

Wireless Router

User Manual

Table of Contents

1 Hardware Setup.....	3
1.1 Getting to know your router.....	3
1.2 Unpack Router's box.....	4
1.3 Hardware Features	5
1.3.1 Front Panel.....	5
1.3.2 Rear Panel.....	6
1.4 Position Your Router.....	7
2 Normal User Settings.....	8
2.1 Login	8
2.2 Wizard Setup.....	10
2.3 Basic Setup.....	17
2.3.1 My Router.....	17
2.3.2 WPS Setup.....	18
2.3.3 LAN Setup.....	20
2.3.4 WAN Setup	21
2.3.5 Parental Control.....	26
2.3.6 Services.....	28
2.3.7 System	37
2.4 Advanced Setup	38
2.4.1 Network	38
2.4.2 Services.....	70
2.4.3 Security.....	80
2.4.4 QoS	93
2.4.5 Admin	100
2.4.6 Tools	104
2.4.7 Status	106
3 Root User Settings	114
3.1 Login	114

3.2 Router	114
3.2.1 Static Routing	114
3.2.2 Dynamic Routing.....	116
3.2.3 Multiple NAT	117
3.3 TR-069	118
3.4 Operation Mode	119
3.4.1 Wireless Router Mode	120
3.4.2 Access Point Mode	120
3.4.3 Media Bridge Mode.....	122
3.5 Admin	125
3.5.1 System	125
3.5.2 Firmware	126
3.6 DFS Test Mode	127
3.9 Fast Roaming	127
3.10 Coverage	129
4.0 FCC Statement:	139

1 Hardware Setup

1.1 Getting to know your router

This product is designed for new flagship service: **Managed Service Home Router**.

Managed Service Home Router provides:

1. High performance:
 - Dual-Core ARM up to 1.7G/1GB DDR RAM.
 - Dual-Band wireless up to AC2550 (2.4G 200M * 4 + 5G 433M * 4).
 - Gigabyte 2x WAN/ 4x LAN Ethernet ports.
2. High security: Firewall/VPN supported.
3. Easy to setup: Friendly wizard, visual setup & maintenance (Basic Mode), complete functions (Advanced Mode).
4. Easy to maintain: Supports TR069, TR181.
5. USB-based services: File/media/printer sharing.

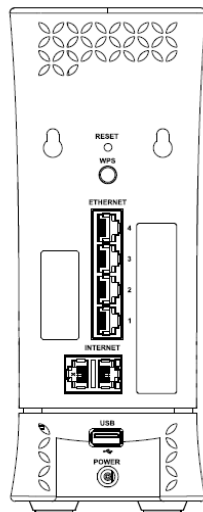
The router is an ideal choice for residential and SOHO (Small Office/Home Office) users who can enjoy a variety of wireless applications and services.

This chapter contains the following contents:

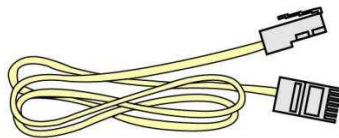
- Unpack Your Router
- Hardware Features
- Position Your Router

1.2 Unpack Router's box

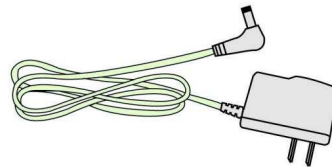
Open the box and remove the router, cables, and installation guide.



Wireless router



Ethernet Cable



Power Adapter

Figure 1. Check the package contents

The box contains the following items:

- Wireless router.
- AC power adapter (plug varies by region).
- Ethernet cable.
- Installation guide.

If any items are missing or damaged, please contact your dealer. Please keep original packing materials in case you need to return the product for repairing.

1.3 Hardware Features

Before setup please take a moment to become familiar with the label and front, side, and back panels of your router. Pay particular attention to the LED on the front panel.

1.3.1 Front Panel

The router front and side panels feature the status LED and buttons as shown in the following figure.

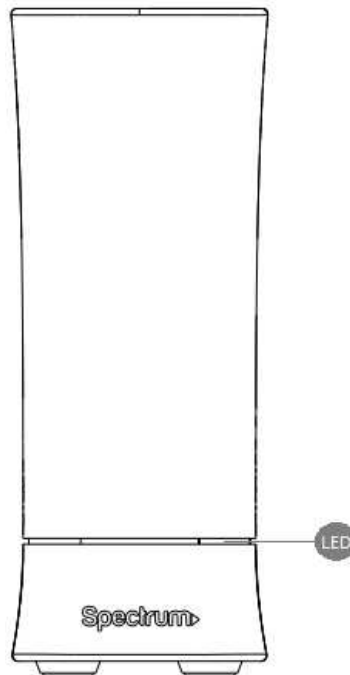


Figure 2. Router front view

Front panel LED status

- **Off:** Device off.
- **Blue** quick blinking (0.4 second intervals): Booting up
- **Blue** *blinking 1 second intervals:* Connecting to Internet
- **Blue** *solid:* Connected to Internet.
- **Red** *blinking:* Connectivity issues (no Internet

connection).

- **Red** and **Blue** *alternate blinking*: Updating firmware
(or any scenario where device must not be restarted).
- **Red** *solid*: Critical issues (hardware or otherwise).
- LED on front of device will dim to low (65%) when there is no settings activity or connectivity issues for 120 hours.
- If any settings are changed or connectivity issues occur LEDs will return to normal (100%) brightness.

1.3.2 Rear Panel

There are slots and buttons shown in the following figure.

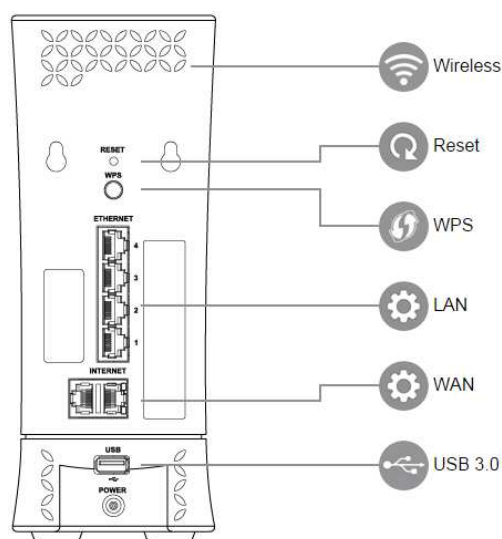


Figure 3. Router rear panel

- **Reset Button:** Push the button and hold for over 15 seconds, then router will restart automatically. During the process of restart, router will restore to factory default settings.
- **WPS Button:** Push the button more than 1 second to activate 2.4G and 5G WPS. Reference **WPS Setup** on page 15.
- **LAN Port:** Connect network cables for LAN (local area network) connections, e.g. network switch, hub, personal computer or Internet devices.

- **WAN Port:** Connect a network cable for WAN (Wide Area Network) connection. This connects the Ethernet and other access lines e.g. modem.
- **USB 3.0 Port:** Connect a USB Printer, U-Disk or USB drive. For printer and folder sharing, reference **Services** on page 19.
- **Power Port(DC-IN):** Use the bundled AC adapter to connect your router to a power source.

1.4 Position Your Router

The router lets you access your network from virtually anywhere within the operating range of your wireless network. However, the wireless communicating distance varies significantly due to placement of the router. For example, the thickness and number of walls the wireless signal passes through can limit the range. For best results, router is likely to be place like this:

- Near the center of the area where your computers and other devices operate, and preferably within line of sight to your wireless devices.
- So it is accessible to an AC power outlet and near Ethernet cables for wired computers.
- In an elevated location such as a shelf, keeping the number of walls and ceilings between the router and your other devices to a minimum.
- Away from electrical devices that are potential sources of interference. Equipment that might cause interference includes ceiling fans, home security systems, microwaves, computers, the base of a cordless phone, or a 2.4 GHz cordless phone.
- Away from any large metal surfaces, such as a solid metal door or aluminum studs. Large expanses of other materials such as glass, insulated walls, fish tanks, mirrors, brick, and concrete can also affect your wireless signal.

2 Normal User Settings

The wireless router contains an intuitive graphical user interface (GUI) based on web, which allows administrator to easily configure its features through a web browser.

2.1 Login

1. Open a web browser, then key in the router's default IP address: <http://192.168.1.1>, and click **Enter** key in the keyboard;
2. On the login webpage, type in its default Username: **admin** and Password: **admin**, then click **Login** button.



TV | INTERNET | VOICE

Wireless Router

Username

Password

Login

After administrator has logged in the router, some basic information on it will be displayed by the browser.

The screenshot displays the Charter Spectrum router's administrative web interface. At the top, the Charter Spectrum logo is on the left, and the user 'admin' is logged in on the right. A red box highlights the 'Change Password' and 'Logout' buttons, with the 'Firmware Version: 1.0.3' displayed below them. A navigation bar includes 'Basic', 'Advanced', and 'Wizard' tabs. A left sidebar lists menu items: 'Network View' (selected), 'My Router', 'Parental Control', 'Services', and 'System'. The main content area is titled 'Network View' and features a network diagram with 'Internet', 'Wireless Router', and 'Users' components. Below the diagram, a table provides system and network details.

System Information		
Up Time:	0D 22H 20M 53S	
FW Version:	1.0.3	
HW version:	V1.0 REV2	
Date:	2016-12-30 02:41:26	

WAN		
IP:	10.8.4.218	
Connection Type:	DHCP	

LAN		
IP (Subnet Mask):	192.168.1.1(255.255.255.0)	
DHCP:	On	

Wireless		
2.4GHz:	SSID: MySpectrumWIFIBD-2G Authentication Method: WPA2 Personal WPA Pre-shared Key: WrWAo43eSYc	
5GHz:	SSID: MySpectrumWIFIBC-5G Authentication Method: WPA2 Personal WPA Pre-shared Key: yFNEZMTDH0m	

USB		
DISK1:	Generic_UDISK Available Space: 5.2G Total Space: 7.1G	

On the right top side, there are two command buttons: **Change Password** and **Logout**. It's highly recommended to click the **Logout** button who locates on the right top side when administrator intends to leave the webpage.

When **Change Password button** has been clicked, the browser will navigate administrator to corresponding webpage.

Basic Advanced Wizard

Network View >
My Router >
Parental Control >
Services >
System >

System

Change the Router Login Password

Username: admin
New Password:
Retype New Password: ☐ Show Password

Miscellaneous

Time Zone: America/New York
Auto Logout: 0 Minutes (Disable: 0)

NTP Server (Maximum:6)

NTP Server	Add/Delete
	+
us.pool.ntp.org	-
north-america.pool.ntp.org	-
time.nst.gov	-
pool.ntp.org	-

Apply

On this page, administrator should just type in new password in New Password and Retype New Password, then click **Apply** button.

2.2 Wizard Setup

The wizard can navigate administrator to configure basic settings for wireless router, which makes it become easy enough to set up the router.

Internet Setup

After administrator has clicked the **Wizard** button, the **Internet Setup** page will come up.

Connection Type:

There are 5 kinds of connection type: **DHCP**, **PPPoE**, **Static**, **PPTP**, and **L2TP**. Consult your ISP if you are unsure which kind of WAN connection type to select.

1. **DHCP**: Enable router to obtain IP addresses automatically. This type is usually

used by cable modem service providers.

The screenshot shows a web-based configuration interface for 'Internet Setup'. The top navigation bar has tabs for 'Basic', 'Advanced', and 'Wizard'. The left sidebar shows a progress list: '1 | Internet Setup' (active), '2 | Network Setup', and '3 | Config Overview'. The main content area is titled 'Internet Setup' and 'Connection Type'. It lists five options: DHCP (selected), PPPoE, Static, PPTP, and L2TP, each with a brief description. Below this is the 'DHCP Setting' section with fields for 'WAN MAC' (with a 'MAC Clone' button), 'Host Name', a checkbox for 'Use WAN DNS', and fields for 'DNS 1' and 'DNS 2'. A 'Next' button is at the bottom.

Basic Advanced **Wizard**

Internet Setup

1 | Internet Setup
2 | Network Setup
3 | Config Overview

Connection Type

☒ DHCP
DHCP allows your PC to obtain an IP address automatically. This connection type is often used by cable modem service providers.

☐ PPPoE
ADSL or other connections that require a username and password are known as PPPoE.

☐ Static
Static IP allows your PC to use a fixed IP address provided by your ISP. This connection type is often used by ADSL service providers.

☐ PPTP
ADSL or other connections that require a username, password and IP address are known as PPTP.

☐ L2TP
L2TP requires a username, password and IP address provided by your ISP.

DHCP Setting

WAN MAC [MAC Clone](#)

Host Name

☐ Use WAN DNS

DNS 1

DNS 2

[Next](#)

WAN MAC: MAC address of WAN port. Some ISPs monitor devices' MAC address who are connecting to their networks, and only these devices with a valid MAC address can be served. If router can't get access to internet, administrator can do either of the followings:

- * Contact your ISP and request to update the MAC address associated with your ISP subscription.

- * Clone or change the MAC address of the new device to match the MAC address of the original device.

- **Host Name:** This field allows administrator to provide a name for router. Usually it's named by ISP.
- **DNS 1 & DNS 2:** Either of them indicates the IP address of a DNS Server.
- Click **Next**.

2. **PPPoE:** An Internet protocol provided by ISPs which requires a username and

password. If you have no idea of the **username** and **password**, please contact your ISP.

PPPoE Setting

Username

Password

Next

- **Username:** This field is only available when you set the WAN Connection Type as PPPoE, PPTP or L2TP.
 - **Password:** This field is only available when you set WAN Connection Type as PPPoE, PPTP or L2TP.
 - Click **Next**.
3. **Static:** Makes the router use a fixed IP address provided by your ISP. This connection type is often used by ADSL service providers.

Static IP

IP

Subnet Mask

Gateway

DNS 1

DNS 2

WAN MAC

MAC Clone

Next

- **IP:** Assigned by your ISP.
- **Subnet Mask:** Assigned by your ISP.
- **Gateway:** IP address of the gateway. Assigned by your ISP.
- **DNS 1 & DNS 2:** Either of them indicates the IP address of DNS server that the router will communicate with.
- **WAN MAC:** MAC address is a unique identifier that identifies your computer or device. ISPs monitor the MAC address of devices connecting to

their services, and will disallow Internet connection for invalid MAC addresses.

- Click **Next**.

Note: All of the parameters in **Static IP** connection type should be provided by your ISP. If you have no idea of them, please ask the ISP for help.

4. **PPTP:** A service provided by ISPs which requires a username, a password and/or IP address.

PPTP Setting

Username	
Password	
Get WAN IP Automatically	☒ Yes ☐ No
IP	
Subnet Mask	
Gateway	
Connect to DNS Server	☒ Yes ☐ No
DNS 1	
DNS 2	
VPN Services	

[Next](#)

- **Username:** This field is only available when you set the WAN Connection Type as PPPoE, PPTP or L2TP.
- **Password:** This field is only available when you set WAN Connection Type as PPPoE, PPTP or L2TP.
- **Get the WAN IP Automatically:** Select **Yes** to get WAN IP automatically and **No** to enter IP manually below.
- **IP:** If your WAN connection requires a static IP address, key in the IP address in this field.
- **Subnet Mask:** If your WAN connection requires a static IP address, key in the subnet mask in this field.

- **Gateway:** If your WAN connection requires a static IP address, type in the gateway IP address in this field.
 - **Connect to DNS Server:** Select Yes to let the device connect to a DNS Server automatically, or No to enter DNS address manually below.
 - **DNS1 & DNS2:** Both present the IP address of the DNS server. If the device can't communicate with DNS1, it will try to communicate with DNS2.
 - **VPN Services:** IP address or DNS for VPN server.
 - Click **Next**.
5. **L2TP** requires a username, password and/or IP address provided by your ISP. Please reference to **PPTP** setting above.

L2TP Setting

Username	
Password	
Get WAN IP Automatically	☒ Yes ☐ No
IP	
Subnet Mask	
Gateway	
Connect to DNS Server	☒ Yes ☐ No
DNS 1	
DNS 2	
VPN Services	

Next

Network Setup

After you have clicked **Next icon** in Internet Setup page, you comes here.

The screenshot shows a web-based configuration wizard with three tabs: 'Basic', 'Advanced', and 'Wizard'. The 'Wizard' tab is active. On the left, a sidebar lists three steps: '1 | Internet Setup', '2 | Network Setup' (highlighted in blue), and '3 | Config Overview'. The main content area is titled 'Network Setup' and is divided into two sections: '2.4GHz' and '5GHz'. The '2.4GHz' section has input fields for 'SSID' (containing 'MySpectrumWiFi50-2G') and 'Key' (containing 'Hi82ywi2CLH'). The '5GHz' section has a checkbox labeled 'Same as 2.4GHz' which is unchecked, followed by 'SSID' (containing 'MySpectrumWiFi51-5G') and 'Key' (containing 'Uopy8lGmPZx') fields. A blue 'Apply' button is at the bottom right. A small 'HELP' icon is visible in the top right corner of the 2.4GHz section.

1. **SSID:** Name for a wireless network, that's to say it's used to identify a wireless network. Wi-Fi devices automatically detect all networks within its communication range, if they own the key.
2. **Key:** A password used by router to authenticate wireless connections.
3. When done, click **Apply**.

Config Overview

After click the **Apply** icon, administrator comes to **Config Overview** page, which displays a summary of configuration information. If the settings are all correct, administrator should click **Apply** icon.

Basic

Advanced

Wizard

1 | Internet Setup

2 | Network Setup

3 | Config Overview

Config Overview

Connection Type

DHCP

DHCP Setting

WAN MAC

Host Name

Use WAN DNS

DNS Server 1

DNS Server 2

No

2.4GHz

SSID

Key

MySpectrumWiFi000044-2G

A9WSHSYLYj

5GHz

SSID

Key

MySpectrumWiFi000044-5G

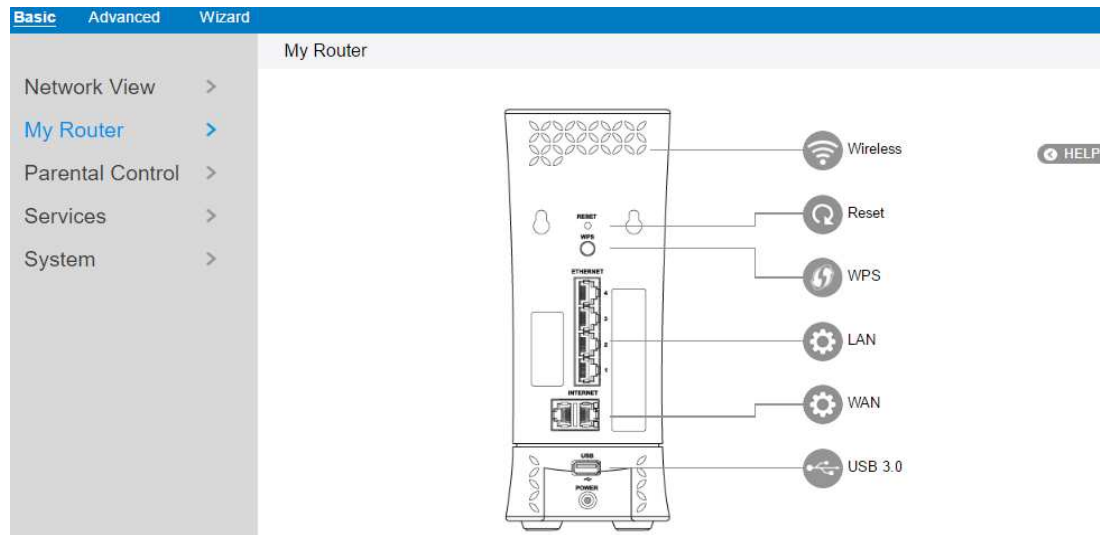
5jUDoCorsS8

Apply

2.3 Basic Setup

2.3.1 My Router

From the navigation panel, go to **Basic > My Router**.



Note: The **Reset** Icon in the picture is used to restart/reboot router manually!

Wireless: This module is implemented to configure some basic settings for router’s wireless connection.

Wireless	
2.4GHz	
SSID	MySpectrumWiFi50-2G
Key	Hi82ywi2CLH
5GHz	
SSID	MySpectrumWiFi51-5G
Key	Uopy8lGmPZx
Apply	

1. **SSID:** A unique name that identifies the wireless network. Wireless device can

automatically detect all networks within its communication range. The maximum length of a SSID is 32 characters.

2. **Key:** A string used for connection authentication. Its length ranges from 0 to 63 characters(letters, numbers or a combination) or from 8 to 64 hex digits.
3. Click **Apply**.

2.3.2 WPS Setup

WPS (Wi-Fi Protected Setup) is a wireless security standard that allows the device easily connect to a wireless network. You can configure the WPS function via the PIN code or WPS button.

WPS	
Frequency	2.4GHz
Enable WPS	☒ On ☐
Connection Status	WPS-ENROLLEE-SEEN
Configured	Yes
AP PIN Code	30649385
WPS Method	☒ Push Button ☐ Client PIN Code
PIN Code	
Start	

Steps to enable WPS(Wi-Fi Protected Setup):

1. From the navigation panel, go to **Basic > My Router**.
2. **Frequency:** Selecting operating band (2.4 GHz or 5 GHz) for WPS function.

Note: If WPS has been enabled and administrator intends to change the frequency, please disable WPS first.

3. **Enable WPS:** Selecting **[On]** to run WPS, which simplifies the process of connecting any device to the wireless network

Note: Authentication methods supported by WPS are: Open system, WPA-Personal and WPA2-Personal. Not supported methods are: Shared Key, WPA-Enterprise, WPA2-Enterprise and RADIUS.

4. **Connection Status** 慎 The connection status of WPS.
5. **Configured:** The configured status of WPS.
6. **AP PIN Code:** Key in the router's PIN code in the client's WPS utility and configure the network name and security settings.
7. **WPS Method:** Selects the method to per PIN (Personal Information Number) method requires a PIN number to establish a wireless connection. PBC (Push Button Configuration) method requires you to push a button (the Start button on this page or a physical WPS button) to establish a wireless connection.
8. **PIN Code:** The WPS PIN code which clients use to connect with the router.
9. In the WPS Method field, select **Push Button** or **Client PIN** code. If you select **Push Button**, go to step 10. If you select **Client PIN code**, go to step 11.
10. To set up WPS using the router's WPS button, follow these steps:
 - a) Click **Start** or press the WPS button found at the rear of the wireless router.
 - b) Press the WPS button on your wireless device. This is normally identified by the WPS logo.

NOTE: Check the wireless router or its user manual for the location of the WPS button.

11. To set up WPS using the Client's PIN code, follow these steps:
 - a) Locate the WPS PIN code on your wireless device's user manual or on the device itself.
 - b) Key in the Client PIN code on the text box.
 - c) Click **Start** to put your wireless router into WPS survey mode. The router's LED indicators quickly flash three times until the WPS setup is completed.
12. Click **Start**.

2.3.3 LAN Setup

This module makes it easier for administrator to modify the default LAN IP Address.

LAN

LAN IP

Subnet Mask

☒ DHCP Server

Steps to modify LAN IP settings:

1. From the navigation panel, go to **Basic > My Router**.
2. **LAN IP**: The LAN IP address of the wireless router. Its default value is 192.168.1.1. In IP-based networks, packets are sent to the network devices' specific IP addresses.
3. **Subnet Mask**: Subnet mask of wireless router. Its default value is 255.255.255.0
4. **DHCP Server**: DHCP (Dynamic Host Configuration Protocol) is mostly used to allocate IP address for lan-side devices. And a DHCP server can inform lan-side devices of DNS server's address, default gateway IP and etc. This wireless router can allocate 253 IP addresses at most.

NOTE: It's recommended for administrator to select **DHCP Server** for LAN IP setting. If not, administrator has to assign IP address to lan-side device manually.

5. Click **Apply**.

2.3.4 WAN Setup

Click **WAN** button to configure the WAN connection settings:

1. **Connection Type:** Choose the Internet Service type. There are five options are DHCP, PPPoE, Static, PPTP, and L2TP. Consult your ISP if you are unsure what kind of WAN connection type to select.

WAN

Connection Type

☒ DHCP ☐ PPPoE ☐ Static ☐ PPTP ☐ L2TP

WAN MAC [MAC Clone](#)

Host Name

☐ Use WAN DNS

DNS 1

DNS 2

[Apply](#)

2. If you select **DHCP**:
 - **WAN MAC:** MAC (Media Access Control) address is a unique identifier that identifies your computer or device in the network. ISPs monitor the MAC addresses of devices that connect to their services, and would disallow Internet connection for new MAC addresses.
To fix this issue, you can do either of the following:
 - * Contact your ISP and request to update the MAC address associated with your ISP subscription.
 - * Clone or change the MAC address of the new device to match the MAC address of the original device.
 - **Host Name:** This field allows you to provide a host name for wireless router. Usually it's provided by ISP.

- **DNS 1 & DNS 2:** Either of them indicates IP address of a DNS server.
- Click **Apply**.

3. If you select **PPPoE**:

WAN

Connection Type

☐ DHCP ☒ PPPoE ☐ Static ☐ PPTP ☐ L2TP

Username

Password

☐

Show Password

Connect to DNS Server

☒ Yes ☐ No

DNS 1

DNS 2

Apply

- **Username:** This field is only available when you set the WAN Connection Type as PPPoE, PPTP or L2TP.
- **Password:** This field is only available when you set WAN Connection Type as PPPoE, PPTP or L2TP.
- **DNS1 & DNS2:** Either of them indicates IP address of a DNS server that wireless router will contact.
- Click **Apply**.

NOTE: All of the parameters mentioned above are provided. If administrator has no idea of these, please consult the ISP.

4. If you select **Static**, below show the steps to set

WAN

Connection Type

☐ DHCP ☐ PPPoE ☒ Static ☐ PPTP ☐ L2TP

IP	
Subnet Mask	
Gateway	
DNS 1	
DNS 2	
WAN MAC	

MAC Clone

Apply

- **IP:** If WAN connection requires a static IP address, key in the IP address in this field.
- **Subnet Mask:** If WAN connection requires a static IP address, key in the subnet mask in this field.
- **Gateway:** If WAN connection requires a static IP address, key in the gateway IP address in this field.
- **DNS 1 & DNS 2:** Either of them indicates IP address of a DNS server.
- **WAN MAC:** MAC (Media Access Control) address is a unique identifier that identifies your computer or device in the network. ISPs monitor the MAC addresses of devices that connect to their services, and would disallow Internet connection for new MAC addresses.

To fix this issue, you can do either of the following:

- * Contact your ISP and request to update the MAC address associated with your ISP subscription.
- * Clone or change the MAC address of the new device to match the MAC address of the original device.
- Click **Apply**.

5. If you select **PPTP**:

WAN

Connection Type

☐ DHCP ☐ PPPoE ☐ Static ☒ PPTP ☐ L2TP

Username

Password ☐ Show Password

Get WAN IP Automatically ☒ Yes ☐ No

IP

Subnet Mask

Gateway

- **Username:** This field is only available when you set the WAN Connection Type as PPPoE, PPTP or L2TP.
- **Password:** This field is only available when you set WAN Connection Type as PPPoE, PPTP or L2TP.
- **Get the WAN IP Automatically:** Select Yes to get WAN IP automatically and No to enter IP manually below.
- **IP:** If WAN connection requires a static IP address, key in the IP address in this field.
- **Subnet Mask:** If WAN connection requires a static IP address, key in the subnet mask in this field.
- **Gateway:** If WAN connection requires a static IP address, key in the gateway IP address in this field.
- Click **Apply**.

