USER MANUAL

SP230 Series

2x2 Dual Band PtP/PtMP
802.11ac Wave 2 Outdoor Access Point

Revision: 3.3.0.4

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Chapter 1. INTRODUCTION

This manual is intended for installing and managing the SP230 Series using the HTTP interface. The SP230 series will simply be referred to as the AP (Access Point) within this guide. The installer should be familiar with network structures, terms, and concepts.

1.1. Product Description

The SP230 Series is a dual-band (2x2) Wave 2 outdoor AP that supports the IEEE 802.11ac standard and can provide wireless data rates up to 1.1 Gbps using MU-MIMO technology and optimizing the 2.4 GHz and 5 GHz frequency bands. The 2.4GHz and 5GHz radios can be used for client access, backhaul traffic, or both. Products details are available on Z-COM website at https://www.zcom.com.tw/index/product/details?id=29

The access point can also operate as a relay mode for other access points that are not directly connected to a wired network. This enables each access point to identify neighbors and intelligently choose the optimal path to the wired network by calculating the cost of each path in terms of signal strength and the number of hops required to get to a controller.

The access point can be configured, monitored, and operated through a Z-COM wireless LAN controller. The controllers use a browser-based management system to manage the controller and the associated access points.

The model numbers and configuration for the Z-COM SP230 Series outdoor access points are described here:

Standards	IEEE 802.11a/b/g/n/ac	
Radio Chains	2.4GHz: 2x2:2; 5GHz: 2x2:2	
Antenna Peak Gain	**SP230**	**SP230-S5**
	2.4GHz: 5dBi (Embedded) 5GHz: 5dBi (Embedded)	2.4GHz: 5dBi (Embedded) 5GHz: 11dBi (Embedded)
Antenna Type	2.4/5GHz: Omni antenna	2.4GHz: Omni antenna 5GHz: Directional antenna
Interface	2 x 1GbE RJ45 port	

Chapter 2. HARDWARE FEATURES

2.1. Package Contents

Carefully remove all the items from the packing of AP. The following items should be included in the packaging:

One outdoor access point

One clamp

Two waterproof cable glands

One ground wire

One mounting bracket
+ Four screws

Note: SP230 and SP230-S5 both provides two waterproof cable glands.

2.2. Installation Requirements

TERMS OF USE: All Ethernet cabling runs must use CAT5e, 24 AWG (or above) Shielded Twisted Pair (STP) cabling. In addition, please cut the cable into a proper length, strip the cables on both ends, and crimp the wires into RJ45 connectors. It is the professional installer's responsibility to follow local country regulations, including operation within legal frequency channels, output power, indoor cabling requirements, and Dynamic Frequency Selection (DFS) requirements.

2.3. Physical Ports

The following physical ports are available on the SP230/SP230-S5.

The following table describes the physical ports that are available on the AP from left to right.

Port	Description
WAN/PoE Port	The WAN/PoE port operates at 10/100/1000 Mbps supports an RJ45 connection. Supporting PoE In, the AP can receive power through the WAN port from PSE (Power Sourcing Equipment), rendering the need for a power supply into the power port.
LAN Port	The LAN port operates at 10/100/1000 Mbps at supports an RJ45 connector. Supporting PoE Out, the LAN port can supply PoE power to PDs (Powered Devices) plugged into the LAN port. Up to 10 Watts output power can be supplied.
Grounding	Access point that can't find its way to local earth ground will transfer to the interior equipment over the communication and power cable.

2.4. LED Indicator

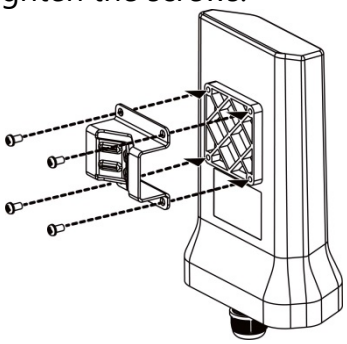
The following table describes the AP status referring to different LED behavior.

Color	Behavior	Description
Red	**Steady**	Initializing
	Flashing	Power / system on
Green	**Steady**	Internet connection detected
	Flashing	No internet connection detected

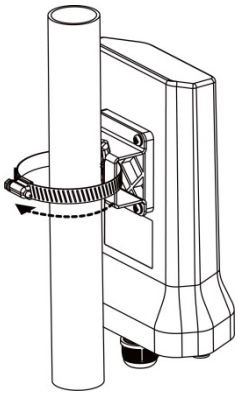
Chapter 3. HARDWARE INSTALLATION

3.1. Mounting the Access Point on the Pole

① Attach the mounting bracket to the AP using four screws (included in the packaging). Securely tighten the screws.



