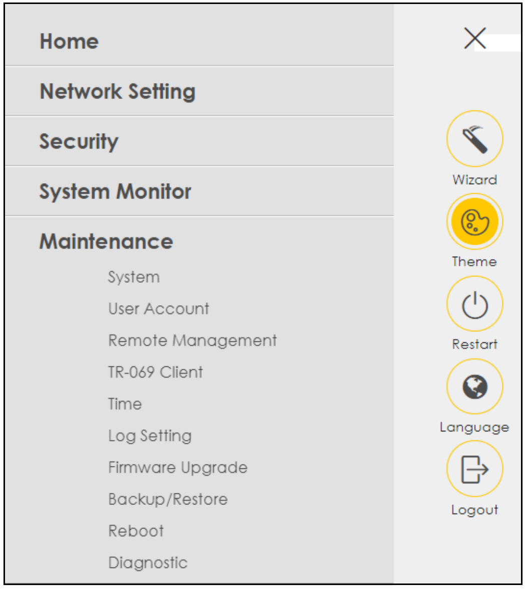


Table 7 Navigation Panel Summary

LINK	TAB	FUNCTION
Connection Status		Use this screen to configure basic Internet access, wireless settings, and parental control settings. This screen also shows the network status of the Zyxel Device and computers/devices connected to it.
Network Setting		
Broadband	Broadband	Use this screen to view and configure ISP parameters, WAN IP address assignment, and other advanced properties. You can also add new WAN connections.
Wireless	General	Use this screen to configure the WiFi settings and WiFi authentication or security settings.
	Guest/More AP	Use this screen to configure multiple BSSs on the Zyxel Device.
	MAC Authentication	Use this screen to block or allow wireless traffic from wireless devices of certain SSIDs and MAC addresses to the Zyxel Device.
	WPS	Use this screen to configure and view your WPS (WiFi Protected Setup) settings.
	WMM	Use this screen to enable or disable WiFi MultiMedia (WMM).
	Others	Use this screen to configure advanced WiFi settings.
	Channel Status	Use this screen to scan WiFi channel noises and view the results.
	Mesh	Use this screen to enable or disable Mesh.
Home Networking	LAN Setup	Use this screen to configure LAN TCP/IP settings, and other advanced properties.
	Static DHCP	Use this screen to assign specific IP addresses to individual MAC addresses.
	UPnP	Use this screen to turn UPnP and UPnP NAT-T on or off.
	Additional Subnet	Use this screen to configure IP alias and public static IP.
	Wake on LAN	Use this screen to remotely turn on a device on the local network.

Table 7 Navigation Panel Summary (continued)

LINK	TAB	FUNCTION
	TFTP Server Name	Use DHCP option 66 to identify a TFTP server name.
NAT	Port Forwarding	Use this screen to make your local servers visible to the outside world.
	Port Triggering	Use this screen to change your Zyxel Device’s port triggering settings.
	DMZ	Use this screen to configure a default server which receives packets from ports that are not specified in the **Port Forwarding** screen.
	ALG	Use this screen to enable the ALGs (Application Layer Gateways) in the Zyxel Device to allow applications to operate through NAT.
	Address Mapping	Use this screen to change your Zyxel Device's IP address mapping settings.
	Sessions	Use this screen to configure the maximum number of NAT sessions each client host is allowed to have through the Zyxel Device.
DNS	DNS Entry	Use this screen to view and configure DNS routes.
	Dynamic DNS	Use this screen to allow a static hostname alias for a dynamic IP address.
Security		
Firewall	General	Use this screen to configure the security level of your firewall.
	Protocol	Use this screen to add Internet services and configure firewall rules.
	Access Control	Use this screen to enable specific traffic directions for network services.
	DoS	Use this screen to activate protection against Denial of Service (DoS) attacks.
Home Security	Connected Home Security	Use this screen to set up a URL filter that blocks users on your network from accessing certain websites.
Parental Control	Parental Control	Use this screen to define time periods and days during which the Zyxel Device performs parental control and/or block web sites with the specific URL.
Scheduler Rule	Scheduler Rule	Use this screen to configure the days and times when a configured restriction (such as parental control) is enforced.
System Monitor		
Log	System Log	Use this screen to view the status of events that occurred to the Zyxel Device. You can export or email the logs.
	Security Log	Use this screen to view all security related events. You can select the level and category of the security events in their proper drop-down list window. Levels include: • Emergency • Alert • Critical • Error • Warning • Notice • Informational • Debugging Categories include: • Account • Attack • Firewall • MAC Filter
Traffic Status	WAN	Use this screen to view the status of all network traffic going through the WAN port of the Zyxel Device.

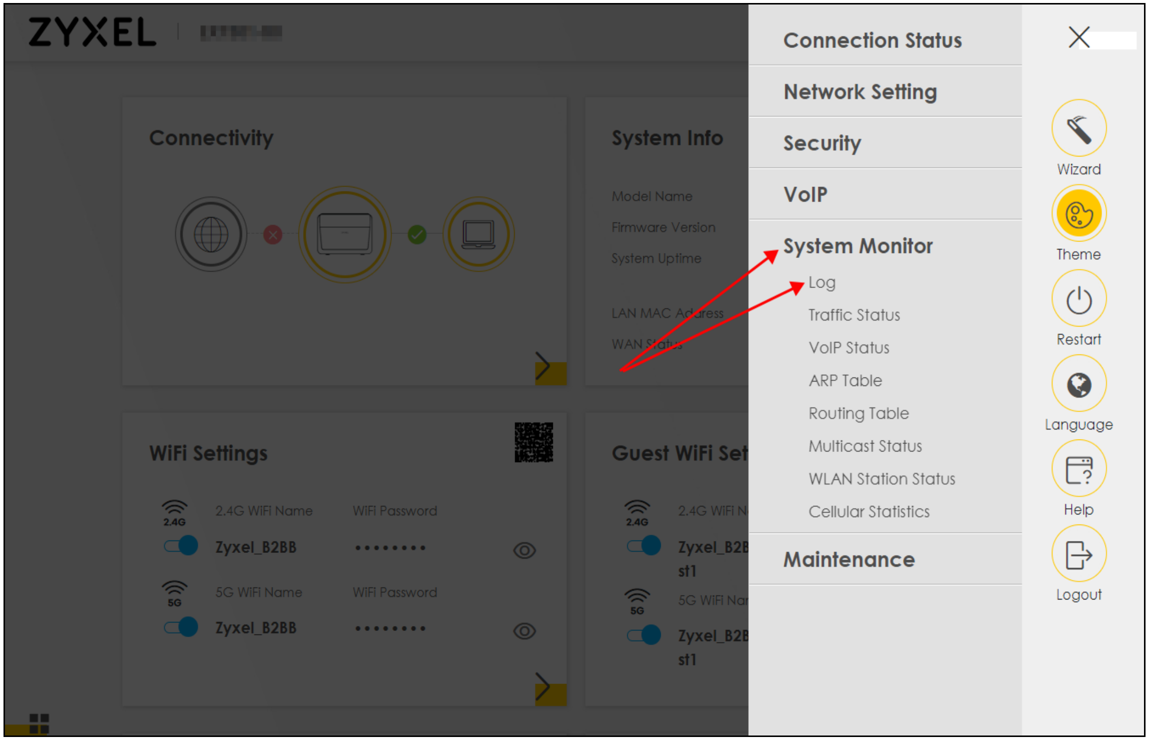
Table 7   Navigation Panel Summary (continued)

LINK	TAB	FUNCTION
	LAN	Use this screen to view the status of all network traffic going through the LAN ports of the Zyxel Device.
	NAT	Use this screen to view NAT statistics for connected hosts.
ARP Table	ARP Table	Use this screen to view the ARP table. It displays the IP and MAC address of each DHCP connection.
Routing Table	Routing Table	Use this screen to view the routing table on the Zyxel Device.
WLAN Station Status	WLAN Station Status	Use this screen to view the wireless stations that are currently associated to the Zyxel Device's WiFi.
Maintenance		
System	System	Use this screen to set the Zyxel Device name and Domain name.
User Account	User Account	Use this screen to change the user password on the Zyxel Device.
Remote Management	MGMT Services	Use this screen to enable specific traffic directions for network services.
	Trust Domain	Use this screen to view a list of public IP addresses which are allowed to access the Zyxel Device through the services configured in the **Maintenance** > **Remote Management** screen.
Time	Time	Use this screen to change your Zyxel Device's time and date.
E-mail Notification	E-mail Notification	Use this screen to configure up to two mail servers and sender addresses on the Zyxel Device.
Log Setting	Log Setting	Use this screen to change your Zyxel Device's log settings.
Backup/Restore	Backup/Restore	Use this screen to backup and restore your Zyxel Device's configuration (settings) or reset the factory default settings.
Reboot	Reboot	Use this screen to reboot the Zyxel Device without turning the power off.
Diagnostic	Ping&Traceroute &Nslookup	Use this screen to identify problems with the Zyxel Device. You can use Ping, TraceRoute, or Nslookup to help you identify problems.

3.2.1.3 Dashboard

Use the menu items in the navigation panel on the right to open screens to configure the Zyxel Device's features.

Figure 24 Navigation Panel

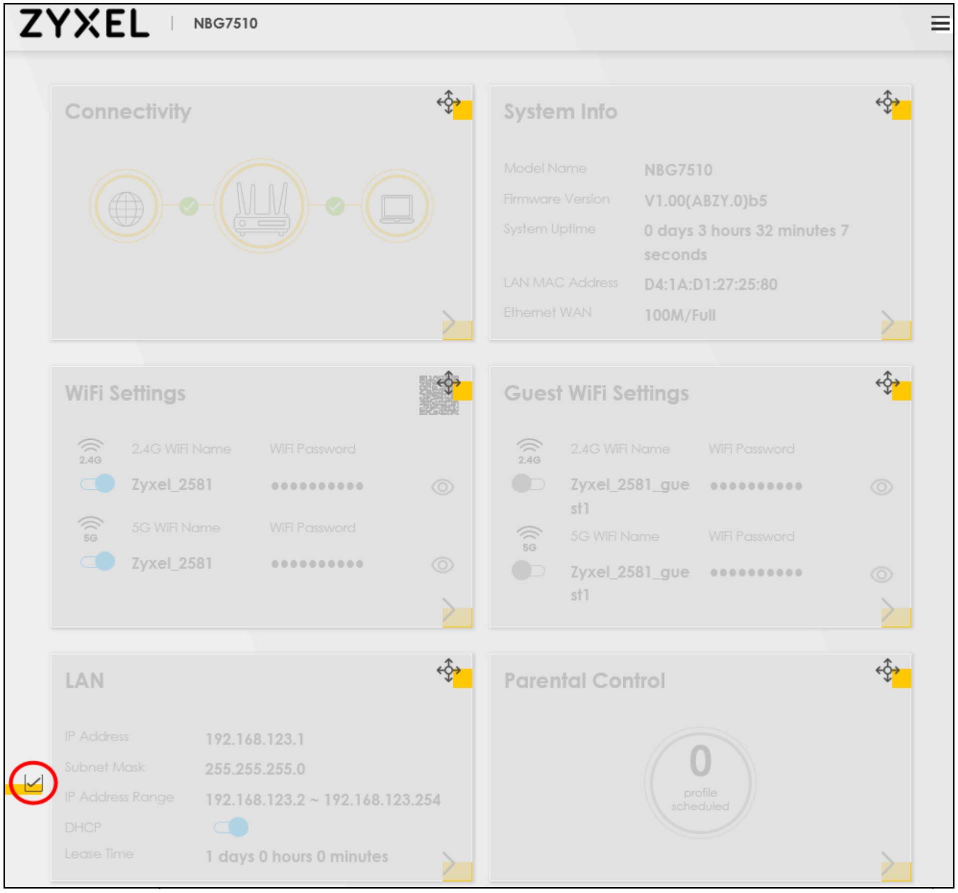


3.2.2 Widget Icon

Click the Widget icon (▦) in the lower left corner to arrange the screen order.

The following screen appears. Select a block and hold it to move around. Click the Check icon (☑) in the lower left corner to save the changes.

Figure 25 Check Icon



Connectivity

System Info

Model Name	NBG7510
Firmware Version	V1.00(ABZY.0)b5
System Uptime	0 days 3 hours 32 minutes 7 seconds
LAN MAC Address	D4:1A:D1:27:25:80
Ethernet WAN	100M/Full

WiFi Settings

2.4G WiFi Name	WiFi Password
Zyxel_2581	●●●●●●●●●●
5G WiFi Name	WiFi Password
Zyxel_2581	●●●●●●●●●●

Guest WiFi Settings

2.4G WiFi Name	WiFi Password
Zyxel_2581_guest1	●●●●●●●●●●
5G WiFi Name	WiFi Password
Zyxel_2581_guest1	●●●●●●●●●●

LAN

IP Address	192.168.123.1
Subnet Mask	255.255.255.0
IP Address Range	192.168.123.2 ~ 192.168.123.254
DHCP	
Lease Time	1 days 0 hours 0 minutes

Parental Control

0 profile scheduled

CHAPTER 4 Quick Start

4.1 Quick Start Overview

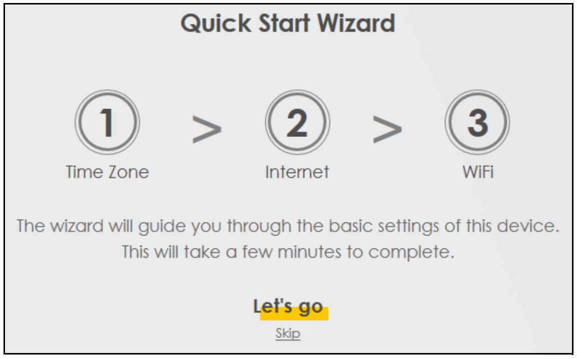
Use the **Wizard** screens to configure the Zyxel Device's time zone and WiFi settings.

Note: See the technical reference chapters for background information on the features in this chapter.

4.2 Quick Start Setup

You can click the **Wizard** icon in the side bar to open the **Wizard** screens. After you click the **Wizard** icon, the following screen appears. Click **Let's go** to proceed with settings on time zone and WiFi networks. It will take you a few minutes to complete the settings on the **Wizard** screens. You can click **Skip** to leave the **Wizard** screens.

Figure 26 Wizard – Home

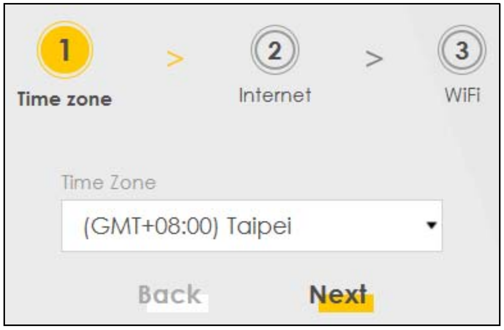


The wizard will guide you through the basic settings of this device. This will take a few minutes to complete.

4.3 Quick Start Setup – Time Zone

Select the time zone of the Zyxel Device's location. Click **Next**.

Figure 27 Wizard – Time Zone

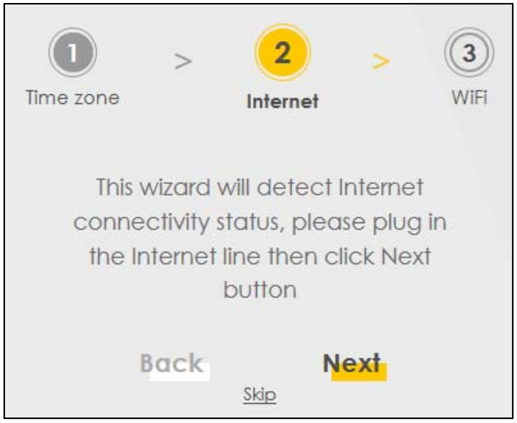


Time Zone: (GMT+08:00) Taipei

4.4 Quick Start Setup – Internet Connection

The Zyxel Device detects your Internet connection status. Click **Next** to continue.

Figure 28 Wizard – Internet

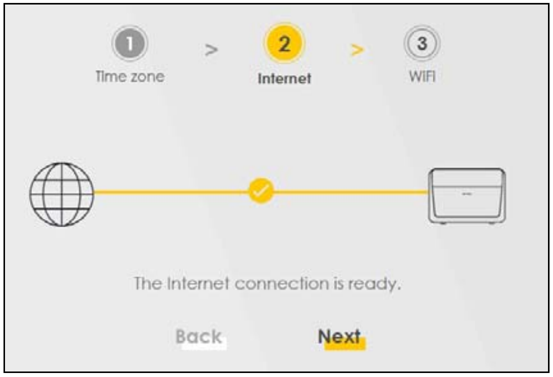


This wizard will detect Internet connectivity status, please plug in the Internet line then click Next button

4.4.1 Successful Internet Connection

The Zyxel Device has Internet access.

Figure 29 Wizard – Successful Internet Connection

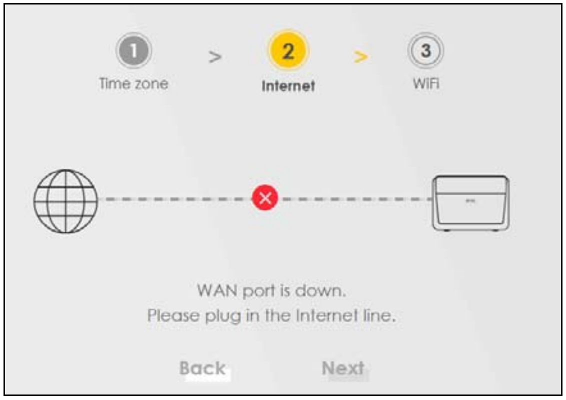


The Internet connection is ready.

4.4.2 Unsuccessful Internet Connection

The Zyxel Device did not detect a WAN connection. See Section 32.4 on page 245 for troubleshooting the Zyxel Device WAN connection.

Figure 30 Wizard – Internet Connection is Down

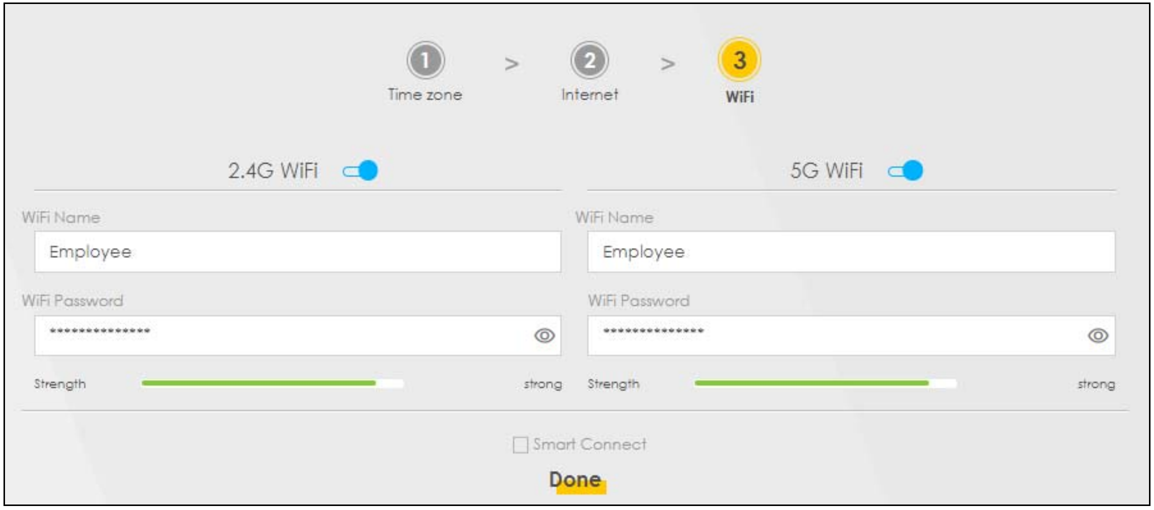


WAN port is down.
Please plug in the Internet line.

4.5 Quick Start Setup – WiFi

Turn WiFi on or off. If you keep it on, record the **WiFi Name** and **Password** in this screen so you can configure your WiFi clients to connect to the Zyxel Device. If you want to show or hide your WiFi password, click the Eye icon (👁).

Figure 31 Wizard – WiFi



2.4G WiFi ●

WiFi Name: Employee

WiFi Password: ***************

5G WiFi ●

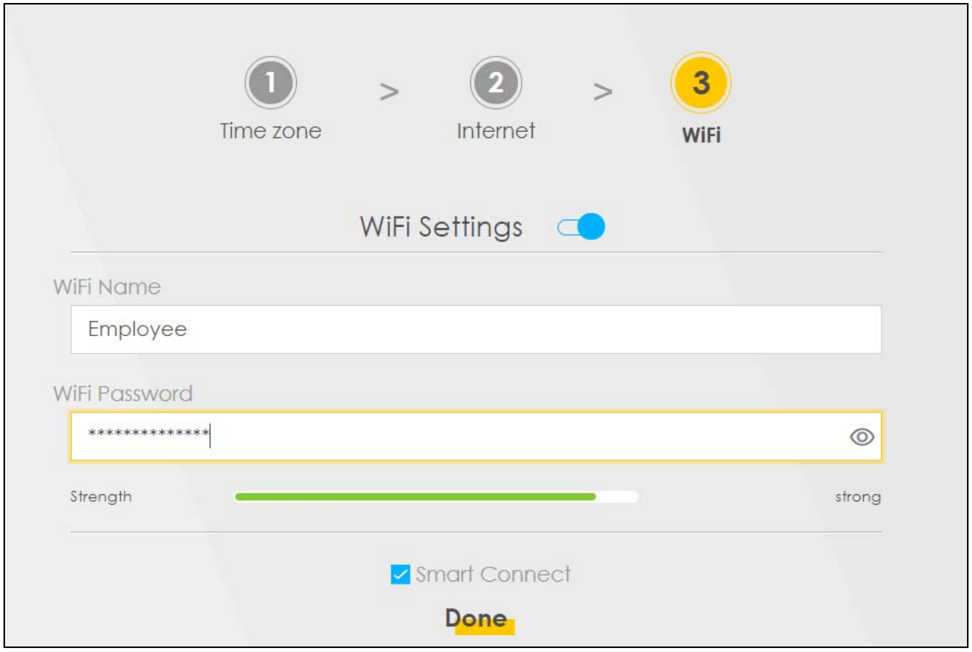
WiFi Name: Employee

WiFi Password: ***************

□ Smart Connect

Click the **Smart Connect** check box to use the same SSID for 2.4G and 5G WiFi networks. Otherwise, clear the check box to have two different SSIDs for 2.4G and 5G WiFi networks. The screen and fields to enter may vary when you select or clear the check box.

Figure 32 Wizard - WiFi – Smart Connect



WiFi Settings

WiFi Name

Employee

WiFi Password

****

Strength strong

☑ Smart Connect

4.6 Quick Start Setup – Finish

Your Zyxel Device saves and applies your settings.

CHAPTER 5
Web Interface Tutorials

5.1 Web Interface Overview

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

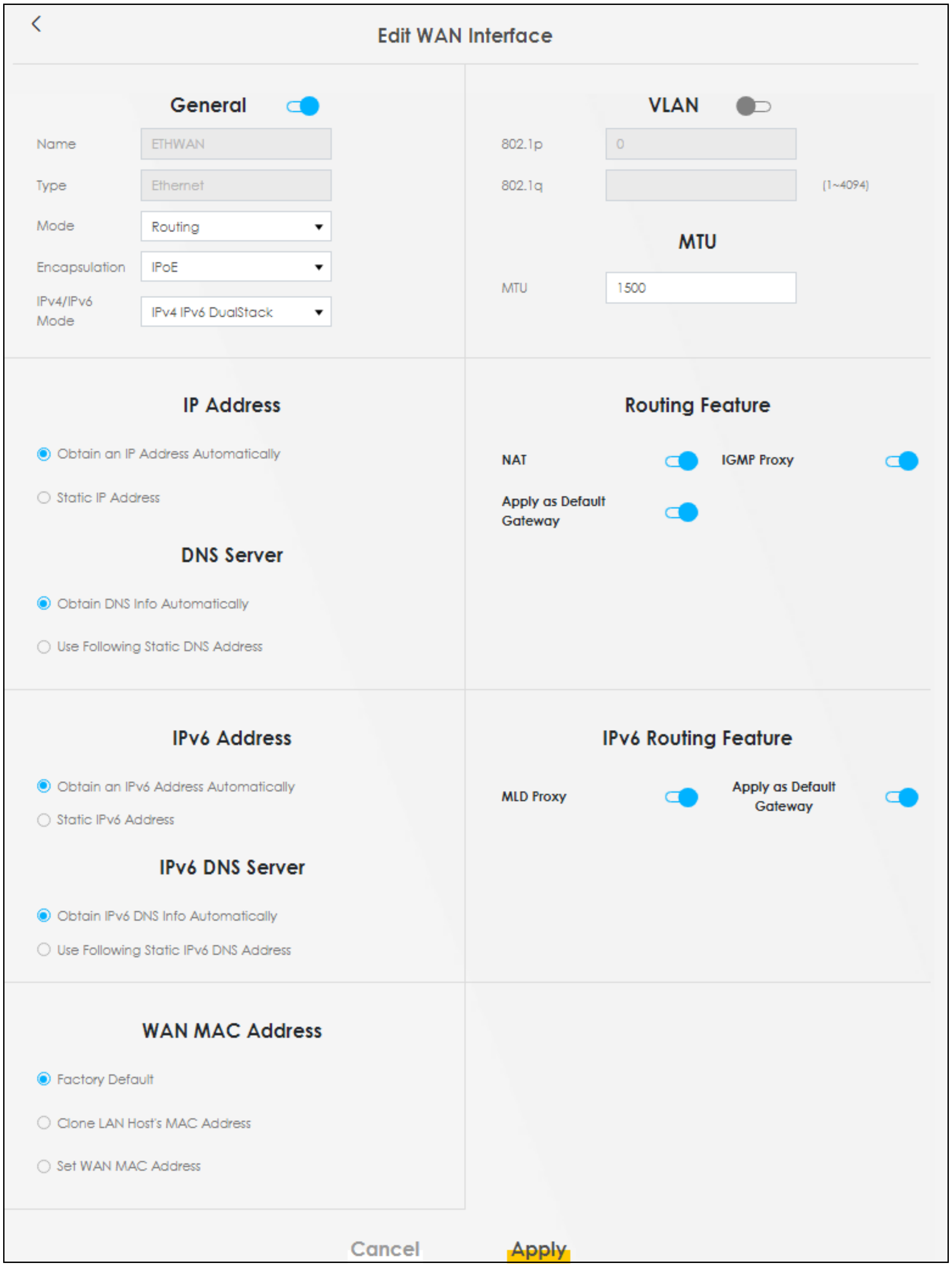
- Wired Network Setup
- WiFi Network Setup
- Network Security
- Device Maintenance

5.2 Wired Network Setup

This section shows you how to set up a wired connection.

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.



Edit WAN Interface

General

Name: ETHWAN

Type: Ethernet

Mode: Routing

Encapsulation: IPoE

IPv4/IPv6 Mode: IPv4 IPv6 DualStack

VLAN

802.1p: 0

802.1q: (1~4094)

MTU

MTU: 1500

IP Address

● Obtain an IP Address Automatically

○ Static IP Address

DNS Server

● Obtain DNS Info Automatically

○ Use Following Static DNS Address

Routing Feature

NAT

IGMP Proxy

Apply as Default Gateway

IPv6 Address

● Obtain an IPv6 Address Automatically

○ Static IPv6 Address

IPv6 DNS Server

● Obtain IPv6 DNS Info Automatically

○ Use Following Static IPv6 DNS Address

IPv6 Routing Feature

MLD Proxy

Apply as Default Gateway

WAN MAC Address

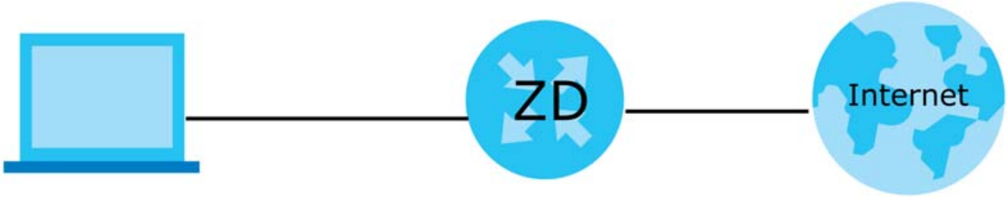
● Factory Default

○ Clone LAN Host's MAC Address

○ Set WAN MAC Address

5.2.1 Setting Up an Ethernet Connection

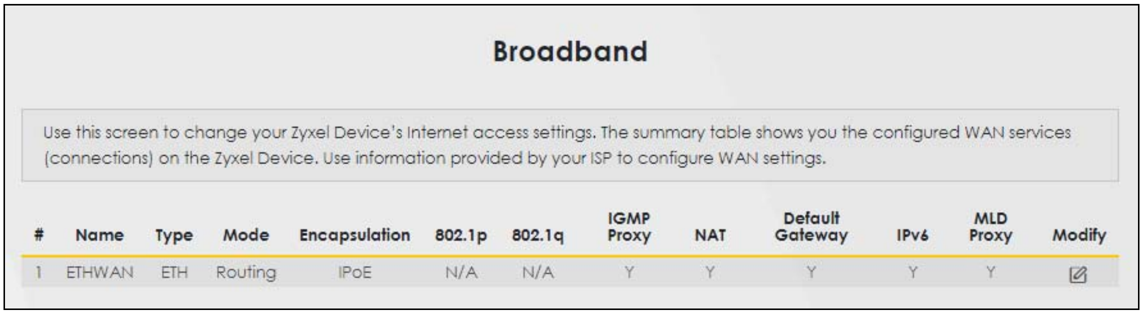
If you connect to the Internet through an Ethernet connection, you need to connect a broadband modem or router with Internet access to the WAN Ethernet port on the Zyxel Device. You need to configure the Internet settings from the broadband modem or router on the Zyxel Device. First, make sure you have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



Broadband

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.

#	Name	Type	Mode	Encapsulation	802.1p	802.1q	IGMP Proxy	NAT	Default Gateway	IPv6	MLD Proxy	Modify
1	ETHWAN	ETH	Routing	IPoE	N/A	N/A	Y	Y	Y	Y	Y	✎

3 To set the Zyxel Device to **Routing** mode, see Section 1 on page 44.

To set the Zyxel Device to **Bridge** mode, see Section 1 on page 45.

Routing Mode

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

General	
Name	My ETH Connection
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.

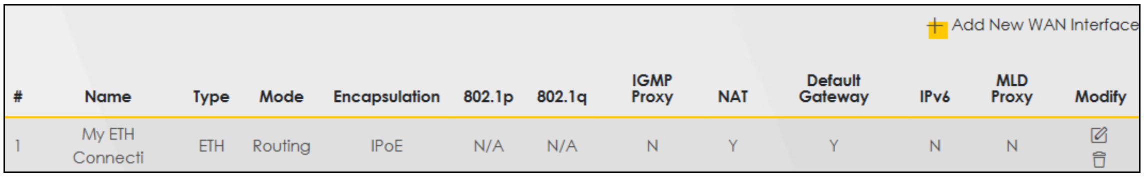
- Enter a **Name** to identify your WAN connection.
- Set the **Type** to **Ethernet**.
- Set your Ethernet connection **Mode** to **Routing**.
- Choose the **Encapsulation** specified by your Internet service provider. For this example, select **IPoE** as the WAN encapsulation type.
- Set the **IPv4/IPv6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



#	Name	Type	Mode	Encapsulation	802.1p	802.1q	IGMP Proxy	NAT	Default Gateway	IPv6	MLD Proxy	Modify
1	My ETH Connecti	ETH	Routing	IPoE	N/A	N/A	N	Y	Y	N	N	

Bridge Mode

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

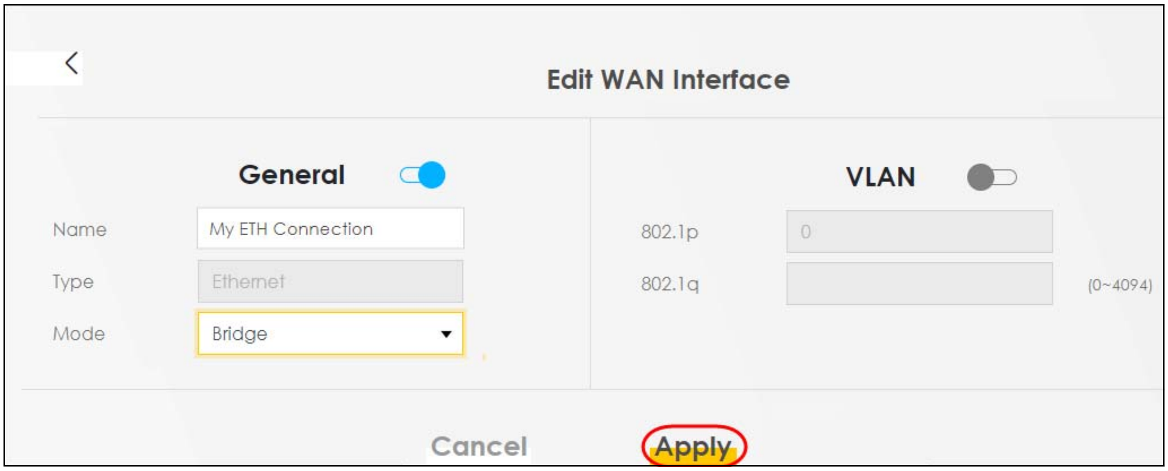
General	
Name	My ETH Connection
Type	Ethernet
Connection Mode	Bridge

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.



Name: My ETH Connection

Type: Ethernet

Mode: Bridge

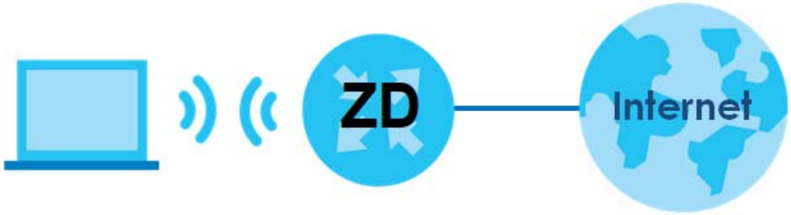
802.1p: 0

802.1q: (0~4094)

5.3 WiFi Network Setup

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 33 WiFi Network Setup



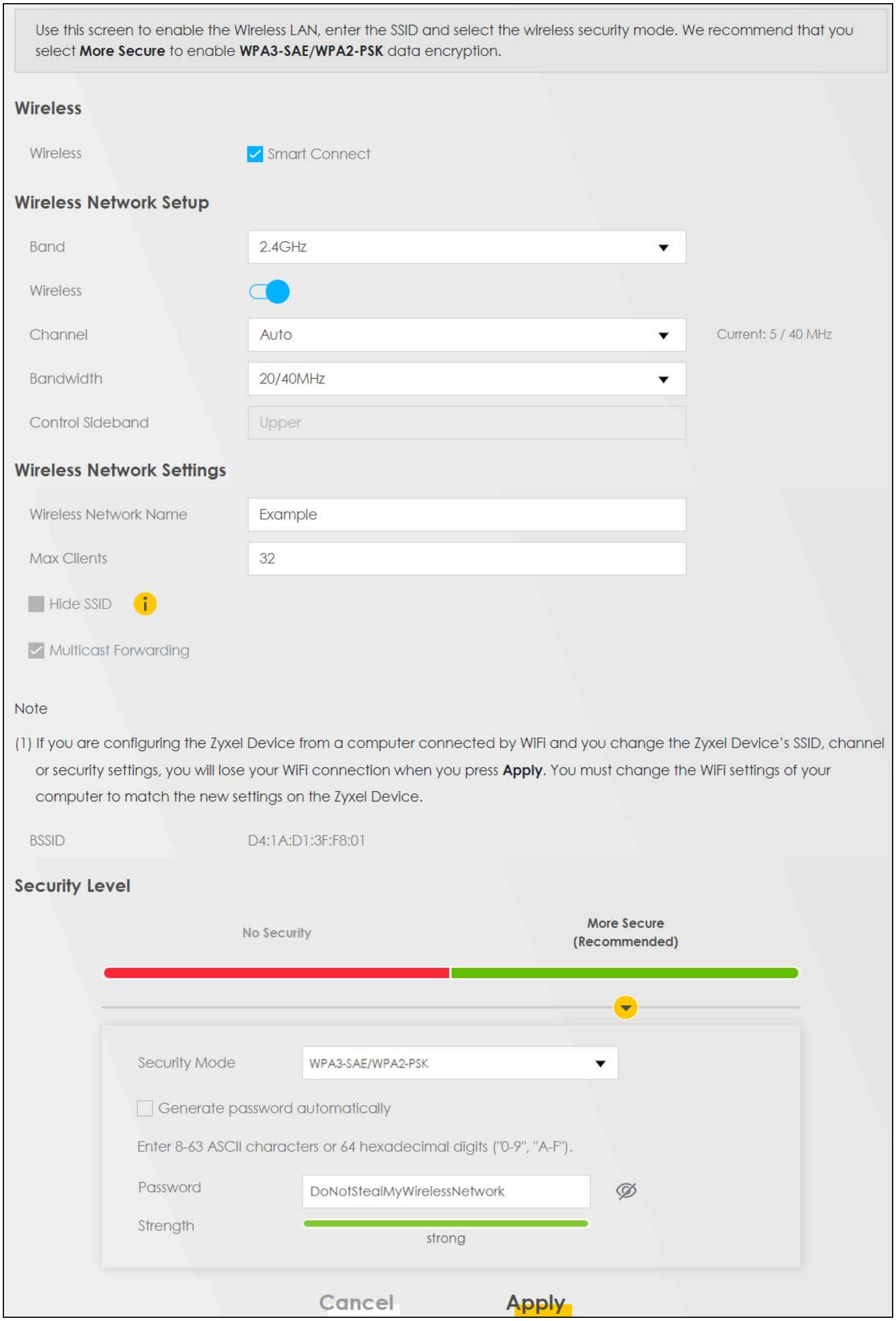
See the label on the Zyxel Device for the WiFi network settings and then connect manually to the Zyxel Device. Alternatively, you can connect to the Zyxel Device WiFi network using WPS. See Section 5.3.2 on page 48.

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**.



Use this screen to enable the Wireless LAN, enter the SSID and select the wireless security mode. We recommend that you select **More Secure** to enable **WPA3-SAE/WPA2-PSK** data encryption.

Wireless

Wireless ☑ Smart Connect

Wireless Network Setup

Band	2.4GHz ▼
Wireless	● (on)
Channel	Auto ▼ — Current: 5 / 40 MHz
Bandwidth	20/40MHz ▼
Control Sideband	Upper

Wireless Network Settings

Wireless Network Name	Example
Max Clients	32

□ Hide SSID

☑ Multicast Forwarding

Note

(1) If you are configuring the Zyxel Device from a computer connected by WiFi and you change the Zyxel Device's SSID, channel or security settings, you will lose your WiFi connection when you press **Apply**. You must change the WiFi settings of your computer to match the new settings on the Zyxel Device.

BSSID D4:1A:D1:3F:F8:01

Security Level

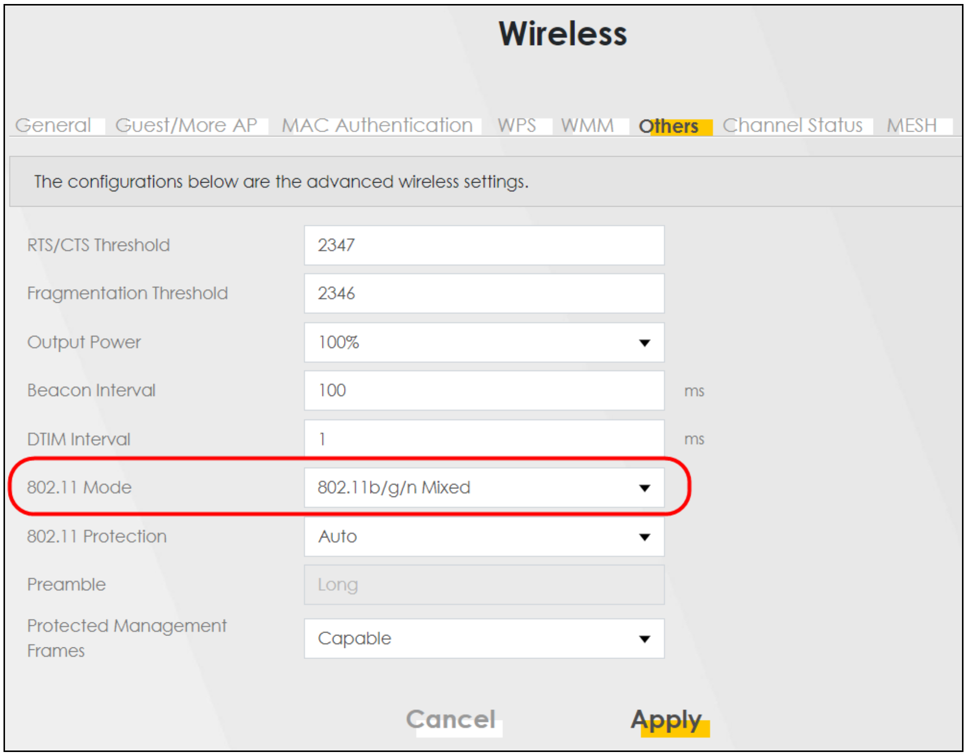
Security Mode	WPA3-SAE/WPA2-PSK ▼

□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password	DoNotStealMyWirelessNetwork
Strength	strong

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



Wireless

The configurations below are the advanced wireless settings.

RTS/CTS Threshold	2347	
Fragmentation Threshold	2346	
Output Power	100%	
Beacon Interval	100	ms
DTIM Interval	1	ms
802.11 Mode	802.11b/g/n Mixed	
802.11 Protection	Auto	
Preamble	Long	
Protected Management Frames	Capable	

You can now use the WPS feature to establish a WiFi connection between your notebook and the Zyxel Device (see Section 5.3.2 on page 48). Now use the new security settings to connect to the Internet through the Zyxel Device using WiFi.

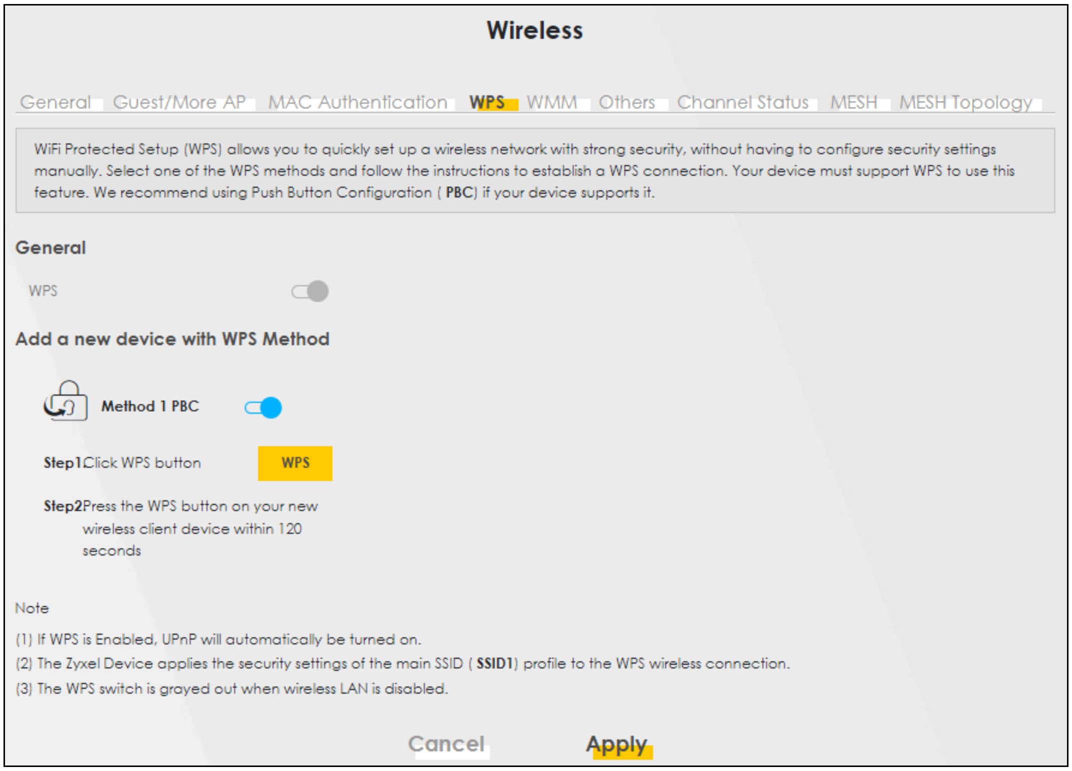
5.3.2 WPS Push Button Configuration (PBC)

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**.



Wireless

WiFi Protected Setup (WPS) allows you to quickly set up a wireless network with strong security, without having to configure security settings manually. Select one of the WPS methods and follow the instructions to establish a WPS connection. Your device must support WPS to use this feature. We recommend using Push Button Configuration (**PBC**) if your device supports it.

General

WPS

Add a new device with WPS Method

Method 1 PBC

Step1 Click WPS button

Step2 Press the WPS button on your new wireless client device within 120 seconds

Note

(1) If WPS is Enabled, UPnP will automatically be turned on.

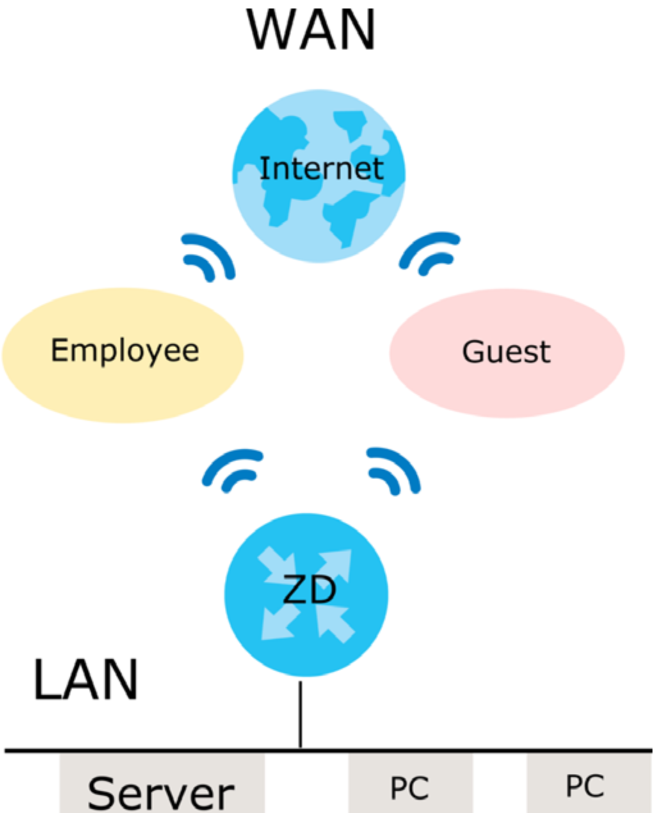
(2) The Zyxel Device applies the security settings of the main SSID (**SSID1**) profile to the WPS wireless connection.

(3) The WPS switch is grayed out when wireless LAN is disabled.

4 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**.

5.3.3 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.

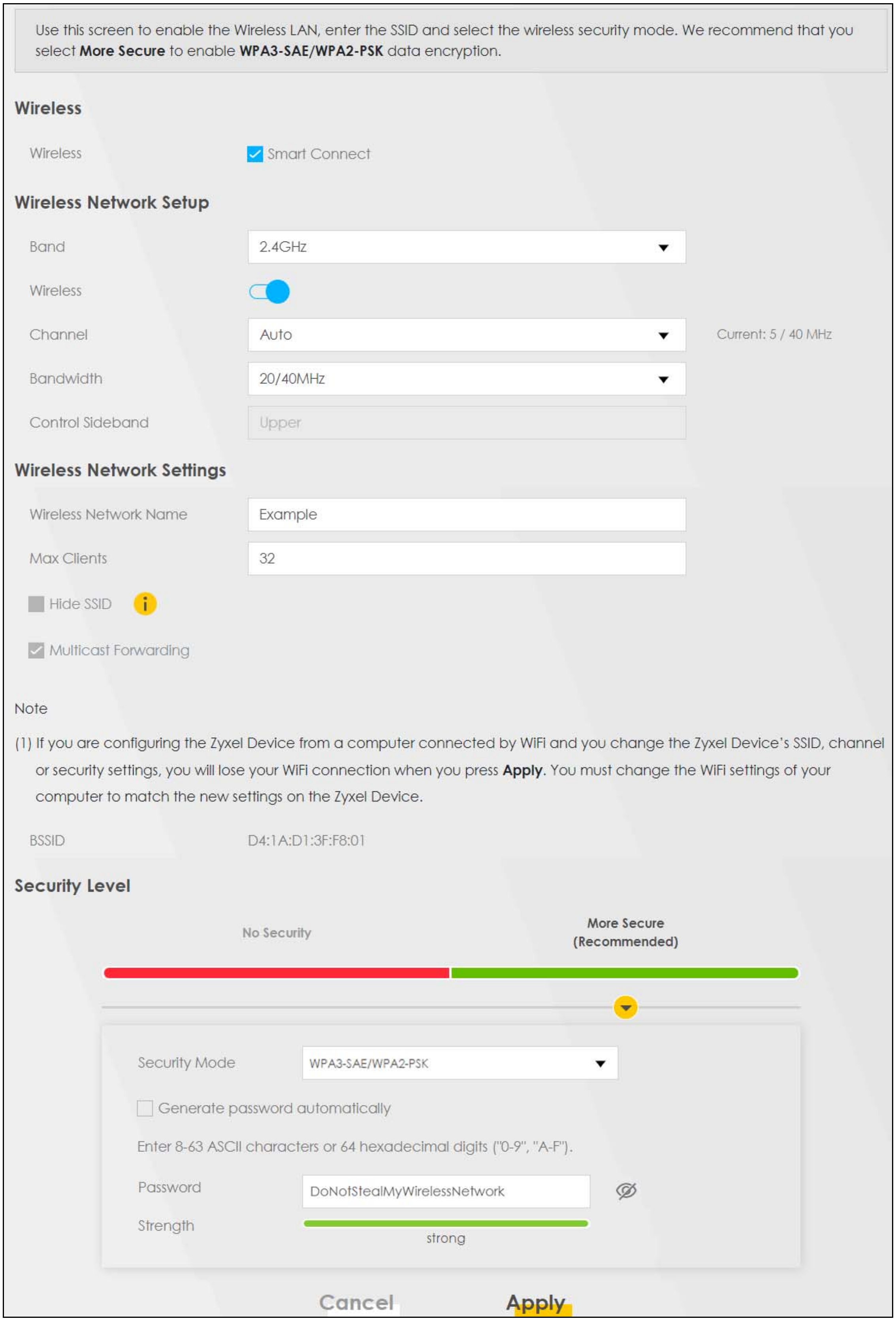


- Employees using the **General** WiFi network group will have access to the local network and the Internet.
- Visitors using the **Guest** WiFi network group with a different SSID and password will have access to the Internet only.

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

1 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 **Smart Connect** to use the same SSID and password. Clear it if you want to configure different SSIDs and passwords for 2.4G and 5G bands.



Use this screen to enable the Wireless LAN, enter the SSID and select the wireless security mode. We recommend that you select **More Secure** to enable **WPA3-SAE/WPA2-PSK** data encryption.

Wireless

Wireless ☑ Smart Connect

Wireless Network Setup

Band	2.4GHz	
Wireless	On	
Channel	Auto	Current: 5 / 40 MHz
Bandwidth	20/40MHz	
Control Sideband	Upper	

Wireless Network Settings

Wireless Network Name	Example
Max Clients	32

□ Hide SSID

☑ Multicast Forwarding

Note

(1) If you are configuring the Zyxel Device from a computer connected by WiFi and you change the Zyxel Device's SSID, channel or security settings, you will lose your WiFi connection when you press **Apply**. You must change the WiFi settings of your computer to match the new settings on the Zyxel Device.

BSSID D4:1A:D1:3F:F8:01

Security Level

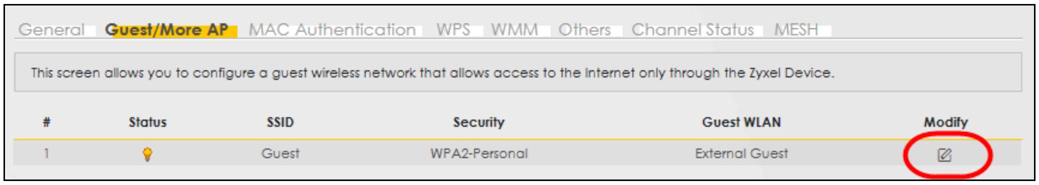
Security Mode	WPA3-SAE/WPA2-PSK

□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password	DoNotStealMyWirelessNetwork
Strength	strong

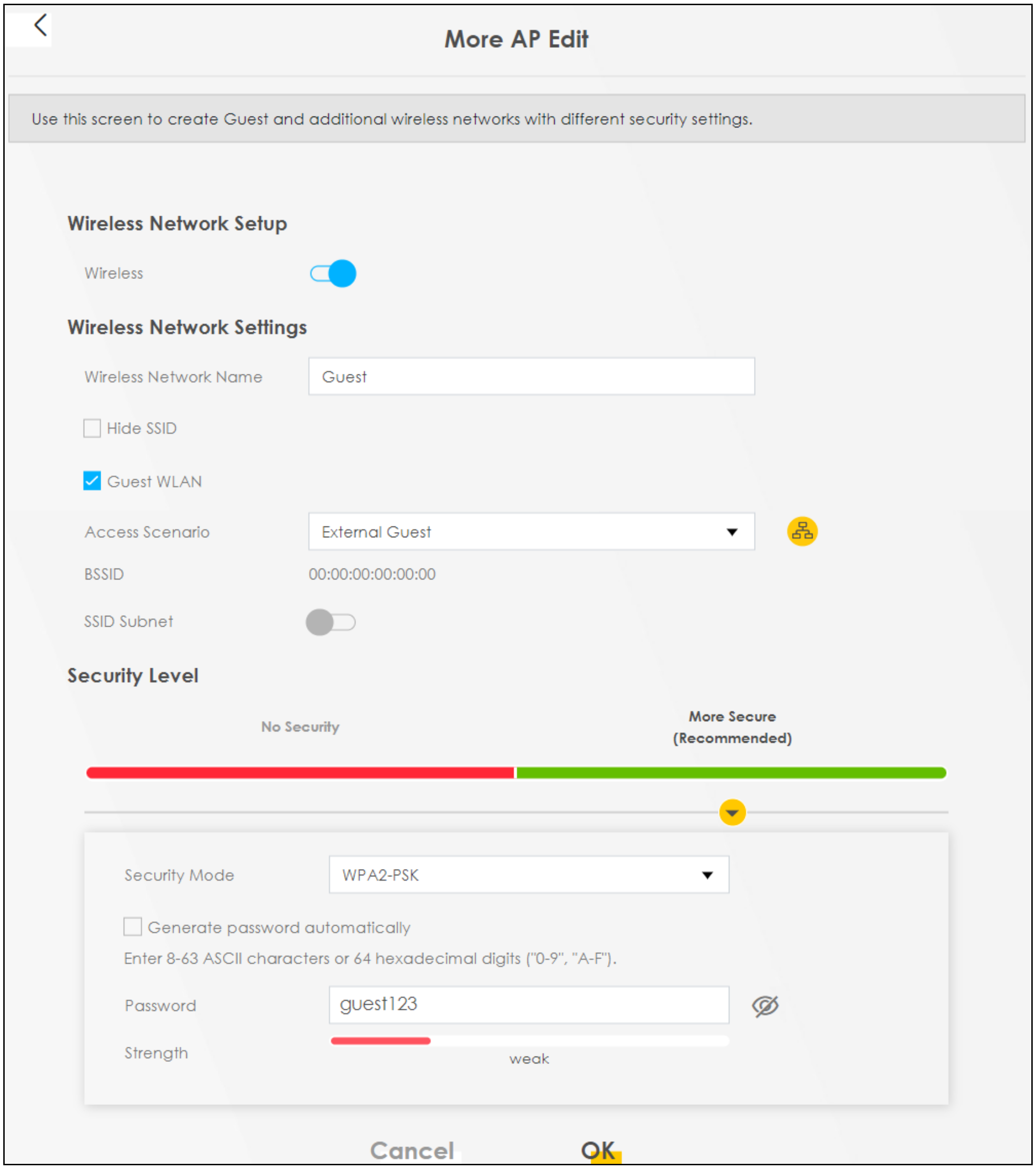
2 Go to the **Network Setting** > **Wireless** > **Guest/More AP** screen. Click the **Modify** icon to configure the second WiFi network group.



This screen allows you to configure a guest wireless network that allows access to the Internet only through the Zyxel Device.

#	Status	SSID	Security	Guest WLAN	Modify
1	💡	Guest	WPA2-Personal	External Guest	✎

3 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

Use this screen to create Guest and additional wireless networks with different security settings.

Wireless Network Setup

Wireless: On

Wireless Network Settings

Wireless Network Name: Guest

□ Hide SSID

☑ Guest WLAN

Access Scenario: External Guest

BSSID: 00:00:00:00:00:00

SSID Subnet: Off

Security Level

No Security — More Secure (Recommended)

Security Mode: WPA2-PSK

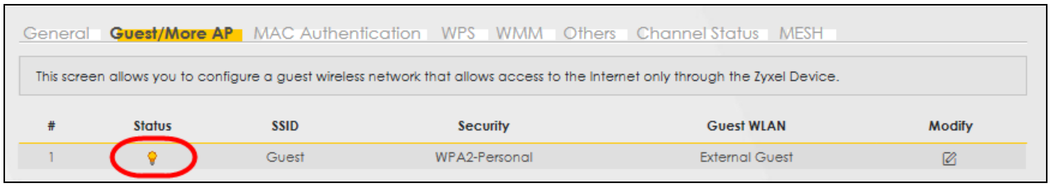
□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password: guest123

Strength: weak

4 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.

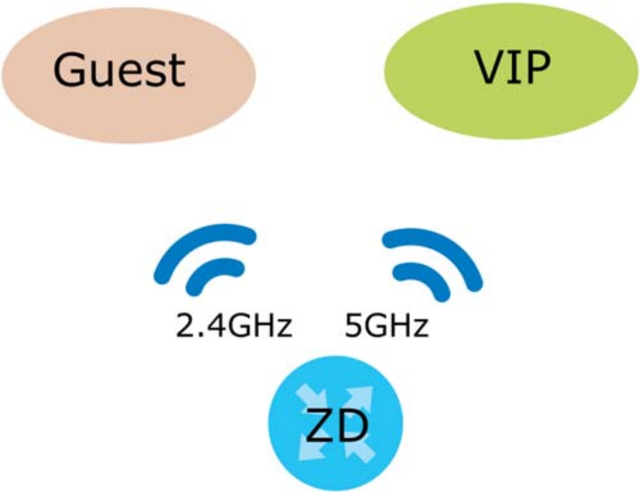


This screen allows you to configure a guest wireless network that allows access to the Internet only through the Zyxel Device.

#	Status	SSID	Security	Guest WLAN	Modify
1	💡	Guest	WPA2-Personal	External Guest	✎

5.3.4 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.

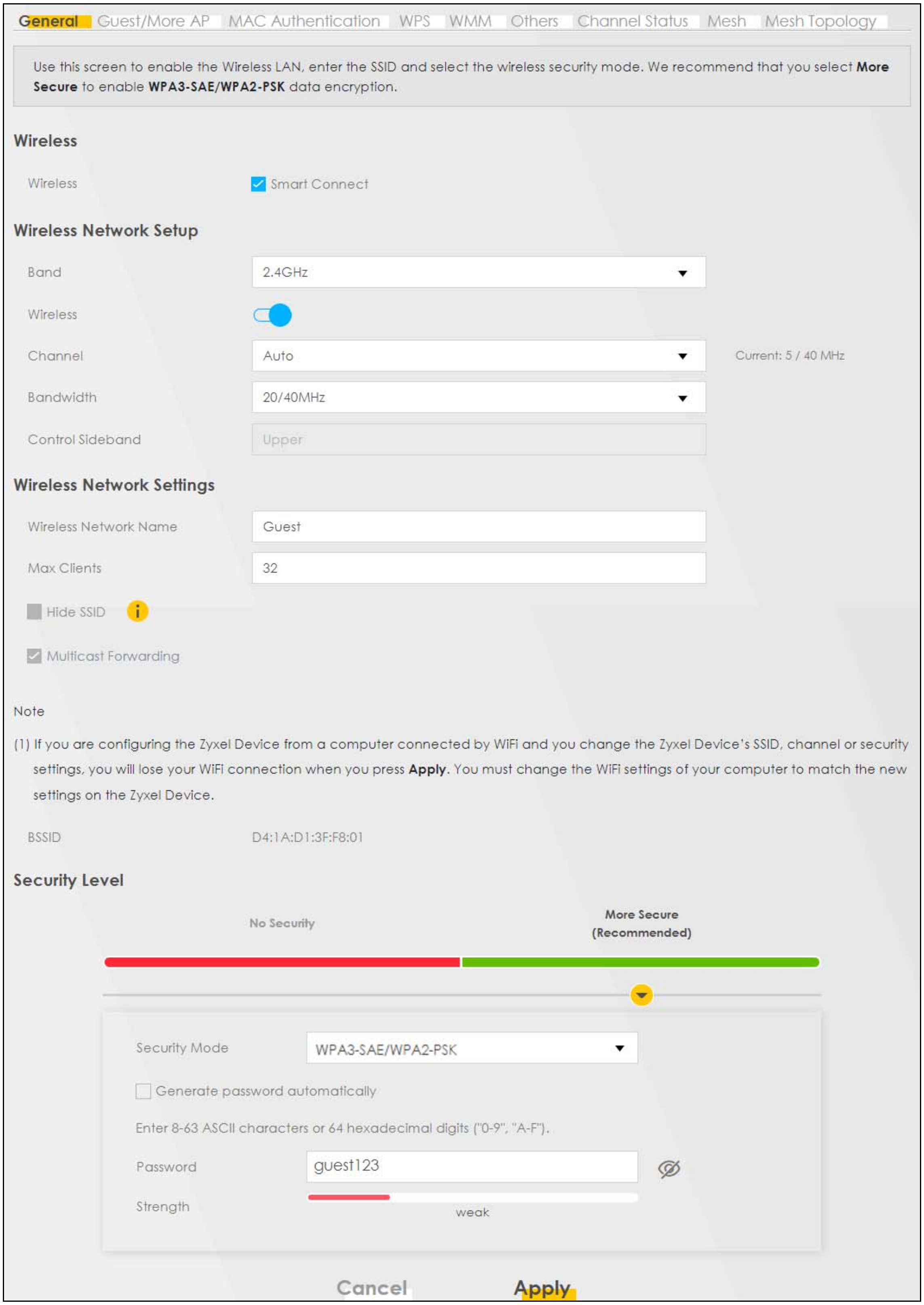
The Company will use the following parameters to set up the WiFi network groups.

Table 8 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 **Smart Connect** is enabled.



Use this screen to enable the Wireless LAN, enter the SSID and select the wireless security mode. We recommend that you select **More Secure** to enable **WPA3-SAE/WPA2-PSK** data encryption.

Wireless

Wireless ☑ Smart Connect

Wireless Network Setup

Band	2.4GHz
Wireless	On
Channel	Auto (Current: 5 / 40 MHz)
Bandwidth	20/40MHz
Control Sideband	Upper

Wireless Network Settings

Wireless Network Name	Guest
Max Clients	32

□ Hide SSID

☑ Multicast Forwarding

Note

(1) If you are configuring the Zyxel Device from a computer connected by WiFi and you change the Zyxel Device's SSID, channel or security settings, you will lose your WiFi connection when you press **Apply**. You must change the WiFi settings of your computer to match the new settings on the Zyxel Device.

BSSID D4:1A:D1:3F:F8:01

Security Level

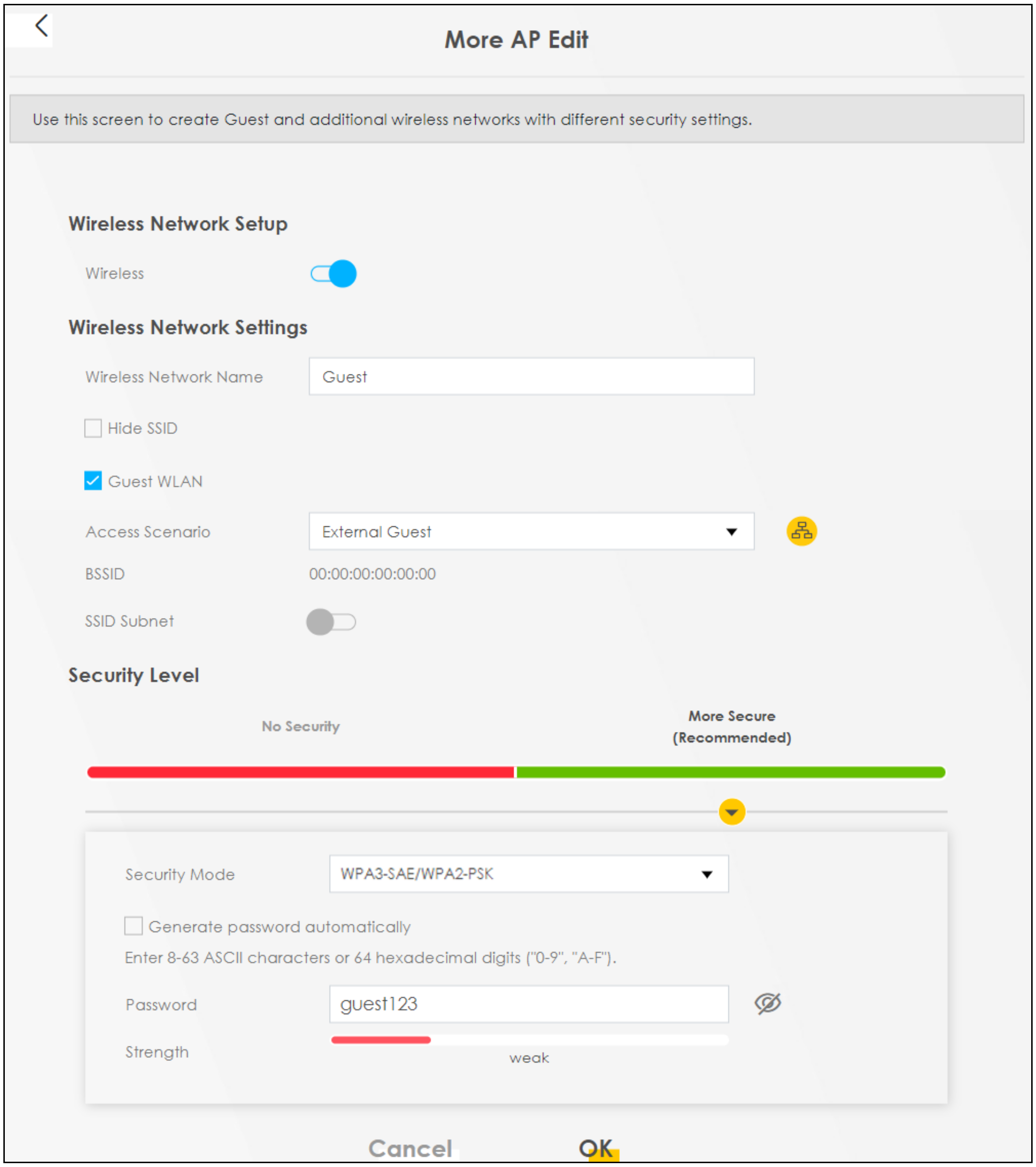
Security Mode	WPA3-SAE/WPA2-PSK

□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password	guest123
Strength	weak

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**.



More AP Edit

Use this screen to create Guest and additional wireless networks with different security settings.

Wireless Network Setup

Wireless: On

Wireless Network Settings

Wireless Network Name: Guest

□ Hide SSID

☑ Guest WLAN

Access Scenario: External Guest

BSSID: 00:00:00:00:00:00

SSID Subnet: Off

Security Level

Security Mode: WPA3-SAE/WPA2-PSK

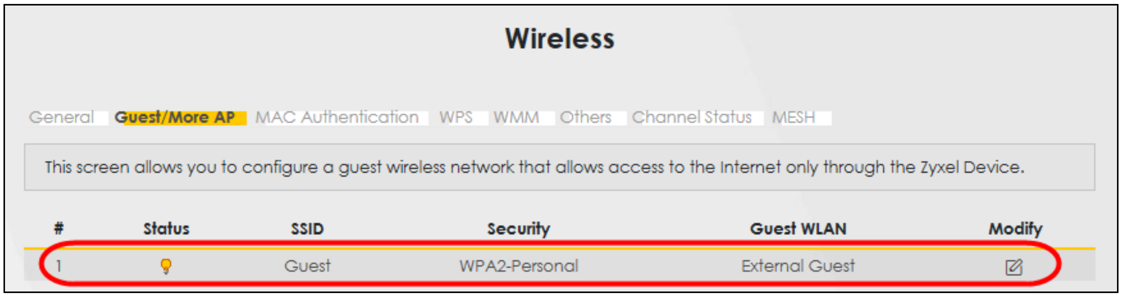
□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password: guest123

Strength: weak

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

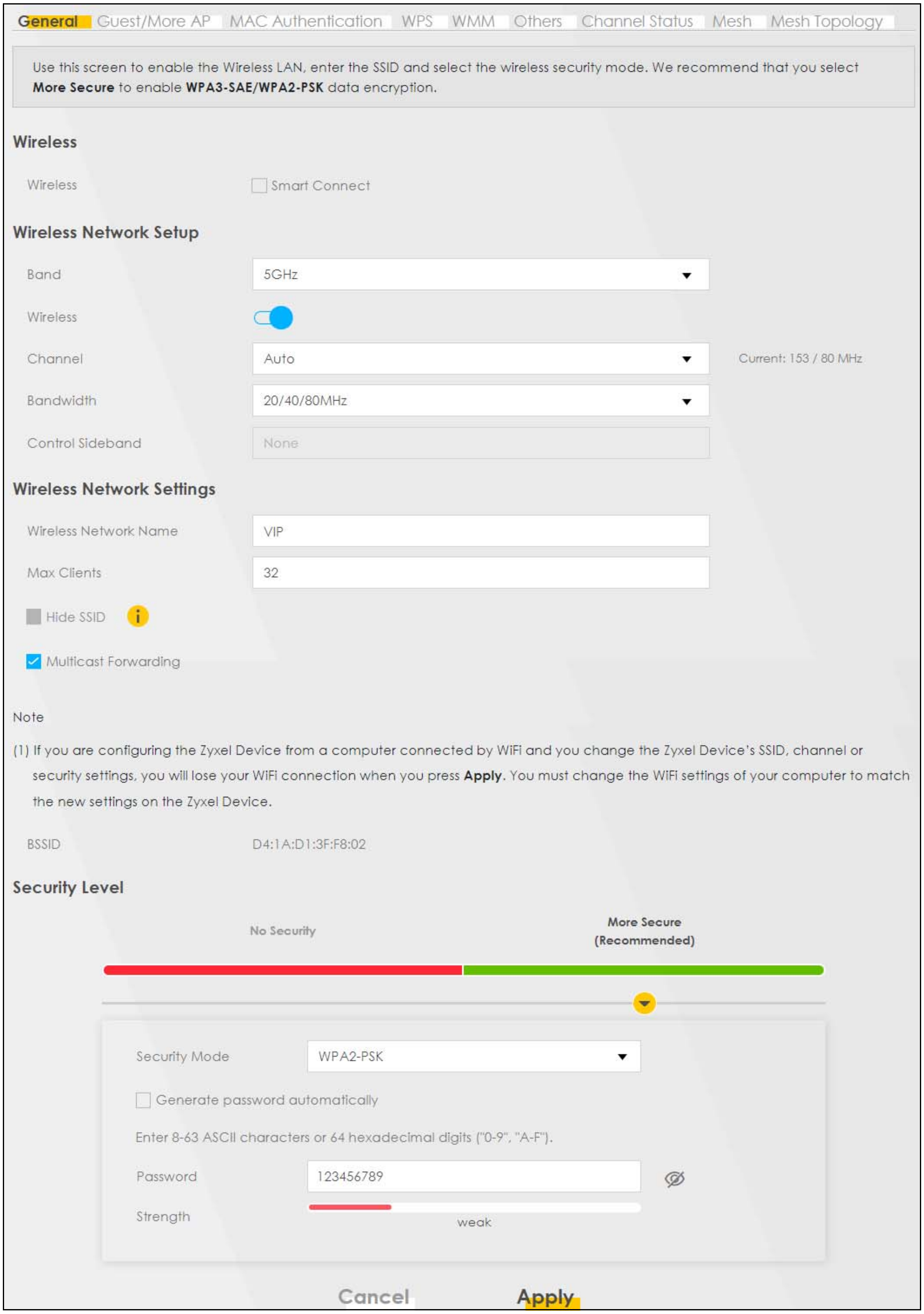


Wireless

This screen allows you to configure a guest wireless network that allows access to the Internet only through the Zyxel Device.

#	Status	SSID	Security	Guest WLAN	Modify
1	💡	Guest	WPA2-Personal	External Guest	✎

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



Use this screen to enable the Wireless LAN, enter the SSID and select the wireless security mode. We recommend that you select **More Secure** to enable **WPA3-SAE/WPA2-PSK** data encryption.

Wireless

Wireless □ Smart Connect

Wireless Network Setup

Band	5GHz ▾	
Wireless	●	
Channel	Auto ▾	Current: 153 / 80 MHz
Bandwidth	20/40/80MHz ▾	
Control Sideband	None	

Wireless Network Settings

Wireless Network Name	VIP
Max Clients	32

□ Hide SSID

☑ Multicast Forwarding

Note

(1) If you are configuring the Zyxel Device from a computer connected by WiFi and you change the Zyxel Device's SSID, channel or security settings, you will lose your WiFi connection when you press **Apply**. You must change the WiFi settings of your computer to match the new settings on the Zyxel Device.

BSSID D4:1A:D1:3F:F8:02

Security Level

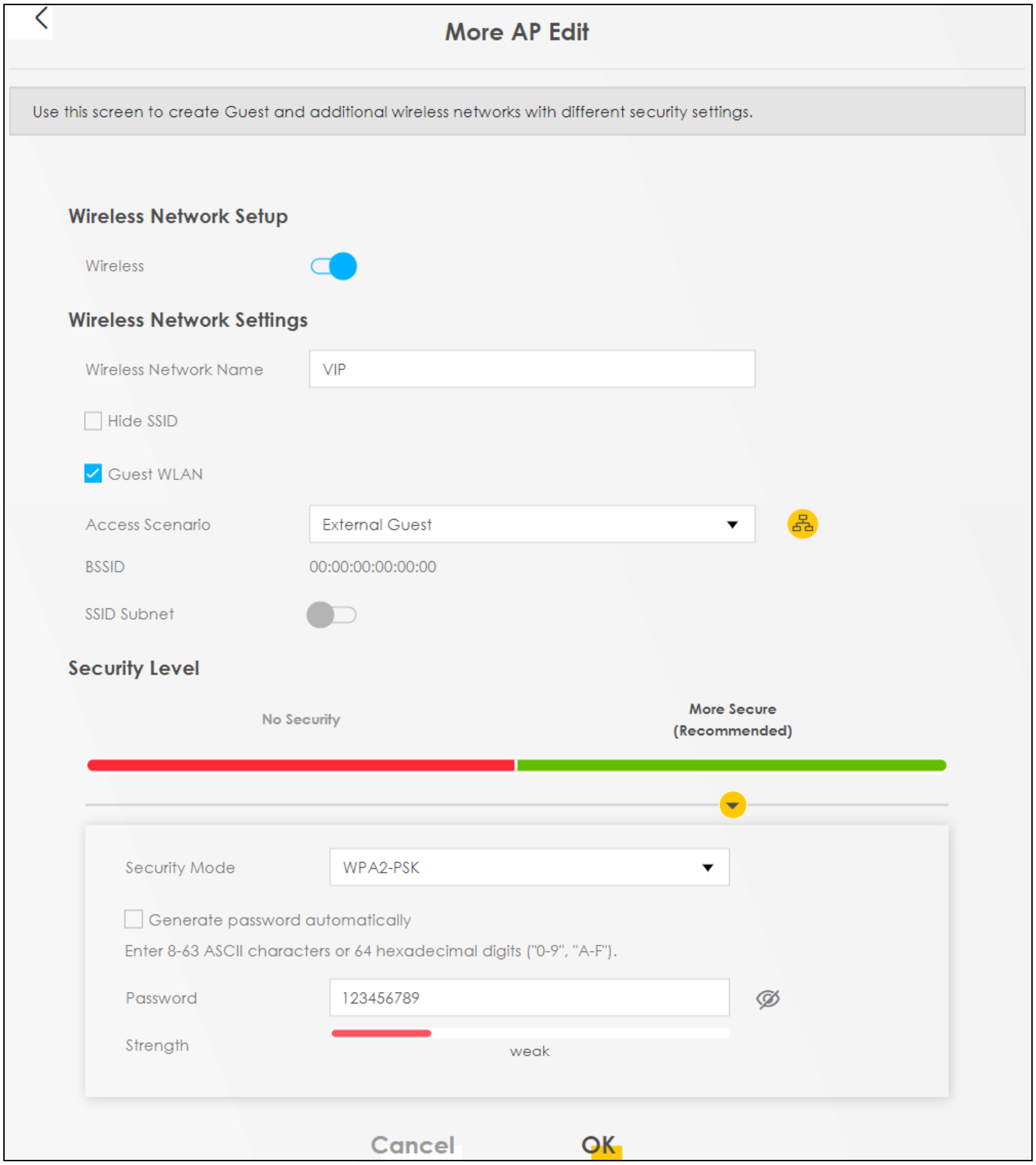
Security Mode	WPA2-PSK ▾

□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password	123456789
Strength	weak

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**.



More AP Edit

Use this screen to create Guest and additional wireless networks with different security settings.