6. If you select **L2TP**:

WAN

Connection Type

☐ DHCP ☐ PPPoE ☐ Static ☐ PPTP ☒ L2TP

Username

Password ☐ Show Password

Get WAN IP Automatically ☒ Yes ☐ No

IP

Subnet Mask

Gateway

Please reference to **PPTP** above for relevant settings descriptions and enter the required information.

2.3.5 Parental Control

Parental Control allows administrator to control the behavior of the router.

The screenshot shows the 'Parental Control' configuration page. On the left is a navigation menu with 'Basic', 'Advanced', and 'Wizard' tabs. Under 'Basic', there are links for 'Network View', 'My Router', 'Parental Control' (highlighted), 'Services', and 'System'. The main content area is titled 'Parental Control' and includes an icon of a parent and child. Text explains that Parental Control allows controlling internet access for child clients. A numbered list provides instructions: 1. Select client by drop-down list of [Client Name] column. 2. Click the plus(+) icon in [Add/Delete] column to add the client. 3. Add schedule in the [Time Management] column. 4. Select desired time slots for allowed access times. 5. If no filter(url/keyword/service), default action is to allow all packets. 6. Click [Confirm] to save settings. A 'HELP' button is also present. Below this, there is a toggle for 'Enable Parental Control' set to 'On' and a 'System time' display showing 'Thu Dec 15 04: 31 2016'. Four sections follow, each with a title and a table for configuration: 'Client & Schedule List (Maximum: 16)' with columns for Client Name, Client MAC, Time Management, and Add / Delete; 'URL Filter List (Maximum: 16)' with columns for URL Filter List and Add / Delete; 'Keyword Filter List (Maximum: 16)' with columns for Keyword Filter List and Add / Delete; and 'Service Filter List (Maximum: 16)' with columns for Port Range, Protocol, and Add / Delete. Each table has a single row with input fields and a plus icon. An 'Apply' button is at the bottom.

Basic Advanced Wizard

Parental Control

Network View >
My Router >
Parental Control >
Services >
System >

Parent Control allows you to control the Internet access of the child client you add in. To use Parent Control:

1. You can select and add client by drop-down list of [Client Name] column.
2. Click the plus(+) icon in [Add/Delete] column to add the client you select.
3. You can add schedule in the [Time Management] column. If not, the default action is to use the filters all the time.
4. Select the desired time slots for allowed access times. Drag and hold to create longer time slots.
5. If you add no filter(url/keyword/service), the default action is to allow all packets passthrough.
6. Click [Confirm] to save the new settings.

Enable Parental Control ☒ On

System time Thu Dec 15 04: 31 2016

Client & Schedule List (Maximum: 16)

Client Name	Client MAC	Time Management	Add / Delete
		-	+

URL Filter List (Maximum: 16)

URL Filter List	Add / Delete
	+

Keyword Filter List (Maximum: 16)

Keyword Filter List	Add / Delete
	+

Service Filter List (Maximum: 16)

Port Range	Protocol	Add / Delete
	TCP	+

Apply

Steps to set parental control function:

1. From the navigation panel, go to **Base > Parental Control**.
2. **Enable Parental Control:** Select **On** to enable parental control, Select **Off** to disable parental control.

3. **Client Name:** Select client from the list. The name in the list stands for the client that is communicating with the router.
4. **Client MAC:** MAC address of the selected client.

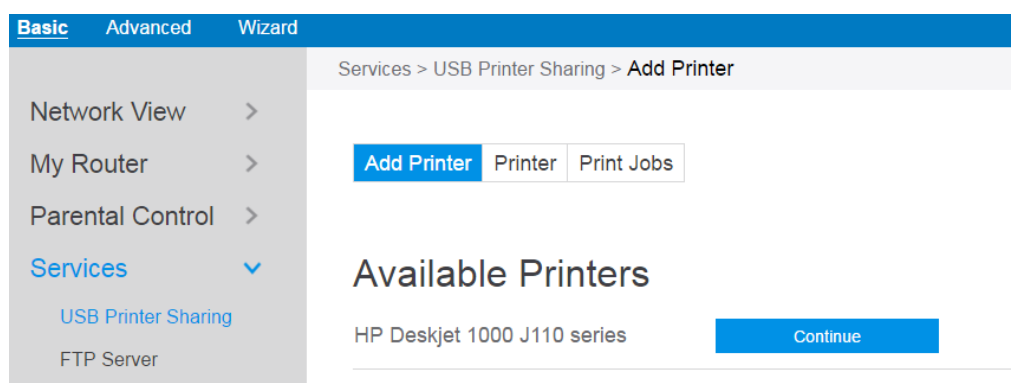
Note: **Client Name** just makes it easier for administrator to distinguish lan-side devices. The **Client MAC** in fact specify the very device under parental control.

5. **Add/Delete:** Click  or  to add/delete the profile.
6. **Time Management:** Click , then setup the client's schedule timetable to allow or deny client's access to Internet.
7. **URL Filter List:** Router prevents lan-side device from accessing the URL in list.
8. **Add/Delete:** Click  or  to add/delete the profile.
9. **Keyword Filter List:** Router prevents lan-side device from accessing to webpages contain the keyword in list.
10. **Add/Delete:** Click  or  to add/delete the profile.
11. **Service Filter List:** Router prevents lan-side device from communicating with remote device with defined port in **Port Rang** and defined **Protocol**.
12. **Add/Delete:** Click  or  to add/delete the profile.
13. Click **Apply**.

2.3.6 Services

2.3.6.1 USB Printer Sharing

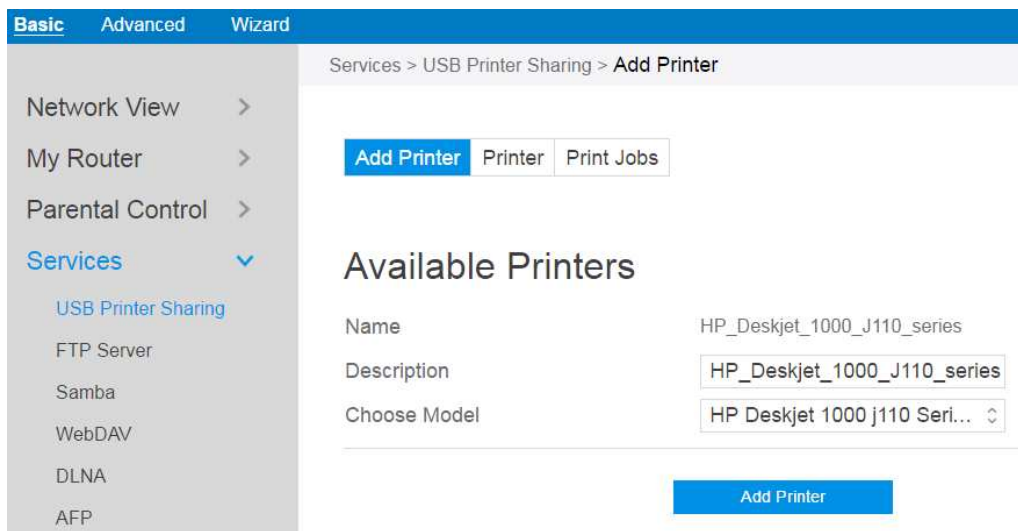
USB Printer sharing allows administrator to plug a USB printer to router's USB port and set up the print server.



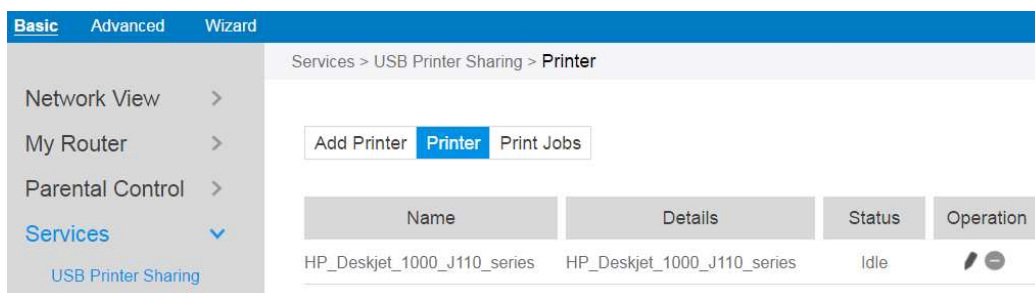
Steps to set up USB Printer sharing:

1. From the navigation panel, go to **Basic > Service > USB Printer sharing > Add Printer**.
2. Plug in the USB interface of the printer to the router. Confirm your printer has been detected and click Continue.
3. Select one of the following modes to install the printer driver, and click Add printer.
 - **Auto select:** Automatically searches for the appropriate printer driver and installs. If there is no corresponding printer driver, the system displays add a printer error; please select the correct printer driver manually.
 - **Select printer driver:** Manually select the corresponding printer brand and model.
 - **Choose PPD File:** If the above methods are unable to correctly install the printer driver, then you can upload a PPD File. Select your PPD file and click

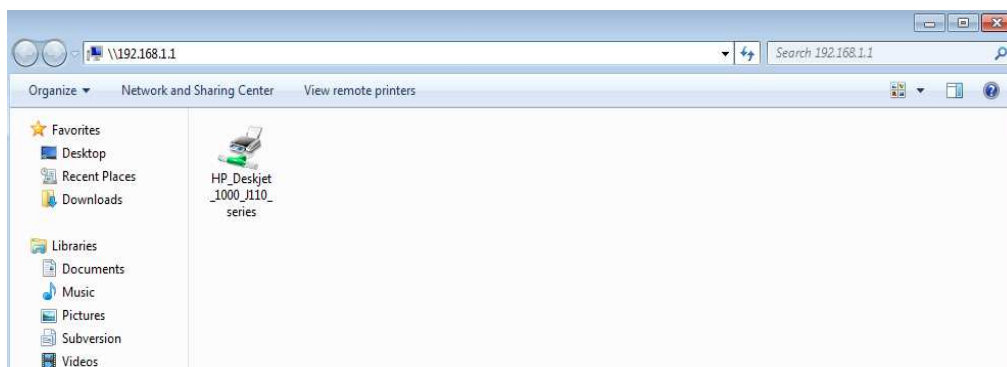
the **upload** button.



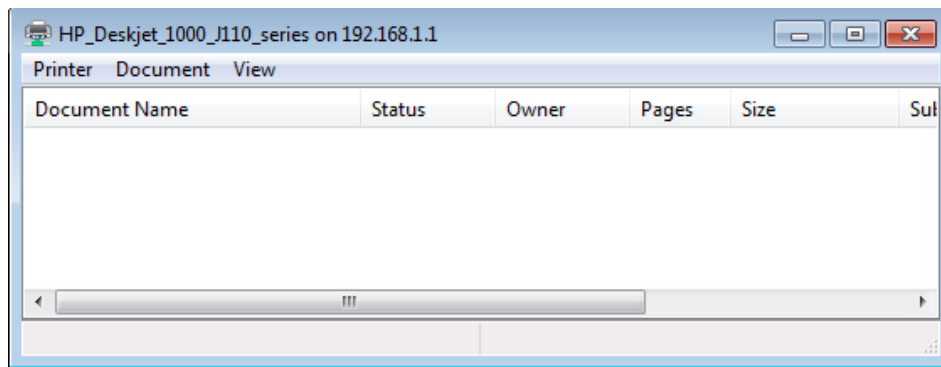
4. **Printer** tab displays whether your printer is operating correctly with the print server, as below.



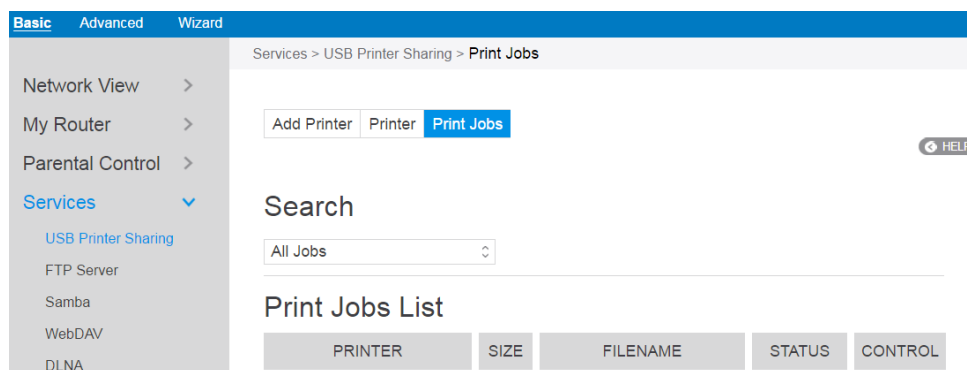
5. To check whether your printer is working correctly or not, input the LAN address (192.168.1.1) for the printer in Windows Finder.



6. Double-click the printer icon and if you see the status interface as shown below, the installation was successful. If an error message prompts that the driver cannot be found, then return to **Add Printer** settings and select the correct driver.



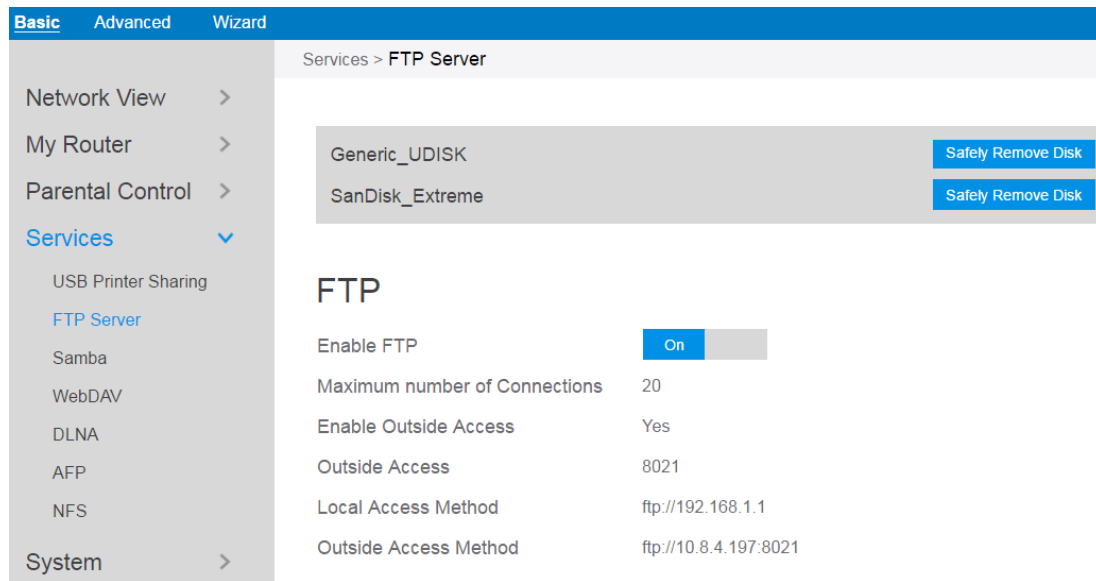
7. You can view print status information in the **Print Jobs** tab.



- **Active:** All active jobs, including processing and pending jobs.
- **Processing:** The job currently processing/communicating print data.
- **All Jobs:** All print jobs.

2.3.6.2 FTP Server

FTP Server enables an FTP server to share files from USB disk to other devices via your local area network or via the Internet. This page shows information about the FTP Server. For set up FTP Server, go to **Advanced > Servers > FTP Server**.

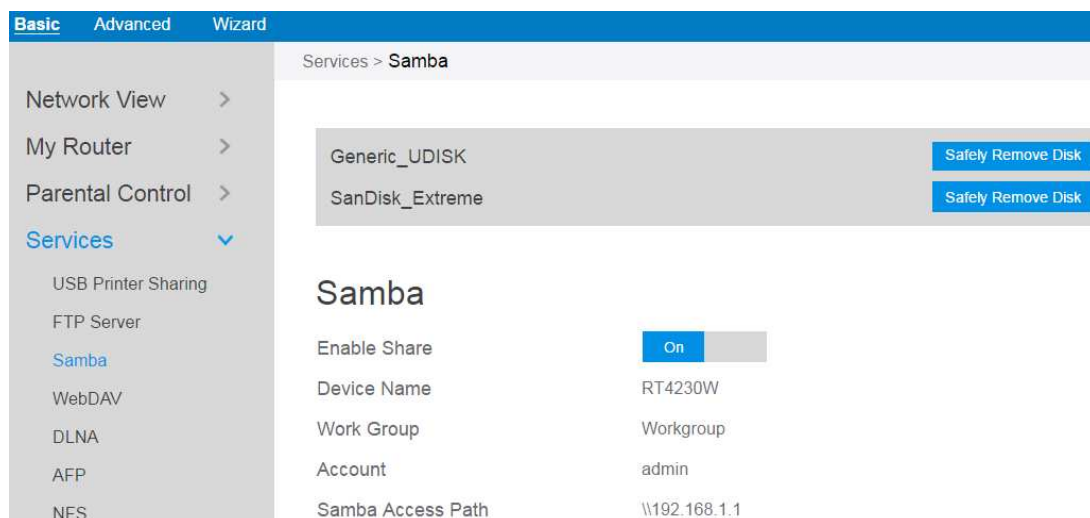


Display information on FTP Server:

1. From the navigation panel, go to **Basic > Services > FTP Server**.
2. Connect an external **USB** hard disk drive or USB flash drive to your router, and your device will be displayed here.
3. **Enable FTP:** Click On/Off to enable/disable Internet access to FTP service.
4. **Maximum number of Connections:** the maximum number of concurrent connections for the Network Neighborhood or FTP Server.
5. **Enable Outside Access:** Select On/Off to enable/disable access to FTP server by wide area network.
6. **Outside Access:** The numbers of external service ports (default value: 8021).
7. **Safely Remove Disk:** Click to safely remove USB devices. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.3.6.3 Samba

Samba Share allows you to set up the accounts and permissions for the Samba service. This page shows information about the Samba Server. For Samba setup go to **Advanced > Servers > Samba**.



- From the navigation panel, go to **Basic > Services > Samba Server**.
- Connect an external **USB** hard disk drive or USB flash drive to your router, and your device will be displayed here.
- **Enable Share:** Click the On/Off to enable/disable Internet access to Samba service.
- **Device Name:** Enter a name for your device and you can use this name in your web browser's URL field to quickly access the device as a Network Place service.
- **Work Group:** Group name of the router in Network Neighborhood.
- **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.3.6.4 WebDAV

The client can write operations in WebDAV directory with appropriate permissions. This page shows information about the WebDAV Server. To set up WebDAV go to **Advanced > Servers > WebDAV**.

The screenshot shows a web interface for configuring WebDAV. On the left is a navigation menu with options: Network View, My Router, Parental Control, Services (selected), USB Printer Sharing, FTP Server, Samba, WebDAV (highlighted), DLNA, AFP, NFS, and System. The main content area is titled 'Services > WebDAV'. At the top, there are two sections for storage: 'Generic_UDISK' and 'SanDisk_Extreme', each with a 'Safely Remove Disk' button. Below this is the 'WebDAV' section, which includes a toggle for 'Enable WebDAV' set to 'On', and fields for 'HTTP Access Port' (80), 'HTTPS Access Port' (443), 'Enable Outside Access' (Yes), 'Outside Access HTTP' (8080), and 'Outside Access HTTPS' (8443). The 'LAN' section lists four access paths: WebDAV HTTP Access Path (http://192.168.1.1:80/UUU), WebDAV HTTPS Access Path (https://192.168.1.1:443/UUU), WebDAV HTTP Access Path (http://192.168.1.1:80/UNTITLED), and WebDAV HTTPS Access Path (https://192.168.1.1:443/UNTITLED). The 'WAN' section lists four access paths: WebDAV HTTP Access Path (http://10.8.4.197:8080/UUU), WebDAV HTTPS Access Path (https://10.8.4.197:8443/UUU), WebDAV HTTP Access Path (http://10.8.4.197:8080/UNTITLED), and WebDAV HTTPS Access Path (https://10.8.4.197:8443/UNTITLED).

Section	Item	Value
WebDAV	Enable WebDAV	On
	HTTP Access Port	80
	HTTPS Access Port	443
	Enable Outside Access	Yes
	Outside Access HTTP	8080
LAN	WebDAV HTTP Access Path	http://192.168.1.1:80/UUU
	WebDAV HTTPS Access Path	https://192.168.1.1:443/UUU
	WebDAV HTTP Access Path	http://192.168.1.1:80/UNTITLED
	WebDAV HTTPS Access Path	https://192.168.1.1:443/UNTITLED
WAN	WebDAV HTTP Access Path	http://10.8.4.197:8080/UUU
	WebDAV HTTPS Access Path	https://10.8.4.197:8443/UUU
	WebDAV HTTP Access Path	http://10.8.4.197:8080/UNTITLED
	WebDAV HTTPS Access Path	https://10.8.4.197:8443/UNTITLED

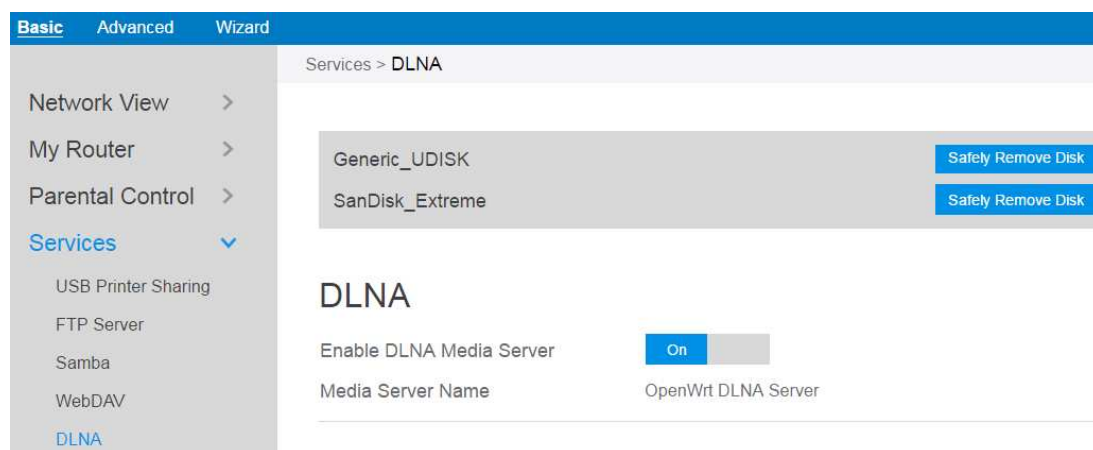
1. From the navigation panel, go to **Basic > Services > WebDAV Server**.
2. Connect an external USB hard disk drive or USB flash drive to your router, and your device will be displayed here.
3. **HTTP Access Port**: The port to access the WebDAV server for HTTP protocol in

the local area network (default value: 80).

4. **HTTPS Access Port:** The port to access the WebDAV server for HTTPS protocol in the local area network (default value: 443).
5. **Enable Outside Access:** Select On/Off to enable/disable access to WebDAV server by wide area network.
6. **Outside Access:** The port number of external service ports via HTTP (default value: 8080).
7. **Outside Access HTTPS:** The port number of external service ports via HTTPS (default value: 8443).
8. **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.3.6.5 DLNA

DLNA (Digital Living Network Alliance) allows you to share audio, image and video. Your router allows DLNA-supported devices to access multimedia files from the USB disk connected to your router. This page shows information about the DLNA Server. To setup a DLNA server, go to **Advanced > Servers > DLNA**.



Steps to set DLNA:

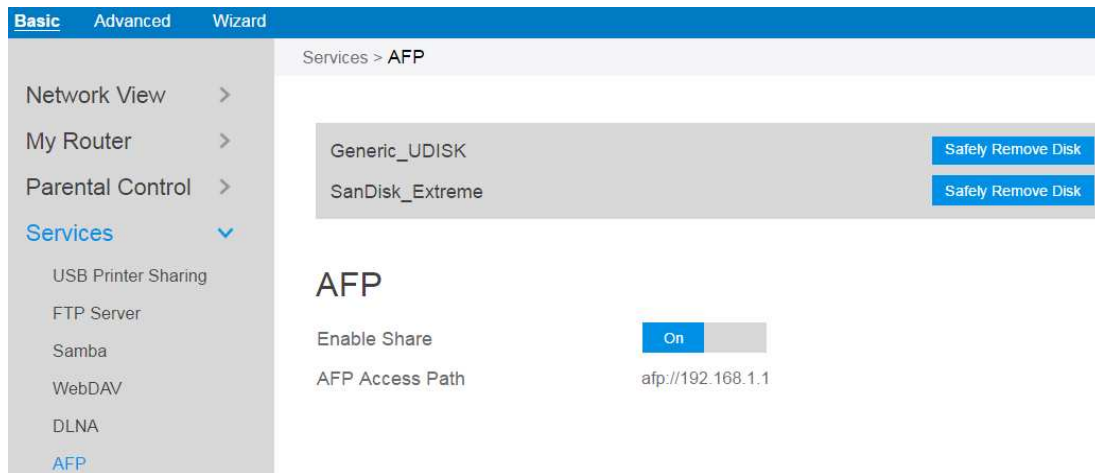
1. From the navigation panel, go to **Basic > Services > DLNA**.
2. Connect an external USB hard disk drive or USB flash drive to your router, and

your device will be displayed here.

3. **Enable DLNA Media Server:** Switch DLNA media server on or off.
4. **Media Server Name:** The DLNA server's name, which will be displayed by the media player such as VLC or Windows Media Player.
5. **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.3.6.6 AFP

An AFP server is a kind of network file sharing server based on AFP protocol implementation, mainly used for file sharing between Linux and MAC systems. This page shows information about the AFP server. To setup AFP, go to **Advanced > Servers > AFP**.

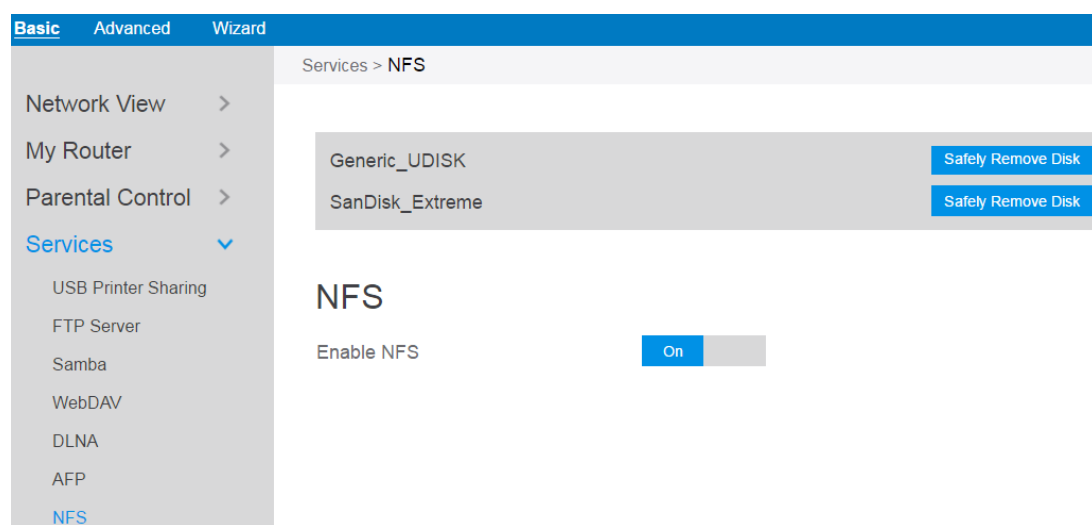


Steps to set AFP:

1. From the navigation panel, go to **Basic > Services > AFP**.
2. Connect an external USB hard disk drive or USB flash drive to your router, and your device will be displayed here.
3. **Enable Share:** Click On/Off to enable/disable AFP service.
4. **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.3.6.7 NFS

Network File System Server is used to share the USB disk with clients via network. Clients can mount the remote disk to a local directory for a faster speed than using a Samba server. This page shows information about the NFS Server. To setup NFS, go to **Advanced > Servers > NFS**.