② Attach the clamp to encircle pole and the mounting bracket. Securely tighten the clamp.

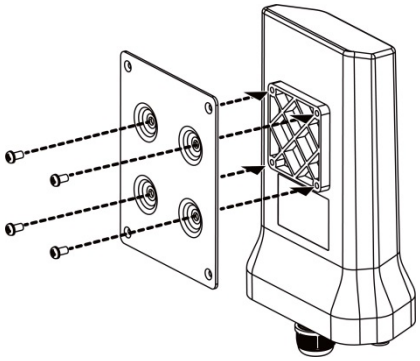


Note: Please avoid having obstacles or metal plates surround the access point.

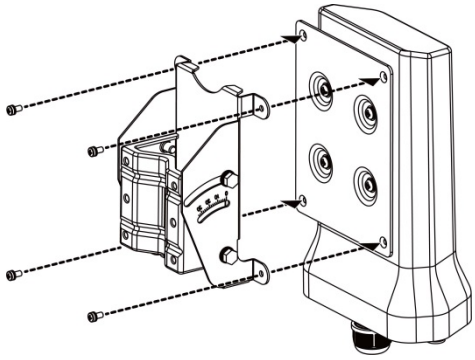
3.2. Two-dimensional Mounting Kit (Optional accessory_SP-MKM5)

3.2.1. Pole-Mount

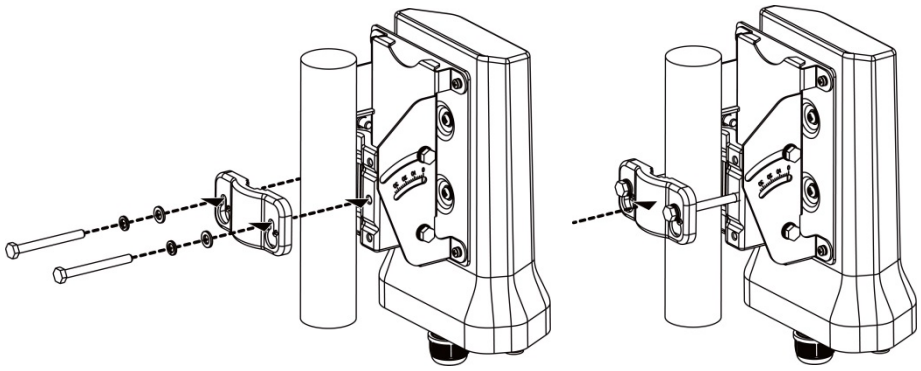
① Attach the intermediate steel plate to the device using four M5 screws (included in the packaging). Securely tighten the screws.



② Attach the two-dimensional mounting bracket to the intermediate steel plate using four M4 screws (included in the packaging). Securely tighten the screws.



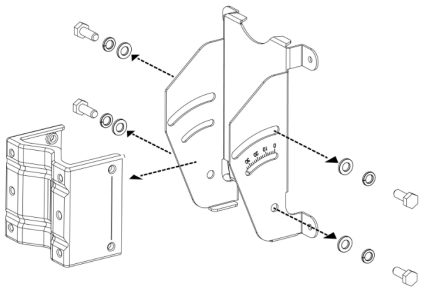
③ Attach the pole-supported bracket and align the area where the flat head screws will be attached. Insert two flat head screws into two-dimensional mounting bracket, and tighten them approximately.



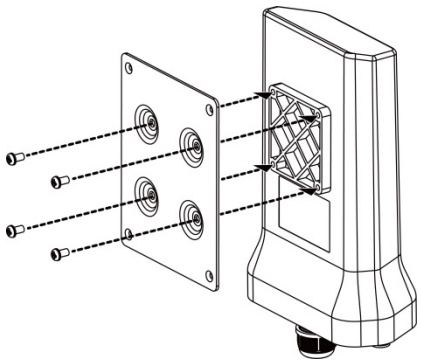
Note: The pole-supported bracket can accommodate up to 6 cm (2.36") in diameter.