Wireless Network Setup

Wireless: On

Wireless Network Settings

Wireless Network Name: VIP

□ Hide SSID

☑ Guest WLAN

Access Scenario: External Guest

BSSID: 00:00:00:00:00:00

SSID Subnet: Off

Security Level

No Security — More Secure (Recommended)

Security Mode: WPA2-PSK

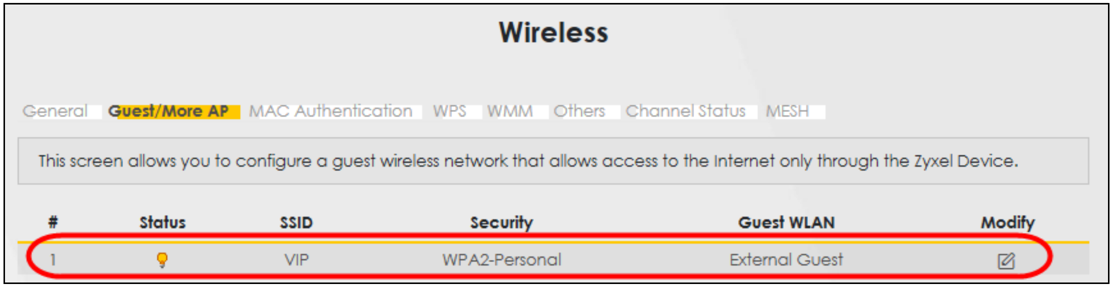
□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password: 123456789

Strength: weak

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



Wireless

This screen allows you to configure a guest wireless network that allows access to the Internet only through the Zyxel Device.

#	Status	SSID	Security	Guest WLAN	Modify
1	●	VIP	WPA2-Personal	External Guest	✎

5.4 Network Security

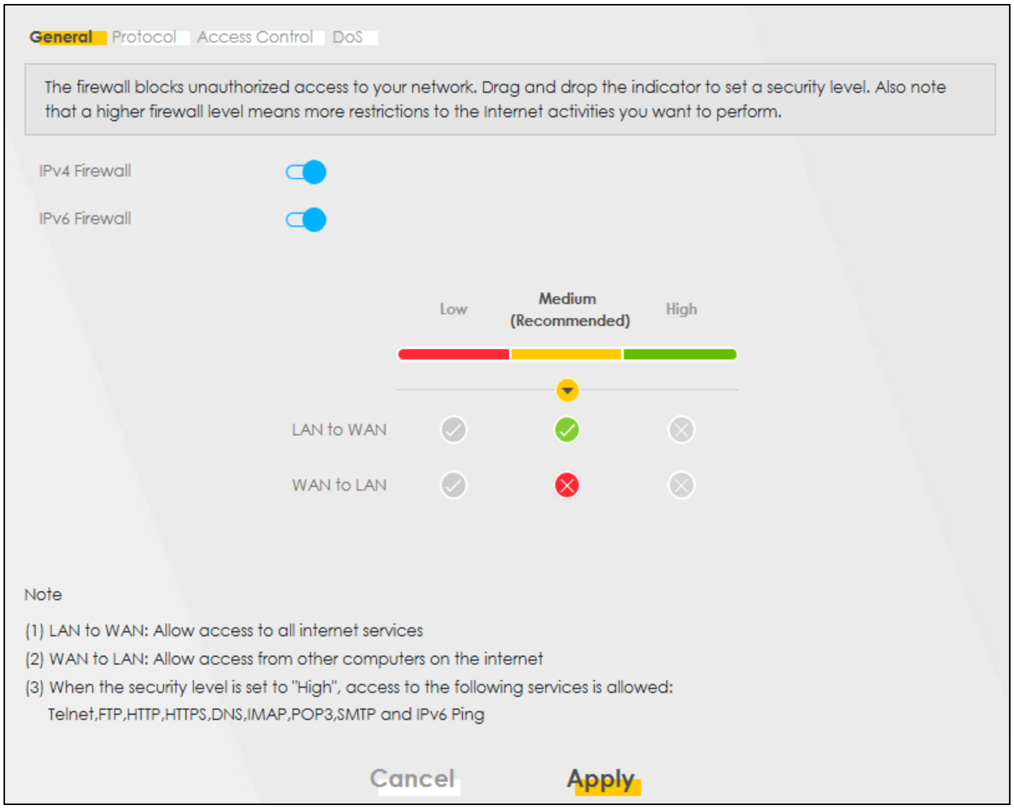
This section shows you how to configure a Firewall rule, Parental Control rule, and MAC Filter rule.

5.4.1 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**.



The firewall blocks unauthorized access to your network. Drag and drop the indicator to set a security level. Also note that a higher firewall level means more restrictions to the Internet activities you want to perform.

IPv4 Firewall: on

IPv6 Firewall: on

	Low	Medium (Recommended)	High
LAN to WAN	✓	✓	✗
WAN to LAN	✓	✗	✗

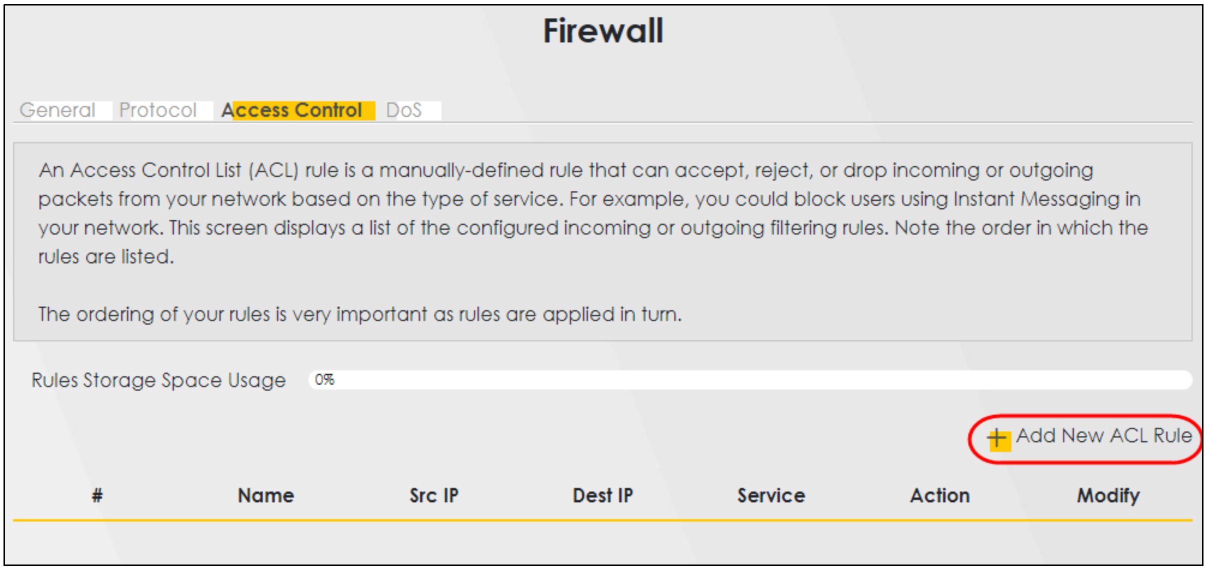
Note

(1) LAN to WAN: Allow access to all internet services

(2) WAN to LAN: Allow access from other computers on the internet

(3) When the security level is set to "High", access to the following services is allowed:
Telnet,FTP,HTTP,HTTPS,DNS,IMAP,POP3,SMTP and IPv6 Ping

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



Firewall

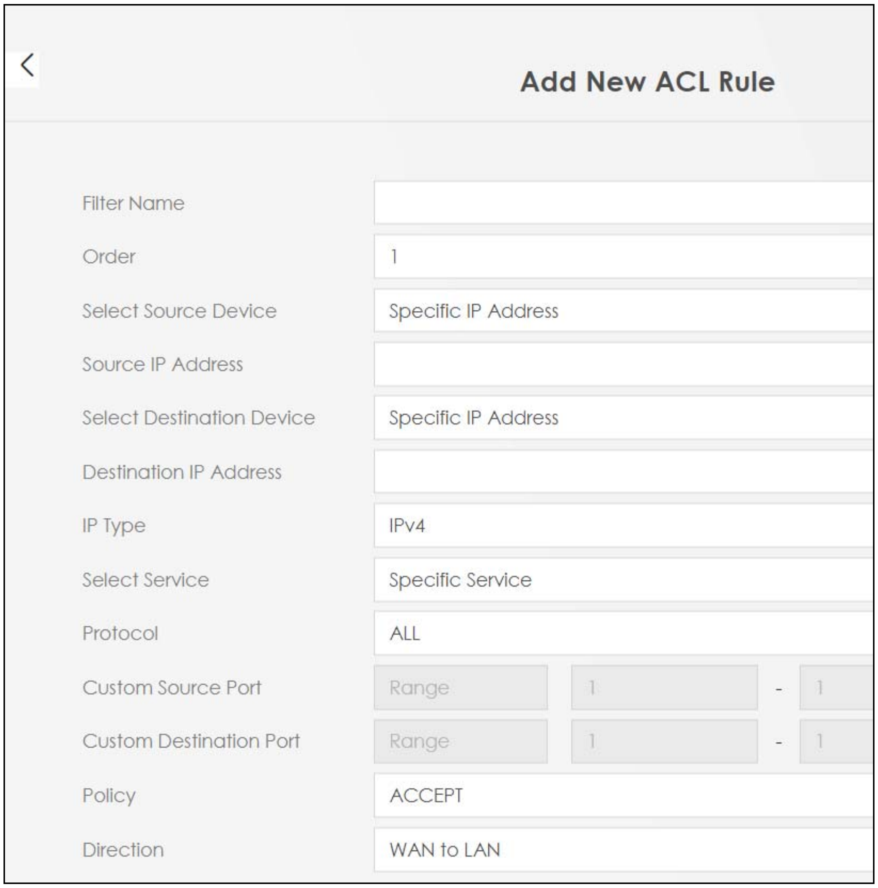
An Access Control List (ACL) rule is a manually-defined rule that can accept, reject, or drop incoming or outgoing packets from your network based on the type of service. For example, you could block users using Instant Messaging in your network. This screen displays a list of the configured incoming or outgoing filtering rules. Note the order in which the rules are listed.

The ordering of your rules is very important as rules are applied in turn.

Rules Storage Space Usage 0%

#	Name	Src IP	Dest IP	Service	Action	Modify

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



Add New ACL Rule

Filter Name			
Order	1		
Select Source Device	Specific IP Address		
Source IP Address			
Select Destination Device	Specific IP Address		
Destination IP Address			
IP Type	IPv4		
Select Service	Specific Service		
Protocol	ALL		
Custom Source Port	Range	1	- 1
Custom Destination Port	Range	1	- 1
Policy	ACCEPT		
Direction	WAN to LAN		

- **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**.

5.4.2 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.

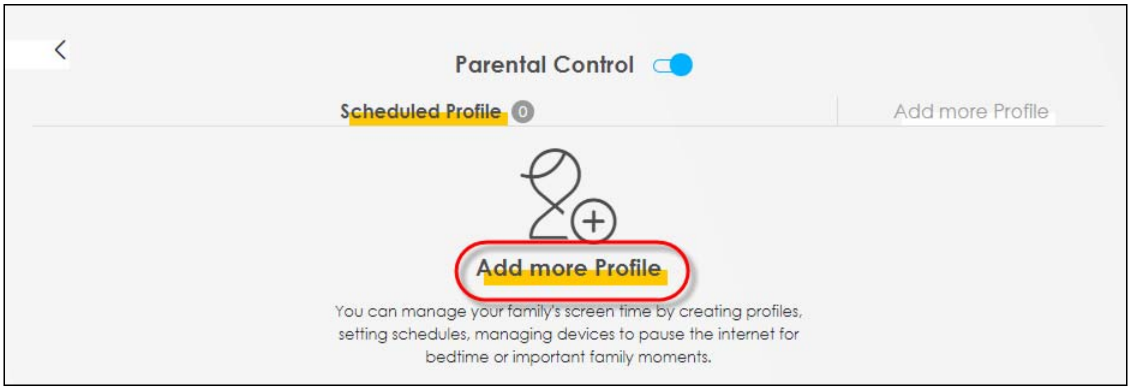
5.4.2.1 Configuring a Parental Control Schedule

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

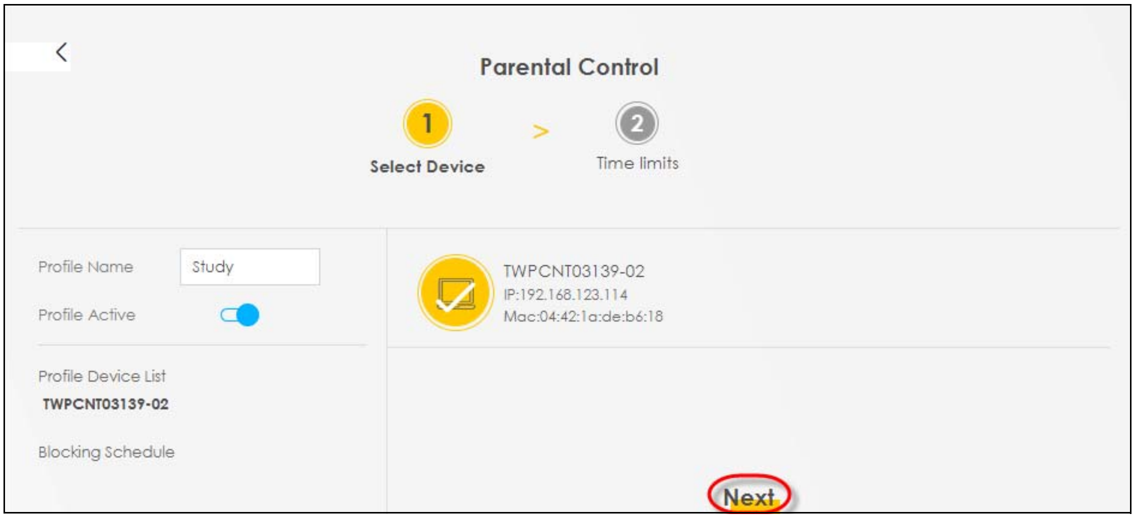
1 Click **Add more Profile** to open the **Parental Control** screen.



You can manage your family's screen time by creating profiles, setting schedules, managing devices to pause the internet for bedtime or important family moments.

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.



Profile Name: Study

Profile Active

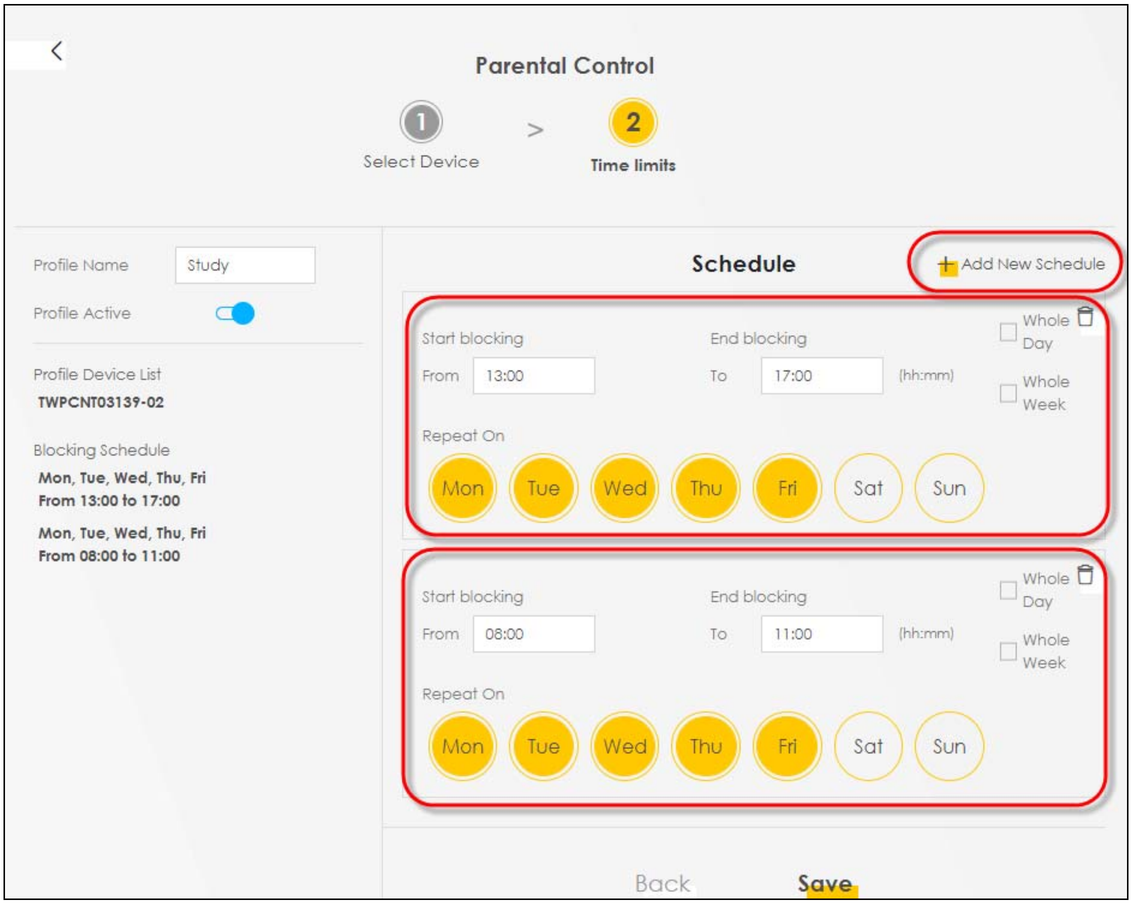
TWPCNT03139-02
IP:192.168.123.114
Mac:04:42:1a:de:b6:18

Profile Device List
TWPCNT03139-02

Blocking Schedule

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.



Profile Name: Study

Profile Active

Profile Device List
TWPCNT03139-02

Blocking Schedule
Mon, Tue, Wed, Thu, Fri
From 13:00 to 17:00

Mon, Tue, Wed, Thu, Fri
From 08:00 to 11:00

Start blocking From 13:00 End blocking To 17:00 (hh:mm) □ Whole Day □ Whole Week
Repeat On: Mon, Tue, Wed, Thu, Fri

Start blocking From 08:00 End blocking To 11:00 (hh:mm) □ Whole Day □ Whole Week
Repeat On: Mon, Tue, Wed, Thu, Fri

5.5 Device Maintenance

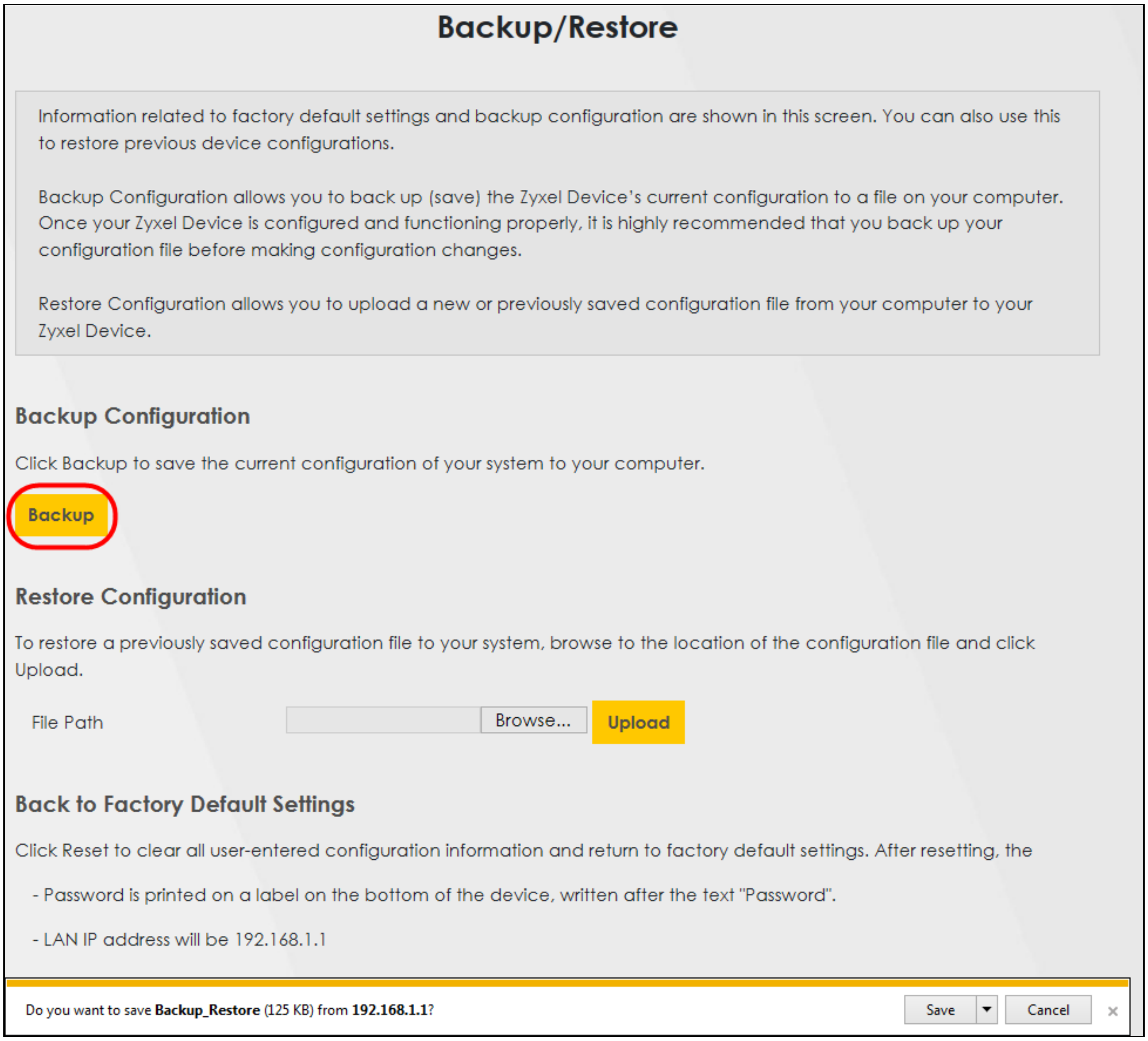
This section shows you how to back up the configuration and restore the Zyxel Device to its previous or default settings.

5.5.1 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.



Backup/Restore

Information related to factory default settings and backup configuration are shown in this screen. You can also use this to restore previous device configurations.

Backup Configuration allows you to back up (save) the Zyxel Device's current configuration to a file on your computer. Once your Zyxel Device is configured and functioning properly, it is highly recommended that you back up your configuration file before making configuration changes.

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

Backup Configuration

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

Restore Configuration

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

File Path

Back to Factory Default Settings

Click Reset to clear all user-entered configuration information and return to factory default settings. After resetting, the

- Password is printed on a label on the bottom of the device, written after the text "Password".

- LAN IP address will be 192.168.1.1

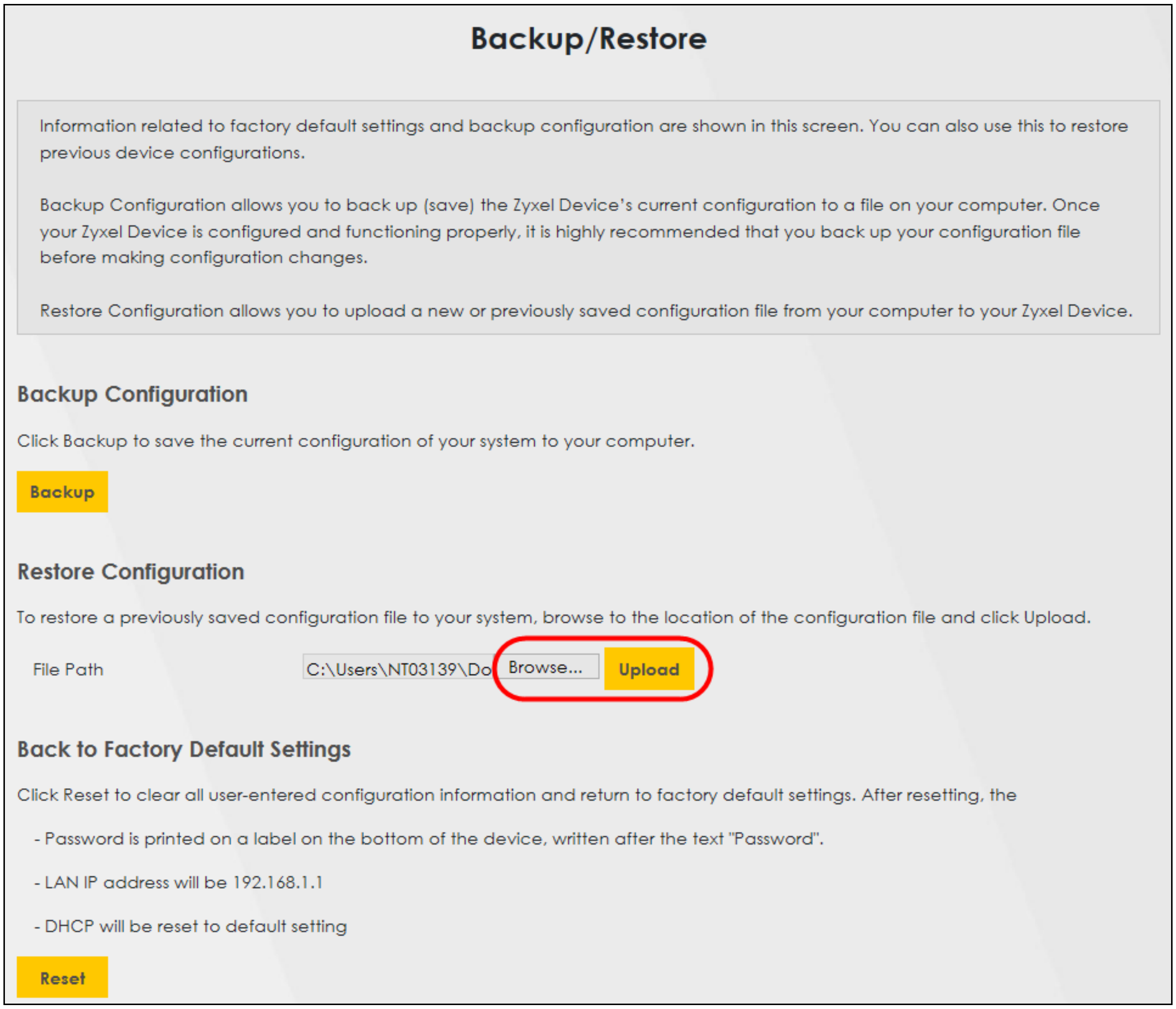
Do you want to save **Backup_Restore** (125 KB) from **192.168.1.1**?

5.5.2 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**.



Backup/Restore

Information related to factory default settings and backup configuration are shown in this screen. You can also use this to restore previous device configurations.

Backup Configuration allows you to back up (save) the Zyxel Device's current configuration to a file on your computer. Once your Zyxel Device is configured and functioning properly, it is highly recommended that you back up your configuration file before making configuration changes.

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

Backup Configuration

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

Backup

Restore Configuration

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

File Path C:\Users\NT03139\Do Browse... Upload

Back to Factory Default Settings

Click Reset to clear all user-entered configuration information and return to factory default settings. After resetting, the

- Password is printed on a label on the bottom of the device, written after the text "Password".

- LAN IP address will be 192.168.1.1

- DHCP will be reset to default setting

Reset

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
Rover App Tutorials

6.1 Rover App Tutorials Overview

This shows you how to use the Rover app to manage the Zyxel Device and its WiFi network.

The table below explains the terms used in this chapter.

Table 9 Tutorial Term Definition

DEVICE	TERM	ROLE
The Zyxel Device in Router Mode	Rover Router	Router
The Zyxel Device in AP Mode	Rover AP	Access Point
A Supported Zyxel AP	Zyxel AP	Access Point
A Supported Zyxel Repeater	Zyxel Repeater	Repeater

6.2 What You Can Do

- Set up your Rover Router with a Zyxel repeater using a wireless connection; see Section 6.3.1 on page 65.
- Set up your Rover AP with a Zyxel router (Rover Router as an example) using a wired connection; see Section 6.4.1 on page 66.
- Set up your Rover Router with a Zyxel access point using a wired connection; see Section 6.4.2 on page 67.
- Use the **Home** screen to see how many devices are connected to your Zyxel Device; see Section 6.6 on page 68.
- Use the **WiFi Settings** screen to configure your general or guest WiFi network; see Section 6.7 on page 69.
- Use the **Devices** screen to view the information of WiFi clients connected to the Zyxel Device; see Section 6.8 on page 75.
- Use the **Parental Control** screen to configure parental control WiFi schedules to block or allow WiFi client device access to the Internet; see Section 6.9 on page 78.
- Use the **Others** screen to run a speed test, view your app version, or log out of the app; see Section 6.10 on page 80.

6.3 WiFi Network Scenario

Connect your Rover Router to a Zyxel repeater.

6.3.1 Connect the Rover Router to a Zyxel Repeater

Follow the steps below to set up a Rover Router with a Zyxel Repeater to extend WiFi range. Connect the Rover Router to the Internet. The Rover Router must be connected to a modem/router using an Ethernet cable.

Table 10 Device Role

DEVICE	TERM	ROLE
Zyxel Device in Router Mode	Rover Router	Router
A Supported Zyxel Repeater	Zyxel Repeater	Repeater

Note: Make sure you reset the Rover Router and the Zyxel Repeater to factory defaults before switching to a different mode. Remember to back up your configuration settings before resetting your Zyxel Devices to factory defaults.

1 Turn on your modem/router for Internet access. Connect an Ethernet cable from a modem/router to the WAN port on the Rover Router.

2 Note the power LEDs on the Rover Router when you're done. The power LEDs should be steady blue. Place the Zyxel Repeater where you want WiFi coverage.

3 Download the Rover app to your smartphone and log into the WiFi network of the Rover Router. You may need to forget your current WiFi connection on your smartphone.

Wi-Fi
WiFi name
W
Forget network
WiFi name
WiFi name

4 Change the default SSID and WiFi key on the Rover Router for better WiFi security; see Section 6.7.1 on page 70 for more information. After applying changes, you will need to reconnect to the Rover Router again using the new SSID and WiFi key.

5 Use WPS to copy the SSID and WiFi key from the Rover Router to the Zyxel Repeater. Press the WPS button on the Rover Router for 1.5 to 4 seconds and then press the WPS button on the Zyxel Repeater for 2 seconds within 120 seconds.

6 Use the Rover app and the table in Section 6.8 on page 75 to see if the repeater is too far from the Rover Router.

6.4 Wired Network Scenarios

- Scenario 1: Connect your Rover AP to a Zyxel router
- Scenario 2: Connect your Rover Router to an Zyxel access point (AP)

6.4.1 Scenario 1: Connect your Rover AP to a Zyxel Router

Follow the steps below to set up your Rover AP with a Zyxel router (the Rover Router as an example). Connect the Rover Router to the Internet. The Rover Router must be connected to a modem/router using an Ethernet cable. Then, connect a LAN port on the Rover AP to a LAN port on the Rover Router using another Ethernet cable.

Table 11 Device Role

DEVICE	TERM	ROLE
Zyxel Device in Router mode	Rover Router	Router
Zyxel Device in AP mode	Rover AP	Access Point

Note: Make sure you reset the Rover Router and Rover AP to factory defaults before switching to a different mode. Remember to back up your configuration setting before resetting your devices to factory defaults. See Section 2.3 on page 25 for more information.

1 Turn on your modem/router for Internet access. Connect an Ethernet cable from a modem/router to the WAN port on the Rover Router.

2 Note the power LEDs when you're done. The power LEDs should be steady blue. Place the Rover AP where you want WiFi coverage and connect it to the Rover Router using an Ethernet cable.

3 Download the app to your smartphone and log into the Rover Router's WiFi network using the default label information on the back label. You may need to forget your current WiFi connection on your smartphone.

Wi-Fi
WiFi name
W
Forget network
WiFi name
WiFi name

4 Change the default SSID and WiFi key on the Rover Router for better WiFi security; see Section 6.7.1 on page 70 for more information. After applying changes, you will need to reconnect to Rover Router again using the new SSID and WiFi key.

5 Use WPS to copy the SSID and WiFi key from the Rover Router to the Rover AP. Press the WPS button on the Rover Router for 1.5 to 4 seconds and then press the WPS button on the Rover AP until the LED blinks in purple within 120 seconds.

6 Use the Rover app and the link quality table in Section 6.8 on page 75 to see if the access point is securely connected to the Rover Router.

6.4.2 Scenario 2: Connect the Rover Router to a Zyxel AP

Follow the steps below to set up the Rover Router with an Zyxel access point. Connect the Rover Router to the Internet. The Rover Router must be connected to a modem/router using an Ethernet cable. Then, connect the LAN port on the AP to a LAN port on the Rover Router using another Ethernet cable.

Table 12 Device Role

DEVICE	TERM	ROLE
Zyxel Device in Router mode	Rover Router	Router
A Supported Zyxel AP	Zyxel AP	Access Point

Note: Make sure you reset the Zyxel Device and the Zyxel AP to factory defaults before switching to a different mode. Remember to back up your configuration setting before resetting your devices to factory defaults. See Section 2.3 on page 25 for more information.

1 Turn on your modem/router for Internet access. Connect an Ethernet cable from a modem/router to the WAN port on the Rover Router.

2 Note the power LEDs when you're done. The power LEDs should be steady blue. Place the Zyxel AP where you want WiFi coverage and connect it to the Rover Router using an Ethernet cable.

3 Download the Rover app to your smartphone and log into Rover Router's WiFi network using the default label information on the back label. You may need to forget your current WiFi connection on your smartphone.

Wi-Fi
WiFi name
W
Forget network
WiFi name
WiFi name

4 Change the default SSID and WiFi key on the Rover Router for better WiFi security; see Section 6.7.1 on page 70 for more information. After applying changes, you will need to reconnect to the Rover Router again using the new SSID and WiFi key.

5. Use WPS to copy the SSID and WiFi key from the Rover Router to the Zyxel AP. Press the WPS button on the Rover Router for 1.5 to 4 seconds and then press the WPS button for 2 seconds on the Zyxel AP within 120 seconds.

6. Use the Rover app and the link quality table in Section 6.8 on page 75 to see if the access point is securely connected to the Rover Router.

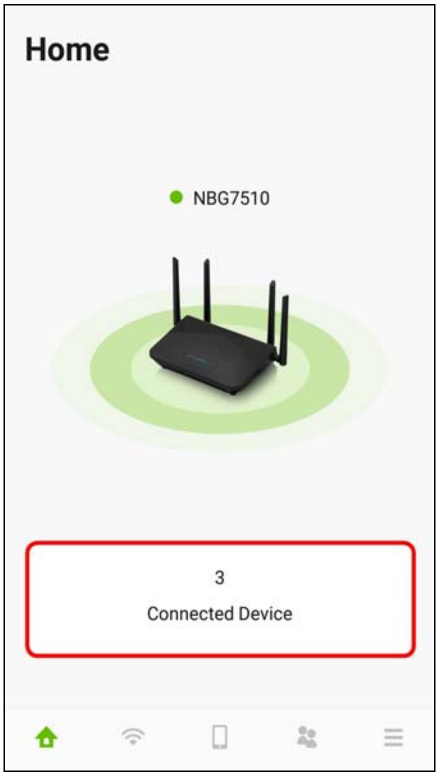
6.5 Network Management with the Rover App

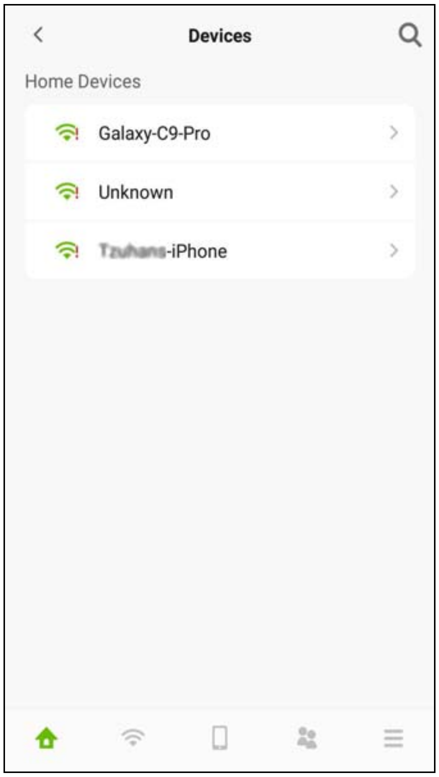
You can use the Rover app to view WiFi connection status of your Zyxel Device, configure general and guest WiFi settings, add a parental control profile, and run a speed test. See the following sections for more information.

- Home Settings
- General WiFi and Guest Settings
- Devices Settings
- Parental Control Settings
- Others Settings

6.6 Home Settings

Tap on the **Home** icon (🏠) in the navigation panel. The **Home** screen displays and shows the number of the devices connected to the Zyxel Device.
You can tap **Connected Device** in the **Home** screen to go to the **Devices** screen. See Section 6.8 on page 75 for more client device information.





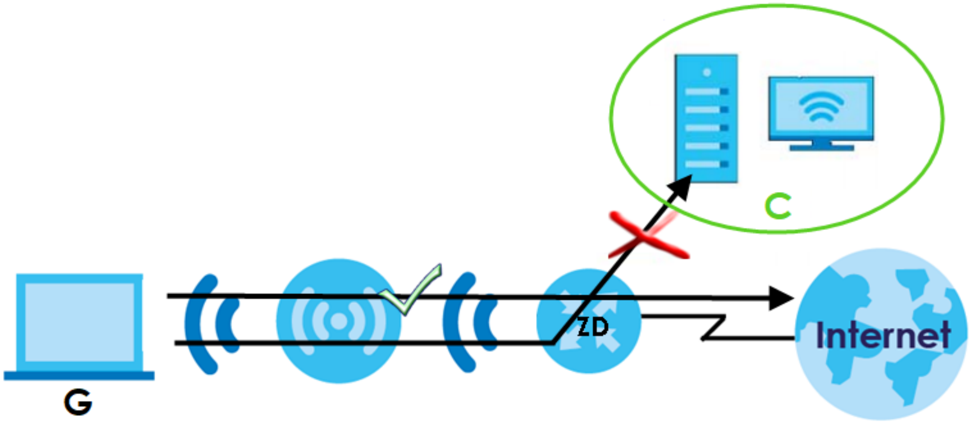
6.7 General WiFi and Guest Settings

Use this screen to configure settings for your main WiFi and guest 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 (**C**) WiFi network group.
- Visiting guests will use the Guest (**G**) WiFi network group, which has a different SSID and password. Visiting guests can connect to the Internet but cannot connect to the company network using guest WiFi.

Figure 34 Visiting Guests Blocked from Company Network



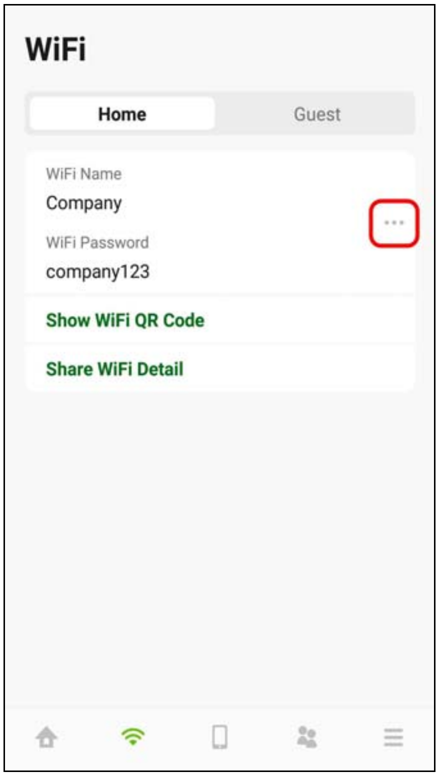
6.7.1 Setting Up General WiFi Settings

Follow the steps below to configure your general WiFi settings. Use the parameters in the table below to create a set of **WiFi Name** and **Password**.

Table 13 The General WiFi Settings Parameters Example

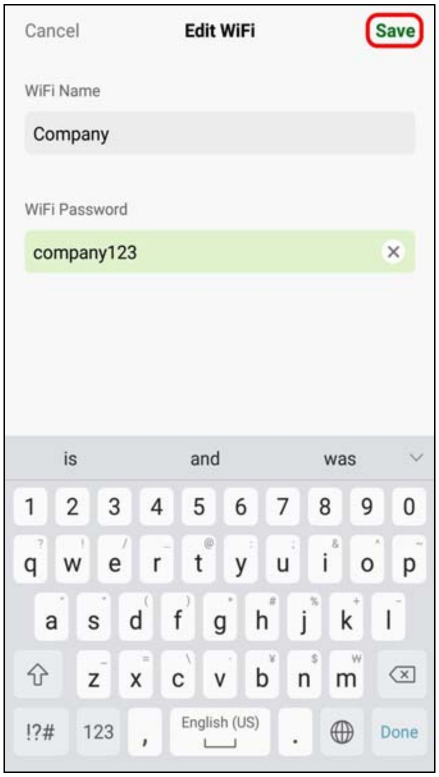
GENERAL WIFI	
WiFi Name	Company
Password	company123

1 Tap on the **WiFi** icon ( ) in the navigation panel. The **WiFi > Home** screen displays. Tap on the (•••) icon to edit your general **WiFi Name** and **WiFi Password**. In this example, enter Company as your general **WiFi Name** and company123 as your general **WiFi Password**. Click **Save** to save the changes.



WiFi Name
Company

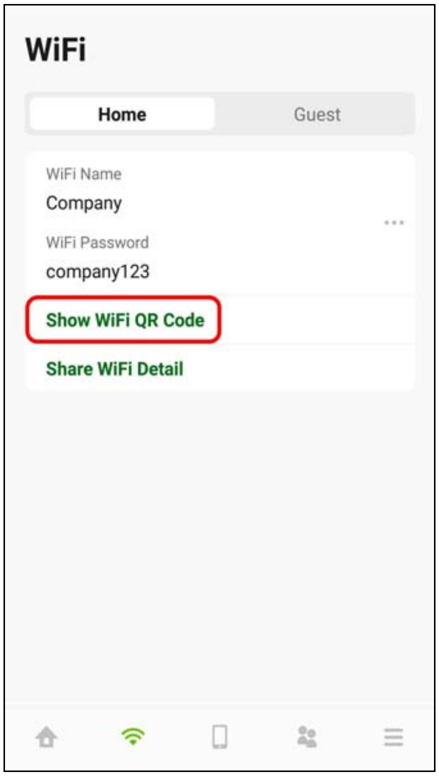
WiFi Password
company123



WiFi Name
Company

WiFi Password
company123

2 You can use the app to create a QR code with your WiFi network name and password. Tap **Show WiFi QR Code** in the **WiFi > Home** screen, the QR code will display as shown.
Use a smartphone to scan the QR code to join the general WiFi network. By printing and placing the QR code somewhere accessible, you can let your friends or guests scan the QR code and join the WiFi network directly without revealing your actual WiFi password.



WiFi

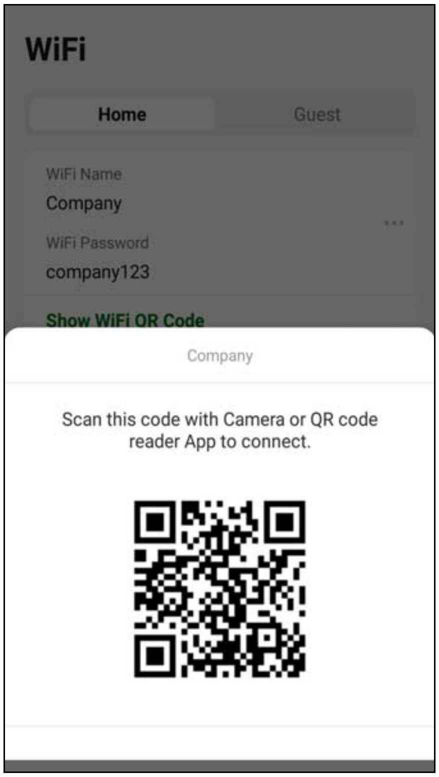
Home Guest

WiFi Name
Company

WiFi Password
company123

Show WiFi QR Code

Share WiFi Detail



WiFi

Home Guest

WiFi Name
Company

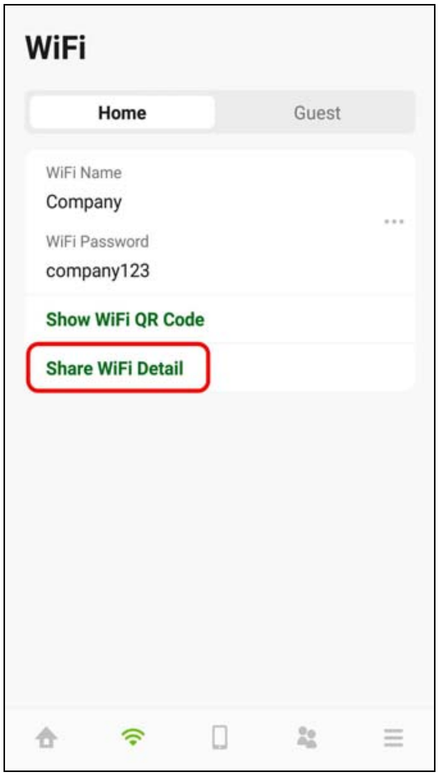
WiFi Password
company123

Show WiFi QR Code

Company

Scan this code with Camera or QR code reader App to connect.

3 Tap **Share WiFi Detail** in the **WiFi > Home** screen. To share your general WiFi name and password with your friends, select a media, such as Gmail or Skype, to send connection info to your friends.



WiFi

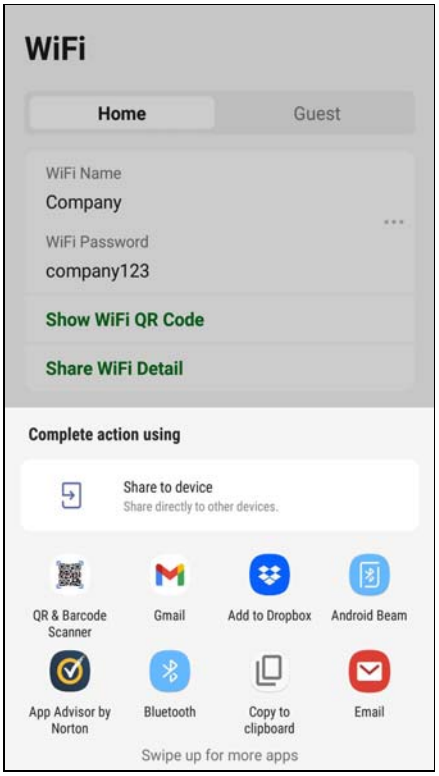
Home Guest

WiFi Name
Company

WiFi Password
company123

Show WiFi QR Code

Share WiFi Detail



WiFi

Home Guest

WiFi Name
Company

WiFi Password
company123

Show WiFi QR Code

Share WiFi Detail

Complete action using

Share to device
Share directly to other devices.

QR & Barcode Scanner
Gmail
Add to Dropbox
Android Beam
App Advisor by Norton
Bluetooth
Copy to clipboard
Email

Swipe up for more apps

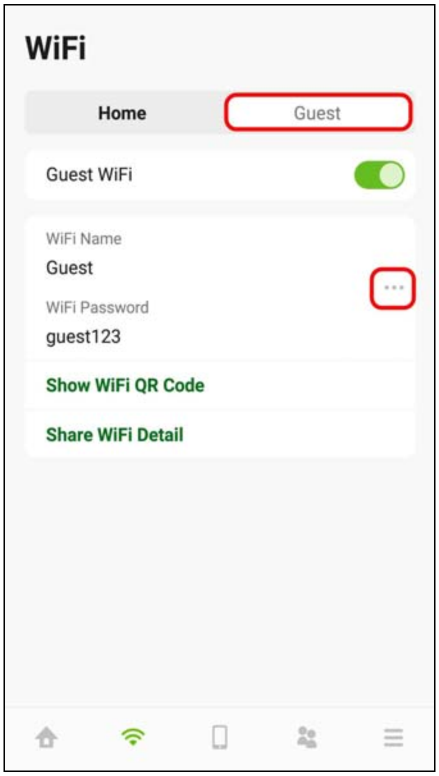
6.7.2 Setting Up Guest WiFi Settings

Follow the steps below to configure your guest WiFi settings. Use the parameters in the table below to create a different set of WiFi name and password.

Table 14 The Guest WiFi Settings Parameters Example

GUEST WIFI	
WiFi Name	Guest
WiFi Password	guest123

Tap on the **Guest** tab and then the **WiFi > Guest** screen appears. Click the switch to enable **Guest WiFi**. When the switch goes to the right, **Guest WiFi** is enabled. Tap on the (•••) icon to edit the guest **WiFi Name** and **WiFi Password**. In this example, enter Guest as your guest **WiFi Name** and guest123 as your guest **WiFi Password**. Click **Save** to save the changes.



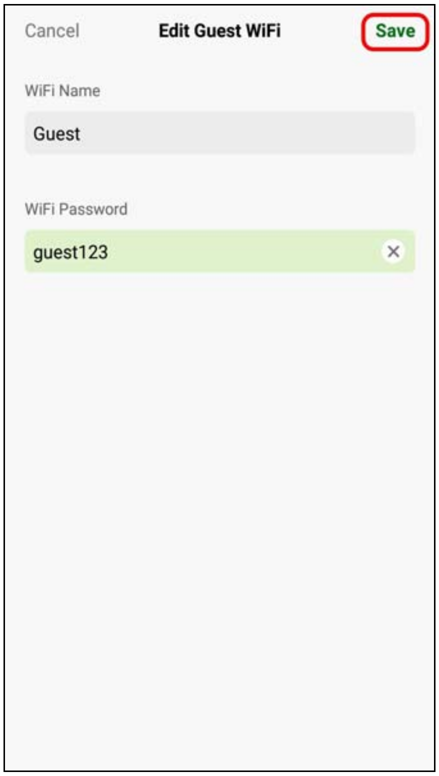
WiFi

Home | Guest

Guest WiFi

WiFi Name
Guest

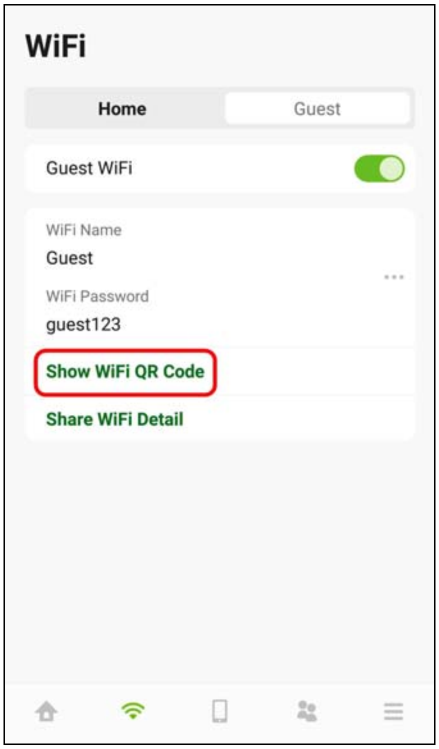
WiFi Password
guest123



WiFi Name
Guest

WiFi Password
guest123

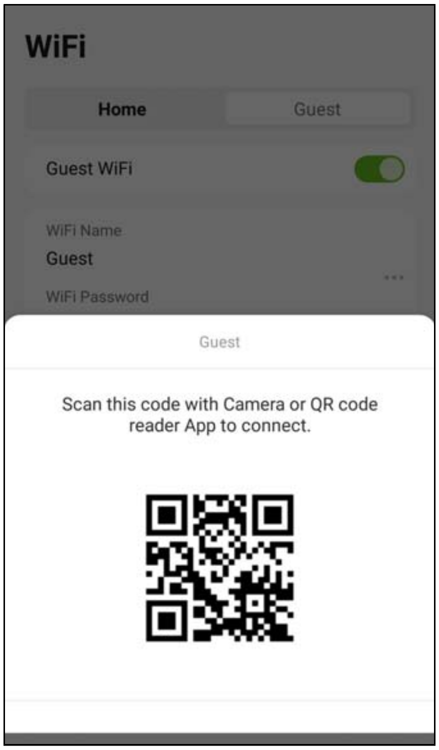
4 You can use the app to create a QR code with your WiFi network name and password. Click **Show WiFi QR Code** in the **WiFi > Guest** screen, the QR code will display as shown.
Use a smartphone to scan the QR code to join the guest WiFi network. By printing and placing the QR code somewhere accessible, you can let your friends or guests scan the QR code and join the WiFi network directly without revealing your actual WiFi password.



Guest WiFi

WiFi Name
Guest

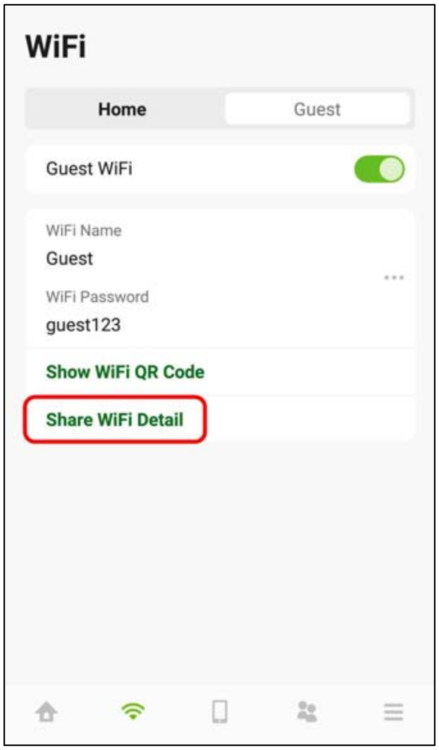
WiFi Password
guest123



Guest

Scan this code with Camera or QR code reader App to connect.

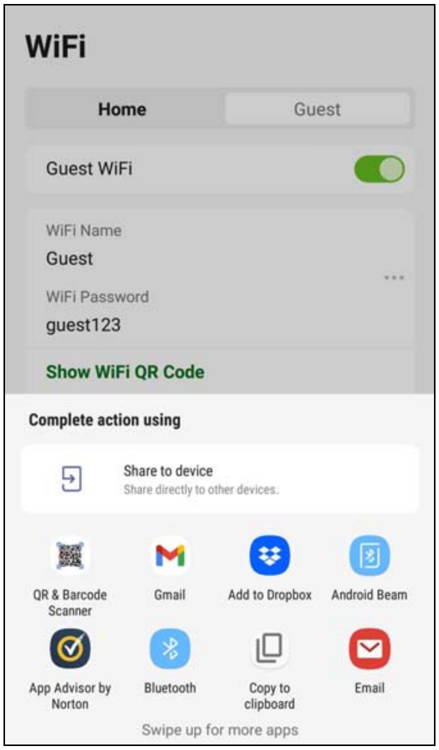
5 Tap **Share WiFi Detail** in the **WiFi > Guest** screen. To share your guest WiFi name and password with your friends, select a media, such as Gmail or Skype, to send connection info to your friends.



Guest WiFi

WiFi Name
Guest

WiFi Password
guest123



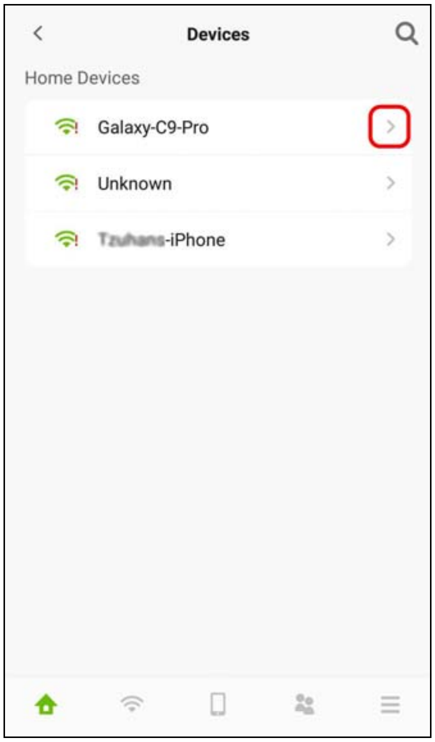
Complete action using

Share to device
Share directly to other devices.

Swipe up for more apps

6.8 Devices Settings

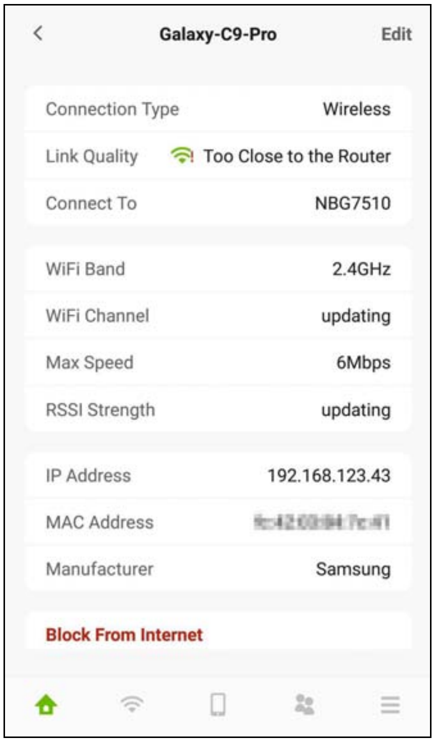
1 Tap on the **Devices** icon (📱) in the navigation panel. Use the **Devices** screen to view the devices connected to the Zyxel Device. Tap on the Arrow icon (>) next to the device name you want to see. In this example, tap on the Arrow icon (>) next to the **Galaxy-C9-Pro**. The **Galaxy-C9-Pro** screen displays.



Devices

Home Devices

- Galaxy-C9-Pro >
- Unknown >
- [redacted]-iPhone >



Galaxy-C9-Pro Edit

Connection Type	Wireless
Link Quality	Too Close to the Router
Connect To	NBG7510
WiFi Band	2.4GHz
WiFi Channel	updating
Max Speed	6Mbps
RSSI Strength	updating
IP Address	192.168.123.43
MAC Address	[redacted]
Manufacturer	Samsung

Block From Internet

2 After you place your access point or repeater connected to the Zyxel Device, use the **Devices** screen and the table below to check WiFi connection status.

Table 15 Link Quality

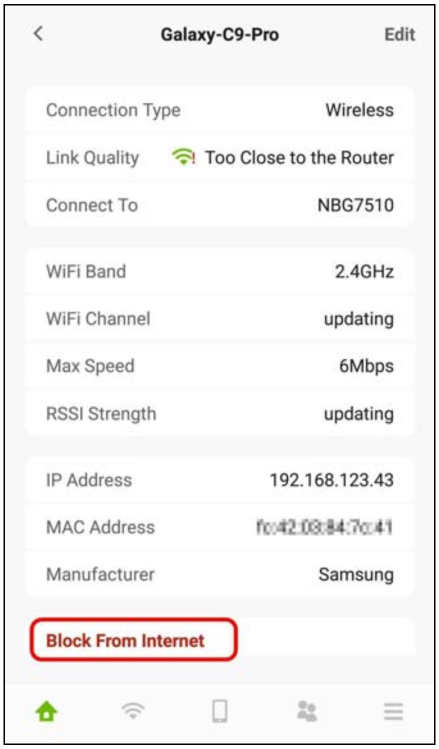
ICON	CONNECTION TYPE	WIFI STATUS
🔌	Wired	Wired Connection
🔌⊘	Wired	Blocked
📶	Wireless	Good to Go
📶!	Wireless	Too Close to the Router
📶	Wireless	Too Far from the Router
📶⊘	Wireless	Blocked

Table 16 WiFi Connection Status

WIFI CONNECTION STATUS	ACTION
Too Close to the Router	Move the client device farther away from the Zyxel Device.
Too Far from the Router	Move the client device closer to the Zyxel Device.

Move your Galaxy-C9-Pro farther away from your Zyxel Device as the WiFi status is **Too Close to the Router.**

3 To quickly block a client device from accessing your WiFi network, click **Block From Internet**. In this example, click **Block from Internet** in the **Galaxy-C9-Pro** screen. Click **Block** to save the changes.

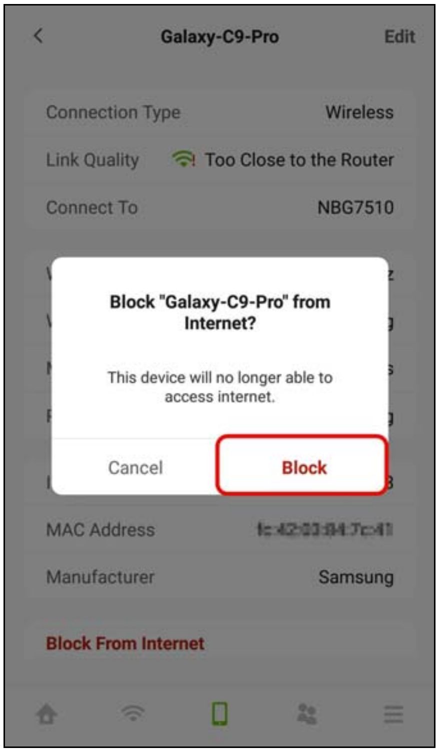


Galaxy-C9-Pro

Connection Type: Wireless
Link Quality: Too Close to the Router
Connect To: NBG7510

WiFi Band: 2.4GHz
WiFi Channel: updating
Max Speed: 6Mbps
RSSI Strength: updating

IP Address: 192.168.123.43
MAC Address: fc:42:03:84:7c:41
Manufacturer: Samsung



Galaxy-C9-Pro

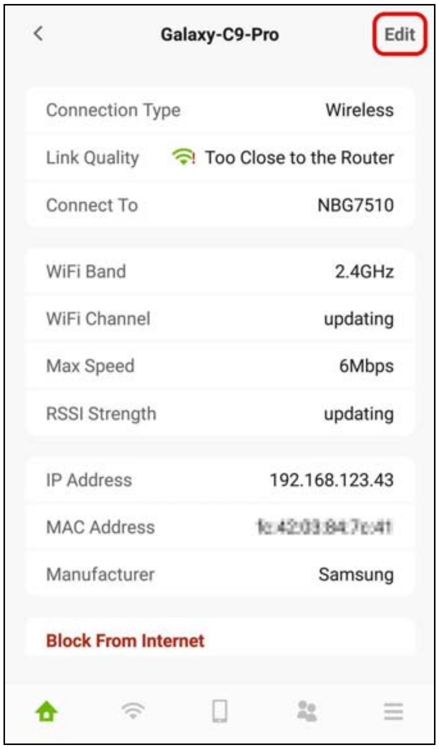
Connection Type: Wireless
Link Quality: Too Close to the Router
Connect To: NBG7510

Block "Galaxy-C9-Pro" from Internet?

This device will no longer able to access internet.

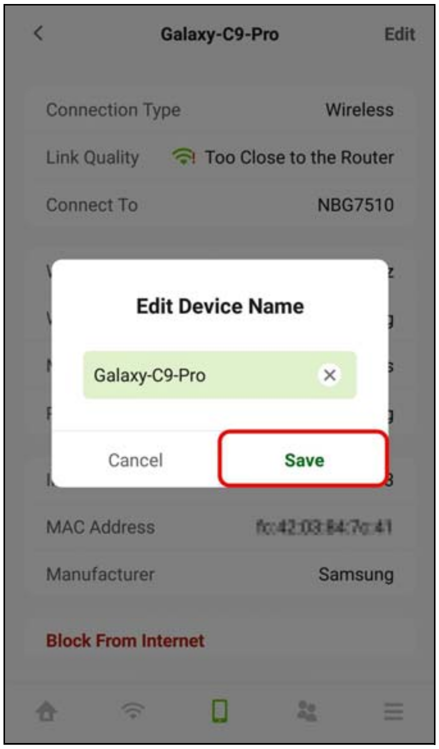
MAC Address: fc:42:03:84:7c:41
Manufacturer: Samsung

4 Click **Edit** if you want to modify your device name. Enter your device name and then click **Save** to save the changes.



Galaxy-C9-Pro

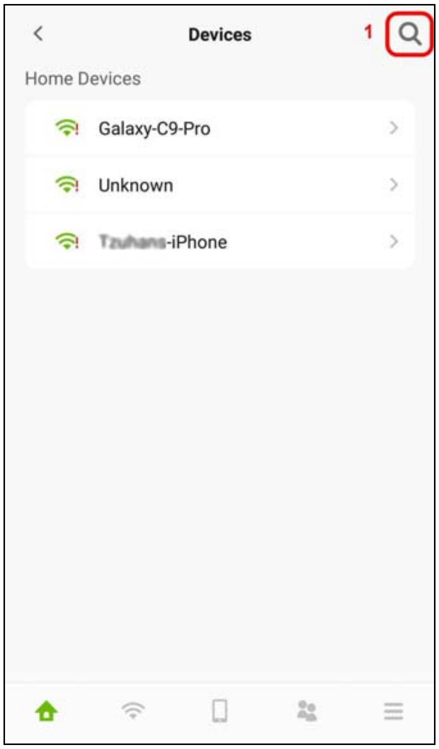
Connection Type	Wireless
Link Quality	Too Close to the Router
Connect To	NBG7510
WiFi Band	2.4GHz
WiFi Channel	updating
Max Speed	6Mbps
RSSI Strength	updating
IP Address	192.168.123.43
MAC Address	[redacted]
Manufacturer	Samsung



Edit Device Name

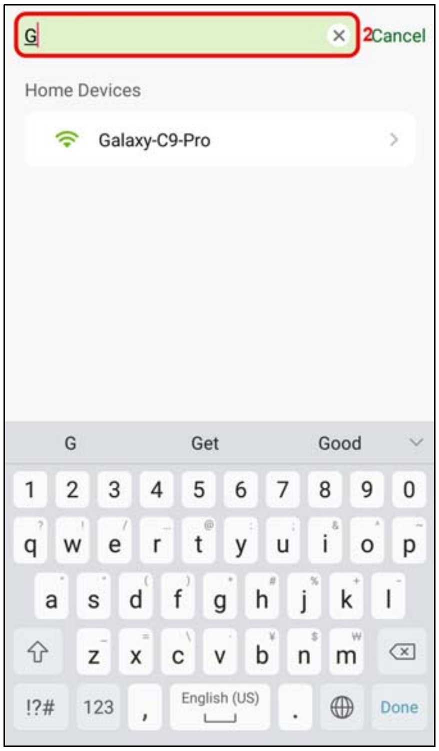
Galaxy-C9-Pro

5 To look for a specific client device, tap on the Search icon (🔍) in the **Devices** screen. Enter keywords to look for a client device. Tap **Cancel** if you want to go back to the previous screen.



Home Devices

- Galaxy-C9-Pro
- Unknown
- [redacted]-iPhone



G

Home Devices

- Galaxy-C9-Pro

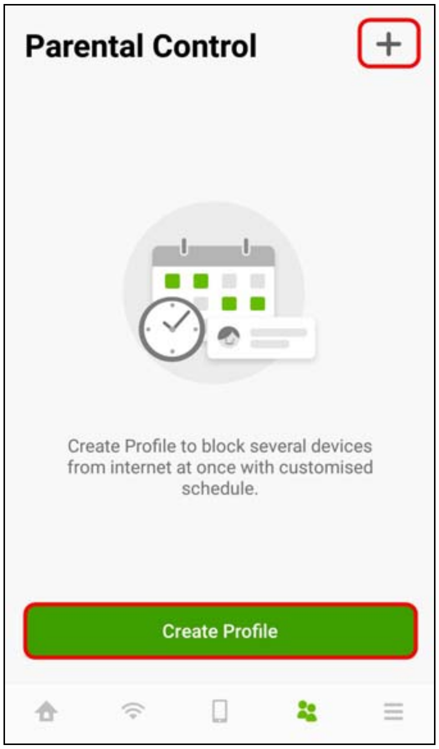
6.9 Parental Control Settings

1 Parental Control allows you to create and repeat a weekly schedule to restrict Internet usage for users. Tap on the **Parental Control** icon (👥). The **Parental Control** screen displays. Tap **Create Profile** (only appears at the first time) or the Add icon (+) to create a new parental control profile. The **New Profile** screen appears as shown.

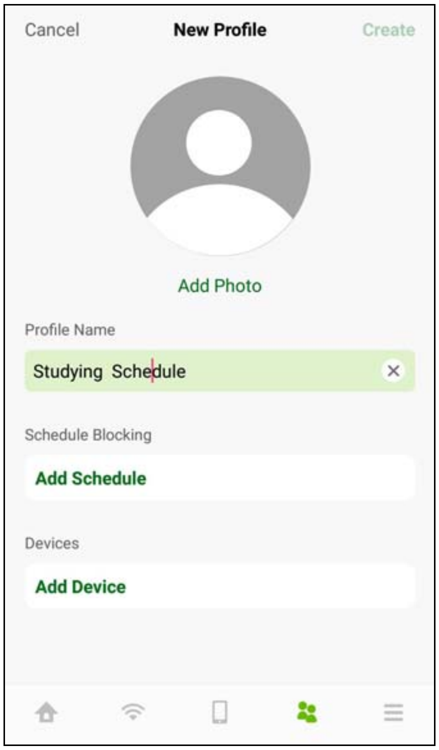
The following example shows you how to create a studying schedule and block users from accessing the Internet for a certain period of time. Use the parameter below to create a profile. Tap **Create Profile** and then the **New Profile** screen appears. Enter Studying Schedule as the profile name.

Table 17 Parental Control Settings Parameters Example

PROFILE NAME	START TIME	END TIME	REPEAT ON
Studying Schedule	8:00 am	11:00 am	from Monday to Friday

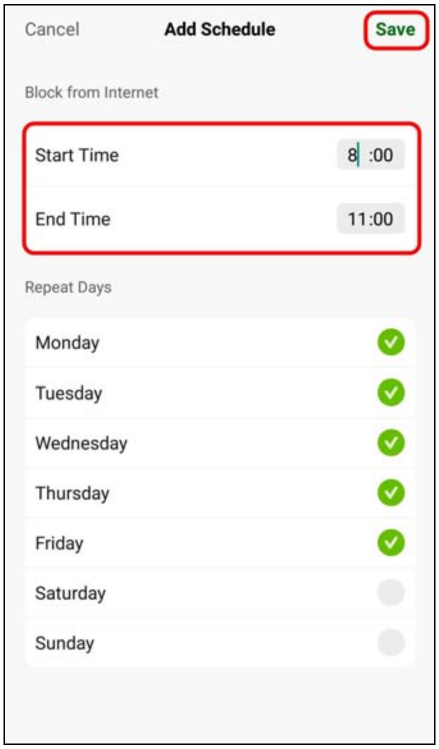

Parental Control

Create Profile to block several devices from internet at once with customised schedule.



Profile Name: Studying Schedule

2 Click **Add Schedule** on the **Studying Schedule** screen to create a schedule. The **Add Schedule** screen displays. Select the day(s) of the week to repeat the rule and then enter the **Start Time** and **End Time** in the **Add Schedule** screen. In this example, select from Monday to Friday. Then, enter 8:00 as **Start Time**, and 11:00 as **End Time.**
Click **Add Device** to apply the **Studying Schedule** profile to a device. The **Add Device** screen appears as shown. Select the device you want to add and then click **Add** to save the changes.



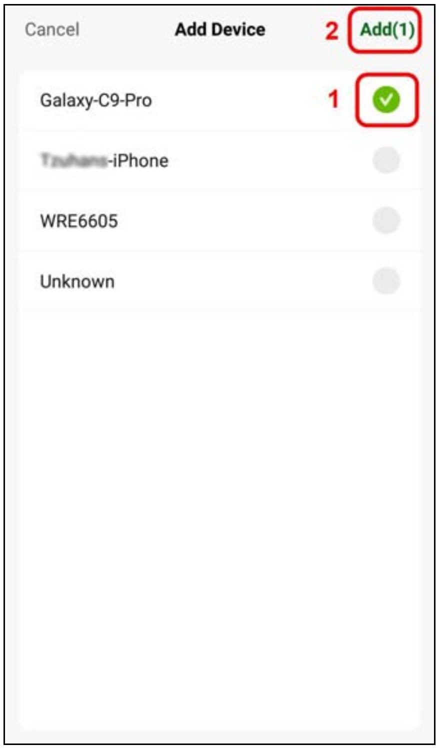
Cancel **Add Schedule** **Save**

Block from Internet

Start Time	8:00
End Time	11:00

Repeat Days

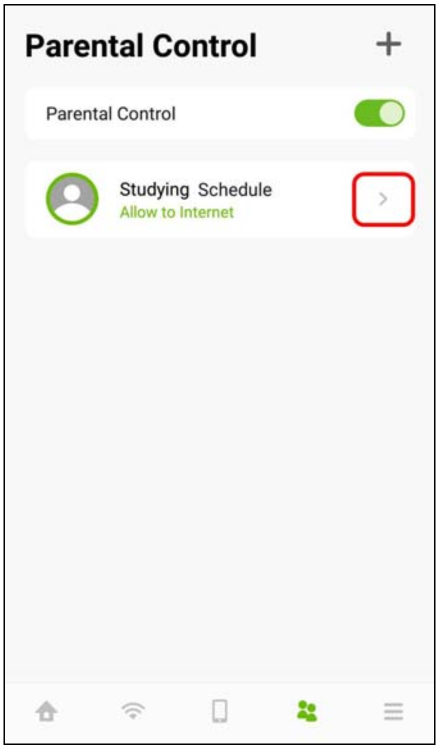
Monday	✓
Tuesday	✓
Wednesday	✓
Thursday	✓
Friday	✓
Saturday	○
Sunday	○



Cancel **Add Device** 2 **Add(1)**

Galaxy-C9-Pro 1	✓
[redacted]-iPhone	○
WRE6605	○
Unknown	○

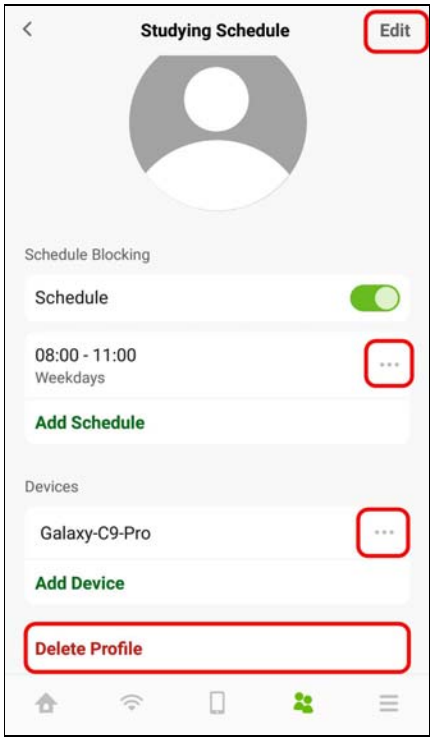
3 Tap on the Arrow icon (›) next to the profile to go back and continue modifying your profile. In this example, click the Arrow icon (›) next to Studying Schedule. The **Studying Schedule** screen will appear.
Click **Edit** if you want to modify the name of the profile. Click the switch to enable or disable this WiFi schedule profile. Click the (•••) icon if you want to edit the parental control schedule or apply this profile to another device. Click **Delete Profile** to remove this profile.



Parental Control +

Parental Control ●

Studying Schedule
Allow to Internet ›



‹ **Studying Schedule** Edit

Schedule Blocking

Schedule ●

08:00 - 11:00
Weekdays •••

Add Schedule

Devices

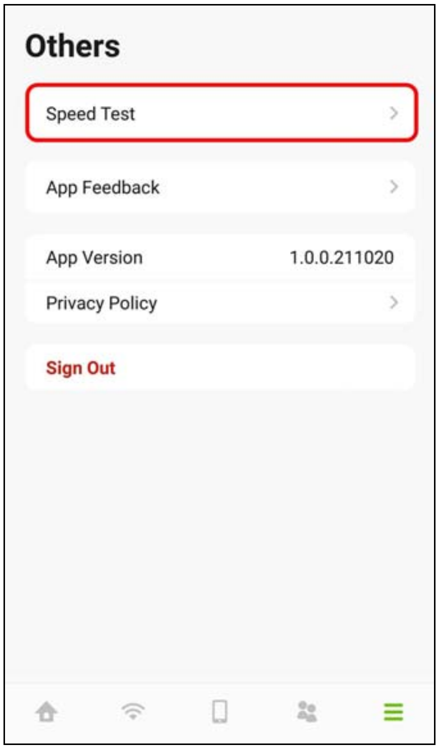
Galaxy-C9-Pro •••

Add Device

Delete Profile

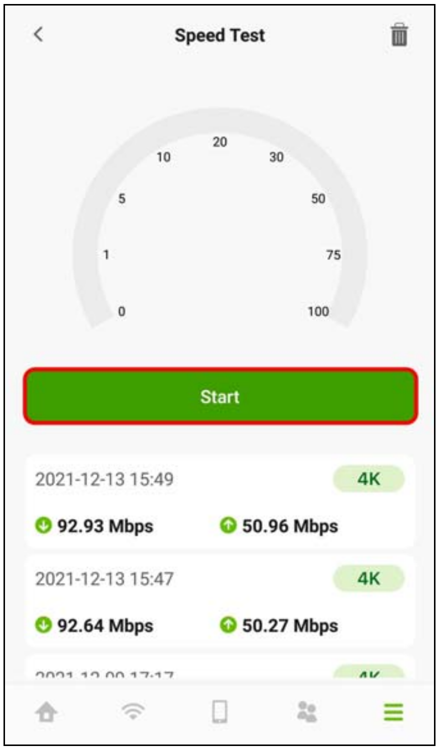
6.10 Others Settings

1 Tap on the **Others** icon (☰) in the navigation panel. The **Others** screen appears. Click Speed Test if you want to conduct a speed test for downstream and upstream data rates. The **Speed Test** screen appears. Click **Start** to perform a test.