Steps to set NFS:

1. From the navigation panel, go to **Basic > Services > NFS**.
2. Connect an external USB hard disk drive or USB flash drive to the router, then device's name will be displayed here.
3. **Enable NFS:** Enable or disable NFS service. When disabled, users can't access the USB storage via the NFS service.
4. **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.3.7 System

The system module allows administrator to configure router. Administrator can change the username and password used to login to the router GUI and other miscellaneous settings such as Time Zone, Auto Logout and NTP Server.

The screenshot shows the 'System' configuration page. At the top, there are tabs for 'Basic', 'Advanced', and 'Wizard'. The 'Basic' tab is selected. On the left, a navigation menu lists 'Network View', 'My Router', 'Parental Control', 'Services', and 'System' (which is highlighted). The main content area is titled 'System' and contains three sections: 'Change the Router Login Password', 'Miscellaneous', and 'NTP Server (Maximum:6)'. The 'Change the Router Login Password' section has input fields for 'Username' (pre-filled with 'admin'), 'New Password', and 'Retype New Password', along with a 'Show Password' checkbox. The 'Miscellaneous' section has a 'Time Zone' dropdown menu (set to 'America/New York') and an 'Auto Logout' field (set to '0' minutes). The 'NTP Server' section features a table with columns 'NTP Server' and 'Add/Delete'. It lists four default NTP servers: 'us.pool.ntp.org', 'north-america.pool.ntp.org', 'time.nst.gov', and 'pool.ntp.org'. Each server entry has a corresponding '+' or '-' icon in the 'Add/Delete' column. An 'Apply' button is located at the bottom right of the page.

System		
Change the Router Login Password		
Username	admin	
New Password		
Retype New Password		☐ Show Password
Miscellaneous		
Time Zone	America/New York	
Auto Logout	0	Minutes (Disable: 0)
NTP Server (Maximum:6)		
NTP Server	Add/Delete	
	+	
us.pool.ntp.org	-	
north-america.pool.ntp.org	-	
time.nst.gov	-	
pool.ntp.org	-	
Apply		

Steps to set the System settings:

1. From the navigation panel, go to **Basic > System**.
2. **Username:** name used to login router.
3. **New Password:** New login password for router.
4. **Retype New Password:** Retype new login password for router.
5. **Time Zone:** The time zone used by default.
6. **Auto Logout:** Auto logout after a specified period of time.
7. **NTP Server:** DNS of a NTP(Network Time Protocol) server.

8. Click **Apply**.

2.4 Advanced Setup

2.4.1 Network

2.4.1.1 WAN Settings

2.4.1.1.1 Internet Settings

Router supports several WAN connection types. Select the type from the WAN Connection Type dropdown menu.

Basic Advanced Wizard

Network > WAN > Internet

Internet DDNS UPnP Port Trigger Port Forward DMZ NAT Pass Through

HELP

Basic

WAN Connection Type: DHCP

MTU: 1500

WAN DNS Settings

Connect to DNS Server: ☒ Yes ☐ No

DNS 1: 10.7.46.1

DNS 2: 61.139.2.69

Account Settings

Authentication: ☒ None ☐ 802.1x MD5

Username:

Password:

Special Requirement

Host Name:

MAC Address: MAC Clone

DHCP Query Frequency: Aggressive Mode

Apply

Steps to configure WAN connection settings:

1. From the navigation panel, go to **Advanced > Network > WAN > Internet**.
2. **WAN Connection Type:** Choose the Internet Service Provider type. There are 5 options: **DHCP, PPPoE, Static , PPTP, and L2TP**. If you are unsure which type to select, please consult your ISP.
3. **MTU:** Maximum Transmission Unit value, which defines the maximum length of a packet.
4. **Connect to DNS Server:** Allows router to get IP address from the DNS Server automatically. DNS Server is a host on the Internet that translates Internet names to numeric IP addresses.
5. **Get WAN IP Automatically:** Select **Yes** to get WAN IP automatically and **No** to enter IP manually below.
6. **IP Address:** If your WAN connection requires a static IP address, key in the IP address in this field.
7. **Subnet Mask:** If your WAN connection requires a static IP address, key in the subnet mask in this field.
8. **Default Gateway:** If your WAN connection requires a static IP address, type in the gateway IP address in this field.
9. **DNS 1 & DNS 2:** Either of them indicates an IP address of a DNS server.
10. **Authentication:** Use 802.1x MD5 authentication or not (IEEE 802.1x is an IEEE Standard for port-based Network Access Control).
11. **Username:** Username for 802.1x MD5 authentication.
12. **Password:** Password for 802.1x MD5 authentication.
13. **PPTP Options:** PPTP Encryption method. Select Auto for automatic Microsoft Point-to-Point Encryption (MPPE) and select No Encryption to disable MPPE. Select MPPE 40 for 40-bit MPPE with PPTP Server and select MPPE 128 for 128-bit MPPE with PPTP Server.
14. **Access Concentrator Name:** Specifies the Access Concentrator to connect to. If

unset, pppd uses the first discovered one.

15. **Additional Pppd Options:** Additional command line arguments to pass to the pppd daemon.
16. **Host Name:** This field allows you to provide a host name for your router. It is usually provided by ISP.
17. **MAC Address:** MAC address identifies a device in the network. ISPs monitor the MAC addresses of devices that connect to their services, and would disallow Internet connection for new MAC addresses.

To fix this issue, you can do either of the following:
 - * Contact your ISP and request to update the MAC address associated with your ISP subscription.
 - * Clone or change the MAC address of the new device to match the MAC address of the original device.
18. **DHCP Query Frequency:** Some ISP blocks MAC addresses if the device makes DHCP queries too often. To prevent this, change the DHCP Query Frequency. In the default Aggressive mode, if your wireless router does not get a response from the ISP, it sends another query after 20 seconds and makes three more attempts. In Normal mode, if your wireless router does not get a response from the ISP, it makes a second query after 120 seconds and makes two more attempts.
19. **Enable Default Route:** Whether to create a default route over the tunnel.
20. **VPN Server:** IP address or DNS for VPN server.
21. Click **Apply**.

2.4.1.1.2 DDNS

Setting up DDNS (Dynamic DNS) allows you to get access to your router from outside through the provided wireless router DDNS Service or another DDNS service.

Steps to set up DDNS:

1. From the navigation panel, go to **Advanced > Network > WAN > DDNS**.
2. **Enable the DDNS Client:** **Yes** means enable DDNS function, **No** means disable DDNS function.
3. **Server:** Select the Supported DDNS provider's URL from the list.
4. **Host Name:** Specifies the host name to be updated.
5. **User Name or E-mail Address:** User name or email address which has been registered an account in a DDNS provider.
6. **Password or DDNS Key:** Password is your registered account.
7. Click **Apply**.

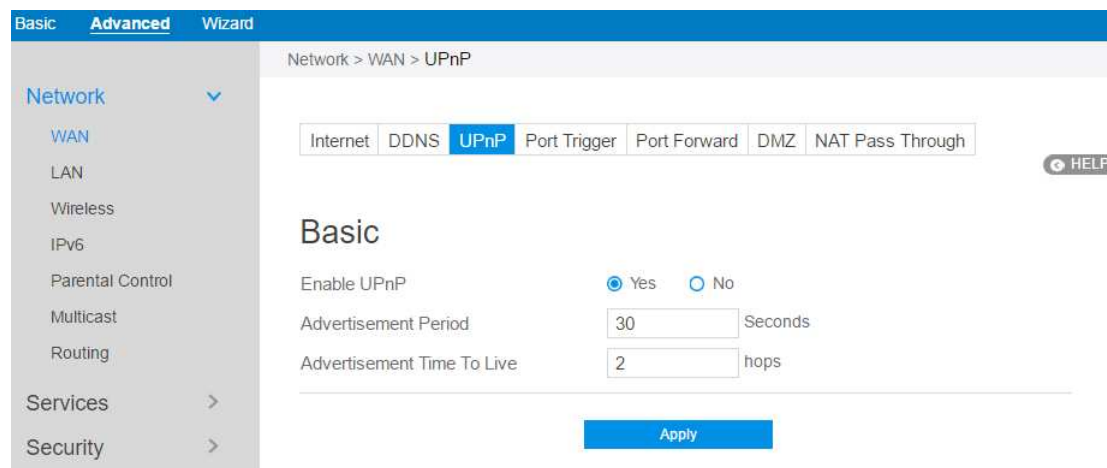
NOTES: DDNS service will not work properly under these conditions:

- When the wireless router is using a private WAN IP address (192.168.x.x, 10.x.x.x, or 172.16.x.x), as indicated by yellow text.
 - The router works on a network who uses multiple NAT tables.
-

2.4.1.1.3 UPnP

UPnP (Universal Plug and Play) allows devices (such as routers, televisions, stereo

systems) to be controlled via an IP-based network with or without a central control unit. Under the help of UPnP, one device can be discovered once it has connected to network, then device can be remotely configured to support P2P applications, interactive gaming, video conferencing, and web or proxy servers. Unlike Port forwarding, UPnP automatically configures the router to accept incoming connections and direct requests to a specific PC on the local network.



Steps to set up UPnP 慎

1. From the navigation panel, go to **Advanced > Network > WAN > UPnP**.
2. **Enable UPnP**: **Yes** means enable UPnP and **No** means disable it.
3. **Advertisement Period**: Router will broadcast its UPnP information to all devices every advertisement-period seconds.
4. **Advertisement Time To Live**: Number of hops that an advertisement will be transmitted .
5. Click Apply.

2.4.1.1.4 Port Trigger

Port trigger mechanism first defines a port (**Trigger Port**), when a lan-side device has written data to this defined port, the incoming data from **incoming port** will be forwarded to same port of the device who has activated this mechanism.

Basic Advanced Wizard

Network > WAN > Port Trigger

Internet DDNS UPnP **Port Trigger** Port Forward DMZ NAT Pass Through

HELP

Basic

Enable Port Trigger ☐ Yes ☒ No

Well-Known Applications

Trigger Port List (Maximum: 32)

Description	Trigger Port	Protocol	Incoming Port	Protocol	Operation
		TCP		TCP	+

Apply

Steps to set up Port Trigger:

1. From the navigation panel, go to **Advanced > Network > WAN > Port Trigger**.
2. **Enable Port Trigger:** Check to enable or disable Port Triggering.
3. **Well-Known Applications:** Select popular games and web services to add to the Port Trigger List.
4. **Description:** A brief description for application.
5. **Trigger Port:** When there is incoming data from lan-side application to this port, the **Port Trigger** mechanism will be activated.
6. **Protocol:** Select the type of protocol that the application will use.
7. **Incoming Port:** Defines the range of port. After Port trigger mechanism has been activated, the data from port within this range will be forwarded to the corresponding port of the application who has activated Port trigger mechanism.
8. **Operation:** Add, Edit or Delete operation for this item.
9. Click **Apply**.

Note: **Trigger Port** element in the list is regarded as a trigger, that's to say when data comes to this port, the Port Trigger mechanism will be activated.

2.4.1.1.5 Port Forward

Port forwarding is a method used to direct network traffic from Internet to a specified port. Setting up Port Forwarding allows traffic from outside to get access to specified services provided by lan-side device.

The screenshot shows the 'Port Forward' configuration page in a router's web interface. The interface has a blue header with 'Basic', 'Advanced', and 'Wizard' tabs. A left sidebar contains a 'Network' menu with sub-items: WAN, LAN, Wireless, IPv6, Parental Control, Multicast, Routing, Services, Security, Qos, Admin, and Tools. The main content area is titled 'Network > WAN > Port Forward' and features a tabbed interface with 'Internet', 'DDNS', 'UPnP', 'Port Trigger', 'Port Forward' (selected), 'DMZ', and 'NAT Pass Through'. Below the tabs, there's a 'Basic' section with two dropdown menus: 'Well Known Server List' and 'Well Known Game List', both set to 'Please Select'. A 'HELP' button is visible. The 'Port Forwarding List (Maximum: 128)' section contains a table with columns: Services, Public IP, Port Range, Local IP, and Local Port. The table has one row with empty input fields. An 'Apply' button is at the bottom.

NOTE: When **Port Forward** is enabled, router blocks unsolicited inbound traffic from the Internet and only allows replies from outbound requests from the LAN. The network client does not have access to the Internet directly, and vice versa.

Steps to set up Port Forwarding:

1. From the navigation panel, go to **Advanced > Network > WAN > Port Forward**.
2. **Enable Port Forwarding:** Check to enable or disable Port Forwarding.
3. **Well Known Server List:** Select a pre-defined Server list from the drop-down menu and the Port Forwarding List will be auto-filled.
4. **Well Known Game List:** Select a game from the Server list and the Port Forwarding List will be auto-filled.
5. **Services:** A short description about this service.
6. **Public IP:** IP address of WAN Port.

7. **Port Range:** Defines the range of port in wan side.

NOTES:

- A network makes use of ports in order to exchange data, with each port assigned a port number and a specific task. For example, port 80 is used for HTTP. A specific port can only be used by one application or service at a time. Hence, two PCs attempting to access data through the same port at the same time would fail. For example, you cannot set up Port Forwarding for port 100 for two PCs at the same time.
 - When your network's firewall is disabled and you set 80 as the HTTP server's port range for your WAN setup, then your http server/web server would be in conflict with the router's web user interface.
-

8. **Local IP:** Key in the client's LAN IP address.

9. **Local Port:** Enter a specific port to receive forwarded packets. Leave this field blank if you want the incoming packets to be redirected to the specified port range.

10. **Protocol:** The required protocol. Refer to the documentation for the service that you are hosting.

11. **Operation:** Add, Edit or Delete operation for this item.

12. Click **Apply**

Steps to check whether Port Forwarding module has been activated successfully:

- Ensure that your server or application is set up and running.
- You will need a client outside your LAN which has Internet access (referred to as "Internet client"). This client should not be connected to the wireless router.
- On the Internet client, use the router's WAN IP to access the server. If port forwarding has been successful, you should be able to access available/specified files or applications.

Differences between port trigger and port forward:

- Port triggering will work even without setting up a specific LAN IP address. Unlike port forwarding, which requires a static LAN IP address, port triggering allows dynamic port forwarding using the router. Predetermined port ranges are configured to accept incoming connections for a limited period of time. Port triggering allows multiple computers to run applications that would normally require manually forwarding the same ports to each PC on the network.
- Port triggering is more secure than port forwarding since the incoming ports are not open all the time. They are opened only when an application is making an outgoing connection through the trigger port.

2.4.1.1.6 DMZ

Virtual DMZ module exposes one client to the Internet, allowing this client to receive all inbound packets directed to a Local Area Network. Inbound traffic from the Internet is usually discarded and routed to a specific client only if port forwarding or a port trigger has been configured on the network. In a DMZ configuration, one network client receives all inbound packets.

Setting up DMZ on a network is useful when you need incoming ports open or you want to host a domain, web, or e-mail server.

CAUTION: Opening all of the client's ports to Internet makes the network vulnerable to outside attacks. Please be aware of the security risks involved in using DMZ.

The screenshot shows the router's configuration interface. At the top, there are tabs for 'Basic', 'Advanced', and 'Wizard'. The 'Advanced' tab is selected. On the left, a navigation menu shows 'Network' expanded, with sub-items like 'WAN', 'LAN', 'Wireless', 'IPv6', 'Parental Control', 'Multicast', and 'Routing'. Below these are 'Services', 'Security', and 'Qos'. The main content area is titled 'Network > WAN > DMZ'. It features a sub-navigation bar with 'Internet', 'DDNS', 'UPnP', 'Port Trigger', 'Port Forward', 'DMZ' (highlighted), and 'NAT Pass Through'. Under the 'DMZ' tab, there's a 'Basic' section with the following settings:

- Enable DMZ:** Radio buttons for 'Yes' (selected) and 'No'.
- IP Address of Exposed Station:** A text input field.
- Enable IPv6 DMZ:** Radio buttons for 'Yes' (selected) and 'No'.
- IPv6 Address of Exposed Station:** A text input field.
- IPv6 prefix for DMZ setting:** A text input field with the placeholder text 'No prefix for ipv6 DMZ setting!'.

At the bottom right of the configuration area is a blue 'Apply' button.

Steps to set up DMZ:

1. From the navigation panel, go to **Advanced > Network > WAN > DMZ**.
2. **Enable DMZ:** Check to enable or disable DMZ.
3. **IP Address of Exposed Station:** LAN IP address of a client who can provide DMZ service. This makes the device with this IP address expose to Internet. Make sure that the server client has a static IP address.
4. **Enable IPv6 DMZ:** Check to enable or disable IPv6 DMZ.
5. **IPv6 Address of Exposed Station:** The client's LAN IPv6 address that will provide the DMZ service and be exposed on the Internet.
6. **IPv6 prefix for DMZ setting:** The IPv6 DMZ address must be in the range of IPv6 prefix. Show it for user to set valid DMZ address.
7. Click **Apply**.

2.3.1.1.7 NAT Pass Through

NAT Pass Through allows a Virtual Private Network (VPN) connection to pass through the router to the network server.

The screenshot shows the 'NAT Pass Through' configuration page in a router's web interface. The interface has a blue header with 'Basic', 'Advanced', and 'Wizard' tabs. Below the header, a breadcrumb trail reads 'Network > WAN > NAT Pass Through'. A left sidebar contains a 'Network' menu with sub-items: WAN, LAN, Wireless, IPv6, Parental Control, Multicast, and Routing. Below these are 'Services', 'Security', 'Qos', 'Admin', 'Tools', and 'Status', each with a right-pointing arrow. The main content area has a sub-header 'Basic' and a row of tabs: 'Internet', 'DDNS', 'UPnP', 'Port Trigger', 'Port Forward', 'DMZ', and 'NAT Pass Through' (which is highlighted). A 'HELP' button is to the right of these tabs. The configuration table below has two columns: the feature name and a dropdown menu. The features and their current settings are: PPTP Passthrough (Enable), L2TP Passthrough (Enable), IPSec Passthrough (Enable), SSL Passthrough (Enable), RTSP Passthrough (Enable), H.323 Passthrough (Enable), SIP Passthrough (Enable), NORM Passthrough (Enable), and Enable PPPoE Relay (Disable). An 'Apply' button is at the bottom right.

Basic	
PPTP Passthrough	Enable
L2TP Passthrough	Enable
IPSec Passthrough	Enable
SSL Passthrough	Enable
RTSP Passthrough	Enable
H.323 Passthrough	Enable
SIP Passthrough	Enable
NORM Passthrough	Enable
Enable PPPoE Relay	Disable

Steps to set up NAT Pass Through:

1. To configure NAT Pass Through settings, go to **Advanced > Network > WAN > NAT Pass Through**.
2. **PPTP Passthrough**: Enable or disable. Point-to-Point Tunneling Protocol (PPTP) is a method for implementing virtual private networks.
3. **L2TP Passthrough**: Enable or disable. In computer networking, Layer 2 Tunneling Protocol (L2TP) is a tunneling protocol used to support virtual private networks (VPNs) or as part of the delivery of services by ISPs. It does not provide any encryption or confidentiality by itself.
4. **IPSec Passthrough**: Enable or disable. Internet Protocol Security (IPsec) is a

protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session.

5. **SSL Passthrough:** Secure Sockets Layer(SSL) is cryptographic protocols that provide communications security over a computer network.
6. **RTSP Passthrough:** Enable or disable. The Real Time Streaming Protocol (RTSP) is a network control protocol designed for use in entertainment and communications systems to control streaming media servers.
7. **H.323 Passthrough:** Enable or disable. H.323 is a recommendation from the ITU Telecommunication Standardization Sector (ITU-T) that defines the protocols to provide audio-visual communication sessions on any packet network.
8. **SIP Passthrough:** Enable or disable. The Session Initiation Protocol (SIP) is a communications protocol for signaling and controlling multimedia communication sessions. The most common applications of SIP are in Internet telephony for voice and video calls, as well as instant messaging all over Internet Protocol (IP) networks.
9. **NORM Passthrough:** Enable or disable. NACK-Oriented Reliable Multicast (NORM) Transport Protocol, which can provide end-to-end reliable transport of bulk data objects or streams over generic IP multicast routing and forwarding services.
10. **Enable PPPoE Relay:** PPPoE relay allows devices in LAN to establish an individual PPPoE connection that passes through NAT.
11. When done, click **Apply**.

2.4.1.2 LAN Settings

2.4.1.2.1 LAN

The LAN IP module allows administrator to modify lan-side IP address of the router.

The screenshot shows a web interface for configuring the LAN IP. At the top, there are tabs for 'Basic', 'Advanced', and 'Wizard'. Below these, a breadcrumb trail reads 'Network > LAN > LAN IP'. On the left is a navigation menu with 'Network' expanded, showing options like WAN, LAN (selected), Wireless, IPv6, Parental Control, Multicast, and Routing. Below 'Network' is a 'Services' section with a right arrow. The main content area has two tabs: 'LAN IP' (selected) and 'DHCP Server'. A 'HELP' button is in the top right. Under the 'Basic' heading, there are two input fields: 'IP Address' with the value '192.168.1.1' and 'Subnet Mask' with the value '255.255.255.0'. An 'Apply' button is at the bottom right.

Steps to modify the LAN IP settings:

1. From the navigation panel, go to **Advanced > Network > LAN > LAN IP**.
2. **IP Address:** The LAN IP address of wireless router. The default value is 192.168.1.1. In IP-based networks, data packets are sent to the network devices' specific IP addresses.
3. **Subnet Mask:** The LAN subnet mask of wireless router. Its default value is **255.255.255.0**
4. Click **Apply**.

NOTE: Any change to the LAN IP module will affect router's DHCP settings.

2.3.1.2.2 DHCP Server

DHCP server can assign each client an IP address and informs the client of DNS server's IP, default gateway's IP and etc. This wireless router can allocate up to 253 IP addresses for lan-side devices.

The screenshot shows the 'DHCP Server' configuration page. The left sidebar has a 'Network' menu expanded, showing options like WAN, LAN, Wireless, IPv6, Parental Control, Multicast, and Routing. The main content area is titled 'Network > LAN > DHCP Server' and has tabs for 'LAN IP' and 'DHCP Server'. The 'Basic' section includes fields for 'Enable DHCP Server' (radio buttons for Yes/No), 'Domain Name' (text box with 'lan'), 'IP Pool Starting Address' (192.168.1.2), 'IP Pool Ending Address' (192.168.1.254), 'Lease Time' (604800), and 'Default Gateway' (192.168.1.1). The 'DNS and WINS Server' section has fields for 'DNS Server' (192.168.1.1) and 'WINS Server'. The 'Static IP Assignment within DHCP IP Pool (Maximum: 64)' section has an 'Enable Manual' radio button (Yes/No) and a table with columns for MAC, IP, and Add/Delete. The table is currently empty. An 'Apply' button is at the bottom.

MAC	IP	Add/Delete
-----	----	------------

Steps to configure the DHCP server:

1. From the navigation panel, go to **Advanced > Network > LAN > DHCP Server**.
2. **Enable DHCP Server:** Enable DHCP server function which allows router to act as a DHCP server to automatically assign IP addresses to network clients. If this function is disabled, administrator has to manually set LAN devices.
3. **Domain Name:** Domain Name for clients who request IP Address from DHCP

Server. This field only contains alphanumeric characters and dash symbols.

4. **IP Pool Starting Address:** Starting address that can be allocated to lan-side devices.
5. **IP Pool Ending Address:** Ending address that can be allocated to lan-side devices.
6. **Lease Time:** Defines the time that lan-side devices can use the assigned IP address. When the lease time expires, the network client will either send renew or rebind message to a DHCP server.
7. **Default Gateway:** IP address of the gateway for LAN.
8. **DNS Server:** IP address of a DNS server. DNS Server is used to resolve a DNS into a numerical IP Address. By default, the router will act as a DNS server.
9. **WINS Server:** Windows Internet Naming Service manages interactions of each PC with the Internet. If you use a WINS server, enter the IP Address of server here.
10. **Enable Manual:** Assign fixed IP address for clients.
11. **MAC:** MAC address of lan-side device.
12. **IP:** IP address within DHCP IP Pool for an-side device.
13. **Add/Delete:** Add/Delete static IP.
14. Click **Apply**.

NOTES:

- We recommend that administrator use an IP address format of 192.168.1.xxx (where xxx can be any number between 2 and 254) when specifying an IP address range.
 - An IP Pool Starting Address should not be greater than the IP Pool Ending Address.
-

2.4.1.3 Wireless Settings

2.4.1.3.1 Basic

Basic settings allow you to set up the basic wireless settings.

The screenshot shows a web interface for configuring wireless settings. On the left is a navigation menu with categories: Network (expanded), Services, Security, Qos, Admin, Tools, and Status. Under 'Network', there are links for WAN, LAN, Wireless (selected), IPv6, Parental Control, Multicast, and Routing. The main content area is titled 'Network > Wireless > Basic'. It has tabs for 'Basic' (selected), WPS, ACL, Professional, Radio, and Guest. A 'HELP' button is in the top right. The 'Basic' section contains the following settings:

Setting	Value
Frequency	2.4GHz
Index	1
SSID Enable	☒ Yes ☐ No
SSID	MySpectrumWiFi50-2G
Hide SSID	☐ Yes ☒ No
Authentication Method	WPA2 Personal
WPA Encryption	AES
WPA Pre-shared Key	Hi82ywi2CLH
Protected Management Frames	Disable
Max Clients	128
Network Key Rotation Interval	3600

An 'Apply' button is located at the bottom right of the settings area.

Steps to set up the basic wireless settings:

1. From the navigation panel, go to **Advanced > Network > Wireless > Basic**.
2. **Frequency**: Select the frequency band to configure.
3. **Index**: Indicates which SSID is under setting.

Note: At present time, the router supports 8 SSIDs. So, router uses **Index** parameter to indicate which SSID is under configuration.

4. **SSID Enable**: Switch the SSID on/off (enable/disable).

5. **SSID:** A name whose length is less than 32 characters is used to identify a wireless network. WiFi devices automatically detect all networks within its communication range.
6. **Hide SSID:** If [Yes] is selected, SSID does not show in site surveys by wireless mobile clients and they can only connect to wireless router by manually entering SSID.
7. **Authentication Method:** This field enables authentication methods for wireless clients.
8. **WPA Encryption:** Enable WPA Encryption to encrypt data.
9. **WPA Pre-Shared Key:** Requires a password of 8-63 characters (letters, numbers or a combination) or 8 - 64 hex digits to start the encryption process.
10. **Protected Management Frames:** Protected Management Frames is a feature to protect some types of management frames like deauthorization, disassociation and action frames.
11. **Max Clients:** The maximum number of clients allowed.
12. **Network Key Rotation Interval:** This field specifies the interval (in seconds) after which a WPA group key is changed. Enter [0] (zero) to indicate that a periodic key-change is not required. Please input the value between 600 to 86400 (seconds).
13. Click **Apply**.

2.4.1.3.2 WPS

WPS (Wi-Fi Protected Setup) is a wireless security standard that allows you to easily connect devices to a wireless network. You can configure the WPS function via the PIN code or WPS button. WPS supports the authentication of Open system, WPA-Personal and WPA2-Personal. Not supported: Shared Key, WPA-Enterprise, WPA2-Enterprise and RADIUS.

The screenshot shows a web-based configuration interface for a network device. The top navigation bar has tabs for 'Basic', 'Advanced', and 'Wizard'. The left sidebar shows a tree view with 'Network' expanded, containing sub-items like WAN, LAN, Wireless, IPv6, Parental Control, Multicast, and Routing. The main content area is titled 'Network > Wireless > WPS'. It has sub-tabs for 'Basic', 'WPS', 'ACL', 'Professional', 'Radio', and 'Guest', with 'WPS' currently selected. A note states: 'Note: ACL will only take effect when WPS is disabled.' The 'Basic' configuration section includes: 'Frequency' set to '2.4GHz', 'Enable WPS' set to 'On', 'Connection Status' as 'WPS-ENROLLEE-SEEN', 'Configured' as 'Yes', 'AP PIN Code' as '30649385', 'WPS Method' with 'Push Button' selected and 'Client PIN Code' unselected, and a 'PIN Code' input field. A 'Start' button is at the bottom.

Steps to set WPS:

1. From the navigation panel, go to **Advanced > Network > Wireless > WPS**.
2. **Frequency:** Select an operating band (2.4 GHz or 5 GHz) for WPS. To change the operating band, please disable the WPS function first.
3. **Enable WPS:** Selecting [**On**] to enable WPS. This can simplify the process of connecting any device to the wireless network.

NOTE: WPS supports authentication using Open System, WPA-Personal, and WPA2 - Personal. WPS does not support a wireless network that uses a Shared Key,

WPA-Enterprise, WPA2-Enterprise, and RADIUS encryption method

4. **Connection Status:** The connection status of WPS.
5. **Configured:** The configured status of WPS.
6. **AP PIN Code:** This is your router's WPS PIN code. Enter this in the client's WPS utility to make a connection.
7. **WPS Method:** PIN (Personal Information Number) method requires you to enter a PIN number to establish a wireless connection. PBC (Push Button Configuration) method requires you to push a button (the Start button on this page or a physical WPS button) to establish a wireless connection.
8. To set up WPS using the router's WPS button:
 - a) Click **Start** or press the WPS button found at the rear of the wireless router.
 - b) Press the WPS button on your wireless device. This is normally identified by the WPS logo.

NOTE: Check your wireless device or its user manual for the location of the WPS button.

9. To set up WPS using the Client's PIN code:
 - a) Locate the WPS PIN code on your wireless device's user manual or on the device itself.
 - b) Key in the Client PIN code on the text box.
 - c) Click **Start** to put your wireless router into WPS survey mode. The router's LED indicators quickly flash three times until the WPS setup is completed.
10. **PIN Code:** The WPS PIN code for clients to connect using PIN method.
11. When done, click **Start**.

2.4.1.3.3 ACL

ACL can be used to allow or disallow one device to send packets.

The screenshot shows a web-based configuration interface for a network device. The top navigation bar has tabs for 'Basic', 'Advanced', and 'Wizard'. The 'Advanced' tab is selected. On the left, a sidebar menu shows 'Network' expanded, with sub-items: WAN, LAN, Wireless (selected), IPv6, Parental Control, Multicast, and Routing. Below these are 'Services', 'Security', 'Qos', 'Admin', 'Tools', and 'Status'. The main content area is titled 'Network > Wireless > ACL'. It has sub-tabs: 'Basic', 'WPS', 'ACL' (selected), 'Professional', 'Radio', and 'Guest'. A note states: 'Note: ACL will only take effect when WPS is disabled.' The 'Basic' section contains the following fields: 'Frequency' (2.4GHz), 'Index' (1), 'SSID Name' (MySpectrumWiFi50-2G), 'Enable MAC Filter' (radio buttons for Yes and No, with 'No' selected), and 'MAC Filter Mode' (Accept). Below this is a 'MAC Filter List (Maximum: 64)' section with a table header 'MAC Filter List' and an 'Add / Delete' button. The table has one empty row with a '+' icon in the right column. An 'Apply' button is at the bottom.

Steps to set up the ACL:

1. From the navigation panel, go to **Advanced > Network > Wireless > ACL**.
2. **Frequency:** In the frequency field, select the frequency band that you want to use for the ACL settings.
3. **Index:** Indicate which SSID is going to apply ACL rules.
4. **SSID Name:** A name whose length is less than 32 characters is used to identify a wireless network.
5. **Enable MAC Filter:** Enable MAC filter or disable.
6. **MAC Filter Mode:** Select **Accept** to allow devices in the MAC filter list to access to the wireless network, select **Reject** to prevent devices in the MAC filter list from access to the wireless network.
7. **MAC Filter List:** Enter the MAC address of the wireless device. MAC filtering allows users to either limit specific MAC addresses from associating with the

AP/router, or specifically indicates which MAC addresses can associate with the AP/router.

8. When done, click **Apply**.

2.4.1.3.4 Professional

The Professional module provides advanced configuration options.

The screenshot shows the 'Professional' configuration page for wireless settings. The left sidebar contains a navigation menu with categories like Network, Services, Security, Qos, Admin, Tools, and Status. The main content area is titled 'Network > Wireless > Professional' and includes tabs for Basic, WPS, ACL, Professional (selected), Radio, and Guest. A 'HELP' button is visible in the top right. The 'SSID Setting' section contains various configuration options: Frequency (2.4GHz), Index (1), SSID (MySpectrumWiFi50-2G), Enable TX STBC (Enable), Enable RX STBC (Enable), Set AP Isolated (No), Multicast Rate (Mbps) (Auto), Short Guard Interval (Enable), DTIM Interval (3), Enable WMM (Enable), Enable WMM APSD (Enable), Turbo QAM (Enable), and Universal Beamforming (Disable). Below this is the 'Disable Specific MCS Data Rates' section, which displays a grid of checkboxes for MCS rates 0 through 31. An 'Apply' button is located at the bottom right of the configuration area.

Frequency	Index	SSID	Enable TX STBC	Enable RX STBC	Set AP Isolated	Multicast Rate (Mbps)	Short Guard Interval	DTIM Interval	Enable WMM	Enable WMM APSD	Turbo QAM	Universal Beamforming
2.4GHz	1	MySpectrumWiFi50-2G	Enable	Enable	☐ Yes ☒ No	Auto	Enable	3	Enable	Enable	Enable	Disable

☐ 31	☐ 30	☐ 29	☐ 28	☐ 27	☐ 26	☐ 25	☐ 24	☐ 23	☐ 22	☐ 21	☐ 20	☐ 19	☐ 18	☐ 17	☐ 16
☐ 15	☐ 14	☐ 13	☐ 12	☐ 11	☐ 10	☐ 9	☐ 8	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0

Apply

NOTE: We recommend that administrators use the default settings.

In this module, administrator can configure the followings:

1. From the navigation panel, go to **Advanced > Network > Wireless > Professional**.

2. **Frequency:** Select the frequency band to configure professional settings.
3. **Index:** Indicates which SSID is under setting.
4. **SSID:** A name whose length is less than 32 characters is used to identify a wireless network.
5. **Enable TX STBC:** Enables or disables the Space Time Coding Block (STBC) feature, as described in 802.11n specification, in transmitting (TX) direction.
6. **Enable RX STBC:** Enables or disables the Space Time Coding Block (STBC) feature, as described in 802.11n specification, in receiving(RX) direction.
7. **Set AP Isolated:** Prevent wireless devices from communicating with each other via router. This feature is useful if many guests frequently join or leave your network. Select [**Yes**] to enable this feature or select [**No**] to disable.
8. **Multicast Rate (Mbps):** Setting transmission rate for multicast.
9. **Short Guard Interval:** Defines the length of time that the router spends for CRC (Cyclic Redundancy Check). CRC is a method of detecting errors during data transmission. Select **Enable** for a busy wireless network with high network traffic.
10. **DTIM Interval:** DTIM (Delivery Traffic Indication Message) Interval or Data Beacon Rate is the time interval before a signal is sent to a wireless device in sleep mode indicating that a data packet is awaiting delivery. The default value is three milliseconds.
11. **Enable WMM:** Enables or disables WMM capabilities in the driver. The WMM capabilities perform special processing for multimedia stream data including voice and video data.
12. **Enable WMM APSD:** Enable WMM APSD (Wi-Fi Multimedia Automatic Power Save Delivery) to improve power management between wireless devices. Select **Disable** to switch off WMM APSD.
13. **Turbo QAM:** 256-QAM (MCS 8/9) support. Wireless Mode must be set to auto.
14. **Universal Beamforming:** For legacy wireless network adapters which do not support **beamforming**, the router estimates the channel and determines the steering direction to improve the downlink speed. (Also known as Implicit

Beamforming.)

15. Click **Apply**.

2.4.1.3.5 Radio

Administrator can set some advanced feature for radio of the router.

The screenshot displays the 'Radio' configuration page within the router's web interface. The navigation pane on the left shows the path: Network > Wireless > Radio. The main content area is divided into three sections: Basic, Schedule, and Radio Setting. The 'Basic' section has a 'Frequency' dropdown set to '2.4GHz'. The 'Schedule' section has 'Enable Wireless Scheduler' set to 'No'. The 'Radio Setting' section contains various radio parameters, most of which are set to default or recommended values. An 'Apply' button is located at the bottom right of the configuration area.

Section	Parameter	Value
Basic	Frequency	2.4GHz
	Schedule	
Schedule	Enable Wireless Scheduler	No
	Radio Setting	
Radio Setting	Enable Radio	Yes
	Wireless Mode	b/g/n
	b/g Protection	Disabled
	Channel Bandwidth	20 MHz
	Control Channel	Auto
	Enable TX Bursting	Enable
	Tx Power Adjustment	100%
	OBSS RSSI	35
	RTS Threshold	2347
	Fragmentation Threshold	2346
	Beacon Interval	100
	AMPDU Aggregation	3
	VHT AMPDU Aggregation	7
	DCS Enable	Disable
	Radio Resource Management	Enable

Steps to set Radio:

1. From the navigation panel, go to **Advanced > Network > Wireless > Radio**.

2. **Frequency:** Selecting the frequency band that the router is running.
3. **Enable Wireless Scheduler:** Switch wireless schedule on or not.
4. **Date to Enable (Weekdays):** Select weekdays to enable Wi-Fi.
5. **Time of Day To Enable:** Set weekday time to enable Wi-Fi.
6. **Date to Enable (Weekend):** Select weekend days to enable Wi-Fi.
7. **Time of Day To Enable:** Set weekend time to enable Wi-Fi.
8. **Enable Radio:** Select [**Yes**] to enable wireless radio (wireless network). Select [**No**] to disable wireless radio (wireless network).
9. **Wireless Mode:** Select a Wireless Mode of your 802.11n interface.
10. **Channel Bandwidth:** Sets manual channel bandwidth.
11. **Control Channel:** The radio channel for wireless connection operation.
12. **Enable TX Bursting:** TX Bursting improves transmission speed between router and 802.11g devices.
13. **Tx Power Adjustment:** Set the capability for transmission power. The maximum value is 100%. You can save power and increase security if you don't require full wireless range.

NOTE: Increasing the Transmission Power adjustment values may affect the stability of the wireless network.

14. **OBSS RSSI:** Configure OBSS RSSI threshold. If OBSS RSSI is greater than configured value, then only move to 20 Mhz.
15. **RTS Threshold:** Select a lower value for RTS (Request to Send) Threshold to improve wireless communication in a busy or noisy wireless network with high network traffic and numerous wireless devices.
16. **Fragmentation Threshold:** Set the fragmentation threshold, which is the maximum fragment size.
17. **Beacon Interval:** Beacon Interval means the period of time between one beacon and the next one. The default value is 100 (the unit is millisecond, or 1/1000

second). Lower the Beacon Interval to improve transmission performance in unstable environment or for roaming clients, but it will be power consuming.

18. **AMPDU Aggregation:** Enables or disables Tx AMPDU aggregation for the entire interface. Receiving aggregate frames will still be performed, but no aggregate frames will be transmitted if this is disabled.
19. **VHT AMPDU Aggregation:** Set VHT capability field, Maximum A-MPDU length exponent. Value range is 0 to 7. Maximum A-MPDU length exponent indicates the maximum length of A-MPDU that the station can receive.
20. **DCS Enable:** Enable or disable DCS function which is a feature to detect and avoid CW interference.
21. **Radio Resource Management:** Enables or disables 802.11k
22. When done, click **Apply**

2.4.1.3.5 Guest

The Guest network can temporarily provide 2.4GHz and 5GHz network connections. Guests can connect to your specific network name (SSID) and won't connect to your private network.

Basic Advanced Wizard

Network > Wireless > Guest

Basic WPS ACL Professional Radio Guest

2.4GHz

Enable Guest ☒ Yes ☐ No

SSID

Authentication Method WPA2 Personal

WPA Encryption AES

Network Key

5GHz

Enable Guest ☒ Yes ☐ No

SSID

Authentication Method WPA2 Personal

WPA Encryption AES

Network Key

Apply

Steps to set **Guest** module:

1. From the navigation panel, go to **Advanced > Network > Wireless > Guest**.
2. **Enable Guest:** Enable/disable the guest SSID.
3. **SSID:** Name of the Guest wireless network.
4. **Authentication Method:** Choose way to exchange authentication data.
5. **WPA Encryption:** Choose the encrypting method.
6. **Network Key:** Key used to encrypt the authentication data.
7. When done, click **Apply**.

2.4.1.4 IPv6

The module is used to set some basic functions related to IPv6. For IPv6 service is not yet widely available, contact your ISP to make sure whether IPv6 service is provided.

The screenshot shows a web-based configuration interface for IPv6 settings. The interface has a top navigation bar with 'Basic', 'Advanced', and 'Wizard' tabs. A left sidebar contains a 'Network' menu with sub-items: WAN, LAN, Wireless, IPv6 (highlighted), Parental Control, Multicast, and Routing. Below this are 'Services', 'Security', 'Qos', 'Admin', 'Tools', and 'Status' sections. The main content area is titled 'Network > IPv6' and contains several sections: 'Basic' with a 'Connection Type' dropdown set to 'Native'; 'IPv6 WAN Setting' with 'WAN IPv6 MTU' set to 1500 and 'User Class Option' set to 'charter_map'; 'IPv6 LAN Setting' with 'Enable LAN' and 'Simultaneous' both set to 'Enable', 'LAN IPv6 Address' set to 64, 'LAN Prefix Length' set to 64, 'LAN IPv6 Prefix' set to 64, 'Enable Pool Setting For Lan Host' set to 'Enable', 'DHCP Pool Start' set to 1, 'DHCP Pool End' set to 1000, and 'LAN IPv6 MTU' set to 1500; 'IPv6 DNS Setting' with 'Connect to DNS Server Automati...' set to 'Yes'; and 'Port Ranges Valid for Port Forwarding' with a text box containing the message 'MapT function is enable,but no port range for port forwarding!'. An 'Apply' button is located at the bottom right of the configuration area.

Basic Advanced Wizard

Network > IPv6

Network

- WAN
- LAN
- Wireless
- IPv6
- Parental Control
- Multicast
- Routing

Services >

Security >

Qos >

Admin >

Tools >

Status >

Basic

Connection Type Native

IPv6 WAN Setting

WAN IPv6 MTU 1500

User Class Option charter_map

IPv6 LAN Setting

Enable LAN ☒ Enable ☐ Disable

Simultaneous ☒ Enable ☐ Disable

LAN IPv6 Address 64

LAN Prefix Length 64

LAN IPv6 Prefix 64

Enable Pool Setting For Lan Host ☒ Enable ☐ Disable

DHCP Pool Start 1

DHCP Pool End 1000

LAN IPv6 MTU 1500

IPv6 DNS Setting

Connect to DNS Server Automati... ☒ Yes ☐ No

Port Ranges Valid for Port Forwarding

MapT function is enable,but no port range for port forwarding!

Apply

Steps to set up IPv6:

1. From the navigation panel, go to **Advanced > Network > IPv6**.

2. **Connection Type:** Select IPv6 connection type to configure Disable, Native, Static IPv6.
3. **DHCP-PD:** Dhcpv6 prefix delegation.
4. **WAN IPv6 Address:** Set the wan interface's ipv6 address.
5. **WAN Prefix Length:** Set the wan interface's ipv6 prefix length.
6. **WAN IPv6 Gateway:** Set the wan interface's ipv6 gateway
7. **WAN IPv6 MTU:** Set the WAN interface's IPv6 MTU (Maximum Transmission Unit).
8. **User Class Option:** The user class option (15) of ORO that DHCPv6 clients send to the DHCPv6 server by solicit message.
9. **Auto Configuration:** The wan interface's address assign type (SLAAC). **Enable:** WAN interface can get ipv6 address by SLAAC. **Disable:** WAN interface gets the ipv6 address only by stateful.
10. **Enable LAN:** Enable/Disable router allocating IPv6 addresses for lan-side devices.
11. **Simultaneous:** The mode which hosts connected to the LAN interface can get IPv6 addresses. When enabled, hosts get IPv6 address by simultaneous Stateless and/or Stateful (requires DHCP pool start and end values). When disabled, hosts do not get IPv6 addresses simultaneously by Stateless and/or Stateful, and a mode must be selected instead.
12. **LAN IPv6 Address:** Set LAN interface's IPv6 address.
13. **LAN Prefix Length:** Set LAN interface's IPv6 prefix length.
14. **LAN IPv6 Prefix:** Set LAN interface's prefix.
15. **Enable Pool Setting For Lan Host:** Enable/Disable allocating ranged IPv6 addresses for lan-side devices.
16. **DHCP Pool Start:** DHCPv6 address setting address pool start.
17. **DHCP Pool End:** DHCPv6 address setting address pool end.
18. **PD-Valid Lifetime:** Prefix delegation for valid lifetime.
19. **PD-Preferred Lifetime:** Prefix delegation for preferred lifetime.
20. **LAN IPv6 MTU:** Set MTU for lan-side devices.
21. **Connect to DNS Server Automatically:** Choose to get the DNS from manually from uplink.

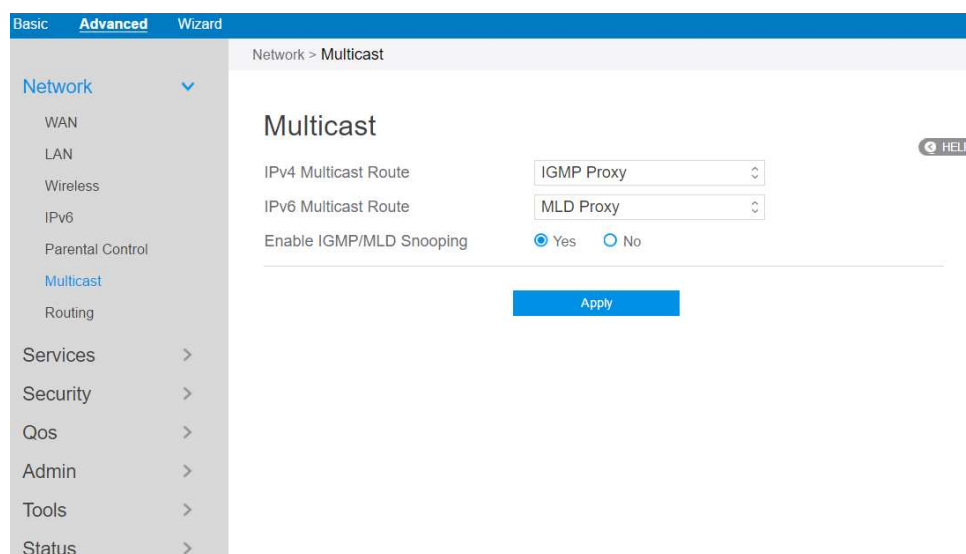
22. **IPv6 DNS Server 1:** IPv6 address for DNS server.
23. **IPv6 DNS Server 2:** IPv6 address for DNS server.
24. **IPv6 DNS Server 3:** IPv6 address for DNS server.
25. **Port Ranges Valid for Port Forwarding:** The "port ranges" are set by Map-T mode, and the port setting for port forwarding must be in these ranges.
26. Click **Apply**.

2.4.1.7 Parental Control

Refer to **2.3.5 Parental Control** for relevant setting descriptions.

2.4.1.8 Multicast

Enable multicast. The sender and receiver achieve a point to multipoint connection.



Steps to set up Multicast:

1. From the navigation panel, go to **Advanced > Network > Multicast**.
2. **IPv4 Multicast Route:** Select an IPv4 Multicast Route.

*IGMP Proxy: IGMP Proxy enables hosts in a unidirectional link routing (UDLR) environment that are not directly connected to a downstream router to join a multicast group sourced from an upstream network.

*PIM: PIM-Source-specific multicast (SSM) is used in IPv4/IPv6 and is a method of delivering multicast packets in which the only packets that are delivered to a receiver are those originating from a specific source address requested by the receiver. By limiting the source, SSM reduces demands on the network and improves security.

3. **IPv6 Multicast Route:** Select an IPv6 Multicast Route.

*MLD Proxy: The MLD proxy is used in IPv6 environments. This feature enables a device to learn proxy group membership information, and forward multicast packets based upon that information. If a device is acting as RP for route proxy entries, MLD membership reports for these entries can be generated on user specified proxy interface.

4. **Enable IGMP/MLD Snooping:** Check [**Yes**] to enable snooping and Check [**No**] to disable snooping. IGMP/MLD snooping is the process of listening to Internet Group Management Protocol (IGMP) / Multicast Listener Discovery (MLD) network traffic. The feature allows a network switch to listen in on the IGMP/MLD conversation between hosts and routers. By listening to these conversations the switch maintains a map of which links need which IP multicast streams. Multicasts may be filtered from the links which do not need them and thus controls which ports receive specific multicast traffic.
5. When done, click **Apply**.

2.4.1.9 Routing

This module can be used to build a static NAT table between WAN IP address and LAN IP address.

The screenshot shows the 'Basic' tab of the 'Routing' configuration page. The left sidebar contains a navigation menu with 'Network' expanded, showing options like WAN, LAN, Wireless, IPv6, Parental Control, Multicast, and 'Routing' (which is highlighted). Below 'Routing' is a 'Services' link. The main content area is titled 'Basic' and has a 'HELP' button. It contains a section 'Enable 1:1 NAT' with radio buttons for 'Yes' (selected) and 'No'. Below this is a '1:1 NAT List (Maximum: 13)' table. The table has columns for 'Name', 'Public IP', 'Local IP', 'On/Off', and 'Operation'. The first row has empty input fields for 'Name', 'Public IP', and 'Local IP', and a dropdown menu for 'On/Off' set to 'On'. To the right of the table is a '+' button. At the bottom of the table is an 'Apply' button.

Name	Public IP	Local IP	On/Off	Operation
	--		On	+

Steps to set up Routing:

1. From the navigation panel, go to **Advanced > Network > Routing**.
2. **Enable 1:1 NAT**: Check [**Yes**] to enable this function, check [**No**] to disable this function.
3. **Name**: A brief description for application.
4. **Public IP**: IP address from Charter supplied public IP subnets.
5. **Local IP**: Key in the client's LAN IP address, not limited to the subnet for the directly connected LAN interface
6. Click **On/Off** to enable/disable Internet access to FTP service.
7. Click  to add this item to the 1:1 NAT List.
8. Click **Apply**.

NOTE: This module only works only when WAN port is in static mode!

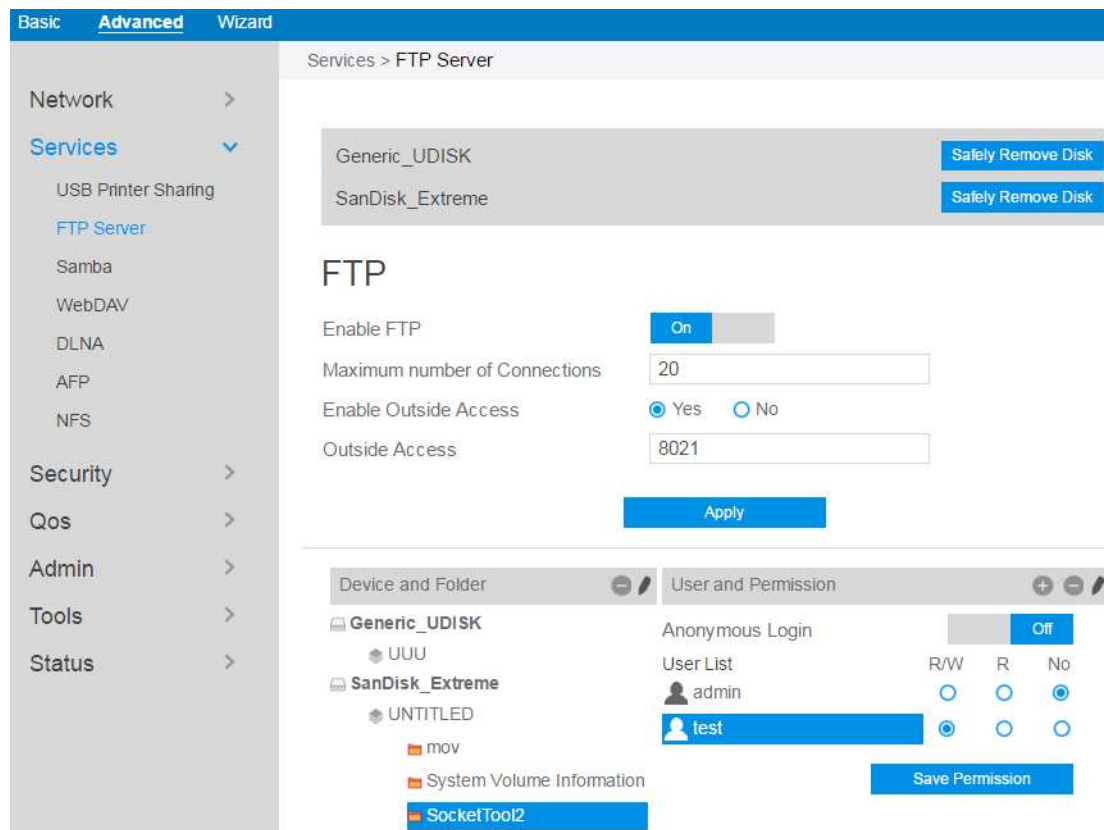
2.4.2 Services

2.4.2.1 USB Printer sharing

Refer to **2.3.6.1 USB Printer sharing** for relevant setting descriptions.