Others

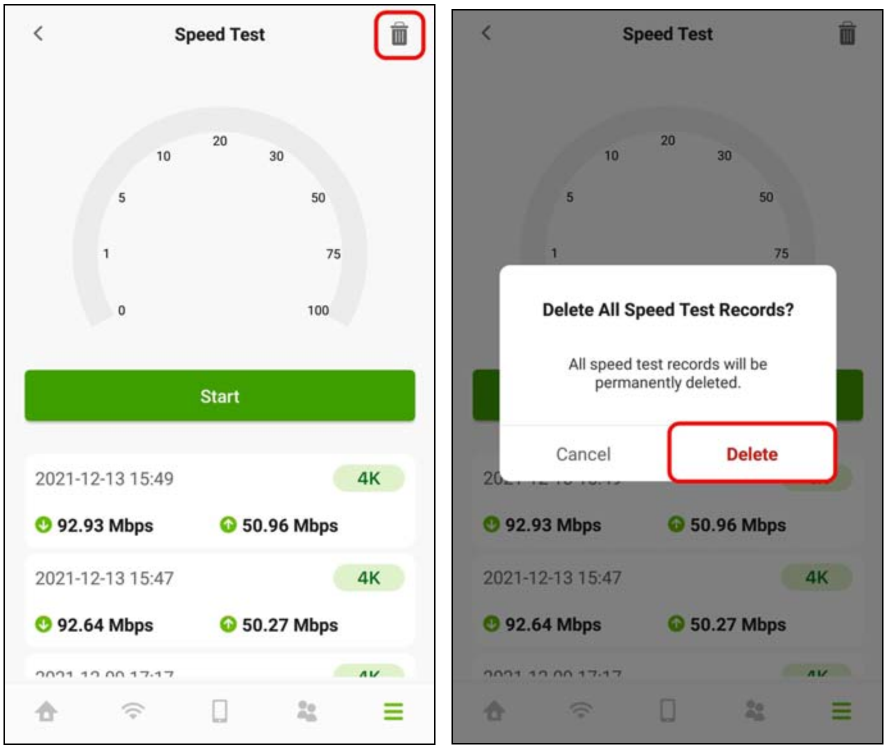
App Version 1.0.0.211020



Speed Test

2021-12-13 15:49		4K
92.93 Mbps	50.96 Mbps	
2021-12-13 15:47		4K
92.64 Mbps	50.27 Mbps	

2 Click the Delete icon (🗑) if you want to remove all previous test results. Click **Delete** to confirm the changes.



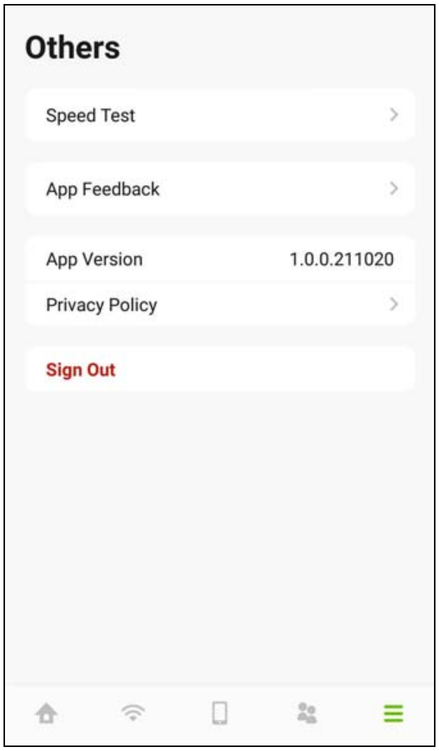
2021-12-13 15:49 4K
92.93 Mbps 50.96 Mbps
2021-12-13 15:47 4K
92.64 Mbps 50.27 Mbps

Delete All Speed Test Records?

All speed test records will be permanently deleted.

3 You can also use this screen to do the following:

- Give us feedback.
- View the app version.
- View the privacy policy.
- Log out of the app.



Others

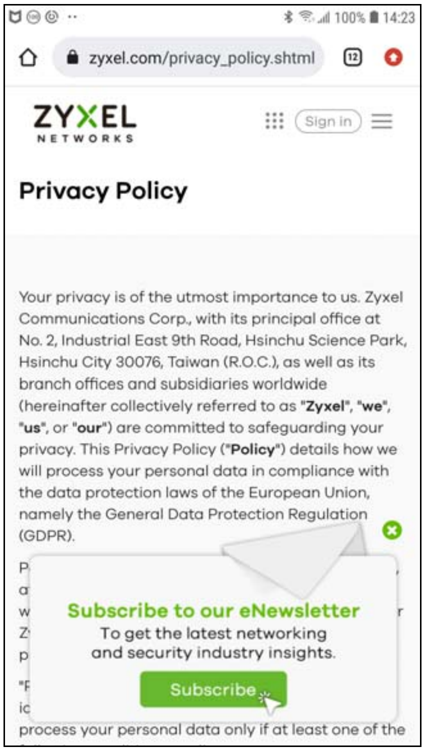
Speed Test

App Feedback

App Version 1.0.0.211020

Privacy Policy

Sign Out



Privacy Policy

Your privacy is of the utmost importance to us. Zyxel Communications Corp., with its principal office at No. 2, Industrial East 9th Road, Hsinchu Science Park, Hsinchu City 30076, Taiwan (R.O.C.), as well as its branch offices and subsidiaries worldwide (hereinafter collectively referred to as "**Zyxel**", "**we**", "**us**", or "**our**") are committed to safeguarding your privacy. This Privacy Policy ("**Policy**") details how we will process your personal data in compliance with the data protection laws of the European Union, namely the General Data Protection Regulation (GDPR).

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process your personal data only if at least one of the

PART II
Technical Reference

CHAPTER 7
Connection Status

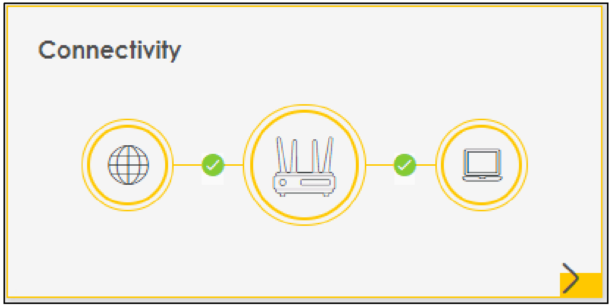
7.1 Connection Status Overview

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 35 Connectivity



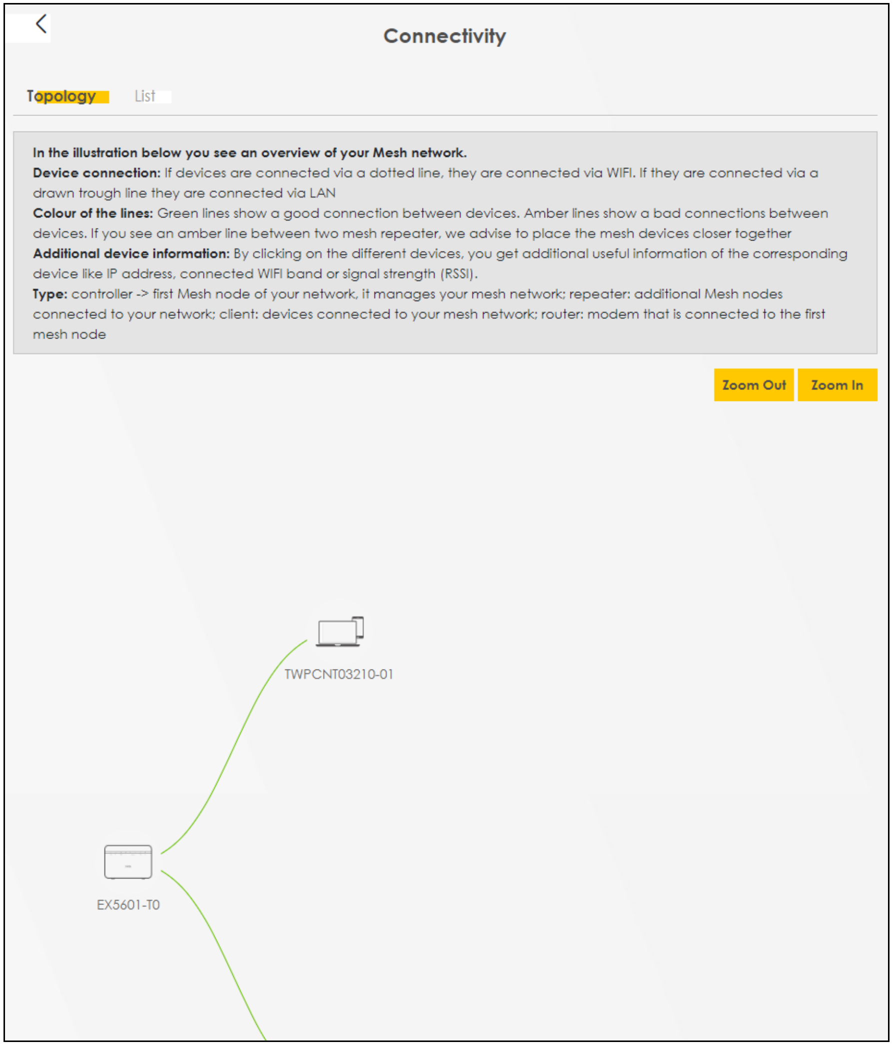
Click the Arrow icon (›) to view IP addresses and MAC addresses of the wireless and wired devices connected to the Zyxel Device.

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'll 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 36 Connectivity: Connected Devices: Topology View



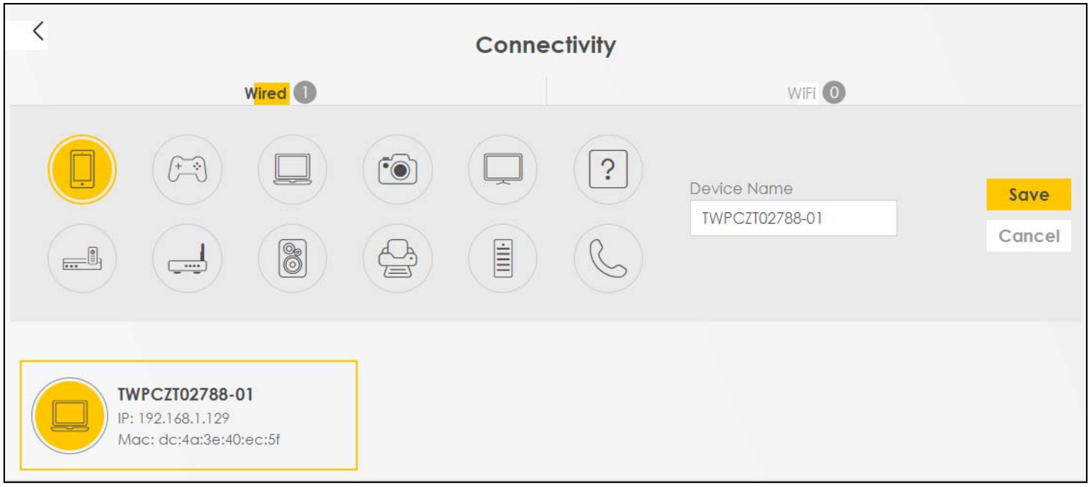
In the illustration below you see an overview of your Mesh network.
Device connection: If devices are connected via a dotted line, they are connected via WIFI. If they are connected via a drawn trough line they are connected via LAN
Colour of the lines: Green lines show a good connection between devices. Amber lines show a bad connections between devices. If you see an amber line between two mesh repeater, we advise to place the mesh devices closer together
Additional device information: By clicking on the different devices, you get additional useful information of the corresponding device like IP address, connected WIFI band or signal strength (RSSI).
Type: controller -> first Mesh node of your network, it manages your mesh network; repeater: additional Mesh nodes connected to your network; client: devices connected to your mesh network; router: modem that is connected to the first mesh node

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.

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 37 Connectivity: Edit



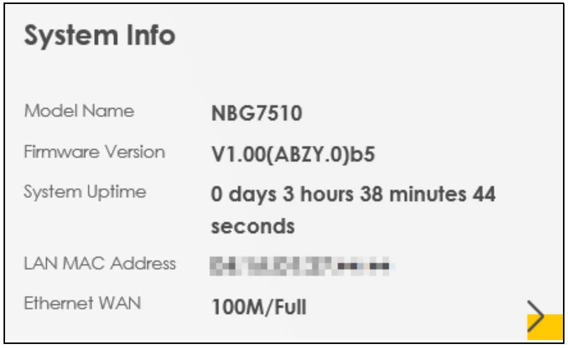
Device Name: TWPCZT02788-01

TWPCZT02788-01
IP: 192.168.1.129
Mac: dc:4a:3e:40:ec:5f

7.1.3 System Info

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

Figure 38 System Info

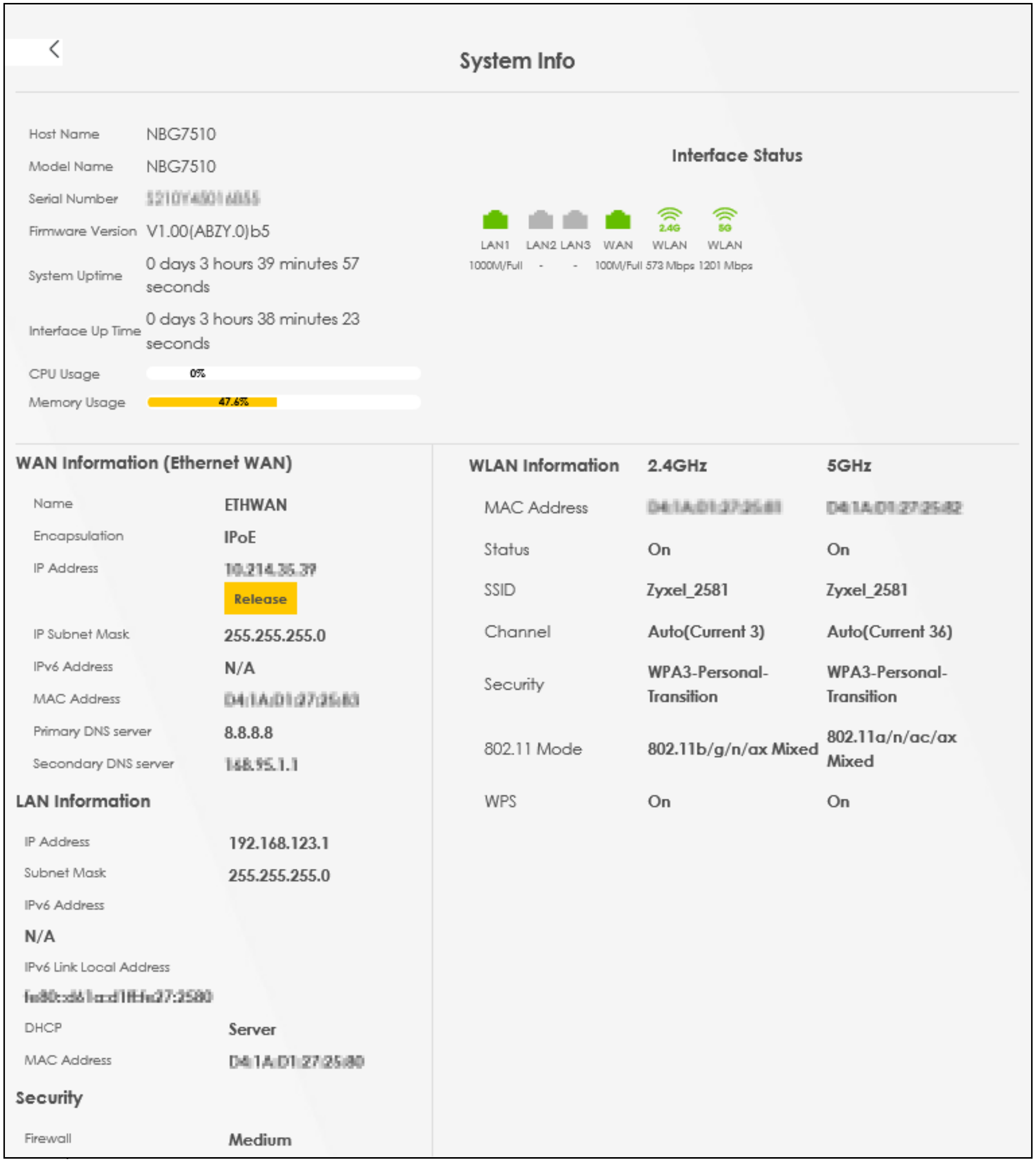


System Info

Model Name	NBG7510
Firmware Version	V1.00(ABZY.0)b5
System Uptime	0 days 3 hours 38 minutes 44 seconds
LAN MAC Address	[redacted]
Ethernet WAN	100M/Full

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

Figure 39 System Info: Detailed Information



System Info

Host Name	NBG7510
Model Name	NBG7510
Serial Number	[redacted]
Firmware Version	V1.00(ABZY.0)b5
System Uptime	0 days 3 hours 39 minutes 57 seconds
Interface Up Time	0 days 3 hours 38 minutes 23 seconds
CPU Usage	0%
Memory Usage	47.6%

Interface Status

WAN Information (Ethernet WAN)

Name	ETHWAN
Encapsulation	IPoE
IP Address	[redacted] Release
IP Subnet Mask	255.255.255.0
IPv6 Address	N/A
MAC Address	[redacted]
Primary DNS server	8.8.8.8
Secondary DNS server	[redacted]

LAN Information

IP Address	192.168.123.1
Subnet Mask	255.255.255.0
IPv6 Address N/A	
IPv6 Link Local Address [redacted]	
DHCP	Server
MAC Address	[redacted]

Security

Firewall	Medium

WLAN Information	2.4GHz	5GHz
MAC Address	[redacted]	[redacted]
Status	On	On
SSID	Zyxel_2581	Zyxel_2581
Channel	Auto(Current 3)	Auto(Current 36)
Security	WPA3-Personal-Transition	WPA3-Personal-Transition
802.11 Mode	802.11b/g/n/ax Mixed	802.11a/n/ac/ax Mixed
WPS	On	On

Each field is described in the following table.

Table 18 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.
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.
CPU Usage	This displays the current CPU usage percentage.
Memory Usage	This displays the current RAM usage percentage.

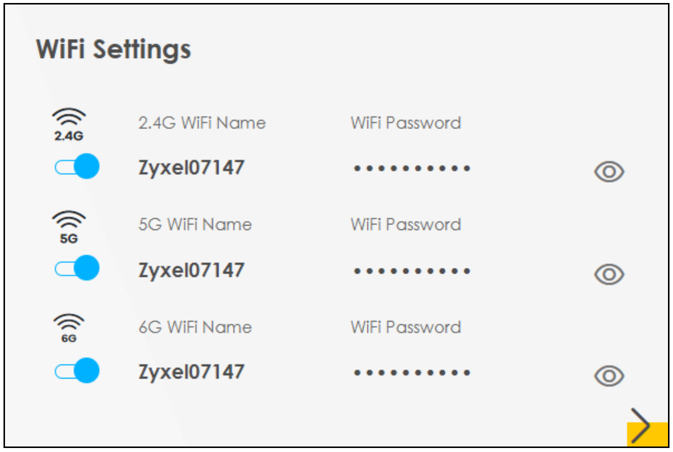
Table 18 System Info: Detailed Information (continued)

LABEL	DESCRIPTION
WAN Information (These fields display when you have a WAN connection.)	
IP Subnet Mask	This field displays the current IPv4 subnet mask of the Zyxel Device in the WAN.
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.
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 40 WiFi Settings



WiFi Settings

2.4G WiFi Name	WiFi Password	
Zyxel07147	••••••••••	◎
5G WiFi Name	WiFi Password	
Zyxel07147	••••••••••	◎
6G WiFi Name	WiFi Password	
Zyxel07147	••••••••••	◎

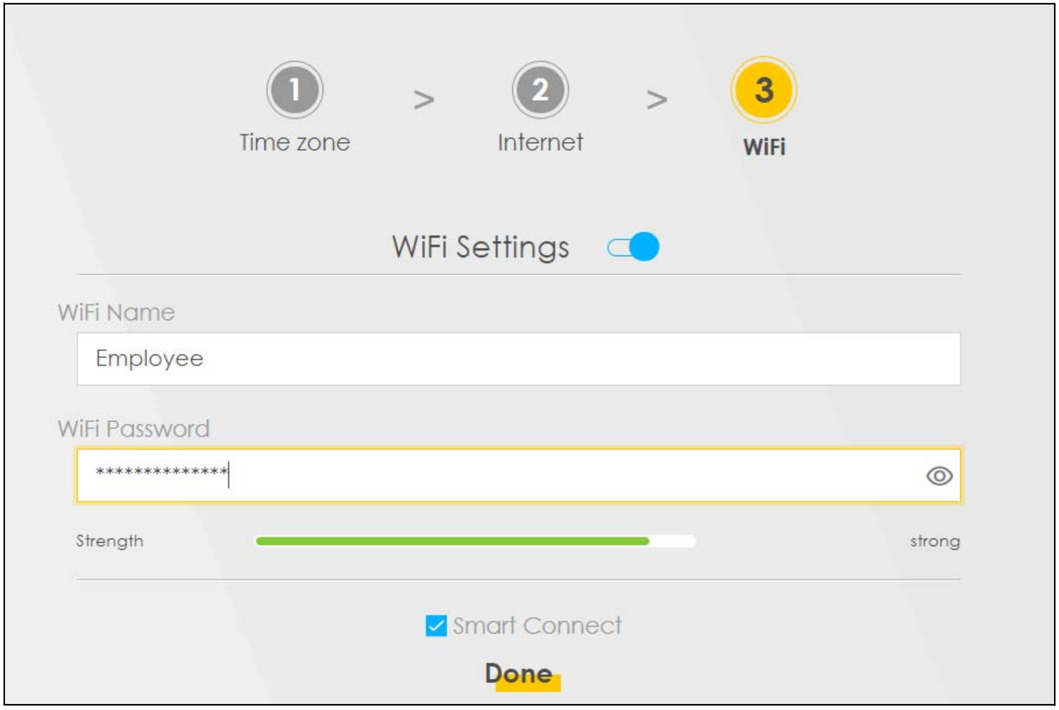
Click the Arrow icon (>) to configure the SSIDs and/or passwords for your main WiFi networks. Click the Eye icon (◎) to display the characters as you enter the WiFi Password.

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

Select **Smart Connect** to use the same SSID for 2.4 GHz and 5 GHz bands.

Note: Note that you have to disable Zyxel MESH in the **Network Setting** > **Wireless** > **Mesh** screen to deselect the **Smart Connect** check box.

Figure 41 WiFi Settings: Configuration



WiFi Settings

WiFi Name: Employee

WiFi Password: **************

Strength: strong

☑ Smart Connect

Each field is described in the following table.

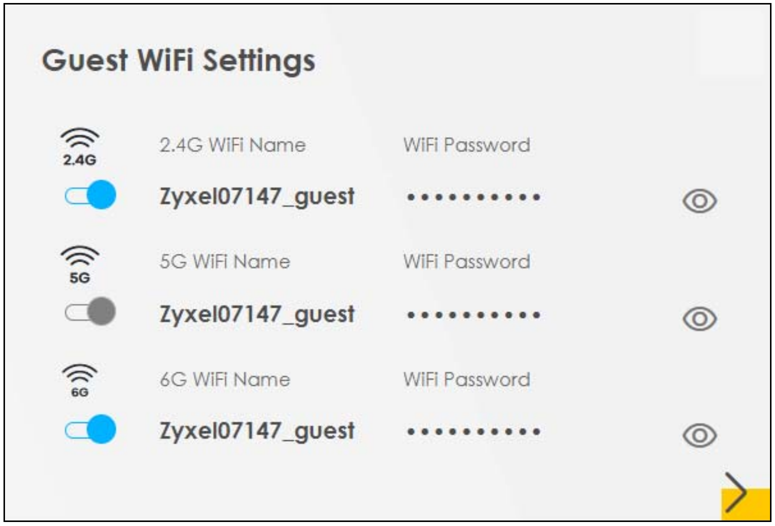
Table 19 WiFi Settings: Configuration

LABEL	DESCRIPTION
Smart Connect	Select this and the 2.4 GHz and 5 GHz WiFi 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 WiFi 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 42 Guest WiFi Settings

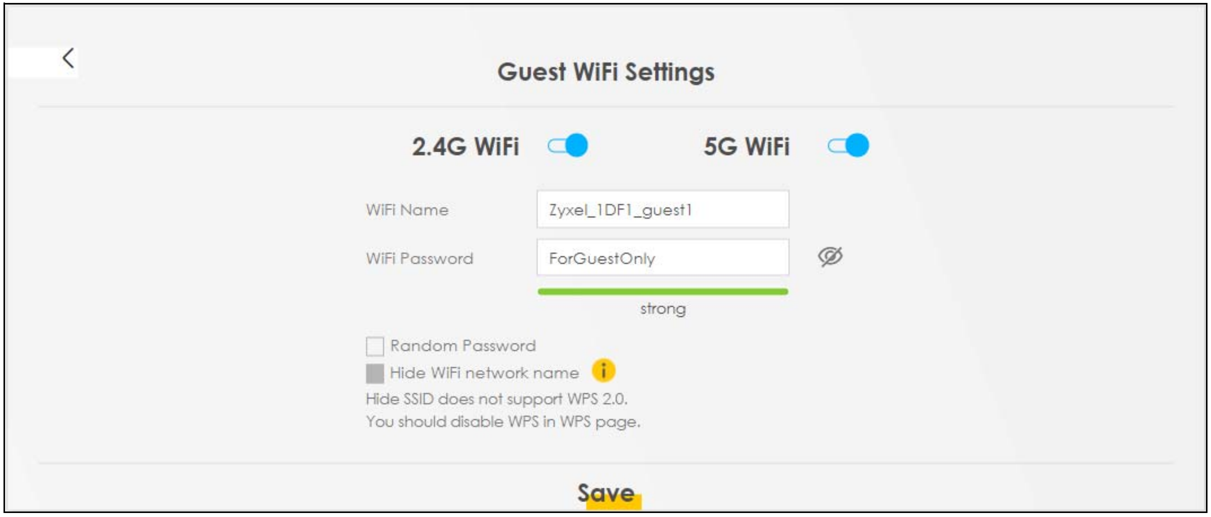


Guest WiFi Settings

2.4G	2.4G WiFi Name	WiFi Password
●	Zyxel07147_guest	•••••••••••
5G	5G WiFi Name	WiFi Password
○	Zyxel07147_guest	•••••••••••
6G	6G WiFi Name	WiFi Password
●	Zyxel07147_guest	•••••••••••

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

Figure 43 Guest WiFi Settings: Configuration



Guest WiFi Settings

2.4G WiFi ● 5G WiFi ●

WiFi Name: Zyxel_1DF1_guest1

WiFi Password: ForGuestOnly

strong

□ Random Password

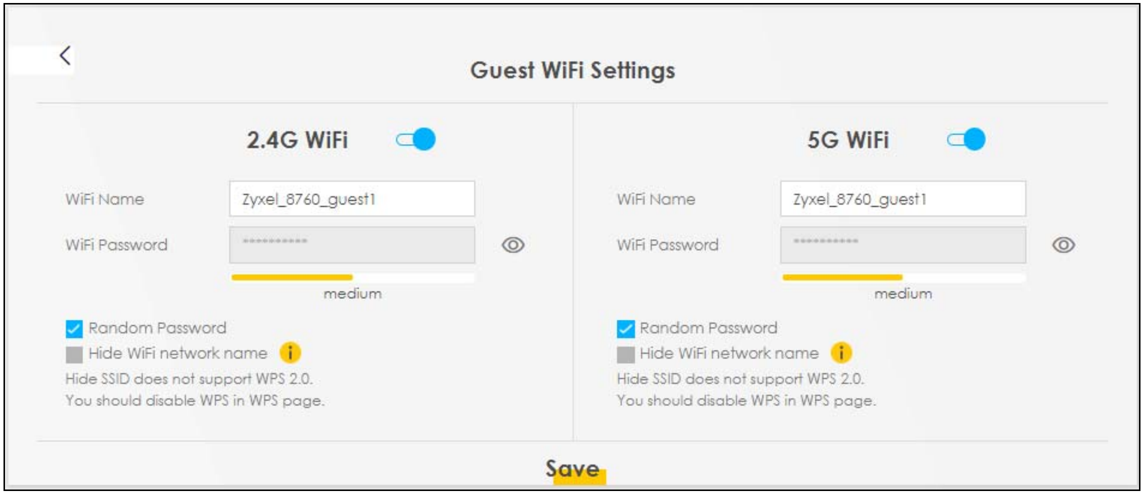
■ Hide WiFi network name

Hide SSID does not support WPS 2.0.
You should disable WPS in WPS page.

To assign different SSIDs to the 2.4 GHz and 5 GHz guest WiFi networks, clear the **Smart Connect** check box in the **WiFi Settings** screen, and the **Guest WiFi Settings** screen will change.

Note: Note that you have to disable Zyxel MESH in the **Network Setting** > **Wireless** > **Mesh** screen to clear the **Smart Connect** check box.

Figure 44 Guest WiFi Settings: Different SSIDs



Guest WiFi Settings

2.4G WiFi

WiFi Name: Zyxel_8760_guest1

WiFi Password: ***********

medium

☑ Random Password

□ Hide WiFi network name

Hide SSID does not support WPS 2.0.
You should disable WPS in WPS page.

5G WiFi

WiFi Name: Zyxel_8760_guest1

WiFi Password: ***********

medium

☑ Random Password

□ Hide WiFi network name

Hide SSID does not support WPS 2.0.
You should disable WPS in WPS page.

Each field is described in the following table.

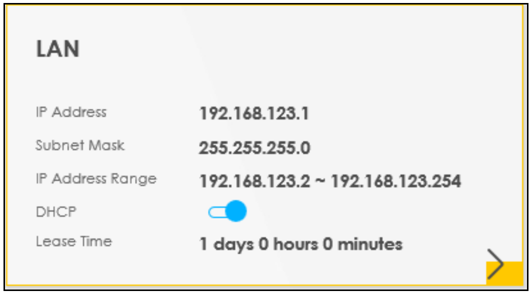
Table 20 WiFi Settings: Configuration

LABEL	DESCRIPTION
2.4G/5G/6G WiFi	Click this switch to enable or disable the 2.4 GHz / 5 GHz / 6GHz 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.
	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 check box to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool. 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 45 LAN



LAN

IP Address 192.168.123.1

Subnet Mask 255.255.255.0

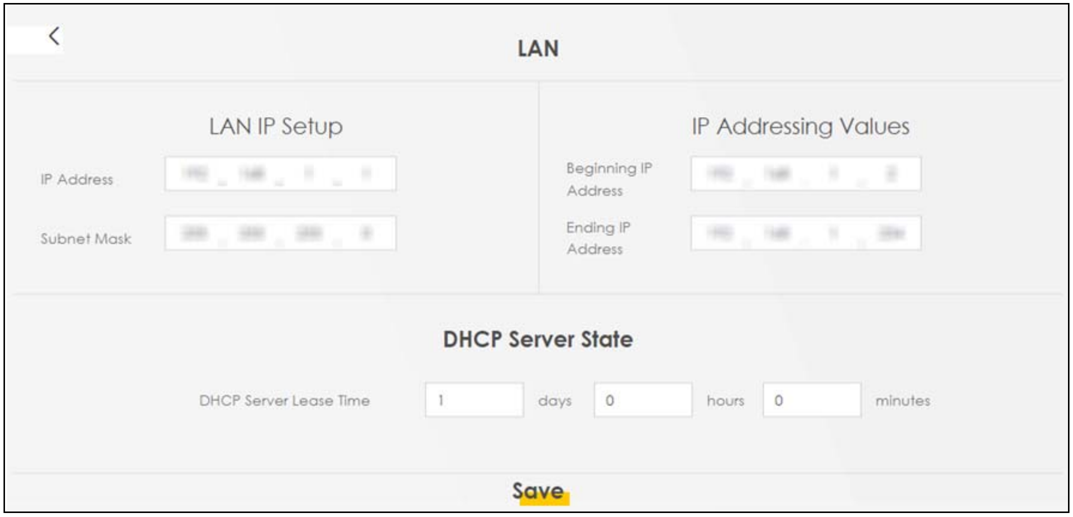
IP Address Range 192.168.123.2 ~ 192.168.123.254

DHCP

Lease Time 1 days 0 hours 0 minutes

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

Figure 46 LAN Setup



LAN

LAN IP Setup

IP Address

Subnet Mask

IP Addressing Values

Beginning IP Address

Ending IP Address

DHCP Server State

DHCP Server Lease Time 1 days 0 hours 0 minutes

Save

Each field is described in the following table.

Table 21 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, 192.168.123.1 (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.
DHCP Server State	

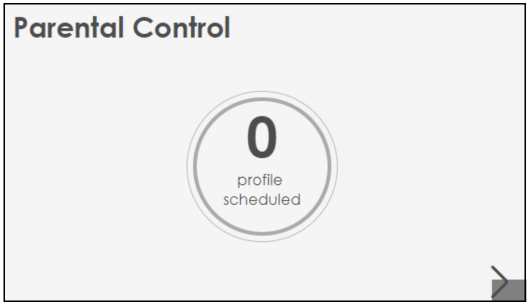
Table 21 LAN Setup (continued)

LABEL	DESCRIPTION
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

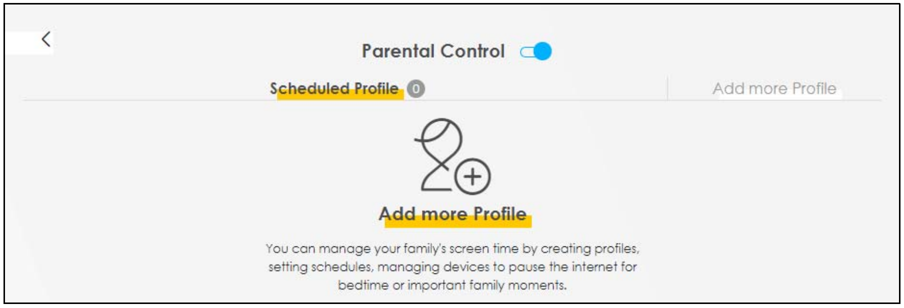
Use this screen to view the number of profiles that were created for parental control.

Figure 47 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 48 Parental Control



You can manage your family's screen time by creating profiles, setting schedules, managing devices to pause the internet for bedtime or important family moments.

Each field is described in the following table.

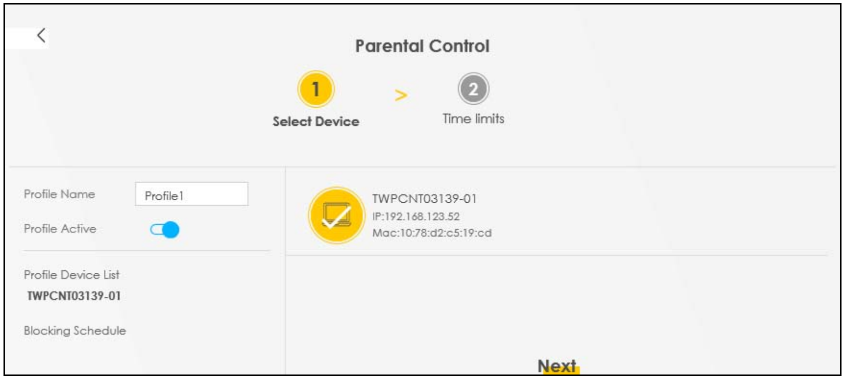
Table 22 Parental Control: Schedule

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 49 Parental Control: Add More Profile



Profile Name: Profile1

Profile Device List: TWPCNT03139-01

TWPCNT03139-01
IP:192.168.123.52
Mac:10:78:d2:c5:19:cd

Each field is described in the following table.

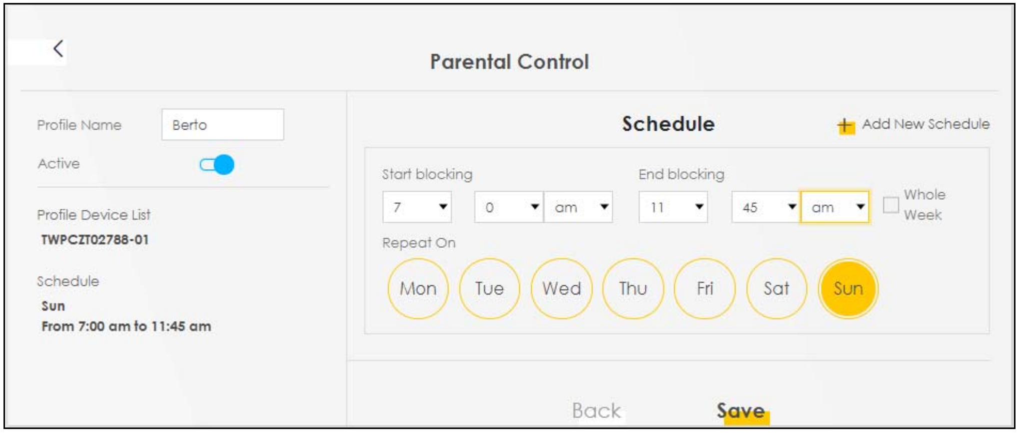
Table 23 Parental Control: Add More Profile

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.

7.3.2 Define a Schedule

Click **Next** to define time periods and days during which Internet access is blocked on the profile devices.

Figure 50 Parental Control: Schedule



Profile Name: Berto

Profile Device List: TWPCZT02788-01

Schedule
Sun
From 7:00 am to 11:45 am

Start blocking: 7 ▾ 0 ▾ am ▾

End blocking: 11 ▾ 45 ▾ am ▾

□ Whole Week

Repeat On: Sun

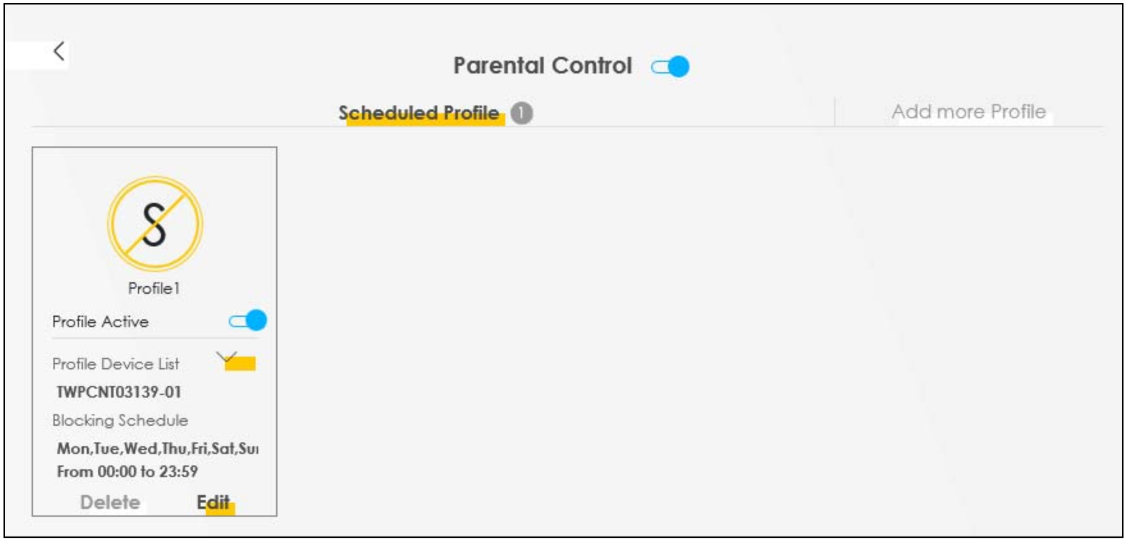
Each field is described in the following table.

Table 24 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. Select **All Day** and the scheduler rule will be activated for 24 hours.
Repeat On	Select the days when Internet access is blocked on the profile devices.
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 51 Parental Control: Edit_Delete



Profile1

Profile Active

Profile Device List

TWPCNT03139-01

Blocking Schedule

Mon,Tue,Wed,Thu,Fri,Sat,Sun
From 00:00 to 23:59

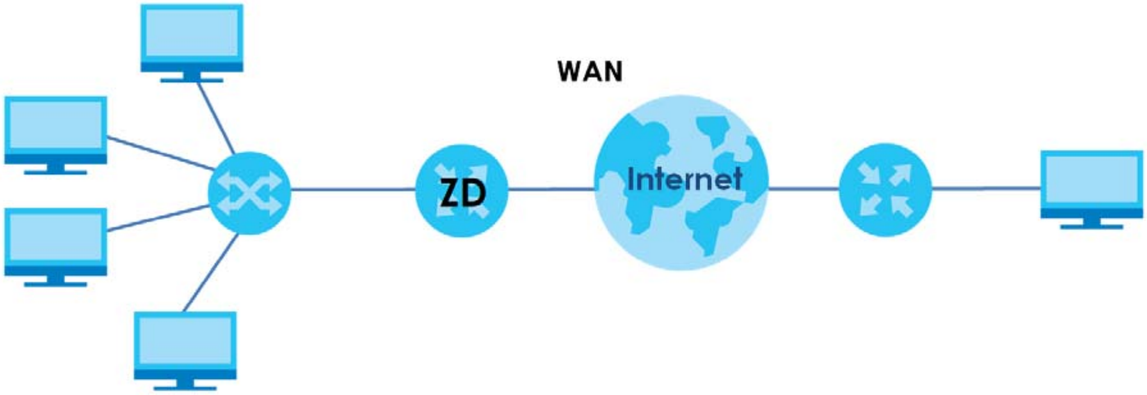
CHAPTER 8 Broadband

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

Figure 52 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 (Section 8.2 on page 100).

Table 25 WAN Setup Overview

LAYER-2 INTERFACE	INTERNET CONNECTION		
CONNECTION	**MODE**	**ENCAPSULATION**	**CONNECTION SETTINGS**
Ethernet	Routing	PPPoE	PPP user name and password, WAN IPv4/IPv6 IP address, routing feature, DNS server, VLAN, and MTU
		IPoE	WAN IPv4/IPv6 IP address, NAT, DNS server and routing feature
	Bridge	N/A	VLAN

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.

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 x 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

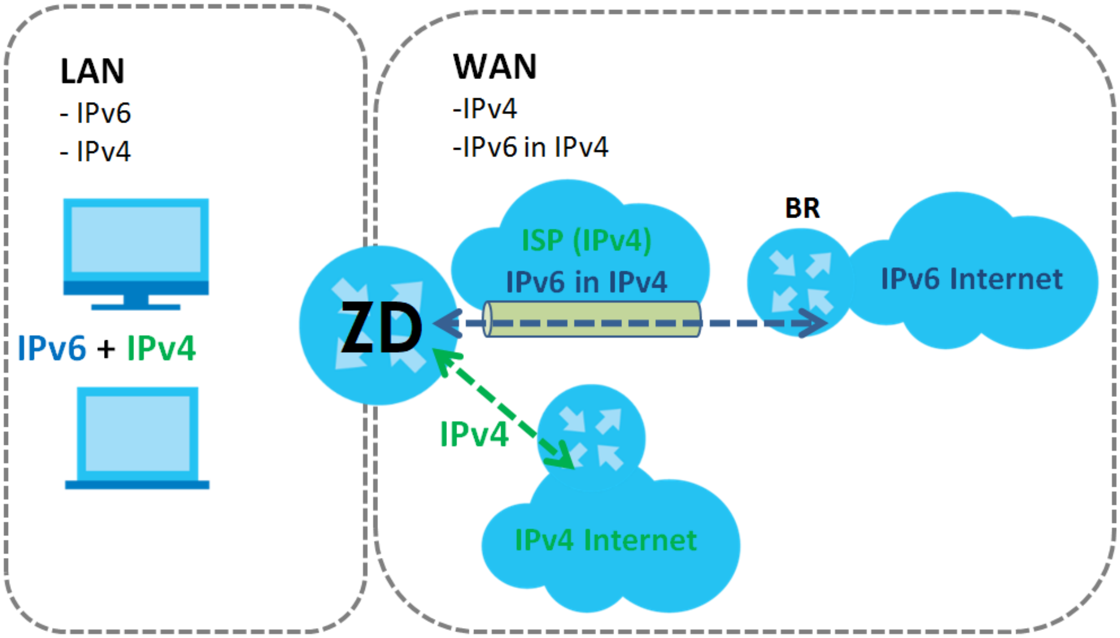
Both an IPv6 address and IPv6 subnet mask compose of 128-bit binary digits, which are divided into eight 16-bit blocks and written in hexadecimal notation. Hexadecimal uses four bits for each character (1 – 10, A – F). Each block’s 16 bits are then represented by four hexadecimal characters. For example, 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 53 IPv6 Rapid Deployment

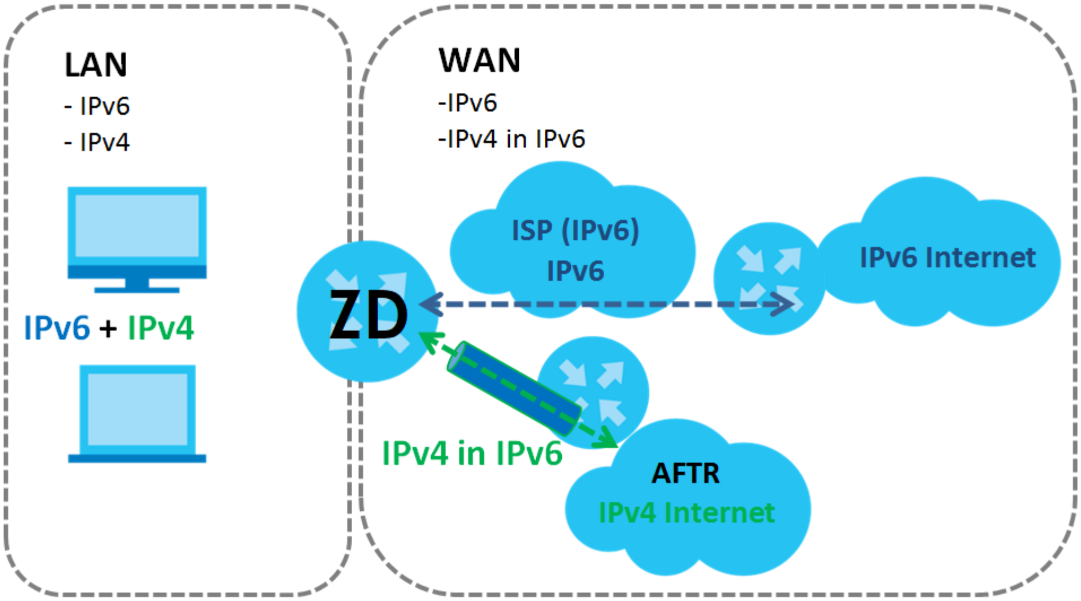


Dual Stack Lite

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 54 Dual Stack Lite



WAN MAC Address

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

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

8.1.3 Before You Begin

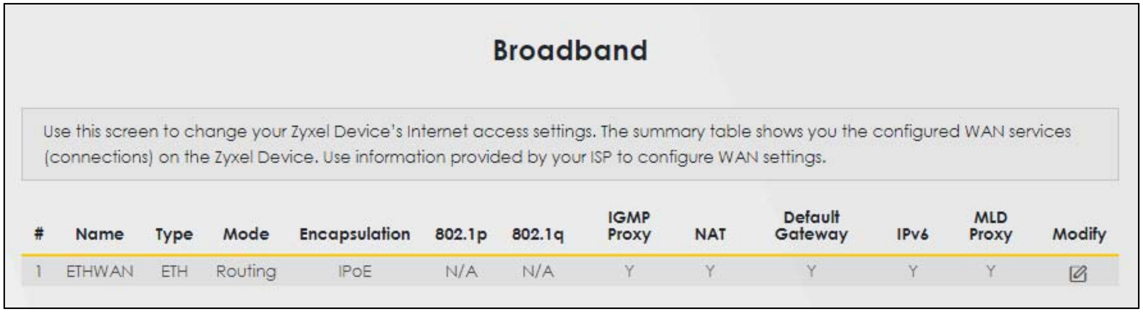
You need to know your Internet access settings such as encapsulation and WAN IP address. Get this information from your ISP.

8.2 Broadband Settings

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 55 Network Setting > Broadband



Broadband

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.

#	Name	Type	Mode	Encapsulation	802.1p	802.1q	IGMP Proxy	NAT	Default Gateway	IPv6	MLD Proxy	Modify
1	ETHWAN	ETH	Routing	IPoE	N/A	N/A	Y	Y	Y	Y	Y	✎

The following table describes the labels in this screen.

Table 26 Network Setting > Broadband

LABEL	DESCRIPTION
#	This is the index number of the entry.
Name	This is the service name of the connection.
Type	This shows types of connections the Zyxel Device 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 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.
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 Edit Internet Connection

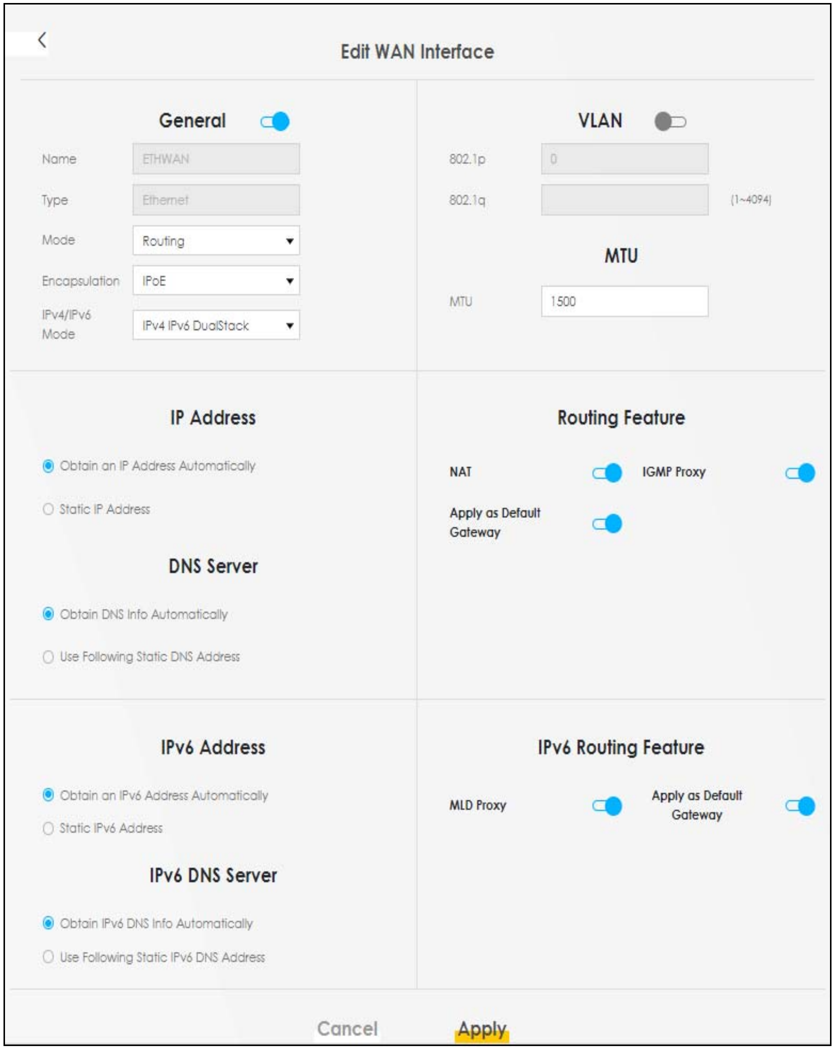
Click the Edit icon in the **Networking** > **Broadband** screen to open the following screen. Use this screen to configure a WAN connection. The screen varies depending on the mode, encapsulation, and IPv6 or IPv4 mode you select.

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 **IPoE** encapsulation. The screen varies when you select other encapsulation and IPv6 or IPv4 mode.

Figure 56 Network Setting > Broadband > Edit New WAN Interface (Ethernet)



Edit WAN Interface

General

Name: ETHWAN

Type: Ethernet

Mode: Routing

Encapsulation: IPoE

IPv4/IPv6 Mode: IPv4 IPv6 DualStack

VLAN

802.1p: 0

802.1q: (1~4094)

MTU

MTU: 1500

IP Address

● Obtain an IP Address Automatically

○ Static IP Address

DNS Server

● Obtain DNS Info Automatically

○ Use Following Static DNS Address

Routing Feature

NAT

IGMP Proxy

Apply as Default Gateway

IPv6 Address

● Obtain an IPv6 Address Automatically

○ Static IPv6 Address

IPv6 DNS Server

● Obtain IPv6 DNS Info Automatically

○ Use Following Static IPv6 DNS Address

IPv6 Routing Feature

MLD Proxy

Apply as Default Gateway

The following table describes the labels in this screen.

Table 27 Network Setting > Broadband > Edit New WAN Interface (Routing Mode)

LABEL	DESCRIPTION
General	Click this switch to enable or disable the interface. When the switch goes to the right, the function is enabled. Otherwise, it is not.
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 **Ethernet**, the choices are **PPPoE** and **IPoE.**

Table 27 Network Setting > Broadband > Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
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.
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	Enter the VLAN ID number (from 1 to 4094) for traffic through this connection.
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.)	
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.
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.

Table 27   Network Setting > Broadband > Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
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.
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 98 for more information. Click this switch to tunnel IPv6 traffic from the local network through the ISP's IPv4 network. When the switch goes to the right, the function is enabled. Otherwise, it is not.
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.
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 check box 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.

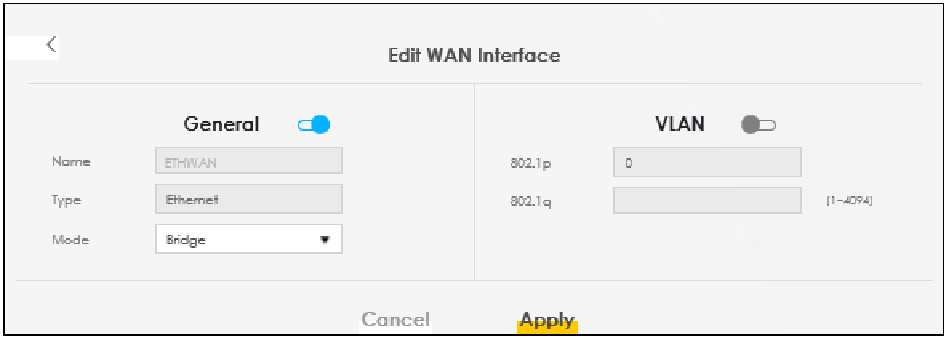
Table 27 Network Setting > Broadband > Edit New WAN Interface (Routing Mode) (continued)

LABEL	DESCRIPTION
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 99 for more information. Click this switch to let local computers use IPv4 through an ISP's IPv6 network. When the switch goes to the right, the function is enabled. Otherwise, it is not.
DS-Lite Relay Server IP	Specify the transition router's IPv6 address.
WAN MAC Address Once the WAN MAC address is successfully configured, the address will be copied to the configuration file. It will not change unless you change the setting or upload a different configuration file.	
Factory default	Select this option to have the WAN interface use the factory assigned default MAC address. By default, the Zyxel Device uses the factory assigned MAC address to identify itself.
Clone LAN Host's MAC Address	Select this option to have the WAN interface use a different MAC address by cloning the MAC address of another device or computer. Enter the IP address of the device or computer whose MAC you are cloning.
Set WAN MAC Address	Select this option to have the WAN interface use a manually specified MAC address. Enter the MAC address in the fields
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

Bridge Mode

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

Figure 57 Network Setting > Broadband > Edit New WAN Interface (Ethernet-Bridge Mode)



Name: ETHWAN
Type: Ethernet
Mode: Bridge
802.1p: 0
802.1q: [1~4094]

The following table describes the fields in this screen.

Table 28 Network Setting > Broadband > Edit New WAN Interface (VDSL over PTM or Ethernet-Bridge Mode)

LABEL	DESCRIPTION
General	Click this switch to enable or disable the interface. When the switch goes to the right, the function is enabled. Otherwise, it is not.
Name	Enter a service name of the connection.
Type (Ethernet)	Select **Ethernet** as the interface that you want to configure. This field is read-only is you are editing the WAN interface.

Table 28 Network Setting > Broadband > Edit New WAN Interface (VDSL over PTM or Ethernet-Bridge Mode) (continued)

LABEL	DESCRIPTION
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 Firewall, DHCP server and NAT on traffic from the selected LAN port(s).
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's 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	Enter the VLAN ID number (from 0 to 4094) for traffic through this connection.
Cancel	Click **Cancel** to exit this screen without saving.
Apply	Click **Apply** to save your changes.

8.3 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 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.

CHAPTER 9 Wireless

9.1 Wireless Overview

This chapter describes the Zyxel Device's **Network Setting** > **Wireless** screens. Use these screens to set up your Zyxel Device's WiFi network and security settings.

9.1.1 What You Can Do in this Chapter

This section describes the Zyxel Device's **Wireless** screens. Use these screens to set up your Zyxel Device's WiFi connection.

- Use the **General** screen to enable the Wireless LAN, enter the SSID and select the WiFi security mode (Section 9.2 on page 110)
- Use the **Guest/More AP** screen to set up multiple WiFi networks on your Zyxel Device (Section 9.3 on page 114).
- Use the **MAC Authentication** screen to allow or deny WiFi clients based on their MAC addresses from connecting to the Zyxel Device (Section 9.4 on page 118).
- Use the **WMM** screen to enable WiFi MultiMedia (WMM) to ensure quality of service in WiFi networks for multimedia applications (Section 9.5 on page 120).
- Use the **Others** screen to configure WiFi advanced features, such as the RTS/CTS Threshold (Section 9.6 on page 121).
- Use the **Channel Status** screen to scan the number of accessing points and view the results (Section 9.7 on page 123).
- Use the **Mesh** screen to enable or disable Mesh on your Zyxel Device (Section 9.8 on page 124).

9.1.2 What You Need to Know

Wireless Basics

"Wireless" is essentially radio communication. In the same way that walkie-talkie radios send and receive information over the airwaves, wireless networking devices exchange information with one another. A wireless networking device is just like a radio that lets your computer exchange information with radios attached to other computers. Like walkie-talkies, most wireless networking devices operate at radio frequency bands that are open to the public and do not require a license to use. However, wireless networking is different from that of most traditional radio communications in that there are a number of wireless networking standards available with different methods of data encryption.

WiFi6 / IEEE 802.11ax

WiFi6 is backwards compatible with IEEE 802.11a/b/g/n/ac and is most suitable in areas with a high concentration of users. WiFi6 devices support Target Wakeup Time (TWT) allowing them to automatically power down when they are inactive.

The following table displays the comparison of the different WiFi standards.

Table 29 WiFI Standards Comparison

WIFI STANDARD	MAXIMUM LINK RATE *	BAND	SIMULTANEOUS CONNECTIONS
802.11b	11 Mbps	2.4 GHz	1
802.11a/g	54 Mbps	2.4 GHz and 5 GHz	1
802.11n	600 Mbps	2.4 GHz and 5 GHz	1
802.11ac	6.93 Gbps	5 GHz	4
802.11ax	2.4 Gbps	2.4 GHz	128
	9.61 Gbps	5 GHz and 6 GHz	

* The maximum link rate is for reference under ideal conditions only.

Finding Out More

See Section 9.9 on page 125 for advanced technical information on WiFi networks.

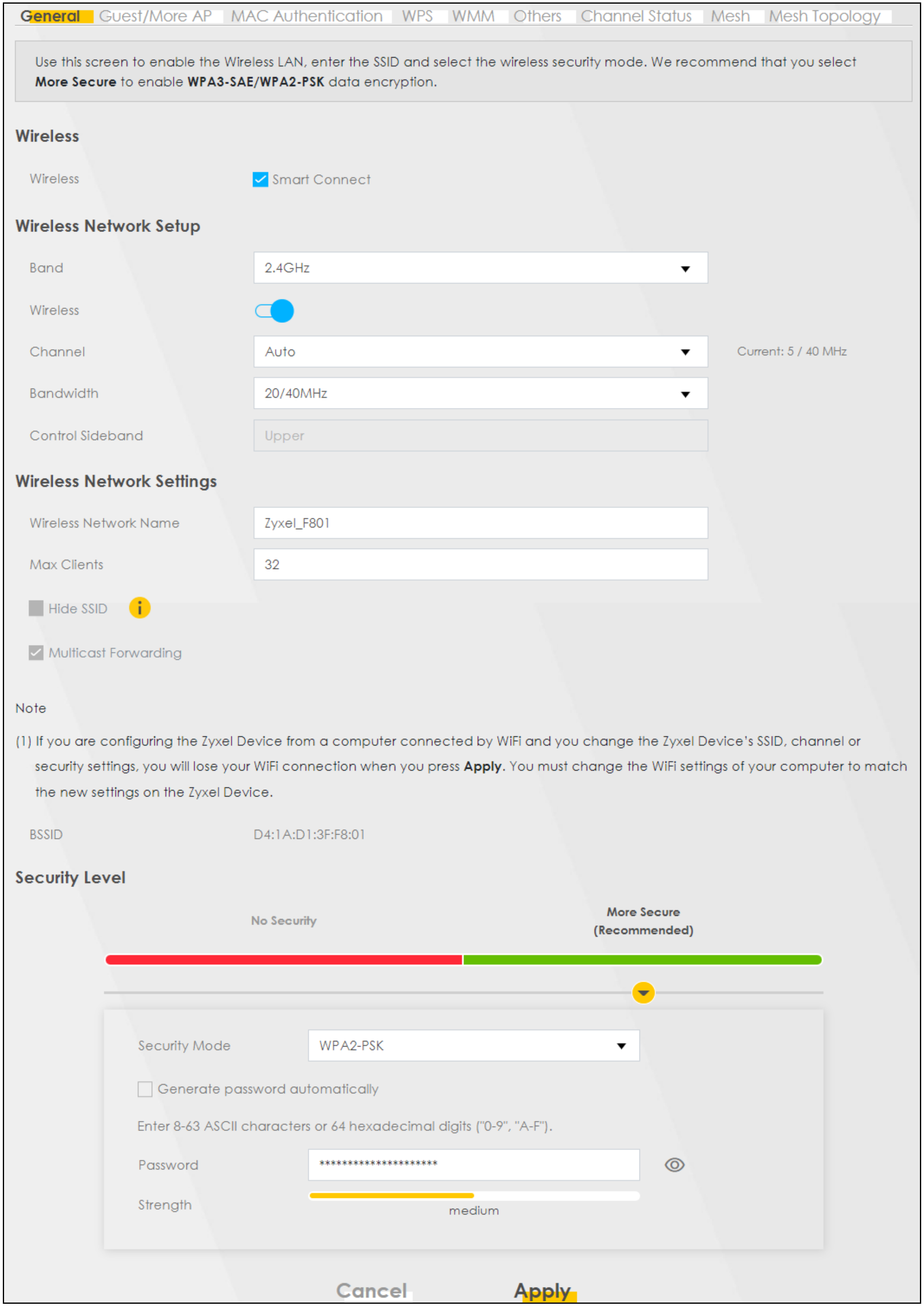
9.2 Wireless General Settings

Use this screen to enable the WiFi, enter the SSID and select the WiFi security mode. We recommend that you select **More Secure** to enable **WPA3-SAE** data encryption.

Note: If you are configuring the Zyxel Device from a computer connected by WiFi and you change the Zyxel Device’s SSID, channel or security settings, you will lose your WiFi connection when you press **Apply**. You must change the WiFi settings of your computer to match the new settings on the Zyxel Device.

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

Figure 58 Network Setting > Wireless > General



Use this screen to enable the Wireless LAN, enter the SSID and select the wireless security mode. We recommend that you select **More Secure** to enable **WPA3-SAE/WPA2-PSK** data encryption.

Wireless

Wireless ☑ Smart Connect

Wireless Network Setup

Band	2.4GHz	
Wireless	●	
Channel	Auto	Current: 5 / 40 MHz
Bandwidth	20/40MHz	
Control Sideband	Upper	

Wireless Network Settings

Wireless Network Name	Zyxel_F801
Max Clients	32

□ Hide SSID

☑ Multicast Forwarding

Note

(1) If you are configuring the Zyxel Device from a computer connected by WiFi and you change the Zyxel Device's SSID, channel or security settings, you will lose your WiFi connection when you press **Apply**. You must change the WiFi settings of your computer to match the new settings on the Zyxel Device.

BSSID D4:1A:D1:3F:F8:01

Security Level

Security Mode WPA2-PSK

□ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password *********************

Strength medium

The following table describes the general WiFi labels in this screen.

Table 30 Network Setting > Wireless > General

LABEL	DESCRIPTION
Smart Connect	Select **Smart Connect** and the 2.4 GHz and 5 GHz WiFi networks will use the same SSID and WiFi security settings.
Wireless/WiFi Network Setup	
Band	This shows the WiFi band which this radio profile is using. **2.4GHz** is the frequency used by IEEE 802.11b/g/n/ax WiFi clients, **5GHz** is used by IEEE 802.11a/n/ac/ax WiFi clients.
Wireless/WiFi	Click this switch to enable or disable WiFi in this field. When the switch turns blue, the function is enabled. Otherwise, it is not.
Channel	Select a channel from the drop-down list box. The options vary depending on the frequency band and the country you are in. Use **Auto** to have the Zyxel Device automatically determine a channel to use.
Bandwidth	Select whether the Zyxel Device uses a WiFi channel width of **20MHz**, **40mHz**, **20/40MHz**, **20/40/80MHz** or **20/40/80Hz**. A standard 20 MHz channel offers transfer speeds of up to 150 Mbps whereas a 40 MHz channel uses two standard channels and offers speeds of up to 300 Mbps. 40 MHz (channel bonding or dual channel) bonds two adjacent radio channels to increase throughput. The WiFi clients must also support 40 MHz. It is often better to use the 20 MHz setting in a location where the environment hinders the WiFi signal. An 80 MHz channel groups adjacent 40 MHz channels into pairs to increase bandwidth even higher. Select **20MHz** if you want to lessen radio interference with other wireless devices in your neighborhood or the WiFi clients do not support channel bonding. Not all Zyxel Devices support all channels. The Zyxel Device will choose the best bandwidth available automatically depending on the radio you chose and network conditions.
Control Sideband	This is available for some regions when you select a specific channel and set the **Bandwidth** field to **40MHz** or **20/40MHz**. Set whether the control channel (set in the **Channel** field) should be in the **Lower** or **Upper** range of channel bands.
Wireless/WiFi Network Settings	
Wireless/WiFi Network 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 for this WiFi network. You can use up to 32 printable characters, including spaces.
Max Clients	Specify the maximum number of clients that can connect to this network at the same time.
Hide SSID	Select this check box to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool. This check box is grayed out if the WPS function is enabled in the **Network Setting** > **Wireless** > **WPS** screen.
Multicast Forwarding	Select this check box to allow the Zyxel Device to convert wireless Multicast traffic into wireless unicast traffic.
BSSID	This shows the MAC address of the wireless interface on the Zyxel Device when WiFi is enabled.
Security Level	

Table 30 Network Setting > Wireless > General (continued)

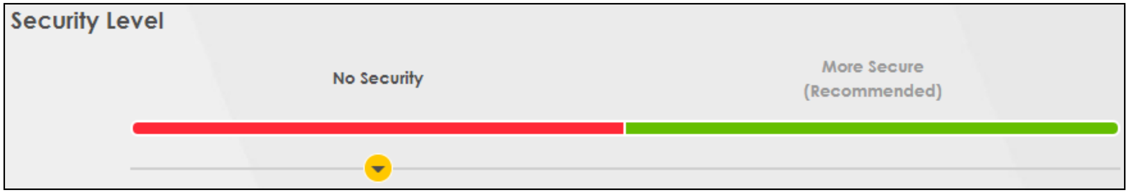
LABEL	DESCRIPTION
Security Mode	Select **More Secure (Recommended)** to add security on this WiFi network. The WiFi clients which want to associate to this network must have same WiFi security settings as the Zyxel Device. When you select to use a security, additional options appears in this screen. Or you can select **No Security** to allow any client to associate this network without any data encryption or authentication. See the following sections for more details about this field.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

9.2.1 No Security

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

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

Figure 59 Wireless > General: No Security



The following table describes the labels in this screen.

Table 31 Wireless > General: No Security

LABEL	DESCRIPTION
Security Level	Choose **No Security** to allow all WiFi connections without data encryption or authentication.

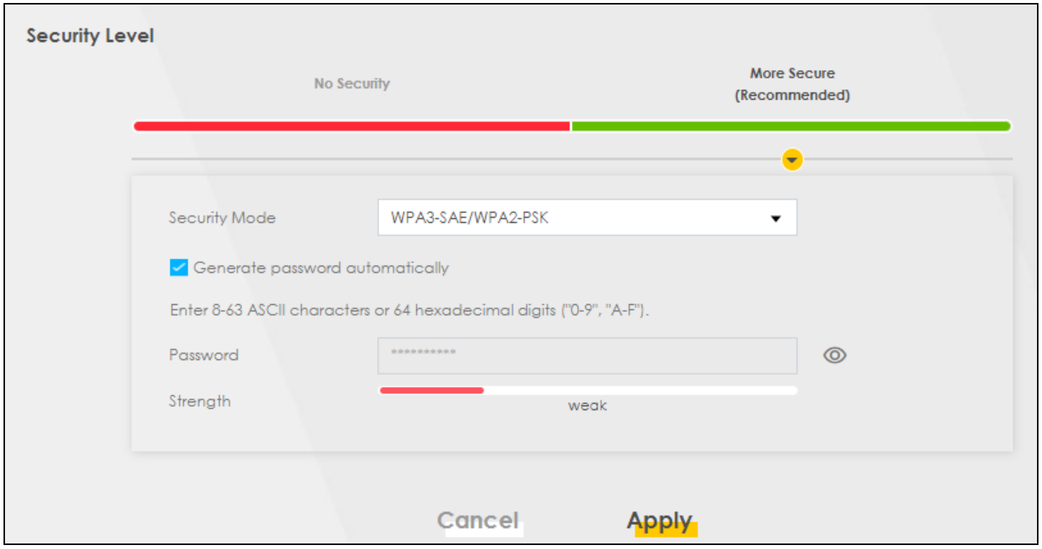
9.2.2 More Secure (Recommended)

The WPA-PSK (WiFi Protected Access-Pre-Shared Key) security mode provides both improved data encryption and user authentication over WEP. Using a pre-shared key, both the Zyxel Device and the connecting client share a common password in order to validate the connection. This type of encryption, while robust, is not as strong as WPA, WPA2 or even WPA2-PSK. The WPA2-PSK security mode is a more robust version of the WPA encryption standard. It offers better security, although the use of PSK makes it less robust than it could be.

The WPA3-SAE (Simultaneous Authentication of Equals handshake) security mode protects against dictionary attacks (password guessing attempts). It improves security by requiring a new encryption key every time a WPA3 connection is made. A handshake is the communication between the Zyxel Device and a connecting client at the beginning of a WiFi session.

Click **Network Setting** > **Wireless** to display the **General** screen. Select **More Secure** as the security level. Then select **WPA3-SAE** from the **Security Mode** list if your WiFi client supports it. If you are not sure, select **WPA3-SAE/WPA2-PSK** or **WPA2-PSK**.

Figure 60 Wireless > General: More Secure: WPA3-SAE/WPA2-PSK



Security Level

Security Mode WPA3-SAE/WPA2-PSK

☑ Generate password automatically

Enter 8-63 ASCII characters or 64 hexadecimal digits ("0-9", "A-F").

Password ***********

Strength weak

The following table describes the labels in this screen.

Table 32 Wireless > General: More Secure: WPA3-SAE/WPA2-PSK

LABEL	DESCRIPTION
Security Level	Select **More Secure** to enable data encryption.
Security Mode	Select a security mode from the drop-down list box.
Generate password automatically	Select this option to have the Zyxel Device automatically generate a password. The password field will not be configurable when you select this option.
Password	Select **Generate password automatically** or enter a **Password**. The password has two uses. 1. Manual. Manually enter the same password on the Zyxel Device and the client. You can use 8 – 63 alphanumeric (0-9, a-z, A-Z) and special characters, including spaces. 2. WPS. When using WPS, the Zyxel Device sends this password to the client. 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.

9.3 Guest/More AP Screen

Use this screen to configure a guest WiFi network that allows access to the Internet through the Zyxel Device. You can use one access point to provide several BSSs simultaneously. You can then assign varying security types to different SSIDs. WiFi clients can use different SSIDs to associate with the same access point.

Click **Network Setting > Wireless** > **Guest/More AP**.

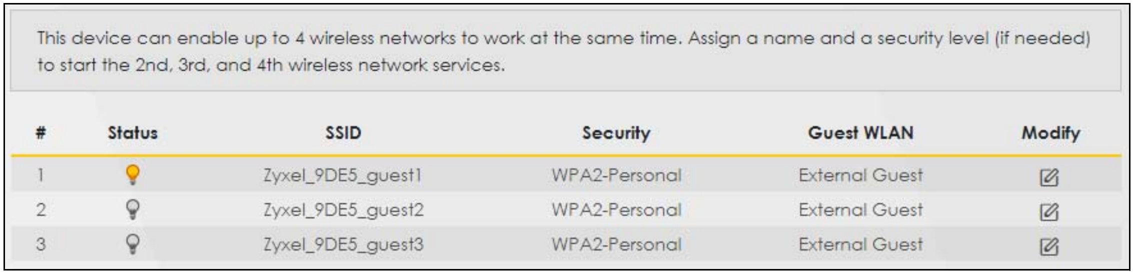
The following table introduces the supported WiFi networks.

Table 33 Supported WiFi Networks

WIFI NETWORKS	WHERE TO CONFIGURE
Main/1	Network Setting > Wireless > General screen
Guest/3	Network Setting > Wireless > Guest/More AP screen

The following screen displays.

Figure 61 Network Setting > Wireless > Guest/More AP



This device can enable up to 4 wireless networks to work at the same time. Assign a name and a security level (if needed) to start the 2nd, 3rd, and 4th wireless network services.

#	Status	SSID	Security	Guest WLAN	Modify
1	●	Zyxel_9DE5_guest1	WPA2-Personal	External Guest	✎
2	○	Zyxel_9DE5_guest2	WPA2-Personal	External Guest	✎
3	○	Zyxel_9DE5_guest3	WPA2-Personal	External Guest	✎

The following table describes the labels in this screen.

Table 34 Network Setting > Wireless > Guest/More AP

LABEL	DESCRIPTION
#	This is the index number of the entry.
Status	This field indicates whether this SSID is active. A yellow bulb signifies that this SSID is active, while a gray bulb signifies that this SSID is not active.
SSID	An SSID profile is the set of parameters relating to one of the Zyxel Device's BSSs. The SSID (Service Set IDentifier) identifies the Service Set with which a wireless device is associated. This field displays the name of the WiFi profile on the network. When a WiFi client scans for an AP to associate with, this is the name that is broadcast and seen in the WiFi client utility.
Security	This field indicates the security mode of the SSID profile.
Guest WLAN	This displays if the guest WLAN function has been enabled for this WLAN. If **Home Guest** displays, clients can connect to each other directly. If **External Guest** displays, clients are blocked from connecting to each other directly. **N/A** displays if guest WLAN is disabled.
Modify	Click the **Edit** icon of an SSID profile to configure the SSID profile.

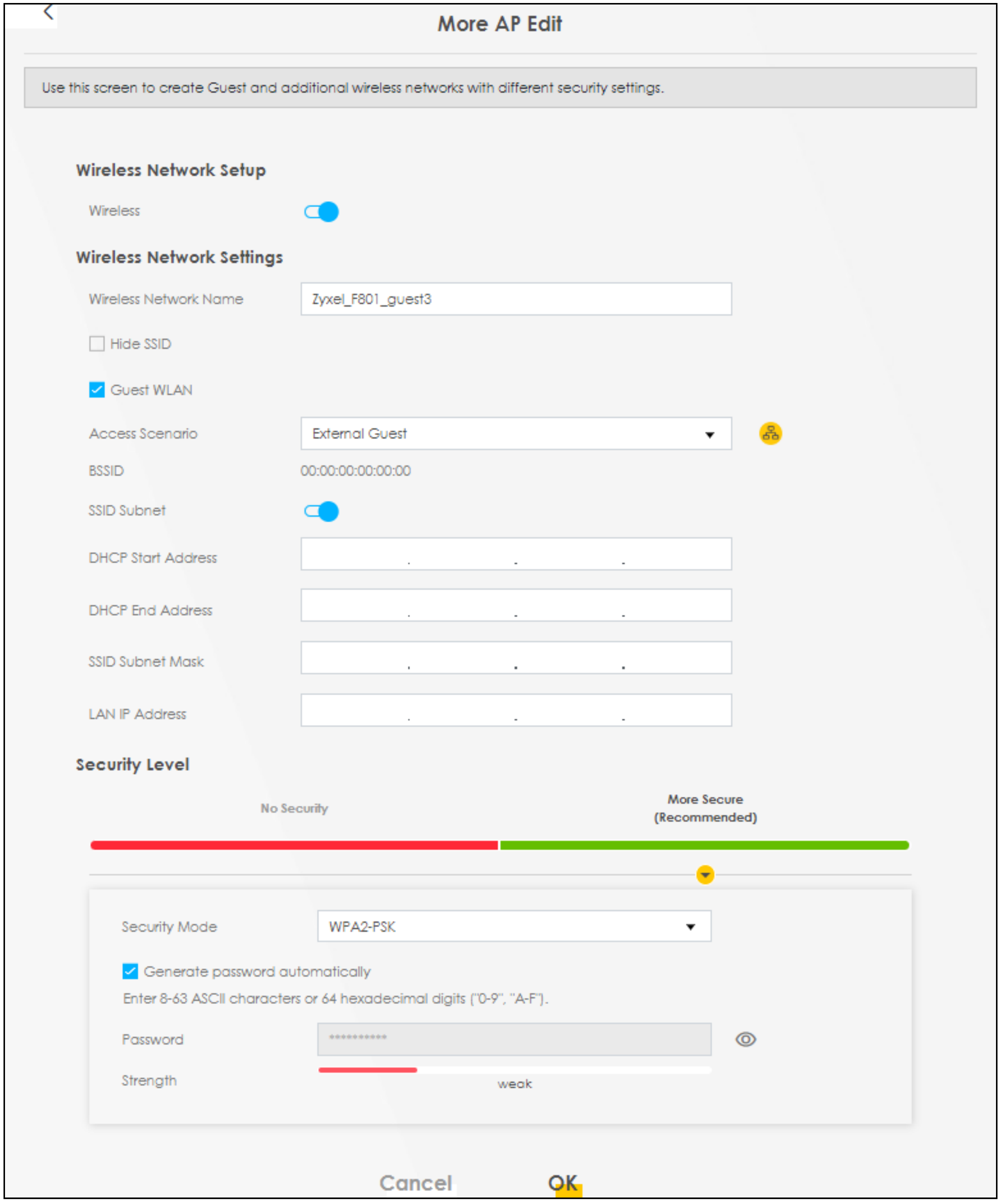
9.3.1 The Edit Guest/More AP Screen

Use this screen to create Guest and additional WiFi networks with different security settings.

Note: If upstream/downstream bandwidth is empty, the Zyxel Device sets the value automatically. Setting a maximum upstream/downstream bandwidth will significantly decrease WiFi performance.

Click the **Edit** icon next to an SSID in the **Guest/More AP** screen. The following screen displays.

Figure 62 Network Setting > Wireless > Guest/More AP > Edit



More AP Edit

Use this screen to create Guest and additional wireless networks with different security settings.

Wireless Network Setup

Wireless ●

Wireless Network Settings

Wireless Network Name: Zyxel_F801_guest3

□ Hide SSID

☑ Guest WLAN

Access Scenario: External Guest

BSSID: 00:00:00:00:00:00

SSID Subnet ●

DHCP Start Address: . . .

DHCP End Address: . . .

SSID Subnet Mask: . . .

LAN IP Address: . . .

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: **********

Strength: weak

The following table describes the fields in this screen.

Table 35 Network Setting > Wireless > Guest/More AP > Edit

LABEL	DESCRIPTION
WiFi/Wireless Network Setup	
WiFi/Wireless	Click this switch to enable or disable the WiFi in this field. When the switch turns blue ●, the function is enabled; otherwise, it is not.
WiFi/Wireless Network Settings	
WiFi/Wireless Network 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 for the WiFi. You can use up to 32 printable characters, including spaces.

Table 35   Network Setting > Wireless > Guest/More AP > Edit (continued)

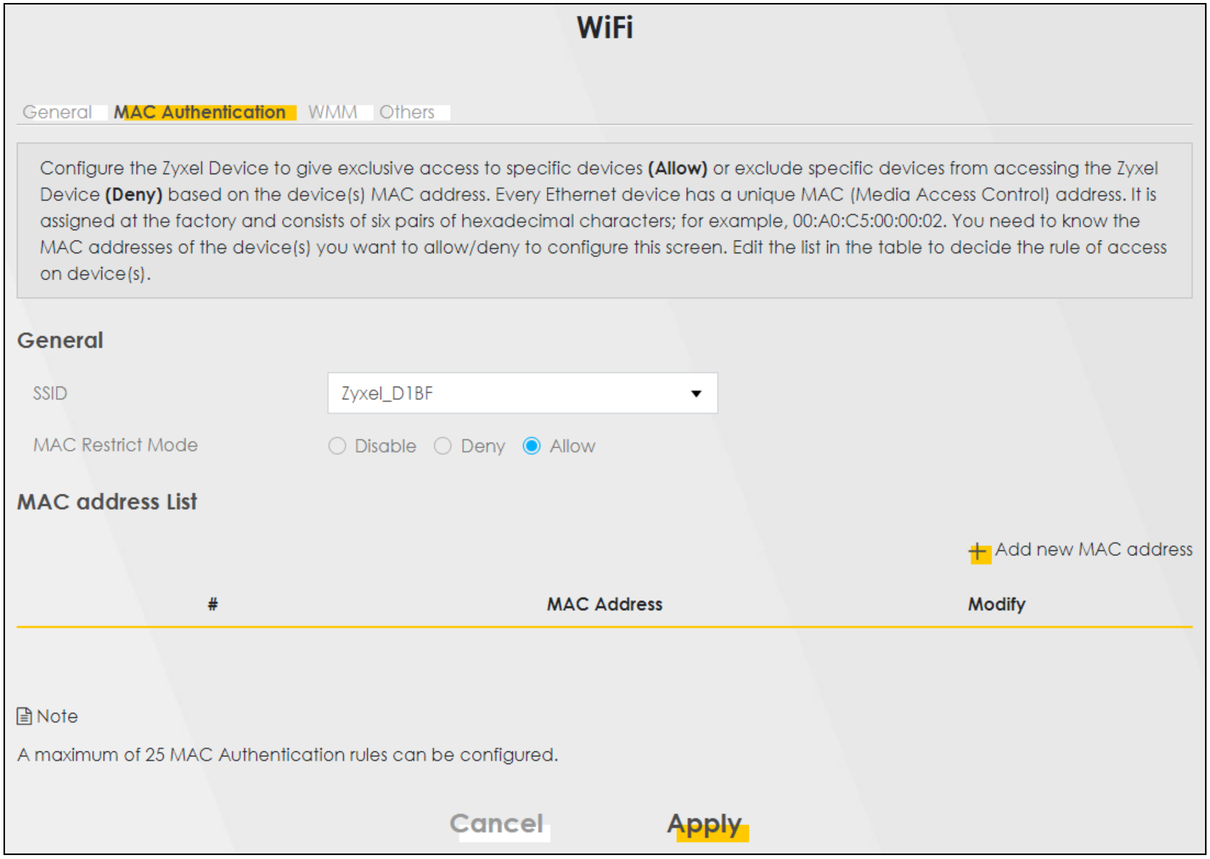
LABEL	DESCRIPTION
Hide SSID	Select this check box to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool.
Guest WLAN	Select this to create Guest WLANs for home and external clients. Select the WLAN type in the **Access Scenario** field.
Access Scenario	If you select **Home Guest**, clients can connect to each other directly. If you select **External Guest**, clients are blocked from connecting to each other directly.
BSSID	This shows the MAC address of the WiFi interface on the Zyxel Device when WiFi is enabled.
SSID Subnet	Click on this switch to **Enable** this function if you want the WiFi network interface to assign DHCP IP addresses to the associated WiFi clients. This option cannot be used if the **Smart Connect** check box is selected in **Network Setting** > **Wireless** > **General**.
DHCP Start Address	Specify the first of the contiguous addresses in the DHCP IP address pool. The Zyxel Device assigns IP addresses from this DHCP pool to WiFi clients connecting to the SSID.
DHCP End Address	Specify the last of the contiguous addresses in the DHCP IP address pool.
SSID Subnet Mask	Specify the subnet mask of the Zyxel Device for the SSID subnet.
LAN IP Address	Specify the IP address of the Zyxel Device for the SSID subnet.
Security Level	
Security Mode	Select **More Secure (Recommended)** to add security on this WiFi network. The WiFi clients which want to associate to this network must have the same WiFi security settings as the Zyxel Device. After you select to use a security, additional options appears in this screen. Or you can select **No Security** to allow any client to associate this network without any data encryption or authentication. See Section 9.2.1 on page 113 for more details about this field.
Generate password automatically	Select this option to have the Zyxel Device automatically generate a password. The password field will not be configurable when you select this option.
Password	WPA2-PSK uses a simple common password, instead of user-specific credentials. If you did not select **Generate password automatically**, you can manually enter a pre-shared key from 8 to 63 alphanumeric (0-9, a-z, A-Z) and special characters. Spaces are allowed. Click the Eye icon to show or hide the password of your WiFi network. When the Eye icon is slashed, you'll see the password in plain text. Otherwise, it's hidden.
Strength	This displays the current password strength – **weak**, **medium**, **strong**.
Click this ⌄ to show more fields in this section. Click again to hide them.	
Encryption	Select the encryption type (**AES** or **TKIP+AES**) for data encryption. Select **AES** if your WiFi clients can all use AES. Select **TKIP+AES** to allow the WiFi clients to use either TKIP or AES. Not all models support the **TKIP+AES** option.
Timer	The **Timer** is the rate at which the RADIUS server sends a new group key out to all clients.
Cancel	Click **Cancel** to exit this screen without saving.
OK	Click **OK** to save your changes.

9.4 MAC Authentication

Use this screen to give exclusive access to specific connected devices **(Allow)** or exclude specific devices from accessing the Zyxel Device **(Deny),** based on the MAC address of each connected device. Every Ethernet device has a unique factory-assigned MAC (Media Access Control) address, which consists of six pairs of hexadecimal characters, for example: 00:A0:C5:00:00:02. You need to know the MAC addresses of the connected device you want to allow/deny to configure this screen.

Note: You can have up to 25 MAC authentication rules.Use this screen to view your Zyxel Device's MAC filter settings and add new MAC filter rules. Click **Network Setting** > **Wireless** > **MAC Authentication**. The screen appears as shown.

Figure 63 Network Setting > Wireless > MAC Authentication



Configure the Zyxel Device to give exclusive access to specific devices **(Allow)** or exclude specific devices from accessing the Zyxel Device **(Deny)** based on the device(s) MAC address. Every Ethernet device has a unique MAC (Media Access Control) address. It is assigned at the factory and consists of six pairs of hexadecimal characters; for example, 00:A0:C5:00:00:02. You need to know the MAC addresses of the device(s) you want to allow/deny to configure this screen. Edit the list in the table to decide the rule of access on device(s).

General

SSID: Zyxel_D1BF

MAC Restrict Mode: ○ Disable ○ Deny ● Allow

MAC address List

#	MAC Address	Modify

Note

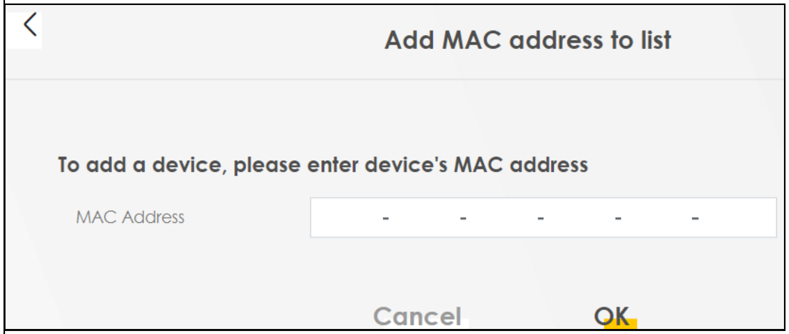
A maximum of 25 MAC Authentication rules can be configured.

The following table describes the labels in this screen.

Table 36 Network Setting > Wireless > MAC Authentication

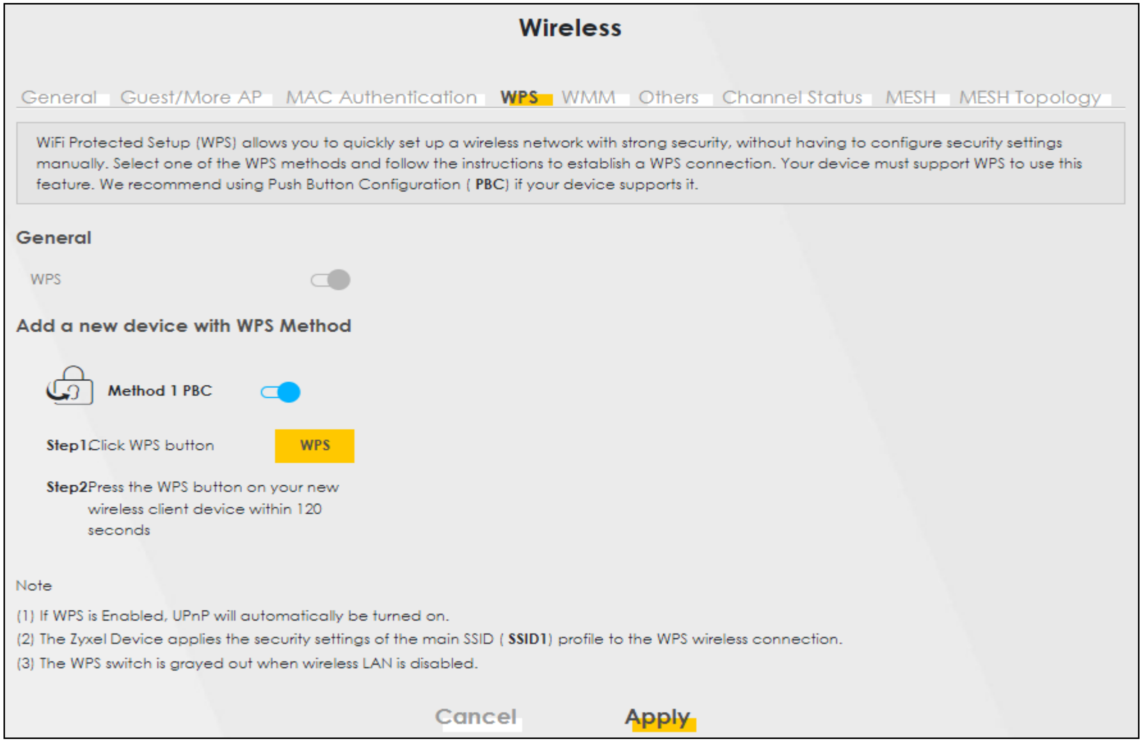
LABEL	DESCRIPTION
General	
SSID	Select the SSID for which you want to configure MAC filter settings.

Table 36 Network Setting > Wireless > MAC Authentication (continued)

LABEL	DESCRIPTION
MAC Restrict Mode	Define the filter action for the list of MAC addresses in the **MAC Address** table. Select **Disable** to turn off MAC filtering. Select **Deny** to block access to the Zyxel Device. MAC addresses not listed will be allowed to access the Zyxel Device. Select **Allow** to permit access to the Zyxel Device. MAC addresses not listed will be denied access to the Zyxel Device.
MAC address List	
Add new MAC address	This field is available when you select **Deny** or **Allow** in the **MAC Restrict Mode** field. Click this if you want to add a new MAC address entry to the MAC filter list below. Enter the MAC addresses of the WiFi devices that are allowed or denied access to the Zyxel Device in these address fields. Enter the MAC addresses in a valid MAC address format, that is, six hexadecimal character pairs, for example, 12:34:56:78:9a:bc.  Add MAC address to list To add a device, please enter device's MAC address
#	This is the index number of the entry.
MAC Address	This is the MAC addresses of the WiFi devices that are allowed or denied access to the Zyxel Device.
Modify	Click the **Edit** icon and type the MAC address of the peer device in a valid MAC address format (six hexadecimal character pairs, for example 12:34:56:78:9a:bc). Click the **Delete** icon to delete the entry.
Cancel	Click **Cancel** to exit this screen without saving.
Apply	Click **Apply** to save your changes.

Note: The Zyxel Device applies the security settings of the main SSID (**SSID1**) profile to the WPS WiFi connection (see Section 9.2.2 on page 113).

Figure 64 Network Setting > Wireless > WPS



WiFi Protected Setup (WPS) allows you to quickly set up a wireless network with strong security, without having to configure security settings manually. Select one of the WPS methods and follow the instructions to establish a WPS connection. Your device must support WPS to use this feature. We recommend using Push Button Configuration (**PBC**) if your device supports it.

General

WPS

Add a new device with WPS Method

Method 1 PBC

Step1 Click WPS button **WPS**

Step2 Press the WPS button on your new wireless client device within 120 seconds

Note

(1) If WPS is Enabled, UPnP will automatically be turned on.

(2) The Zyxel Device applies the security settings of the main SSID (**SSID1**) profile to the WPS wireless connection.

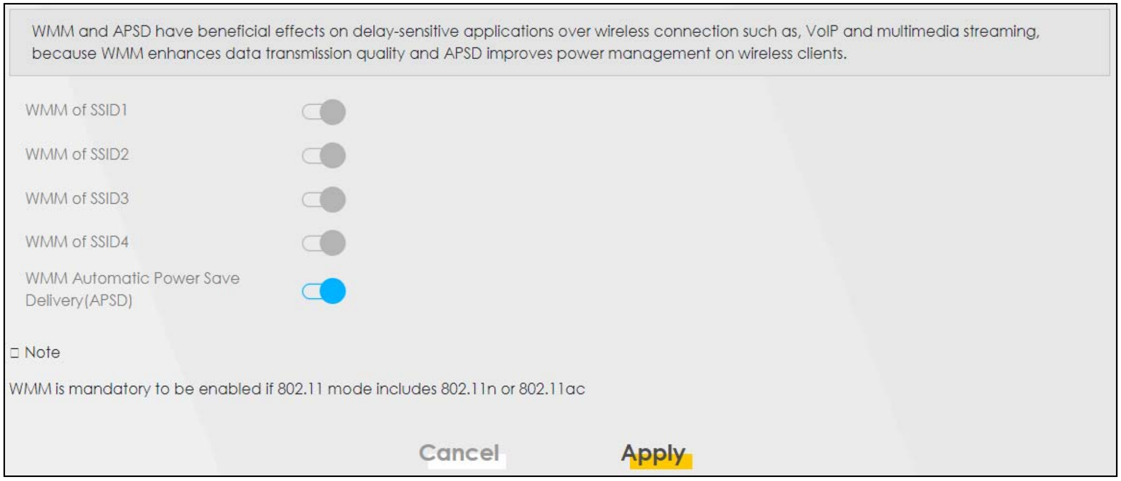
(3) The WPS switch is grayed out when wireless LAN is disabled.

9.5 WMM

Use this screen to enable WiFi MultiMedia (**WMM**) and **WMM Automatic Power Save Delivery** (**APSD**) in WiFi networks for multimedia applications. **WMM** enhances data transmission quality, while **APSD** improves power management of WiFi clients. This allows time-sensitive applications, such as voice and videos, to run more smoothly.

Click **Network Setting** > **Wireless** > **WMM** to display the following screen.

Figure 65 Network Setting > Wireless > WMM



WMM and APSD have beneficial effects on delay-sensitive applications over wireless connection such as, VoIP and multimedia streaming, because WMM enhances data transmission quality and APSD improves power management on wireless clients.

WMM of SSID1

WMM of SSID2

WMM of SSID3

WMM of SSID4

WMM Automatic Power Save Delivery(APSD)

□ Note

WMM is mandatory to be enabled if 802.11 mode includes 802.11n or 802.11ac

Note: **WMM** cannot be disabled if 802.11 mode includes 802.11n or 802.11ac.

Note: APSD only affects SSID1. For SSID2-SSID4, APSD is always enabled.

The following table describes the labels in this screen.

Table 37 Network Setting > Wireless > WMM

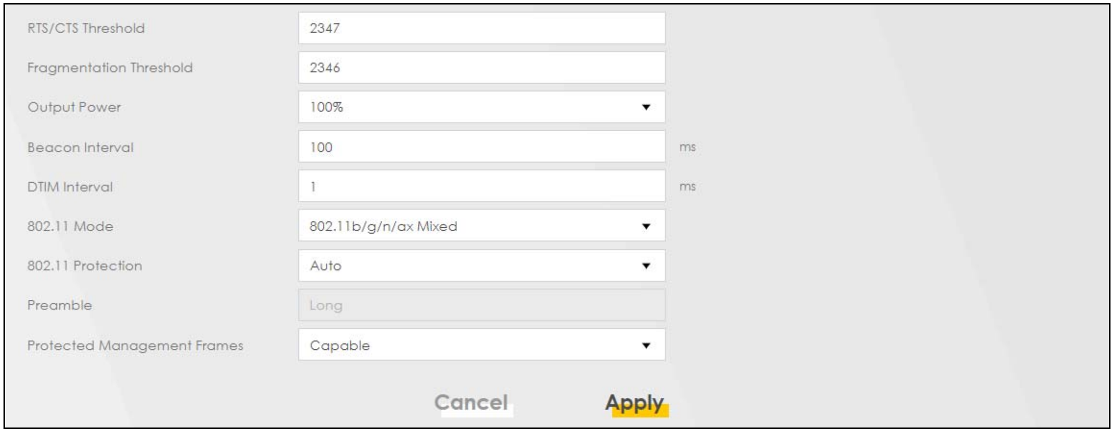
LABEL	DESCRIPTION
WMM of SSID	Select **On** to have the Zyxel Device automatically give the WiFi network (SSIDx) a priority level according to the ToS value in the IP header of packets it sends. WMM QoS (WiFi MultiMedia Quality of Service) gives high priority to video, which makes them run more smoothly. SSID1 is the **General** WiFi SSID; SSID2-SSID4 are the **Guest** WiFi SSIDs. If the **802.11 Mode** in **Network Setting** > **Wireless** > **Others** is set to include 802.11n or 802.11ac, WMM cannot be disabled.
WMM Automatic Power Save Delivery (APSD)	Select this option to extend the battery life of your mobile devices (especially useful for small devices that are running multimedia applications). The Zyxel Device goes to sleep mode to save power when it is not transmitting data. The AP buffers the packets sent to the Zyxel Device until the Zyxel Device "wakes up." The Zyxel Device wakes up periodically to check for incoming data. Note: This works only if the WiFi device to which the Zyxel Device is connected also supports this feature.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

9.6 Others Screen

Use this screen to configure advanced WiFi settings, such as additional security settings, power saving, and data transmission settings. Click **Network Setting** > **Wireless** > **Others**. The screen appears as shown.

See Section 9.9.2 on page 126 for detailed definitions of the terms listed here.

Figure 66 Network Setting > Wireless > Others



RTS/CTS Threshold	2347	
Fragmentation Threshold	2346	
Output Power	100%	
Beacon Interval	100	ms
DTIM Interval	1	ms
802.11 Mode	802.11b/g/n/ax Mixed	
802.11 Protection	Auto	
Preamble	Long	
Protected Management Frames	Capable	

The following table describes the labels in this screen.

Table 38 Network Setting > Wireless > Others

LABEL	DESCRIPTION
RTS/CTS Threshold	Data with its frame size larger than this value will perform the RTS (Request To Send)/CTS (Clear To Send) handshake. Enter a value between 0 and 2347.
Fragmentation Threshold	This is the maximum data fragment size that can be sent. Enter a value between 256 and 2346.
Output Power	Set the output power of the Zyxel Device. If there is a high density of APs in an area, decrease the output power to reduce interference with other APs. Select one of the following: **20%**, **40%**, **60%**, **80%** or **100%**.
Beacon Interval	When a wirelessly networked device sends a beacon, it includes with it a beacon interval. This specifies the time period before the device sends the beacon again. The interval tells receiving devices on the network how long they can wait in low power mode before waking up to handle the beacon. This value can be set from 50 ms to 1000 ms. A high value helps save current consumption of the access point.
DTIM Interval	Delivery Traffic Indication Message (DTIM) is the time period after which broadcast and Multicast packets are transmitted to mobile clients in the Power Saving mode. A high DTIM value can cause clients to lose connectivity with the network. This value can be set from 1 to 255.
802.11 Mode	For 2.4 GHz frequency WiFi devices: • Select **802.11b Only** to allow only IEEE 802.11b compliant WiFi devices to associate with the Zyxel Device. • Select **802.11g Only** to allow only IEEE 802.11g compliant WiFi devices to associate with the Zyxel Device. • Select **802.11n Only** to allow only IEEE 802.11n compliant WiFi devices to associate with the Zyxel Device. • Select **802.11b/g Mixed** to allow either IEEE 802.11b or IEEE 802.11g compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced. • Select **802.11b/g/n Mixed** to allow IEEE 802.11b, IEEE 802.11g or IEEE 802.11n compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced. • Select **802.11b/g/n/ax Mixed** to allow IEEE 802.11b, IEEE 802.11g, IEEE 802.11n or IEEE 802.11ax compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced. For 5 GHzfrequency WiFi devices: • Select **802.11a Only** to allow only IEEE 802.11a compliant WiFi devices to associate with the Zyxel Device. • Select **802.11n Only** to allow only IEEE 802.11n compliant WiFi devices to associate with the Zyxel Device. • Select **802.11ac Only** to allow only IEEE 802.11ac compliant WiFi devices to associate with the Zyxel Device. • Select **802.11a/n Mixed** to allow either IEEE 802.11a or IEEE 802.11n compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced. • Select **802.11n/ac Mixed** to allow either IEEE 802.11n or IEEE 802.11ac compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced. • Select **802.11a/n/ac Mixed** to allow IEEE 802.11a, IEEE 802.11n or IEEE 802.11ac compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced. • Select **802.11a/n/ac/ax Mixed** to allow IEEE 802.11a, IEEE 802.11n, IEEE 802.11ac or IEEE 802.11ax compliant WiFi devices to associate with the Zyxel Device. The transmission rate of your Zyxel Device might be reduced.

Table 38 Network Setting > Wireless > Others (continued)

LABEL	DESCRIPTION
802.11 Protection	Enabling this feature can help prevent collisions in mixed-mode networks (networks with both IEEE 802.11b and IEEE 802.11g traffic). Select **Auto** to have the wireless devices transmit data after a RTS/CTS handshake. This helps improve IEEE 802.11g performance. Select **Off** to disable 802.11 protection. The transmission rate of your Zyxel Device might be reduced in a mixed-mode network. This field displays **Off** and is not configurable when you set **802.11 Mode** to **802.11b Only**.
Preamble	Select a preamble type from the drop-down list box. Choices are **Long** or **Short**. See Section 9.9.7 on page 129 for more information. This field is configurable only when you set 802.11 Mode to **802.11b**.
Protected Management Frames	WiFi with Protected Management Frames (PMF) provides protection for unicast and Multicast management action frames. Unicast management action frames are protected from both eavesdropping and forging, and Multicast management action frames are protected from forging. Select **Capable** if the WiFi client supports PMF, then the management frames will be encrypted. Select **Required** to force the WiFi client to support PMF; otherwise the authentication cannot be performed by the Zyxel Device. Otherwise, select **Disabled**.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

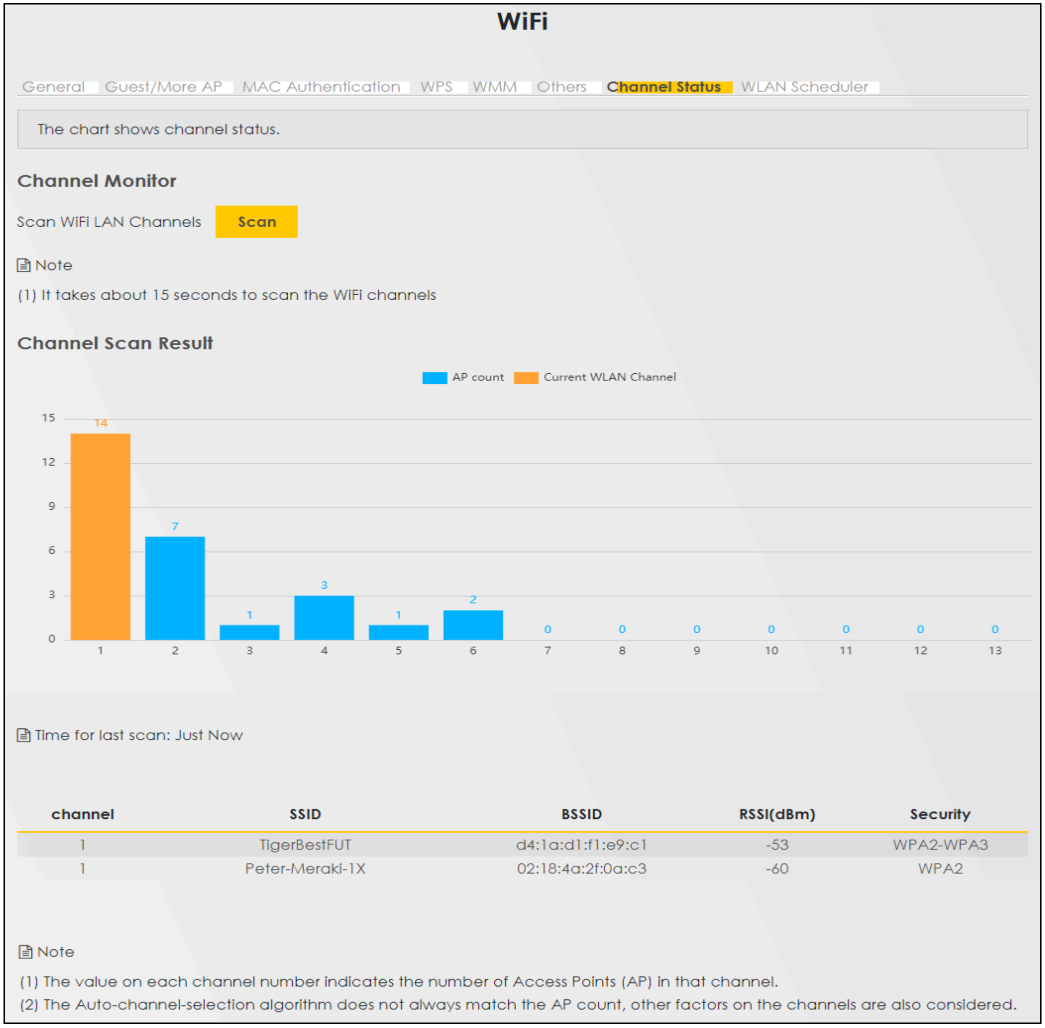
9.7 Channel Status

Use this screen to scan for WiFi channel noise and view the results. Click **Scan** to start, and then view the results in the **Channel Scan Result** section. The value on each channel number indicates the number of Access Points (AP) using that channel. The Auto-channel-selection algorithm does not always directly follow the AP count; other factors about the channels are also considered. Click **Network Setting** > **Wireless** > **Channel Status**. The screen appears as shown.

Note: If the current channel is a DFS channel, the warning ‘Channel scan process is denied because current channel is a DFS channel (Channel: 52 – 140). If you want to run channel scan, please select a non-DFS channel and try again.’ appears.

Note: The AP count may not be a real-time value.

Figure 67 Network Setting > Wireless > Channel Status



The chart shows channel status.

Channel Monitor

Scan WiFi LAN Channels

Note

(1) It takes about 15 seconds to scan the WiFi channels

Channel Scan Result

Time for last scan: Just Now

channel	SSID	BSSID	RSSI(dBm)	Security
1	TigerBestFUT	d4:1a:d1:f1:e9:c1	-53	WPA2-WPA3
1	Peter-Meraki-1X	02:18:4a:2f:0a:c3	-60	WPA2

Note

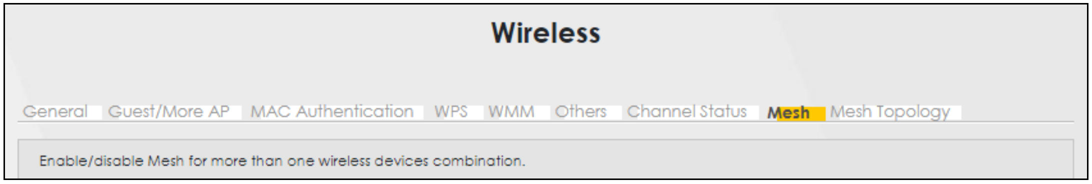
(1) The value on each channel number indicates the number of Access Points (AP) in that channel.

(2) The Auto-channel-selection algorithm does not always match the AP count, other factors on the channels are also considered.

9.8 Mesh

Use this screen to enable or disable **Mesh** on the Zyxel Device. Click **Network Setting** > **Wireless** > **Mesh** to open the following screen.

Figure 68 Network Setting > Wireless > Mesh



Enable/disable Mesh for more than one wireless devices combination.

The following table describes the labels in this screen.

Table 39 Network Setting > Wireless > Mesh

LABEL	DESCRIPTION
Mesh	Click this switch to enable **Mesh**.
OK	Click **OK** to save the changes back to the Zyxel Device.
Cancel	Click **Cancel** to close the window with changes unsaved.

9.9 Technical Reference

This section discusses WiFi in depth.

9.9.1 WiFi Network Overview

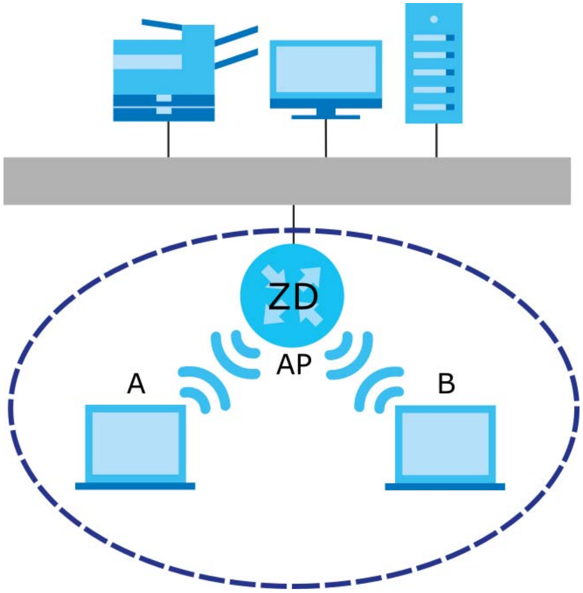
WiFi networks consist of WiFi clients, access points and bridges.

- A WiFi client is a radio connected to a user's computer.
- An access point is a radio with a wired connection to a network, which can connect with numerous WiFi clients and let them access the network.
- A bridge is a radio that relays communications between access points and WiFi clients, extending a network's range.

Normally, a WiFi network operates in an "infrastructure" type of network. An "infrastructure" type of network has one or more access points and one or more WiFi clients. The WiFi clients connect to the access points.

The following figure provides an example of a WiFi network.

Figure 69 Example of a WiFi Network



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

Every WiFi network must follow these basic guidelines.

- Every WiFi device in the same WiFi network must use the same SSID.

  The SSID is the name of the WiFi network. It stands for Service Set IDentifier.
- If two WiFi networks overlap, they should use a different channel.

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

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

9.9.2 Additional WiFi Terms

The following table describes some WiFi network terms and acronyms used in the Zyxel Device's Web Configurator.

Table 40 Additional WiFi Terms

TERM	DESCRIPTION
RTS/CTS Threshold	In a WiFi network which covers a large area, WiFi devices are sometimes not aware of each other's presence. This may cause them to send information to the AP at the same time and result in information colliding and not getting through. By setting this value lower than the default value, the WiFi devices must sometimes get permission to send information to the Zyxel Device. The lower the value, the more often the devices must get permission. If this value is greater than the fragmentation threshold value (see below), then WiFi devices never have to get permission to send information to the Zyxel Device.
Preamble	A preamble affects the timing in your WiFi network. There are two preamble modes: long and short. If a WiFi device uses a different preamble mode than the Zyxel Device does, it cannot communicate with the Zyxel Device.
Authentication	The process of verifying whether a WiFi device is allowed to use the WiFi network.
Fragmentation Threshold	A small fragmentation threshold is recommended for busy networks, while a larger threshold provides faster performance if the network is not very busy.

9.9.3 WiFi Security Overview

By their nature, radio communications are simple to intercept. For WiFi data networks, this means that anyone within range of a WiFi network without security can not only read the data passing over the airwaves, but also join the network. Once an unauthorized person has access to the network, he or she can steal information or introduce malware (malicious software) intended to compromise the network. For these reasons, a variety of security systems have been developed to ensure that only authorized people can use a WiFi data network, or understand the data carried on it.

These security standards do two things. First, they authenticate. This means that only people presenting the right credentials (often a username and password, or a “key” phrase) can access the network. Second, they encrypt. This means that the information sent over the air is encoded. Only people with the code key can understand the information, and only people who have been authenticated are given the code key.

These security standards vary in effectiveness. Some can be broken, such as the old Wired Equivalent Protocol (WEP). Using WEP is better than using no security at all, but it will not keep a determined attacker out. Other security standards are secure in themselves but can be broken if a user does not use them properly. For example, the WPA-PSK security standard is very secure if you use a long key which is difficult for an attacker's software to guess – for example, a twenty-letter long string of apparently random numbers and letters – but it is not very secure if you use a short key which is very easy to guess – for example, a three-letter word from the dictionary.

Because of the damage that can be done by a malicious attacker, it is not just people who have sensitive information on their network who should use security. Everybody who uses any WiFi network should ensure that effective security is in place.

A good way to come up with effective security keys, passwords and so on is to use obscure information that you personally will easily remember, and to enter it in a way that appears random and does not include real words. For example, if your mother owns a 1970 Dodge Challenger and her favorite movie is Vanishing Point (which you know was made in 1971) you could use "70dodchal71vanpoi" as your security key.

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

9.9.3.1 SSID

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

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

9.9.3.2 MAC Address Filter

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

You can use the MAC address filter to tell the Zyxel Device which devices are allowed or not allowed to use the WiFi network. If a WiFi device is allowed to use the WiFi network, it still has to have the correct information (SSID, channel, and security). If a WiFi device is not allowed to use the WiFi network, it does not matter if it has the correct information.

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

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

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

9.9.3.3 Encryption

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

The types of encryption you can choose depend on the type of authentication. (See Section 9.9.3.3 on page 128 for information about this.)

Table 41 Types of Encryption for Each Type of Authentication

	NO AUTHENTICATION	RADIUS SERVER
Weakest	No Security	WPA
↕	WPA-PSK	
	WPA2	WPA2
Strongest	WPA3-SAE	WPA3 (server certificate validation)

For example, if the WiFi network has a RADIUS server, you can choose **WPA**, **WPA2**, or **WPA3**. If users do not log in to the WiFi network, you can choose no encryption, **WPA2-PSK**, or **WPA3-SAE**.

Note: It is recommended that WiFi networks use **WPA3-SAE**, **WPA2-PSK**, or stronger encryption. The other types of encryption are better than none at all, but it is still possible for unauthorized WiFi devices to figure out the original information pretty quickly.

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

9.9.4 Signal Problems

Because WiFi networks are radio networks, their signals are subject to limitations of distance, interference and absorption.

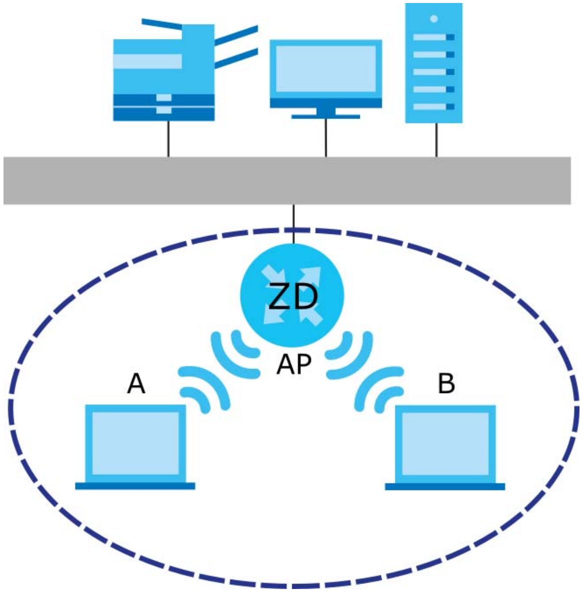
Problems with distance occur when the two radios are too far apart. Problems with interference occur when other radio waves interrupt the data signal. Interference may come from other radio transmissions, such as military or air traffic control communications, or from machines that are coincidental emitters such as electric motors or microwaves. Problems with absorption occur when physical objects (such as thick walls) are between the two radios, muffling the signal.

9.9.5 BSS

A Basic Service Set (BSS) exists when all communications between wireless stations go through one access point (AP).

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

Figure 70 Basic Service Set



9.9.6 MBSSID

Traditionally, you need to use different APs to configure different Basic Service Sets (BSSs). As well as the cost of buying extra APs, there is also the possibility of channel interference. The Zyxel Device's MBSSID (Multiple Basic Service Set IDentifier) function allows you to use one access point to provide several BSSs simultaneously. You can then assign varying QoS priorities and/or security modes to different SSIDs.

Wireless devices can use different BSSIDs to associate with the same AP.

9.9.6.1 Notes on Multiple BSSs

- A maximum of eight BSSs are allowed on one AP simultaneously.
- You must use different keys for different BSSs. If two wireless devices have different BSSIDs (they are in different BSSs), but have the same keys, they may hear each other's communications (but not communicate with each other).
- MBSSID should not replace but rather be used in conjunction with 802.1x security.

9.9.7 Preamble Type

Preamble is used to signal that data is coming to the receiver. Short and long refer to the length of the synchronization field in a packet.

Short preamble increases performance as less time sending preamble means more time for sending data. All IEEE 802.11 compliant WiFi adapters support long preamble, but not all support short preamble.

Use long preamble if you are unsure what preamble mode other WiFi devices on the network support, and to provide more reliable communications in busy WiFi networks.

Use short preamble if you are sure all WiFi devices on the network support it, and to provide more efficient communications.

Use the dynamic setting to automatically use short preamble when all WiFi devices on the network support it, otherwise the Zyxel Device uses long preamble.

Note: The WiFi devices MUST use the same preamble mode in order to communicate.

9.9.8 WiFi Protected Setup (WPS)

Your Zyxel Device supports WiFi Protected Setup (WPS), which is an easy way to set up a secure WiFi network. WPS is an industry standard specification, defined by the WiFi Alliance.

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

Depending on the devices you have, you can either press a button (on the device itself, or in its configuration utility) or enter a PIN (a unique Personal Identification Number that allows one device to authenticate the other) in each of the two devices. When WPS is activated on a device, it has 2 minutes to find another device that also has WPS activated. Then, the two devices connect and set up a secure network by themselves.

9.9.8.1 Push Button Configuration

WPS Push Button Configuration (PBC) is initiated by pressing a button on each WPS-enabled device, and allowing them to connect automatically. You do not need to enter any information.

Not every WPS-enabled device has a physical WPS button. Some may have a WPS PBC button in their configuration utilities instead of or in addition to the physical button.

Take the following steps to set up WPS using the button.

1 Ensure that the two devices you want to set up are within WiFi range of one another.

2 Look for a WPS button on each device. If the device does not have one, log into its configuration utility and locate the button (see the device's User's Guide for how to do this – for the Zyxel Device).

3 Press the button on one of the devices (it does not matter which). For the Zyxel Device you must press the **WiFi** button for more than 5 seconds.

4 Within 2 minutes, press the button on the other device. The registrar sends the network name (SSID) and security key through a secure connection to the enrollee.

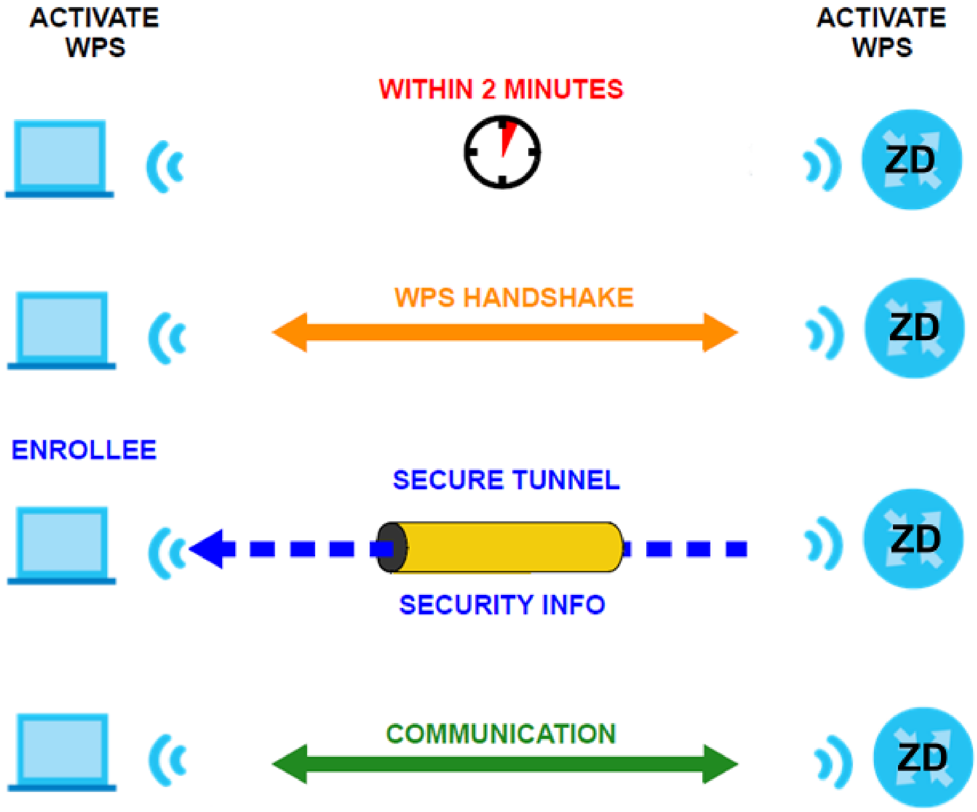
If you need to make sure that WPS worked, check the list of associated WiFi clients in the AP's configuration utility. If you see the WiFi client in the list, WPS was successful.

9.9.8.2 How WPS Works

When two WPS-enabled devices connect, each device must assume a specific role. One device acts as the registrar (the device that supplies network and security settings) and the other device acts as the enrollee (the device that receives network and security settings. The registrar creates a secure EAP (Extensible Authentication Protocol) tunnel and sends the network name (SSID) and the WPA-PSK or WPA2-PSK pre-shared key to the enrollee. Whether WPA-PSK or WPA2-PSK is used depends on the standards supported by the devices. If the registrar is already part of a network, it sends the existing information. If not, it generates the SSID and WPA2-PSK randomly.

The following figure shows a WPS-enabled client (installed in a notebook computer) connecting to a WPS-enabled access point.

Figure 71 How WPS Works



The roles of registrar and enrollee last only as long as the WPS setup process is active (2 minutes). The next time you use WPS, a different device can be the registrar if necessary.

The WPS connection process is like a handshake; only two devices participate in each WPS transaction. If you want to add more devices you should repeat the process with one of the existing networked devices and the new device.

Note that the access point (AP) is not always the registrar, and the WiFi client is not always the enrollee. All WPS-certified APs can be a registrar, and so can some WPS-enabled WiFi clients.

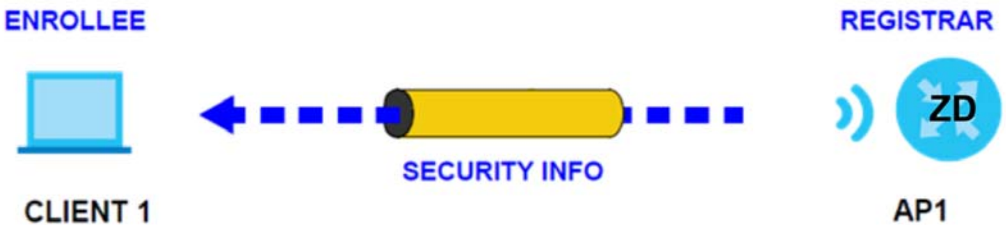
By default, a WPS device is 'un-configured'. This means that it is not part of an existing network and can act as either enrollee or registrar (if it supports both functions). If the registrar is un-configured, the security settings it transmits to the enrollee are randomly-generated. Once a WPS-enabled device has connected to another device using WPS, it becomes 'configured'. A configured WiFi client can still act as enrollee or registrar in subsequent WPS connections, but a configured access point can no longer act as enrollee. It will be the registrar in all subsequent WPS connections in which it is involved. If you want a configured AP to act as an enrollee, you must reset it to its factory defaults.

9.9.8.3 Example WPS Network Setup

This section shows how security settings are distributed in a sample WPS setup.

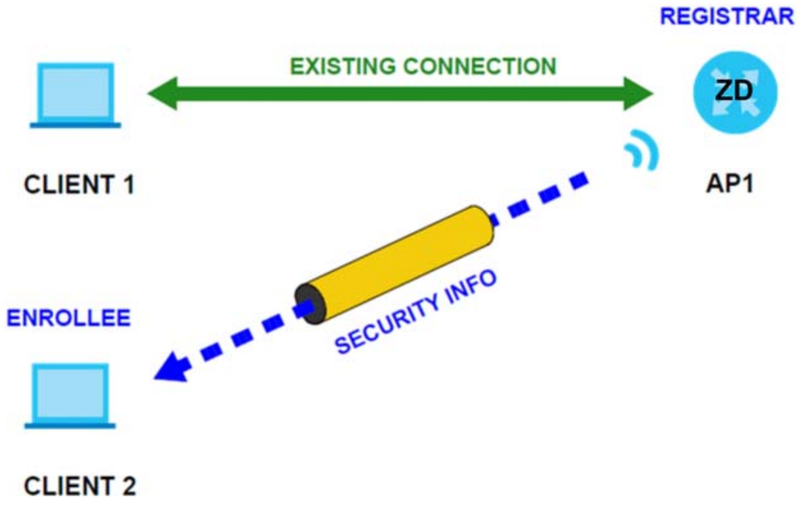
The following figure shows a sample network. In step 1, both **AP1** and **Client 1** are un-configured. When WPS is activated on both, they perform the handshake. In this example, **AP1** is the registrar, and **Client 1** is the enrollee. The registrar randomly generates the security information to set up the network, since it is un-configured and has no existing information.

Figure 72 WPS: Example Network Step 1



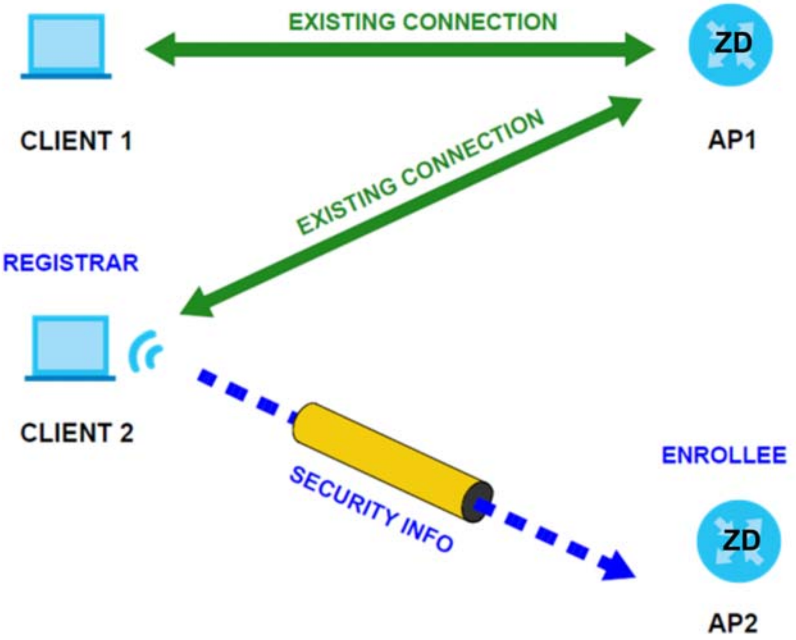
In step **2**, you add another WiFi client to the network. You know that **Client 1** supports registrar mode, but it is better to use **AP1** for the WPS handshake with the new client since you must connect to the access point anyway in order to use the network. In this case, **AP1** must be the registrar, since it is configured (it already has security information for the network). **AP1** supplies the existing security information to **Client 2**.

Figure 73 WPS: Example Network Step 2



In step 3, you add another access point (**AP2**) to your network. **AP2** is out of range of **AP1**, so you cannot use **AP1** for the WPS handshake with the new access point. However, you know that **Client 2** supports the registrar function, so you use it to perform the WPS handshake instead.

Figure 74 WPS: Example Network Step 3



9.9.8.4 Limitations of WPS

WPS has some limitations of which you should be aware.

- When you use WPS, it works between two devices only. You cannot enroll multiple devices simultaneously, you must enroll one after the other.

  For instance, if you have two enrollees and one registrar you must set up the first enrollee (by pressing the WPS button on the registrar and the first enrollee, for example), then check that it was successfully enrolled, then set up the second device in the same way.

- WPS works only with other WPS-enabled devices. However, you can still add non-WPS devices to a network you already set up using WPS.

  WPS works by automatically issuing a randomly-generated WPA-PSK or WPA2-PSK pre-shared key from the registrar device to the enrollee devices. Whether the network uses WPA-PSK or WPA2-PSK depends on the device. You can check the configuration interface of the registrar device to discover the key the network is using (if the device supports this feature). Then, you can enter the key into the non-WPS device and join the network as normal (the non-WPS device must also support WPA-PSK or WPA2-PSK).

- When you use the PBC method, there is a short period (from the moment you press the button on one device to the moment you press the button on the other device) when any WPS-enabled device could join the network. This is because the registrar has no way of identifying the ‘correct’ enrollee, and cannot differentiate between your enrollee and a rogue device. This is a possible way for a hacker to gain access to a network.

  You can easily check to see if this has happened. WPS only works simultaneously between two devices, so if another device has enrolled your device will be unable to enroll, and will not have access to the network. If this happens, open the access point’s configuration interface and look at the list of associated clients (usually displayed by MAC address). It does not matter if the access point is the WPS registrar, the enrollee, or was not involved in the WPS handshake; a rogue device must still associate with the access point to gain access to the network. Check the MAC addresses of your WiFi clients (usually printed on a label on the bottom of the device). If there is an unknown MAC address you can remove it or reset the AP.

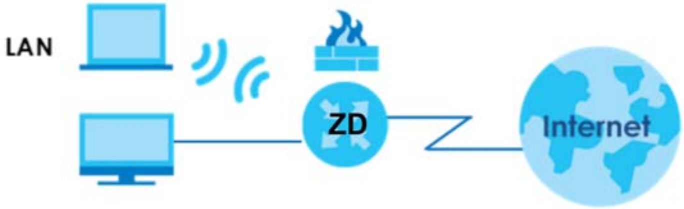
CHAPTER 10
Home Networking

10.1 Home Networking Overview

A Local Area Network (LAN) is a shared communication system to which many computers are attached. A LAN is usually located in one immediate area such as a building or floor of a building.

The LAN screens can help you configure a LAN DHCP server and manage IP addresses.

Figure 75 Home Networking Example



10.1.1 What You Can Do in this Chapter

- Use the **LAN Setup** screen to set the LAN IP address, subnet mask, and DHCP settings (Section 10.2 on page 136).
- Use the **Static DHCP** screen to assign IP addresses on the LAN to specific individual computers based on their MAC addresses (Section 10.3 on page 141).
- Use the **UPnP** screen to enable UPnP (Section 10.4 on page 143).
- Use the **Additional Subnet** screen to configure IP alias and public static IP (Section 10.5 on page 144).
- Use the **Wake on LAN** screen to remotely turn on a device on the network. (Section 10.6 on page 146).
- Use the **TFTP Server Name** screen to identify a TFTP server for configuration file download using DHCP option 66. (Section 10.7 on page 147).

10.1.2 What You Need To Know

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

10.1.2.1 About LAN

IP Address

Similar to the way houses on a street share a common street name, so too do computers on a LAN share one common network number. This is known as an Internet Protocol address.

Subnet Mask

The subnet mask specifies the network number portion of an IP address. Your Zyxel Device will compute the subnet mask automatically based on the IP address that you entered. You do not need to change the subnet mask computed by the Zyxel Device unless you are instructed to do otherwise.

DHCP

DHCP (Dynamic Host Configuration Protocol) allows clients to obtain TCP/IP configuration at start-up from a server. This Zyxel Device has a built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

DNS

DNS (Domain Name System) maps a domain name to its corresponding IP address and vice versa. The DNS server is extremely important because without it, you must know the IP address of a computer before you can access it. The DNS server addresses you enter when you set up DHCP are passed to the client machines along with the assigned IP address and subnet mask.

RADVD (Router Advertisement Daemon)

When an IPv6 host sends a Router Solicitation (RS) request to discover the available routers, RADVD with Router Advertisement (RA) messages in response to the request. It specifies the minimum and maximum intervals of RA broadcasts. RA messages containing the address prefix. IPv6 hosts can be generated with the IPv6 prefix an IPv6 address.

10.1.2.2 About UPnP

How do I know if I am using UPnP?

UPnP hardware is identified as an icon in the Network Connections folder (Windows 7). Each UPnP compatible device installed on your network will appear as a separate icon. Selecting the icon of a UPnP device will allow you to access the information and properties of that device.

NAT Traversal

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

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

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

Cautions with UPnP

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

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

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

UPnP and Zyxel

Zyxel has achieved UPnP certification from the Universal Plug and Play Forum UPnP™ Implementers Corp. (UIC).

See Section 10.9 on page 150 for examples on installing and using UPnP.

10.1.3 Before You Begin

Find out the MAC addresses of your network devices if you intend to add them to the DHCP Client List screen.

10.2 LAN Setup

A LAN IP address is the IP address of a networking device in the LAN. You can use the Zyxel Device's LAN IP address to access its Web Configurator from the LAN. The DHCP server settings define the rules on assigning IP addresses to LAN clients on your network.

Use this screen to set the Local Area Network IP address and subnet mask of your Zyxel Device. Configure DHCP settings to have the Zyxel Device or a DHCP server assign IP addresses to devices. Click **Network Setting** > **Home Networking** to open the **LAN Setup** screen.

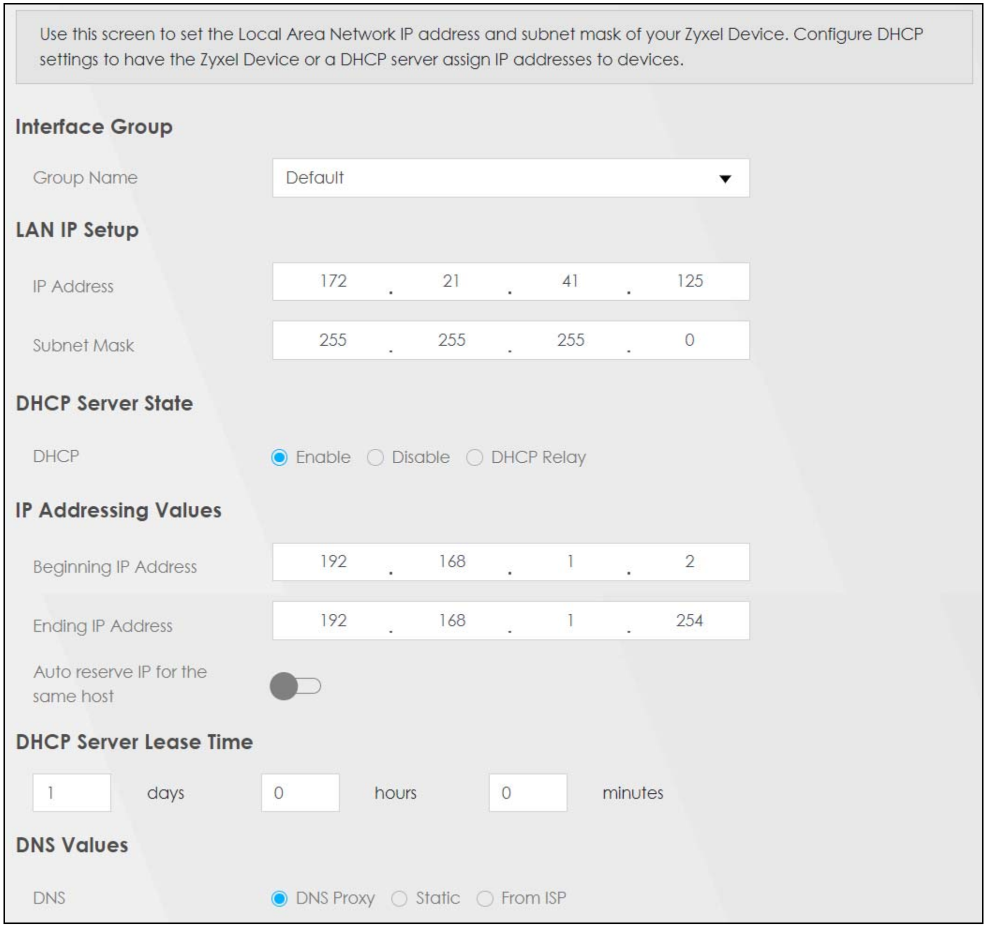
Follow these steps to configure your LAN settings.

1 Enter an IP address into the **IP Address** field. The IP address must be in dotted decimal notation. This will become the IP address of your Zyxel Device.

2 Enter the IP subnet mask into the **IP Subnet Mask** field. Unless instructed otherwise it is best to leave this alone, the configurator will automatically compute a subnet mask based upon the IP address you entered.

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

Figure 76 Network Setting > Home Networking > LAN Setup



Use this screen to set the Local Area Network IP address and subnet mask of your Zyxel Device. Configure DHCP settings to have the Zyxel Device or a DHCP server assign IP addresses to devices.

Interface Group

Group Name: Default ▼

LAN IP Setup

IP Address: 172 . 21 . 41 . 125

Subnet Mask: 255 . 255 . 255 . 0

DHCP Server State

DHCP: ● Enable ○ Disable ○ DHCP Relay

IP Addressing Values

Beginning IP Address: 192 . 168 . 1 . 2

Ending IP Address: 192 . 168 . 1 . 254

Auto reserve IP for the same host

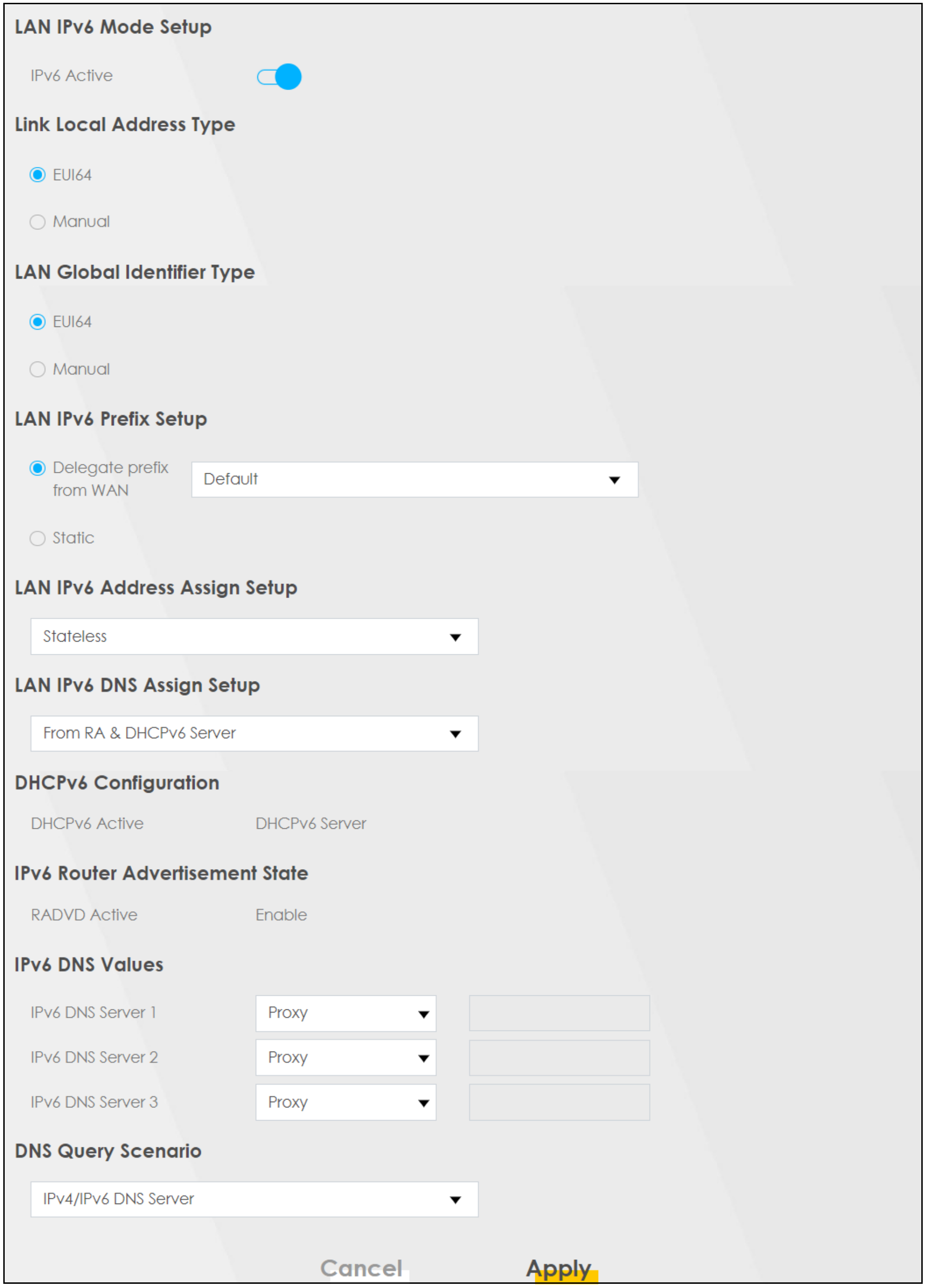
DHCP Server Lease Time

1 days 0 hours 0 minutes

DNS Values

DNS: ● DNS Proxy ○ Static ○ From ISP

Figure 77 Network Setting > Home Networking > LAN Setup (Continued)



LAN IPv6 Mode Setup

IPv6 Active: ON

Link Local Address Type

● EUI64

○ Manual

LAN Global Identifier Type

● EUI64

○ Manual

LAN IPv6 Prefix Setup

● Delegate prefix from WAN: Default

○ Static

LAN IPv6 Address Assign Setup: Stateless

LAN IPv6 DNS Assign Setup: From RA & DHCPv6 Server

DHCPv6 Configuration

DHCPv6 Active: DHCPv6 Server

IPv6 Router Advertisement State

RADVD Active: Enable

IPv6 DNS Values

IPv6 DNS Server 1: Proxy

IPv6 DNS Server 2: Proxy

IPv6 DNS Server 3: Proxy

DNS Query Scenario: IPv4/IPv6 DNS Server

The following table describes the fields in this screen.

Table 42 Network Setting > Home Networking > LAN Setup

LABEL	DESCRIPTION
Interface Group	
Group Name	Select the interface group that you want to configure its LAN settings.
LAN IP Setup	

Table 42 Network Setting > Home Networking > LAN Setup (continued)

LABEL	DESCRIPTION
IP Address	Enter the LAN IP address you want to assign to your Zyxel Device in dotted decimal notation, for example, 192.168.123.1 (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.
DHCP Server State	
DHCP	Select **Enable** to have your Zyxel Device assign IP addresses, an IP default gateway and DNS servers to LAN computers and other devices that are DHCP clients. If you select **Disable**, you need to manually configure the IP addresses of the computers and other devices on your LAN. If you select **DHCP Relay**, the Zyxel Device acts as a surrogate DHCP server and relays DHCP requests and responses between the remote server and the clients.
IP Addressing Values The **IP Addressing Values** fields appear only when you select **Enable** in the **DHCP** field.	
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.
Auto reserve IP for the same host	Enable this if you want to reserve the IP address for the same host.
DHCP Server Lease Time This is the period of time DHCP-assigned addresses is used. DHCP automatically assigns IP addresses to clients when they log in. DHCP centralizes IP address management on central computers that run the DHCP server program. DHCP leases addresses, for a period of time, which means that past addresses are “recycled” and made available for future reassignment to other systems. This field is only available when you select **Enable** in the **DHCP** field.	
Days/Hours/Minutes	DHCP server leases an address to a new client device for a period of time, called the DHCP lease time. When the lease expires, the DHCP server might assign the IP address to a different client device.
DNS Values This field appears only when you select **Enable** in the **DHCP** field.	
DNS	The Zyxel Device supports DNS proxy by default. The Zyxel Device sends out its own LAN IP address to the DHCP clients as the first DNS server address. DHCP clients use this first DNS server to send domain-name queries to the Zyxel Device. The Zyxel Device sends a response directly if it has a record of the domain-name to IP address mapping. If it does not, the Zyxel Device queries an outside DNS server and relays the response to the DHCP client. Select **DNS Proxy** to have the DHCP clients use the Zyxel Device’s own LAN IP address. The Zyxel Device works as a DNS relay. Select **Static** if you have the IP address of a DNS server. Enter the DNS server's IP address in the field to the right. Select **From ISP** if your ISP dynamically assigns DNS server information (and the Zyxel Device's WAN IP address).
LAN IPv6 Mode Setup	
IPv6 Active	Use this to enable or disable IPv6 on the Zyxel Device. When IPv6 is used, the following fields need to be set.

Table 42   Network Setting > Home Networking > LAN Setup (continued)

<table>
<tr><th>LABEL</th><th>DESCRIPTION</th></tr>
<tr><td>Link Local Address Type</td><td>A link-local address uniquely identifies a device on the local network (the LAN). It is similar to a "private IP address" in IPv6. You can have the same link-local address on multiple interfaces on a device. A link-local unicast address has a predefined prefix of fe80::/10. The link-local unicast address format is as follows. Select **EUI64** to allow the Zyxel Device to generate an interface ID for the LAN interface's link-local address using the EUI-64 format. Otherwise, enter an interface ID for the LAN interface's link-local address if you select **Manual**.
Link-local Unicast Address Format<table><tr><td>1111 1110 10</td><td>0</td><td>Interface ID</td></tr><tr><td>10 bits</td><td>54 bits</td><td>64 bits</td></tr></table></td></tr>
<tr><td>EUI64</td><td>Select this to have the Zyxel Device generate an interface ID for the LAN interface's link-local address using the EUI-64 format.</td></tr>
<tr><td>Manual</td><td>Select this to manually enter an interface ID for the LAN interface's link-local address.</td></tr>
<tr><td>LAN Global Identifier Type</td><td>Select **EUI64** to have the Zyxel Device generate an interface ID using the EUI-64 format for its global address. Select **Manual** to manually enter an interface ID for the LAN interface's global IPv6 address.</td></tr>
<tr><td>EUI64</td><td>Select this to have the Zyxel Device generate an interface ID using the EUI-64 format for its global address.</td></tr>
<tr><td>Manual</td><td>Select this to manually enter an interface ID for the LAN interface's global IPv6 address.</td></tr>
<tr><td>LAN IPv6 Prefix Setup</td><td>Select **Delegate prefix from WAN** to automatically obtain an IPv6 network prefix from the service provider or an uplink router. Select **Static** to configure a fixed IPv6 address for the Zyxel Device's LAN IPv6 address.</td></tr>
<tr><td>Delegate prefix from WAN</td><td>Select this option to automatically obtain an IPv6 network prefix from the service provider or an uplink router.</td></tr>
<tr><td>Static</td><td>Select this option to configure a fixed IPv6 address for the Zyxel Device's LAN IPv6 address.</td></tr>
<tr><td>LAN IPv6 Address Assign Setup</td><td>Select how you want to obtain an IPv6 address:
Stateless: The Zyxel Device uses IPv6 stateless auto-configuration. RADVD (Router Advertisement Daemon) is enabled to have the Zyxel Device send IPv6 prefix information in router advertisements periodically and in response to router solicitations. DHCPv6 server is disabled.
Stateful: The Zyxel Device uses IPv6 stateful auto-configuration. The DHCPv6 server is enabled to have the Zyxel Device act as a DHCPv6 server and pass IPv6 addresses to DHCPv6 clients.</td></tr>
<tr><td>LAN IPv6 DNS Assign Setup</td><td>Select how the Zyxel Device provide DNS server and domain name information to the clients:
From RA & DHCPv6 Server: The Zyxel Device provides DNS information through both router advertisements and DHCPv6.
From DHCPv6 Server: The Zyxel Device provides DNS information through DHCPv6.
From Router Advertisement: The Zyxel Device provides DNS information through router advertisements.</td></tr>
<tr><td colspan="2">DHCPv6 Configuration</td></tr>
<tr><td>DHCPv6 Active</td><td>This shows the status of the DHCPv6. **DHCP Server** displays if you configured the Zyxel Device to act as a DHCPv6 server which assigns IPv6 addresses and/or DNS information to clients.</td></tr>
<tr><td colspan="2">IPv6 Router Advertisement State</td></tr>
<tr><td>RADVD Active</td><td>This shows whether RADVD is enabled or not.</td></tr>
<tr><td colspan="2">IPv6 DNS Values</td></tr>
</table>

Table 42 Network Setting > Home Networking > LAN Setup (continued)

LABEL	DESCRIPTION
IPv6 DNS Server 1 – 3	Specify the IP addresses up to three DNS servers for the DHCP clients to use. Use one of the following ways to specify these IP addresses. **User Defined** – Select this if you have the IPv6 address of a DNS server. Enter the DNS server IPv6 addresses the Zyxel Device passes to the DHCP clients. **From ISP** – Select this if your ISP dynamically assigns IPv6 DNS server information. **Proxy** – Select this if the DHCP clients use the IP address of this interface and the Zyxel Device works as a DNS relay. Otherwise, select **None** if you do not want to configure IPv6 DNS servers.
DNS Query Scenario	Select how the Zyxel Device handles clients' DNS information requests. **IPv4/IPv6 DNS Server**: The Zyxel Device forwards the requests to both the IPv4 and IPv6 DNS servers and sends clients the first DNS information it receives. **IPv6 DNS Server Only**: The Zyxel Device forwards the requests to the IPv6 DNS server and sends clients the DNS information it receives. **IPv4 DNS Server Only**: The Zyxel Device forwards the requests to the IPv4 DNS server and sends clients the DNS information it receives. **IPv6 DNS Server First**: The Zyxel Device forwards the requests to the IPv6 DNS server first and then the IPv4 DNS server. Then it sends clients the first DNS information it receives. **IPv4 DNS Server First**: The Zyxel Device forwards the requests to the IPv4 DNS server first and then the IPv6 DNS server. Then it sends clients the first DNS information it receives.
Apply	Click **Apply** to save your changes.
Cancel	Click **Cancel** to restore your previously saved settings.

10.3 Static DHCP

When any of the LAN clients in your network want an assigned fixed IP address, add a static lease for each LAN client. Knowing the LAN client's MAC addresses is necessary. This table allows you to assign IP addresses on the LAN to individual computers based on their MAC addresses.

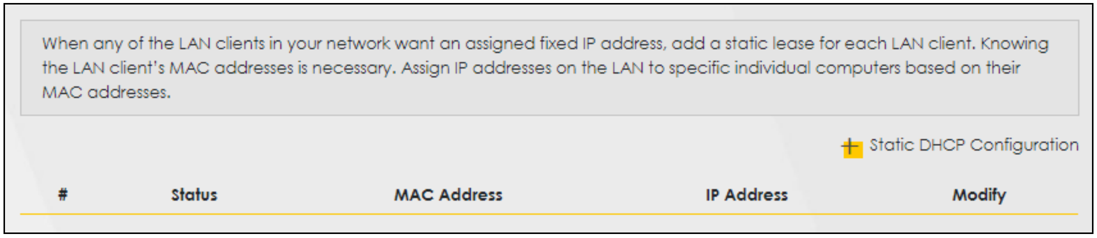
Every Ethernet device has a unique MAC (Media Access Control) address. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00:A0:C5:00:00:02.

10.3.1 Before You Begin

Find out the MAC addresses of your network devices if you intend to add them to the **Static DHCP** screen.

Use this screen to change your Zyxel Device's static DHCP settings. Click **Network Setting** > **Home Networking** > **Static DHCP** to open the following screen.

Figure 78 Network Setting > Home Networking > Static DHCP



When any of the LAN clients in your network want an assigned fixed IP address, add a static lease for each LAN client. Knowing the LAN client's MAC addresses is necessary. Assign IP addresses on the LAN to specific individual computers based on their MAC addresses.

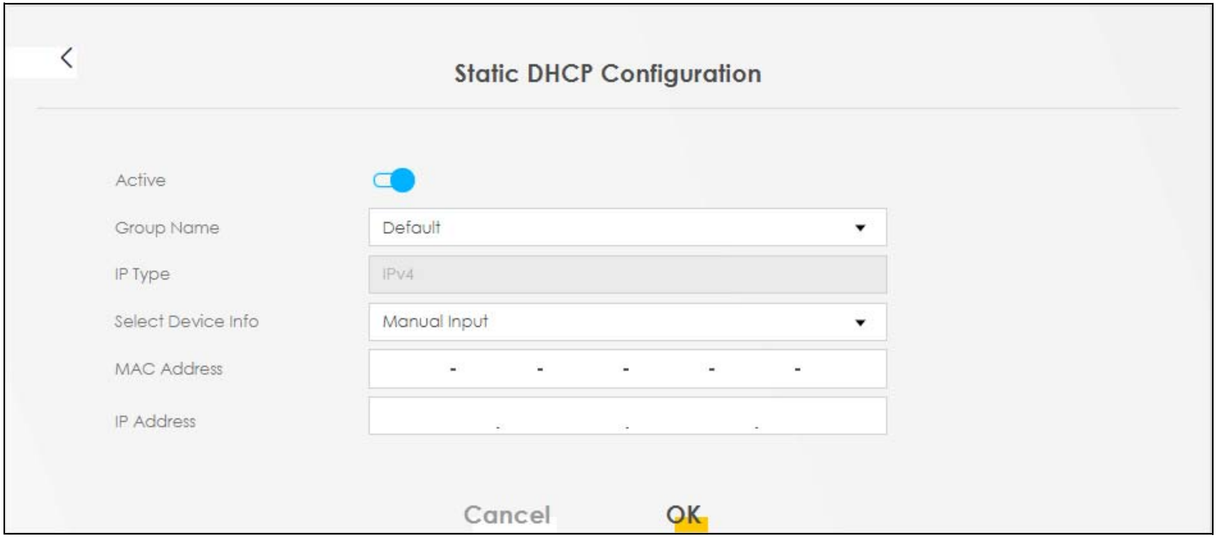
The following table describes the labels in this screen.

Table 43 Network Setting > Home Networking > Static DHCP

LABEL	DESCRIPTION
Static DHCP Configuration	Click this to configure a static DHCP entry.
#	This is the index number of the entry.
Status	This field displays whether the client is connected to the Zyxel Device.
MAC Address	The MAC (Media Access Control) or Ethernet address on a LAN (Local Area Network) is unique to your computer (six pairs of hexadecimal notation). A network interface card such as an Ethernet adapter has a hardwired address that is assigned at the factory. This address follows an industry standard that ensures no other adapter has a similar address.
IP Address	This field displays the IP address relative to the # field listed above.
Modify	Click the **Edit** icon to configure the connection. Click the **Delete** icon to remove the connection.

If you click **Static DHCP Configuration** in the **Static DHCP** screen, the following screen displays. Using a static DHCP means a LAN client will always have the same IP address assigned to it by the DHCP server. Assign a fixed IP address to a client device by selecting the interface group of this client device and its IP address type and selecting the device/computer from a list or manually entering its MAC address and assigned IP address.

Figure 79 Network Setting > Home Networking > Static DHCP: Static DHCP Configuration



Static DHCP Configuration

Active: On
Group Name: Default
IP Type: IPv4
Select Device Info: Manual Input
MAC Address: - - - - -
IP Address: . . .

The following table describes the labels in this screen.

Table 44   Network Setting > Home Networking > Static DHCP: Static DHCP Configuration

LABEL	DESCRIPTION
Active	Select **Enable** to activate static DHCP in your Zyxel Device.
Group Name	Select the interface group for which you want to configure the static DHCP settings.
IP Type	The **IP Type** is normally **IPv4** (non-configurable).
Select Device Info	Select between **Manual Input** which allows you to enter the next two fields (**MAC Address** and **IP Address**); or select an existing LAN device to show its MAC address and IP address.
MAC Address	Enter the MAC address of a computer on your LAN if you select **Manual Input** in the previous field.
IP Address	Enter the IP address that you want to assign to the computer on your LAN with the MAC address that you will also specify if you select **Manual Input** in the previous field.
OK	Click **OK** to save your changes.
Cancel	Click **Cancel** to exit this screen without saving.