2.4.2.2 FTP Server

FTP Server enables an FTP server to share files from USB disk to other devices via your local area network or via the Internet.



To set up FTP Server:

9. From the navigation panel, go to **Advanced > Services > FTP Server**.
10. Connect an external **USB** hard disk drive or USB flash drive to the router, and your device will be displayed here.
11. Click **On/Off** to enable/disable Internet access to FTP service.

To create a new account:

1. Add new account.
2. In the Account and Password fields, key in the name and password of your network client. Retype the password to confirm. Click **Add** to add the account to the list.

To add a folder:

1. Add new folder.
2. Enter a folder name. The folder that you created will be added to the folder list.

To set up permissions on the folder for FTP server:

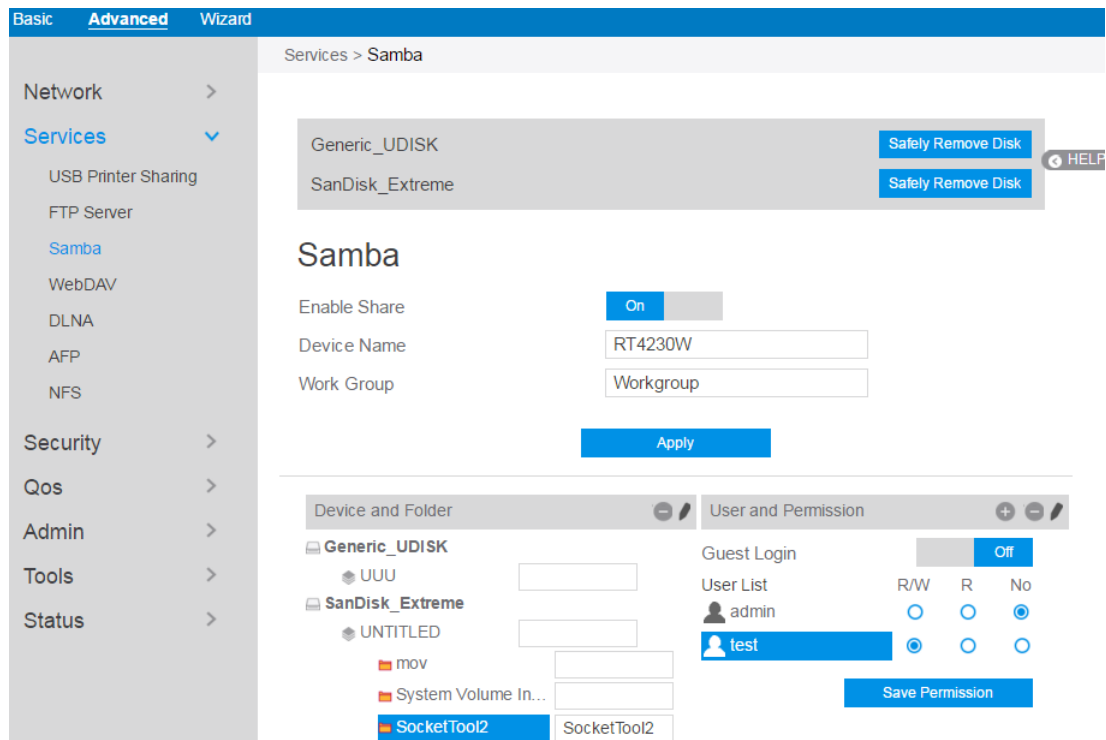
1. From the list of folders, choose one of the shared folders and select the type of access permission that you want to assign for specific users:
 - **R/W**: Select this option to assign read/write access.
 - **R**: Select this option to assign read-only access.
 - **No**: Select this option if you do not want to share a specific file folder.
2. Click Save Permission to apply the changes.

Refer to the following descriptions:

- **Maximum number of Connections**: The maximum number of concurrent connections for the Network Neighborhood or FTP Server.
- **Enable Outside Access**: Select On/Off to enable/disable to access FTP server by wide area network.
- **Outside Access**: The numbers of external service ports (default value: 8021).
- **Anonymous Login**: Enable/disable anonymous access to the FTP server.
- **Safely Remove Disk**: Click to safely remove disk. When the USB disk is ejected successfully, the USB status shows “No device”.
- Click **Save Permission**.

2.4.2.3 Samba

Samba Share allows you to set up the accounts and permissions for the Samba service.



To set up Samba:

1. From the navigation panel, go to **Advanced > Services > Samba Server**.
2. Connect an external **USB** hard disk drive or USB flash drive to the router, and your device will be displayed here.
3. Click **On/Off** to enable/disable Internet access to Samba service.

To create a new account:

1. Add new account.
2. In the Account and Password fields, key in the name and password of your network client. Retype the password to confirm. Click **Add** to add the account to the list.

To add a folder:

1. Add new folder.
2. Enter a folder name. The folder that you created will be added to the folder list.

To set up permissions on the folder for Samba server:

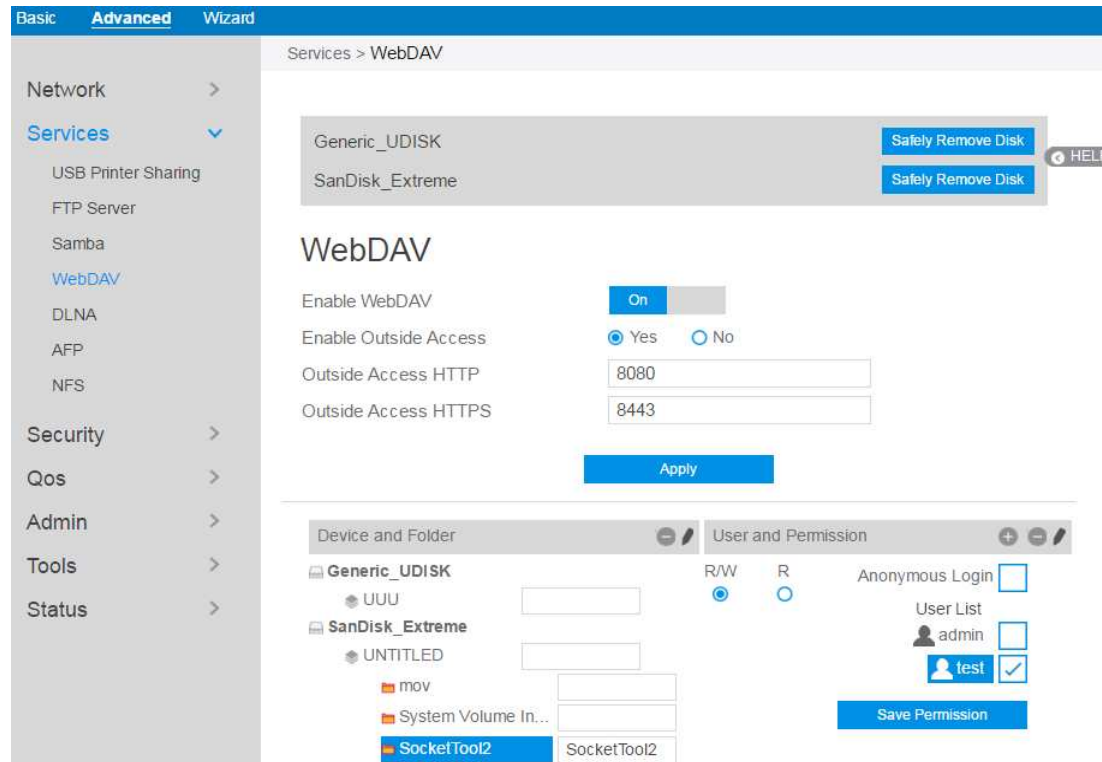
1. From the list of folders, choose one of the shared folders and add the share name, and choose the type of access permission that you want to assign for specific users:
 - **R/W:** Select this option to assign read/write access.
 - **R:** Select this option to assign read-only access.
 - **No:** Select this option if you do not want to share a specific file folder.
2. Click Save Permission to apply the changes.

Refer to the following descriptions:

- **Device Name:** Enter a name for your device and you can use this name in your web browser's URL field to quickly access the device as a Network Place service.
- **Work Group:** Group name of the cascade in Network Neighborhood.
- **Note:** The standard input characters include letters (A-Z, a-z), digits (0-9). The hyphen (-) and under line (_) characters may also be used, but not as the first character.
- **Guest Login:** By enabling [**Guest Login**], any user in your local network can access your network place (Samba) without authentication.
- **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.
- Click **Save Permission**.

2.4.2.4 WebDAV

The client can write operation in WebDAV directory with appropriate permissions.



To set up WebDAV:

1. From the navigation panel, go to **Advanced > Services > WebDAV Server**.
2. Connect an external USB hard disk drive or USB flash drive to your router, and your device will be displayed here.
3. Click **On/Off** to enable/disable Internet access via WebDAV.

To create a new account:

1. Add new account.
2. In the Account and Password fields, key in the name and password of your network client. Retype the password to confirm. Click Add to add the account to the list.

To add a folder:

1. Add new folder.
2. Enter a folder name. The folder that you created will be added to the folder list.

To set up permissions on the folder for WebDAV server:

1. From the list of folders, choose one of the shared folders and add the share name, then choose the type of access permission that you want to assign for specific users:
 - **R/W:** Select this option to assign read/write access.
 - **R:** Select this option to assign read-only access.
2. Click Save Permission to apply the changes.

Refer to the following for the descriptions of the fields:

- **Enable Outside Access:** Select **On/Off** to enable/ disable access to WebDAV server by WAN (wide area network).
- **Outside Access:** The port number of external service ports via HTTP (default value: 8080).
- **Outside Access HTTPS:** The port number of external service ports via HTTPS (default value: 8443).
- **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.
- Click **Save Permission**.

2.4.2.5 DLNA

DLNA (Digital Living Network Alliance) allows you to share audio, image and video. Your router allows DLNA-supported devices to access multimedia files from the USB disk connected to your router.

Basic **Advanced** Wizard

Services > DLNA

Generic_UDISK Safely Remove Disk

SanDisk_Extreme Safely Remove Disk

HELP

DLNA

Enable DLNA Media Server ☒ On

Media Server Name

Media Server Path Setting

☐ All Disks Shared

☒ Manual Media Server Path

Manual Media Server Path (Maximum: 10)

Media Server Directory	Shared Content Type	Add / Delete
Please Select	☐ Audio ☐ Image ☐ Video	+
/mnt/UNTITLED/SocketTool2	Audio Image Video	-

Apply

To set up DLNA:

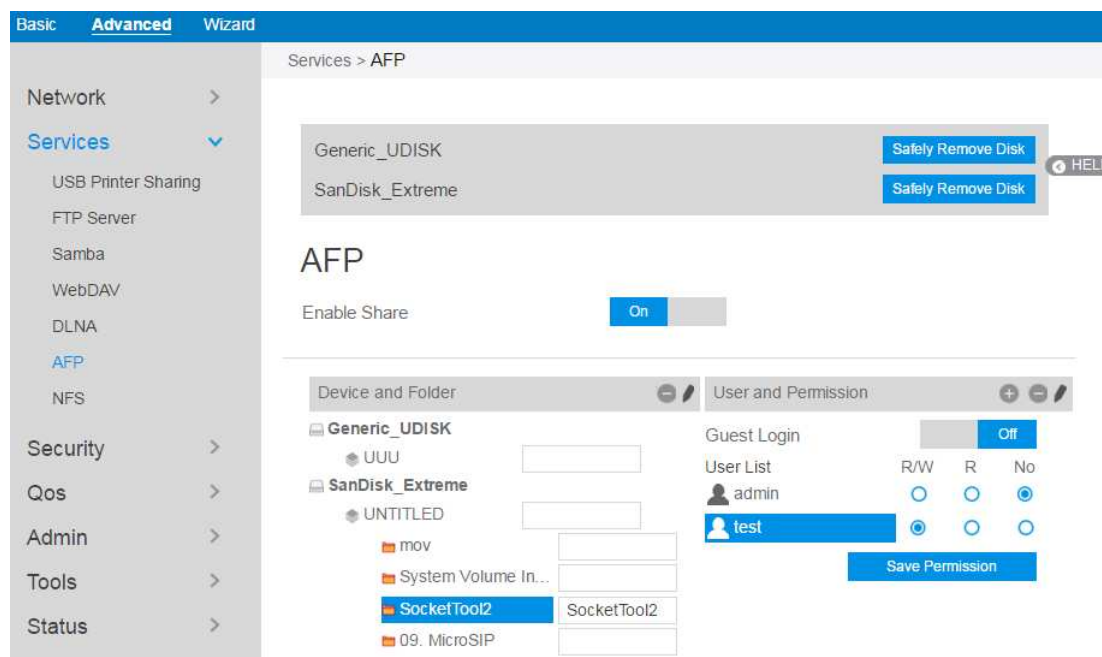
1. From the navigation panel, go to **Advanced > Services > DLNA Server**.
2. **Enable DLNA Media Server:** Switch DLNA media on or off.
3. **Media Server Name:** The DLNA server's name, which will be displayed by the media player, such as VLC or windows media player.
4. **Media Server Path Setting:** The methods of setting the folders' path which will be shared. There are two methods to be chose, "**All Disks Shared**" means share all of the mounted disks' all media; "**Manual Media Server Path**" means set the folders to be shared manually, When Manual is selected you must enter additional information in "**Manual Media Server Path**".
5. **Manual Media Server Path:** Set the folders to be shared and the media type

that will be shared by the DLNA server.

6. **Media Server Directory:** The folders that will be shared by the DLNA.
7. **Shared Content Type:** The media type that will be shared by the DLNA server: audio, image, video.
8. **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.
9. Click **Apply**.

2.4.2.6 AFP

An AFP server is a kind of network file sharing server based on AFP protocol implementation, mainly used for file sharing between Linux and MAC systems.



To set up AFP:

1. From the navigation panel, go to **Advanced > Services > AFP Server**.
2. Connect an external USB hard disk drive or USB flash drive to your router, and your device will be displayed here.
3. Click the **On/Off** to enable/disable Internet access via AFP.

To create a new account:

1. Add new account.
2. In the Account and Password fields, key in the name and password of your network client. Retype the password to confirm. Click Add to add the account to the list.

To add a folder:

1. Add new folder.
2. Enter a folder name. The folder that you created will be added to the folder list.

To set up permissions on the folder for AFP server:

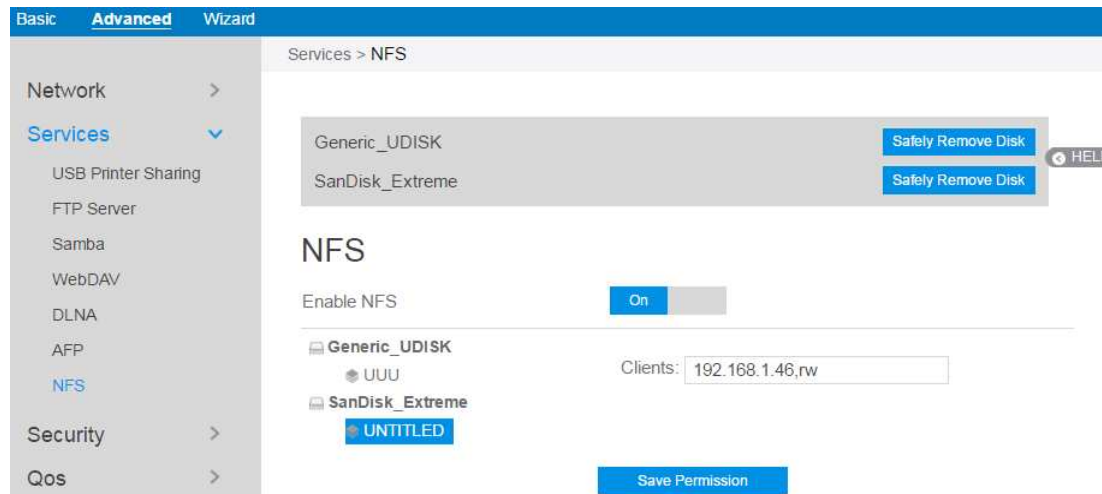
1. From the list of folders, choose one of the shared folder and add the share name, and choose the type of access permission that you want to assign for specific users:
 - **RW:** Select this option to assign read/write access.
 - **R:** Select this option to assign read-only access.
 - **No:** Select this option if you do not want to share a specific file folder.
2. Click Save Permission to apply the changes.

Refer to the following for the descriptions of the fields:

- **Guest Login:** By enabling [**Guest Login**], any user in your local network can access your network place (AFP) without authentication.
- **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.
- Click Save Permission.

2.4.2.7 NFS

Network File System Server is used to share the USB disk with clients via network. Clients can mount the remote disk to a local directory for a faster speed than using a Samba server.



To setup NFS:

1. From the navigation panel, go to **Advanced > Services > NFS Server**.
2. Connect an external USB hard disk drive or USB flash drive to your router, and your device will be displayed here.
3. **Enable NFS:** Enable or disable NFS service. When disabled, users can't access the USB storage via the NFS service.
4. **Clients:** "Clients" are users who can access the shared partition specified. You can input the proper information into the input field to allow the clients to access the specified shared partition. The proper permission format is "IP address, Read and write permission" and if you want to set more than one clients and with different permission, you can input the information separated by ";". For read and write permissions, "ro" means "read only" permission and the "rw" means "read and write" permission. The IP address can be replaced by "*" and means all IPs. For example,
 - 1) Allows the clients with the IP address 192.168.1.2 to access the partition

with "read and write" permission.

- 2) Allows two clients to access the shared partition. The client with IP address 192.168.1.2 has "read only" permission, and the client with IP address 192.168.1.3 has "read and write" permission. > 192.168.1.2,ro;192.168.1.3,rw
 - 3) Allows all clients to access the destination shared partition with the "read only" permission. > *,ro
5. **Safely Remove Disk:** Click to safely remove the disk. When the USB disk is ejected successfully, the USB status shows 'No device '.

2.4.3 Security

2.4.3.1 VPN

VPN (Virtual Private Network) provides a secure communication to a remote computer or remote network using a public network such as the Internet.

2.4.3.1.1 PPTP VPN Server

The VPN server allows administrator to get access to home network anytime, anywhere.

The screenshot shows a web-based configuration interface for a PPTP VPN Server. The interface has a sidebar on the left with a menu containing 'Network', 'Services', 'Security' (which is expanded to show 'VPN', 'IPv4 Firewall', and 'IPv6 Firewall'), 'Qos', 'Admin', 'Tools', and 'Status'. The main content area is titled 'Security > VPN > PPTP VPN Server'. It features three tabs: 'PPTP VPN Server' (active), 'OpenVPN Server', and 'VPN Client'. A 'HELP' button is located in the top right corner. The 'Basic Config' section includes a toggle for 'Enable VPN Server' set to 'On' and a dropdown for 'VPN Details' set to 'General'. Below this is a section for 'Username and Password (Maximum: 16)' with a table containing columns for 'Connection Status', 'Username', 'Password', and 'Add / Delete'. The 'Add / Delete' column has a '+' icon. At the bottom of the configuration area is an 'Apply' button.

NOTE: Before setting up a VPN connection, you need the IP address or domain name of the VPN server you are trying to access.

Steps to set up access to PPTP VPN server:

1. From the navigation panel, go to **Advanced > Security > VPN > PPTP VPN Server**.
 - **Enable VPN Server:** enable or disable PPTP VPN Server.
 - **VPN Details:** The details of PPTP VPN Server. Select General or Advanced settings.
 - **Username and Password:** The user information of PPTP VPN Server. Input the user name and password for the VPN server and click the  button.
2. Advanced VPN server settings, as below.

Advanced Settings

Broadcast Support	☒ Yes ☐ No
When Network Place is enabled, this must be enabled.	
Authorization Mode	Auto
MPPE Encryption	☒ MPPE-128 ☒ MPPE-40 ☒ No Encryption
Connect to DNS Server Automatic...	☒ Yes ☐ No
Connect to WINS Server Automatic...	☒ Yes ☐ No
MRU	1482
MTU	1482
Client IP Address	192.168.0.2 ~ 192.168.0.11 (Maximum:10)

Apply

- **Broadcast Support:** Turns on broadcast relay to clients from the router.
- **Authorization Mode:** Select Authorization Mode.
- **MPPE Encryption:** Select MPPE Encryption type.
- **Connect to DNS Server Automatically:** DNS of PPTP clients.

- **Connect to WINS Server Automatically:** WINS of PPTP clients.
- **MRU/MTU:** The Maximum Receive Unit (MRU) or Maximum Transmission Unit (MTU) sizes are sent to the client as part of the PPTP parameters to use during the PPTP session. We recommend that you do not change MTU or MRU values unless you are sure the change corrects a known problem with your PPTP sessions. Incorrect MTU or MRU values cause traffic through the PPTP VPN to fail.
- **Client IP Address:** The IP address range of PPTP clients.
- Click **Apply**.

2.4.3.1.2 OpenVPN Server

The VPN server allows administrator to get access to home network anytime, anywhere.

Basic Advanced Wizard

Security > VPN > OpenVPN Server

PPTP VPN Server OpenVPN Server VPN Client

Update succeeded !

Basic Config

Enable VPN Server ☒ On

VPN Details General

Username and Password (Maximum: 16)

Connection Status	Username	Password	Add / Delete
			+

Apply

Steps to set OpenVPN Server:

1. From the navigation panel, go to **Advanced > Security > VPN > OpenVPN Server**.
 - **Enable VPN Server:** Enable or disable OpenVPN server function.
 - **VPN Details:** Enter the details of your VPN server. Select General or

Advanced settings.

- **Username and Password:** The user information of OpenVPN server. Input the user name and password for the VPN server and click the  button.

2. Advanced VPN server settings:

Advanced Settings

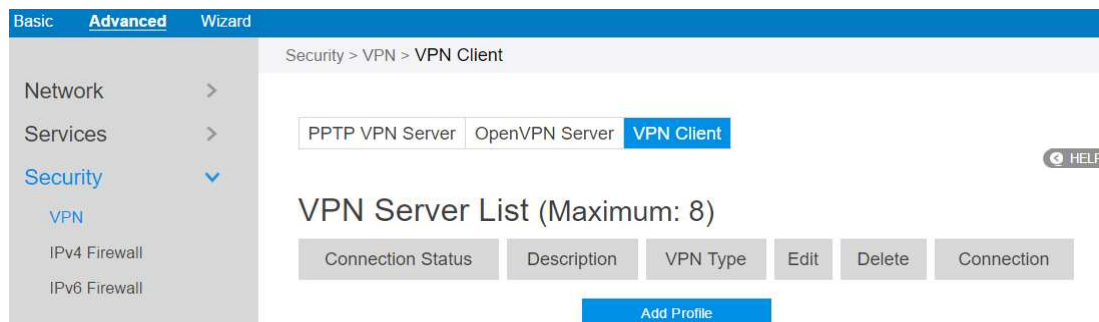
Interface Type	TUN
Protocol	UDP
Server Port	1194
Firewall	Auto
Authorization Mode	TLS
Content Modification of Keys & Certification.	
Username / Password Auth. Only	☐ Yes ☒ No
Extra HMAC Authorization	Disable
VPN Subnet / Subnet Mask	10.8.0.0 255.255.255.0
Poll Interval	0 Minutes
Push LAN to Clients	☐ Yes ☒ No
All traffic through VPN	☐ Yes ☒ No
Respond to DNS	☐ Yes ☒ No
Encryption Cipher	Default
Compression	Disable
TLS Renegotiation Time	0 Seconds
Manage Client-Specific Options	☐ Yes ☒ No

- **Interface Type:** "TUN" will create a routed IP tunnel, "TAP" will create an Ethernet tunnel.
- **Protocol:** TCP or UDP server.
- **Server Port:** The TCP/UDP port which OpenVPN server will listen on.
- **Firewall:** Firewall configuration for VPN server. **Auto** will create complete firewall configurations, **External only** will create basic firewall configurations and **Custom** will not create any firewall configurations.
- **Authorization Mode:** Select Authorization Mode.

- **Username / Password Auth. Only: Yes** requires only username and password for authentication, **No** also requires authentication certificate.
- **Extra HMAC Authorization:** If enabled, a `tls_auth` key will be used on the server. Every client must also have the key.
- **VPN Subnet / Subnet Mask:** VPN subnet and subnet mask settings.
- **Poll Interval:** The interval time for crontab of VPN server starting.
- **Push LAN to Clients:** Push routes to the client to allow it to reach other private subnets behind the server.
- **All traffic through VPN:** If enabled, this directive will configure all clients to redirect their default network gateway through the VPN, causing all IP traffic such as web browsing and DNS lookups to go through the VPN.
- **Respond to DNS:** Push DNS to clients.
- **Encryption Cipher:** Select a cryptographic method. This configure item must be copied to the client configure file as well.
- **Compression:** Enable compression on the VPN link. If this function is enable here, in the client configure administrator also should enable it.
- **TLS Renegotiation Time:** After a period of time, authentication is required again.
- **Manage Client-Specific Options:** To assign specific IP addresses to specific clients or if a connecting client has a private subnet behind it that should also have VPN access, enable this option.
- Click **Apply**.

2.4.3.1.3 VPN Client

View the VPN server list and add profiles. There are three types of VPN servers: PPTP, L2TP and OpenVPN.



Steps to setup a VPN Client:

1. From the navigation panel, go to **Advanced > Security > VPN > VPN Client**.
2. VPN Server list is displayed. Click **Add Profile** to set up VPN Client.

VPN Client

VPN Type	PPTP
Enable Default Route	☐ Yes ☒ No
Description	
VPN Server	
Username	
Password	
PPTP Options	Auto
Confirm	

3. **VPN Server List:** Current VPN Services which have been configured.
4. **VPN Type:** Type of VPN Server access such as PPTP, L2TP and OpenVPN.
5. **Enable Default Route:** Check [**Yes**] to use default route acquiring from VPN Server. Check [**No**] to use general default route.
6. **Description:** Enter a description for reference.

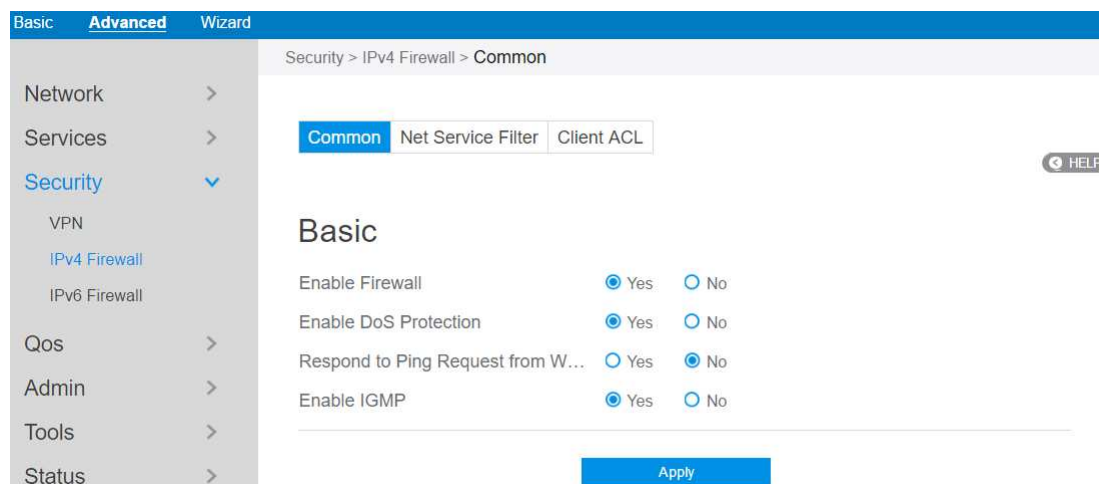
7. **VPN Server:** VPN Server IP address or URL.
8. **Username:** VPN authentication username.
9. **Password:** VPN authentication password.
10. **PPTP Options:** PPTP Encryption method. Select Auto for automatic Microsoft Point-to-Point Encryption (MPPE) and select No Encryption to disable MPPE. Select MPPE 40 for 40-bit MPPE with PPTP Server and select MPPE 128 for 128-bit MPPE with PPTP Server.
11. When done, click **Confirm**.