10.4 UPnP

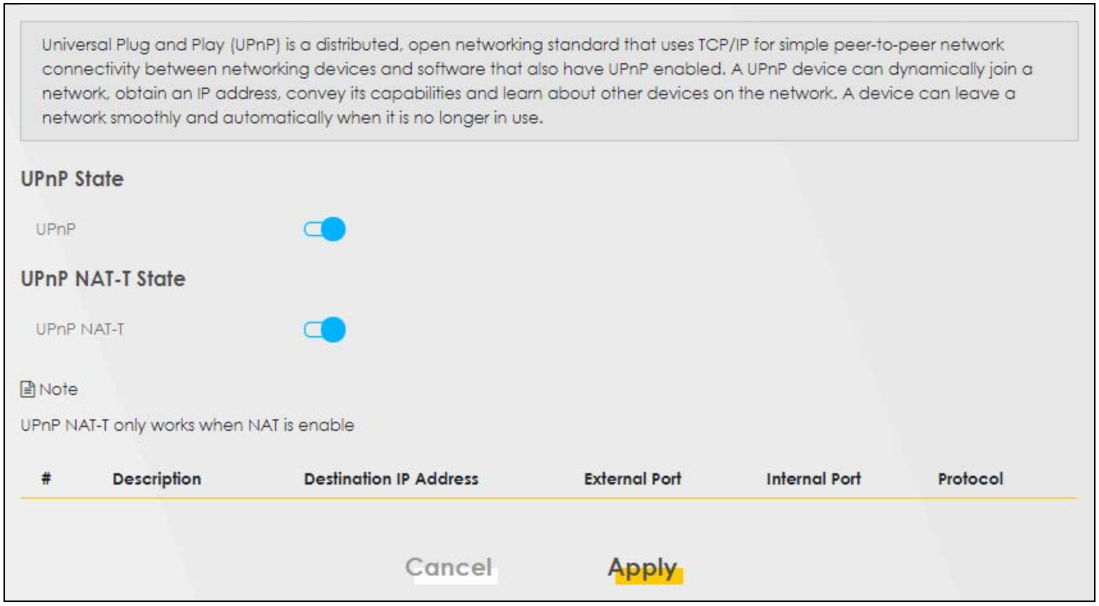
Universal Plug and Play (UPnP) is an open networking standard that uses TCP/IP for simple peer-to-peer network connectivity between networking devices or software applications which have UPnP enabled. A UPnP device can dynamically join a network, obtain an IP address, advertise its services, and learn about other devices on the network. A device can also leave a network automatically when it is no longer in use.

See Section 10.9 on page 150 for more information on UPnP.

Note: To use **UPnP NAT-T**, enable **NAT** in the **Network Setting** > **Broadband** > **Edit** or **Add New WAN Interface** screen.

Use the following screen to configure the UPnP settings on your Zyxel Device. Click **Network Setting** > **Home Networking** > **UPnP** to display the screen shown next.

Figure 80 Network Setting > Home Networking > UPnP



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

UPnP State

UPnP

UPnP NAT-T State

UPnP NAT-T

Note

UPnP NAT-T only works when NAT is enable

#	Description	Destination IP Address	External Port	Internal Port	Protocol

The following table describes the labels in this screen.

Table 45 Network Settings > Home Networking > UPnP

LABEL	DESCRIPTION
UPnP State	
UPnP	Select **Enable** to activate UPnP. Be aware that anyone could use a UPnP application to open the Web Configurator's login screen without entering the Zyxel Device's IP address (although you must still enter the password to access the Web Configurator).
UPnP NAT-T State	
UPnP NAT-T	Select **Enable** to activate UPnP with NAT enabled. UPnP NAT traversal automates the process of allowing an application to operate through NAT. UPnP network devices can automatically configure network addressing, announce their presence in the network to other UPnP devices and enable exchange of simple product and service descriptions.
#	This field displays the index number of the entry.
Description	This field displays the description of the UPnP NAT-T connection.
Destination IP Address	This field displays the IP address of the other connected UPnP-enabled device.
External Port	This field displays the external port number that identifies the service.
Internal Port	This field displays the internal port number that identifies the service.
Protocol	This field displays the protocol of the NAT mapping rule. Choices are **TCP** or **UDP**.
Apply	Click **Apply** to save your changes.
Cancel	Click **Cancel** to restore your previously saved settings.

10.5 LAN Additional Subnet

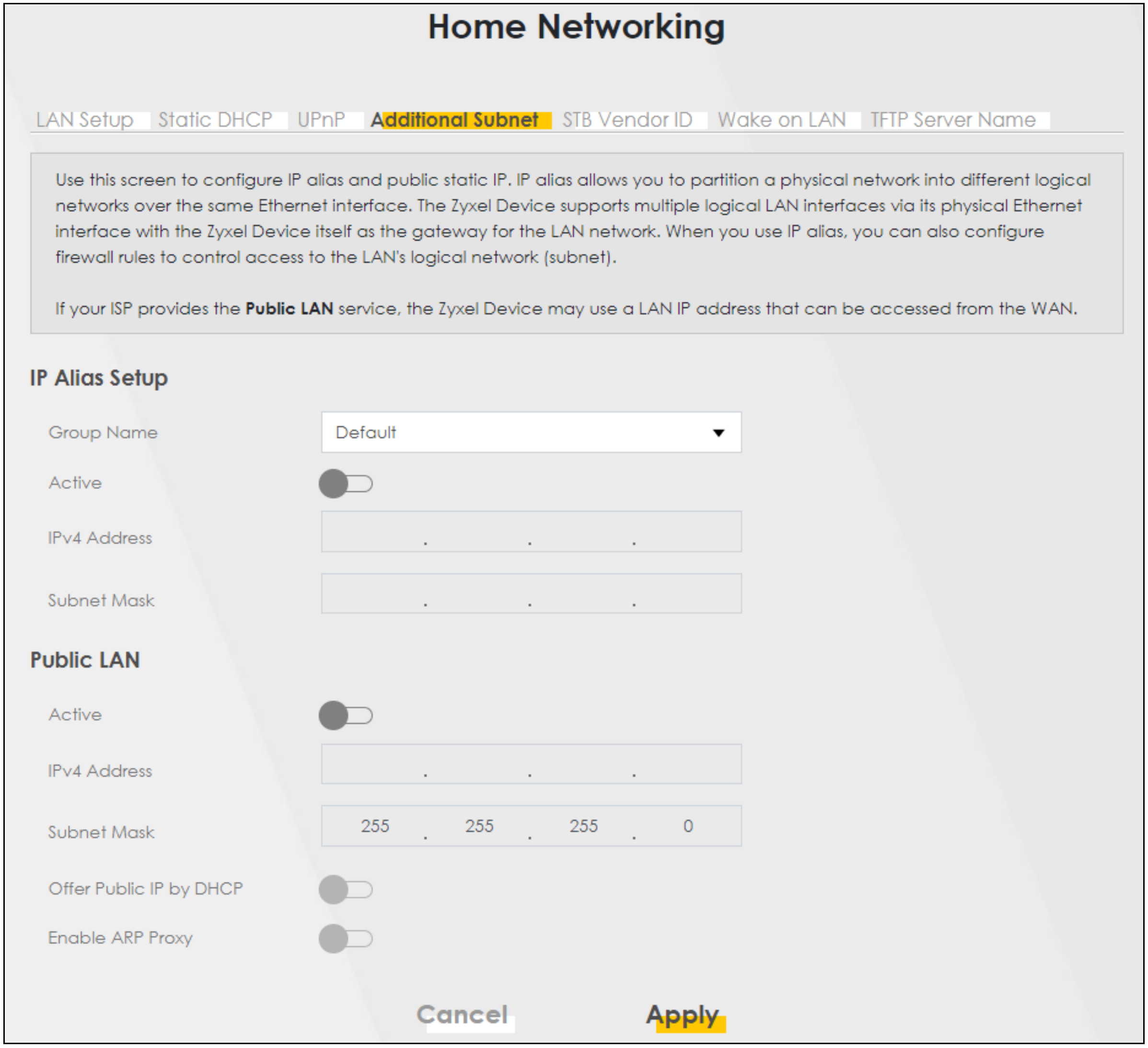
Use this screen to configure IP alias and public static IP.

IP alias allows you to partition a physical network into different logical networks over the same Ethernet interface. The Zyxel Device supports multiple logical LAN interfaces through its physical Ethernet interface with the Zyxel Device itself as the gateway for the LAN network. When you use IP alias, you can also configure firewall rules to control access to the LAN's logical network (subnet).

If your ISP provides the **Public LAN** service, the Zyxel Device may use a LAN IP address that can be accessed from the WAN.

Click **Network Setting** > **Home Networking** > **Additional Subnet** to display the screen shown next.

Figure 81 Network Setting > Home Networking > Additional Subnet



Use this screen to configure IP alias and public static IP. IP alias allows you to partition a physical network into different logical networks over the same Ethernet interface. The Zyxel Device supports multiple logical LAN interfaces via its physical Ethernet interface with the Zyxel Device itself as the gateway for the LAN network. When you use IP alias, you can also configure firewall rules to control access to the LAN's logical network (subnet).

If your ISP provides the **Public LAN** service, the Zyxel Device may use a LAN IP address that can be accessed from the WAN.

IP Alias Setup

Group Name: Default

Active

IPv4 Address: . . .

Subnet Mask: . . .

Public LAN

Active

IPv4 Address: . . .

Subnet Mask: 255 . 255 . 255 . 0

Offer Public IP by DHCP

Enable ARP Proxy

The following table describes the labels in this screen.

Table 46 Network Setting > Home Networking > Additional Subnet

LABEL	DESCRIPTION
IP Alias Setup	
Group Name	Select the interface group name for which you want to configure the IP alias settings.
Active	Click this switch to enable a logical LAN for the Zyxel Device. When this is enabled, the following fields will be configurable.
IPv4 Address	Enter the IP address of your Zyxel Device in dotted decimal notation.

Table 46 Network Setting > Home Networking > Additional Subnet (continued)

LABEL	DESCRIPTION
Subnet Mask	Your Zyxel Device will automatically calculate the subnet mask based on the IPv4 address that you assign. Unless you are implementing subnetting, use this value computed by the Zyxel Device.
Public LAN	
Active	Click this switch to enable or disable the Public LAN feature. Your ISP must support Public LAN and static IP.
IPv4 Address	Enter the public IP address provided by your ISP.
Subnet Mask	Enter the public IPv4 subnet mask provided by your ISP.
Offer Public IP by DHCP	Click this switch to enable the Zyxel Device to provide public IP addresses by DHCP server. Otherwise, click to disable.
Enable ARP Proxy	Click this switch to enable the Address Resolution Protocol (ARP) proxy. Otherwise, click to disable.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

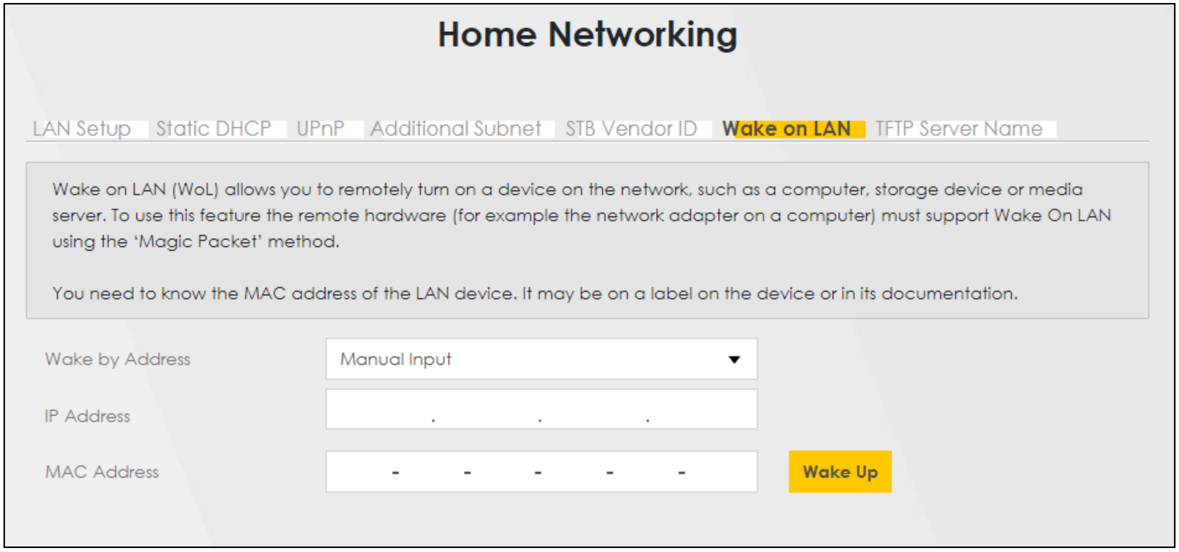
10.6 Wake on LAN

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

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

Click **Network Setting** > **Home Networking** > **Wake on LAN** to open this screen.

Figure 82 Network Setting > Home Networking > Wake on LAN



Home Networking

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

You need to know the MAC address of the LAN device. It may be on a label on the device or in its documentation.

Wake by Address: Manual Input

IP Address: . . .

MAC Address: - - - - -

The following table describes the labels in this screen.

Table 47 Network Setting > Home Networking > Wake on LAN

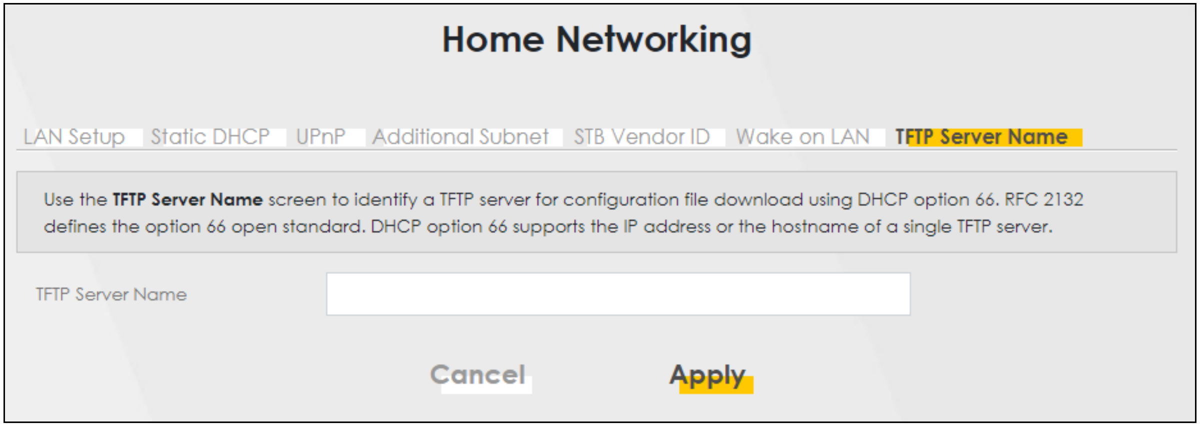
LABEL	DESCRIPTION
Wake by Address	Select **Manual** and enter the IP address or MAC address of the LAN device to turn it on remotely. The drop-down list also lists the IP addresses that can be found in the Zyxel Device's ARP table. If you select an IP address, the MAC address of the LAN device with the selected IP address then displays in the **MAC Address** field.
IP Address	Enter the IPv4 IP address of the LAN device to turn it on. This field is not available if you select an IP address in the **Wake by Address** field.
MAC Address	Enter the MAC address of the LAN device to turn it on. A MAC address consists of six hexadecimal character pairs.
Wake Up	Click this to send a WoL magic packet to wake up the specified LAN device.

10.7 TFTP Server Name

Use the **TFTP Server Name** screen to identify a TFTP server for configuration file download using DHCP option 66. RFC 2132 defines the option 66 open standard. DHCP option 66 supports the IP address or the host name of a single TFTP server.

Click **Network Setting** > **Home Networking** > **TFTP Server Name** to open this screen.

Figure 83 Network Setting > Home Networking > TFTP Server Name



Use the **TFTP Server Name** screen to identify a TFTP server for configuration file download using DHCP option 66. RFC 2132 defines the option 66 open standard. DHCP option 66 supports the IP address or the hostname of a single TFTP server.

The following table describes the labels in this screen.

Table 48 Network Setting > Home Networking > TFTP Server Name

LABEL	DESCRIPTION
TFTP Server Name	Enter the IP address or the host name of a single TFTP server.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

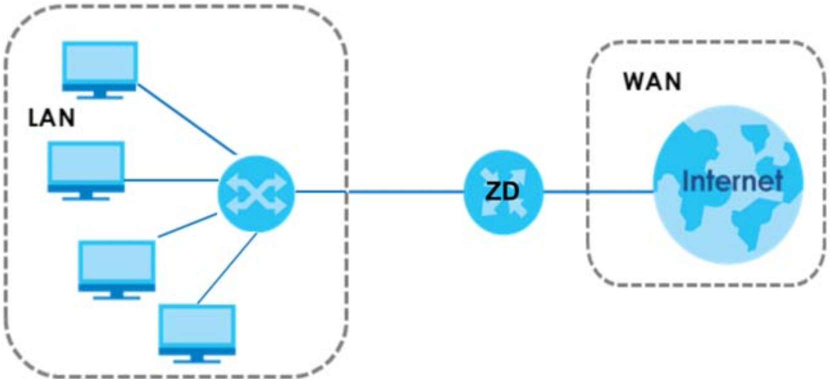
10.8 Technical Reference

This section provides some technical background information about the topics covered in this chapter.

LANs, WANs and the Zyxel Device

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

Figure 84 LAN and WAN IP Addresses



10.8.1 DHCP Setup

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

IP Pool Setup

The Zyxel Device is pre-configured with a pool of IP addresses for the DHCP clients (DHCP Pool). See the product specifications in the appendices. Do not assign static IP addresses from the DHCP pool to your LAN computers.

10.8.2 DNS Server Addresses

DNS (Domain Name System) maps a domain name to its corresponding IP address and vice versa. The DNS server is extremely important because without it, you must know the IP address of a computer before you can access it. The DNS server addresses you enter when you set up DHCP are passed to the client machines along with the assigned IP address and subnet mask.

There are two ways that an ISP disseminates the DNS server addresses.

- 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, enter them in the **DNS Server** fields in the **DHCP Setup** screen.

- Some ISPs choose to disseminate the DNS server addresses using the DNS server extensions of IPCP (IP Control Protocol) after the connection is up. If your ISP did not give you explicit DNS servers, chances are the DNS servers are conveyed through IPCP negotiation. The Zyxel Device supports the IPCP DNS server extensions through the DNS proxy feature.

  Please note that DNS proxy works only when the ISP uses the IPCP DNS server extensions. It does not mean you can leave the DNS servers out of the DHCP setup under all circumstances. If your ISP gives you explicit DNS servers, make sure that you enter their IP addresses in the **DHCP Setup** screen.

10.8.3 LAN TCP/IP

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

IP Address and Subnet Mask

Similar to the way houses on a street share a common street name, so too do computers on a LAN share one common network number.

Where you obtain your network number depends on your particular situation. If the ISP or your network administrator assigns you a block of registered IP addresses, follow their instructions in selecting the IP addresses and the subnet mask.

If the ISP did not explicitly give you an IP network number, then most likely you have a single user account and the ISP will assign you a dynamic IP address when the connection is established. If this is the case, it is recommended that you select a network number from 192.168.0.0 to 192.168.255.0 and you must enable the Network Address Translation (NAT) feature of the Zyxel Device. The Internet Assigned Number Authority (IANA) reserved this block of addresses specifically for private use; please do not use any other number unless you are told otherwise. Let's say you select 192.168.1.0 as the network number; which covers 254 individual addresses, from 192.168.1.1 to 192.168.1.254 (zero and 255 are reserved). In other words, the first three numbers specify the network number while the last number identifies an individual computer on that network.

Once you have decided on the network number, pick an IP address that is easy to remember, for instance, 192.168.1.1, for your Zyxel Device, but make sure that no other device on your network is using that IP address.

The subnet mask specifies the network number portion of an IP address. Your Zyxel Device will compute the subnet mask automatically based on the IP address that you entered. You do not need to change the subnet mask computed by the Zyxel Device unless you are instructed to do otherwise.

Private IP Addresses

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

- 10.0.0.0 — 10.255.255.255
- 172.16.0.0 — 172.31.255.255
- 192.168.0.0 — 192.168.255.255

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

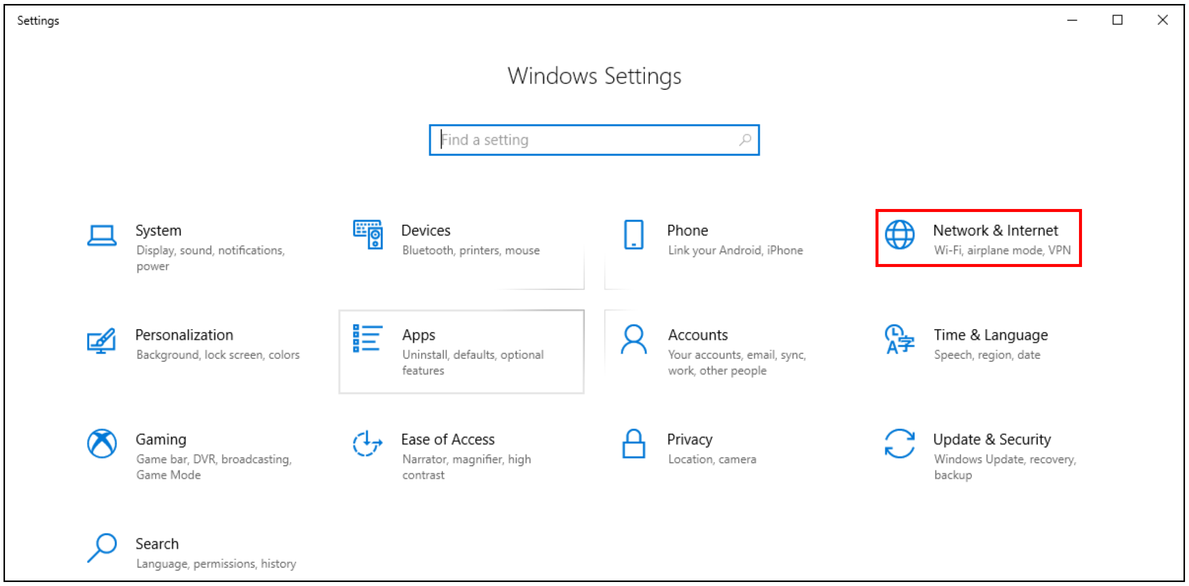
Note: Regardless of your particular situation, do not create an arbitrary IP address; always follow the guidelines above. For more information on address assignment, please refer to RFC 1597, "Address Allocation for Private Internets" and RFC 1466, "Guidelines for Management of IP Address Space".

10.9 Turn on UPnP in Windows 10 Example

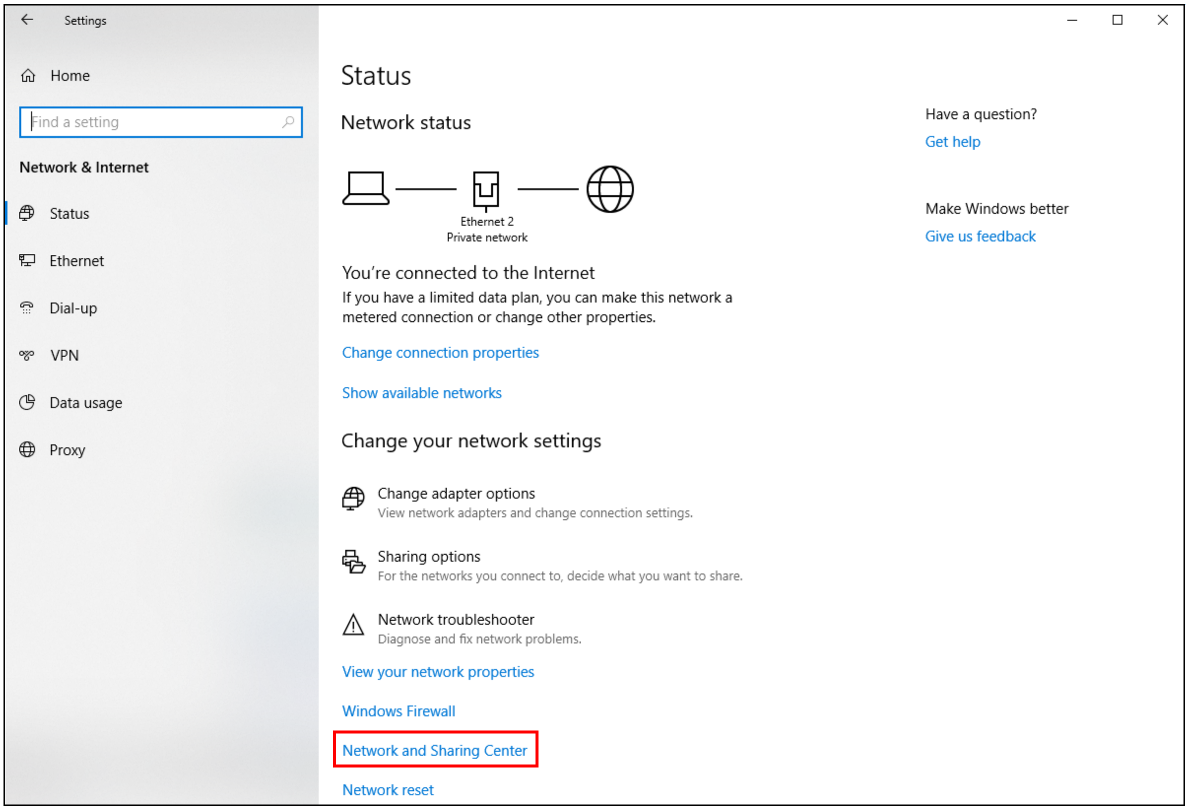
This section shows you how to use the UPnP feature in Windows 10. UPnP server is installed in Windows 10. Activate UPnP on the Zyxel Device by clicking **Network Setting** > **Home Networking** > **UPnP**.

Make sure the computer is connected to the LAN port of the Zyxel Device. Turn on your computer and the Zyxel Device.

1 Click the start icon, **Settings** and then **Network & Internet**.


Settings
Windows Settings
Find a setting
System
Display, sound, notifications, power
Devices
Bluetooth, printers, mouse
Phone
Link your Android, iPhone
Network & Internet
Wi-Fi, airplane mode, VPN
Personalization
Background, lock screen, colors
Apps
Uninstall, defaults, optional features
Accounts
Your accounts, email, sync, work, other people
Time & Language
Speech, region, date
Gaming
Game bar, DVR, broadcasting, Game Mode
Ease of Access
Narrator, magnifier, high contrast
Privacy
Location, camera
Update & Security
Windows Update, recovery, backup
Search
Language, permissions, history

2 Click **Network and Sharing Center**.



Settings

Home

Find a setting

Network & Internet

Status

Ethernet

Dial-up

VPN

Data usage

Proxy

Status

Network status

Ethernet 2
Private network

You're connected to the Internet

If you have a limited data plan, you can make this network a metered connection or change other properties.

Change connection properties

Show available networks

Change your network settings

Change adapter options
View network adapters and change connection settings.

Sharing options
For the networks you connect to, decide what you want to share.

Network troubleshooter
Diagnose and fix network problems.

View your network properties

Windows Firewall

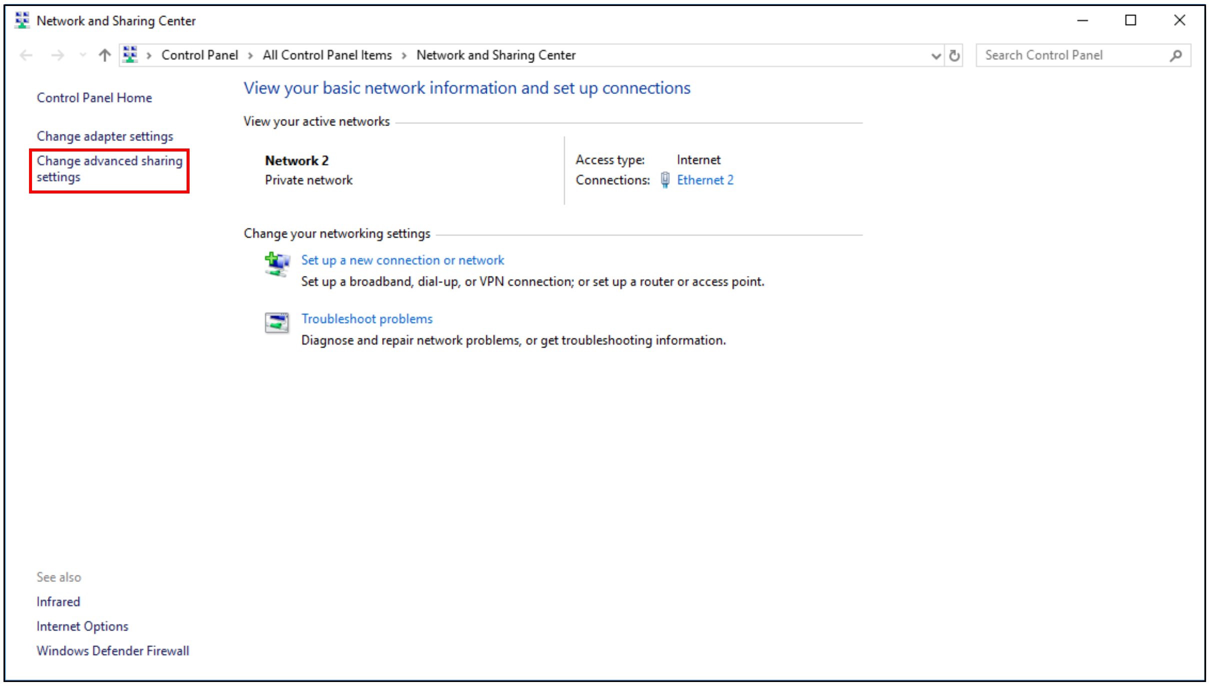
Network and Sharing Center

Network reset

Have a question?
Get help

Make Windows better
Give us feedback

3 Click **Change advanced sharing settings**.



Network and Sharing Center

Control Panel > All Control Panel Items > Network and Sharing Center

Search Control Panel

Control Panel Home

Change adapter settings

Change advanced sharing settings

View your basic network information and set up connections

View your active networks

Network 2
Private network

Access type: Internet
Connections: Ethernet 2

Change your networking settings

Set up a new connection or network
Set up a broadband, dial-up, or VPN connection; or set up a router or access point.

Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.

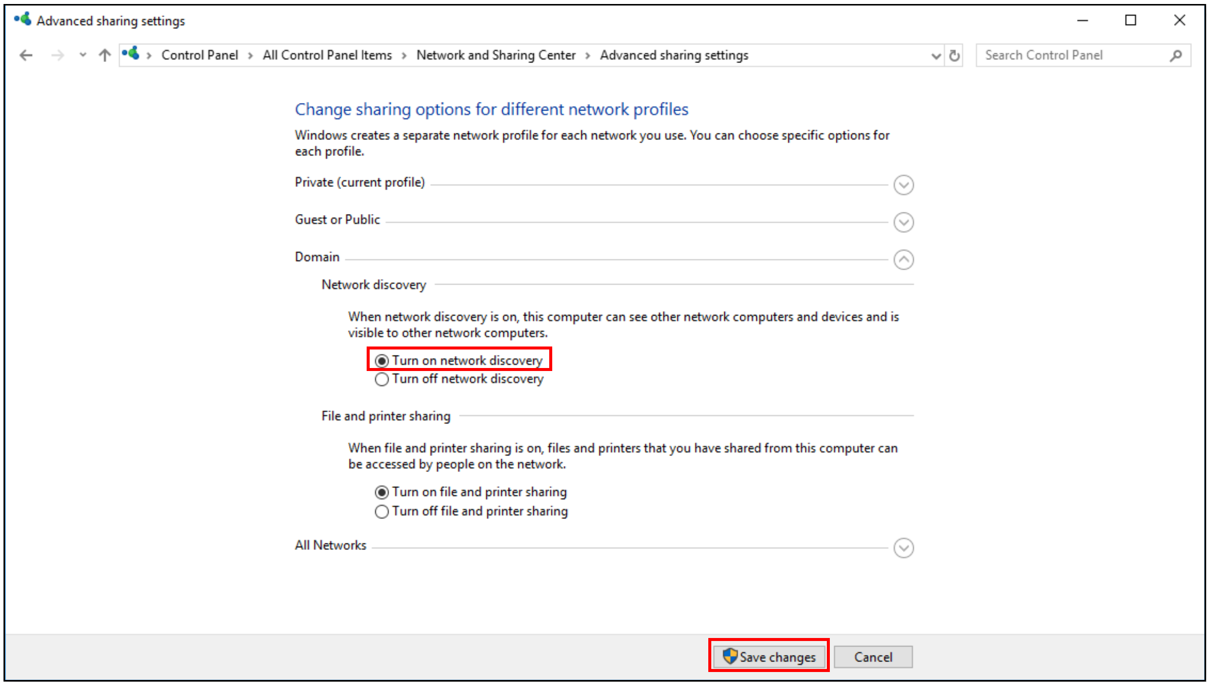
See also

Infrared

Internet Options

Windows Defender Firewall

4 Under **Domain**, select **Turn on network discovery** and click **Save Changes**. Network discovery allows your computer to find other computers and devices on the network and other computers on the network to find your computer. This makes it easier to share files and printers.



Advanced sharing settings

Control Panel › All Control Panel Items › Network and Sharing Center › Advanced sharing settings

Change sharing options for different network profiles

Windows creates a separate network profile for each network you use. You can choose specific options for each profile.

Private (current profile)

Guest or Public

Domain

Network discovery

When network discovery is on, this computer can see other network computers and devices and is visible to other network computers.

● Turn on network discovery
○ Turn off network discovery

File and printer sharing

When file and printer sharing is on, files and printers that you have shared from this computer can be accessed by people on the network.

● Turn on file and printer sharing
○ Turn off file and printer sharing

All Networks

10.9.1 Auto-discover Your UPnP-enabled Network Device

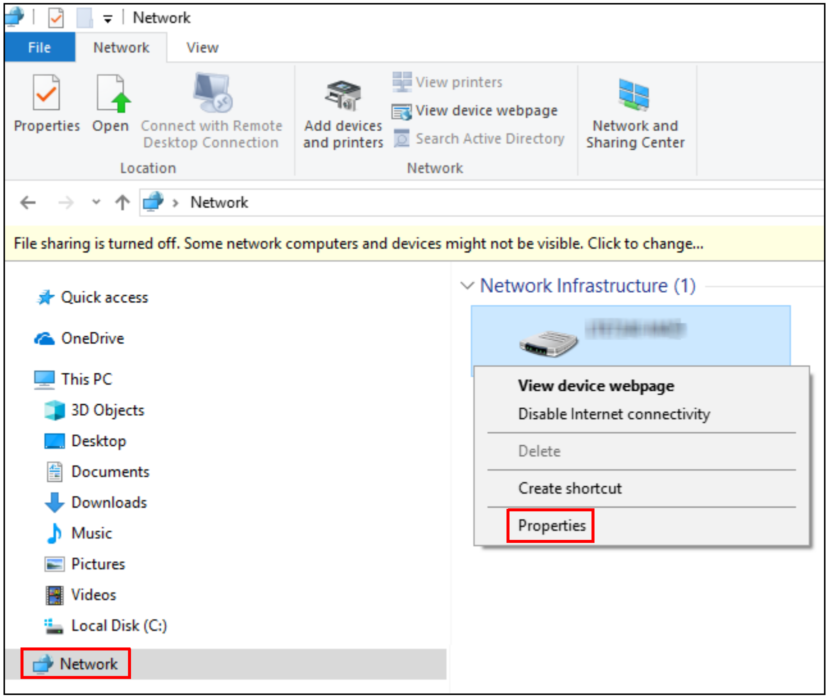
Before you follow these steps, make sure you already have UPnP activated on the Zyxel Device and in your computer.

Make sure your computer is connected to the LAN port of the Zyxel Device.

1 Open **File Explorer** and click **Network**.

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

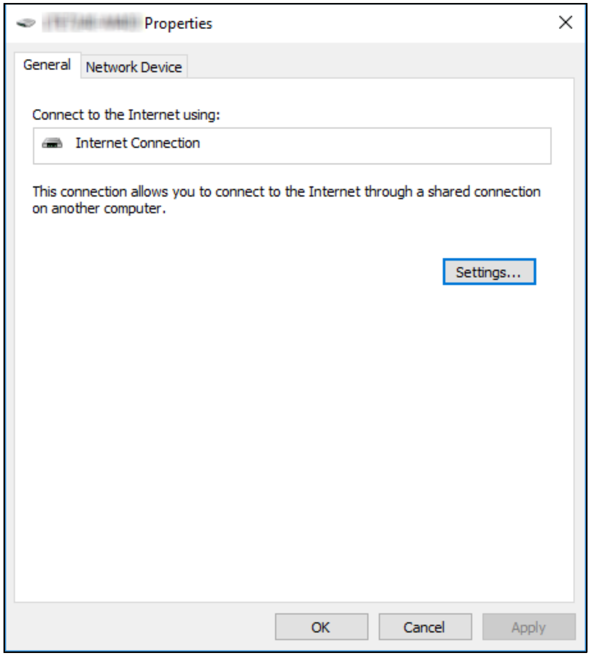
Figure 85 Network Connections



File sharing is turned off. Some network computers and devices might not be visible. Click to change...

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

Figure 86 Internet Connection Properties



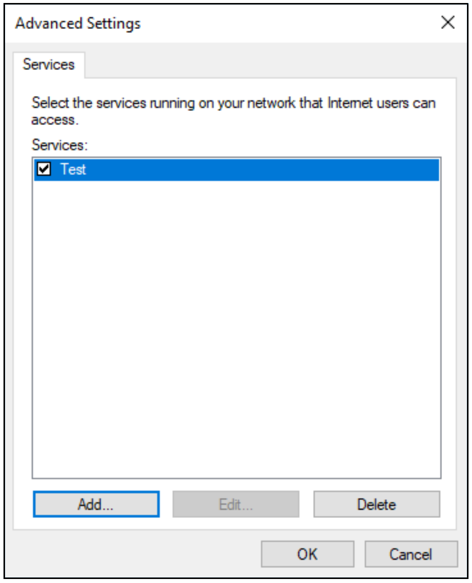
Connect to the Internet using:

Internet Connection

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

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

Figure 87 Internet Connection Properties: Advanced Settings



Advanced Settings

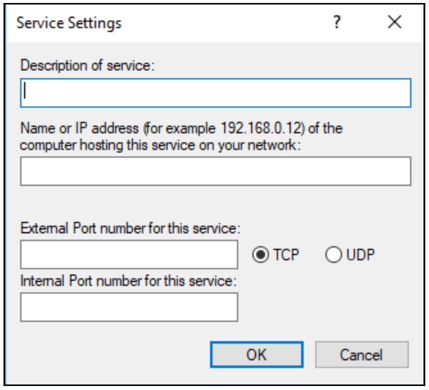
Services

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

Services:

☑ Test

Figure 88 Internet Connection Properties: Advanced Settings: Add



Service Settings

Description of service:

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

External Port number for this service:

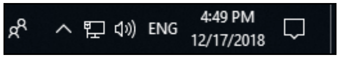
● TCP ○ UDP

Internal Port number for this service:

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

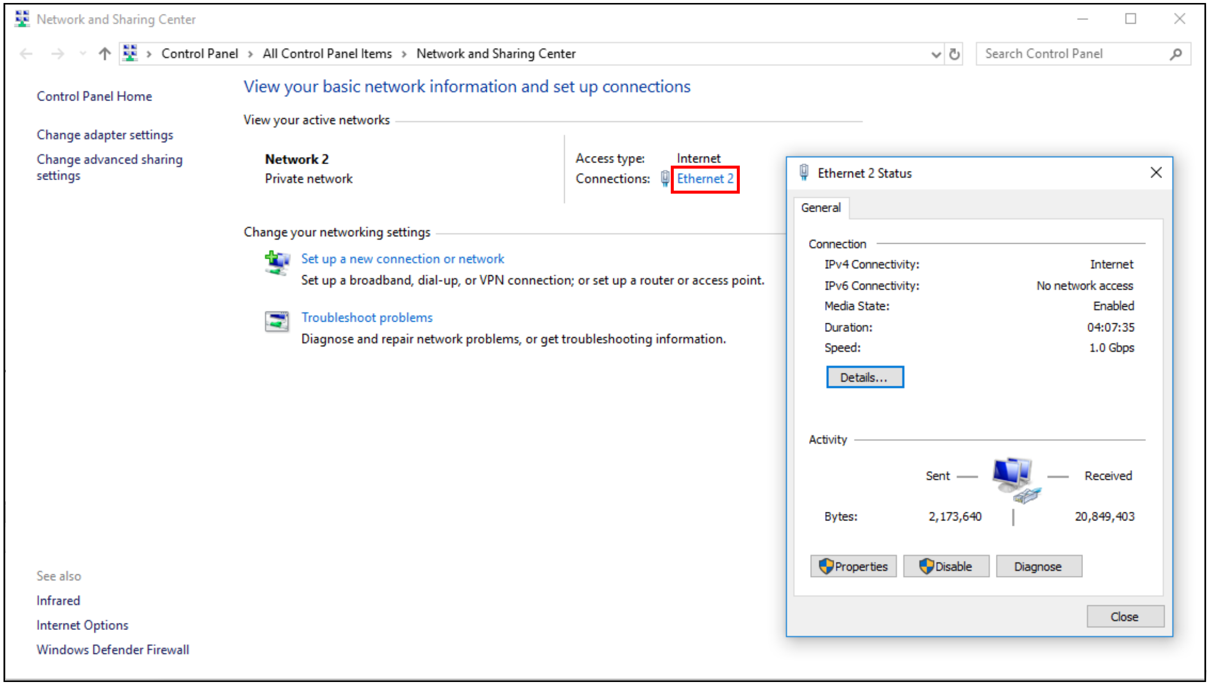
5 Click **OK**. Check the network icon on the system tray to see your Internet connection status.

Figure 89 System Tray Icon



6 To see more details about your current Internet connection status, right click the network icon in the system tray and click **Open Network & Internet settings**. Click **Network and Sharing Center** and click the **Connections**.

Figure 90 Internet Connection Status



Network and Sharing Center

Control Panel > All Control Panel Items > Network and Sharing Center

Search Control Panel

Control Panel Home

Change adapter settings

Change advanced sharing settings

View your basic network information and set up connections

View your active networks

Network 2
Private network

Access type: Internet
Connections: Ethernet 2

Change your networking settings

Set up a new connection or network
Set up a broadband, dial-up, or VPN connection; or set up a router or access point.

Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.

See also
Infrared
Internet Options
Windows Defender Firewall

Ethernet 2 Status

General

Connection

IPv4 Connectivity:	Internet
IPv6 Connectivity:	No network access
Media State:	Enabled
Duration:	04:07:35
Speed:	1.0 Gbps

Details...

Activity

	Sent	Received
Bytes:	2,173,640	20,849,403

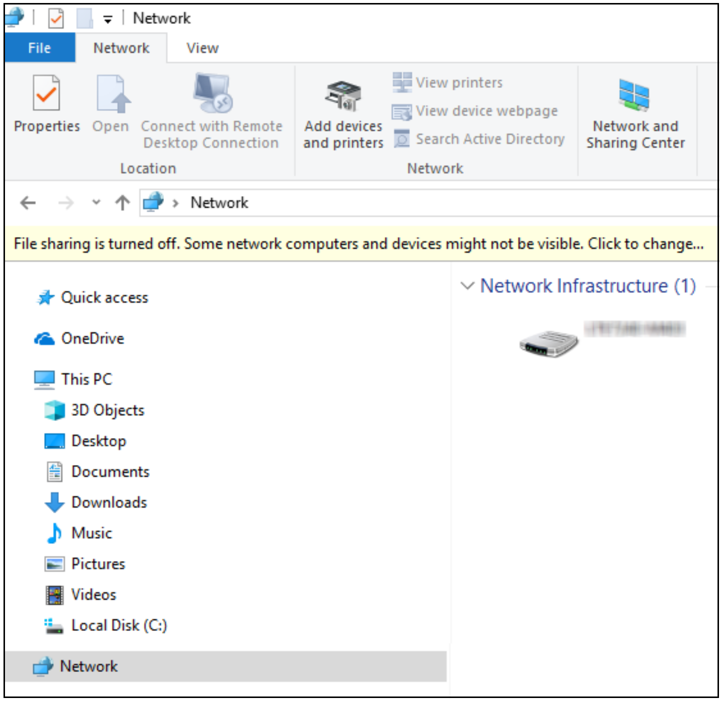
10.10 Web Configurator Access with UPNP in Windows 10

Follow the steps below to access the Web Configurator.

1 Open **File Explorer**.

2 Click **Network**.

Figure 91 Network Connections

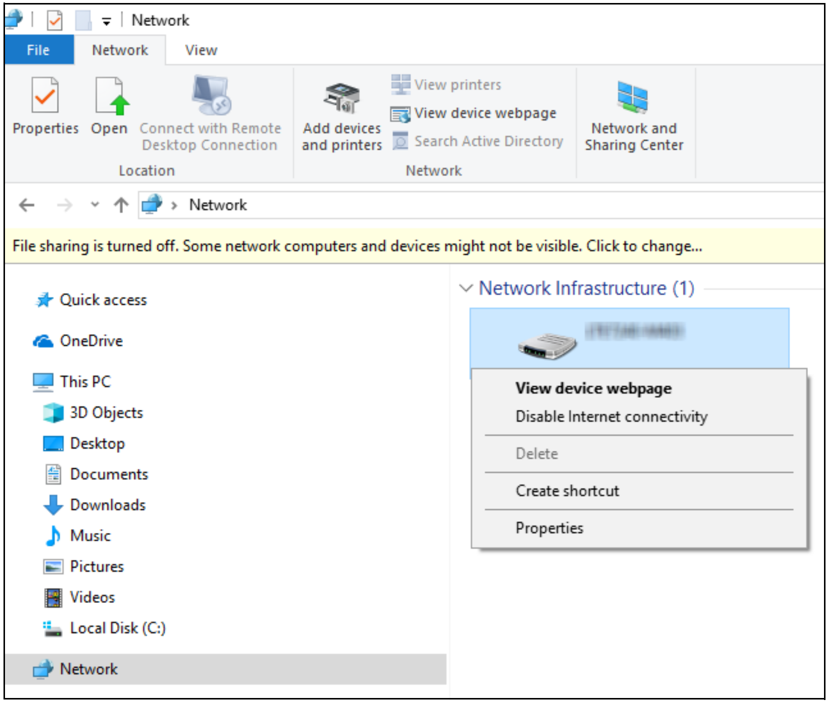


File sharing is turned off. Some network computers and devices might not be visible. Click to change...

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

4 Right-click the icon for your Zyxel Device and select **View device webpage**. The Web Configurator login screen displays.

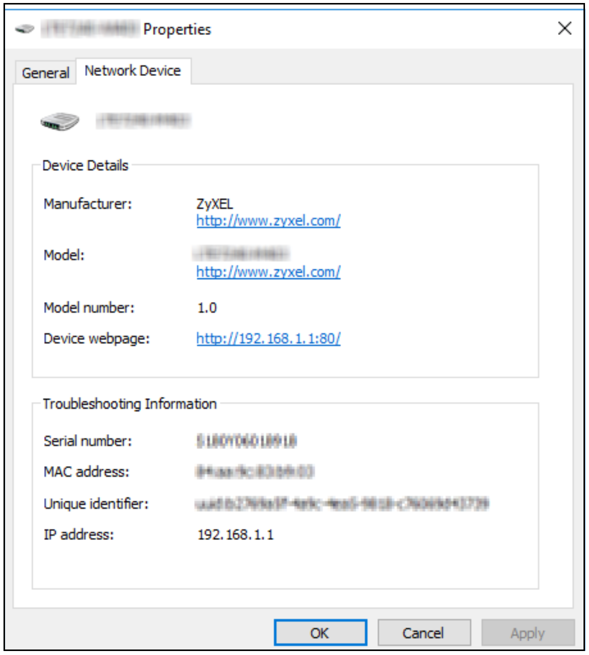
Figure 92 Network Connections: Network Infrastructure



File sharing is turned off. Some network computers and devices might not be visible. Click to change...

5 Right-click the icon for your Zyxel Device and select **Properties**. Click the **Network Device** tab. A window displays information about the Zyxel Device.

Figure 93 Network Connections: Network Infrastructure: Properties: Example



Device Details

Manufacturer: ZyXEL
http://www.zyxel.com/

Model: [redacted]
http://www.zyxel.com/

Model number: 1.0

Device webpage: http://192.168.1.1:80/

Troubleshooting Information

Serial number: [redacted]

MAC address: [redacted]

Unique identifier: [redacted]

IP address: 192.168.1.1

CHAPTER 11
Network Address Translation (NAT)

11.1 NAT Overview

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

11.1.1 What You Can Do in this Chapter

- Use the **Port Forwarding** screen to configure forward incoming service requests to the servers on your local network (Section 11.2 on page 159).
- Use the **Port Triggering** screen to add and configure the Zyxel Device's trigger port settings (Section 11.3 on page 162).
- Use the **DMZ** screen to configure a default server (Section 11.4 on page 165).
- Use the **ALG** screen to enable or disable the SIP ALG (Section 11.5 on page 166).
- Use the **Address Mapping** screen to enable and disable the NAT Address Mapping in the Zyxel Device (Section 11.6 on page 167).
- Use the **Sessions** screen to limit the number of concurrent NAT sessions each client can use (Section 11.7 on page 170).

11.1.2 What You Need To Know

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

Inside/Outside and Global/Local

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

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

NAT

In the simplest form, NAT changes the source IP address in a packet received from a subscriber (the inside local address) to another (the inside global address) before forwarding the packet to the WAN side. When the response comes back, NAT translates the destination address (the inside global address) back to the inside local address before forwarding it to the original inside host.

Port Forwarding

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

11.2 Port Forwarding

Use **Port Forwarding** to forward incoming service requests from the Internet to the servers on your local network. Port forwarding is commonly used when you want to host online gaming, P2P file sharing, or other servers on your network.

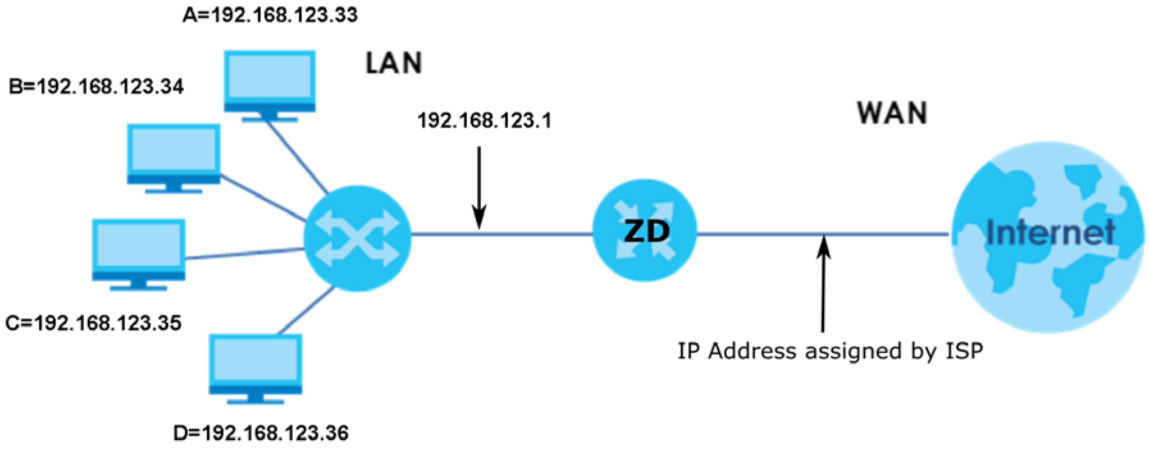
You may enter a single port number or a range of port numbers to be forwarded, and the local IP address of the desired server. The port number identifies a service; for example, web service is on port 80 and FTP on port 21. In some cases, such as for unknown services or where one server can support more than one service (for example both FTP and web service), it might be better to specify a range of port numbers. You can allocate a server IP address that corresponds to a port or a range of ports. Please refer to RFC 1700 for further information about port numbers.

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

Configure Servers Behind Port Forwarding (Example)

Let's say you want to assign ports 21-25 to one FTP, Telnet and SMTP server (**A** in the example), port 80 to another (**B** in the example), a default server IP address of 192.168.1.35 to a third (**C** in the example), and a default server IP address of 192.168.1.36 to a fourth (**D** in the example). You assign the LAN IP addresses and the ISP assigns the WAN IP address. The NAT network appears as a single host on the Internet.

Figure 94 Multiple Servers Behind NAT Example

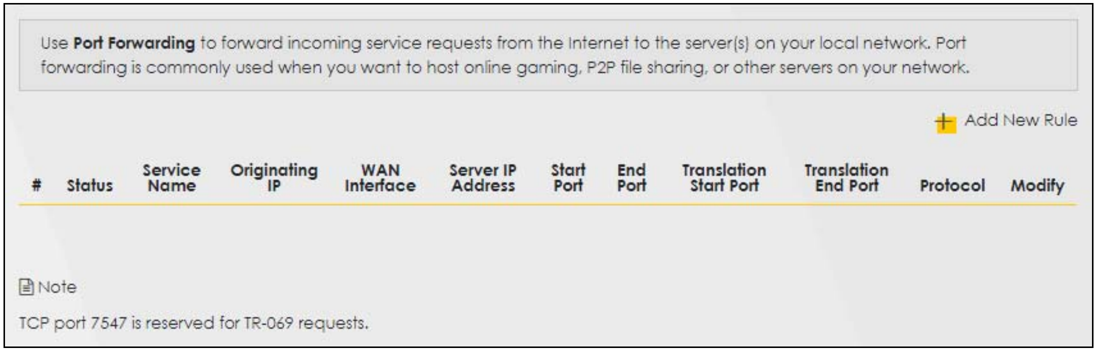


11.2.1 Port Forwarding

Click **Network Setting** > **NAT** to open the **Port Forwarding** screen.

Note: TCP port 7547 is reserved for system use.

Figure 95 Network Setting > NAT > Port Forwarding



Use **Port Forwarding** to forward incoming service requests from the Internet to the server(s) on your local network. Port forwarding is commonly used when you want to host online gaming, P2P file sharing, or other servers on your network.

#	Status	Service Name	Originating IP	WAN Interface	Server IP Address	Start Port	End Port	Translation Start Port	Translation End Port	Protocol	Modify

Note

TCP port 7547 is reserved for TR-069 requests.

The following table describes the fields in this screen.

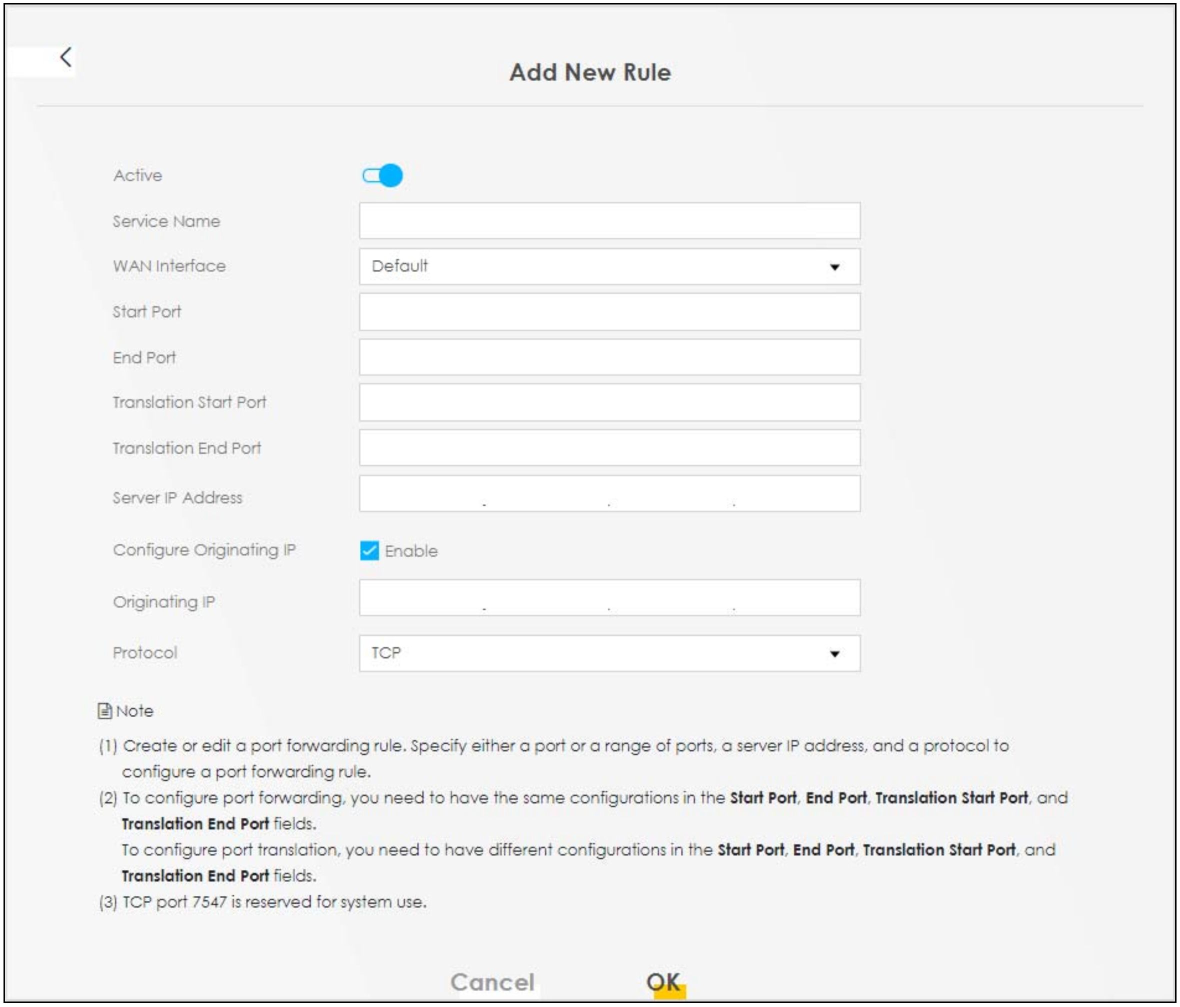
Table 49 Network Setting > NAT > Port Forwarding

LABEL	DESCRIPTION
Add New Rule	Click this to add a new port forwarding rule.
#	This is the index number of the entry.
Status	This field indicates whether the rule is active or not. A yellow bulb signifies that this rule is active. A gray bulb signifies that this rule is not active.
Service Name	This is the service's name. This shows **User Defined** if you manually added a service. You can change this by clicking the edit icon.
Originating IP	This is the source's IP address.
WAN Interface	Select the WAN interface for which to configure NAT port forwarding rules.
Server IP Address	This is the server's IP address.
Start Port	This is the first external port number that identifies a service.
End Port	This is the last external port number that identifies a service.
Translation Start Port	This is the first internal port number that identifies a service.
Translation End Port	This is the last internal port number that identifies a service.
Protocol	This field displays the protocol (TCP, UDP, TCP+UDP) used to transport the packets for which you want to apply the rule.
Modify	Click the **Edit** icon to edit the port forwarding rule. Click the **Delete** icon to delete an existing port forwarding rule. Note that subsequent address mapping rules move up by one when you take this action.

11.2.2 Add or Edit Port Forwarding

Create or edit a port forwarding rule. Specify either a port or a range of ports, a server IP address, and a protocol to configure a port forwarding rule. Click **Add New Rule** in the **Port Forwarding** screen or the **Edit** icon next to an existing rule to open the following screen.

Figure 96 Network Setting > NAT > Port Forwarding: Add or Edit



Add New Rule

Active	●
Service Name	
WAN Interface	Default ▾
Start Port	
End Port	
Translation Start Port	
Translation End Port	
Server IP Address	. . .
Configure Originating IP	☑ Enable
Originating IP	. . .
Protocol	TCP ▾

Note

(1) Create or edit a port forwarding rule. Specify either a port or a range of ports, a server IP address, and a protocol to configure a port forwarding rule.

(2) To configure port forwarding, you need to have the same configurations in the **Start Port**, **End Port**, **Translation Start Port**, and **Translation End Port** fields.
To configure port translation, you need to have different configurations in the **Start Port**, **End Port**, **Translation Start Port**, and **Translation End Port** fields.

(3) TCP port 7547 is reserved for system use.

Note: To configure port forwarding, you need to have the same configurations in the **Start Port**, **End Port**, **Translation Start Port**, and **Translation End Port** fields.
To configure port translation, you need to have different configurations in the **Start Port**, **End Port**, **Translation Start Port**, and **Translation End Port** fields.
Here is an example to configure port translation. Configure **Start Port** to 100, **End Port** to 120, **Translation Start Port** to 200, and **Translation End Port** to 220.

Note: TCP port 7547 is reserved for system use.

The following table describes the labels in this screen.

Table 50 Network Setting > NAT > Port Forwarding: Add or Edit

LABEL	DESCRIPTION
Active	Click to turn the port forwarding rule on or off.
Service Name	Enter a name for the service to forward. You can use up to 256 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
WAN Interface	Select the WAN interface for which to configure NAT port forwarding rules.

Table 50 Network Setting > NAT > Port Forwarding: Add or Edit (continued)

LABEL	DESCRIPTION
Start Port	Configure this for a user-defined entry. Enter the original destination port for the packets. To forward only one port, enter the port number again in the **End Port** field. To forward a series of ports, enter the start port number here and the end port number in the **End Port** field.
End Port	Configure this for a user-defined entry. Enter the last port of the original destination port range. To forward only one port, enter the port number in the **Start Port** field above and then enter it again in this field. To forward a series of ports, enter the last port number in a series that begins with the port number in the **Start Port** field above.
Translation Start Port	Configure this for a user-defined entry. This shows the port number to which you want the Zyxel Device to translate the incoming port. For a range of ports, enter the first number of the range to which you want the incoming ports translated.
Translation End Port	Configure this for a user-defined entry. This shows the last port of the translated port range.
Server IP Address	Enter the inside IP address of the virtual server here.
Configure Originating IP	Click the **Enable** check box to enter the source IP in the next field.
Originating IP	Enter the source IP address here.
Protocol	Select the protocol supported by this virtual server. Choices are **TCP**, **UDP**, or **TCP/UDP**.
OK	Click this to save your changes.
Cancel	Click this to exit this screen without saving.

11.3 Port Triggering

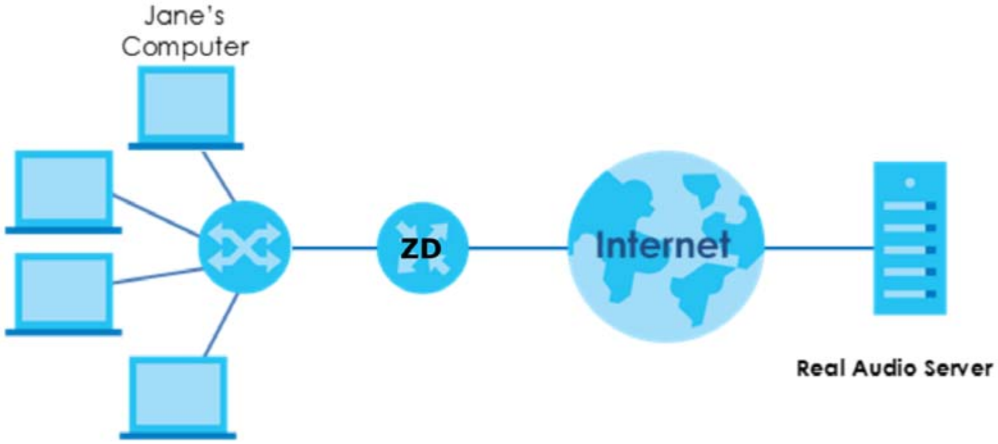
Some services use a dedicated range of ports on the client side and a dedicated range of ports on the server side. With regular port forwarding, you set a forwarding port in NAT to forward a service (coming in from the server on the WAN) to the IP address of a computer on the client side (LAN). The problem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

Trigger port forwarding allows computers on the LAN to dynamically take turns using the service.

The Zyxel Device records the IP address of a LAN computer that sends traffic to the WAN to request a service with a specific port number and protocol (a \"trigger\" port). When the Zyxel Device's WAN port receives a response with a specific port number and protocol (\"open\" port), the Zyxel Device forwards the traffic to the LAN IP address of the computer that sent the request. After that computer’s connection for that service closes, another computer on the LAN can use the service in the same manner. This way you do not need to configure a new IP address each time you want a different LAN computer to use the application.

For example:

Figure 97 Trigger Port Forwarding Process: Example



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

2 Port 7070 is a "trigger" port and causes the Zyxel Device to record Jane's computer IP address. The Zyxel Device associates Jane's computer IP address with the "open" port range of 6970 – 7170.

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

4 The Zyxel Device forwards the traffic to Jane's computer IP address.

5 Only Jane can connect to the Real Audio server until the connection is closed or times out. The Zyxel Device times out in 3 minutes with UDP (User Datagram Protocol) or 2 hours with TCP/IP (Transfer Control Protocol/Internet Protocol).

Click **Network Setting** > **NAT** > **Port Triggering** to open the following screen. Use this screen to view your Zyxel Device's trigger port settings.

Note: TCP port 7547 is reserved for system use.

Note: The sum of trigger ports in all rules must be less than 1000 and every open port range must be less than 1000. When the protocol is TCP/UDP, the ports are counted twice.

Figure 98 Network Setting > NAT > Port Triggering

The following table describes the labels in this screen.

Table 51 Network Setting > NAT > Port Triggering

LABEL	DESCRIPTION
Add New Rule	Click this to create a new rule.
#	This is the index number of the entry.
Status	This field displays whether the port triggering rule is active or not. A yellow bulb signifies that this rule is active. A gray bulb signifies that this rule is not active.
Service Name	This field displays the name of the service used by this rule.

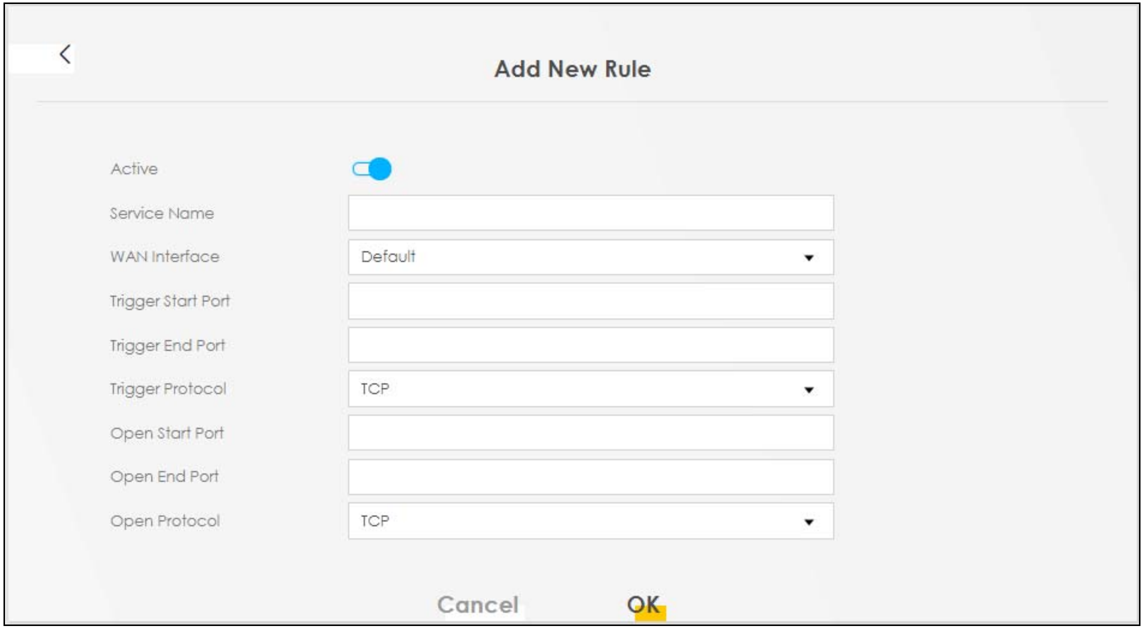
Table 51 Network Setting > NAT > Port Triggering (continued)

LABEL	DESCRIPTION
WAN Interface	This field shows the WAN interface through which the service is forwarded.
Trigger Start Port	The trigger port is a port (or a range of ports) that causes (or triggers) the Zyxel Device to record the IP address of the LAN computer that sent the traffic to a server on the WAN. This is the first port number that identifies a service.
Trigger End Port	This is the last port number that identifies a service.
Trigger Proto.	This is the trigger transport layer protocol.
Open Start Port	The open port is a port (or a range of ports) that a server on the WAN uses when it sends out a particular service. The Zyxel Device forwards the traffic with this port (or range of ports) to the client computer on the LAN that requested the service. This is the first port number that identifies a service.
Open End Port	This is the last port number that identifies a service.
Open Protocol	This is the open transport layer protocol.
Modify	Click the **Edit** icon to edit this rule. Click the **Delete** icon to delete an existing rule.

11.3.1 Add or Edit Port Triggering Rule

This screen lets you create new port triggering rules. Click **Add New Rule** in the **Port Triggering** screen or click a rule's **Edit** icon to open the following screen. Use this screen to configure a port or range of ports and protocols for sending out requests and for receiving responses.

Figure 99 Network Setting > NAT > Port Triggering: Add or Edit



Add New Rule

Active	●
Service Name	
WAN Interface	Default
Trigger Start Port	
Trigger End Port	
Trigger Protocol	TCP
Open Start Port	
Open End Port	
Open Protocol	TCP

The following table describes the labels in this screen.

Table 52 Network Setting > NAT > Port Triggering: Add or Edit

LABEL	DESCRIPTION
Active	Click this switch to activate this rule.
Service Name	Enter a name to identify this rule. You can use up to 256 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
WAN Interface	Select a WAN interface for which you want to configure port triggering rules.
Trigger Start Port	The trigger port is a port (or a range of ports) that causes (or triggers) the Zyxel Device to record the IP address of the LAN computer that sent the traffic to a server on the WAN. Enter a port number or the starting port number in a range of port numbers.
Trigger End Port	Enter a port number or the ending port number in a range of port numbers.
Trigger Protocol	Select the transport layer protocol from **TCP**, **UDP**, or **TCP/UDP**.
Open Start Port	The open port is a port (or a range of ports) that a server on the WAN uses when it sends out a particular service. The Zyxel Device forwards the traffic with this port (or range of ports) to the client computer on the LAN that requested the service. Enter a port number or the starting port number in a range of port numbers.
Open End Port	Enter a port number or the ending port number in a range of port numbers.
Open Protocol	Select the transport layer protocol from **TCP**, **UDP**, or **TCP/UDP**.
Cancel	Click **Cancel** to exit this screen without saving.
OK	Click **OK** to save your changes.

11.4 DMZ

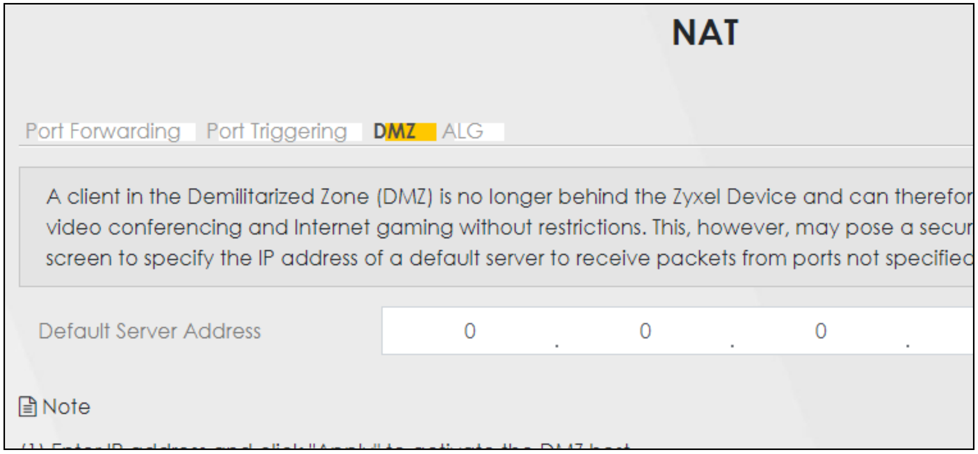
Use this screen to specify the IP address of a default server to receive packets from ports not specified in the **Port Triggering** screen. The DMZ (DeMilitarized Zone) is a network between the WAN and the LAN that is accessible to devices on both the WAN and LAN with firewall protection. Devices on the WAN can initiate connections to devices on the DMZ but not to those on the LAN.

You can put public servers, such as email, web, and FTP servers, on the DMZ to provide services on both the WAN and LAN. To use this feature, you first need to assign a DMZ host. Click **Network Setting** > **NAT** > **DMZ** to open the **DMZ** screen.

Note: Use an IPv4 address for the DMZ server.

Note: Enter the IP address of the default server in the **Default Server Address** field, and click **Apply** to activate the DMZ host. Otherwise, clear the IP address in the **Default Server Address** field, and click **Apply** to deactivate the DMZ host.

Figure 100 Network Setting > NAT > DMZ



NAT

A client in the Demilitarized Zone (DMZ) is no longer behind the Zyxel Device and can therefor video conferencing and Internet gaming without restrictions. This, however, may pose a secur screen to specify the IP address of a default server to receive packets from ports not specified

Default Server Address 0 . 0 . 0 .

Note

(1) Enter IP address and click "Apply" to activate the DMZ host.

The following table describes the fields in this screen.

Table 53 Network Setting > NAT > DMZ

LABEL	DESCRIPTION
Default Server Address	Enter the IP address of the default server which receives packets from ports that are not specified in the **Port Forwarding** screen. Note: If you do not assign a default server, the Zyxel Device discards all packets received for ports not specified in the virtual server configuration.
Apply	Click this to save your changes back to the Zyxel Device.
Cancel	Click **Cancel** to restore your previously saved settings.

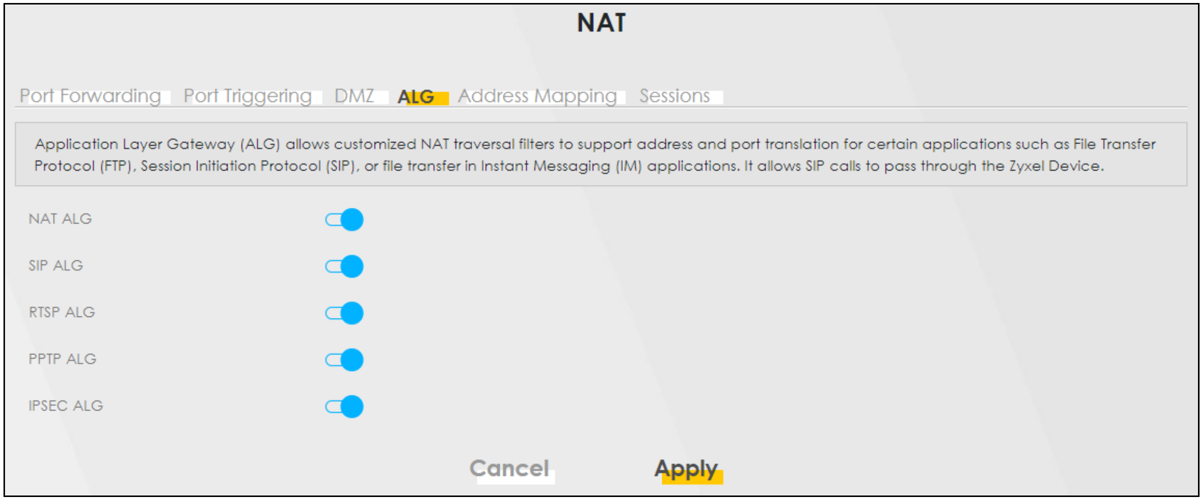
11.5 ALG

Application Layer Gateway (ALG) allows customized NAT traversal filters to support address and port translation for certain applications such as File Transfer Protocol (FTP), Session Initiation Protocol (SIP), or file transfer in Instant Messaging (IM) applications. It allows SIP calls to pass through the Zyxel Device. When the Zyxel Device registers with the SIP register server, the SIP ALG translates the Zyxel Device's private IP address inside the SIP data stream to a public IP address. You do not need to use STUN or an outbound proxy if your Zyxel Device is behind a SIP ALG.

Click **Network Setting** > **NAT** > **ALG** to open the **ALG** screen. Use this screen to enable and disable the NAT Application Layer Gateway (ALG) in the Zyxel Device.

Application Layer Gateway (ALG) allows certain applications such as File Transfer Protocol (FTP), Session Initiation Protocol (SIP), or file transfer in Instant Messaging (IM) applications to pass through the Zyxel Device.

Figure 101 Network Setting > NAT > ALG



NAT

Application Layer Gateway (ALG) allows customized NAT traversal filters to support address and port translation for certain applications such as File Transfer Protocol (FTP), Session Initiation Protocol (SIP), or file transfer in Instant Messaging (IM) applications. It allows SIP calls to pass through the Zyxel Device.

NAT ALG ●

SIP ALG ●

RTSP ALG ●

PPTP ALG ●

IPSEC ALG ●

The following table describes the fields in this screen.

Table 54 Network Setting > NAT > ALG

LABEL	DESCRIPTION
NAT ALG	Enable this to make sure applications such as FTP and file transfer in IM applications work correctly with port-forwarding and address-mapping rules.
SIP ALG	Click this switch to enable SIP ALG to make sure SIP (VoIP) works correctly with port-forwarding and address-mapping rules.
RTSP ALG	Click this switch to enable RTSP ALG to have the Zyxel Device detect RTSP traffic and help build RTSP sessions through its NAT. The Real Time Streaming (media control) Protocol (RTSP) is a remote control for multimedia on the Internet.
PPTP ALG	Click this switch to enable the PPTP ALG on the Zyxel Device to detect PPTP traffic and help build PPTP sessions through the Zyxel Device's NAT.
IPSEC ALG	Click this switch to enable IPsec ALG on the Zyxel Device to detect IPsec traffic and help build IPsec sessions through the Zyxel Device's NAT.
Apply	Click **Apply** to save your changes back to the Zyxel Device.
Cancel	Click **Cancel** to restore your previously saved settings.