2.4.3.2 IPv4 Firewall

Enable the firewall to protect local area network against attacks from outside. Firewall filters the incoming and outgoing packets based on rules.

NOTE: Firewall is enable by default.

2.4.3.2.1 Common



Steps to set up basic Firewall settings:

1. From the navigation panel, go to **Advanced > Security > IPv4 Firewall > Common**.
2. **Enable Firewall:** Disabling the firewall will deactivate all related functions.
3. **Enable DoS Protection:** A "denial-of-service" attack is an explicit attempt to deny legitimate users from using a service or computer resource. Enabling this feature can protect the router from DoS attack but it would increase the router's workload.
4. **Respond to Ping Request from WAN:** This feature allows router to make a response to ping request from WAN.
5. **Enable IGMP:** Check [Yes] to allow IGMP packages to be transferred to the

router. Check No to deny IGMP packages.

6. Click **Apply**.

2.4.3.2.2 Net Service Filter

Under the help of this module, administrator can set black list to block certain services, or set white list to let some services to pass through the router.

The screenshot shows the 'Net Service Filter' configuration page. The interface has a top navigation bar with 'Basic', 'Advanced', and 'Wizard' tabs. A left sidebar contains a tree view with categories like Network, Services, Security (expanded), VPN, IPv4 Firewall, IPv6 Firewall, Qos, Admin, Tools, and Status. The main content area has a breadcrumb 'Security > IPv4 Firewall > Net Service Filter' and three tabs: 'Common', 'Net Service Filter' (active), and 'Client ACL'. There is a 'HELP' button. The 'Net Service Filter' section includes: 'Enable Net Service Filter' with radio buttons for 'Yes' and 'No' (selected); 'Filter Table List' with a dropdown menu showing 'White List'; and 'Filtered ICMP packet types' with an empty text input field. Below this is a table titled 'Network Services Filter Table (Maximum: 32)'. The table has columns: Source IP, Port Range, Destination IP, Port Range, Protocol, and Add / Delete. The first row shows empty input fields for Source IP, Port Range, Destination IP, and Port Range, and 'TCP' for Protocol. An 'Apply' button is at the bottom.

Steps to set **Net Service Filter** 慎

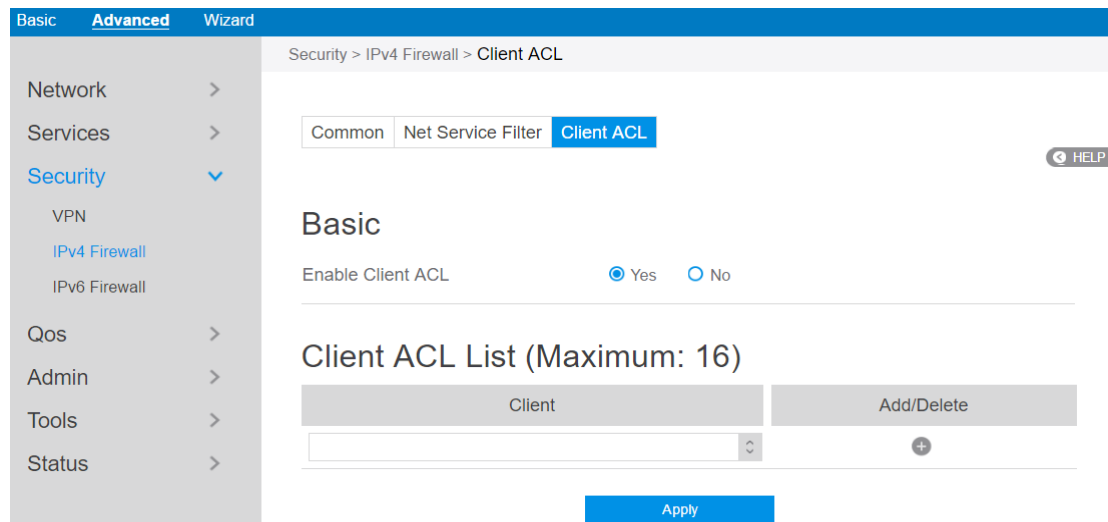
1. From the navigation panel, go to **Advanced> Security> IPv4 Firewall> Net Service Filter**.
2. **Enable Net Service Filter:** Enable or disable this module.
3. **Filter Table List:** There are two kinds of filter list: White List, Black List. White List can make router serve the specified service defined in the list, Black List make router deny serving the specified service.
4. **Filtered ICMP packet types:** This field defines a list of LAN to WAN ICMP packets type that will be filtered. For example, if you would like to filter Echo (type 8) and Echo Reply (type 0) ICMP packets, you need to enter a string with numbers separated by blank, such as [0 8].
5. **Source IP:** For source or destination IP address, you can: (a) enter a specific IP

address such as "192.168.122.1"; (b) enter IP addresses within one subnet or within the same IP pool such as "192.168.123.*" or "192.168.*.*"; or (c) enter all IP addresses as "*. *.*.*".

6. **Port Range:** For source or destination port range, you can either: a) enter a specific port, such as "95"; or b) enter ports within a range such as "103:315", ">100", or "<65535".
7. **Destination IP:** For source or destination IP address, you can: (a) enter a specific IP address such as "192.168.122.1"; (b) enter IP addresses within one subnet or within the same IP pool such as "192.168.123.*" or "192.168.*.*"; or (c) enter all IP addresses as "*. *.*.*".
8. **Port Range:** For source or destination port range, you can either: a) enter a specific port, such as "95"; or b) enter ports within a range, such as "103:315", ">100", or "<65535".
9. **Protocol:** The protocol of service used to transport the packages. (UDP, TCP)
10. **Add/Delete:** Click  or  to add/delete the profile.
11. When done, click **Apply**.

2.4.3.2.3 Client ACL

This module is used by administrator to prevent router from routing packets which are from specified lan-side devices.

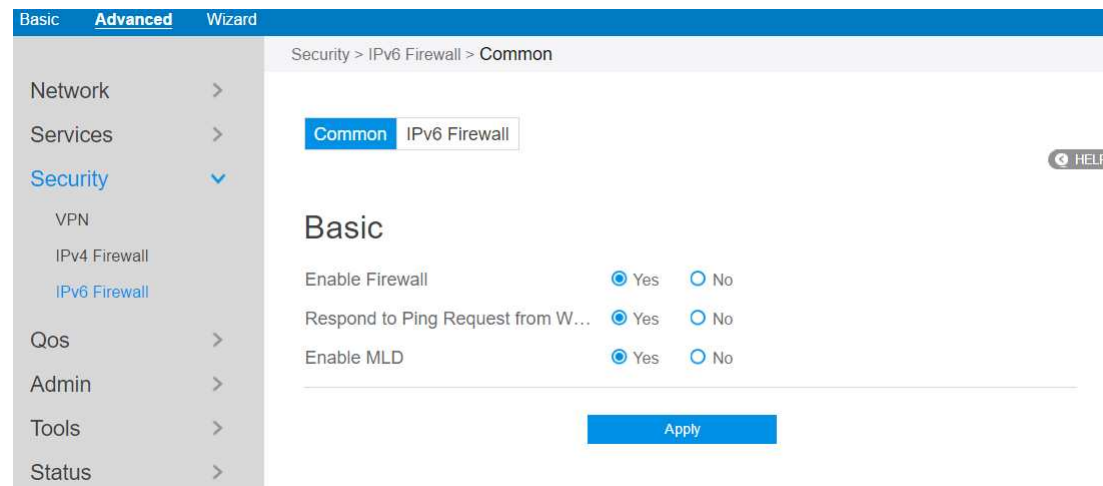


Steps to set up **Client ACL** 慎

1. From the navigation panel, go to **Advanced**> **Security**> **IPv4 Firewall**> **Client ACL**.
2. **Enable Client ACL**: Enable or disable **Client ACL** function.
3. **Client**: MAC address of lan-side devices.
4. **Add/Delete**: Click  or  to add/delete the profile.
5. When done, click **Apply**.

2.4.3.3 IPv6 Firewall

2.4.3.3.1 Common



Steps to set up common **IPv6 Firewall**:

1. From the navigation panel, go to **Advanced > Security > IPv6 Firewall > Common**.
2. **Enable Firewall**: Disabling the firewall will deactivate all related functions.
3. **Respond to Ping Request from WAN**: This feature allows router to make a response to ping request from WAN.
4. **Enable MLD**: Check [**Yes**] to allow MLD packages to be transferred to the router. Check [**No**] to deny MLD packages.
5. Click **Apply**.

2.4.3.3.1 IPv6 Firewall

All outbound traffic coming from lan-side IPv6 hosts is allowed, as well as related inbound traffic. Any other inbound traffic must be specifically allowed here. You can leave the remote IP empty to allow traffic from any remote host. A subnet can also be specified.

The screenshot shows the 'IPv6 Firewall' configuration page. The left sidebar has a navigation menu with 'Security' expanded, showing 'VPN', 'IPv4 Firewall', and 'IPv6 Firewall'. The main content area has tabs for 'Common' and 'IPv6 Firewall', with 'IPv6 Firewall' selected. Below the tabs is a 'Basic' section with 'Enable Service Firewall' set to 'No' and an 'Allowed Well-Known Server List' dropdown. There are two tables for adding rules: 'Allowed Service Rules (Maximum: 32)' and 'Allowed ICMPv6 Rules (Maximum: 16)'. The first table has columns for Service Name, Remote IP/CIDR, Local IP, Port Range, Protocol, and Add/Delete. The second table has columns for ICMPv6 Message type, Local Host, and Add/Delete. An 'Apply' button is at the bottom.

Service Name	Remote IP/CIDR	Local IP	Port Range	Protocol	Add / Delete
				TCP	+

ICMPv6 Message type	Local Host	Add / Delete
destination-unreachable		+

Steps to set up **IPv6 Firewall**:

1. From the navigation panel, go to **Advanced > Security > IPv6 Firewall > IPv6 Firewall**.
2. **Enable Service Firewall**: Enable or disable the IPv6 firewall. When disabled, all IPv6 packages can input router, output router and forward without any limitation.
3. **Allowed Well-Known Server List**: List of well-known servers to be allowed. For example: ftp, samba.
4. **Service Name**: The name of the service which will add IPv6 firewall rule.
5. **Remote IP/CIDR**: IPv6 address of a remote server.
6. **Local IP**: IPv6 address of a lan-side client.

7. **Port Range:** Port range accepts various formats such as Port Range (300:350), individual ports (566,789) or Mix (1015:1024, 3021).
8. **Protocol:** The protocol the service uses to transport the packages e.g. (UDP, TCP).
9. **ICMPv6 Message Type:** Make router process the defined types of ICMPv6 packet from specified host.
10. **Local Host:** IPv6 address of the host.
11. **Add/Delete:** Click  or  to add/delete the profile.
12. When done, click **Apply**.

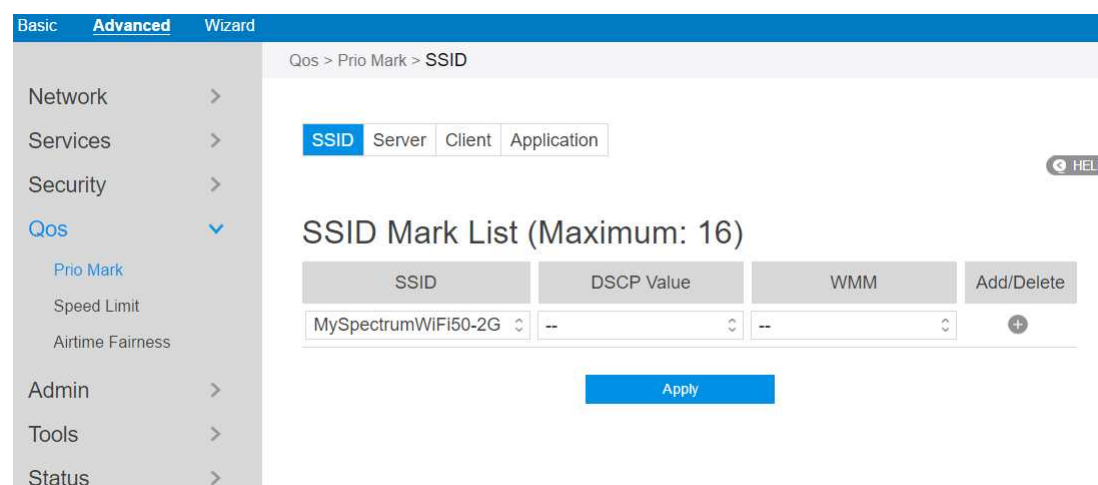
2.4.4 QoS

QoS(Quality of Service, QoS) module provides different services according to the priority of applications, users, or data flows. In a word, it can guarantee a certain level of performance to a data flow.

2.4.4.1 Prio Mark

2.4.4.1.1 SSID

This module can equip the router with the ability to provide QoS service to the wireless connections.



The screenshot shows the router's configuration interface for QoS > Prio Mark > SSID. The left sidebar contains a menu with options: Network, Services, Security, QoS (selected), Prio Mark (selected), Speed Limit, Airtime Fairness, Admin, Tools, and Status. The main content area has tabs for SSID, Server, Client, and Application. Below the tabs is a table titled "SSID Mark List (Maximum: 16)". The table has columns for SSID, DSCP Value, WMM, and Add/Delete. A single entry is shown with SSID "MySpectrumWiFi50-2G", DSCP Value "--", and WMM "--". There is a plus icon in the Add/Delete column. Below the table is an "Apply" button.

SSID	DSCP Value	WMM	Add/Delete
MySpectrumWiFi50-2G	--	--	+

Steps to set up:

1. From the navigation panel, go to **QoS > Prio Mark > SSID**.
2. **SSID**: Choose the name of the Wi-Fi which is going to provide QoS service.
3. **DSCP Value**: Its value is used to indicate the priority for uploading data.
4. **WMM**: Its value is used to indicate the priority for downloading data.
5. Click  to add this item to the SSID Mark List.
6. Click **Apply**.

2.4.4.1.2 Server

For different remote servers, this setting can let the connections get different priorities.

Basic Advanced Wizard

QoS > Prio Mark > Server

SSID Server Client Application

HELP

Server Mark List (Maximum: 16)

Server IP	DSCP Value	Add/Delete
	AF13(001110)	+

Apply

Steps to set up :

1. From the navigation panel, go to **QoS > Prio Mark > Server**.
2. **Server IP**: IP address of remote server.
3. **DSCP Value**: It's value is used to indicate priority of connections to the responding server.
4. Click  to add this item to the Server Mark List.
5. Click **Apply**.

2.4.4.1.3 Client

The screenshot shows a web-based configuration interface. At the top, there are tabs for 'Basic', 'Advanced', and 'Wizard'. Below these, a breadcrumb trail reads 'Qos > Prio Mark > Client'. On the left is a navigation menu with categories: Network, Services, Security, Qos (expanded), and Admin. Under 'Qos', there are sub-items: Prio Mark (selected), Speed Limit, and Airtime Fairness. The main content area is titled 'Client Mark List (Maximum: 16)'. It features a table with three columns: 'Client', 'DSCP Value', and 'Add/Delete'. The 'Client' column has a text input field and a dropdown arrow. The 'DSCP Value' column has a text input field. The 'Add/Delete' column contains a '+' icon. Below the table is a blue 'Apply' button. A 'HELP' icon is visible in the top right corner of the main area.

Steps to set up :

1. From the navigation panel, go to **QoS > Prio Mark > Client**.
2. **Client**: MAC address of the lan side device.
3. **DSCP Value**: It's value is used to indicate priority of connections to the lan-side device.
4. Click  to add this item to the Server Mark List.
5. Click **Apply**.

2.4.4.1.4 Application

The screenshot shows the 'Application' configuration page under the 'QoS > Prio Mark' menu. The left sidebar has a tree view with 'QoS' expanded, showing 'Prio Mark', 'Speed Limit', 'Airtime Fairness', and 'Admin'. The main content area has tabs for 'SSID', 'Server', 'Client', and 'Application', with 'Application' selected. Below the tabs is a table titled 'Application Mark List (Maximum: 16)'. The table has three columns: 'Application', 'DSCP Value', and 'Add/Delete'. The first row shows 'Access Remote PC' in the 'Application' column, an empty field in the 'DSCP Value' column, and a '+' icon in the 'Add/Delete' column. An 'Apply' button is at the bottom right.

Application	DSCP Value	Add/Delete
Access Remote PC		+

Steps to set up :

1. From the navigation panel, go to **QoS > Prio Mark > Application**.
2. **Application:** The name of application that is going to use QoS.
3. **DSCP Value:** It's value is used to indicate priority of application.
4. Click  to add this item to the Server Mark List.
5. Click **Apply**.

2.4.4.2 Speed Limit

This module makes it possible for user to limit the speed of downloading and uploading respectively.

The screenshot shows the 'Speed Limit' configuration page under the 'QoS > Speed Limit' menu. The left sidebar is the same as in the previous screenshot, with 'Speed Limit' selected under 'QoS'. The main content area has a title 'Internet Bandwidth Status' and a 'HELP' button. Below the title are two sections: 'Enable Upload Limit' and 'Enable Download Limit'. Each section has radio buttons for 'Yes' and 'No', with 'No' selected. Below each section is a text input field for speed in Mbps. An 'Apply' button is at the bottom right.

Enable Upload Limit	Upload Speed
☐ Yes ☒ No	Mbps

Enable Download Limit	Download Speed
☐ Yes ☒ No	Mbps

Steps to set up **Speed Limit**:

1. From the navigation panel, go to **QoS > Speed Limit**.
2. **Enable Upload Limit:** . Check [**Yes**] to enable upload speed limit and Check [**No**] to disable upload speed limit.
3. **Upload Speed:** The highest speed that the router can provide for data uploading.
4. **Enable Download Limit:** Choose the wifi that is going to provide QoS.
5. **Download Speed:** The highest speed that the router can provide for data downloading.
6. Click **Apply**.

NOTE: If speed of uploading or downloading set by you is beyond actual value provided by your ISP, your setting will take no effect

2.4.4.2 Airtime Fairness

The ATF(Airtime Fairness, ATF) module supports mixing rates of WiFi devices to achieve better performance in busy/intense environments.

Basic Advanced Wizard

QoS > Airtime Fairness

General

Enable ATF ☐ Yes ☒ No

Frequency

ATF Mode

SSID	Percentage of Air Time (%)
MySpectrumWiFi50-2G	60

MAC +

Apply

Steps to set ATF:

1. From the navigation panel, go to **Advanced > QoS > Airtime Fairness**.
2. **Enable ATF:** Enable or disable. ATF require primarily focuses on scheduling fairness for transmission of traffic from Access Point (AP), and efficient Wi-Fi bandwidth utilization.
3. **Frequency:** In the frequency field, select the frequency band that you want to use for the ATF settings.
4. **ATF mode:** Airtime Fairness implements 2 scheduling algorithms: strict-queue and fair-queue algorithm, which are mutually exclusive. Strict-queue algorithm follows strict airtime allocation as configured by the user and does not try and utilize any unused bandwidth. Fair-queue algorithm guarantees the configured airtime in congested environments and it also utilizes any unused bandwidth.
5. **SSID:** Set the SSID which will be controlled by ATF.
6. **Percentage of Air Time:** Set the percentage of SSID which will be used for ATF control.
7. **MAC:** Select client by MAC address and set the percent which will be used for ATF control.
8. Click Apply

2.4.5 Admin

2.4.5.1 System

The System page allows you to configure your wireless router settings.

The screenshot shows the 'System' configuration page under the 'Admin' tab. The left sidebar contains a navigation menu with 'Admin' selected and expanded, showing 'System', 'Configuration', and 'Log'. The main content area is titled 'Admin > System' and contains three sections: 'Change the Router Login Password', 'SSH Daemon', and 'Miscellaneous'. The 'Change the Router Login Password' section has fields for 'Username' (admin), 'New Password', and 'Retype New Password', with a 'Show password' checkbox. The 'SSH Daemon' section has radio buttons for 'Enable SSH Access from WAN' and 'Enable SSH Access from LAN', both set to 'No'. The 'Miscellaneous' section has fields for 'Remote Log Server', 'Time Zone' (America/New York), and 'Auto Logout' (0 minutes), with radio buttons for 'Enable WAN Down Notification' (Yes) and 'Allow Only Specified IP Address' (No). Below these is an 'NTP Server (Maximum: 6)' section with a table listing NTP servers and their status.

NTP Server	Add/Delete
	+
us.pool.ntp.org	-
north-america.pool.ntp.org	-
time.nst.gov	-
pool.ntp.org	-

Apply

Steps to set **System**:

1. From the navigation panel, go to **Advanced > Admin > System**.
2. **Username**: Router's login name.
3. **New Password**: New password.

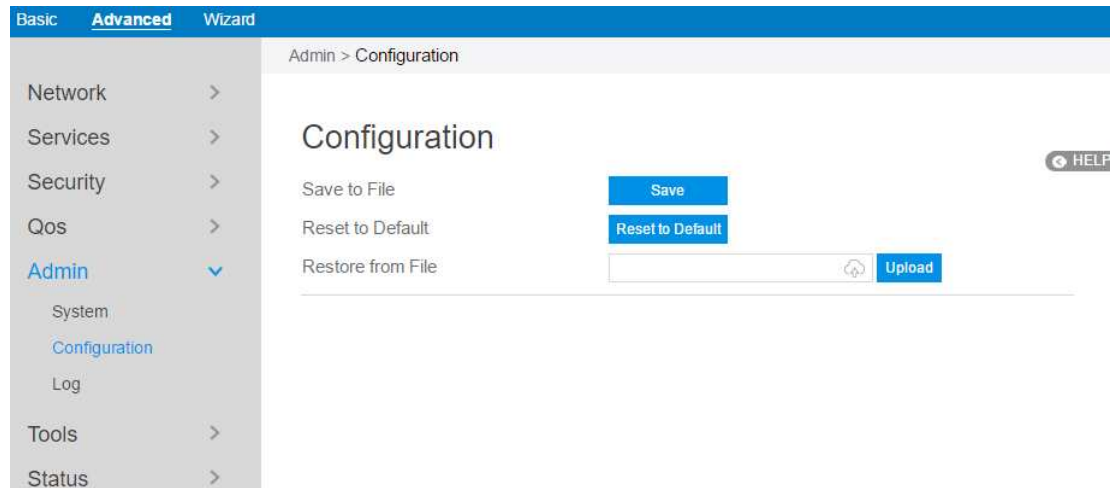
4. **Retype New Password:** Retype new password.
5. **Enable SSH Access from WAN:** Enable or disable SSH connection from WAN port.
6. **Enable SSH Access from LAN:** Enable or disable SSH connection from LAN port.

NOTE: Three SSH accounts can be used to login the router.

1. Admin: username and password are: **admin, admin**
 2. Operator: username and password are: **operator, operator**
 3. Root: username and password are: **root, MmvGB^RY3#**
-

7. **Remote Log Server:** IP address of a syslog server to which log messages will be sent in addition to the local destination.
8. **Time Zone:** Default time-zone is America/ New York.
9. **Enable Web Access from WAN:** Enable or disable remote access via WAN port.
10. **Auto Logout:** Auto logout after a specified time.
11. **Enable WAN Down Notification:** When there is no Internet access, redirect to local notification.
12. **NTP Server:** Router can access a NTP (Network Time Protocol) server in order to synchronize the time automatically.
13. Click **Apply**.

2.4.5.2 Configuration



Steps to save/reset/restore router's configuration:

1. From the navigation panel, go to **Advanced > Admin > Configuration**.
2. Click **Save**, and then the browser will automatically download router's setting files.
3. Click **Reset to Default**, this will reset all settings to factory default settings.
4. Click  to select setting file, then click **Upload** button, this will make the router to be set.

2.4.5.3 Log

System Log contains logs on network activities in the router.

Basic **Advanced** Wizard

Admin > Log

System Time Thu Dec 15 21 : 43 : 57 2016

Up Time 0D 19H 19M 31S

Thu Dec 15 15:27:00 2016 cron.info crond[3805]: USER root pid 18046 cmd /sbin/wifi_log
Thu Dec 15 15:27:39 2016 kern.warn kernel: [46999.765370] [wifi0] FWLOG: [47948610] WAL_DBGID_SECURITY_ENCR_EN ()
Thu Dec 15 15:27:39 2016 kern.warn kernel: [46999.770769] [wifi0] FWLOG: [47948610] WAL_DBGID_SECURITY_MCAST_KEY_SET (0x2)
Thu Dec 15 15:27:46 2016 kern.warn kernel: [47006.515259] [wifi1] FWLOG: [47955906] WAL_DBGID_SECURITY_ENCR_EN ()
Thu Dec 15 15:27:46 2016 kern.warn kernel: [47006.520667] [wifi1] FWLOG: [47955906] WAL_DBGID_SECURITY_MCAST_KEY_SET (0x2)
Thu Dec 15 15:28:00 2016 cron.info crond[3805]: USER root pid 18108 cmd /sbin/wifi_log
Thu Dec 15 15:29:00 2016 cron.info crond[3805]: USER root pid 18217 cmd /sbin/wifi_log
Thu Dec 15 15:30:00 2016 cron.info crond[3805]: USER root pid 18279 cmd /sbin/wifi_log
Thu Dec 15 15:31:00 2016 cron.info crond[3805]: USER root pid 18350 cmd /sbin/wifi_log
Thu Dec 15 15:32:00 2016 cron.info crond[3805]: USER root pid 18412 cmd /sbin/wifi_log
Thu Dec 15 15:33:00 2016 cron.info crond[3805]: USER root pid 18475 cmd /sbin/wifi_log
Thu Dec 15 15:34:00 2016 cron.info crond[3805]: USER root pid 18546 cmd /sbin/wifi_log
Thu Dec 15 15:35:00 2016 cron.info crond[3805]: USER root pid 18608 cmd

Clear Save Refresh

Steps to set router's log:

1. From the navigation panel, go to **Advanced> Admin> Log**.
2. **Clear**: Clear contents in log file.
3. **Save**: Download log file from router.
4. **Refresh**: Refresh the log window to show the latest log.

2.4.6 Tools

2.4.6.1 Diagnostic Tools

Various diagnostic tools are available such as ping, ping6, traceroute and nslookup.