11.6 Address Mapping

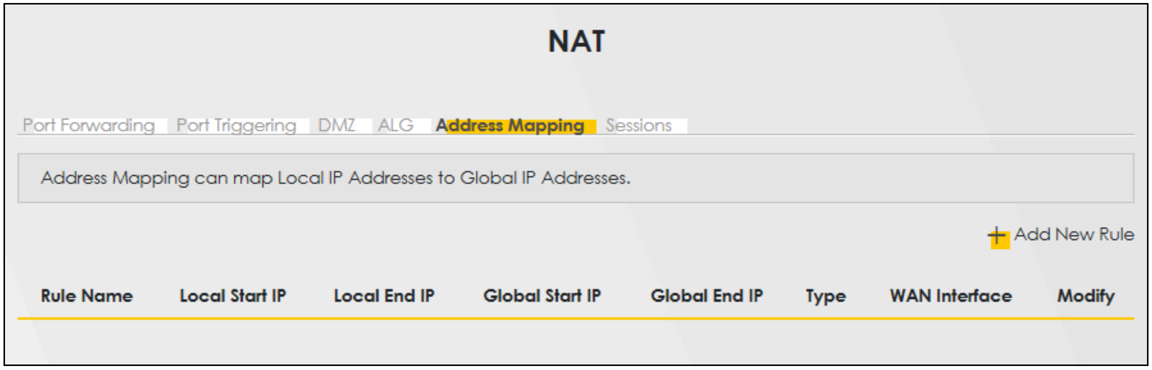
Address mapping can map local IP Addresses to global IP addresses. Ordering your rules is important because the Zyxel Device applies the rules in the order that you specify. When a rule matches the current packet, the Zyxel Device takes the corresponding action and the remaining rules are ignored.

Use this screen to enable or disable the NAT Address Mapping in the Zyxel Device.

11.6.1 Address Mapping Screen

Click **Network Setting** > **NAT** > **Address Mapping** to open the **Address Mapping** screen.

Figure 102 Network Setting > NAT > Address Mapping



NAT

Address Mapping can map Local IP Addresses to Global IP Addresses.

Rule Name	Local Start IP	Local End IP	Global Start IP	Global End IP	Type	WAN Interface	Modify

The following table describes the fields in this screen.

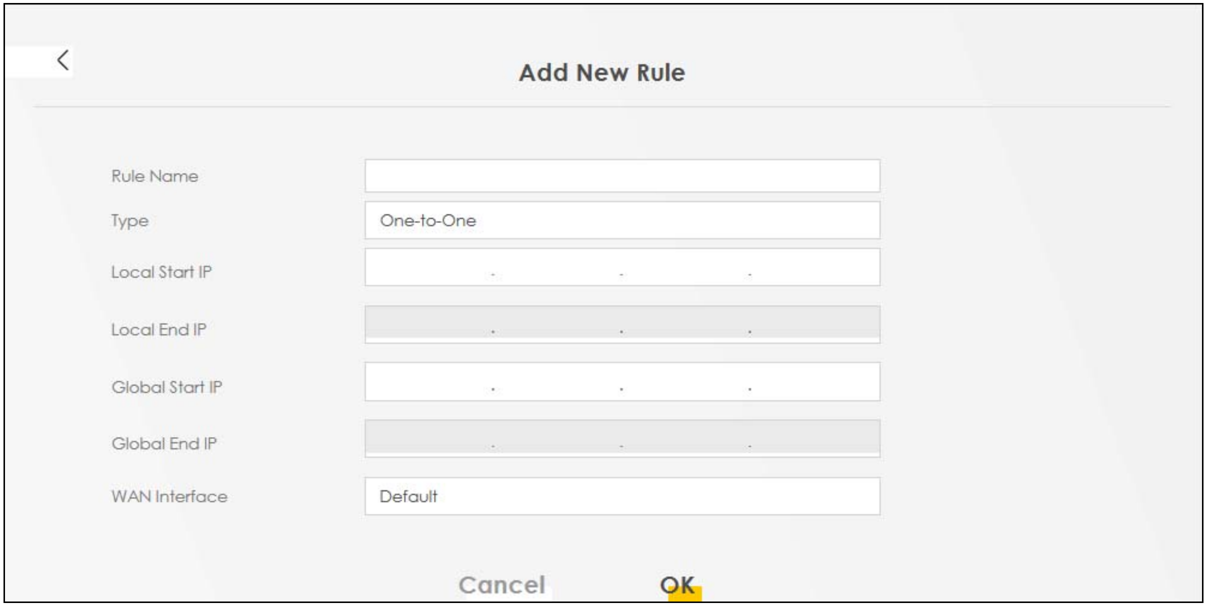
Table 55 Network Setting > NAT > Address Mapping

LABEL	DESCRIPTION
Add New Rule	Click this to create a new rule.
Rule Name	This is the name of the rule.
Local Start IP	This is the starting Inside Local IP Address (ILA).
Local End IP	This is the ending Inside Local IP Address (ILA). If the rule is for all local IP addresses, then this field displays 0.0.0.0 as the Local Start IP address and 255.255.255.255 as the Local End IP address. This field is blank for **One-to-One** mapping types.
Global Start IP	This is the starting Inside Global IP Address (IGA). Enter 0.0.0.0 here if you have a dynamic IP address from your ISP. You can only do this for the **Many-to-One** mapping type.
Global End IP	This is the ending Inside Global IP Address (IGA). This field is blank for **One-to-One** and **Many-to-One** mapping types.
Type	This is the address mapping type. **One-to-One**: This mode maps one local IP address to one global IP address. Note that port numbers do not change for the One-to-One NAT mapping type. **Many-to-One**: This mode maps multiple local IP addresses to one global IP address. This is equivalent to SUA (i.e., PAT, port address translation), the Device's Single User Account feature that previous routers supported only. **Many-to-Many**: This mode maps multiple local IP addresses to shared global IP addresses.
WAN Interface	This is the WAN interface to which the address mapping rule applies.
Modify	Click the **Edit** icon to go to the screen where you can edit the address mapping rule. Click the **Delete** icon to delete an existing address mapping rule. Note that subsequent address mapping rules move up by one when you take this action.

11.6.2 Add New Rule Screen

To add or edit an address mapping rule, click **Add New Rule** or the **Modify** icon in the **Address Mapping** screen to display the screen shown next.

Figure 103 Network Setting > NAT > Address Mapping > Add New Rule



Add New Rule

Rule Name	
Type	One-to-One
Local Start IP	. . .
Local End IP	. . .
Global Start IP	. . .
Global End IP	. . .
WAN Interface	Default

The following table describes the fields in this screen.

Table 56 Network Setting > NAT > Address Mapping > Add New Rule

LABEL	DESCRIPTION
Rule Name	Enter a descriptive name for this rule. You can use up to 20 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Type	Choose the IP or port mapping type from one of the following. **One-to-One**: This mode maps one local IP address to one global IP address. Note that port numbers do not change for the One-to-One NAT mapping type. **Many-to-One**: This mode maps multiple local IP addresses to one global IP address. This is equivalent to SUA (for example, PAT, port address translation), the device's Single User Account feature that previous routers supported only. **Many-to-Many**: This mode maps multiple local IP addresses to shared global IP addresses.
Local Start IP	Enter the starting Inside Local IP Address (ILA).
Local End IP	Enter the ending Inside Local IP Address (ILA). If the rule is for all local IP addresses, then this field displays 0.0.0.0 as the Local Start IP address and 255.255.255.255 as the Local End IP address. This field is blank for **One-to-One** mapping types.
Global Start IP	Enter the starting Inside Global IP Address (IGA). Enter 0.0.0.0 here if you have a dynamic IP address from your ISP. You can only do this for the Many-to-One mapping type.
Global End IP	Enter the ending Inside Global IP Address (IGA). This field is blank for **One-to-One** and **Many-to-One** mapping types.
WAN Interface	Select a WAN interface to which the address mapping rule applies.
Cancel	Click **Cancel** to exit this screen without saving.
OK	Click **OK** to save your changes.

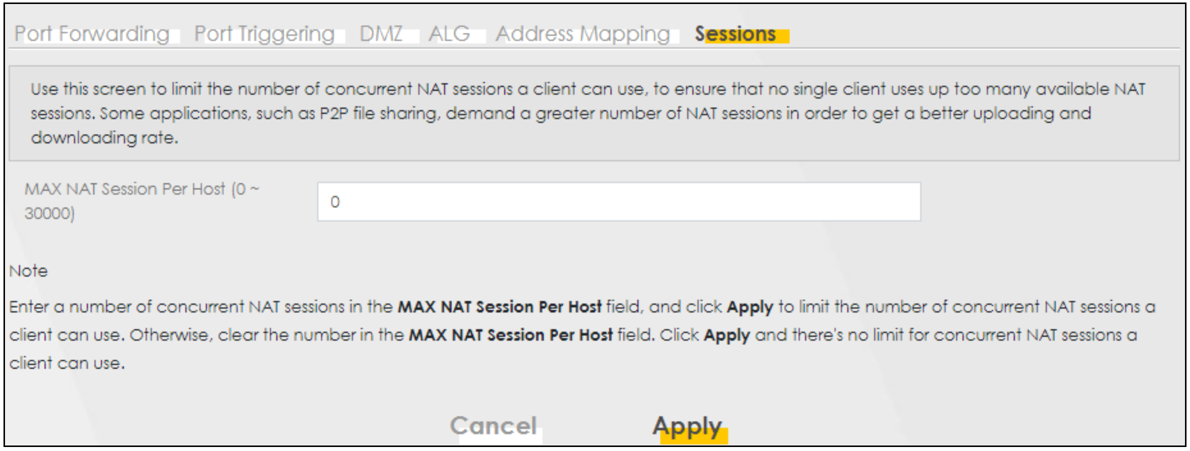
11.7 Sessions

Use this screen to limit the number of concurrent NAT sessions a client can use, to ensure that no single client uses up too many available NAT sessions. Some applications, such as P2P file sharing, demand a greater number of NAT sessions in order to get a better uploading and downloading rate. Click **Network Setting** > **NAT** > **Sessions** to display the following screen.

Use the **Sessions** screen to limit the number of concurrent NAT sessions each client can use. Click **Network Setting** > **NAT** > **Sessions** to open the **Sessions** screen.

Note: Enter a number of concurrent NAT sessions in the **MAX NAT Session Per Host** field, and click **Apply** to limit the number of concurrent NAT sessions a client can use. Otherwise, clear the number in the **MAX NAT Session Per Host** field. Click **Apply** and there is no limit for concurrent NAT sessions a client can use.

Figure 104 Network Setting > NAT > Sessions



Use this screen to limit the number of concurrent NAT sessions a client can use, to ensure that no single client uses up too many available NAT sessions. Some applications, such as P2P file sharing, demand a greater number of NAT sessions in order to get a better uploading and downloading rate.

MAX NAT Session Per Host (0 ~ 30000): 0

Note

Enter a number of concurrent NAT sessions in the **MAX NAT Session Per Host** field, and click **Apply** to limit the number of concurrent NAT sessions a client can use. Otherwise, clear the number in the **MAX NAT Session Per Host** field. Click **Apply** and there's no limit for concurrent NAT sessions a client can use.

The following table describes the fields in this screen.

Table 57 Network Setting > NAT > Sessions

LABEL	DESCRIPTION
MAX NAT Session Per Host	Use this field to set a common limit to the number of concurrent NAT sessions each client computer can have. If only a few clients use peer to peer applications, you can raise this number to improve their performance. With heavy peer to peer application use, lower this number to ensure no single client uses too many of the available NAT sessions.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

11.8 Technical Reference

This part contains more information regarding NAT.

11.8.1 NAT Definitions

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

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

Note that inside or outside refers to the location of a host, while global/local refers to the IP address of a host used in a packet. Thus, an inside local address (ILA) is the IP address of an inside host in a packet when the packet is still in the local network, while an inside global address (IGA) is the IP address of the same inside host when the packet is on the WAN side. The following table summarizes this information.

Table 58 NAT Definitions

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

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

11.8.2 What NAT Does

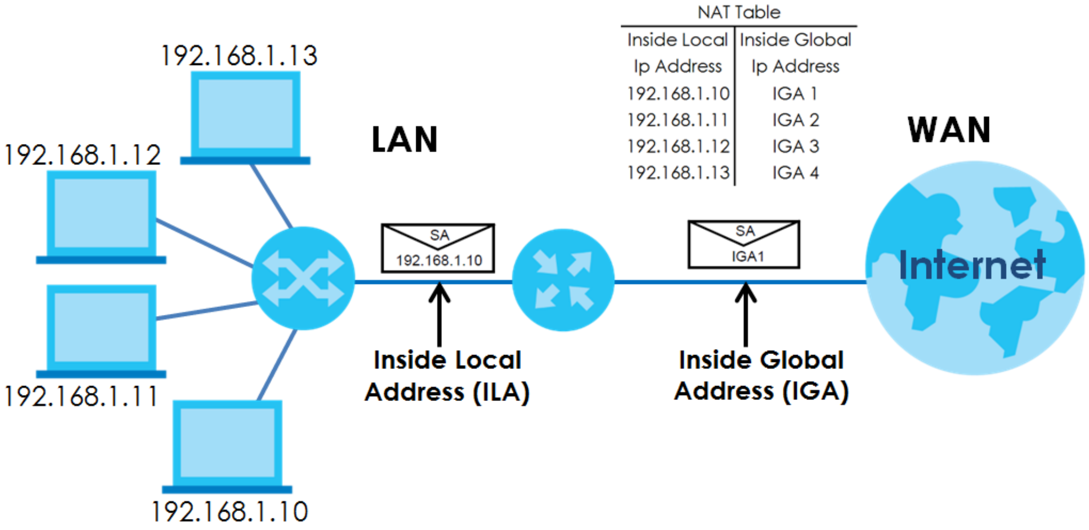
In the simplest form, NAT changes the source IP address in a packet received from a subscriber (the inside local address) to another (the inside global address) before forwarding the packet to the WAN side. When the response comes back, NAT translates the destination address (the inside global address)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

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

11.8.3 How NAT Works

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

Figure 105 How NAT Works



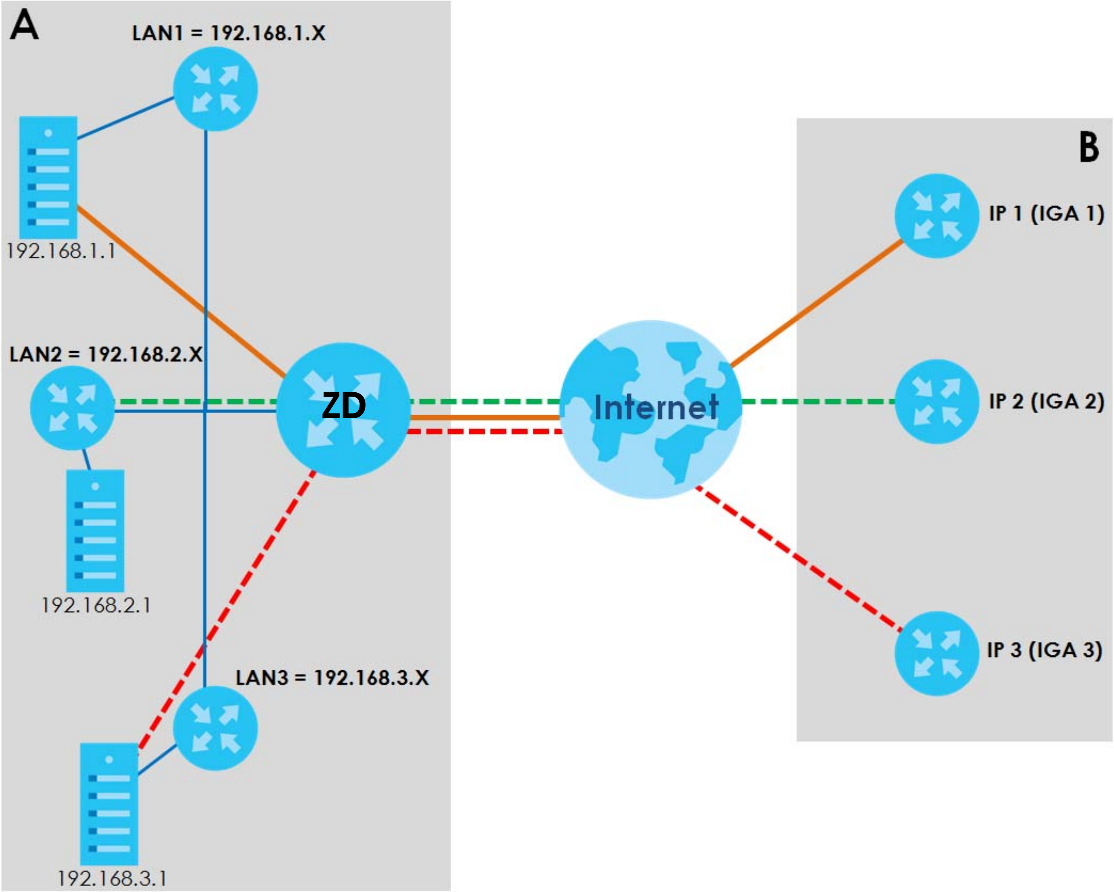
NAT Table

Inside Local Ip Address	Inside Global Ip Address
192.168.1.10	IGA 1
192.168.1.11	IGA 2
192.168.1.12	IGA 3
192.168.1.13	IGA 4

11.8.4 NAT Application

The following figure illustrates a possible NAT application, where three inside LANs (logical LANs using IP alias) behind the Zyxel Device can communicate with three distinct WAN networks.

Figure 106 NAT Application With IP Alias



Port Forwarding: Services and Port Numbers

The most often used port numbers are shown in the following table. Please refer to RFC 1700 for further information about port numbers. Please also refer to the Supporting CD for more examples and details on port forwarding and NAT.

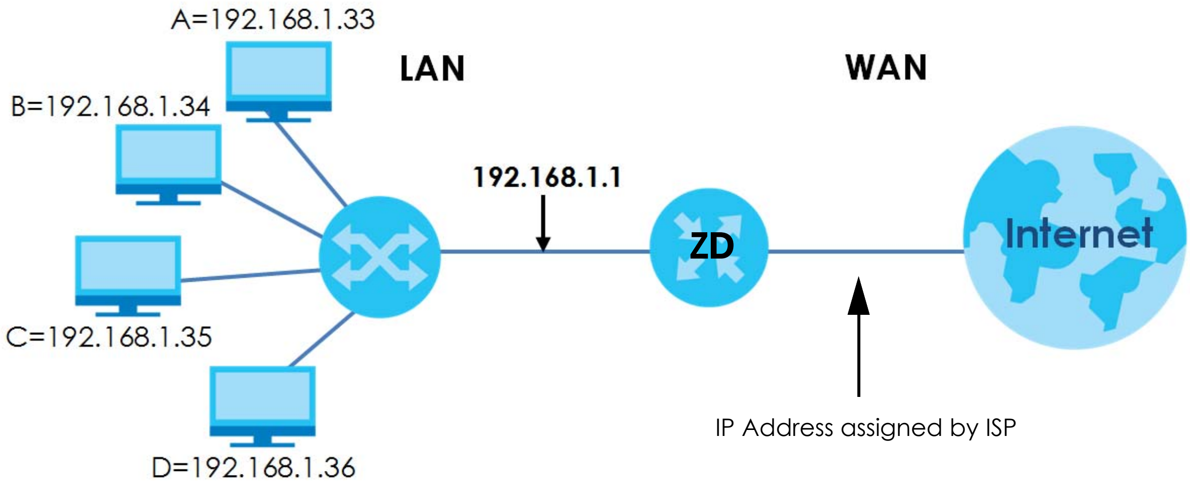
Table 59 Services and Port Numbers

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

Port Forwarding Example

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

Figure 107 Multiple Servers Behind NAT Example



CHAPTER 12 DNS

12.1 DNS Overview

DNS

DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa. The DNS server is extremely important because without it, you must know the IP address of a machine before you can access it.

In addition to the system DNS servers, each WAN interface (service) is set to have its own static or dynamic DNS server list. You can configure a DNS static route to forward DNS queries for certain domain names through a specific WAN interface to its DNS servers. The Zyxel Device uses a system DNS server (in the order you specify in the **Broadband** screen) to resolve domain names that do not match any DNS routing entry. After the Zyxel Device receives a DNS reply from a DNS server, it creates a new entry for the resolved IP address in the routing table.

Dynamic DNS

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

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

12.1.1 What You Can Do in this Chapter

- Use the **DNS Entry** screen to view, configure, or remove DNS routes (Section 12.2 on page 176).
- Use the **Dynamic DNS** screen to enable DDNS and configure the DDNS settings on the Zyxel Device (Section 12.3 on page 177).

12.1.2 What You Need To Know

DYNDNS Wildcard

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

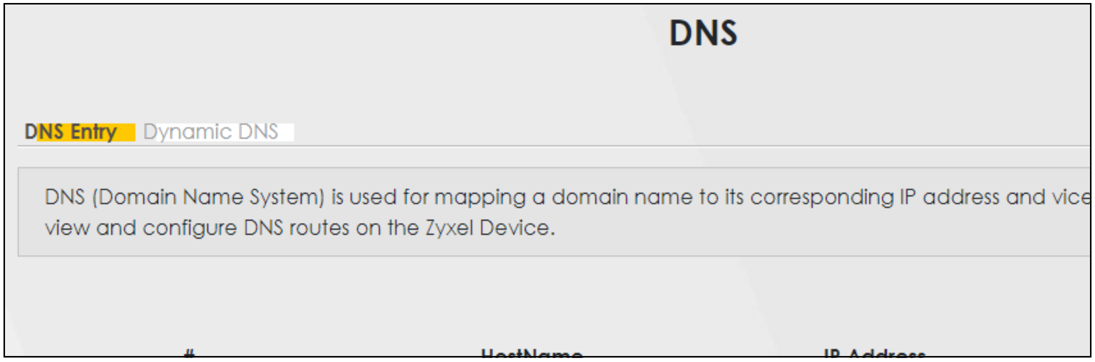
If you have a private WAN IP address, then you cannot use Dynamic DNS.

12.2 DNS Entry

DNS (Domain Name System) is used for mapping a domain name to its corresponding IP address and vice versa. Use this screen to view and configure manual DNS entires on the Zyxel Device. Click **Network Setting** > **DNS** to open the **DNS Entry** screen.

Note: The host name should consist of the host's local name and the domain name. For example, Mycomputer.home is a host name where Mycomputer is the host's local name, and .home is the domain name.

Figure 108 Network Setting > DNS > DNS Entry



DNS (Domain Name System) is used for mapping a domain name to its corresponding IP address and vice view and configure DNS routes on the Zyxel Device.

The following table describes the fields in this screen.

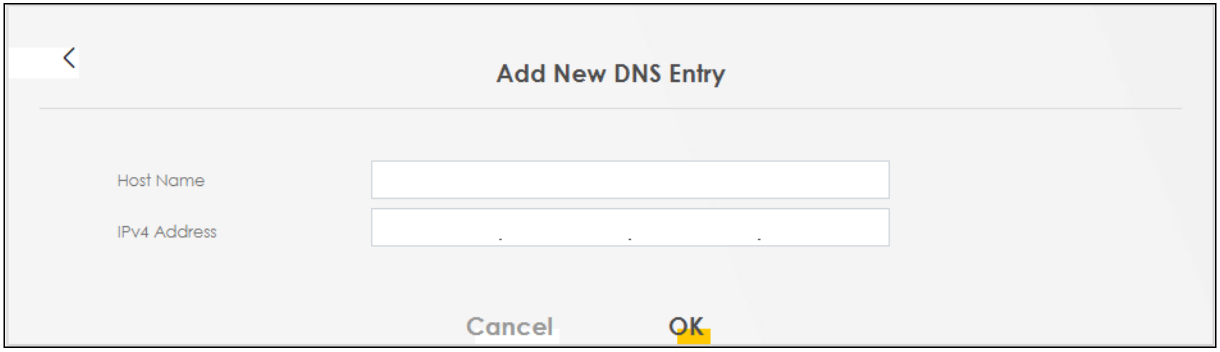
Table 60 Network Setting > DNS > DNS Entry

LABEL	DESCRIPTION
Add New DNS Entry	Click this to create a new DNS entry.
#	This is the index number of the entry.
HostName	This indicates the host name or domain name.
IP Address	This indicates the IP address assigned to this computer.
Modify	Click the **Edit** icon to edit the rule. Click the **Delete** icon to delete an existing rule.

12.2.1 Add or Edit DNS Entry

You can manually add or edit the Zyxel Device's DNS name and IP address entry. Click **Add New DNS Entry** in the **DNS Entry** screen or the **Edit** icon next to the entry you want to edit. The screen shown next appears.

Figure 109 Network Setting > DNS > DNS Entry: Add or Edit



Add New DNS Entry

Host Name

IPv4 Address

The following table describes the labels in this screen.

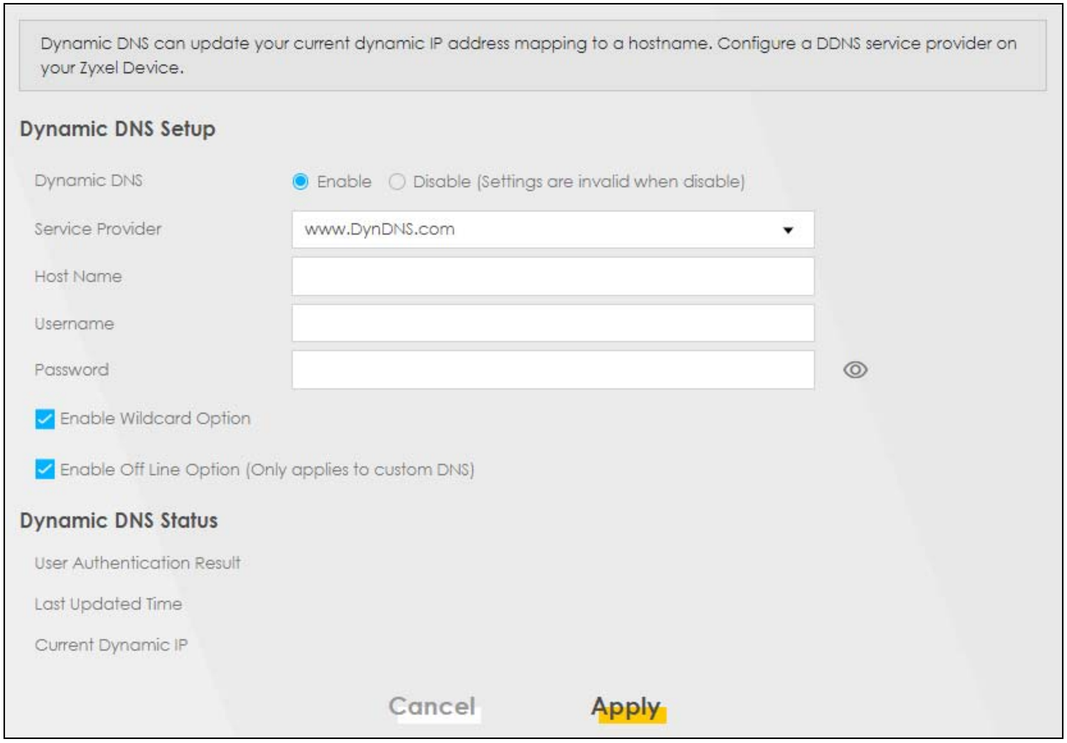
Table 61 Network Setting > DNS > DNS Entry: Add or Edit

LABEL	DESCRIPTION
Host Name	Enter the host name of the DNS entry. You can use up to 256 alphanumeric (0-9, a-z, A-Z) characters with hyphens [-] and periods [.]. You can use the wildcard character, an "*" (asterisk) as the left most part of a domain name, such as *.example.com.
IPv4 Address	Enter the IPv4 address of the DNS entry.
Cancel	Click **Cancel** to exit this screen without saving.
OK	Click **OK** to save your changes.

12.3 Dynamic DNS

Dynamic DNS can update your current dynamic IP address mapping to a hostname. Configure a DDNS service provider on your Zyxel Device. Click **Network Setting** > **DNS** > **Dynamic DNS**. The screen appears as shown.

Figure 110 Network Setting > DNS > Dynamic DNS



Dynamic DNS can update your current dynamic IP address mapping to a hostname. Configure a DDNS service provider on your Zyxel Device.

Dynamic DNS Setup

Dynamic DNS ● Enable ○ Disable (Settings are invalid when disable)

Service Provider: www.DynDNS.com

Host Name

Username

Password

☑ Enable Wildcard Option

☑ Enable Off Line Option (Only applies to custom DNS)

Dynamic DNS Status

User Authentication Result

Last Updated Time

Current Dynamic IP

The following table describes the fields in this screen.

Table 62 Network Setting > DNS > Dynamic DNS

LABEL	DESCRIPTION
Dynamic DNS Setup	
Dynamic DNS	Select **Enable** to use dynamic DNS.
Service Provider	Select your Dynamic DNS service provider from the drop-down list box.
Host Name	Enter the domain name assigned to your Zyxel Device by your Dynamic DNS provider. You can use up to 256 alphanumeric (0-9, a-z, A-Z) characters with hyphens [-] and periods [.]. You can specify up to two host names in the field separated by a comma (",").
Username	Enter your user name.
Password	Enter the password assigned to you.
Enable Wildcard Option	Select the check box to enable DynDNS Wildcard.
Enable Off Line Option (Only applies to custom DNS)	Check with your Dynamic DNS service provider to have traffic redirected to a URL (that you can specify) while you are off line.
Dynamic DNS Status	
User Authentication Result	This shows **Success** if the account is correctly set up with the Dynamic DNS provider account.
Last Updated Time	This shows the last time the IP address the Dynamic DNS provider has associated with the hostname was updated.
Current Dynamic IP	This shows the IP address your Dynamic DNS provider has currently associated with the hostname.

Table 62 Network Setting > DNS > Dynamic DNS (continued)

LABEL	DESCRIPTION
Cancel	Click **Cancel** to exit this screen without saving.
Apply	Click **Apply** to save your changes.

CHAPTER 13 Firewall

13.1 Firewall Overview

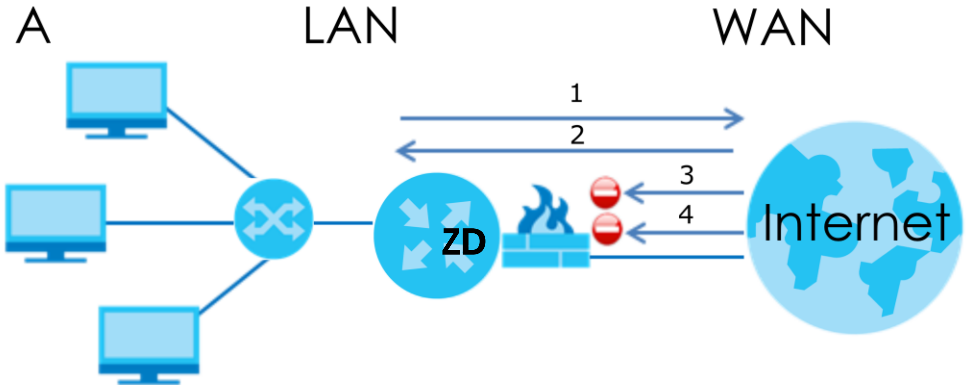
This chapter shows you how to enable the Zyxel Device firewall. Use the firewall to protect your Zyxel Device and network from attacks by hackers on the Internet and control access to it. The firewall:

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

By default, the Zyxel Device blocks DoS attacks whether the firewall is enabled or disabled.

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

Figure 111 Default Firewall Action



13.1.1 What You Need to Know About Firewall

SYN Attack

A SYN attack floods a targeted system with a series of SYN packets. Each packet causes the targeted system to issue a SYN-ACK response. While the targeted system waits for the ACK that follows the SYN-ACK, it queues up all outstanding SYN-ACK responses on a backlog queue. SYN-ACKs are moved off the queue only when an ACK comes back or when an internal timer terminates the three-way handshake. Once the queue is full, the system will ignore all incoming SYN requests, making the system unavailable for legitimate users.

DoS

Denial-of-Service (DoS) attacks are aimed at devices and networks with a connection to the Internet. Their goal is not to steal information, but to disable a device or network so users no longer have access to network resources. The Zyxel Device is pre-configured to automatically detect and thwart all known DoS attacks.

DoS Thresholds

For DoS attacks, the Zyxel Device uses thresholds to determine when to drop sessions that do not become fully established. These thresholds apply globally to all sessions. You can use the default threshold values, or you can change them to values more suitable to your security requirements.

DDoS

A Distributed Denial-of-Service (DDoS) attack is one in which multiple compromised systems attack a single target, thereby causing denial of service for users of the targeted system.

ICMP

Internet Control Message Protocol (ICMP) is a message control and error-reporting protocol between a host server and a gateway to the Internet. ICMP uses Internet Protocol (IP) datagrams, but the messages are processed by the TCP/IP software and directly apparent to the application user.

LAND Attack

In a LAND attack, hackers flood SYN packets into the network with a spoofed source IP address of the target system. This makes it appear as if the host computer sent the packets to itself, making the system unavailable while the target system tries to respond to itself.

Ping of Death

Ping of Death uses a ‘ping’ utility to create and send an IP packet that exceeds the maximum 65,536 bytes of data allowed by the IP specification. This may cause systems to crash, hang or reboot.

SPI

Stateful Packet Inspection (SPI) tracks each connection crossing the firewall and makes sure it is valid. Filtering decisions are based not only on rules but also context. For example, traffic from the WAN may only be allowed to cross the firewall in response to a request from the LAN.

13.2 Firewall

Use the firewall to protect your Zyxel Device and network from attacks by hackers on the Internet and control access to it.

13.2.1 What You Can Do in this Chapter

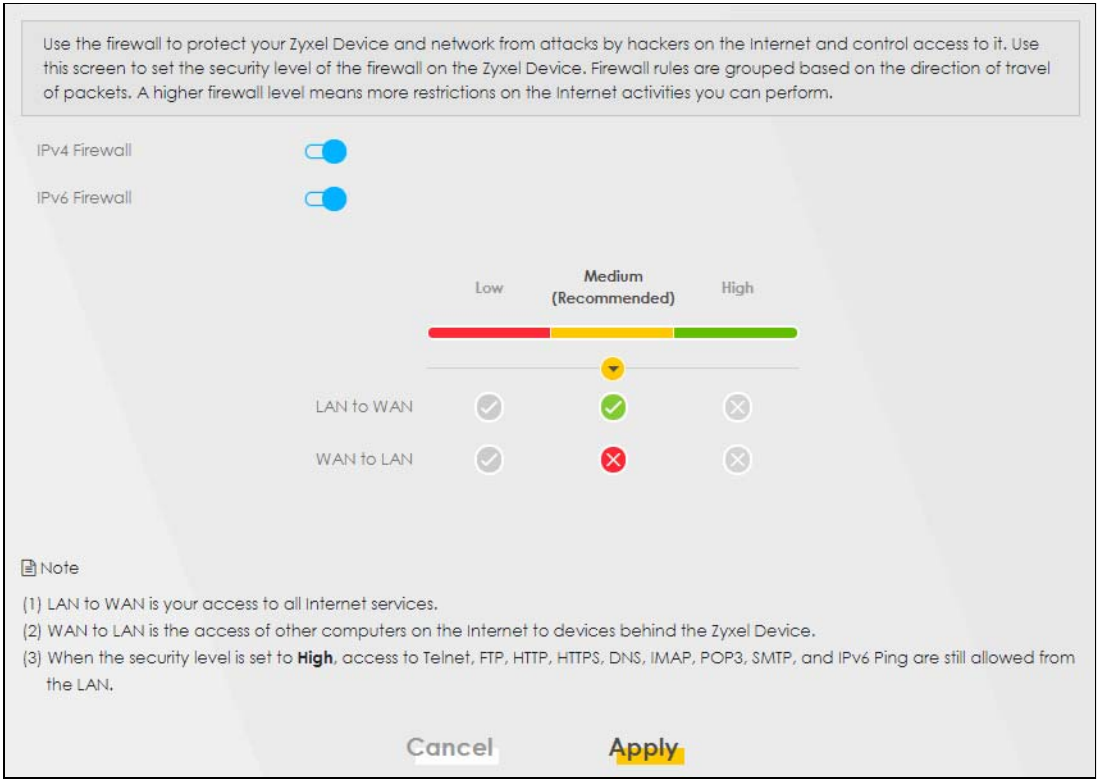
- Use the **General** screen to configure the security level of the firewall on the Zyxel Device (Section 13.3 on page 182).
- Use the **Protocol** screen to add or remove predefined Internet services and configure firewall rules (Section 13.4 on page 183).

- Use the **Access Control** screen to view and configure incoming or outgoing filtering rules (Section 13.5 on page 184).
- Use the **DoS** screen to activate protection against Denial of Service (DoS) attacks (Section 13.6 on page 187).

13.3 Firewall General Settings

Use the firewall to protect your Zyxel Device and network from attacks by hackers on the Internet and control access to it. Use this screen to set the security level of the firewall on the Zyxel Device. Firewall rules are grouped based on the direction of travel of packets. A higher firewall level means more restrictions on the Internet activities you can perform. Click **Security** > **Firewall** > **General** to display the following screen. Use the slider to select the level of firewall protection.

Figure 112 Security > Firewall > General



Use the firewall to protect your Zyxel Device and network from attacks by hackers on the Internet and control access to it. Use this screen to set the security level of the firewall on the Zyxel Device. Firewall rules are grouped based on the direction of travel of packets. A higher firewall level means more restrictions on the Internet activities you can perform.

IPv4 Firewall

IPv6 Firewall

Medium (Recommended)

LAN to WAN ✓

WAN to LAN ✗

Note

(1) LAN to WAN is your access to all Internet services.

(2) WAN to LAN is the access of other computers on the Internet to devices behind the Zyxel Device.

(3) When the security level is set to **High**, access to Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3, SMTP, and IPv6 Ping are still allowed from the LAN.

Note: LAN to WAN is your access to all Internet services. WAN to LAN is the access of other computers on the Internet to devices behind the Zyxel Device.
When the security level is set to **High**, Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3, SMTP, and/or IPv6 ICMPv6 (Ping) traffic from the LAN are still allowed.

The following table describes the labels in this screen.

Table 63 Security > Firewall > General

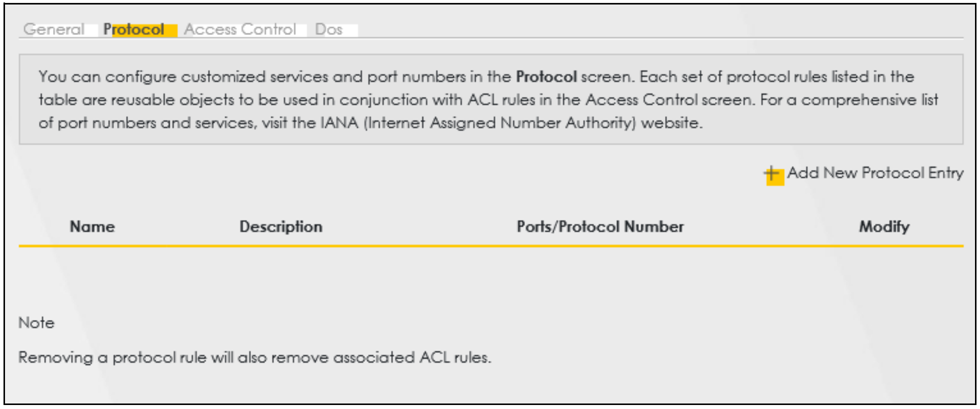
LABEL	DESCRIPTION
IPv4 Firewall	Enable firewall protection when using **IPv4** (Internet Protocol version 4).
IPv6 Firewall	Enable firewall protection when using **IPv6** (Internet Protocol version 6).
High	This setting blocks all traffic to and from the Internet. Only local network traffic and LAN to WAN service (Telnet, FTP, HTTP, HTTPS, DNS, POP3, SMTP) is permitted.
Medium	This is the recommended setting. It allows traffic to the Internet but blocks anyone from the Internet from accessing any services on your local network.
Low	This setting allows traffic to the Internet and also allows someone from the Internet to access services on your local network. This would be used with Port Forwarding, Default Server.
Apply	Click this to save your changes.
Cancel	Click this to restore your previously saved settings.

13.4 Protocol (Customized Services)

You can configure customized services and port numbers in the **Protocol** screen. Each set of protocol rules listed in the table are reusable objects to be used in conjunction with ACL rules in the Access Control screen. For a comprehensive list of port numbers and services, visit the IANA (Internet Assigned Number Authority) website. Click **Security** > **Firewall** > **Protocol** to display the following screen.

Note: Removing a protocol rule will also remove associated ACL rules.

Figure 113 Security > Firewall > Protocol



You can configure customized services and port numbers in the **Protocol** screen. Each set of protocol rules listed in the table are reusable objects to be used in conjunction with ACL rules in the Access Control screen. For a comprehensive list of port numbers and services, visit the IANA (Internet Assigned Number Authority) website.

Name	Description	Ports/Protocol Number	Modify

Note

Removing a protocol rule will also remove associated ACL rules.

The following table describes the labels in this screen.

Table 64 Security > Firewall > Protocol

LABEL	DESCRIPTION
Add New Protocol Entry	Click this to configure a customized service.
Name	This is the name of your customized service.
Description	This is a description of your customized service.

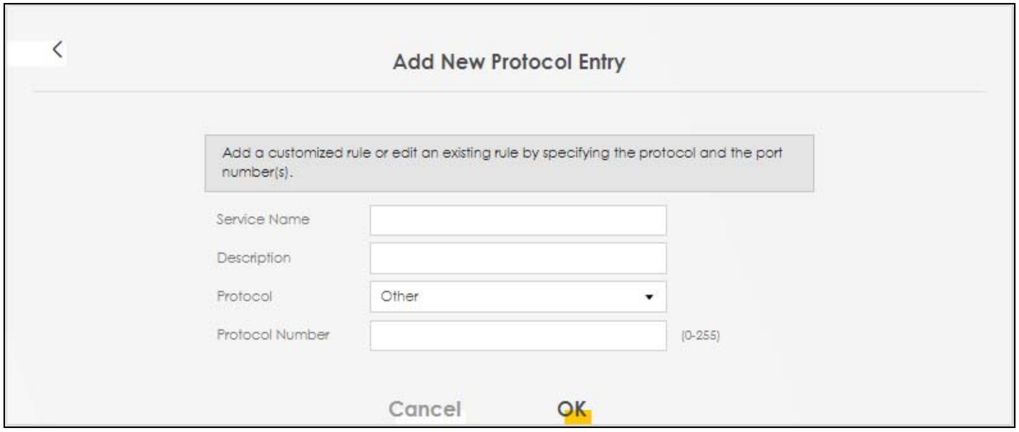
Table 64 Security > Firewall > Protocol (continued)

LABEL	DESCRIPTION
Ports/Protocol Number	This shows the port number or range and the IP protocol (**TCP** or **UDP**) that defines your customized service.
Modify	Click this to edit a customized service.

13.4.1 Add Customized Service

Add a customized rule or edit an existing rule by specifying the protocol and the port numbers. Click **Add New Protocol Entry** in the **Protocol** screen to display the following screen.

Figure 114 Security > Firewall > Protocol: Add New Protocol Entry



Add New Protocol Entry

Add a customized rule or edit an existing rule by specifying the protocol and the port number(s).

Service Name

Description

Protocol: Other

Protocol Number (0-255)

The following table describes the labels in this screen.

Table 65 Security > Firewall > Protocol: Add New Protocol Entry

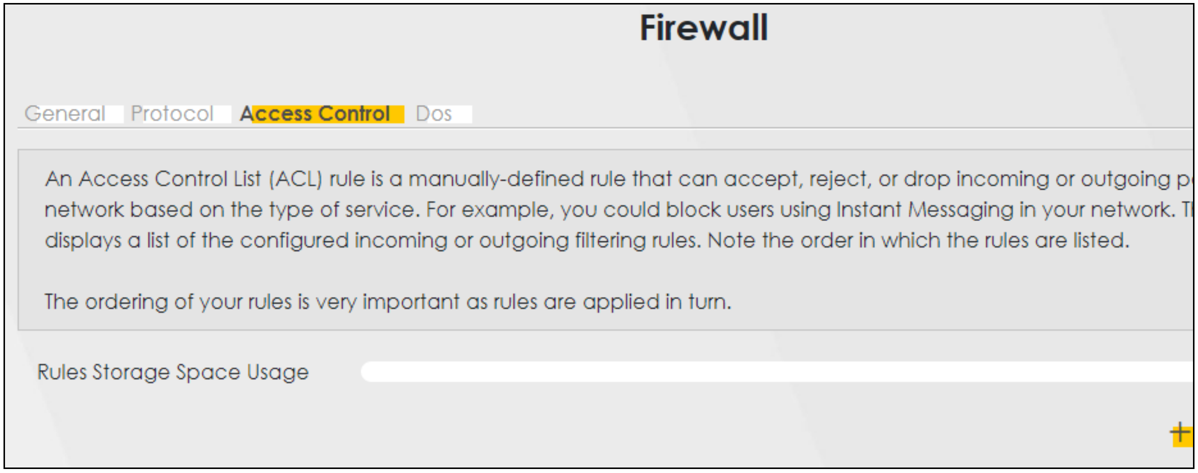
LABEL	DESCRIPTION
Service Name	Enter a descriptive name for your customized service. You can use up to 16 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Description	Enter a description for your customized service. You can use up to 16 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Protocol	Select the protocol (**TCP**, **UDP**, **ICMP**, **ICMPv6**, or **Other**) that defines your customized port from the drop down list box.
Protocol Number	Enter a single port number or the range of port numbers (**0** – **255**) that define your customized service.
OK	Click this to save your changes.
Cancel	Click this to exit this screen without saving.

13.5 Access Control (Rules)

An Access Control List (ACL) rule is a manually-defined rule that can accept, reject, or drop incoming or outgoing packets from your network. This screen displays a list of the configured incoming or outgoing filtering rules. Note the order in which the rules are listed. Click **Security** > **Firewall** > **Access Control** to display the following screen.

Note: The ordering of your rules is very important as rules are applied in turn.

Figure 115 Security > Firewall > Access Control



Firewall

An Access Control List (ACL) rule is a manually-defined rule that can accept, reject, or drop incoming or outgoing p network based on the type of service. For example, you could block users using Instant Messaging in your network. T displays a list of the configured incoming or outgoing filtering rules. Note the order in which the rules are listed.

The ordering of your rules is very important as rules are applied in turn.

Rules Storage Space Usage

The following table describes the labels in this screen.

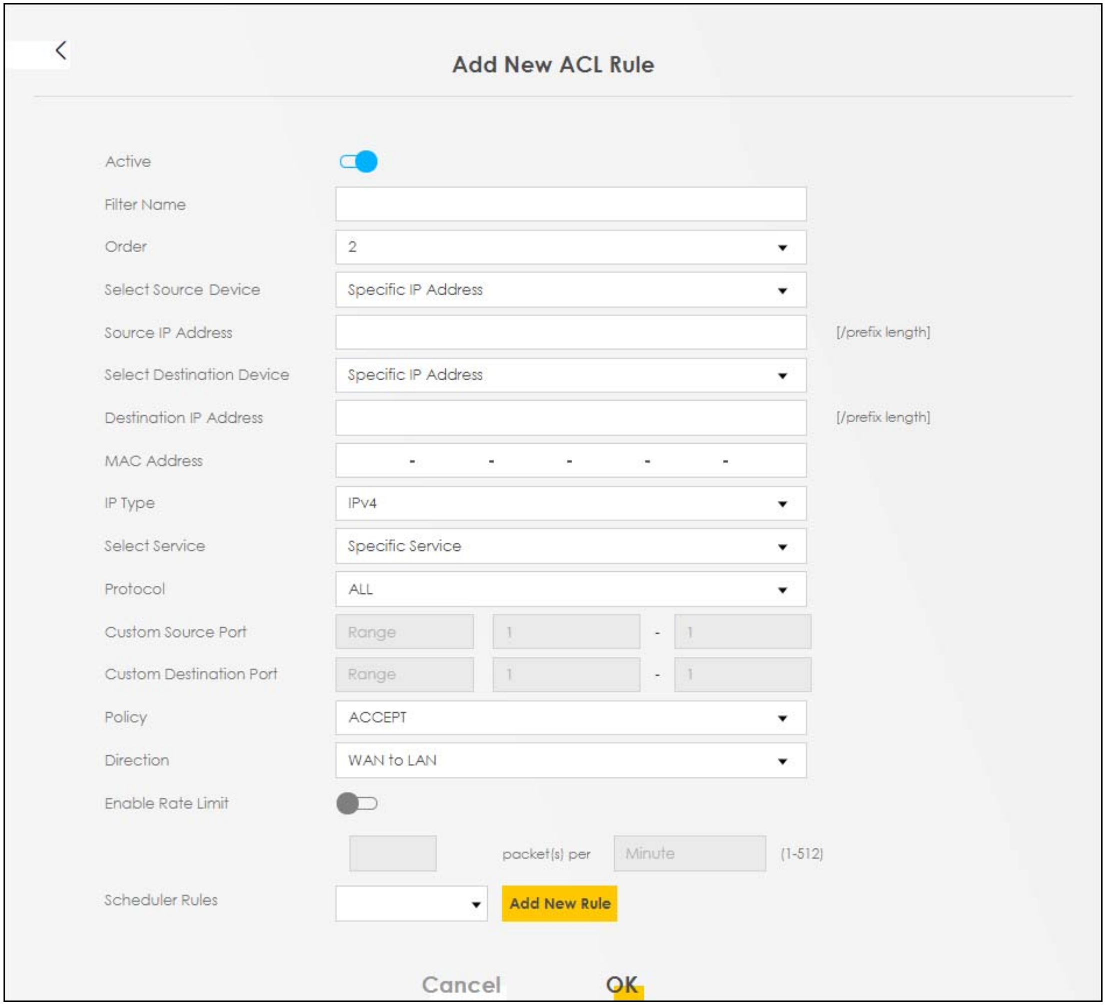
Table 66 Security > Firewall > Access Control

LABEL	DESCRIPTION
Rules Storage Space Usage	This read-only bar shows how much of the Zyxel Device's memory is in use for recording firewall rules. When you are using 80% or less of the storage space, the bar is green. When the amount of space used is over 80%, the bar is red.
Add New ACL Rule	Select an index number and click **Add New ACL Rule** to add a new firewall rule after the selected index number. For example, if you select "6", your new rule becomes number 7 and the previous rule 7 (if there is one) becomes rule 8.
#	This field displays the rule index number. The ordering of your rules is important as rules are applied in turn.
Status	This field displays the status of the ACL rule. A yellow bulb signifies that this ACL rule is active, while a gray bulb signifies that this ACL rule is not active.
Name	This field displays the rule name.
Src IP	This field displays the source IP addresses to which this rule applies.
Dest IP	This field displays the destination IP addresses to which this rule applies.
Service	This field displays the protocol (All, TCP, UDP, TCP/UDP, ICMP, ICMPv6, or any) used to transport the packets for which you want to apply the rule.
Action	Displays whether the firewall silently discards packets (**Drop**), discards packets and sends a TCP reset packet or an ICMP destination-unreachable message to the sender (**Reject**), or allow the passage of (**Accept**) packets that match this rule.
Modify	Click the **Edit** icon to edit the firewall rule. Click the **Delete** icon to delete an existing firewall rule.

13.5.1 Add New ACL Rule

Click **Add new ACL** rule or the **Edit** icon next to an existing ACL rule in the **Access Control** screen. The following screen displays. Use this screen to accept, reject, or drop packets based on specified parameters, such as source and destination IP address, IP Type, service, and direction. You can also specify a limit as to how many packets this rule applies to at a certain period of time or specify a schedule for this rule.

Figure 116 Security > Firewall > Access Control > Add New ACL Rule



Add New ACL Rule

Active	●	
Filter Name		
Order	2	
Select Source Device	Specific IP Address	
Source IP Address		[/prefix length]
Select Destination Device	Specific IP Address	
Destination IP Address		[/prefix length]
MAC Address	- - - - -	
IP Type	IPv4	
Select Service	Specific Service	
Protocol	ALL	
Custom Source Port	Range 1 - 1	
Custom Destination Port	Range 1 - 1	
Policy	ACCEPT	
Direction	WAN to LAN	
Enable Rate Limit	○	
	packet(s) per Minute	(1-512)
Scheduler Rules	Add New Rule	

The following table describes the labels in this screen.

Table 67 Security > Firewall > Access Control > Add New ACL Rule

LABEL	DESCRIPTION
Active	Click this switch to enable this ACL rule.
Filter Name	Enter a descriptive name for your filter rule. You can use up to 16 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Order	Assign the order of your rules as rules are applied in turn.
Select Source Device	If you want the source to come from a particular (single) IP, select **Specific IP Address**. If not, select from a detected device.
Source IP Address	If you selected **Specific IP Address** in the previous item, enter the source device's IP address here. Otherwise this field will be hidden if you select the detected device.
Select Destination Device	If you want your rule to apply to packets with a particular (single) IP, select **Specific IP Address**. If not, select a detected device.
Destination IP Address	If you selected **Specific IP Address** in the previous item, enter the destination device's IP address here. Otherwise this field will be hidden if you select the detected device.
MAC Address	Enter the MAC addresses of the WiFi or wired LAN clients that are allowed access to the Zyxel Device in these address fields. Enter the MAC addresses in a valid MAC address format, that is, six hexadecimal character pairs, for example, 12:34:56:78:9a:bc.

Table 67 Security > Firewall > Access Control > Add New ACL Rule (continued)

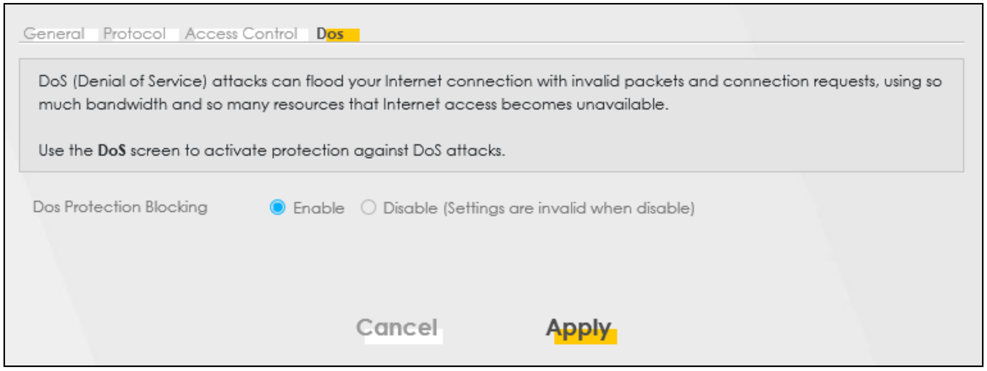
LABEL	DESCRIPTION
IP Type	Select between **IPv4** or **IPv6**. Compared to **IPv4**, **IPv6** (Internet Protocol version 6), is designed to enhance IP address size and features. The increase in **IPv6** address size to 128 bits (from the 32-bit **IPv4** address) allows up to 3.4 x 1038 IP addresses. The Zyxel Device can use **IPv4/IPv6** dual stack to connect to **IPv4** and **IPv6** networks, and supports **IPv6** rapid deployment (6RD).
Select Service	Select a service from the **Select Service** box.
Protocol	Select the protocol (**ALL**, **TCP/UDP**, **TCP**, **UDP**, **ICMP**, or **ICMPv6**) used to transport the packets for which you want to apply the rule.
Custom Source Port	This is a single port number or the starting port number of a range that defines your rule.
Custom Destination Port	This is a single port number or the ending port number of a range that defines your rule.
Policy	Use the drop-down list box to select whether to discard (**Drop**), deny and send an ICMP destination-unreachable message to the sender (**Reject**), or allow the passage of (**Accept**) packets that match this rule.
Direction	Select **WAN to LAN** to apply the rule to traffic from WAN to LAN. Select **LAN to WAN** to apply the rule to traffic from LAN to WAN. Select **WAN to Router** to apply the rule to traffic from WAN to router. Select **LAN to Router** to apply the rule to traffic from LAN to router.
Enable Rate Limit	Click this switch to enable the setting of maximum number of packets per maximum number of minute or second to limit the throughput of traffic that matches this rule. If not, the next item will be disabled.
Scheduler Rules	Select a schedule rule for this ACL rule form the drop-down list box. You can configure a new schedule rule by clicking **Add New Rule**. This will bring you to the **Security** > **Scheduler Rules** screen.
packet(s) per (1–512)	Enter the maximum number of packets (1 – 512) per minute or second.
Add New Rule	Select a schedule rule for this ACL rule from the drop-down list box. You can configure a new schedule rule by clicking **Add New Rule**.
OK	Click this to save your changes.
Cancel	Click this to exit this screen without saving.

13.6 DoS

DoS (Denial of Service) attacks can flood your Internet connection with invalid packets and connection requests, using so much bandwidth and so many resources that Internet access becomes unavailable. Use the **DoS** screen to activate protection against DoS attacks.

Click **Security** > **Firewall** > **DoS** to display the following screen.

Figure 117 Security > Firewall > DoS



DoS (Denial of Service) attacks can flood your Internet connection with invalid packets and connection requests, using so much bandwidth and so many resources that Internet access becomes unavailable.

Use the **DoS** screen to activate protection against DoS attacks.

Dos Protection Blocking ● Enable ○ Disable (Settings are invalid when disable)

The following table describes the labels in this screen.

Table 68 Security > Firewall > DoS

LABEL	DESCRIPTION
DoS Protection Blocking	Enable this to protect against DoS attacks. The Zyxel Device will drop sessions that surpass maximum thresholds.
Apply	Click this to save your changes.
Cancel	Click this to restore your previously saved settings.

13.7 Firewall Technical Reference

This section provides some technical background information about the topics covered in this chapter.

13.7.1 Firewall Rules Overview

Your customized rules take precedence and override the Zyxel Device's default settings. The Zyxel Device checks the source IP address, destination IP address and IP protocol type of network traffic against the firewall rules (in the order you list them). When the traffic matches a rule, the Zyxel Device takes the action specified in the rule.

Firewall rules are grouped based on the direction of travel of packets to which they apply:

- LAN to Router
- LAN to WAN
- WAN to LAN
- WAN to Router

By default, the Zyxel Device's stateful packet inspection allows packets traveling in the following directions:

- LAN to Router

  These rules specify which computers on the LAN can manage the Zyxel Device (remote management).

Note: You can also configure the remote management settings to allow only a specific computer to manage the Zyxel Device.

- LAN to WAN

  These rules specify which computers on the LAN can access which computers or services on the WAN.

By default, the Zyxel Device's stateful packet inspection drops packets traveling in the following directions:

- WAN to LAN

  These rules specify which computers on the WAN can access which computers or services on the LAN.

Note: You also need to configure NAT port forwarding (or full featured NAT address mapping rules) to allow computers on the WAN to access devices on the LAN.

- WAN to Router

  By default the Zyxel Device stops computers on the WAN from managing the Zyxel Device. You could configure one of these rules to allow a WAN computer to manage the Zyxel Device.

Note: You also need to configure the remote management settings to allow a WAN computer to manage the Zyxel Device.

You may define additional rules and sets or modify existing ones but please exercise extreme caution in doing so.

For example, you may create rules to:

- Block certain types of traffic, such as IRC (Internet Relay Chat), from the LAN to the Internet.
- Allow certain types of traffic, such as Lotus Notes database synchronization, from specific hosts on the Internet to specific hosts on the LAN.
- Allow everyone except your competitors to access a web server.
- Restrict use of certain protocols, such as Telnet, to authorized users on the LAN.

These custom rules work by comparing the source IP address, destination IP address and IP protocol type of network traffic to rules set by the administrator. Your customized rules take precedence and override the Zyxel Device's default rules.

13.7.2 Guidelines For Security Enhancement With Your Firewall

1. Change the default password through the Web Configurator.
2. Think about access control before you connect to the network in any way.
3. Limit who can access your router.
4. Don't enable any local service (such as telnet or FTP) that you do not use. Any enabled service could present a potential security risk. A determined hacker might be able to find creative ways to misuse the enabled services to access the firewall or the network.
5. For local services that are enabled, protect against misuse. Protect by configuring the services to communicate only with specific peers, and protect by configuring rules to block packets for the services at specific interfaces.

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

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

13.7.3 Security Considerations

Note: Incorrectly configuring the firewall may block valid access or introduce security risks to the Zyxel Device and your protected network. Use caution when creating or deleting firewall rules and test your rules after you configure them.

Consider these security ramifications before creating a rule:

1 Does this rule stop LAN users from accessing critical resources on the Internet? For example, if IRC (Internet Relay Chat) is blocked, are there users that require this service?

2 Is it possible to modify the rule to be more specific? For example, if IRC is blocked for all users, will a rule that blocks just certain users be more effective?

3 Does a rule that allows Internet users access to resources on the LAN create a security vulnerability? For example, if FTP ports (TCP 20, 21) are allowed from the Internet to the LAN, Internet users may be able to connect to computers with running FTP servers.

4 Does this rule conflict with any existing rules?

Once these questions have been answered, adding rules is simply a matter of entering the information into the correct fields in the Web Configurator screens.

Chapter 14 Home Security

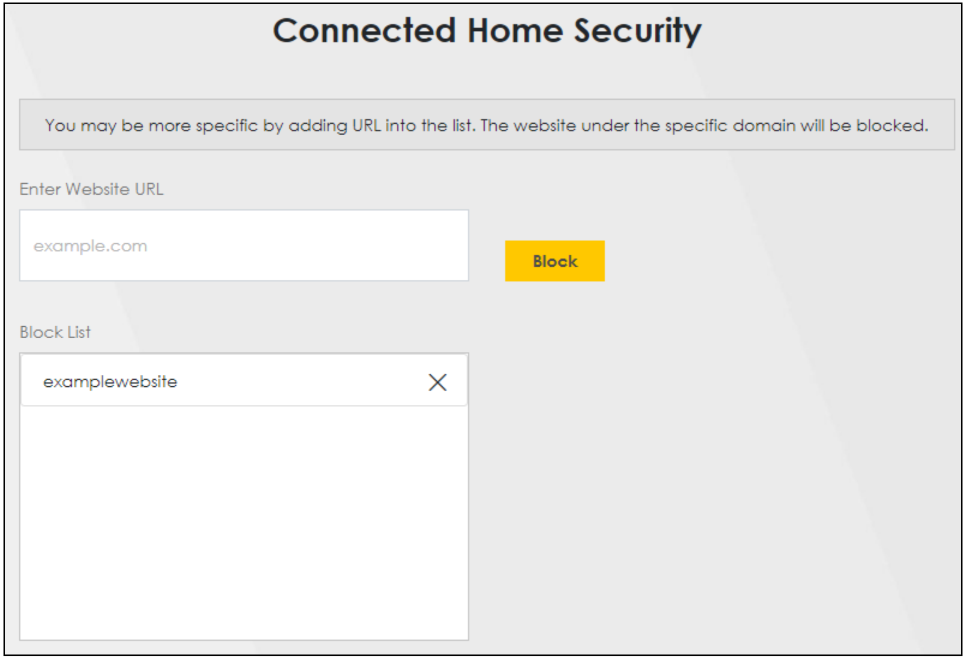
14.1 Home Security Overview

The Zyxel Device supports URL (Uniform Resource Locator) filtering that allows you to block user access to specific websites containing inappropriate or harmful content. Users on your network will not be able to enter the websites with URL domain names, keywords or full URLs you specify. Check Section 1.1 on page 20 to see if your Zyxel Device supports the Home Security feature.

14.2 Home Security

Use this screen to configure URL filtering settings to block users on your network from accessing certain websites. To access this screen, click **Security** > **Home Security**.

Figure 118 Security > Home Security



Connected Home Security

You may be more specific by adding URL into the list. The website under the specific domain will be blocked.

Enter Website URL

example.com

Block List

examplewebsite

The following table describes the labels in this screen.

Table 69 Security > Home Security

LABEL	DESCRIPTION
Enter Website URL	Enter the URL of a website or URL keyword to which the Zyxel Device blocks access. Click **Block** to add the website to the **Block List**. Use keywords, domain names, or full URLs to block websites. For example, if you want to block a website with the domain name "www.exampleWeb.com", you can use the following input formats: • http://exampleWeb.com • https://exampleWeb.com • exampleWeb.com • www.exampleWeb.com • example
Block List	The Zyxel Device prohibits users on your network from viewing the websites with the URLs/keywords in this block list. Click **x** to remove the entry from the list.

CHAPTER 15 Parental Control

15.1 Parental Control Overview

Parental control allows you to limit the time a user can access the Internet and prevent users from viewing inappropriate content or participating in specified online activities.

See Section 1.1 on page 20 for more information.

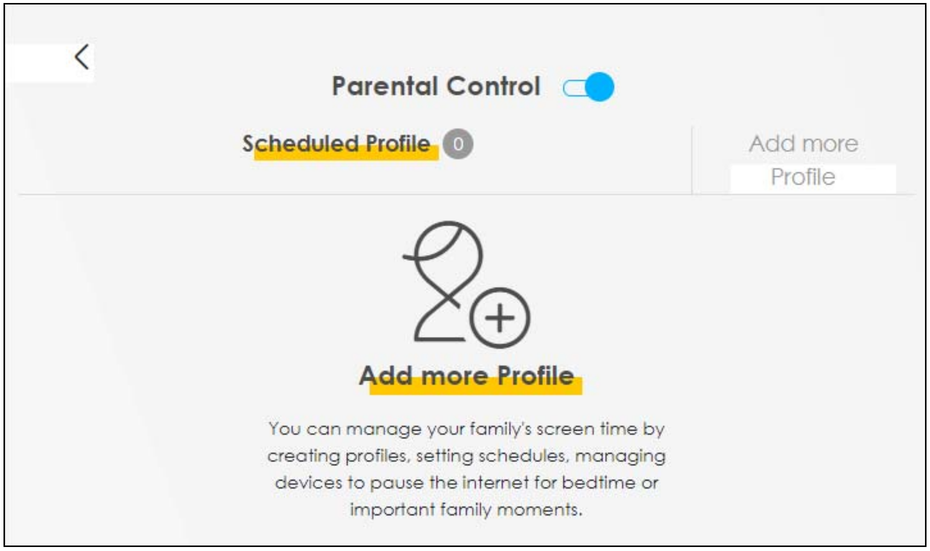
15.2 Parental Control Schedule

Use this screen to enable parental control and view parental control rules and schedules. You can limit the time a user can access the Internet. These rules are defined in a Parental Control Profile (PCP).

Click **Security** > **Parental Control** to open the following screen.

Note: For some Zyxel Device models, you need to disable MESH to add a new parental control profile.

Figure 119 Security > Parental Control



You can manage your family's screen time by creating profiles, setting schedules, managing devices to pause the internet for bedtime or important family moments.

The following table describes the fields in this screen.

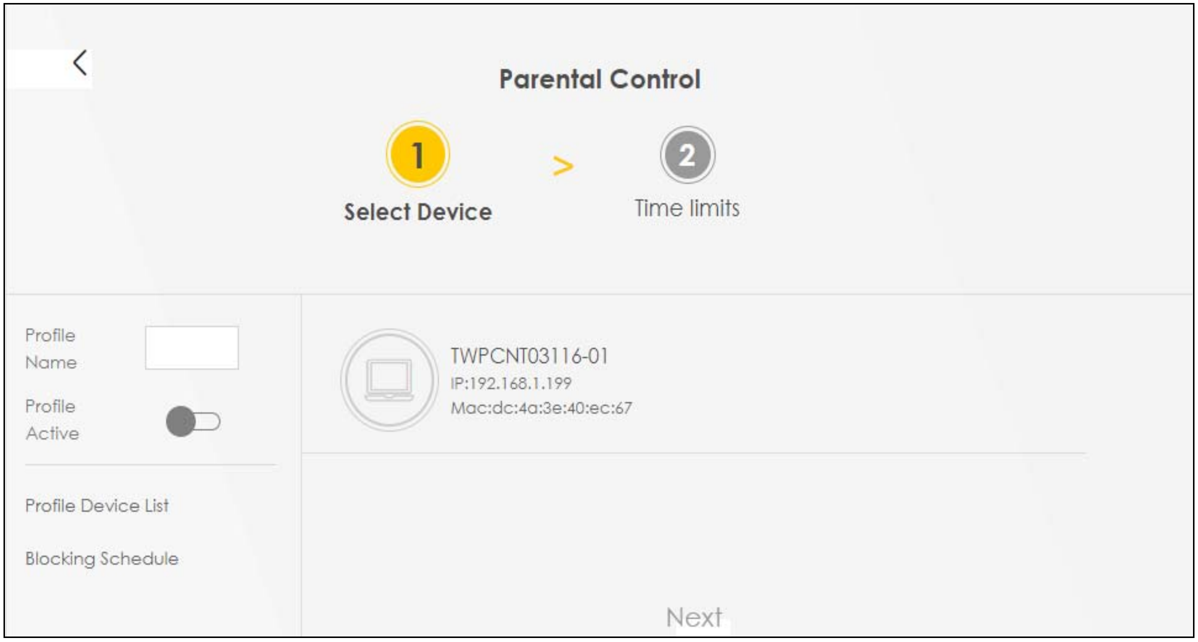
Table 70 Security > Parental Control

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

15.2.1 Add or Edit a Parental Control Profile

Click **Add more Profile** in the **Parental Control** screen to add a new rule or click the **Edit** icon next to an existing rule to edit it. Use this screen to configure a restricted access schedule.

Figure 120 Parental Control > Add more Profile: Select Device



The following table describes the fields in this screen.

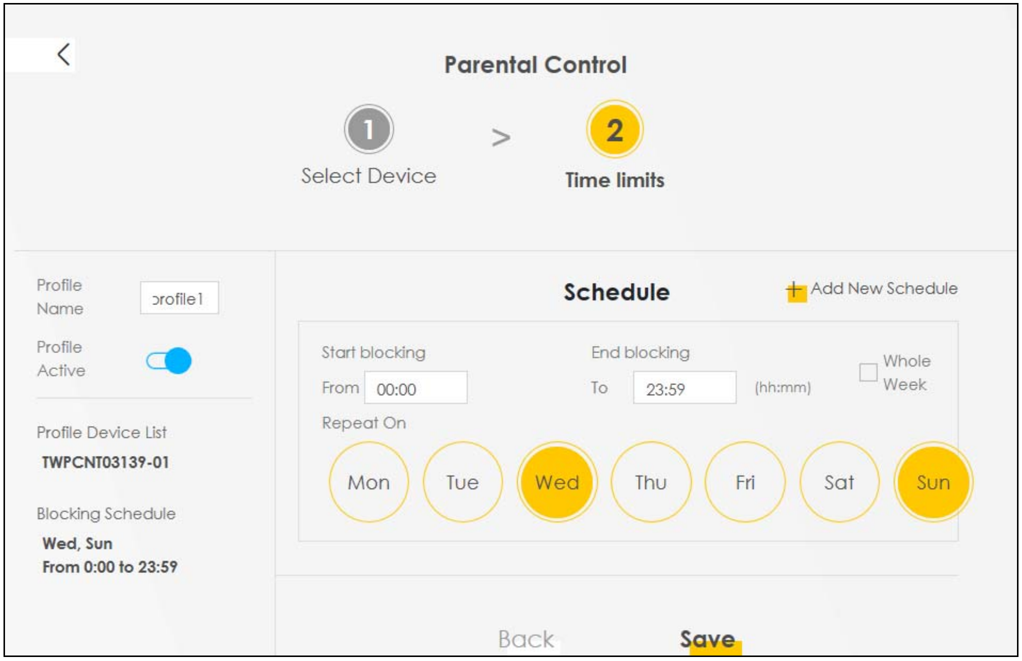
Table 71 Parental Control > Add more Profile: Select Device

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 or disable 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.
Next	Click **Next** to go to the next step to set a schedule for this profile.

15.2.2 Define a Schedule

This screen allow you to define time periods and days during which Internet access is blocked on the profile devices. Finish the settings in the **Select Device** step and click **Next** to access this screen.

Figure 121 Parental Control > Add more Profile: Time limits



Parental Control

1 Select Device > 2 Time limits

Profile Name: profile1

Profile Active

Profile Device List
TWPCNT03139-01

Blocking Schedule
Wed, Sun
From 0:00 to 23:59

Schedule

Start blocking From 00:00

End blocking To 23:59 (hh:mm)

□ Whole Week

Repeat On: Mon Tue [✓ Wed] Thu Fri Sat [✓ Sun]

The following table describes the fields in this screen.

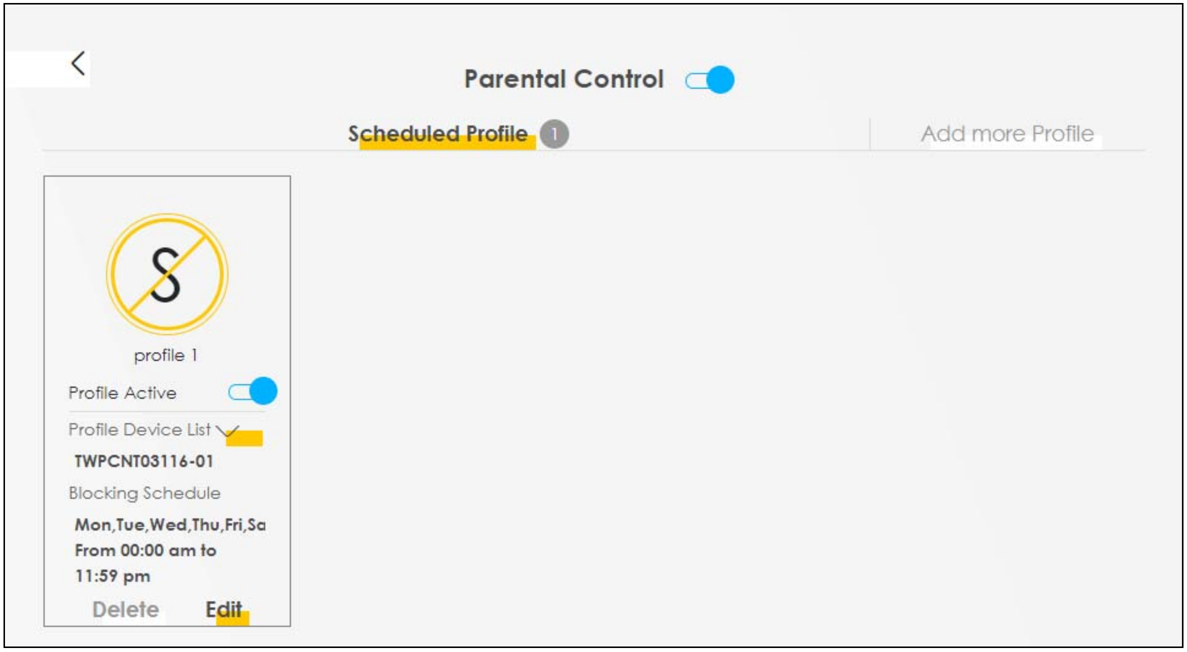
Table 72 Parental Control > Add more Profile: Time limits

LABEL	DESCRIPTION
Profile Name	Enter a descriptive name for the profile.
Profile Active	Click this switch to enable or disable this profile. When the switch goes to the right (●), this profile is active. 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 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** and the scheduler rule will be activated for the whole week.
Back	Click **Back** to return to the previous screen.
Save	Click **Save** to save your changes.

15.2.3 Parental Control Scheduled Profile

Use this screen to view and manage the created parental control profiles.

Figure 122 Parental Control > Scheduled Profile



profile 1

Profile Active

Profile Device List

TWPCNT03116-01

Blocking Schedule

Mon,Tue,Wed,Thu,Fri,Sa
From 00:00 am to
11:59 pm

The following table describes the fields in this screen.

Table 73 Parental Control > Scheduled Profile

LABEL	DESCRIPTION
Parental Control	Click this switch to enable or disable parental control. When the switch goes to the right (●), the function is enabled. Otherwise, it is not.
Profile Active	Click this switch to enable or disable a created profile. When the switch goes to the right (●), this profile is active. Otherwise, it is not.
Scheduled Profile	This screen shows all the created profiles. Click ∨ beside **Profile Device List** to view more information about the profile. You can click **Delete** to remove the profile or click **Edit** to change the profile settings. Only the **Add more Profile** button displays if there is no profile created.
Add more Profile	Click this button to create a new profile.

CHAPTER 16 Scheduler Rule

16.1 Scheduler Rule Overview

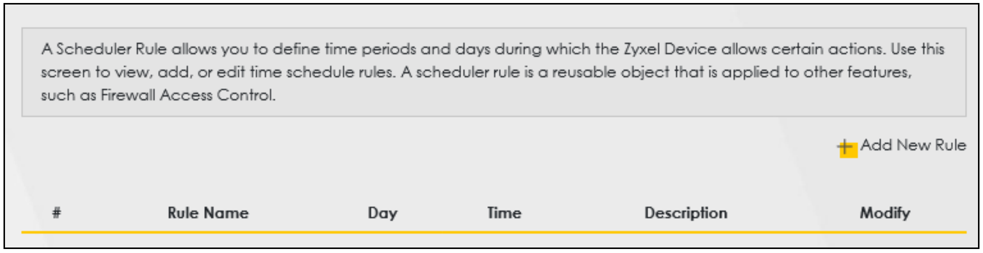
A Scheduler Rule allows you to define time periods and days during which the Zyxel Device allows certain actions.

16.2 Scheduler Rule Settings

Use this screen to view, add, or edit time schedule rules. A scheduler rule is a reusable object that is applied to other features, such as Firewall Access Control.

Click **Security** > **Scheduler Rule** to open the following screen.

Figure 123 Security > Scheduler Rule



A Scheduler Rule allows you to define time periods and days during which the Zyxel Device allows certain actions. Use this screen to view, add, or edit time schedule rules. A scheduler rule is a reusable object that is applied to other features, such as Firewall Access Control.

The following table describes the fields in this screen.