The screenshot shows a web interface for network management. On the left is a navigation panel with tabs: Basic, **Advanced**, and Wizard. Under the Advanced tab, there are links for Network, Services, Security, Qos, Admin, **Tools** (highlighted with a blue arrow), Diagnostic Tools, Wake on LAN, and Status. The main content area is titled 'Tools > Diagnostic Tools'. It features a 'Diagnostic Tools' heading, a 'HELP' button, and three input fields: 'Method' (set to 'Ping'), 'Target' (set to 'Wikipedia'), and 'Count' (set to '10'). A blue 'Diagnose' button is positioned below these fields. The output of the ping test is displayed in a text box, showing detailed statistics for 10 packets sent to www.wikipedia.org (198.35.26.96).

```
PING www.wikipedia.org (198.35.26.96): 56 data bytes
64 bytes from 198.35.26.96: seq=1 ttl=51 time=218.238 ms
64 bytes from 198.35.26.96: seq=2 ttl=51 time=217.465 ms
64 bytes from 198.35.26.96: seq=3 ttl=51 time=219.071 ms
64 bytes from 198.35.26.96: seq=4 ttl=51 time=214.718 ms
64 bytes from 198.35.26.96: seq=5 ttl=51 time=216.365 ms
64 bytes from 198.35.26.96: seq=6 ttl=51 time=215.609 ms
64 bytes from 198.35.26.96: seq=7 ttl=51 time=214.811 ms
64 bytes from 198.35.26.96: seq=8 ttl=51 time=216.399 ms
64 bytes from 198.35.26.96: seq=9 ttl=51 time=214.366 ms

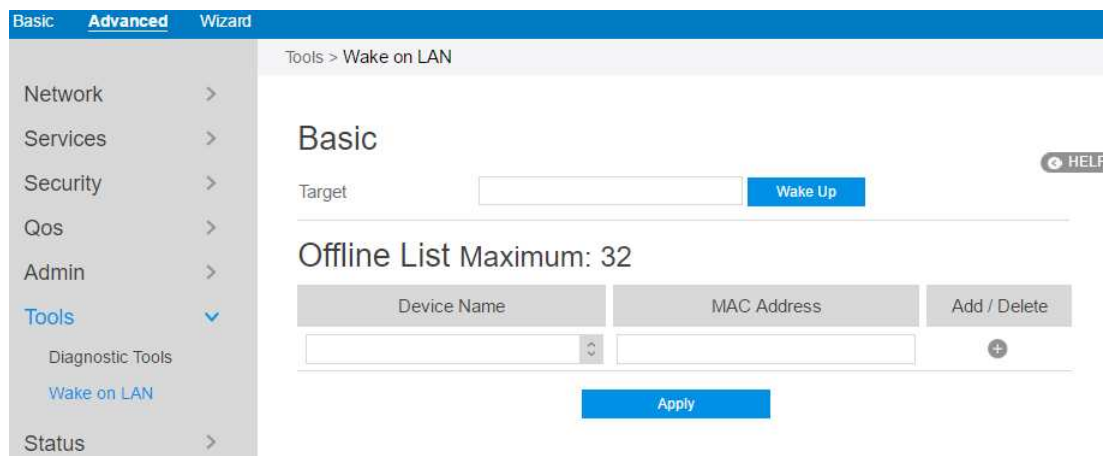
--- www.wikipedia.org ping statistics ---
10 packets transmitted, 9 packets received, 10% packet loss
round-trip min/avg/max = 214.366/216.338/219.071 ms
```

Steps to use Diagnostic Tools:

1. From the navigation panel, go to **Advanced**> **Tools**> **Diagnostic Tools**
2. **Method**: Choose a specified method to test network.
3. **Target**: Choose target for the test.
4. **Count**: Number of times to test.
5. Click **Diagnose**.

2.4.6.2 Wake on LAN

Wake on LAN is a power management function. It allows network admins to wake up LAN side devices from standby or hibernation mode. This function requires motherboard support on LAN-side devices.



The screenshot shows a web-based configuration interface for Wake on LAN. The top navigation bar has tabs for 'Basic', 'Advanced', and 'Wizard'. The left sidebar lists various categories: Network, Services, Security, Qos, Admin, Tools (selected), Diagnostic Tools, Wake on LAN, and Status. The main content area is titled 'Tools > Wake on LAN' and contains a 'Basic' configuration section. It features a 'Target' input field with a 'Wake Up' button. Below this, it states 'Offline List Maximum: 32'. A table with two columns, 'Device Name' and 'MAC Address', is shown with an 'Add / Delete' button. An 'Apply' button is at the bottom.

Steps to set Wake on LAN:

1. From the navigation panel, go to **Advanced > Tools > Wake on LAN**.
2. **Target:** Enter the MAC address of the device to be woken up, or select the device name from the list.
3. **Device Name:** Name of device.
4. **MAC Address:** The format for the MAC address is six groups of two hexadecimal digits, separated by colons (:), in transmission order (e.g. 12:34:56:aa:bc:ef).
5. When done, click **Apply**.

2.4.7 Status

2.4.7.1 System Information

System Information displays basic System, WAN, LAN and USB information.

From the navigation panel, go to **Advanced** > **Status** > **System Information**.

Basic

Advanced

Wizard

Network >

Services >

Security >

Qos >

Admin >

Tools >

Status >

System Information

Wireless

DHCP Lease

Routing Table

Port Forwarding

Connection List

IPv6 Information

Snooping Table

Current Users

Blocked Users

Status > System Information

System Information

Up Time	0D 22H 22M 53S
Date Time	2016-12-30 02:43:25
FW Version	1.0.3
HW Version	V1.0 REV:2

WAN Information

Connection Status	Connected
Connection Type	DHCP
Connect IP	10.8.4.218
Connection Time	0D 22H 21M 53S

LAN Information

IP (Subnet Mask)	192.168.1.1(255.255.255.0)
DHCP Server On/Off	ON

USB Information

Model Name	Generic_UDISK
Total Space	7.1G
Available Space	5.2G

2.4.7.2 Wireless

Wireless shows status information for wireless clients.

From the navigation panel, go to **Advanced** > **Status** > **Wireless** .

The screenshot shows the router's web interface. The top navigation bar has 'Basic', 'Advanced', and 'Wizard' tabs. The left sidebar shows 'Status' selected. The main content area is titled 'Status > Wireless > 2.4GHz Clients'. Below this, there are tabs for '2.4GHz Clients' and '5GHz Clients'. The 'Wireless Log' section displays the following information:

```
interface 1:
ath1 IEEE 802.11ng ESSID:'MySpectrumWiFi50-2G'
Mode:Master Frequency:2.412 GHz Access Point: B4:EE:B4:E9:AB:50
Bit Rate:378.4 Mb/s Tx-Power:29 dBm
RTS thr:off Fragment thr:off
Encryption key:BD72-DFA5-CE9C-BDC2-6552-EE0E-6DC4-00E7 [3] Security
mode:open
Power Management:off
Link Quality=94/94 Signal level=-97 dBm Noise level=-95 dBm
Rx invalid nwid:6874 Rx invalid crypt:0 Rx invalid frag:0
Tx excessive retries:0 Invalid misc:0 Missed beacon:0

Stations List
-----
No station connected
```

2.4.7.3 DHCP Lease

Show DHCP Lease status information, including MAC, IP and Hostname information.

From the navigation panel, go to **Advanced** > **Status** > **DHCP Lease**.

The screenshot shows the router's web interface. The top navigation bar has 'Basic', 'Advanced', and 'Wizard' tabs. The left sidebar shows 'Status' selected. The main content area is titled 'Status > DHCP Lease'. Below this, there are tabs for 'MAC', 'IP', and 'Hostname'. The 'DHCP Leases' section displays a table with columns for MAC, IP, and Hostname. The table is currently empty, and there are navigation arrows on the left and right sides of the table.

2.4.7.4 Routing Table

Show IPv4 and IPv6 routing table and status information.

From the navigation panel, go to **Advanced** > **Status** > **Routing Table**.

The screenshot shows a network management interface with a navigation panel on the left and a main content area. The navigation panel has tabs for Basic, Advanced, and Wizard. Under Advanced, there is a Status section with a dropdown menu. The main content area is titled 'Status > Routing Table' and displays two routing tables: 'Kernel IP routing table' and 'Kernel IPv6 routing table'.

Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
0.0.0.0	10.8.4.1	0.0.0.0	UG	0	0	0	eth3
10.8.4.0	0.0.0.0	255.255.255.0	U	0	0	0	eth3
10.8.4.1	0.0.0.0	255.255.255.255	UH	0	0	0	eth3
192.168.1.0	0.0.0.0	255.255.255.0	U	0	0	0	br-lan

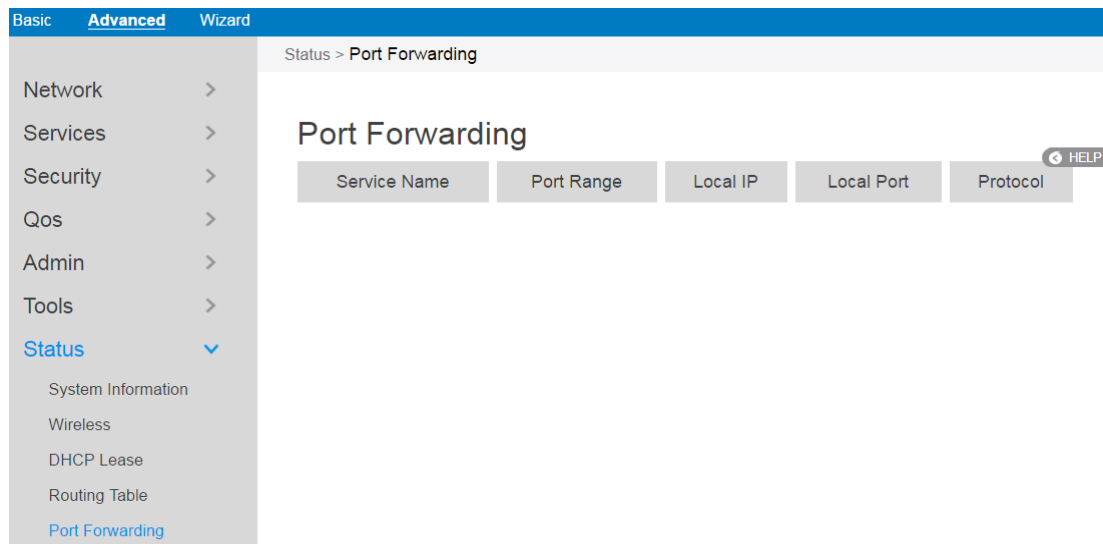
Kernel IPv6 routing table

Destination	Next Hop
::/0	fe80::4687:3ca4:962d:5f6b
fe80::/64	::
fe80::/64	::
fe80::/64	::
fe80::/64	::
fe80::/64	::
fe80::/64	::
::1/128	::
2000::55/128	::
fe80::/128	::
fe80::/128	::
fe80::/128	::
fe80::/128	::
fe80::/128	::
fe80::b6ee:b4ff:fee9:aab7/128	::
fe80::b6ee:b4ff:fee9:aab7/128	::
fe80::b6ee:b4ff:fee9:aab9/128	::
fe80::b6ee:b4ff:fee9:ab50/128	::
fe80::b6ee:b4ff:fee9:ab51/128	::
ff02::1/128	::
ff02::c/128	::

2.4.7.5 Port Forwarding

This module is used to show port forwarding status information.

From the navigation panel, go to **Advanced** > **Status** > **Port Forwarding**.



2.4.7.6 Connection List

Show active connections status information.

From the navigation panel, go to **Advanced > Status > Connection List**.

Basic

Advanced

Wizard

Status > Connection List

Network >

Services >

Security >

Qos >

Admin >

Tools >

Status ▾

System Information

Wireless

DHCP Lease

Routing Table

Port Forwarding

Connection List

IPv6 Information

Snooping Table

Current Users

Blocked Users

Active Connections

HELP

Network	Protocol	Status	Source	Destination
ipv4	tcp	TIME_WAIT	192.168.1.112:59292	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59275	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59276	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59270	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59291	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59271	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59290	192.168.1.1:80
ipv4	tcp	ESTABLISHED	192.168.1.112:59293	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59289	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59285	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59288	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59280	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59277	192.168.1.1:80
ipv4	tcp	TIME_WAIT	192.168.1.112:59287	192.168.1.1:80

2.4.7.7 IPv6 Information

Shows details on WAN and LAN IPv6 information.

From the navigation panel, go to **Advanced > Status > IPv6 Information**.

Basic **Advanced** Wizard

Status > IPv6 Information

Network >
Services >
Security >
Qos >
Admin >
Tools >
Status >
System Information
Wireless
DHCP Lease
Routing Table
Port Forwarding
Connection List
IPv6 Information

IPv6 Network Information

IPv6 Connection Type: Native-Simultaneous
WAN IPv6 Address: 2000::55
WAN IPv6 Gateway: fe80::4687:3ca4:962d:5f6b
LAN IPv6 Address:
LAN IPv6 Link-Local Address: fe80::b6ee:b4ff:fee9:aab7
DHCP-PD: Enabled
LAN IPv6 Prefix:
DNS Address: 2000::1 2001::1

IPv6 LAN Devices List

Hostname	MAC Address	IPv6 Address
DESKTOP-J684GS3	34:97:F6:7E:49:A7	2001:db8:acc3:5500::28b5

HELP

2.4.7.8 Snooping Table

Displays snooping table for client joins/leaves for both wired and wireless client streams.

From the navigation panel, go to **Advanced > Status > Snooping Table**.

Basic **Advanced** Wizard

Status > Snooping Table

Network >
Services >
Security >
Qos >
Admin >
Tools >
Status >
System Information
Wireless
DHCP Lease
Routing Table
Port Forwarding
Connection List
IPv6 Information
Snooping Table

Snooping Table

Bridge Snooping Hash Table -- IPv4--

NUM	GROUP	FDB	PC
1	239.255.255.250	34:97:f6:7e:49:a7 et	

!--Source Mode:Block Listed Sources
!--Num of Sources:0

Bridge Snooping Hash Table -- IPv6--

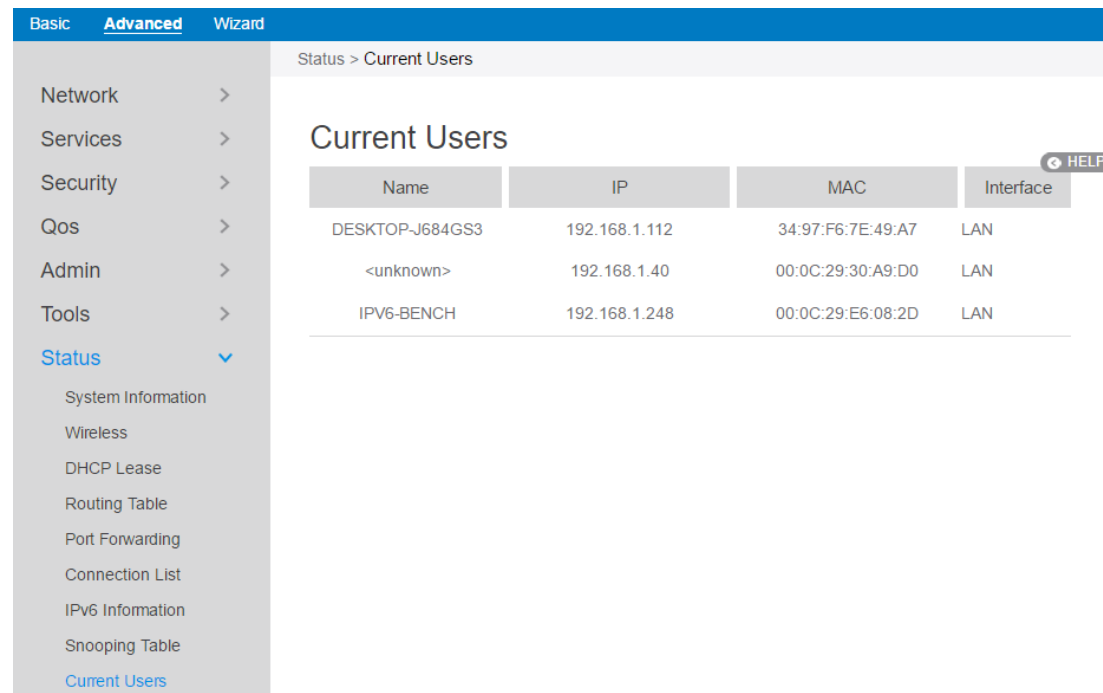
NUM	GROUP	FDB	PC
-----	-------	-----	----

HELP

2.4.7.9 Current Users

Display current user who is permitted to get access to Internet through the router.

From the navigation panel, go to **Advanced** > **Status** > **Current User Table**.



The screenshot shows the router's web interface. At the top, there are tabs for 'Basic', 'Advanced', and 'Wizard'. The 'Advanced' tab is selected. On the left is a navigation panel with categories: Network, Services, Security, Qos, Admin, Tools, and Status. The 'Status' category is expanded, showing sub-items: System Information, Wireless, DHCP Lease, Routing Table, Port Forwarding, Connection List, IPv6 Information, Snooping Table, and 'Current Users' (which is highlighted in blue). The main content area is titled 'Status > Current Users' and contains a table titled 'Current Users'. The table has four columns: Name, IP, MAC, and Interface. There is a 'HELP' button in the top right corner of the table area.

Name	IP	MAC	Interface
DESKTOP-J684GS3	192.168.1.112	34:97:F6:7E:49:A7	LAN
<unknown>	192.168.1.40	00:0C:29:30:A9:D0	LAN
IPV6-BENCH	192.168.1.248	00:0C:29:E6:08:2D	LAN

2.4.7.10 Blocked Users

Display current users who are not permitted to get access to Internet through the router.

From the navigation panel, go to **Advanced** > **Status** > **Blocked User**.

BasicAdvancedWizard

Network >
Services >
Security >
Qos >
Admin >
Tools >
Status **▼**
 System Information
 Wireless
 DHCP Lease
 Routing Table
 Port Forwarding
 Connection List
 IPv6 Information
 Snooping Table
 Current Users
 Blocked Users

Status > Blocked Users

Blocked Users

FrequencyMACInterface

HELP

3 Root User Settings

You can login to the GUI as a root user for more configuration options. Root user settings are hidden and cannot be configured by normal users.

3.1 Login

Root user of the router owns more privilege than Normal User. Following shows the steps to log in Root User's GUI:

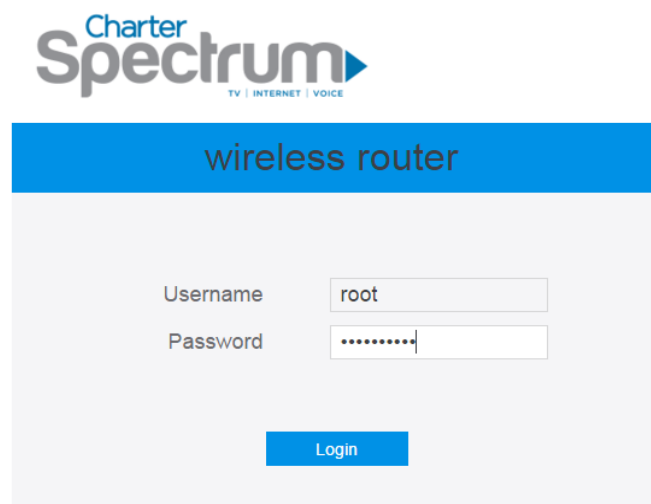
1. Open a web browser and enter IP address:

<http://192.168.1.1/a43edc96b945ff5d3c624838b54bf3f2/813dbdb6be123e5/ca6c40542f5e7c4a59f66ca01028597a/login.html>.

2. On the login page, enter the default root username: **root**, and password:

MmvGB^RY3#.

3. Use the Web GUI to configure various hidden settings of your wireless router.



3.2 Router

3.2.1 Static Routing

This module allows administrator to add routing rules for the router. This feature can

be useful when there are several devices who are connecting with router.

Root Wizard

Router > Static Routing

Router

- Static Routing
- Dynamic Routing
- Multiple NAT

TR-069 >

Operation Mode >

Admin >

DFS Test Mode >

Basic

Enable Static Routes ☒ Yes ☐ No

Static Routing List (Maximum: 32)

Network/Host IP	Subnet Mask	Gateway	Metric	Interface	Add/Delete
				WAN	+

Apply

Steps to set Static Routing:

1. From the navigation panel, go to **Root > Router > Static Routing**.
2. **Enable Static Routes:** Select [**Yes**] to enable static routes.
3. **Network/Host IP:** The destination network or host of a route rule. It could be a host address such as '192.168.123.11' or a network address such as '192.168.0.0'.
4. **Subnet Mask:** Indicates how many bits are for network ID and subnet ID. For example: if the dotted-decimal Subnet Mask is 255.255.255.0, then its' Subnet Mask bits is 24. If the destination is a host, its Subnet Mask bits should be 32.
5. **Gateway:** This is the IP address of the gateway where packets are routed to. The specified gateway must be setup and reachable first.
6. **Metric:** Metric is a value of distance for the network.
7. **Interface:** Network interface that the route rule will apply to.
8. **Add/Delete:** Click or to add/delete the profile.
9. When done, click **Apply**.

3.2.2 Dynamic Routing

Dynamic routing means router can automatically maintain its routing table. Dynamic routing has two basic functions: maintain routing table, and exchange routing table with other routers.

The screenshot shows a web-based configuration interface for a router. The top navigation bar includes 'Root' and 'Wizard'. A left sidebar menu is expanded to 'Router', showing sub-items: 'Static Routing', 'Dynamic Routing' (selected), and 'Multiple NAT'. Below these are other router-related options like 'TR-069', 'Operation Mode', 'Admin', 'DFS Test Mode', 'Fast Roaming', and 'Coverage'. The main content area is titled 'Router > Dynamic Routing' and contains a 'Basic' configuration section. This section includes a 'RIP Key Authentication' toggle set to 'Yes', a 'RIP Key Chain' text field, and two 'RIP Key' fields (0 and 1) each with a 'Show Key' checkbox. A 'Dynamic NAT IP' dropdown menu is also present. Below these fields is a 'RIP Block List (Maximum: 3)' table with columns for Alias, RIIP, RIPSUBnet, RIPDefaultGateway, On/Off, and Operation. The table currently has one row with an empty Alias field, an empty RIIP field, an empty RIPSUBnet field, an empty RIPDefaultGateway field, and 'On' selected in the On/Off column. An 'Apply' button is at the bottom right of the configuration area.

Steps to set up Dynamic Routing:

1. From the navigation panel, go to **Root > Router > Dynamic Routing**.
2. **RIP Key Authentication:** Enable or disable RIP key authentication mechanism when switching route with other routers.
3. **RIP Key Chain:** RIP key name.
4. **RIP Key 0:** RIP key value of RIP Key 0.
5. **RIP Key 1:** RIP key value of RIP Key 0.
6. **Dynamic NAT IP:** Single IP address from Charter supplied public IP subnets used for all internal hosts traffic flow.
7. **Alias:** Friendly identifier for managed element
8. **RIIP:** IP address to be advertised.
9. **RIPSUBnet:** Subnet mask for RIIP.

10. **RIPDefaultGateway:** Gateway IP for RIPIIP
11. **On/Off:** Enable or disable this item rule.
12. When done, click **Apply**.

3.2.3 Multiple NAT

This can let you limit range of ipaddress that is going to use NAT function.

The screenshot shows a web interface for configuring Multiple NAT. On the left is a navigation panel with 'Router' expanded, showing 'Static Routing', 'Dynamic Routing', 'Multiple NAT' (selected), 'TR-069', 'Operation Mode', 'Admin', and 'DFS Test Mode'. The main content area is titled 'Router > Multiple NAT' and 'Basic'. It has a toggle for 'Enable Multiple NAT' with 'Yes' and 'No' radio buttons, where 'No' is selected. Below this is a section 'Multiple NAT (Maximum: 32)' containing a table with columns: Name, Public IP, Network/Host IP, Subnet Mask, On/Off, and Operation. The table has one row with empty input fields for the first four columns, 'On' for On/Off, and a '+' icon for Operation. An 'Apply' button is at the bottom right.

Steps to set **Multiple NAT**:

1. From the navigation panel, go to **Root > Router > Multiple NAT**.
2. **Enable Multiple NAT:** Check [**Yes**] to enable this function, Check [**No**] to disable this function.
3. **Name:** The name for the item bar.
4. **Public IP:** IP address that Host IP will be mapped to.
5. **Network/Host IP:** IP address of the host reside on lan-side.
6. **Subnet Mask:** The subnet mask for lan-side IP address.
7. **On/Off:** Enable or disable the multiple NAT rule.
8. Click  to add this item to the Multiple NAT List.
9. Click **Apply**.

3.3 TR-069

TR-069 is a technical standard defined by DSL forum. Its full name is CPE WAN management protocol. This module can provide a general framework and protocol to a centralized router from remote Internet for next-generation network-management family equipment configuration.

TR-069	
Enable Remote Management	☒ Yes ☐ No
ACS Identifier	CHARTER
URL	http://askey.acs.clearaccess.cor
Username	digest
Password	digest
Periodic Inform Time	2015-04-28T11:40:00Z
Periodic Inform Interval	900
Periodic Inform Enable	☒ Enable ☐ Disable
Connection Request Username	admin00000000000044
Connection Request Password	OneAcsToRuleThemAll

Apply

Steps to set TR-069:

1. From the navigation panel, go to **Root > TR-069**.
2. **Enable Remote Management:** Enable or disable TR-069 remote management.
3. **ACS Identifier:** Mark the current choice of connecting the ACS server is CHARTER or TWC.
4. **URL:** ACS's address is defined by an URL. Router(CPE) can communicate with an ACS through an valid URL.
5. **Username:** Username used to authenticate the CPE when making a connection to

the ACS using the CPE WAN Management Protocol. This username is used only for HTTP-based authentication of the CPE.

6. **Password:** Password used to authenticate the CPE when making a connection to the ACS using the CPE WAN Management Protocol. This password is used only for HTTP-based authentication of the CPE.
7. **Periodic Inform Interval:** An absolute time reference in UTC to determine when the CPE will initiate the periodic Inform method calls. Each Inform call MUST occur at this reference time plus or minus an integer multiple of the Periodic Inform Interval.
8. **Periodic Inform Enable:** Whether or not the CPE MUST periodically send CPE information to the ACS using the Inform method call.
9. **Connection Request Username:** Username used to authenticate an ACS making a Connection Request to the CPE.
10. **Connection Request Password:** Password used to authenticate an ACS making a Connection Request to the CPE.
11. Click **Apply**.

3.4 Operation Mode

The Operation Mode page allows you to select the appropriate mode for your network. Select your mode: wireless router, access point or media bridge.

The screenshot shows a web interface for configuring a device. On the left is a sidebar with a menu: 'Root' (highlighted), 'Wizard', 'Router', 'TR-069', 'Operation Mode' (highlighted in blue), 'Admin', 'DFS Test Mode', 'Fast Roaming', and 'Coverage'. The main content area is titled 'Operation Mode' and contains the heading 'Please Select Operation Mode'. There are three radio button options: 'Wireless Router' (selected), 'Access Point', and 'Media Bridge'. Each option has a descriptive paragraph below it. A 'HELP' button is visible next to the 'Wireless Router' option. At the bottom right of the main area is a blue 'Apply' button.