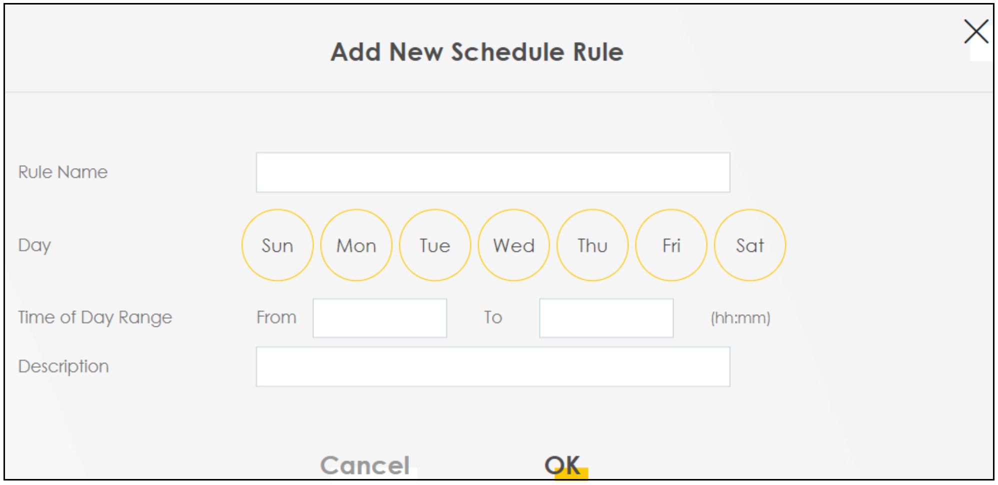
Table 74 Security > Scheduler Rule

LABEL	DESCRIPTION
Add New Rule	Click this to create a new rule.
#	This is the index number of the entry.
Rule Name	This shows the name of the rule.
Day	This shows the days on which this rule is enabled.
Time	This shows the period of time on which this rule is enabled.
Description	This shows the description of this rule.
Modify	Click the **Edit** icon to edit the schedule. Click the **Delete** icon to delete a scheduler rule. Note: You cannot delete a scheduler rule once it is applied to a certain feature.

16.2.1 Add or Edit a Schedule Rule

Click the **Add New Rule** button in the **Scheduler Rule** screen or click the **Edit** icon next to a schedule rule to open the following screen. Use this screen to configure a restricted access schedule.

Figure 124 Security > Scheduler Rule: Add or Edit



Add New Schedule Rule

Rule Name

Day

Time of Day Range From To (hh:mm)

Description

The following table describes the fields in this screen.

Table 75 Security > Scheduler Rule: Add or Edit

LABEL	DESCRIPTION
Rule Name	Enter a descriptive name for this schedule. You can use up to 31 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Day	Select check boxes for the days that you want the Zyxel Device to perform this scheduler rule.
Time of Day Range	Enter the time period of each day, in 24-hour format, during which the rule will be enforced.
Description	Enter a description for this scheduler rule. You can use up to 63 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Cancel	Click **Cancel** to exit this screen without saving.
OK	Click **OK** to save your changes.

CHAPTER 17
Log

17.1 Log Overview

These screens allow you to determine the categories of events and/or alerts that the Zyxel Device logs and then display these logs or have the Zyxel Device send them to an administrator (through email) or to a syslog server.

17.1.1 What You Can Do in this Chapter

- Use the **System Log** screen to see the system logs (Section 17.2 on page 200).
- Use the **Security Log** screen to see the security-related logs for the categories that you select (Section 17.3 on page 201).

17.1.2 What You Need To Know

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

Alerts and Logs

An alert is a type of log that warrants more serious attention. They include system errors, attacks (access control) and attempted access to blocked web sites. Some categories such as **System Errors** consist of both logs and alerts. You may differentiate them by their color in the **View Log** screen. Alerts display in red and logs display in black.

Syslog Overview

The syslog protocol allows devices to send event notification messages across an IP network to syslog servers that collect the event messages. A syslog-enabled device can generate a syslog message and send it to a syslog server.

Syslog is defined in RFC 3164. The RFC defines the packet format, content and system log related information of syslog messages. Each syslog message has a facility and severity level. The syslog facility identifies a file in the syslog server. Refer to the documentation of your syslog program for details. The following table describes the syslog severity levels.

Table 76 Syslog Severity Levels

CODE	SEVERITY
0	Emergency: The system is unusable.
1	Alert: Action must be taken immediately.
2	Critical: The system condition is critical.
3	Error: There is an error condition on the system.
4	Warning: There is a warning condition on the system.

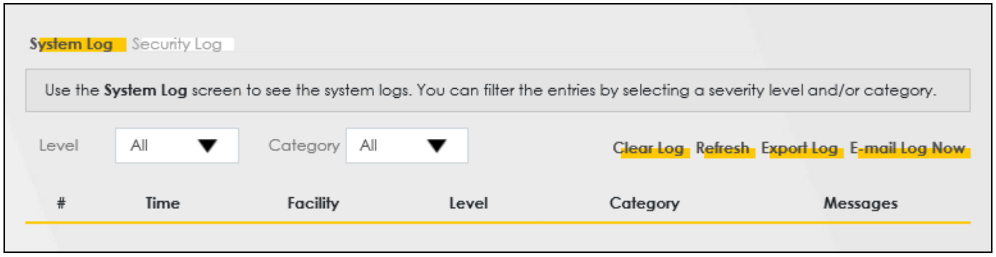
Table 76 Syslog Severity Levels (continued)

CODE	SEVERITY
5	Notice: There is a normal but significant condition on the system.
6	Informational: The syslog contains an informational message.
7	Debugging: The message is intended for debug-level purposes.

17.2 System Log

Use the **System Log** screen to see the system logs. You can filter the entries by selecting a severity level and/or category. Click **System Monitor** > **Log** to open the **System Log** screen.

Figure 125 System Monitor > Log > System Log



Use the **System Log** screen to see the system logs. You can filter the entries by selecting a severity level and/or category.

The following table describes the fields in this screen.

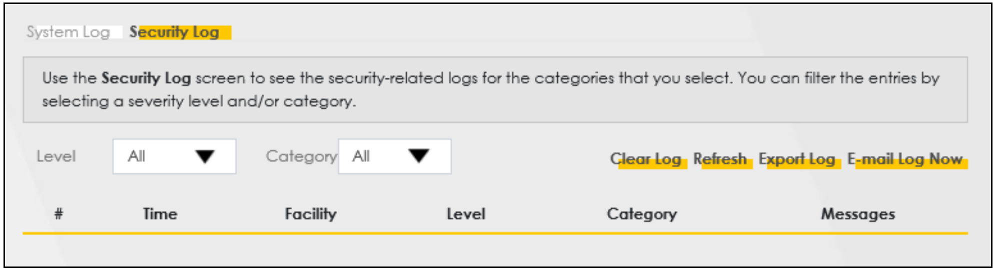
Table 77 System Monitor > Log > System Log

LABEL	DESCRIPTION
Level	Select a severity level from the drop-down list box. This filters search results according to the severity level you have selected. When you select a severity, the Zyxel Device searches through all logs of that severity or higher.
Category	Select the type of logs to display.
Clear Log	Click this to delete all the logs.
Refresh	Click this to renew the log screen.
Export Log	Click this to export the selected logs.
E-mail Log Now	Click this to send the log files to the email address you specify in the **Maintenance** > **Log Setting** screen.
#	This field is a sequential value and is not associated with a specific entry.
Time	This field displays the time the log was recorded.
Facility	The log facility allows you to send logs to different files in the syslog server. Refer to the documentation of your syslog program for more details.
Level	This field displays the severity level of the log that the Zyxel Device is to send to this syslog server.
Category	This field displays the type of the log.
Messages	This field states the reason for the log.

17.3 Security Log

Use the **Security Log** screen to see the security-related logs for the categories that you select. You can filter the entries by selecting a severity level and/or category. Click **System Monitor** > **Log** > **Security Log** to open the following screen.

Figure 126 System Monitor > Log > Security Log



Use the **Security Log** screen to see the security-related logs for the categories that you select. You can filter the entries by selecting a severity level and/or category.

#	Time	Facility	Level	Category	Messages

The following table describes the fields in this screen.

Table 78 System Monitor > Log > Security Log

LABEL	DESCRIPTION
Level	Select a severity level from the drop-down list box. This filters search results according to the severity level you have selected. When you select a severity, the Zyxel Device searches through all logs of that severity or higher.
Category	Select the type of logs to display.
Clear Log	Click this to delete all the logs.
Refresh	Click this to renew the log screen.
Export Log	Click this to export the selected logs.
E-mail Log Now	Click this to send the log files to the email address you specify in the **Maintenance** > **Log Setting** screen.
#	This field is a sequential value and is not associated with a specific entry.
Time	This field displays the time the log was recorded.
Facility	The log facility allows you to send logs to different files in the syslog server. Refer to the documentation of your syslog program for more details.
Level	This field displays the severity level of the log that the Zyxel Device is to send to this syslog server.
Category	This field displays the type of the log.
Messages	This field states the reason for the log.

CHAPTER 18
Traffic Status

18.1 Traffic Status Overview

Use the **Traffic Status** screens to look at the network traffic status and statistics of the WAN/LAN interfaces and NAT.

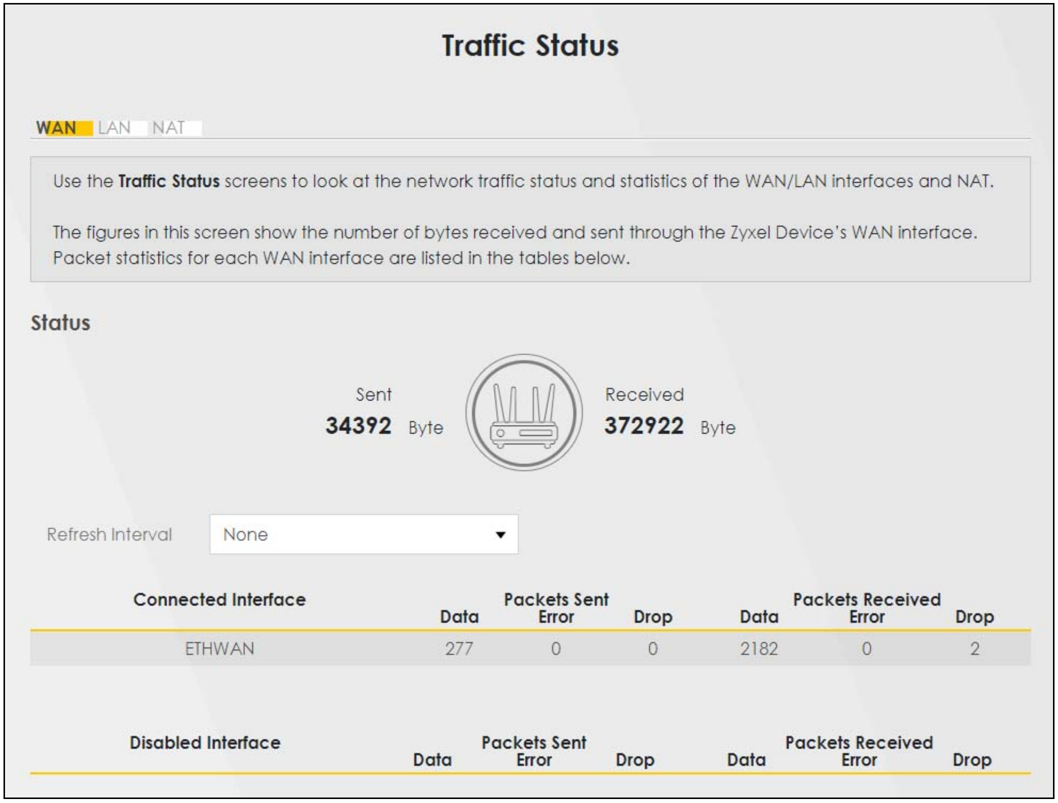
18.1.1 What You Can Do in this Chapter

- Use the **WAN** screen to view the WAN traffic statistics (Section 18.2 on page 202).
- Use the **LAN** screen to view the LAN traffic statistics (Section 18.3 on page 204).
- Use the **NAT** screen to view the NAT status of the Zyxel Device's clients (Section 18.4 on page 205).

18.2 WAN Status

Click **System Monitor** > **Traffic Status** to open the **WAN** screen. The figures in this screen show the number of bytes received and sent through the Zyxel Device's WAN interface. The table below shows packet statistics for each WAN interface.

Figure 127 System Monitor > Traffic Status > WAN



Traffic Status

Use the **Traffic Status** screens to look at the network traffic status and statistics of the WAN/LAN interfaces and NAT.

The figures in this screen show the number of bytes received and sent through the Zyxel Device's WAN interface. Packet statistics for each WAN interface are listed in the tables below.

Status

Sent 34392 Byte

Received 372922 Byte

Refresh Interval: None

Connected Interface	Packets Sent Data	Packets Sent Error	Packets Sent Drop	Packets Received Data	Packets Received Error	Packets Received Drop
ETHWAN	277	0	0	2182	0	2

Disabled Interface	Packets Sent Data	Packets Sent Error	Packets Sent Drop	Packets Received Data	Packets Received Error	Packets Received Drop

The following table describes the fields in this screen.

Table 79 System Monitor > Traffic Status > WAN

LABEL	DESCRIPTION
Refresh Interval	Select how often you want the Zyxel Device to update this screen.
Connected Interface	This shows the name of the WAN interface that is currently connected.
Packets Sent	
Data	This indicates the number of transmitted packets on this interface.
Error	This indicates the number of frames with errors transmitted on this interface.
Drop	This indicates the number of outgoing packets dropped on this interface.
Packets Received	
Data	This indicates the number of received packets on this interface.
Error	This indicates the number of frames with errors received on this interface.
Drop	This indicates the number of received packets dropped on this interface.
Disabled Interface	This shows the name of the WAN interface that is currently disabled.
Packets Sent	
Data	This indicates the number of transmitted packets on this interface.
Error	This indicates the number of frames with errors transmitted on this interface.
Drop	This indicates the number of outgoing packets dropped on this interface.
Packets Received	
Data	This indicates the number of received packets on this interface.

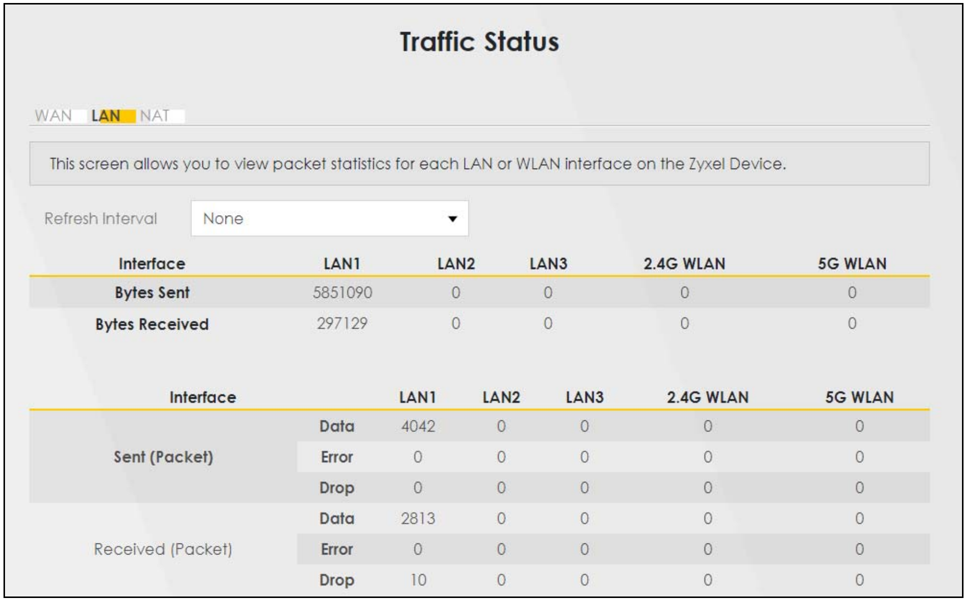
Table 79 System Monitor > Traffic Status > WAN (continued)

LABEL	DESCRIPTION
Error	This indicates the number of frames with errors received on this interface.
Drop	This indicates the number of received packets dropped on this interface.

18.3 LAN Status

Click **System Monitor** > **Traffic Status** > **LAN** to open the following screen. This screen allows you to view packet statistics for each LAN or WLAN interface on the Zyxel Device.

Figure 128 System Monitor > Traffic Status > LAN



Traffic Status

This screen allows you to view packet statistics for each LAN or WLAN interface on the Zyxel Device.

Refresh Interval: None

Interface	LAN1	LAN2	LAN3	2.4G WLAN	5G WLAN
Bytes Sent	5851090	0	0	0	0
Bytes Received	297129	0	0	0	0

Interface		LAN1	LAN2	LAN3	2.4G WLAN	5G WLAN
Sent (Packet)	Data	4042	0	0	0	0
	Error	0	0	0	0	0
	Drop	0	0	0	0	0
Received (Packet)	Data	2813	0	0	0	0
	Error	0	0	0	0	0
	Drop	10	0	0	0	0

The following table describes the fields in this screen.

Table 80 System Monitor > Traffic Status > LAN

LABEL	DESCRIPTION
Refresh Interval	Select how often you want the Zyxel Device to update this screen.
Interface	This shows the LAN or WLAN interface.
Bytes Sent	This indicates the number of bytes transmitted on this interface.
Bytes Received	This indicates the number of bytes received on this interface.
Interface	This shows the LAN or WLAN interfaces.
Sent (Packets)	
Data	This indicates the number of transmitted packets on this interface.
Error	This indicates the number of frames with errors transmitted on this interface.
Drop	This indicates the number of outgoing packets dropped on this interface.
Received (Packets)	
Data	This indicates the number of received packets on this interface.

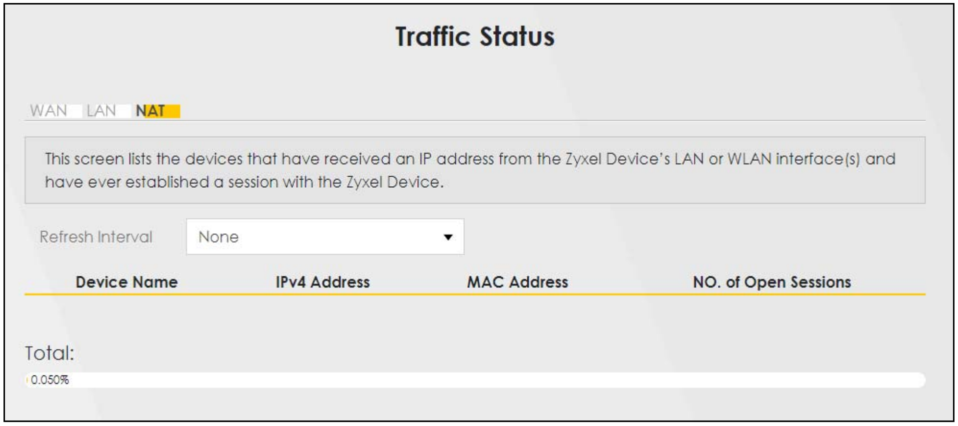
Table 80 System Monitor > Traffic Status > LAN (continued)

LABEL	DESCRIPTION
Error	This indicates the number of frames with errors received on this interface.
Drop	This indicates the number of received packets dropped on this interface.

18.4 NAT Status

Click **System Monitor** > **Traffic Status** > **NAT** to open the following screen. This screen lists the devices that have received an IP address from the Zyxel Device LAN or WLAN interfaces and have ever established a session with the Zyxel Device.

Figure 129 System Monitor > Traffic Status > NAT



Traffic Status

This screen lists the devices that have received an IP address from the Zyxel Device's LAN or WLAN interface(s) and have ever established a session with the Zyxel Device.

Refresh Interval: None

Device Name	IPv4 Address	MAC Address	NO. of Open Sessions

Total:

0.050%

The following table describes the fields in this screen.

Table 81 System Monitor > Traffic Status > NAT

LABEL	DESCRIPTION
Refresh Interval	Select how often you want the Zyxel Device to update this screen.
Device Name	This displays the name of the connected host.
IPv4 Address	This displays the IP address of the connected host.
MAC Address	This displays the MAC address of the connected host.
No. of Open Sessions	This displays the number of NAT sessions currently opened for the connected host.
Total	This displays what percentage of NAT sessions the Zyxel Device can support is currently being used by all connected hosts. You can also see the number of active NAT sessions and the maximum number of NAT sessions the Zyxel Device can support

CHAPTER 19
ARP Table

19.1 ARP Table Overview

Address Resolution Protocol (ARP) is a protocol for mapping an Internet Protocol (IP) address to a physical machine address, known as a Media Access Control (MAC) address, on the local area network.

An IP version 4 address is 32 bits long. MAC addresses are 48 bits long. The ARP table maintains an association between each MAC address and its corresponding IP address.

19.1.1 How ARP Works

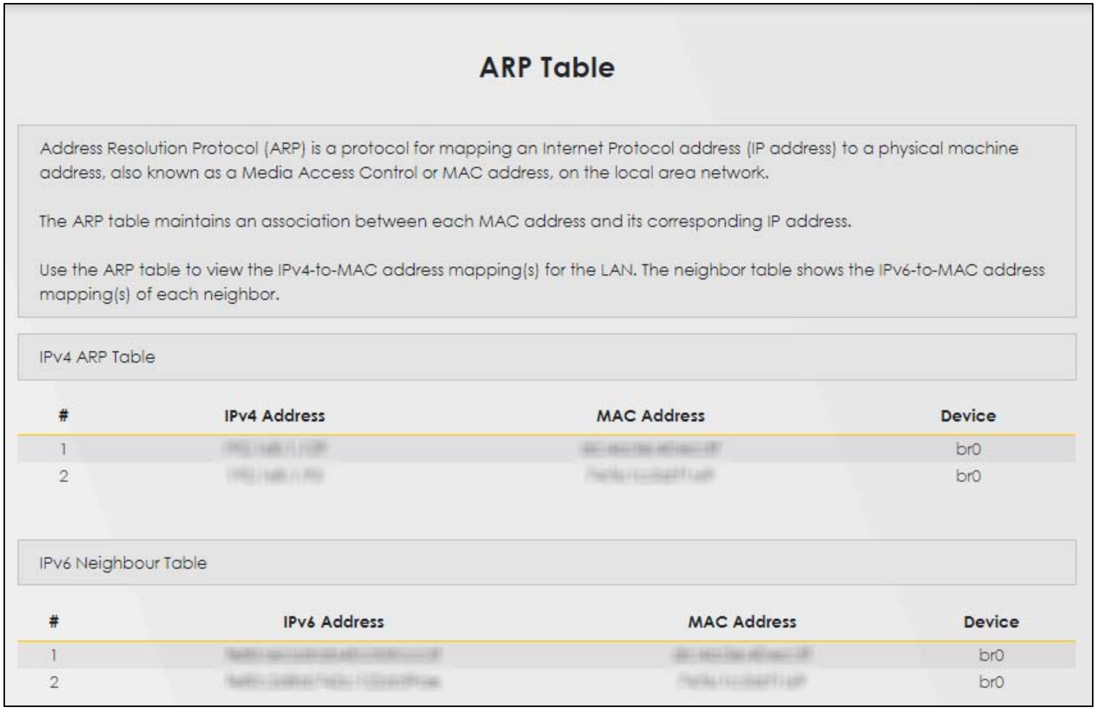
When an incoming packet destined for a host device on a local area network arrives at the device, the device's ARP program looks in the ARP table and, if it finds the address, sends it to the device.

If no entry is found for the IP address, ARP broadcasts the request to all the devices on the LAN. The device fills in its own MAC and IP address in the sender address fields, and puts the known IP address of the target in the target IP address field. In addition, the device puts all ones in the target MAC field (FF.FF.FF.FF.FF.FF is the Ethernet broadcast address). The replying device (which is either the IP address of the device being sought or the router that knows the way) replaces the broadcast address with the target's MAC address, swaps the sender and target pairs, and unicasts the answer directly back to the requesting machine. ARP updates the ARP table for future reference and then sends the packet to the MAC address that replied.

19.2 ARP Table

Use the ARP table to view the IPv4-to-MAC address mappings for each device connected to the Zyxel Device. The neighbor table shows the IPv6-to-MAC address mappings of each IPv6 neighbor. To open this screen, click **System Monitor** > **ARP Table**.

Figure 130 System Monitor > ARP Table



ARP Table

Address Resolution Protocol (ARP) is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address, also known as a Media Access Control or MAC address, on the local area network.

The ARP table maintains an association between each MAC address and its corresponding IP address.

Use the ARP table to view the IPv4-to-MAC address mapping(s) for the LAN. The neighbor table shows the IPv6-to-MAC address mapping(s) of each neighbor.

IPv4 ARP Table

#	IPv4 Address	MAC Address	Device
1	[redacted]	[redacted]	br0
2	[redacted]	[redacted]	br0

IPv6 Neighbour Table

#	IPv6 Address	MAC Address	Device
1	[redacted]	[redacted]	br0
2	[redacted]	[redacted]	br0

The following table describes the labels in this screen.

Table 82 System Monitor > ARP Table

LABEL	DESCRIPTION
#	This is the ARP table entry number.
IPv4 / IPv6 Address	This is the learned IPv4 or IPv6 IP address of a device connected to the Zyxel Device.
MAC Address	This is the MAC address of the connected device with the listed IP address.
Device	This is the type of interface used by the connected device. You can click the device type to go to its configuration screen.

CHAPTER 20
Routing Table

20.1 Routing Table Overview

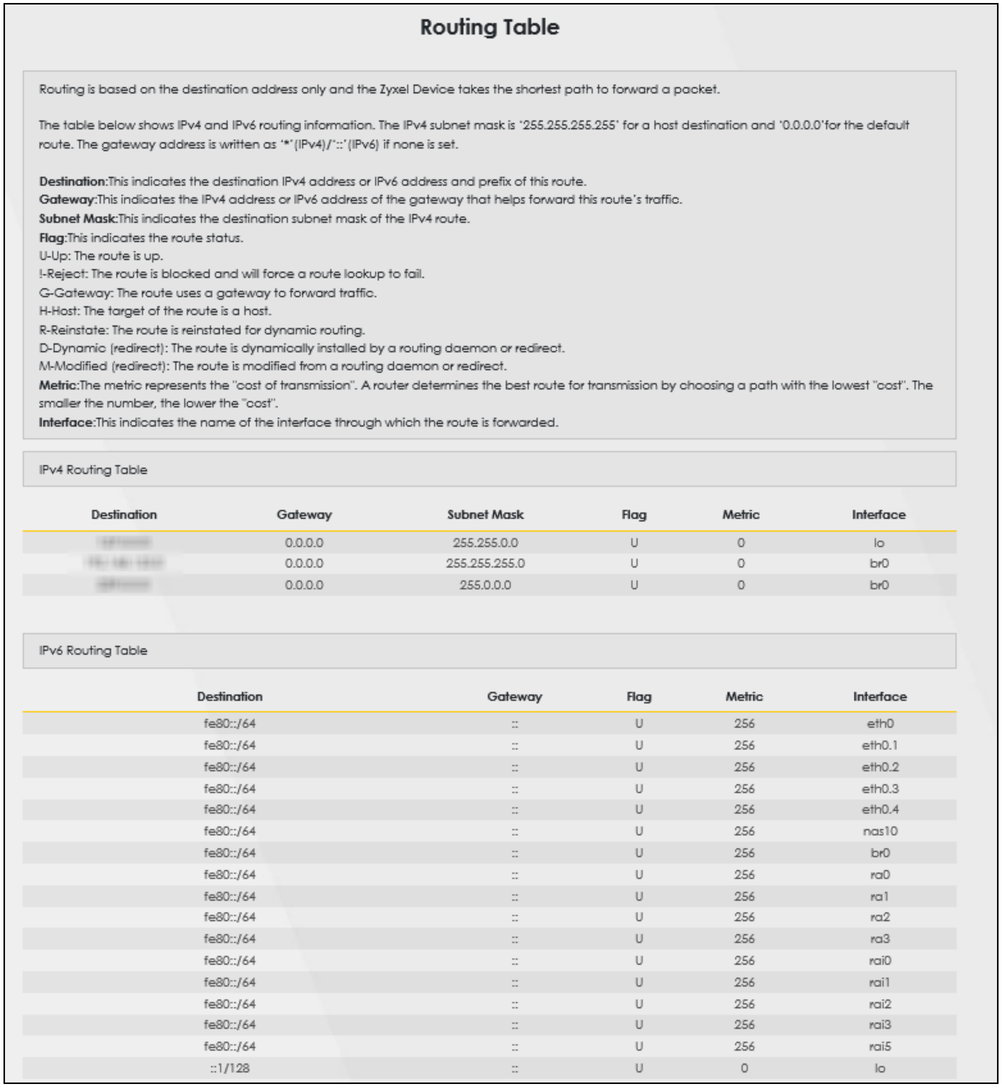
Routing is based on the destination address only and the Zyxel Device takes the shortest path to forward a packet.

20.2 Routing Table

The table below shows IPv4 and IPv6 routing information. The IPv4 subnet mask is ‘255.255.255.255’ for a host destination and ‘0.0.0.0’ for the default route. The gateway address is written as ‘*’(IPv4)/‘::’(IPv6) if none is set.

Click **System Monitor** > **Routing Table** to open the following screen.

Figure 131 System Monitor > Routing Table



Routing Table

Routing is based on the destination address only and the Zyxel Device takes the shortest path to forward a packet.

The table below shows IPv4 and IPv6 routing information. The IPv4 subnet mask is '255.255.255.255' for a host destination and '0.0.0.0'for the default route. The gateway address is written as '*'(IPv4)/'::'(IPv6) if none is set.

Destination: This indicates the destination IPv4 address or IPv6 address and prefix of this route.
Gateway: This indicates the IPv4 address or IPv6 address of the gateway that helps forward this route's traffic.
Subnet Mask: This indicates the destination subnet mask of the IPv4 route.
Flag: This indicates the route status.
U-Up: The route is up.
!-Reject: The route is blocked and will force a route lookup to fail.
G-Gateway: The route uses a gateway to forward traffic.
H-Host: The target of the route is a host.
R-Reinstate: The route is reinstated for dynamic routing.
D-Dynamic (redirect): The route is dynamically installed by a routing daemon or redirect.
M-Modified (redirect): The route is modified from a routing daemon or redirect.
Metric: The metric represents the "cost of transmission". A router determines the best route for transmission by choosing a path with the lowest "cost". The smaller the number, the lower the "cost".
Interface: This indicates the name of the interface through which the route is forwarded.

IPv4 Routing Table

Destination	Gateway	Subnet Mask	Flag	Metric	Interface
[redacted]	0.0.0.0	255.255.0.0	U	0	lo
[redacted]	0.0.0.0	255.255.255.0	U	0	br0
[redacted]	0.0.0.0	255.0.0.0	U	0	br0

IPv6 Routing Table

Destination	Gateway	Flag	Metric	Interface
fe80::/64	::	U	256	eth0
fe80::/64	::	U	256	eth0.1
fe80::/64	::	U	256	eth0.2
fe80::/64	::	U	256	eth0.3
fe80::/64	::	U	256	eth0.4
fe80::/64	::	U	256	nas10
fe80::/64	::	U	256	br0
fe80::/64	::	U	256	ra0
fe80::/64	::	U	256	ra1
fe80::/64	::	U	256	ra2
fe80::/64	::	U	256	ra3
fe80::/64	::	U	256	rai0
fe80::/64	::	U	256	rai1
fe80::/64	::	U	256	rai2
fe80::/64	::	U	256	rai3
fe80::/64	::	U	256	rai5
::1/128	::	U	0	lo

The following table describes the labels in this screen.

Table 83 System Monitor > Routing Table

LABEL	DESCRIPTION
IPv4 / IPv6 Routing Table	
Destination	This indicates the destination IPv4 address or IPv6 address and prefix of this route.
Gateway	This indicates the IPv4 address or IPv6 address of the gateway that helps forward this route's traffic.
Subnet Mask	This indicates the destination subnet mask of the IPv4 route.

Table 83 System Monitor > Routing Table (continued)

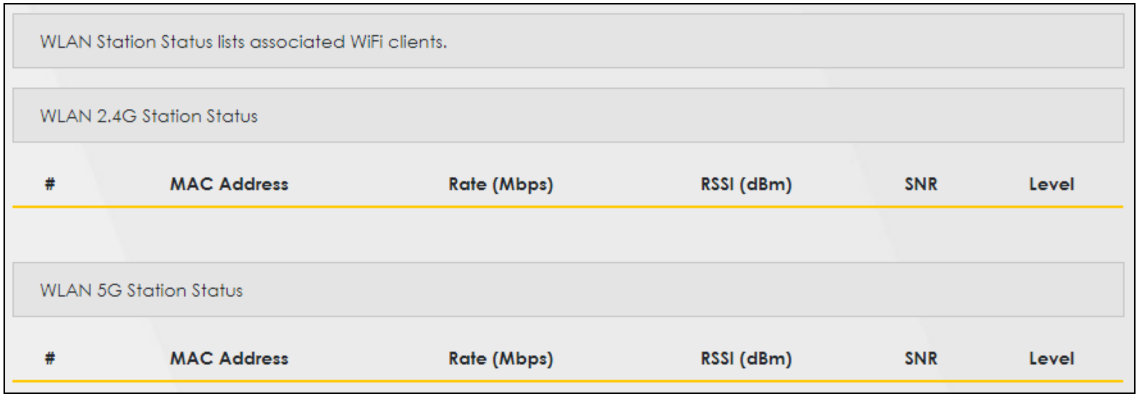
LABEL	DESCRIPTION
Flag	This indicates the route status. **U–Up:** The route is up. **!–Reject:** The route is blocked and will force a route lookup to fail. **G–Gateway:** The route uses a gateway to forward traffic. **H–Host:** The target of the route is a host. **R–Reinstate:** The route is reinstated for dynamic routing. **D–Dynamic (redirect):** The route is dynamically installed by a routing daemon or redirect. **M–Modified (redirect):** The route is modified from a routing daemon or redirect.
Metric	The metric represents the "cost of transmission." A router determines the best route for transmission by choosing a path with the lowest "cost." The smaller the number, the lower the "cost."
Interface	This indicates the name of the interface through which the route is forwarded. • **brx** indicates a LAN interface where x can be 0 – 3 to represent LAN1 to LAN4 respectively. • **ethx** indicates an Ethernet WAN interface using IPoE or in bridge mode. • **ppp0** indicates a WAN interface using PPPoE. • **wlx** indicates a wireless interface where x can be 0 – 1.

CHAPTER 21
WLAN Station Status

21.1 WLAN Station Status Overview

Click **System Monitor** > **WLAN Station Status** to open the following screen. Use this screen to view information and status of the WiFi stations (WiFi clients) that are currently associated with the Zyxel Device. Being associated means that a WiFi client (for example, your computer with a WiFi network card installed) has connected successfully to an AP (or WiFi router) using the same SSID, channel, and WiFi security settings.

Figure 132 System Monitor > WLAN Station Status



WLAN Station Status lists associated WiFi clients.

WLAN 2.4G Station Status

#	MAC Address	Rate (Mbps)	RSSI (dBm)	SNR	Level

WLAN 5G Station Status

#	MAC Address	Rate (Mbps)	RSSI (dBm)	SNR	Level

The following table describes the labels in this screen.

Table 84 System Monitor > WLAN Station Status

LABEL	DESCRIPTION
#	This is the index number of an associated WiFi station.
MAC Address	This field displays the MAC address of an associated WiFi station.
Rate (Mbps)	This field displays the transmission rate of WiFi traffic between an associated WiFi station and the Zyxel Device.
RSSI (dBm)	The RSSI (Received Signal Strength Indicator) field shows the WiFi signal strength of the station's WiFi connection. The normal range is –30dBm to –79dBm. If the value drops below –80dBm, try moving the associated WiFi station closer to the Zyxel Device to get better signal strength.

Table 84 System Monitor > WLAN Station Status (continued)

LABEL	DESCRIPTION
SNR	The Signal-to-Noise Ratio (SNR) is the ratio between the received signal power and the received noise power. The greater the number, the better the quality of WiFi. The normal range is 15 to 40. If the value drops below 15, try moving the associated WiFi station closer to the Zyxel Device to get better quality WiFi.
Level	This field displays a number which represents the strength of the WiFi signal between an associated WiFi station and the Zyxel Device. The Zyxel Device uses the RSSI and SNR values to determine the strength of the WiFi signal. **5** means the Zyxel Device is receiving an excellent WiFi signal. **4** means the Zyxel Device is receiving a very good WiFi signal. **3** means the Zyxel Device is receiving a weak WiFi signal, **2** means the Zyxel Device is receiving a very weak WiFi signal. **1** means the Zyxel Device is not receiving a WiFi signal.

CHAPTER 22 Operating Mode

22.1 Operating Mode Overview

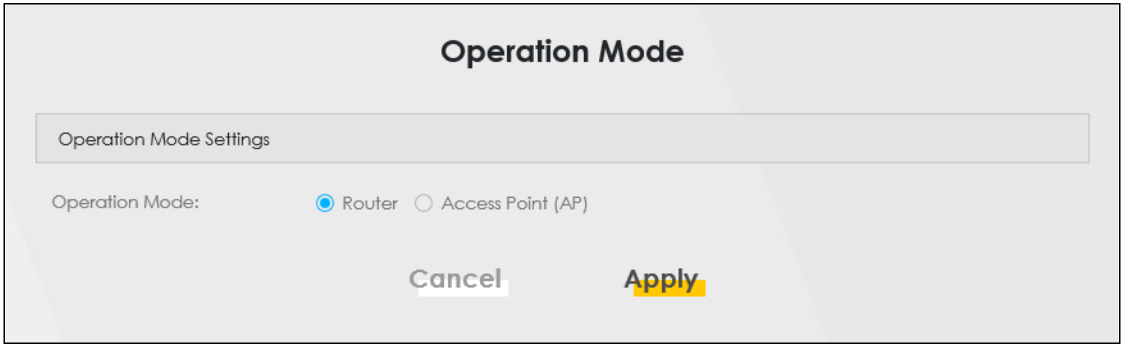
Use this screen to select how you want to use your Zyxel Device. The Operating Mode function lets you configure your Zyxel Device as a router or access point. You can choose between **Router** Mode, and **Access Point (AP)** Mode depending on your network topology and the features you require from your Zyxel Device.

Click **Maintenance > Operating Mode** to show the following screen. The Zyxel Device has the following operating modes:

• **Router**: This is the Zyxel Device's default mode. In this mode, the Zyxel Device routes traffic between a local network and another network such as the Internet.

• **Access Point (AP)**: Use this mode if you already have a router in your network and want to use the Zyxel Device as an access point to bridge a wired network (LAN) and another LAN or wireless LAN (WLAN) in the same subnet.

Figure 133 Maintenance > Operating Mode



Operation Mode

Operation Mode Settings

Operation Mode: ● Router ○ Access Point (AP)

The following table describes the labels in this screen.

Table 85 Maintenance > Operating Mode

LABEL	DESCRIPTION
Operating Mode Settings	
Operating Mode	Select **Router** to use the Zyxel Device as a router. Select **Access Point (AP)** to use the Zyxel Device as an access point.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

CHAPTER 23
System

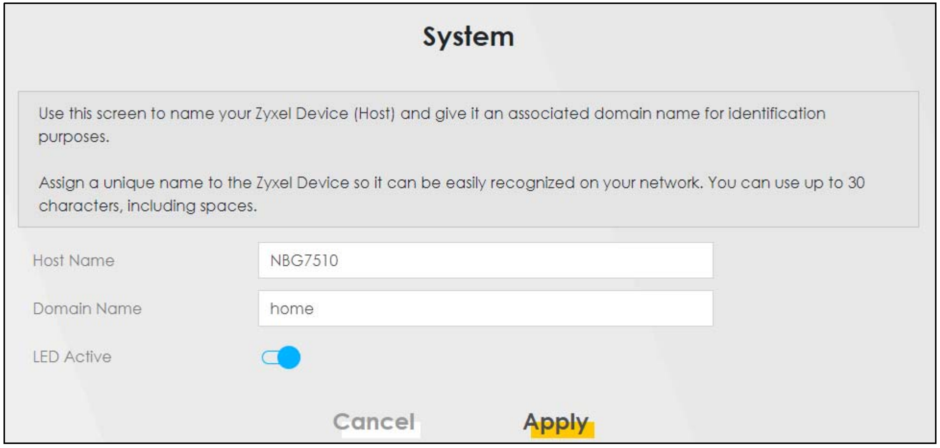
23.1 System Overview

Use this screen to name your Zyxel Device (Host) and give it an associated domain name for identification purposes.

23.2 System

Click **Maintenance** > **System** to open the following screen. Assign a unique name to the Zyxel Device so it can be easily recognized on your network. You can use up to 30 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.

Figure 134 Maintenance > System



System

Use this screen to name your Zyxel Device (Host) and give it an associated domain name for identification purposes.

Assign a unique name to the Zyxel Device so it can be easily recognized on your network. You can use up to 30 characters, including spaces.

Host Name: NBG7510

Domain Name: home

LED Active: ●

The following table describes the labels in this screen.

Table 86 Maintenance > System

LABEL	DESCRIPTION
Host Name	Enter a descriptive host name for your Zyxel Device. You can use up to 30 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. For some models, the supported maximum input length is 16 alphanumeric characters.
Domain Name	Enter a domain name for your host Zyxel Device. You can use up to 30 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.
Cancel	Click **Cancel** to abandon this screen without saving.
Apply	Click **Apply** to save your changes.

CHAPTER 24
User Account

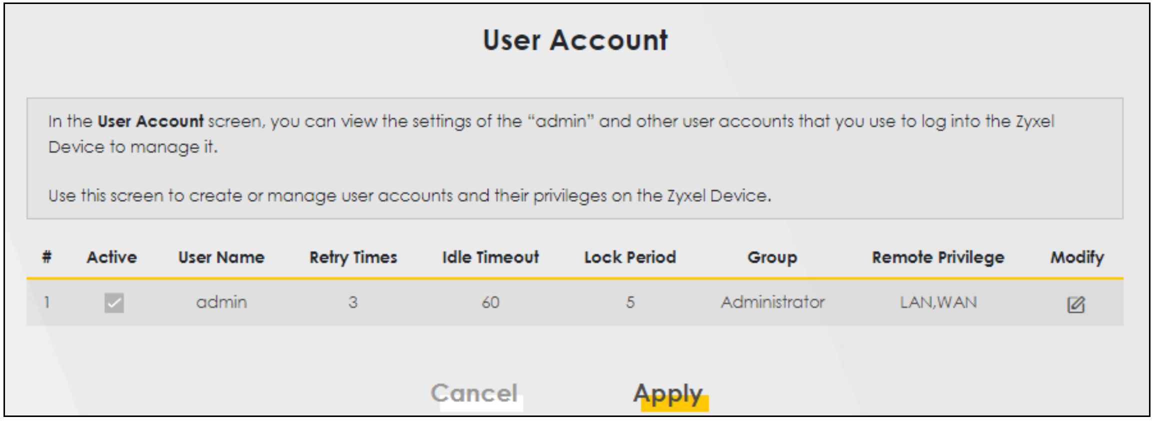
24.1 User Account Overview

In the **User Account** screen, you can view the settings of the “admin” that you use to log into the Zyxel Device to manage it.

24.2 User Account

Click **Maintenance** > **User Account** to open the following screen. Use this screen to manage user accounts and their privileges on the Zyxel Device.

Figure 135 Maintenance > User Account



User Account

In the **User Account** screen, you can view the settings of the “admin” and other user accounts that you use to log into the Zyxel Device to manage it.

Use this screen to create or manage user accounts and their privileges on the Zyxel Device.

#	Active	User Name	Retry Times	Idle Timeout	Lock Period	Group	Remote Privilege	Modify
1	☑	admin	3	60	5	Administrator	LAN,WAN	✎

The following table describes the labels in this screen.

Table 87 Maintenance > User Account

LABEL	DESCRIPTION
#	This is the index number.
Active	This indicates whether the user account is active or not. The check box is selected when the user account is enabled. It is cleared when it is disabled.
User Name	This displays the name of the account used to log into the Zyxel Device Web Configurator.
Retry Times	This displays the number of times consecutive wrong passwords can be entered for this account. 0 means there is no limit.
Idle Timeout	This displays the length of inactive time before the Zyxel Device will automatically log the user out of the Web Configurator.
Lock Period	This field displays the length of time a user must wait before attempting to log in again after a number of consecutive wrong passwords have been entered as defined in **Retry Times**.
Group	This field displays this user has **Administrator** privileges.

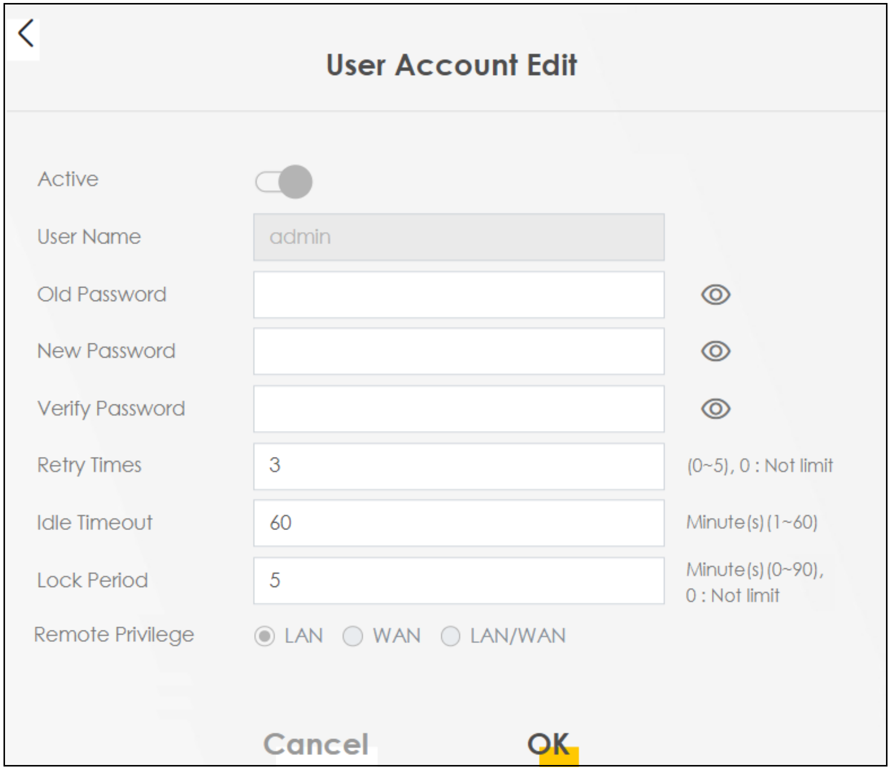
Table 87 Maintenance > User Account (continued)

LABEL	DESCRIPTION
Remote Privilege	This field displays whether this user can access the Zyxel Device with HTTP, Telnet or SSH through the **WAN**, **LAN** or **LAN/WAN**.
Modify	Click the **Edit** icon to configure the entry.
Cancel	Click **Cancel** to restore your previously saved settings.
Apply	Click **Apply** to save your changes.

24.2.1 User Account Add or Edit

Add or change the name of the user account, set the security password and the retry times, and whether this user will have **Administrator** or **User** privileges. Click **Add New Account** or the **Edit** icon of an existing account in the **Maintenance** > **User Account** to open the following screen.

Figure 136 Maintenance > User Account: Edit



User Account Edit

Active

User Name: admin

Old Password

New Password

Verify Password

Retry Times: 3 (0~5), 0 : Not limit

Idle Timeout: 60 Minute(s) (1~60)

Lock Period: 5 Minute(s) (0~90), 0 : Not limit

Remote Privilege: ● LAN ○ WAN ○ LAN/WAN

The following table describes the labels in this screen.

Table 88 Maintenance > User Account > User Account Add/Edit

LABEL	DESCRIPTION
Active	Click to enable (switch turns blue) or disable (switch turns gray) to activate or deactivate the user account.
User Name	Enter a name for this account. You can use up to 31 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed.

Table 88 Maintenance > User Account > User Account Add/Edit (continued)

LABEL	DESCRIPTION
Password	Enter your new system password. The password must contain at least one numeric and one alphabetic character. You can use 6 – 64 alphanumeric (0-9, a-z, A-Z) and special characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. Note that as you type a password, the screen displays a (*) for each character you type. After you change the password, use the new password to access the Zyxel Device. If you are changing your existing password, you have to first enter your **Old Password** then enter your **New Password**.
Verify Password	Enter the new password again for confirmation.
Retry Times	Enter the number of times consecutive wrong passwords can be entered for this account. 0 means there is no limit.
Idle Timeout	Enter the length of inactive time before the Zyxel Device will automatically log the user out of the Web Configurator.
Lock Period	Enter the length of time a user must wait before attempting to log in again after a number of consecutive wrong passwords have been entered as defined in **Retry Times**.
Remote Privilege	Select whether this user can access the Zyxel Device with HTTP, Telnet or SSH through the **WAN**, **LAN** or **LAN/WAN**. Only the **Administrator** is allowed to use Telnet and SSH for remote management.
Cancel	Click **Cancel** to restore your previously saved settings.
OK	Click **OK** to save your changes.

CHAPTER 25 Remote Management

25.1 Remote Management Overview

Remote management controls through which interfaces, which web services (such as HTTP, HTTPS, FTP, Telnet, SSH and Ping) can access the Zyxel Device.

Note: The Zyxel Device is managed using the Web Configurator.

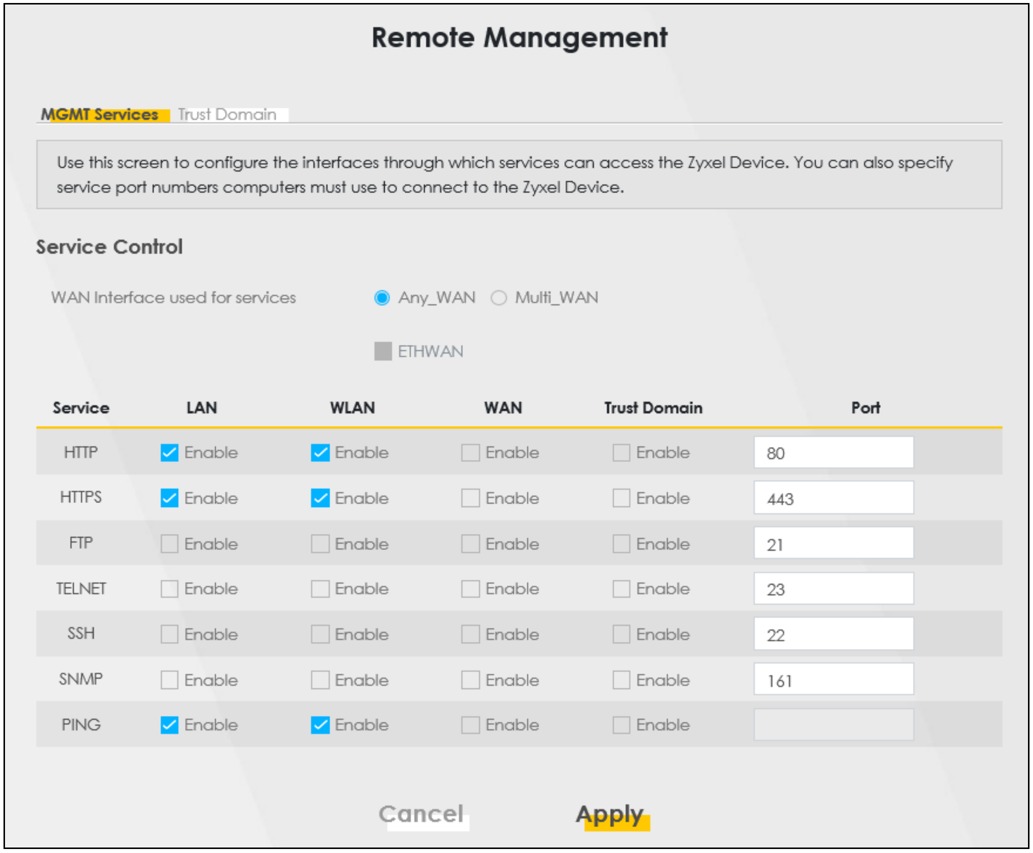
25.1.1 What You Can Do in this Chapter

- Use the **MGMT Services** screen to allow various approaches to access the Zyxel Device remotely from a WAN and/or LAN connection (Section 25.2 on page 218).
- Use the **Trust Domain** screen to enable users to permit access from local management services by entering specific IP addresses (Section 25.3 on page 220).

25.2 MGMT Services

Use this screen to configure the interfaces through which services can access the Zyxel Device. You can also specify service port numbers computers must use to connect to the Zyxel Device. Click **Maintenance** > **Remote Management** > **MGMT Services** to open the following screen.

Figure 137 Maintenance > Remote Management > MGMT Services



Remote Management

Use this screen to configure the interfaces through which services can access the Zyxel Device. You can also specify service port numbers computers must use to connect to the Zyxel Device.

Service Control

WAN Interface used for services ● Any_WAN ○ Multi_WAN

☐ ETHWAN

Service	LAN	WLAN	WAN	Trust Domain	Port
HTTP	☑ Enable	☑ Enable	☐ Enable	☐ Enable	80
HTTPS	☑ Enable	☑ Enable	☐ Enable	☐ Enable	443
FTP	☐ Enable	☐ Enable	☐ Enable	☐ Enable	21
TELNET	☐ Enable	☐ Enable	☐ Enable	☐ Enable	23
SSH	☐ Enable	☐ Enable	☐ Enable	☐ Enable	22
SNMP	☐ Enable	☐ Enable	☐ Enable	☐ Enable	161
PING	☑ Enable	☑ Enable	☐ Enable	☐ Enable	

The following table describes the fields in this screen.

Table 89 Maintenance > Remote Management > MGMT Services

LABEL	DESCRIPTION
Service Control	
WAN Interface used for services	Select **Any_WAN** to have the Zyxel Device automatically activate the remote management service when any WAN connection is up. Select **Multi_WAN** and then select one or more WAN connections to have the Zyxel Device activate the remote management service when the selected WAN connections are up.
ETHWAN	Enable the Ethernet WAN connection configured in **Network Setting** > **Broadband** > **Ethernet WAN** to access the service on the Zyxel Device.
Service	This is the service you may use to access the Zyxel Device.
LAN	Select the **Enable** check box for the corresponding services that you want to allow access to the Zyxel Device from the LAN.
WLAN	Select the **Enable** check box for the corresponding services that you want to allow access to the Zyxel Device from the WLAN.
WAN	Select the **Enable** check box for the corresponding services that you want to allow access to the Zyxel Device from all WAN connections.
Trust Domain	Select the **Enable** check box for the corresponding services that you want to allow access to the Zyxel Device from the trusted host IP address.
Port	You may change the server port number for a service if needed, however you must use the same port number in order to use that service for remote management.

Table 89 Maintenance > Remote Management > MGMT Services (continued)

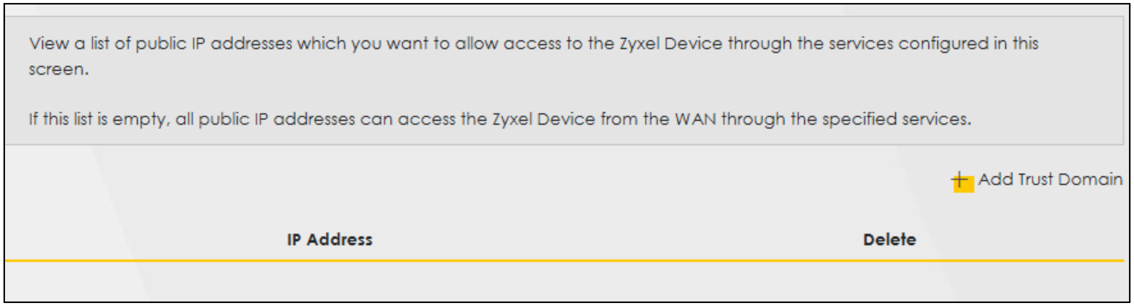
LABEL	DESCRIPTION
Redirect HTTP to HTTPS	To allow only secure Web Configurator access, select this to redirect all HTTP connection requests to the HTTPS server. For example, if you enter http://192.168.1.1 in your browser to access the Web Configurator, then the Zyxel Device will automatically change this to the more secure https://192.168.1.1 for access.
Apply	Click **Apply** to save your changes back to the Zyxel Device.
Cancel	Click **Cancel** to restore your previously saved settings.

25.3 Trust Domain

Use this screen to view a list of public IP addresses which are allowed to access the Zyxel Device through the services configured in the **Maintenance** > **Remote Management** > **MGMT Services** screen. Click **Maintenance** > **Remote Management** > **Trust Domain** to open the following screen.

Note: Enter the IP address of the management station permitted to access the local management services. If specific services from the trusted hosts are allowed access but the trust domain list is empty, all public IP addresses can access the Zyxel Device from the WAN using the specified services.

Figure 138 Maintenance > Remote Management > Trust Domain



View a list of public IP addresses which you want to allow access to the Zyxel Device through the services configured in this screen.

If this list is empty, all public IP addresses can access the Zyxel Device from the WAN through the specified services.

The following table describes the fields in this screen.

Table 90 Maintenance > Remote Management > Trust Domain

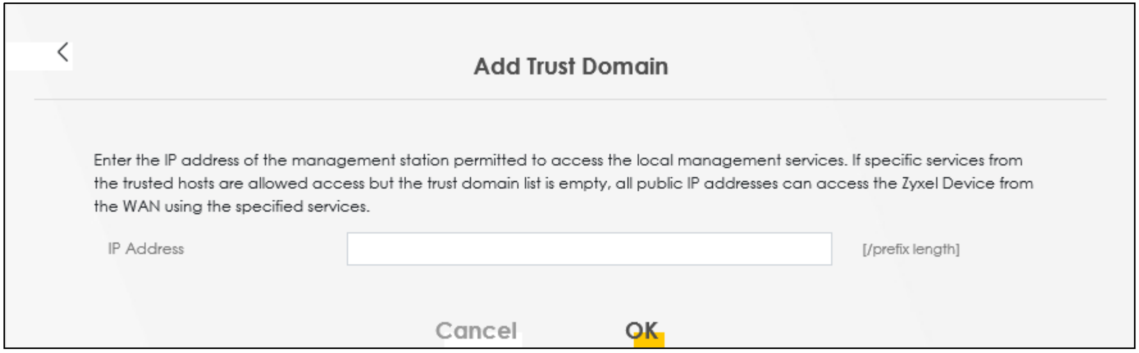
LABEL	DESCRIPTION
Add Trust Domain	Click this to add a trusted host IP address.
IP Address	This field shows a trusted host IP address.
Delete	Click the **Delete** icon to remove the trusted host IP address.

25.3.1 Add Trust Domain

Use this screen to add a public IP addresses or a complete domain name of a device which is allowed to access the Zyxel Device. Enter the IP address of the management station permitted to access the local management services. If specific services from the trusted-hosts are allowed access but the trust domain list is empty, all public IP addresses can access the Zyxel Device from the WAN using the specified services.

Click the **Add Trust Domain** button in the **Maintenance** > **Remote Management** > **Trust Domain** screen to open the following screen.

Figure 139 Maintenance > Remote Management > Trust Domain > Add Trust Domain



Add Trust Domain

Enter the IP address of the management station permitted to access the local management services. If specific services from the trusted hosts are allowed access but the trust domain list is empty, all public IP addresses can access the Zyxel Device from the WAN using the specified services.

IP Address [/prefix length]

The following table describes the fields in this screen.

Table 91 Maintenance > Remote Management > Trust Domain > Add Trust Domain

LABEL	DESCRIPTION
IP Address	Enter a public IPv4/IPv6 IP address which is allowed to access the service on the Zyxel Device from the WAN.
OK	Click **OK** to save your changes back to the Zyxel Device.
Cancel	Click **Cancel** to restore your previously saved settings.

CHAPTER 26
Time Settings

26.1 Time Settings Overview

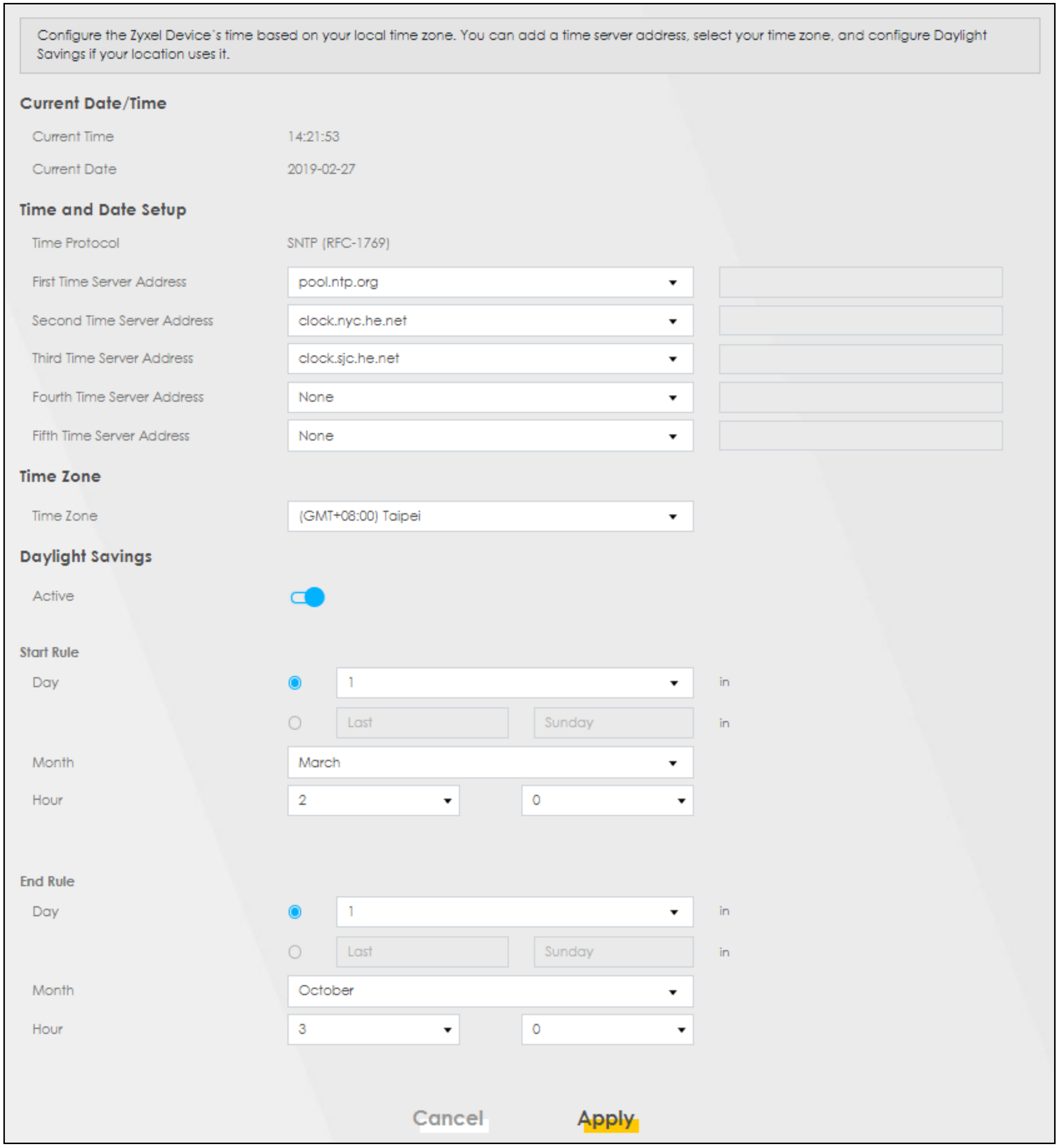
This chapter shows you how to configure system related settings, such as system date and time.

26.2 Time

For effective scheduling and logging, the Zyxel Device system time must be accurate. Use this screen to configure the Zyxel Device's time based on your local time zone. You can enter a time server address, select the time zone where the Zyxel Device is physically located, and configure Daylight Savings settings if needed.

To change your Zyxel Device's time and date, click **Maintenance** > **Time**. The screen appears as shown.

Figure 140 Maintenance > Time



Configure the Zyxel Device's time based on your local time zone. You can add a time server address, select your time zone, and configure Daylight Savings if your location uses it.

Current Date/Time

Current Time 14:21:53

Current Date 2019-02-27

Time and Date Setup

Time Protocol SNTP (RFC-1769)

First Time Server Address pool.ntp.org

Second Time Server Address clock.nyc.he.net

Third Time Server Address clock.sjc.he.net

Fourth Time Server Address None

Fifth Time Server Address None

Time Zone

Time Zone (GMT+08:00) Taipei

Daylight Savings

Active

Start Rule

Day ● 1 in

○ Last Sunday in

Month March

Hour 2 0

End Rule

Day ● 1 in

○ Last Sunday in

Month October

Hour 3 0

The following table describes the fields in this screen.

Table 92 Maintenance > Time

LABEL	DESCRIPTION
Current Date/Time	
Current Time	This displays the time of your Zyxel Device. Each time you reload this screen, the Zyxel Device synchronizes the time with the time server.
Current Date	This displays the date of your Zyxel Device. Each time you reload this screen, the Zyxel Device synchronizes the date with the time server.
Time and Date Setup	
Time Protocol	This displays the time protocol used by your Zyxel Device.

Table 92 Maintenance > Time (continued)

LABEL	DESCRIPTION
First – Fifth Time Server Address	Select an NTP time server from the drop-down list box. Otherwise, select **Other** and enter the IP address or URL (up to 29 printable characters in length) of your time server. Select **None** if you do not want to configure the time server. Check with your ISP/network administrator if you are unsure of this information.
Time Zone	
Time zone	Choose the time zone of your location. This will set the time difference between your time zone and Greenwich Mean Time (GMT).
Daylight Savings Daylight Saving Time is a period from late spring to early fall when many countries set their clocks ahead of normal local time by one hour to give more daytime light in the evening.	
Active	Click this switch to enable or disable Daylight Saving Time. When the switch turns blue, the function is enabled. Otherwise, it is not.
Start Rule	Configure the day and time when Daylight Saving Time starts if you enabled Daylight Saving. You can select a specific date in a particular month or a specific day of a specific week in a particular month. The **Time** field uses the 24 hour format. Here are a couple of examples: Daylight Saving Time starts in most parts of the United States on the second Sunday of March. Each time zone in the United States starts using Daylight Saving Time at 2 A.M. local time. So in the United States, set the day to **Second**, **Sunday**, the month to **March** and the time to **2** in the **Hour** field. Daylight Saving Time starts in the European Union on the last Sunday of March. All of the time zones in the European Union start using Daylight Saving Time at the same moment (1 A.M. GMT or UTC). So in the European Union you would set the day to **Last**, **Sunday** and the month to **March**. The time you select in the **o'clock** field depends on your time zone. In Germany for instance, you would select **2** in the **Hour** field because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
End Rule	Configure the day and time when Daylight Saving Time ends if you enabled Daylight Saving. You can select a specific date in a particular month or a specific day of a specific week in a particular month. The **Time** field uses the 24 hour format. Here are a couple of examples: Daylight Saving Time ends in the United States on the first Sunday of November. Each time zone in the United States stops using Daylight Saving Time at 2 A.M. local time. So in the United States you would set the day to **First**, **Sunday**, the month to **November** and the time to **2** in the **Hour** field. Daylight Saving Time ends in the European Union on the last Sunday of October. All of the time zones in the European Union stop using Daylight Saving Time at the same moment (1 A.M. GMT or UTC). So in the European Union you would set the day to **Last**, **Sunday**, and the month to **October**. The time you select in the **o'clock** field depends on your time zone. In Germany for instance, you would select **2** in the **Hour** field because Germany's time zone is one hour ahead of GMT or UTC (GMT+1).
Cancel	Click **Cancel** to exit this screen without saving.
Apply	Click **Apply** to save your changes.

CHAPTER 27
Email Notification

27.1 Email Notification Overview

A mail server is an application or a computer that can receive, forward and deliver email messages.

To have the Zyxel Device send reports, logs or notifications through email, you must specify an email server and the email addresses of the sender and receiver.

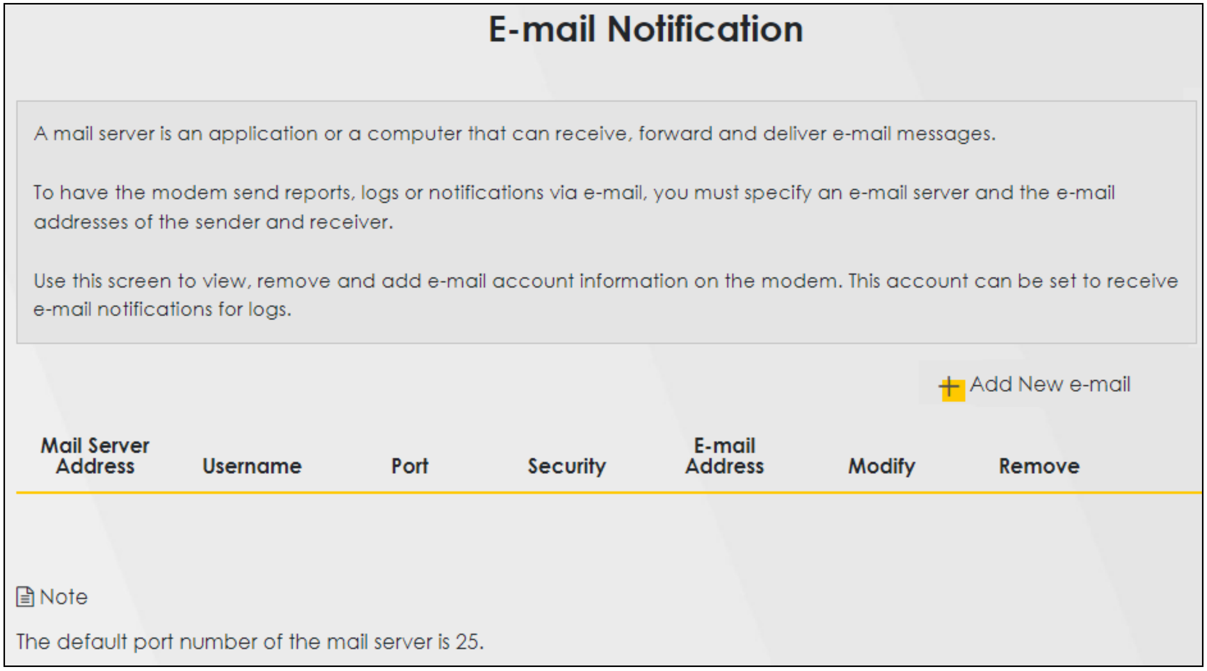
27.2 Email Notification

Use this screen to view, remove and add email account information on the Zyxel Device. This account can be set to send email notifications for logs.

Click **Maintenance** > **E-mail Notification** to open the **E-mail Notification** screen.

Note: The default port number of the mail server is 25.

Figure 141 Maintenance > E-mail Notification



E-mail Notification

A mail server is an application or a computer that can receive, forward and deliver e-mail messages.

To have the modem send reports, logs or notifications via e-mail, you must specify an e-mail server and the e-mail addresses of the sender and receiver.

Use this screen to view, remove and add e-mail account information on the modem. This account can be set to receive e-mail notifications for logs.

Mail Server Address	Username	Port	Security	E-mail Address	Modify	Remove

Note

The default port number of the mail server is 25.

The following table describes the labels in this screen.

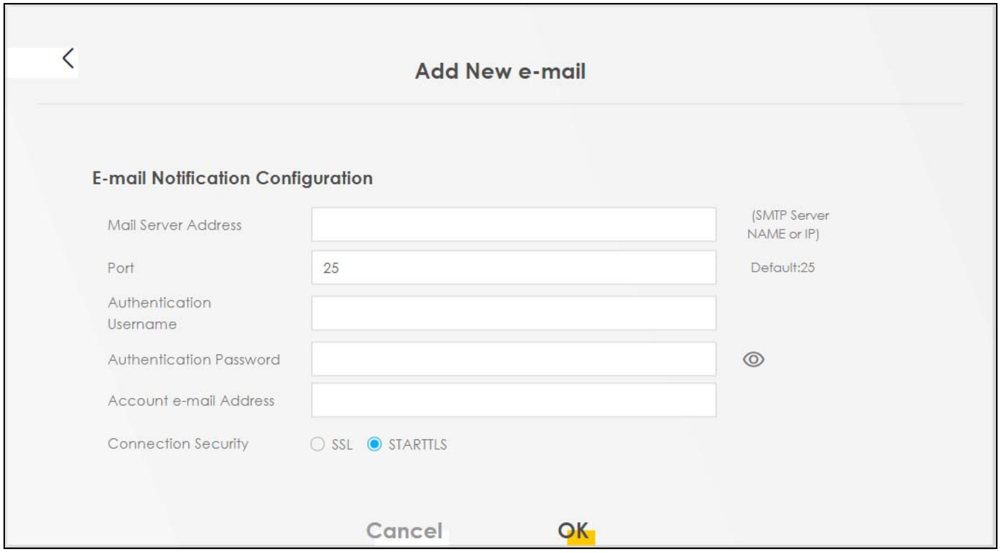
Table 93 Maintenance > E-mail Notification

LABEL	DESCRIPTION
Add New e-mail	Click this button to create a new entry (up to 32 can be created).
Mail Server Address	This displays the server name or the IP address of the mail server.
Username	This displays the user name of the sender's mail account.
Port	This field displays the port number of the mail server.
Security	This field displays the protocol used for encryption.
E-mail Address	This field displays the email address that you want to be in the from or sender line of the email that the Zyxel Device sends.
Modify	Click the **Edit** icon to configure the entry. Click the **Delete** icon to remove the entry.
Remove	Click this button to delete the selected entries.

27.2.1 E-mail Notification Edit

Click the **Add** button in the **E-mail Notification** screen. Use this screen to configure the required information for sending email through a mail server.

Figure 142 Maintenance > E-mail Notification > Add



Add New e-mail

E-mail Notification Configuration

Mail Server Address		(SMTP Server NAME or IP)
Port	25	Default:25
Authentication Username		
Authentication Password		
Account e-mail Address		
Connection Security	○ SSL ● STARTTLS	

The following table describes the labels in this screen.

Table 94 Maintenance > E-mail Notification > Add

LABEL	DESCRIPTION
Mail Server Address	Enter the server name or the IP address of the mail server for the email address specified in the **Account e-mail Address** field. If this field is left blank, reports, logs or notifications will not be sent through email.
Port	Enter the same port number here as is on the mail server for mail traffic.
Authentication Username	Enter the user name. You can use up to 32 printable characters except ["], [`], ['], [<], [>], [^], [$], [|], [&], or [;]. Spaces are allowed. This is usually the user name of a mail account you specified in the **Account email Address** field.

Table 94   Maintenance > E-mail Notification > Add (continued)

LABEL	DESCRIPTION
Authentication Password	Enter the password associated with the user name above.
Account e-mail Address	Enter the email address that you want to be in the from or sender line of the email notification that the Zyxel Device sends. If you activate SSL/TLS authentication, the email address must be able to be authenticated by the mail server as well.
Connection Security	Select **SSL** to use Secure Sockets Layer (SSL) or Transport Layer Security (TLS) if you want encrypted communications between the mail server and the Zyxel Device. Select **STARTTLS** to upgrade a plain text connection to a secure connection using SSL/TLS.
Cancel	Click this button to begin configuring this screen afresh.
OK	Click this button to save your changes and return to the previous screen.

CHAPTER 28 Log Setting

28.1 Log Setting Overview

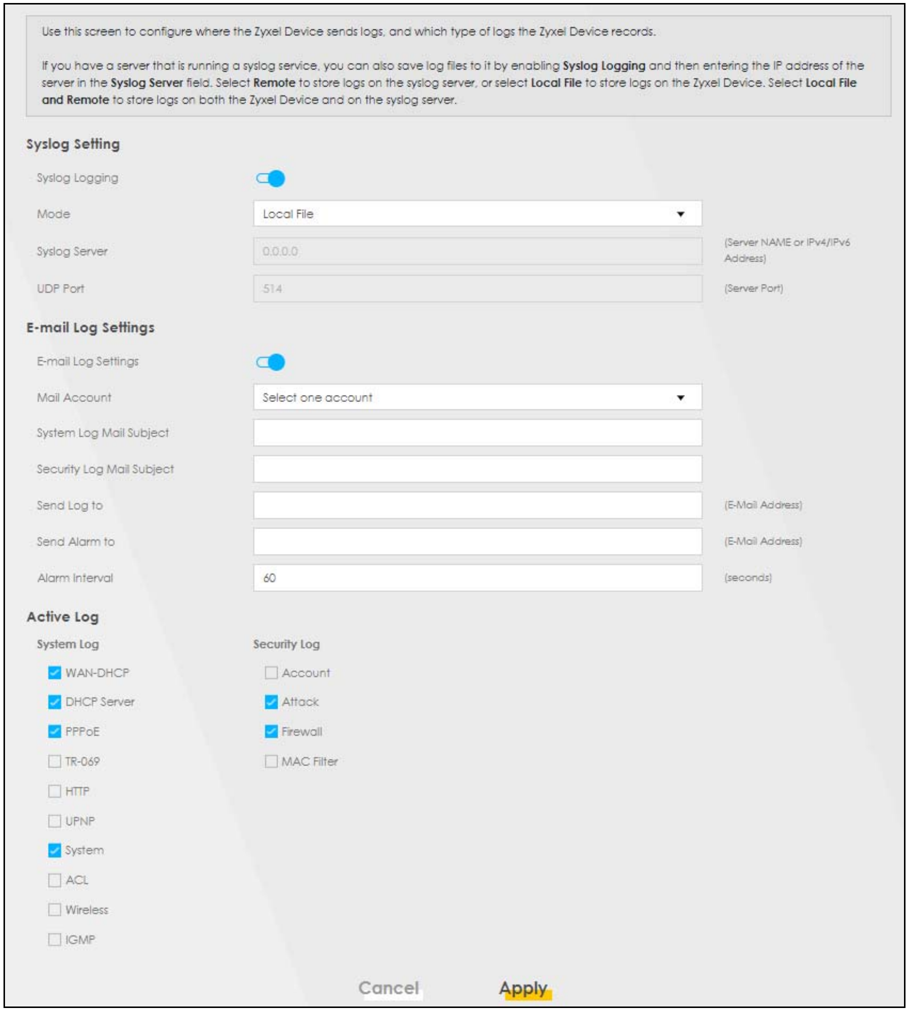
You can configure where the Zyxel Device sends logs and which type of logs the Zyxel Device records in the **Logs Setting** screen.

28.2 Log Setting

Use this screen to configure where the Zyxel Device sends logs, and which type of logs the Zyxel Device records.

If you have a server that is running a syslog service, you can also save log files to it by enabling **Syslog Logging**, and then entering the IP address of the server in the **Syslog Server** field. Select **Remote** to store logs on the syslog server, or select **Local File** to store logs on the Zyxel Device. Select **Local File and Remote** to store logs on both the Zyxel Device and the syslog server. To change your Zyxel Device's log settings, click **Maintenance** > **Log Setting**. The screen appears as shown.

Figure 143 Maintenance > Log Setting



Use this screen to configure where the Zyxel Device sends logs, and which type of logs the Zyxel Device records.

If you have a server that is running a syslog service, you can also save log files to it by enabling **Syslog Logging** and then entering the IP address of the server in the **Syslog Server** field. Select **Remote** to store logs on the syslog server, or select **Local File** to store logs on the Zyxel Device. Select **Local File and Remote** to store logs on both the Zyxel Device and on the syslog server.

Syslog Setting

Syslog Logging: ●
Mode: Local File
Syslog Server: 0.0.0.0 (Server NAME or IPv4/IPv6 Address)
UDP Port: 514 (Server Port)

E-mail Log Settings

E-mail Log Settings: ●
Mail Account: Select one account
System Log Mail Subject:
Security Log Mail Subject:
Send Log to: (E-Mail Address)
Send Alarm to: (E-Mail Address)
Alarm Interval: 60 (seconds)

Active Log

System Log
☑ WAN-DHCP
☑ DHCP Server
☑ PPPoE
□ TR-069
□ HTTP
□ UPNP
☑ System
□ ACL
□ Wireless
□ IGMP

Security Log
□ Account
☑ Attack
☑ Firewall
□ MAC Filter

The following table describes the fields in this screen.

Table 95 Maintenance > Log Setting

LABEL	DESCRIPTION
Syslog Settings	
Syslog Logging	Slide the switch to the right to enable syslog logging.
Mode	Select **Remote** to have the Zyxel Device send it to an external syslog server. Select **Local File** to have the Zyxel Device save the log file on the Zyxel Device itself. Select **Local File and Remote** to have the Zyxel Device save the log file on the Zyxel Device itself and send it to an external syslog server. Note: A warning appears upon selecting **Remote** or **Local File and Remote**. Just click **OK** to continue.
Syslog Server	Enter the server name or IP address of the syslog server that will log the selected categories of logs.
UDP Port	Enter the port number used by the syslog server.
E-mail Log Settings	

Table 95 Maintenance > Log Setting (continued)

LABEL	DESCRIPTION
E-mail Log Settings	Slide the switch to the right to allow the sending through email the system and security logs to the email address specified in **Send Log to**. Note: Make sure that the **Mail Server Address** field is not left blank in the **Maintenance** > **E-mail Notifications** screen.
Mail Account	Select a server specified in **Maintenance** > **E-mail Notifications** to send the logs to.
System Log Mail Subject	This field allows you to enter a descriptive name for the system log email (for example Zyxel System Log). Up to 127 printable characters are allowed for the **System Log Mail Subject** including special characters inside the square brackets [!#%()*+,–./:=?@[]\{}~].
Security Log Mail Subject	This field allows you to enter a descriptive name for the security log email (for example Zyxel Security Log). Up to 127 printable characters are allowed for the **Security Log Mail Subject** including special characters inside the square brackets [!#%()*+,–./:=?@[]\{}~].
Send Log to	This field allows you to enter the log’s designated email recipient. The log’s format is plain text file sent as an email attachment.
Send Alarm to	This field allows you to enter the alarm’s designated e-mail recipient. The alarm’s format is plain text file sent as an email attachment.
Alarm Interval	Select the frequency of showing of the alarm.
Active Log	
System Log	Select the categories of **System Log**s that you want to record.
Security Log	Select the categories of **Security Log**s that you want to record.
Apply	Click **Apply** to save your changes.
Cancel	Click **Cancel** to restore your previously saved settings.

28.2.1 Example Email Log

An ‘End of Log’ message displays for each mail in which a complete log has been sent. The following is an example of a log sent by email.

- You may edit the subject title.
- The date format here is Day-Month-Year.
- The date format here is Month-Day-Year. The time format is Hour-Minute-Second.
- ‘`End of Log`’ message shows that a complete log has been sent.

Figure 144 Email Log Example

```
Subject:
        Firewall Alert From
   Date:
        Fri, 07 Apr 2000 10:05:42
   From:
        user@zyxel.com
     To:
        user@zyxel.com
  1|Apr  7 00 |From:192.168.1.1     To:192.168.1.255   |default policy  |forward
   | 09:54:03 |UDP     src port:00520 dest port:00520  |<1,00>          |
  2|Apr  7 00 |From:192.168.1.131   To:192.168.1.255   |default policy  |forward
   | 09:54:17 |UDP     src port:00520 dest port:00520  |<1,00>          |
  3|Apr  7 00 |From:192.168.1.6     To:10.10.10.10     |match           |forward
   | 09:54:19 |UDP     src port:03516 dest port:00053  |<1,01>          |
…………………………..{snip}…………………………..
…………………………..{snip}…………………………..
126|Apr  7 00 |From:192.168.1.1     To:192.168.1.255   |match           |forward
   | 10:05:00 |UDP     src port:00520 dest port:00520  |<1,02>          |
127|Apr  7 00 |From:192.168.1.131   To:192.168.1.255   |match           |forward
   | 10:05:17 |UDP     src port:00520 dest port:00520  |<1,02>          |
128|Apr  7 00 |From:192.168.1.1     To:192.168.1.255   |match           |forward
   | 10:05:30 |UDP     src port:00520 dest port:00520  |<1,02>          |

End of Firewall Log
```

CHAPTER 29
Firmware Upgrade

29.1 Firmware Upgrade Overview

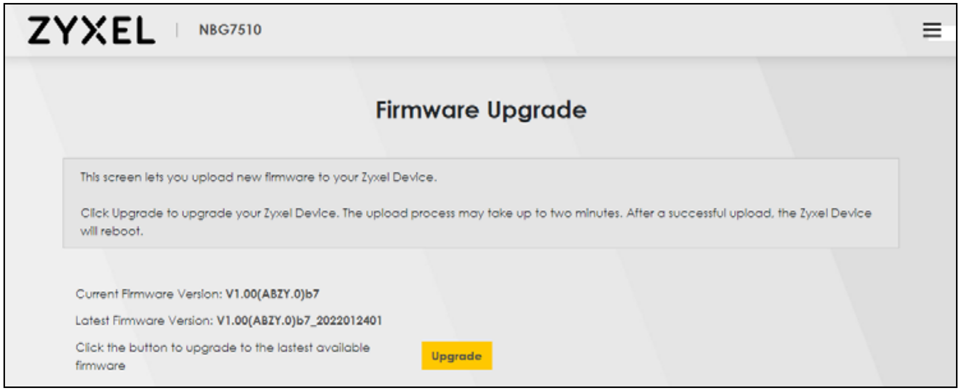
This chapter explains how to upgrade new firmware for your Zyxel Device. You can check and download new firmware online to upgrade your Zyxel Device's performance.

29.2 Firmware Upgrade

Click **Maintenance** > **Firmware Upgrade** to open the **following** screen. Click the **Upgrade** button to update to the latest available firmware. The **Upgrade** button is available only when the latest firmware update is available.

Do NOT turn off the Zyxel Device while firmware upload is in progress!

Figure 145 Maintenance > Firmware Upgrade



Firmware Upgrade

This screen lets you upload new firmware to your Zyxel Device.

Click Upgrade to upgrade your Zyxel Device. The upload process may take up to two minutes. After a successful upload, the Zyxel Device will reboot.

Current Firmware Version: **V1.00(ABZY.0)b7**

Latest Firmware Version: **V1.00(ABZY.0)b7_2022012401**

Click the button to upgrade to the lastest available firmware

The following table describes the labels in this screen.

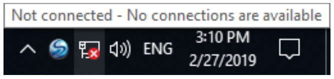
Table 96 Maintenance > Firmware Upgrade

LABEL	DESCRIPTION
Upgrade Firmware	
Current Firmware Version	This is the current firmware version.
Latest Firmware Version	This is the latest firmware version.

After you see the firmware updating screen, wait a few minutes before logging into the Zyxel Device again.

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

Figure 146 Network Temporarily Disconnected

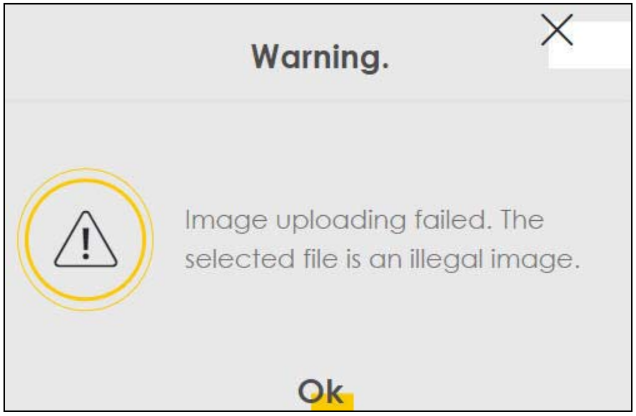


Not connected - No connections are available

After 2 minutes, log in again and check your new firmware version in the **Connection Status** screen.

If the upload was not successful, an error screen will appear. Click **OK** to go back to the **Firmware Upgrade** screen.

Figure 147 Error Message



Warning.

Image uploading failed. The selected file is an illegal image.

CHAPTER 30
Backup/Restore

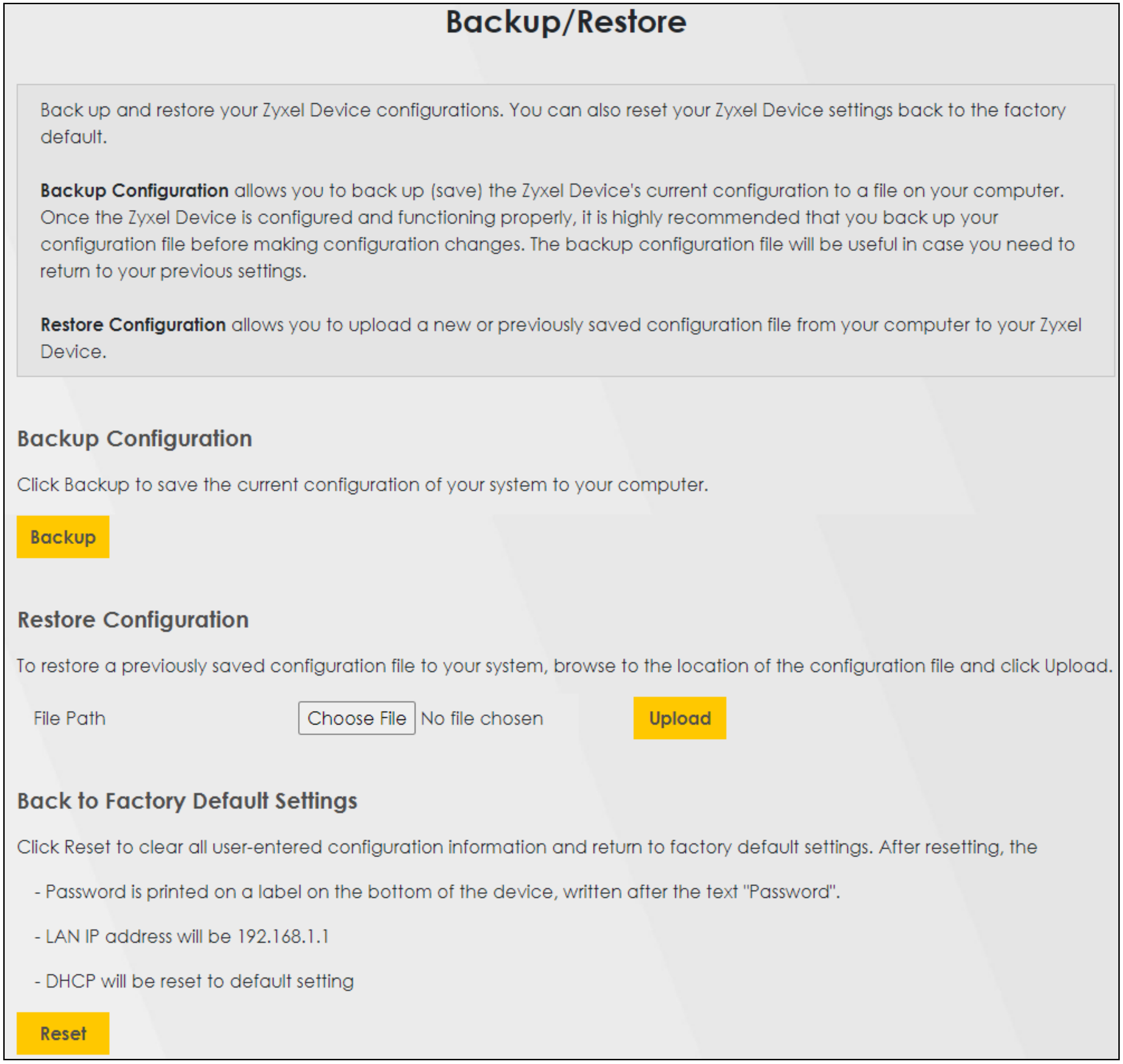
30.1 Backup/Restore Overview

Information related to factory default settings and backup configuration are shown in this screen. You can also use this to restore Zyxel Device's previous configurations.

30.2 Backup/Restore

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

Figure 148 Maintenance > Backup/Restore



Backup/Restore

Back up and restore your Zyxel Device configurations. You can also reset your Zyxel Device settings back to the factory default.

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

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

Backup Configuration

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

Restore Configuration

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

File Path Choose File No file chosen

Back to Factory Default Settings

Click Reset to clear all user-entered configuration information and return to factory default settings. After resetting, the

- Password is printed on a label on the bottom of the device, written after the text "Password".

- LAN IP address will be 192.168.1.1

- DHCP will be reset to default setting

Backup Configuration

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

Click **Backup** to save the Zyxel Device's current configuration to your computer.

Restore Configuration

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

Table 97 Maintenance > Backup/Restore: Restore Configuration

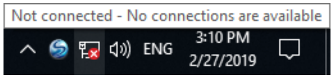
LABEL	DESCRIPTION
File Path	Enter in the location of the file you want to upload in this field or click **Choose File** / **Browse** to find it.
Choose File / Browse	Click this to find the file you want to upload. Remember that you must decompress compressed (.ZIP) files before you can upload them.
Upload	Click this to begin the upload process.
Reset	Click this to reset your Zyxel Device settings back to the factory default.

Do not turn off the Zyxel Device while configuration file upload is in progress.

After the Zyxel Device configuration has been restored successfully, the login screen appears. Login again to restart the Zyxel Device.

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

Figure 149 Network Temporarily Disconnected

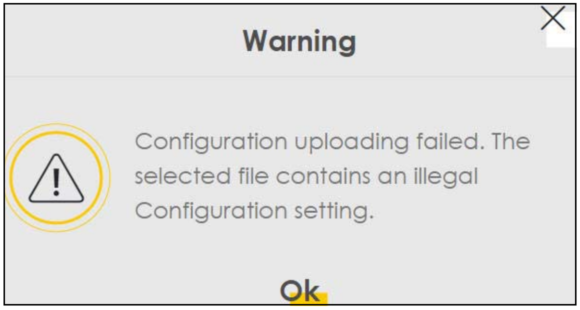


Not connected - No connections are available

If you restore the default configuration, you may need to change the IP address of your computer to be in the same subnet as that of the default Zyxel Device IP address (192.168.1.1-192.168.225.225).

If the upload was not successful, an error screen will appear. Click **OK** to go back to the **Configuration** screen.

Figure 150 Configuration Upload Error



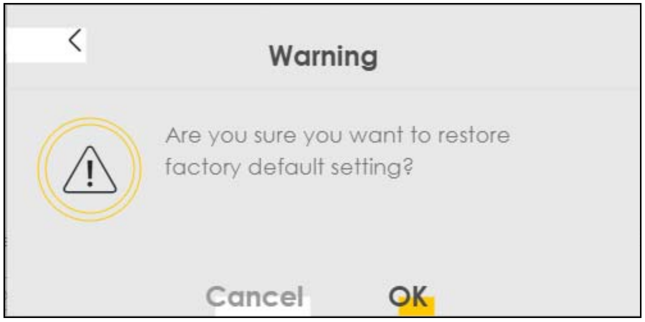
Warning

Configuration uploading failed. The selected file contains an illegal Configuration setting.

Back to Factory Default Settings

Click the **Reset All Settings** button to clear all user-entered configuration information and return the Zyxel Device to its factory defaults. The following warning screen appears.

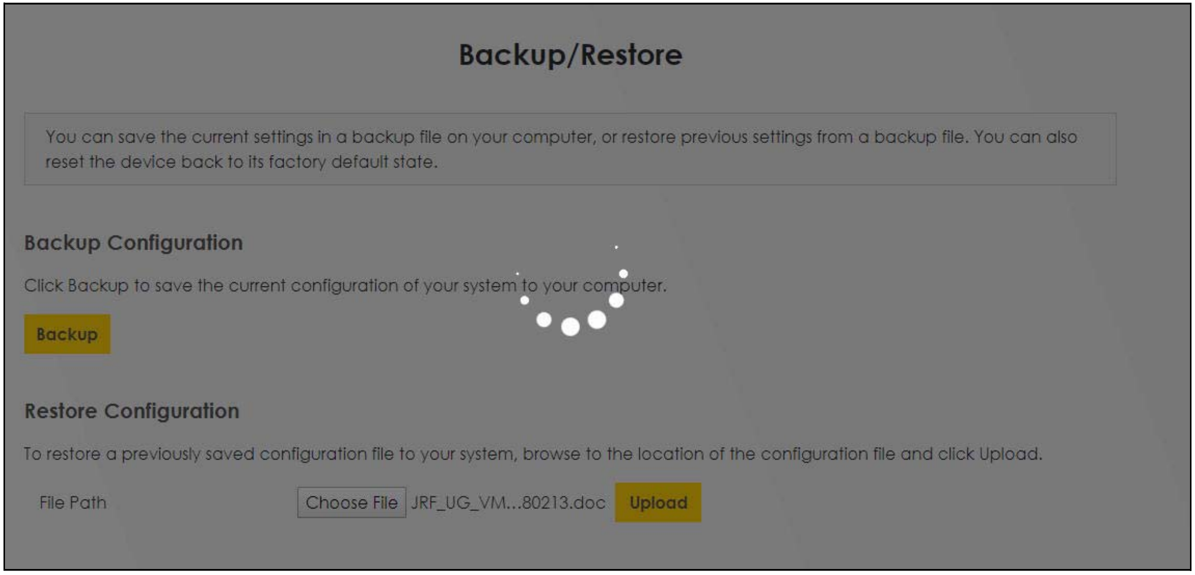
Figure 151 Reset Warning Message



Warning

Are you sure you want to restore factory default setting?

Figure 152 Reset In Progress



Backup/Restore

You can save the current settings in a backup file on your computer, or restore previous settings from a backup file. You can also reset the device back to its factory default state.

Backup Configuration

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

Restore Configuration

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

File Path: JRF_UG_VM...80213.doc

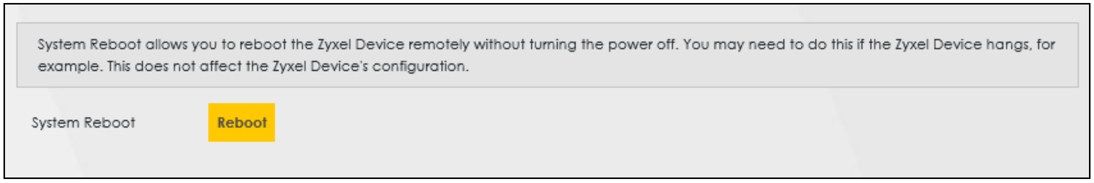
You can also press the **RESET** button on the panel to reset the factory defaults of your Zyxel Device.

30.3 Perform Partial Factory ResetReboot

System **Reboot** allows you to reboot the Zyxel Device remotely without turning the power off. You may need to do this if the Zyxel Device hangs, for example. This does not affect the Zyxel Device's configuration.

Click **Maintenance** > **Reboot**. Click **Reboot** to have the Zyxel Device reboot.

Figure 153 Maintenance > Reboot



System Reboot allows you to reboot the Zyxel Device remotely without turning the power off. You may need to do this if the Zyxel Device hangs, for example. This does not affect the Zyxel Device's configuration.

System Reboot

CHAPTER 31 Diagnostic

31.1 Diagnostic Overview

The **Diagnostic** screen displays information to help you identify Internet connection problems with the Zyxel Device.

31.1.1 What You Can Do in this Chapter

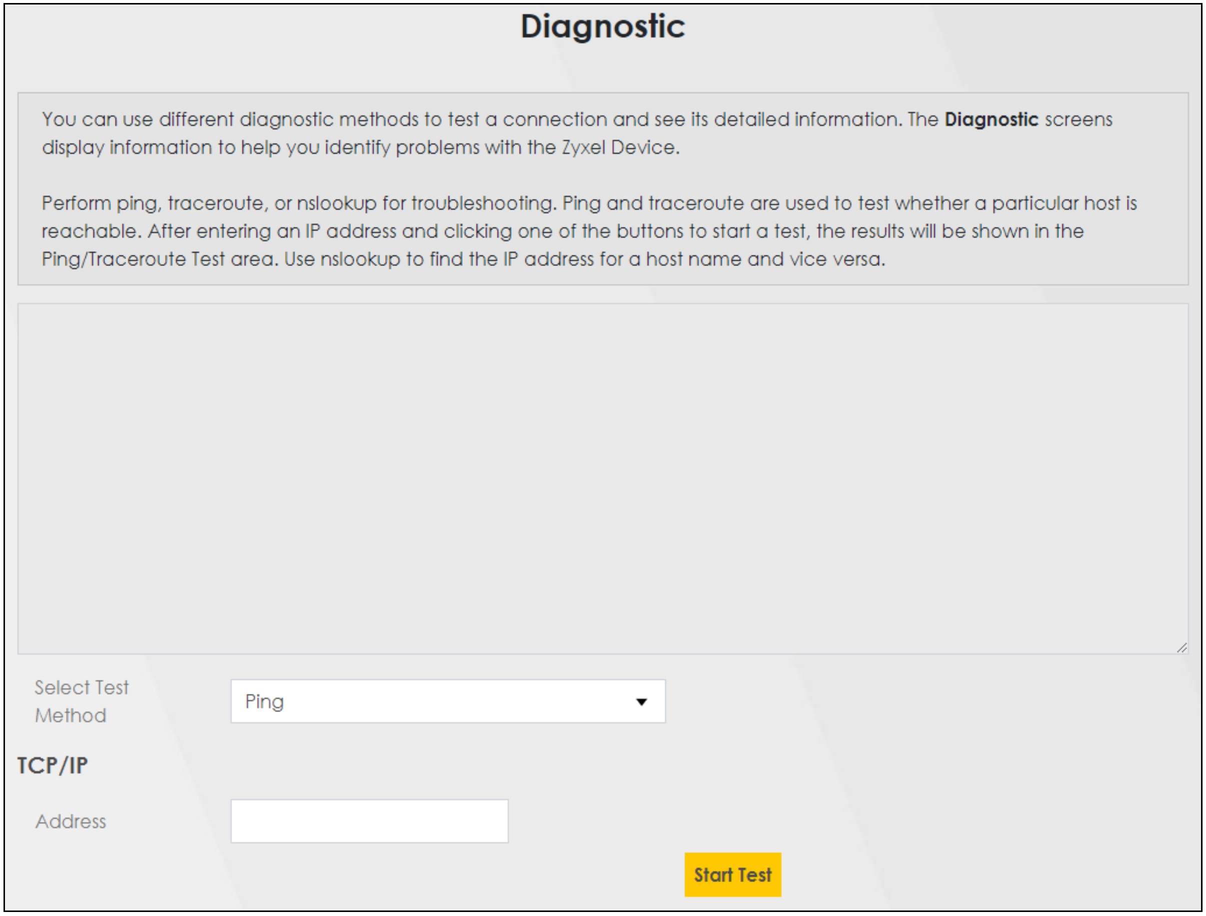
- The **Diagnostic** screen lets you select different methods to test an Internet connection (Section 31.2 on page 238).

31.2 Diagnostic

Use this screen to ping, traceroute, nslookup, or speed test for troubleshooting. Ping and traceroute are used to test whether a particular host is reachable. After entering an IP address and clicking one of the buttons to start a test, the results will be shown in the screen. Use nslookup to find the IP address for a host name and vice versa. Use speed test to perform an upload and download throughput test for applications such as file transfer, web browsing and email.

Click **Maintenance** > **Diagnostic** to open the following screen.

Figure 154 Maintenance > Diagnostic



Diagnostic

You can use different diagnostic methods to test a connection and see its detailed information. The **Diagnostic** screens display information to help you identify problems with the Zyxel Device.

Perform ping, traceroute, or nslookup for troubleshooting. Ping and traceroute are used to test whether a particular host is reachable. After entering an IP address and clicking one of the buttons to start a test, the results will be shown in the Ping/Traceroute Test area. Use nslookup to find the IP address for a host name and vice versa.

Select Test Method: Ping

TCP/IP

Address:

The following table describes the fields in this screen.

Table 98 Maintenance > Diagnostic

LABEL	DESCRIPTION
	The result of tests is shown here in the info area.
Select Test Method	
Ping	Select this to perform a ping test on the IPv4 address or host name in order to test a connection. The ping statistics will show in the info area.
Ping 6	Select this to perform a ping test on the IPv6 address or host name in order to test a connection. The ping statistics will show in the info area.
Trace Route	Select this to perform the IPv4 trace route function. This determines the path a packet takes to the specified host.
Trace Route 6	Select this to perform the IPv6 trace route function. This determines the path a packet takes to the specified host.
Nslookup	Select this to perform a DNS lookup on the IP address or host name.
TCP/IP	
Address	Enter the IP address of a computer that you want to perform ping, trace route, nslookup, or speed test in order to test a connection.
Start Test	Click this to perform the selected test method.

PART III
Troubleshooting and Appendices

Appendices contain general information. Some information may not apply to your Zyxel Device.

CHAPTER 32 Troubleshooting

32.1 Troubleshooting Overview

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

- Power and Hardware Problems
- Device Access Problems
- Internet Problems
- WiFi Problems
- UPnP Problems

32.2 Power and Hardware Problems

The Zyxel Device does not turn on.

1 Make sure you are using the power adapter included with the Zyxel Device.

2 Make sure the power adapter is connected to the Zyxel Device and plugged in to an appropriate power source. Make sure the power source is turned on.

3 Disconnect and re-connect the power adapter to the Zyxel Device.

4 Make sure you have pressed the **POWER** button to turn on the Zyxel Device.

5 If the problem continues, contact the vendor.

The LED does not behave as expected.

1 Make sure you understand the normal behavior of the LED.

2 Check the hardware connections.

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

4 Turn the Zyxel Device off and on.

5 If the problem continues, contact the vendor.

32.3 Device Access Problems

I do not know the IP address of the Zyxel Device.

1 The default IP address is 192.168.123.1

2 If you changed the IP address, you might be able to find the IP address of the Zyxel Device by looking up the IP address of your computer's default gateway. To do this in Microsoft Windows, click **Start** > **Run**, enter **cmd**, and then enter **ipconfig**. The IP address of the **Default Gateway** might be the IP address of the Zyxel Device, depending on your network environment.

3 If this does not work, reset the Zyxel Device to its factory defaults.

I forgot the admin password.

1 See the Zyxel Device label or this document's cover page for the default admin password.

2 If you changed the password from default and cannot remember the new one, you have to reset the Zyxel Device to its factory default settings.

I cannot access the Web Configurator login screen.

1 Make sure you are using the correct IP address.

- The default IP address is 192.168.123.1.
- If you changed the IP address, use the new IP address.
- If you changed the IP address and have forgotten the new address, see the troubleshooting suggestions for I do not know the IP address of the Zyxel Device.

2 Check the hardware connections, and make sure the LEDs are behaving as expected.

3 Make sure your Internet browser does not block pop-up windows and has JavaScript and Java enabled.

4 Clear the Internet browser cache and try accessing the Web Configurator login screen again.

5 If it is possible to log in from another interface, check the service control settings for HTTP and HTTPS (**Maintenance** > **Remote Management**).

6 Reset the Zyxel Device to its factory default, and try to access the Zyxel Device with the default IP address.

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

Advanced Suggestions

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

I cannot log into the Zyxel Device.

1 Make sure you have entered the user name and password correctly. The default user name is **admin**. These both user name and password are case-sensitive, so make sure [Caps Lock] is not on.

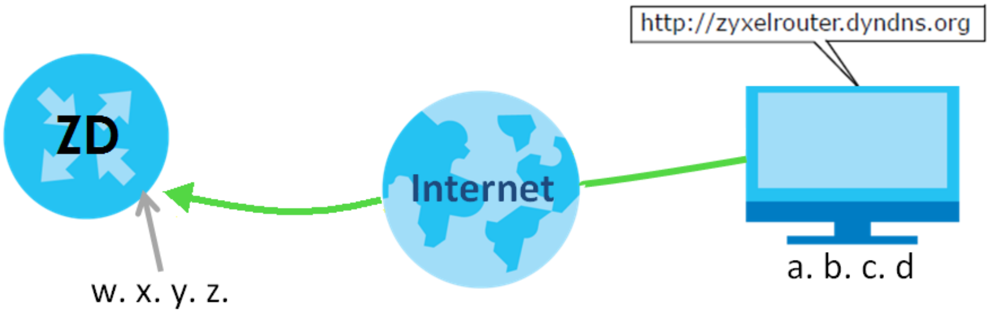
2 You cannot log in to the Web Configurator while someone is using Telnet to access the Zyxel Device. Log out of the Zyxel Device in the other session, or ask the person who is logged in to log out.

3 Turn the Zyxel Device off and on.

4 If this does not work, you have to reset the Zyxel Device to its factory default.

I cannot log into the Zyxel Device using DDNS.

If you connect your Zyxel Device to the Internet and it uses a dynamic WAN IP address, it is inconvenient for you to manage the Zyxel Device from the Internet. The Zyxel Device's WAN IP address changes dynamically. Dynamic DNS (DDNS) allows you to access the Zyxel Device using a domain name.



To use this feature, you have to apply for DDNS service at www.dyndns.org.

Note: If you have a private WAN IP address, then you cannot use DDNS.

Here are the three steps to use a domain name to log in the Web Configurator:

Step 1 Register for a DDNS Account on www.dyndns.org

1. Open a browser and enter **http://www.dyndns.org**.

2. Apply for a user account. This tutorial uses **UserName1** and **12345** as the username and password.

3. Log into www.dyndns.org using your account.

4. Add a new DDNS host name. This tutorial uses the following settings as an example.
   - Hostname: **zyxelrouter.dyndns.org**
   - Service Type: **Host with IP address**
   - IP Address: Enter the WAN IP address that your Zyxel Device is currently using. You can find the IP address on the Zyxel Device's Web Configurator **Status** page.

Then you will need to configure the same account and host name on the Zyxel Device later.

Step 2 Configure DDNS on Your Zyxel Device

Configure the following settings in the **Network Setting** > **DNS** > **Dynamic DNS** screen.

- Select **Enable Dynamic DNS**.
- Select **www.DynDNS.com** as the service provider.
- Enter **zyxelrouter.dyndns.org** in the **Host Name** field.
- Enter the user name (**UserName1**) and password (**12345**). Click **Apply**.

Step 3 Test the DDNS Setting

Now you should be able to access the Zyxel Device from the Internet. To test this:

1. Open a web browser on the computer (using the IP address **a.b.c.d**) that is connected to the Internet.

2. Enter **http://zyxelrouter.dyndns.org** and press [Enter].

3. The Zyxel Device's login page should appear. You can then log into the Zyxel Device and manage it.

I cannot connect to the Zyxel Device using FTP, Telnet, SSH, or Ping.

1. See the Remote Management section for details on allowing web services (such as HTTP, HTTPS, FTP, Telnet, SSH and Ping) to access the Zyxel Device.

2. Check the server **Port** number field for the web service in the **Maintenance** > **Remote Management** screen. You must use the same port number in order to use that web service for remote management.

3. Try the troubleshooting suggestions for I cannot access the Web Configurator login screen. Ignore the suggestions about your browser.

The SIM card cannot be detected.

1 Disconnect the Zyxel Device from the power supply.

2 Remove the SIM card from its slot.

3 Clean the SIM card slot of any loose debris using compressed air.

4 Clean the gold connectors on the SIM card with a clean lint-free cloth.

5 Insert the SIM card into its slot and connect the Zyxel Device to the power supply to restart it.

I get an **Invalid** SIM card alert.

1 Make sure you have an active plan with your ISP.

2 Make sure that the Zyxel Device is in the coverage area of a cellular network.

3 Enable **Data Roaming** in **Network Setting** > **Broadband** > **Cellular WAN** to keep the Zyxel Device connected to the Internet when you are traveling outside the geographical coverage area of the network to which you are registered, such as a different country. Then, restart the Zyxel Device.

1 Check the signal strength. Look at the LEDs, and check the LED section for more information. If the signal strength is low, try moving the Zyxel Device closer to the ISP's base station if possible, and look around to see if there are any devices that might be interfering with the wireless network (such as microwaves, other wireless networks).

2 Select **Auto** in **Network Setting** > **Broadband** > **Cellular Band**: **Preferred Access Technology** and slide the switch to the right to enable **Band Auto Selection**.

3 Find the location of your nearest cellular base stations, then install the Zyxel Device towards the direction of those sites. The nearest site or site with a direct line-of-sight is usually preferred.

32.4 Internet Problems

I cannot access the Internet.

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

2 Make sure you entered your ISP account information correctly on the **Network Setting** > **Broadband** screen. Fields on this screen are case-sensitive, so check if [Caps Lock] is on of off.

3 Check that the WAN interface you are connected to is in the same interface group as the Ethernet connection (**Network Setting** > **Interface Group**).

4 Make sure you have the Ethernet WAN port connected to a Modem or Router.

5. If you set up a WAN connection using bridging service, make sure you turn off the DHCP feature in the **Network Setting** > **Home Networking** > **LAN Setup** screen to have the clients get WAN IP addresses directly from your ISP's DHCP server.
6. If you are trying to access the Internet wirelessly, make sure that you enabled the WiFi in the Zyxel Device and your WiFi client and that the WiFi settings in the WiFi client are the same as the settings in the Zyxel Device.
7. Disconnect all the cables from your Zyxel Device and reconnect them.
8. If the problem continues, contact your ISP.

I cannot connect to the Internet using an Ethernet connection.

1. Make sure you have the Ethernet WAN port connected to a Modem or Router.
2. Make sure you configured a proper Ethernet WAN interface (**Network Setting** > **Broadband** screen) with the Internet account information provided by your ISP and that it is enabled.
3. Check that the WAN interface you are connected to is in the same interface group as the Ethernet connection (**Network Setting** > **Interface Group**).
4. If you set up a WAN connection using bridging service, make sure you turn off the DHCP feature in the **Network Setting** > **Home Networking** > **LAN Setup** screen to have the clients get WAN IP addresses directly from your ISP's DHCP server.

The Internet connection is slow or intermittent.

1. There might be a lot of traffic on the network. If the Zyxel Device is sending or receiving a lot of information, try closing some programs that use the Internet, especially peer-to-peer applications.
2. If your Zyxel Device keeps alternating between ISPs, then choose a fixed ISP. Go to the **Network Setting** > **Cellular PLMN** screen, disable **PLMN Auto Selection** and then choose your preferred ISP.
3. Turn the Zyxel Device off and on.
4. If the problem continues, contact the network administrator or vendor, or try the advanced suggestions in I cannot access the Web Configurator login screen.

   Note: If your Zyxel Device is an outdoor-type, inclement weather like rain and hot weather may affect cellular signals.

32.5 WiFi Problems

I cannot connect to the Zyxel Device WiFi.

1. Check the WiFi LED status to make sure the Zyxel Device WiFi is on.
2. Make sure your WiFi client is within transmission range of the Zyxel Device.
3. Make sure you entered the correct SSID and password. See the Zyxel Device back label for the default SSID and password.
4. Make sure your WiFi client is using the same WiFi security type (WPA2-PSK, WPA3-SAE, or none) as the Zyxel Device.
5. Make sure the WiFi adapter on your WiFi client is working properly. Right-click your computer's network adapter then select **Properties** to check your network adapter status.
6. Make sure the WiFi adapter on your WiFi client is IEEE 802.11-compatible and supports the same WiFi standard as the Zyxel Device radio.

The WiFi connection is slow and intermittent.

The following factors may cause interference:

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

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

- Move your wireless device closer to the AP if the signal strength is low.
- Reduce wireless interference that may be caused by other WiFi networks or surrounding wireless electronics such as cordless phones.
- Place the AP where there are minimum obstacles (such as walls and ceilings) between the AP and the WiFi client.
- Reduce the number of WiFi clients connecting to the same AP simultaneously, or add additional APs if necessary.
- Try closing some programs that use the Internet, especially peer-to-peer applications. If the WiFi client is sending or receiving a lot of information, it may have too many programs open that use the Internet.
- Place the Zyxel Device where there are minimum obstacles (such as walls and ceilings) between the Zyxel Device and the WiFi client. Avoid placing the Zyxel Device inside any type of box that might block WiFi signals.

32.6 UPnP Problems

My computer cannot detect UPnP settings from the Zyxel Device.

1 Make sure that UPnP is enabled in your computer.

2 On the Zyxel Device, make sure that UPnP is enabled on the **Network Settings** > **Home Networking** > **UPnP** screen.

3 Disconnect the Ethernet cable from the Zyxel Device's Ethernet port or from your computer.

4 Reconnect the Ethernet cable.

5 Restart your computer.

32.7 Getting More Troubleshooting Help

Search for support information for your model at *support.zyxel.com* and *community.zyxel.com* for more troubleshooting suggestions.

APPENDIX A
Customer Support

In the event of problems that cannot be solved by using this manual, you should contact your vendor. If you cannot contact your vendor, then contact a Zyxel office for the region in which you bought the Zyxel Device.

For Zyxel Communication offices, see *https://service-provider.zyxel.com/global/en/contact-us* for the latest information.

For Zyxel Network offices, see *https://www.zyxel.com/index.shtml* for the latest information.

Please have the following information ready when you contact an office.

Required Information

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

Corporate Headquarters (Worldwide)

Taiwan

- Zyxel Communications (Taiwan) Co., Ltd.
- *https://www.zyxel.com*

Asia

China

- Zyxel Communications Corporation–China Office
- *https://www.zyxel.com/cn/sc*

India

- Zyxel Communications Corporation–India Office
- *https://www.zyxel.com/in/en-in*

Kazakhstan

- Zyxel Kazakhstan
- *https://www.zyxel.com/ru/ru*

Korea

- Zyxel Korea Co., Ltd.
- *http://www.zyxel.kr/*

Malaysia

- Zyxel Communications Corp.
- *https://www.zyxel.com/global/en*

Philippines

- Zyxel Communications Corp.
- *https://www.zyxel.com/global/en*

Singapore

- Zyxel Communications Corp.
- *https://www.zyxel.com/global/en*

Taiwan

- Zyxel Communications (Taiwan) Co., Ltd.
- *https://www.zyxel.com/tw/zh*

Thailand

- Zyxel Thailand Co., Ltd.
- *https://www.zyxel.com/th/th*

Vietnam

- Zyxel Communications Corporation–Vietnam Office
- *https://www.zyxel.com/vn/vi*

Europe

Belarus

- Zyxel Communications Corp.
- *https://www.zyxel.com/ru/ru*

Belgium (Netherlands)

- Zyxel Benelux
- *https://www.zyxel.com/nl/nl*
- *https://www.zyxel.com/fr/fr*

Bulgaria

- Zyxel Bulgaria

- *https://www.zyxel.com/bg/bg*

Czech Republic

- Zyxel Communications Czech s.r.o.
- *https://www.zyxel.com/cz/cs*

Denmark

- Zyxel Communications A/S
- *https://www.zyxel.com/dk/da*

Finland

- Zyxel Communications
- *https://www.zyxel.com/fi/fi*

France

- Zyxel France
- *https://www.zyxel.com/fr/fr*

Germany

- Zyxel Deutschland GmbH.
- *https://www.zyxel.com/de/de*

Hungary

- Zyxel Hungary & SEE
- *https://www.zyxel.com/hu/hu*

Italy

- Zyxel Communications Italy S.r.l.
- *https://www.zyxel.com/it/it*

Norway

- Zyxel Communications A/S
- *https://www.zyxel.com/no/no*

Poland

- Zyxel Communications Poland
- *https://www.zyxel.com/pl/pl*

Romania

- Zyxel Romania
- *https://www.zyxel.com/ro/ro*

Russian Federation

- Zyxel Communications Corp.
- *https://www.zyxel.com/ru/ru*

Slovakia

- Zyxel Slovakia
- *https://www.zyxel.com/sk/sk*

Spain

- Zyxel Iberia
- *https://www.zyxel.com/es/es*

Sweden

- Zyxel Communications A/S
- *https://www.zyxel.com/se/sv*

Switzerland

- Studerus AG
- *https://www.zyxel.com/ch/de-ch*
- *https://www.zyxel.com/fr/fr*

Turkey

- Zyxel Turkey A.S.
- *https://www.zyxel.com/tr/tr*

UK

- Zyxel Communications UK Ltd.
- *https://www.zyxel.com/uk/en-gb*

Ukraine

- Zyxel Ukraine
- *https://www.zyxel.com/ua/uk-ua*

South America

Argentina

- Zyxel Communications Corp.
- *https://www.zyxel.com/co/es-co*

Brazil

- Zyxel Communications Brasil Ltda.

- *https://www.zyxel.com/br/pt*

Colombia

- Zyxel Communications Corp.
- *https://www.zyxel.com/co/es-co*

Ecuador

- Zyxel Communications Corp.
- *https://www.zyxel.com/co/es-co*

South America

- Zyxel Communications Corp.
- *https://www.zyxel.com/co/es-co*

Middle East

Israel

- Zyxel Communications Corp.
- *https://il.zyxel.com*

North America

USA

- Zyxel Communications, Inc. – North America Headquarters
- *https://www.zyxel.com/us/en-us*

APPENDIX B
IPv6

Overview

IPv6 (Internet Protocol version 6), is designed to enhance IP address size and features. The increase in IPv6 address size to 128 bits (from the 32-bit IPv4 address) allows up to 3.4 x 10^{38} IP addresses.

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`.

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.

Link-local Address

A link-local address uniquely identifies a device on the local network (the LAN). It is similar to a "private IP address" in IPv4. You can have the same link-local address on multiple interfaces on a device. A link-local unicast address has a predefined prefix of fe80::/10. The link-local unicast address format is as follows.

Table 99 Link-local Unicast Address Format

1111 1110 10	0	Interface ID
10 bits	54 bits	64 bits

Global Address

A global address uniquely identifies a device on the Internet. It is similar to a "public IP address" in IPv4. A global unicast address starts with a 2 or 3.

Unspecified Address

An unspecified address (0:0:0:0:0:0:0:0 or ::) is used as the source address when a device does not have its own address. It is similar to “0.0.0.0” in IPv4.

Loopback Address

A loopback address (0:0:0:0:0:0:0:1 or ::1) allows a host to send packets to itself. It is similar to “127.0.0.1” in IPv4.

Multicast Address

In IPv6, Multicast addresses provide the same functionality as IPv4 broadcast addresses. Broadcasting is not supported in IPv6. A Multicast address allows a host to send packets to all hosts in a Multicast group.

Multicast scope allows you to determine the size of the Multicast group. A Multicast address has a predefined prefix of ff00::/8. The following table describes some of the predefined Multicast addresses.

Table 100 Predefined Multicast Address

MULTICAST ADDRESS	DESCRIPTION
FF01:0:0:0:0:0:0:1	All hosts on a local node.
FF01:0:0:0:0:0:0:2	All routers on a local node.
FF02:0:0:0:0:0:0:1	All hosts on a local connected link.
FF02:0:0:0:0:0:0:2	All routers on a local connected link.
FF05:0:0:0:0:0:0:2	All routers on a local site.
FF05:0:0:0:0:0:1:3	All DHCP severs on a local site.

The following table describes the Multicast addresses which are reserved and cannot be assigned to a Multicast group.

Table 101 Reserved Multicast Address

MULTICAST ADDRESS
FF00:0:0:0:0:0:0:0
FF01:0:0:0:0:0:0:0
FF02:0:0:0:0:0:0:0
FF03:0:0:0:0:0:0:0
FF04:0:0:0:0:0:0:0
FF05:0:0:0:0:0:0:0
FF06:0:0:0:0:0:0:0
FF07:0:0:0:0:0:0:0
FF08:0:0:0:0:0:0:0
FF09:0:0:0:0:0:0:0
FF0A:0:0:0:0:0:0:0
FF0B:0:0:0:0:0:0:0
FF0C:0:0:0:0:0:0:0
FF0D:0:0:0:0:0:0:0
FF0E:0:0:0:0:0:0:0
FF0F:0:0:0:0:0:0:0

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.

Interface ID

In IPv6, an interface ID is a 64-bit identifier. It identifies a physical interface (for example, an Ethernet port) or a virtual interface (for example, the management IP address for a VLAN). One interface should have a unique interface ID.

EUI-64

The EUI-64 (Extended Unique Identifier) defined by the IEEE (Institute of Electrical and Electronics Engineers) is an interface ID format designed to adapt with IPv6. It is derived from the 48-bit (6-byte) Ethernet MAC address as shown next. EUI-64 inserts the hex digits fffe between the third and fourth bytes of the MAC address and complements the seventh bit of the first byte of the MAC address. See the following example.

Table 102

MAC	00	:	13	:	49 : 12	:	34	:	56

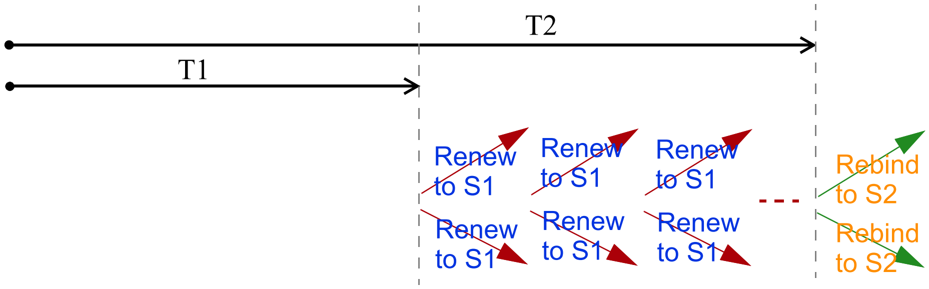
Table 103

EUI-64	02	:	13	:	49 :	FF	:	FE	: 12	:	34	:	56

Identity Association

An Identity Association (IA) is a collection of addresses assigned to a DHCP client, through which the server and client can manage a set of related IP addresses. Each IA must be associated with exactly one interface. The DHCP client uses the IA assigned to an interface to obtain configuration from a DHCP server for that interface. Each IA consists of a unique IAID and associated IP information.

The IA type is the type of address in the IA. Each IA holds one type of address. IA_NA means an identity association for non-temporary addresses and IA_TA is an identity association for temporary addresses. An IA_NA option contains the T1 and T2 fields, but an IA_TA option does not. The DHCPv6 server uses T1 and T2 to control the time at which the client contacts with the server to extend the lifetimes on any addresses in the IA_NA before the lifetimes expire. After T1, the client sends the server (**S1**) (from which the addresses in the IA_NA were obtained) a Renew message. If the time T2 is reached and the server does not respond, the client sends a Rebind message to any available server (**S2**). For an IA_TA, the client may send a Renew or Rebind message at the client's discretion.



DHCP Relay Agent

A DHCP relay agent is on the same network as the DHCP clients and helps forward messages between the DHCP server and clients. When a client cannot use its link-local address and a well-known multicast address to locate a DHCP server on its network, it then needs a DHCP relay agent to send a message to a DHCP server that is not attached to the same network.

The DHCP relay agent can add the remote identification (remote-ID) option and the interface-ID option to the Relay-Forward DHCPv6 messages. The remote-ID option carries a user-defined string, such as the system name. The interface-ID option provides slot number, port information and the VLAN ID to the DHCPv6 server. The remote-ID option (if any) is stripped from the Relay-Reply messages before the relay agent sends the packets to the clients. The DHCP server copies the interface-ID option from the Relay-Forward message into the Relay-Reply message and sends it to the relay agent. The interface-ID should not change even after the relay agent restarts.

Prefix Delegation

Prefix delegation enables an IPv6 router to use the IPv6 prefix (network address) received from the ISP (or a connected uplink router) for its LAN. The Zyxel Device uses the received IPv6 prefix (for example, 2001:db2::/48) to generate its LAN IP address. Through sending Router Advertisements (RAs) regularly by Multicast, the Zyxel Device passes the IPv6 prefix information to its LAN hosts. The hosts then can use the prefix to generate their IPv6 addresses.

ICMPv6

Internet Control Message Protocol for IPv6 (ICMPv6 or ICMP for IPv6) is defined in RFC 4443. ICMPv6 has a preceding Next Header value of 58, which is different from the value used to identify ICMP for IPv4. ICMPv6 is an integral part of IPv6. IPv6 nodes use ICMPv6 to report errors encountered in packet processing and perform other diagnostic functions, such as "ping".

Neighbor Discovery Protocol (NDP)

The Neighbor Discovery Protocol (NDP) is a protocol used to discover other IPv6 devices and track neighbor’s reachability in a network. An IPv6 device uses the following ICMPv6 messages types:

- Neighbor solicitation: A request from a host to determine a neighbor’s link-layer address (MAC address) and detect if the neighbor is still reachable. A neighbor being “reachable” means it responds to a neighbor solicitation message (from the host) with a neighbor advertisement message.
- Neighbor advertisement: A response from a node to announce its link-layer address.
- Router solicitation: A request from a host to locate a router that can act as the default router and forward packets.
- Router advertisement: A response to a router solicitation or a periodical Multicast advertisement from a router to advertise its presence and other parameters.

IPv6 Cache

An IPv6 host is required to have a neighbor cache, destination cache, prefix list and default router list. The Zyxel Device maintains and updates its IPv6 caches constantly using the information from response messages. In IPv6, the Zyxel Device configures a link-local address automatically, and then sends a neighbor solicitation message to check if the address is unique. If there is an address to be resolved or verified, the Zyxel Device also sends out a neighbor solicitation message. When the Zyxel Device receives a neighbor advertisement in response, it stores the neighbor's link-layer address in the neighbor cache. When the Zyxel Device uses a router solicitation message to query for a router and receives a router advertisement message, it adds the router's information to the neighbor cache, prefix list and destination cache. The Zyxel Device creates an entry in the default router list cache if the router can be used as a default router.

When the Zyxel Device needs to send a packet, it first consults the destination cache to determine the next hop. If there is no matching entry in the destination cache, the Zyxel Device uses the prefix list to determine whether the destination address is on-link and can be reached directly without passing through a router. If the address is unlink, the address is considered as the next hop. Otherwise, the Zyxel Device determines the next-hop from the default router list or routing table. Once the next hop IP address is known, the Zyxel Device looks into the neighbor cache to get the link-layer address and sends the packet when the neighbor is reachable. If the Zyxel Device cannot find an entry in the neighbor cache or the state for the neighbor is not reachable, it starts the address resolution process. This helps reduce the number of IPv6 solicitation and advertisement messages.

Multicast Listener Discovery

The Multicast Listener Discovery (MLD) protocol (defined in RFC 2710) is derived from IPv4's Internet Group Management Protocol version 2 (IGMPv2). MLD uses ICMPv6 message types, rather than IGMP message types. MLDv1 is equivalent to IGMPv2 and MLDv2 is equivalent to IGMPv3.

MLD allows an IPv6 switch or router to discover the presence of MLD listeners who wish to receive Multicast packets and the IP addresses of Multicast groups the hosts want to join on its network.

MLD snooping and MLD proxy are analogous to IGMP snooping and IGMP proxy in IPv4.

MLD filtering controls which Multicast groups a port can join.

MLD Messages

A Multicast router or switch periodically sends general queries to MLD hosts to update the Multicast forwarding table. When an MLD host wants to join a Multicast group, it sends an MLD Report message for that address.

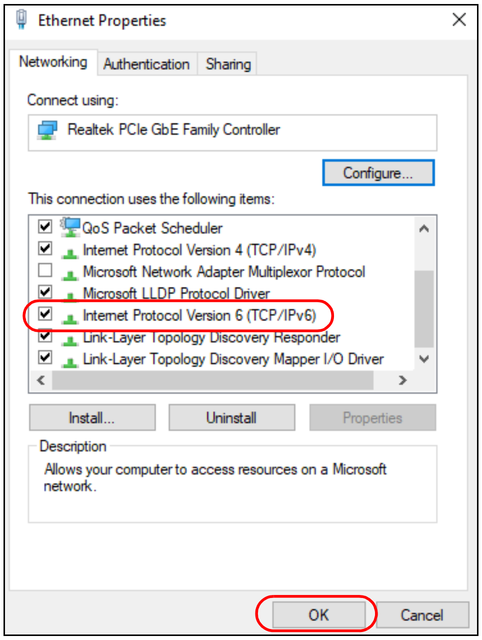
An MLD Done message is equivalent to an IGMP Leave message. When an MLD host wants to leave a Multicast group, it can send a Done message to the router or switch. The router or switch then sends a group-specific query to the port on which the Done message is received to determine if other devices connected to this port should remain in the group.

Example – Enabling IPv6 on Windows 10

Windows 10 supports IPv6 by default. DHCPv6 is also enabled when you enable IPv6 on a Windows 10 computer.

To enable IPv6 in Windows 10:

1. Click the start icon, **Settings** and then **Network & Internet**.
2. Select the **Internet Protocol Version 6 (TCP/IPv6)** checkbox to enable it.
3. Click **OK** to save the change.



Ethernet Properties

Networking | Authentication | Sharing

Connect using:

Realtek PCIe GbE Family Controller

Configure...

This connection uses the following items:

- ☑ QoS Packet Scheduler
- ☑ Internet Protocol Version 4 (TCP/IPv4)
- ☐ Microsoft Network Adapter Multiplexor Protocol
- ☑ Microsoft LLDP Protocol Driver
- ☑ Internet Protocol Version 6 (TCP/IPv6)
- ☑ Link-Layer Topology Discovery Responder
- ☑ Link-Layer Topology Discovery Mapper I/O Driver

Install... | Uninstall | Properties

Description

Allows your computer to access resources on a Microsoft network.

OK | Cancel

4 Click the Search icon (🔍) and then enter “cmd” in the search box..

5 Use the `ipconfig` command to check your dynamic IPv6 address. This example shows a global address (2001:b021:2d::1000) obtained from a DHCP server.

```
C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   IPv6 Address. . . . . . . . . . . : 2001:b021:2d::1000
   Link-local IPv6 Address . . . . . : fe80::25d8:dcab:c80a:5189%11
   IPv4 Address. . . . . . . . . . . : 172.16.100.61
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::213:49ff:f
```

APPENDIX C
Services

The following table lists some commonly-used services and their associated protocols and port numbers.

- **Name**: This is a short, descriptive name for the service. You can use this one or create a different one, if you like.
- **Protocol**: This is the type of IP protocol used by the service. If this is **TCP/UDP**, then the service uses the same port number with TCP and UDP. If this is **USER-DEFINED**, the **Port(s**) is the IP protocol number, not the port number.
- **Port(s)**: This value depends on the **Protocol**.
  - If the **Protocol** is **TCP**, **UDP**, or **TCP/UDP**, this is the IP port number.
  - If the **Protocol** is **USER**, this is the IP protocol number.
- **Description**: This is a brief explanation of the applications that use this service or the situations in which this service is used.

Table 104 Examples of Services

NAME	PROTOCOL	PORT(S)	DESCRIPTION
AH (IPSEC_TUNNEL)	User-Defined	51	The IPSEC AH (Authentication Header) tunneling protocol uses this service.
AIM	TCP	5190	AOL's Internet Messenger service.
AUTH	TCP	113	Authentication protocol used by some servers.
BGP	TCP	179	Border Gateway Protocol.
BOOTP_CLIENT	UDP	68	DHCP Client.
BOOTP_SERVER	UDP	67	DHCP Server.
CU-SEEME	TCP/UDP TCP/UDP	7648 24032	A popular videoconferencing solution from White Pines Software.
DNS	TCP/UDP	53	Domain Name Server, a service that matches web names (for instance www.zyxel.com) to IP numbers.
ESP (IPSEC_TUNNEL)	User-Defined	50	The IPSEC ESP (Encapsulation Security Protocol) tunneling protocol uses this service.
FINGER	TCP	79	Finger is a UNIX or Internet related command that can be used to find out if a user is logged on.
FTP	TCP TCP	20 21	File Transfer Protocol, a program to enable fast transfer of files, including large files that may not be possible by email.
H.323	TCP	1720	NetMeeting uses this protocol.
HTTP	TCP	80	Hyper Text Transfer Protocol - a client/server protocol for the world wide web.
HTTPS	TCP	443	HTTPS is a secured http session often used in e-commerce.
ICMP	User-Defined	1	Internet Control Message Protocol is often used for diagnostic purposes.
ICQ	UDP	4000	This is a popular Internet chat program.
IGMP (MULTICAST)	User-Defined	2	Internet Group Multicast Protocol is used when sending packets to a specific group of hosts.
IKE	UDP	500	The Internet Key Exchange algorithm is used for key distribution and management.
IMAP4	TCP	143	The Internet Message Access Protocol is used for email.
IMAP4S	TCP	993	This is a more secure version of IMAP4 that runs over SSL.
IRC	TCP/UDP	6667	This is another popular Internet chat program.
MSN Messenger	TCP	1863	Microsoft Networks' messenger service uses this protocol.
NetBIOS	TCP/UDP TCP/UDP TCP/UDP TCP/UDP	137 138 139 445	The Network Basic Input/Output System is used for communication between computers in a LAN.
NEW-ICQ	TCP	5190	An Internet chat program.
NEWS	TCP	144	A protocol for news groups.

Table 104 Examples of Services (continued)

NAME	PROTOCOL	PORT(S)	DESCRIPTION
NFS	UDP	2049	Network File System - NFS is a client/server distributed file service that provides transparent file sharing for network environments.
NNTP	TCP	119	Network News Transport Protocol is the delivery mechanism for the USENET newsgroup service.
PING	User-Defined	1	Packet INternet Groper is a protocol that sends out ICMP echo requests to test whether or not a remote host is reachable.
POP3	TCP	110	Post Office Protocol version 3 lets a client computer get email from a POP3 server through a temporary connection (TCP/IP or other).
POP3S	TCP	995	This is a more secure version of POP3 that runs over SSL.
PPTP	TCP	1723	Point-to-Point Tunneling Protocol enables secure transfer of data over public networks. This is the control channel.
PPTP_TUNNEL (GRE)	User-Defined	47	PPTP (Point-to-Point Tunneling Protocol) enables secure transfer of data over public networks. This is the data channel.
RCMD	TCP	512	Remote Command Service.
REAL_AUDIO	TCP	7070	A streaming audio service that enables real time sound over the web.
REXEC	TCP	514	Remote Execution Daemon.
RLOGIN	TCP	513	Remote Login.
ROADRUNNER	TCP/UDP	1026	This is an ISP that provides services mainly for cable modems.
RTELNET	TCP	107	Remote Telnet.
RTSP	TCP/UDP	554	The Real Time Streaming (media control) Protocol (RTSP) is a remote control for multimedia on the Internet.
SFTP	TCP	115	The Simple File Transfer Protocol is an old way of transferring files between computers.
SMTP	TCP	25	Simple Mail Transfer Protocol is the message-exchange standard for the Internet. SMTP enables you to move messages from one email server to another.
SMTPS	TCP	465	This is a more secure version of SMTP that runs over SSL.
SNMP	TCP/UDP	161	Simple Network Management Program.
SNMP-TRAPS	TCP/UDP	162	Traps for use with the SNMP (RFC:1215).
SQL-NET	TCP	1521	Structured Query Language is an interface to access data on many different types of database systems, including mainframes, midrange systems, UNIX systems and network servers.
SSDP	UDP	1900	The Simple Service Discovery Protocol supports Universal Plug-and-Play (UPnP).
SSH	TCP/UDP	22	Secure Shell Remote Login Program.
STRM WORKS	UDP	1558	Stream Works Protocol.
SYSLOG	UDP	514	Syslog allows you to send system logs to a UNIX server.

Table 104 Examples of Services (continued)

NAME	PROTOCOL	PORT(S)	DESCRIPTION
TACACS	UDP	49	Login Host Protocol used for (Terminal Access Controller Access Control System).
TELNET	TCP	23	Telnet is the login and terminal emulation protocol common on the Internet and in UNIX environments. It operates over TCP/IP networks. Its primary function is to allow users to log into remote host systems.
VDOLIVE	TCP UDP	7000 user-defined	A videoconferencing solution. The UDP port number is specified in the application.

APPENDIX D
Legal Information

Copyright

Disclaimer

Zyxel does not assume any liability arising out of the application or use of any products, or software described herein. Neither does it convey any license under its patent rights nor the patent rights of others. Zyxel further reserves the right to make changes in any products described herein without notice. This publication is subject to change without notice.

Trademarks

Trademarks mentioned in this publication are used for identification purposes only and may be properties of their respective owners.

Regulatory Notice and Statement

United States of America

The following information applies if you use the product within USA area.

FCC Statement

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

  (1) This device may not cause harmful interference, and

  (2) This device must accept any interference received, including interference that may cause undesired operation.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the device.
- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
- If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving antenna
  - Increase the separation between the equipment and receiver
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
  - Consult the dealer or an experienced radio/TV technician for assistance

The following information applies to products with wireless functions.

- For 2.4G WLAN, only channels 1~11 are operational. Selection of other channels is not possible.
- Operation of this device is restricted to indoor use only, unless the relevant user's manual states that this device can be installed outdoors.

FCC Radiation Exposure Statement

- This device complies with FCC Radio Frequency (RF) radiation exposure limits set forth for an uncontrolled environment.
- This transmitter must be at least 20 cm from the user and must not be co-located or operating in conjunction with any other antenna or transmitter.
- Country Code selection feature to be disabled for products marketed to the US/CANADA.

Europe and the United Kingdom

CE and UK CA

The following information applies if you use the product within the European Union and United Kingdom.

Declaration of Conformity with Regard to EU Directive 2014/53/EU (Radio Equipment Directive, RED) and UK Radio Equipment Regulations 2017

- Compliance information for wireless products relevant to the EU and other Countries following the EU Directive 2014/53/EU (RED) and UK regulation 2017 SI 2017-1206. And this product may be used in all EU countries (and other countries following the EU Directive 2014/53/EU) and the United Kingdom without any limitation except for the countries mentioned in the below table:
- In the majority of the EU, United Kingdom, and other European countries, the 5GHz bands have been made available for the use of wireless local area networks (LANs). Later in this document you will find an overview of countries in which additional restrictions or requirements or both are applicable. The requirements for any country may evolve. Zyxel recommends that you check with the local authorities for the latest status of their national regulations for the 5GHz wireless LANs.
- If this device operates in the 5150-5350 MHz band, it is for indoor use only.
- This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.
- The maximum RF operating power for each band as follows:
  - the band 2,400 MHz to 2,483.5 MHz is 98.17 mW,
  - the band 5,150 MHz to 5,350 MHz is194.54 mW,
  - the band 5,470 MHz to 5,725 MHz is 977.24 mW.

Belgium (English) België (Flemish) Belgique (French)	**National Restrictions** • The Belgian Institute for Postal Services and Telecommunications (BIPT) must be notified of any outdoor wireless link having a range exceeding 300 meters. Please check http://www.bipt.be for more details. • Draadloze verbindingen voor buitengebruik en met een reikwijdte van meer dan 300 meter dienen aangemeld te worden bij het Belgisch Instituut voor postdiensten en telecommunicatie (BIPT). Zie http://www.bipt.be voor meer gegevens. • Les liaisons sans fil pour une utilisation en extérieur d'une distance supérieure à 300 mètres doivent être notifiées à l'Institut Belge des services Postaux et des Télécommunications (IBPT). Visitez http://www.bipt.be pour de plus amples détails.
Español (Spanish)	Por medio de la presente Zyxel declara que el equipo cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2014/53/UE..
Čeština (Czech)	Zyxel tímto prohlašuje, že tento zařízení je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.
Dansk (Danish)	Undertegnede Zyxel erklærer herved, at følgende udstyr udstyr overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.
Deutsch (German)	Hiermit erklärt Zyxel, dass sich das Gerät Ausstattung in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2014/53/EU befindet.
Eesti keel (Estonian)	Käesolevaga kinnitab Zyxel seadme seadmed vastavust direktiivi 2014/53/EU põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
Ελληνικά (Greek)	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Zyxel ΔΗΛΩΝΕΙ ΟΤΙ εξοπλισμός ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2014/53/EU.
English	Hereby, Zyxel declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.
Français (French)	Par la présente Zyxel déclare que l'appareil équipements est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53/EU.
Hrvatski (Croatian)	Zyxel ovime izjavljuje da je radijska oprema tipa u skladu s Direktivom 2014/53/EU.
Íslenska (Icelandic)	Hér með lýsir, Zyxel því yfir að þessi búnaður er í samræmi við grunnkröfur og önnur viðeigandi ákvæði tilskipunar 2014/53/EU.
Italiano (Italian)	Con la presente Zyxel dichiara che questo attrezzatura è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/EU. **National Restrictions** • This product meets the National Radio Interface and the requirements specified in the National Frequency Allocation Table for Italy. Unless this wireless LAN product is operating within the boundaries of the owner's property, its use requires a "general authorization." Please check http://www.mise.gov.it/it/ for more details. • Questo prodotto è conforme alla specifiche di Interfaccia Radio Nazionali e rispetta il Piano Nazionale di ripartizione delle frequenze in Italia. Se non viene installato all 'interno del proprio fondo, l'utilizzo di prodotti Wireless LAN richiede una "Autorizzazione Generale". Consultare http://www.mise.gov.it/it/ per maggiori dettagli.
Latviešu valoda (Latvian)	Ar šo Zyxel deklarē, ka iekārtas atbilst Direktīvas 2014/53/EU būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių kalba (Lithuanian)	Šiuo Zyxel deklaruoja, kad šis įranga atitinka esminius reikalavimus ir kitas 2014/53/EU Direktyvos nuostatas.

Magyar (Hungarian)	Alulírott, Zyxel nyilatkozom, hogy a berendezés megfelel a vonatkozó alapvetõ követelményeknek és az 2014/53/EU irányelv egyéb elõírásainak.
Malti (Maltese)	Hawnhekk, Zyxel, jiddikjara li dan tagħmir jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2014/53/EU.
Nederlands (Dutch)	Hierbij verklaart Zyxel dat het toestel uitrusting in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2014/53/EU.
Norsk (Norwegian)	Erklærer herved Zyxel at dette utstyret er I samsvar med de grunnleggende kravene og andre relevante bestemmelser I direktiv 2014/53/EU.
Polski (Polish)	Niniejszym Zyxel oświadcza, że sprzęt jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/EU.
Português (Portuguese)	Zyxel declara que este equipamento está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/EU.
Română (Romanian)	Prin prezenta, Zyxel declară că acest echipament este în conformitate cu cerințele esențiale şi alte prevederi relevante ale Directivei 2014/53/EU.
Slovenčina (Slovak)	Zyxel týmto vyhlasuje, že zariadenia spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EU.
Slovenščina (Slovene)	Zyxel izjavlja, da je ta oprema v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/EU.
Suomi (Finnish)	Zyxel vakuuttaa täten että laitteet tyyppinen laite on direktiivin 2014/53/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska (Swedish)	Härmed intygar Zyxel att denna utrustning står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2014/53/EU.
Български (Bulgarian)	С настоящото Zyxel декларира, че това оборудване е в съответствие със съществените изисквания и другите приложими разпоредбите на Директива 2014/53/ЕС.

Notes:

1. Not all European states that implement EU Directive 2014/53/EU are European Union (EU) members.

2. The regulatory limits for maximum output power are specified in EIRP. The EIRP level (in dBm) of a device can be calculated by adding the gain of the antenna used (specified in dBi) to the output power available at the connector (specified in dBm).

List of national codes

COUNTRY	ISO 3166 2 LETTER CODE	COUNTRY	ISO 3166 2 LETTER CODE
Austria	AT	Liechtenstein	LI
Belgium	BE	Lithuania	LT
Bulgaria	BG	Luxembourg	LU
Croatia	HR	Malta	MT
Cyprus	CY	Netherlands	NL
Czech Republic	CZ	Norway	NO
Denmark	DK	Poland	PL
Estonia	EE	Portugal	PT
Finland	FI	Romania	RO
France	FR	Serbia	RS
Germany	DE	Slovakia	SK
Greece	GR	Slovenia	SI
Hungary	HU	Spain	ES
Iceland	IS	Switzerland	CH
Ireland	IE	Sweden	SE
Italy	IT	Turkey	TR
Latvia	LV	United Kingdom	GB

Safety Warnings

- Do not put the device in a place that is humid, dusty, has extreme temperatures, or that blocks the device ventilation slots. These conditions may harm your device.
- Please refer to the device back label, datasheet, box specifications or catalog information for power rating of the device and operating temperature.
- There is a remote risk of electric shock from lightning: (1) Do not use the device outside, and make sure all the connections are indoors. (2) Do not install or service this device during a thunderstorm.

- Do not expose your device to dampness, dust or corrosive liquids.
- Do not store things on the device.
- Do not install, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Connect ONLY suitable accessories to the device.
- Do not open the device, Opening or removing the device covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel should service or disassemble this device. Please contact your vendor for further information.
- Make sure to connect the cables to the correct ports.
- Place connected cables carefully so that no one will step on them or stumble over them.
- Disconnect all cables from this device before servicing or disassembling.
- Do not remove the plug and connect it to a power outlet by itself; always attach the plug to the power adaptor first before connecting it to a power outlet.
- Do not allow anything to rest on the power adaptor or cord and do NOT place the product where anyone can walk on the power adaptor or cord.
- Please use the provided or designated connection cables/power cables/ adaptors. Connect the power adaptor or cord to the right supply voltage (for example, 120V AC in North America or 230V AC in Europe). If the power adaptor or cord is damaged, it might cause electrocution. Remove the damaged power adaptor or cord from the device and the power source. Do not try to repair the power adaptor or cord by yourself. Contact your local vendor to order a new one.
- CAUTION: There is a risk of explosion if you replace the device battery with an incorrect one. Dispose of used batteries according to the instructions. Dispose them at the applicable collection point for the recycling of electrical and electronic devices. For detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the store where you purchased the product.
- Do not leave a battery in an extremely high temperature environment or surroundings since it can result in an explosion or the leakage of flammable liquid or gas.
- Do not subject a battery to extremely low air pressure since it may result in an explosion or the leakage of flammable liquid or gas.
- The following warning statements apply, where the disconnect device is not incorporated in the device or where the plug on the power supply cord is intended to serve as the disconnect device.

  - For a permanently connected device, a readily accessible method to disconnect the device shall be incorporated externally to the device;

  - For a pluggable device, the socket-outlet shall be installed near the device and shall be easily accessible.

Important Safety Instructions

• Caution! The RJ-45 jacks are not used for telephone line connection.

• Caution! Do not use this product near water, for example a wet basement or near a swimming pool.

• Caution! Avoid using this product (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.

• Caution! Always disconnect all telephone lines from the wall outlet before servicing or disassembling this product.

• Attention: Les prises RJ-45 ne sont pas utilisés pour la connexion de la ligne téléphonique.

• Attention: Ne pas utiliser ce produit près de l'eau, par exemple un sous-sol humide ou près d'une piscine.

• Attention: Évitez d'utiliser ce produit (autre qu'un type sans fil) pendant un orage. Il peut y avoir un risque de choc électrique de la foudre.

• Attention: Toujours débrancher toutes les lignes téléphoniques de la prise murale avant de réparer ou de démonter ce produit.

Environment Statement

ErP (Energy-related Products)

Zyxel products put on the EU and United Kingdom markets comply with the requirement of the European Parliament and the Council published Directive 2009/125/EC and UK regulation establishing a framework for the setting of ecodesign requirements for energy-related products (recast), the so called "ErP Directive (Energy-related Products directive), as well as ecodesign requirements laid down in applicable implementation measures. Power consumption has satisfied the regulation requirements which are:

- Network standby power consumption < 8 W (watts), and/or
- Off mode power consumption < 0.5 W (watts), and/or
- Standby mode power consumption < 0.5 W (watts).

(Wireless settings, please refer to the chapter about wireless settings for more detail.)

Disposal and Recycling Information

The symbol below means that according to local regulations your product and/or its battery shall be disposed of separately from domestic waste. If this product is end of life, take it to a recycling station designated by local authorities. At the time of disposal, the separate collection of your product and/or its battery will help save natural resources and ensure that the environment is sustainable development.

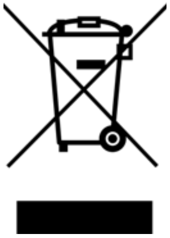
Die folgende Symbol bedeutet, dass Ihr Produkt und/oder seine Batterie gemäß den örtlichen Bestimmungen getrennt vom Hausmüll entsorgt werden muss. Wenden Sie sich an eine Recyclingstation, wenn dieses Produkt das Ende seiner Lebensdauer erreicht hat. Zum Zeitpunkt der Entsorgung wird die getrennte Sammlung von Produkt und/oder seiner Batterie dazu beitragen, natürliche Ressourcen zu sparen und die Umwelt und die menschliche Gesundheit zu schützen.

El símbolo de abajo indica que según las regulaciones locales, su producto y/o su batería deberán depositarse como basura separada de la doméstica. Cuando este producto alcance el final de su vida útil, llévelo a un punto limpio. Cuando llegue el momento de desechar el producto, la recogida por separado éste y/o su batería ayudará a salvar los recursos naturales y a proteger la salud humana y medioambiental.

Le symbole ci-dessous signifie que selon les réglementations locales votre produit et/ou sa batterie doivent être éliminés séparément des ordures ménagères. Lorsque ce produit atteint sa fin de vie, amenez-le à un centre de recyclage. Au moment de la mise au rebut, la collecte séparée de votre produit et/ou de sa batterie aidera à économiser les ressources naturelles et protéger l'environnement et la santé humaine.

Il simbolo sotto significa che secondo i regolamenti locali il vostro prodotto e/o batteria deve essere smaltito separatamente dai rifiuti domestici. Quando questo prodotto raggiunge la fine della vita di servizio portarlo a una stazione di riciclaggio. Al momento dello smaltimento, la raccolta separata del vostro prodotto e/o della sua batteria aiuta a risparmiare risorse naturali e a proteggere l'ambiente e la salute umana.

Symbolen innebär att enligt lokal lagstiftning ska produkten och/eller dess batteri kastas separat från hushållsavfallet. När den här produkten når slutet av sin livslängd ska du ta den till en återvinningsstation. Vid tiden för kasseringen bidrar du till en bättre miljö och mänsklig hälsa genom att göra dig av med den på ett återvinningsställe.



台灣

以下訊息僅適用於產品具有無線功能且銷售至台灣地區

- 取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
- 低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。
- 使用無線產品時，應避免影響附近雷達系統之操作。
- 高增益指向性天線只得應用於固定式點對點系統。

以下訊息僅適用於產品屬於專業安裝並銷售至台灣地區

- 本器材須經專業工程人員安裝及設定，始得設置使用，且不得直接販售給一般消費者。

安全警告 - 為了您的安全，請先閱讀以下警告及指示 :

- 請勿將此產品接近水、火焰或放置在高溫的環境。
- 避免設備接觸 :
  - 任何液體 - 切勿讓設備接觸水、雨水、高濕度、污水腐蝕性的液體或其他水份。
  - 灰塵及污物 - 切勿接觸灰塵、污物、沙土、食物或其他不合適的材料。
- 雷雨天氣時，不要安裝或維修此設備。有遭受電擊的風險。
- 切勿重摔或撞擊設備，並勿使用不正確的電源變壓器。
- 若接上不正確的電源變壓器會有爆炸的風險。
- 請勿隨意更換產品內的電池。
- 如果更換不正確之電池型式，會有爆炸的風險，請依製造商說明書處理使用過之電池。
- 請將廢電池丟棄在適當的電器或電子設備回收處。
- 請勿將設備解體。
- 請勿阻礙設備的散熱孔，空氣對流不足將會造成設備損害。
- 請使用隨貨提供或指定的連接線 / 電源線 / 電源變壓器，將其連接到合適的供應電壓 (如 : 台灣供應電壓 110 伏特)。
- 假若電源變壓器或電源變壓器的纜線損壞，請從插座拔除，若您還繼續插電使用，會有觸電死亡的風險。
- 請勿試圖修理電源變壓器或電源變壓器的纜線，若有毀損，請直接聯絡您購買的店家，購買一個新的電源變壓器。
- 請勿將此設備安裝於室外，此設備僅適合放置於室內。
- 請勿隨一般垃圾丟棄。
- 請參閱產品背貼上的設備額定功率。
- 請參考產品型錄或是彩盒上的作業溫度。
- 產品沒有斷電裝置或者採用電源線的插頭視為斷電裝置的一部分，以下警語將適用 :
  - 對永久連接之設備，在設備外部須安裝可觸及之斷電裝置；
  - 對插接式之設備，插座必須接近安裝之地點而且是易於觸及的。

About the Symbols

Various symbols are used in this product to ensure correct usage, to prevent danger to the user and others, and to prevent property damage. The meaning of these symbols are described below. It is important that you read these descriptions thoroughly and fully understand the contents.

Explanation of the Symbols

SYMBOL	EXPLANATION
∼	Alternating current (AC): AC is an electric current in which the flow of electric charge periodically reverses direction.
⎓	Direct current (DC): DC if the unidirectional flow or movement of electric charge carriers.
⏚	Earth; ground: A wiring terminal intended for connection of a Protective Earthing Conductor.
⧈	Class II equipment: The method of protection against electric shock in the case of class II equipment is either double insulation or reinforced insulation.

Viewing Certifications

Go to http://www.zyxel.com to view this product's documentation and certifications.

Zyxel Limited Warranty

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

Note

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

To obtain the services of this warranty, contact your vendor. You may also refer to the warranty policy for the region in which you bought the device at *https://www.zyxel.com/global/en/support/warranty-information*.

Registration

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

Open Source Licenses

This product may contain in part some free software distributed under GPL license terms and/or GPL-like licenses.

To request the source code covered under these licenses, please go to: *https://www.zyxel.com/form/gpl_oss_software_notice.shtml*

Index