Root Wizard

Operation Mode

Please Select Operation Mode [HELP](#)

☒ Wireless Router
In Wireless Router mode, the router connects to the Internet via PPPoE, DHCP, PPTP, L2TP or Static IP and shares the wireless network to LAN clients or devices. In this mode, NAT, firewall, and DHCP server are enabled by default. UPnP and Dynamic DNS are supported for SOHO and home users. Select this mode if you are a first-time user or you are not currently using any wired/wireless routers.

☐ Access Point
In Access Point (AP) mode, your device connects to a Wireless Router through an Ethernet cable to extend the wireless signal coverage to other network clients. In this mode, the firewall, IP sharing, and NAT functions are disabled by default.

☐ Media Bridge
Media Bridge mode provides a fast 802.11ac Wi-Fi connection for multiple media devices such as computer, Smart TV, game console, DVR, or media player simultaneously, via Ethernet cable. To set up the Media Bridge mode, you need two devices: one configured as a Media Bridge and the other as a router. In Media Bridge mode, only wireless devices connect to the AP. Client devices need to be connected to the Media Bridge with a network cable.

Apply

Steps to set operating mode:

1. From the navigation panel, go to **Root > Operation Mode**
2. Select the mode that you want the router to run.
3. Click **Apply**.

3.4.1 Wireless Router Mode

In wireless router mode, the router connects to the Internet via PPPoE, DHCP, PPTP, L2TP or Static IP and shares the wireless network to LAN clients or devices. In this mode, NAT, firewall, and DHCP server are enabled by default. UPnP and Dynamic DNS are supported for SOHO and home users. Select this mode if you are a first-time user or you are not currently using any wired/wireless routers. Select the wireless router mode, and click Apply to jump to the wizard page, then refer to **1 wizard setup** for normal user setup.

3.4.2 Access Point Mode

In Access Point (AP) mode, your device connects to a wireless router through an Ethernet cable to extend the wireless signal coverage to other network clients. In this mode the firewall, IP sharing and NAT functions are disabled by default.

The screenshot shows a web interface for the 'Internet Setup' wizard. On the left is a navigation panel with three items: '1 | Internet Setup' (highlighted in blue), '2 | Network Setup', and '3 | Config Overview'. The main content area is titled 'Internet Setup' and 'LAN IP Setting'. It contains the following fields and options:

- 'Get LAN IP Automatically?' with radio buttons for 'Yes' (selected) and 'No'.
- 'IP Address' with a text input field.
- 'Subnet Mask' with a text input field.
- 'Default Gateway' with a text input field.
- 'Connect to DNS Server Automatic...' with radio buttons for 'Yes' (selected) and 'No'.
- 'DNS Server 1' with a text input field.
- 'DNS Server 2' with a text input field.

At the bottom right of the main content area is a blue button labeled 'Next'.

Steps to set up Access Point mode:

1. Click Apply, go to **Wizard > Internet setup**.
 - **IP Address:** The LAN IP address of wireless router. The default value is 192.168.1.1. In IP-based networks, data packets are sent to the network devices' specific IP addresses.
 - **Subnet Mask:** The LAN subnet mask of wireless router. The default value is 255.255.255.0
 - **DNS Server 1 & DNS Server 2:** Either indicates the IP address of DNS server that the wireless router will contact.
 - Click **Next**.
2. Assign the wireless network name (SSID) and security key for **2.4GHz** and **5 GHz** wireless connections.

The screenshot shows a web-based configuration wizard titled "Wizard" with a "Root" link. The left sidebar contains three steps: "1 | Internet Setup", "2 | Network Setup" (which is highlighted in blue), and "3 | Config Overview". The main content area is titled "Network Setup" and is divided into two sections for "2.4GHz" and "5GHz".

2.4GHz Section:

- SSID: MySpectrumWiFi000044-2G
- Key: A9WSHSYLXyj

5GHz Section:

- ☐ Same as 2.4GHz
- SSID: MySpectrumWiFi000044-5G
- Key: 5jUDoCorsS8

An "Apply" button is located at the bottom right of the 5GHz section.

- **SSID:** The network name or SSID is a unique name that identifies the wireless network. Wi-Fi devices automatically detect all networks within range.
- **Key:** A security key is the password that is assigned to secure a wireless network from unauthorized access. To access a secured network, the user will

be asked to enter the security key.

- When done, click **Apply**.

3. To display the new configuration information click **Apply**.

The screenshot shows a web-based configuration interface. At the top, there is a blue header bar with 'Root' and 'Wizard'. Below this, a sidebar on the left contains a list of steps: '1 | Internet Setup', '2 | Network Setup', and '3 | Config Overview' (which is highlighted in blue). The main content area is titled 'Config Overview' and contains three sections: 'LAN IP Setting', '2.4GHz', and '5GHz'. Each section has a table of configuration parameters. The 'LAN IP Setting' section includes 'Get LAN IP Automatically?' (Yes), 'IP Address', 'Subnet Mask', 'Default Gateway', 'Connect to DNS Server Automatic...' (Yes), 'DNS Server 1', and 'DNS Server 2'. The '2.4GHz' section includes 'SSID' (MySpectrumWiFi000044-2G) and 'Key' (A9WSHSYLXyj). The '5GHz' section includes 'SSID' (MySpectrumWiFi000044-5G) and 'Key' (5jUDoCorsS8). At the bottom right of the main content area, there is a blue button labeled 'Apply'.

LAN IP Setting	
Get LAN IP Automatically?	Yes
IP Address	
Subnet Mask	
Default Gateway	
Connect to DNS Server Automatic...	Yes
DNS Server 1	
DNS Server 2	

2.4GHz	
SSID	MySpectrumWiFi000044-2G
Key	A9WSHSYLXyj

5GHz	
SSID	MySpectrumWiFi000044-5G
Key	5jUDoCorsS8

Apply

3.4.3 Media Bridge Mode

Media Bridge mode provides a fast 802.11ac Wi-Fi connection for multiple media devices such as computer, Smart TV, game console, DVR, or media player simultaneously, via Ethernet cable. To set up the Media Bridge mode, you need two devices: one configured as a Media Bridge and the other as a router. In Media Bridge mode, only wireless devices connect directly to the router/AP. Client devices need to be connected to the Media Bridge with a network cable. Select Media Bridge mode.

Root **Wizard**

Internet Setup

1 | Internet Setup
2 | Network Setup
3 | Config Overview

Select the network and click [Connect].

HELP

Wireless name	MAC	Channel	Wireless Security	Band	Radio
_wifi-5G	B4:EE:B4:E9:AE:64	108	mixed WPA/WPA2 PSK (TKIP, CCMP)	5GHz	📶
hello-5g	54:A0:50:6D:12:B4	157	WPA2 PSK (CCMP)	5GHz	📶
BBB-5G	B4:EE:B4:E9:A9:35	116	WPA2 PSK (CCMP)	5GHz	📶
AAA-GUEST-5G	BA:EE:B4:E9:AB:03	136	WPA2 PSK (CCMP)	5GHz	📶

Network Key: 123456789 ☒ Show Password **Connect**

To set up Media Bridge mode:

- Click Apply, go to Wizard > Internet setup.
 - Select the wireless network to connect your media bridge to and enter the password.
 - When done, click **Connect**.
- Input LAN IP information and click **Apply**.

Root **Wizard**

Internet Setup

1 | Internet Setup
2 | Network Setup
3 | Config Overview

LAN IP Setting

Get LAN IP Automatically? ☒ Yes ☐ No

IP Address

Subnet Mask

Default Gateway

Connect to DNS Server Automatic... ☒ Yes ☐ No

DNS Server 1

DNS Server 2

Apply

- IP Address:** The LAN IP address of wireless router. The default value is 192.168.1.1. In IP-based networks, data packets are sent to the network devices' specific IP addresses.
- Subnet Mask:** The LAN subnet mask of wireless router. The default value is 255.255.255.0
- DNS Server 1 & DNS Server 2:** Either indicates the IP address of DNS

server that the router will contact.

3. To display the new configuration information click **Apply**.

Root

Wizard

1 | Internet Setup

2 | Network Setup

3 | Config Overview

Internet SetupConfig Overview

Basic

Frequency	5GHz
SSID	_wifi-5G
Authentication Method	WPA2-Personal
WEP Encryption	
Key Index	
Network Key	
WPA Encryption	AES
WPA Pre-shared Key	123456789

LAN IP Setting

Get LAN IP Automatically?	Yes
IP Address	
Subnet Mask	
Default Gateway	
Connect to DNS Server Automatic...	Yes
DNS Server 1	
DNS Server 2	

Apply

3.5 Admin

3.5.1 System

Through this module, administrator can change admin's password, root's login password and operator's password .

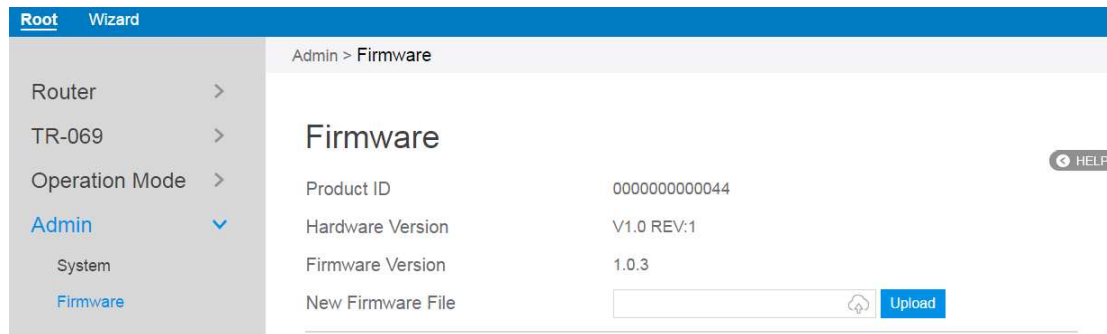
The screenshot shows a web interface for changing router login passwords. On the left is a navigation menu with 'Root' and 'Wizard' at the top, and 'Router', 'TR-069', 'Operation Mode', 'Admin' (selected), 'System', 'Firmware', 'DFS Test Mode', 'Fast Roaming', and 'Coverage' below. The main content area is titled 'Admin > System' and 'Change the Router Login Password'. It contains three sections for 'root', 'admin', and 'operator' users. Each section has fields for 'Username', 'New Password', and 'Retype New Password'. There are 'Show Password' checkboxes next to the 'Retype New Password' fields. A blue 'Apply' button is at the bottom right. A 'HELP' icon is in the top right corner.

Steps to change the router login password:

1. From the navigation panel, go to **Root > Admin**.
2. **New Password:** Enter the new password you wish to use.
3. **Retype New password:** Retype your new password for confirmation.
4. When done, click **Apply**.

3.5.2 Firmware

This module enable administrator to upgrade firmware through web.



The screenshot shows a web interface for upgrading firmware. On the left is a navigation panel with a blue header containing 'Root' and 'Wizard'. The panel lists 'Router', 'TR-069', 'Operation Mode', 'Admin' (selected with a blue checkmark), 'System', and 'Firmware'. The main content area has a breadcrumb 'Admin > Firmware' and a title 'Firmware' with a 'HELP' button. It displays fields for 'Product ID' (0000000000044), 'Hardware Version' (V1.0 REV:1), and 'Firmware Version' (1.0.3). At the bottom, there is a 'New Firmware File' label, a file selection button with a cloud icon, and an 'Upload' button.

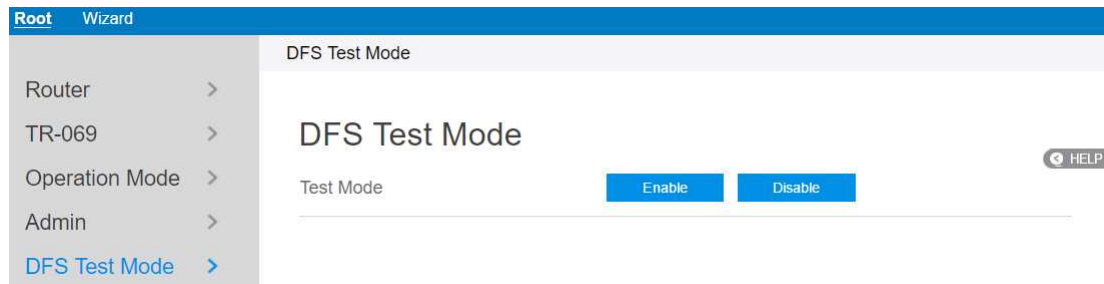
Product ID	0000000000044
Hardware Version	V1.0 REV:1
Firmware Version	1.0.3
New Firmware File	 Upload

Steps to upgrade firmware:

1. From the navigation panel, go to **Root > Admin > Firmware**.
2. **New Firmware File:** Click  to locate the firmware file.
3. Click **Upload**.

3.6 DFS Test Mode

This module is used to test wireless switch.



Root Wizard

Router >

TR-069 >

Operation Mode >

Admin >

DFS Test Mode >

DFS Test Mode

Test Mode

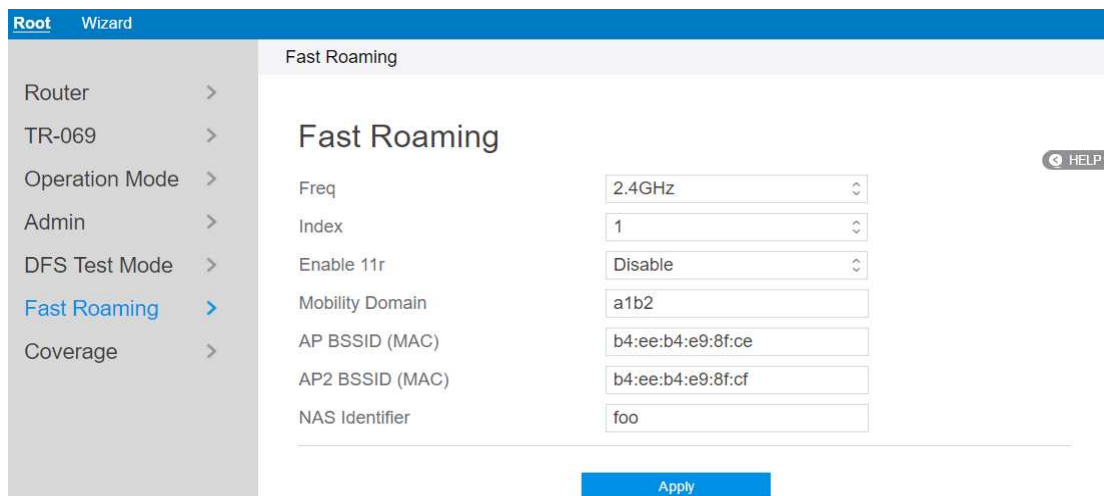
Enable Disable

HELP

1. From the navigation panel, go to **Root > DFS Test Mode**.
2. **Test Mode:** Enable or disable DFS test mode.

3.9 Fast Roaming

Set up fast roaming for smooth client roaming between SSIDs.



Root Wizard

Router >

TR-069 >

Operation Mode >

Admin >

DFS Test Mode >

Fast Roaming >

Coverage >

Fast Roaming

Freq 2.4GHz

Index 1

Enable 11r Disable

Mobility Domain a1b2

AP BSSID (MAC) b4:ee:b4:e9:8f:ce

AP2 BSSID (MAC) b4:ee:b4:e9:8f:cf

NAS Identifier foo

Apply

HELP

Steps to set up Fast Roaming:

1. From the navigation panel, go to **Root > Fast Roaming**.
2. **Freq:** Select 2.4GHz or 5GHz WiFi frequency to configure.
3. **Index:** Select which index to configure.
4. **Enable 11r:** Enable or disable 11r (Fast Roaming).
5. **Mobility Domain:** Set 11r mobility domain.

6. **AP BSSID (MAC):** Your/our AP's MAC Address.
7. **AP2 BSSID (MAC):** Other AP's MAC Address.
8. **NAS Identifier:** NAS ID of AP.

3.10 Coverage

Coverage allows automatic network switching according to the strength of the signal (2.4GHz or 5GHz) to maintain optimum signal condition.

The screenshot shows a web-based configuration interface for a network device. On the left is a navigation menu with the following items: Router, TR-069, Operation Mode, Admin, DFS Test Mode, Fast Roaming, and Coverage (which is highlighted in blue). The main content area is titled 'Coverage' and contains three sections: 'Basic Settings', 'Station Database', and 'Idle Steering Settings'. The 'Basic Settings' section includes 'Band Steering Enable' (radio buttons for Yes and No, with 'No' selected) and 'SSID to Match' (a text input field). The 'Station Database' section includes 'Include Out-of-Network Devices' (radio buttons for Yes and No, with 'Yes' selected) and 'Mark Adv Client As Dual Band' (radio buttons for Yes and No, with 'No' selected). The 'Idle Steering Settings' section includes 'Auth Allow' (radio buttons for Yes and No, with 'No' selected), '5G RSSI steering (dB)' (input field with value 5), '2.4G RSSI steering (dB)' (input field with value 20), 'Normal Inactive timer (s)' (input field with value 10), 'Overload Inactive timer (s)' (input field with value 10), and 'Inactive Check Frequency (s)' (input field with value 1). Below these is the 'Active Steering Settings' section, which includes 'Client Tx over (Kbps)' (input field with value 50000), 'STA RSSI threshold (dB)' (input field with value 30), 'Client Tx under (Kbps)' (input field with value 6000), and 'Client RSSI under (dB)' (input field with value 0). A 'HELP' button is located in the top right corner of the 'Basic Settings' section.

Section	Setting	Value
Basic Settings	Band Steering Enable	No
	SSID to Match	
Station Database	Include Out-of-Network Devices	Yes
	Mark Adv Client As Dual Band	No
Idle Steering Settings	Auth Allow	No
	5G RSSI steering (dB)	5
	2.4G RSSI steering (dB)	20
	Normal Inactive timer (s)	10
	Overload Inactive timer (s)	10
	Inactive Check Frequency (s)	1
Active Steering Settings	Client Tx over (Kbps)	50000
	STA RSSI threshold (dB)	30
	Client Tx under (Kbps)	6000
	Client RSSI under (dB)	0

Steps to set up Coverage:

1. From the navigation panel, go to **Root> Coverage**.
2. Basic Settings:
 - **Band Steering Enable:** Enable or disable load balancing logic. Whole Home Coverage brings some new steering mechanisms and algorithms in the Load Balancing Daemon (lbd) to handle more scenarios and make use of features supported on newer Wi-Fi devices.
 - **SSID to match:** The SSID to match when limiting band steering to only a

single SSID.

3. Station Database:

- **Include Out-of-Network Devices:** Whether out of network devices should be included in the database or not.
- **Mark Adv Client As Dual Band:** Whether mark advertisement client as dual band should be included in the database or not.

4. Idle Steering Settings:

- **5G RSSI steering (dB):** RSSI value indicating a node associated on 5GHz should be steered to 2.4GHz (dB).
- **2.4G RSSI steering (dB):** RSSI value indicating a node associated on 2.4GHz should be steered to 5GHz (dB).

5. Active Steering Settings:

- **Client Tx over(Kbps):** When the client Tx rate increases beyond this threshold, generate an indication (Kbps).
- **STA RSSI threshold(dB):** When evaluating a STA for rate-based upgrade steering, the RSSI must also be above this threshold (dB).
- **Client Tx under(Kbps):** When the client Tx rate decreases beyond this threshold, generate an indication (Kbps).
- **Client RSSI under(dB):** When the client RSSI decreases beyond this threshold, generate an indication (dB).

Offloading Settings

Interference Avoidance Steerin... ☒ Yes ☐ No

Interference Avoidance Steerin... ☒ Yes ☐ No

Use Best Effort ☐ Yes ☒ No

Max Pollution Time (s)

New report time avg (s)

2.4G overload limit %

5G overload limit %

2.4G active steering %

5G active steering %

Safe RSSI uplink (dB)

6. Offloading Settings:

- **New report time avg (s):** Time to average before generating a new utilization report (s).
- **2.4G overload limit %:** Medium utilization threshold for an overload condition on 2.4GHz (%).
- **5G overload limit %:** Medium utilization threshold for an overload condition on 5GHz (%)
- **2.4G active steering %:** Medium utilization safety threshold for active steering to 2.4GHz (%).
- **5G active steering %:** Medium utilization safety threshold for active steering to 5GHz (%)
- **Safe RSSI uplink (dB):** Uplink RSSI (in dB) above which association will be considered safe.

7. Steering Executor Settings:

Steering Executor Settings

Legacy steering wait (s)	300
BTM steering wait (s)	30

- **Legacy steering wait (s):** Time to wait before steering a legacy client again after completing steering (s).
- **BTM steering wait (s):** Time to wait before steering a client via BTM again after completing steering without sending an auth reject (s).

Basic Advanced

Recent measurement (s)	5
------------------------	--------------------------------

Station Database Advanced

Size Threshold For Aging Timer	100
Aging Timer Frequency (s)	60
Out-of-network max (s)	300
Max Age for In-Network Client (s)	2592000
Num Remote BSSes	4
Populate Non Serving PHY Info	1

Post-association steering decision maker

2.4G RSSI measurements	5
5G RSSI measurements	5

Utilization Monitor Advanced Settings

RSSI avg probe requests	1
2.4G check frequency (s)	10
5G check frequency (s)	10
MUReport Period (s)	30
Load Balancing Allowed Max P...	15
Num Remote Channels	3

8. Basic Advanced:

- **Recent measurement (s):** Maximum number of seconds elapsed allowed for a 'recent' measurement.

9. Station Database Advanced:

- **Out-of-network max (s):** Max Age for Out-of-Network Client (s).
10. Post-association steering decision maker:
- **2.4G RSSI measurements:** Number of RSSI measurements on 2.4GHz band.
 - **5G RSSI measurements:** Number of RSSI measurements on 5GHz band.
11. Utilization Monitor Advanced Settings:
- **RSSI avg probe requests:** Number of probe requests required for the RSSI averaging.
 - **2.4G check frequency(s):** The frequency to check medium utilization on 2.4GHz .
 - **5G check frequency(s):** The frequency to check medium utilization on 5GHz.

12. Rate estimation:

Rate estimation

5G RSSI difference	-15
2.4G RSSI difference	5
RSSI avg probe requests	3
Data rate estimate (s)	1
PHY scaling factor (%)	50
Continuous measure demo	☐ Yes ☒ No
11k active scan (s)	50
11k passive scan (s)	200
11k Prohibit Time Short (s)	30
11k Prohibit Time Long (s)	300
Fast Pollution Detect Buf Size	10
Normal Pollution Detect Buf Size	10
Pollution Detect Threshold	60
Pollution Clear Threshold	40
Interference Age Limit (s)	15
IAS Low RSSI Threshold (dB)	12
IAS Max Rate Factor	88
IAS Min Delta Bytes	2000
IAS Min Delta Packets	10

- **5G RSSI difference:** Difference when estimating 5GHz RSSI value from the one measured on 2.4GHz.
- **2.4G RSSI difference:** Difference when estimating 2.4GHz RSSI value from the one measured on 5GHz.
- **RSSI avg probe requests:** Number of probe requests required for the RSSI averaging.
- **Data rate estimate (s):** Seconds between successive stats samples for estimating data rate.
- **PHY scaling factor (%):** Scaling factor (as percentage) for converting PHY rate to upper layer rate for airtime computations.
- **Continuous measure demo:** Continuously measure throughput (for demo

purposes only).

- **11k active scan (s):** Active scan duration used in 802.11k Beacon Report (s).
- **11k passive scan (s):** Passive scan duration used in 802.11k Beacon Report request (s).

Steering Executor Advanced Settings

Abort steering time (s)	15
Coalesce reject time (s)	2
Max auth. rejects	3
Unfriendly time (s)	600
Max unfriendly STAs (s)	604800
2.4G RSSI assoc. (dB)	5
5G RSSI assoc. (dB)	15
Autoremove blacklist (s)	900
BTM response wait (s)	10
Association wait (s)	6
If set to 1, will also setup blackli...	1
BTM unfriendly (s)	600
Unfriendly BTM STAs (s)	86400
BTM STA backoff (s)	604800
Min best effort RSSI dB	12
RSSI indication (dB)	10
Start In BTM Active State	☐ Yes ☒ No
Delay 24G Probe RSSI Thresh...	35
Delay 24G Probe Time Window...	0
Delay 24G Probe Min Req Count	0

13. Steering Executor Advanced Settings:

- **Abort steering time (s):** Maximum time for client to associate on target band before AP aborts steering (s).
- **Coalesce reject time (s):** Time to coalesce multiple authentication rejects down to a single one (s).
- **Max auth. Rejects:** Max consecutive authentication rejects after which the device is marked as steering unfriendly.
- **Unfriendly time (s):** The base amount of time a device is considered steering unfriendly before another attempt (s).
- **Max unfriendly STAs (s):** The maximum time used for backoff for steering unfriendly STAs. Total amount of backoff is calculated as $\min(\text{MaxSteeringUnfriendly}, \text{SteeringUnfriendlyTime} * 2^{\text{CountConsecutiveFailures}})$ (s).

- **2.4G RSSI assoc. (dB):** RSSI threshold indicating 2.4GHz band is not strong enough for association (dB).
- **5G RSSI assoc. (dB):** RSSI threshold indicating 5GHz band is not strong enough for association (dB).
- **Autoremove blacklist (s):** The amount of time (in seconds) before automatically removing the blacklist (s).
- **BTM response wait (s):** The amount of time to wait for a BTM response (s).
- **Association wait (s):** The amount of time to wait for an association on the correct band after receiving a BTM response (s).
- **BTM unfriendly (s):** The base amount of time a device is considered BTM-steering unfriendly before another attempt to steer via BTM (s).
- **Unfriendly BTM STAs (s):** The maximum time used for backoff for BTM unfriendly STAs. Total amount of backoff is calculated as $\min(\text{MaxBTMUnfriendly}, \text{BTMUnfriendlyTime} * 2^{\text{CountConsecutiveFailures}})$ (s).
- **BTM STA backoff (s):** The maximum time used for backoff for BTM STAs that fail active steering. Total amount of backoff is calculated as $\min(\text{MaxBTMActiveUnfriendly}, \text{BTMUnfriendlyTime} * 2^{\text{CountConsecutiveFailures}})$ (s).
- **Min best effort RSSI dB:** The minimum RSSI, below which lbd will only steer clients via best effort (no blacklists, failures do not mark as unfriendly) (dB).
- **RSSI indication (dB):** RSSI threshold to generate an indication when a client crosses it (dB).

Steering Algorithm Advanced Settings

Downlink rate (Mbps)	53
Max Steering Target Count	1

AP Steering thresholds

Low RSSI APSteer Threshold ...	20
Low RSSI APSteer Threshold ...	45
APSteer To Root Min RSSI Inc...	5
APSteer To Leaf Min RSSI Inc...	10
APSteer To Peer Min RSSI Inc...	10
Downlink RSSI Threshold W5 (...)	-65

14. Steering Algorithm Advanced Settings

- **Downlink rate (Mbps):** Downlink rate (in Mbps) should exceed at least Low TxRateXingThreshold + this value, when steering from 2.4GHz to 5GHz due to overload.

4.0 FCC Statement

Federal Communication Commission Interference Statement

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 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 help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This 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.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device is restricted for indoor use.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 25 cm between the radiator & your body.