3.2.2. Wall-Mount

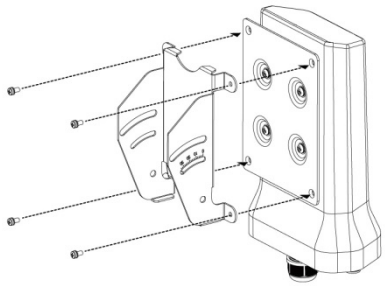
① Separate it into two parts: half-mounting bracket and M-type bracket and unscrew four hex head machine bolts on the two-dimensional mounting bracket.



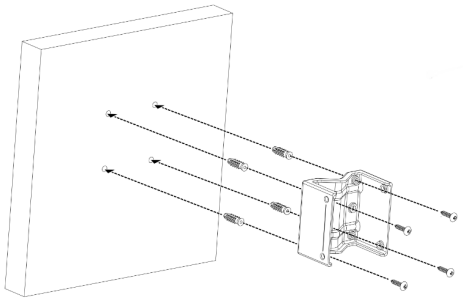
② Attach the intermediate steel plate to the device using four M5 screws (included in the packaging). Securely tighten the screws.



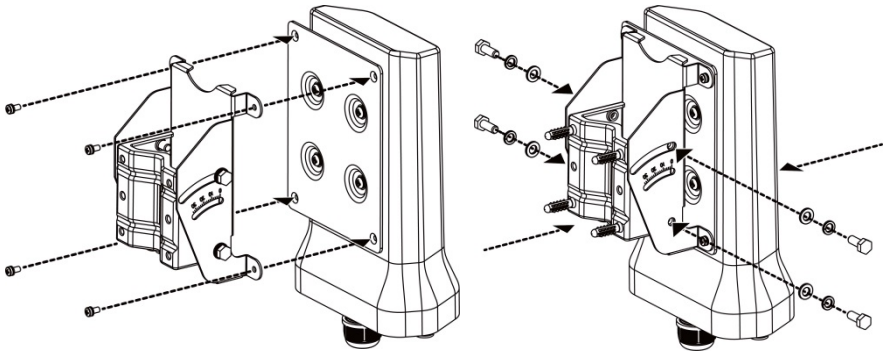
③ Attach half-mounting bracket to the device with intermediate steel plate using four M4 screws (included in the packaging). Securely tighten the screws.



④ Attach M-type bracket to the device onto the wall, using four M5 screws + screw anchors (included in the packaging). Securely tighten the screws.

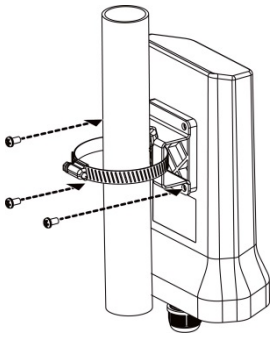


⑤ Attach half-mounting bracket to the M-type bracket, then screw four hex head machine bolts. Securely tighten the screws.

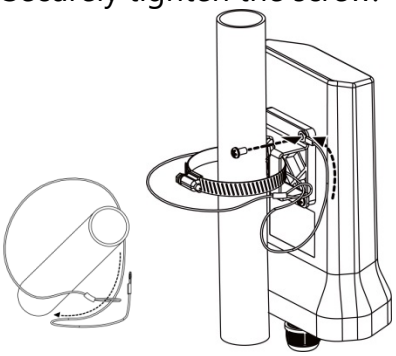


3.3. Anti-theft Steel Rope (Optional accessory_SP-CBM5)

① Insert three of anti-theft screws (included in the packaging) to the device through the mounting bracket. Securely tighten these three screws.



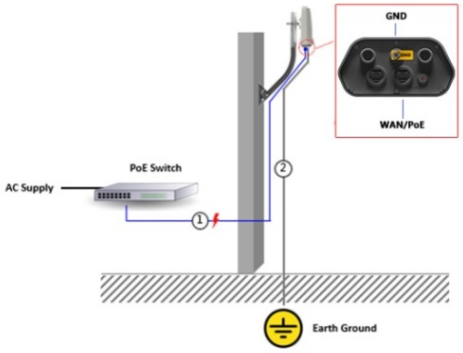
② Encircle the anti-theft steel rope around the pole, and insert the last anti-theft screw (included in the packaging) to the device with one side of anti-theft steel rope. Securely tighten the screw.



3.4. Grounding Connection & Protect from Lightning

1. Make your device GND port connect to ground wire.
2. The ground wire connects to the earth. In addition, the grounding wire meets to 6-AWG copper grounding wire.

Note: Be sure that grounding is available and that it must comply with local and national electrical codes. For additional lightning protection, use lightning rods and lightning arrestors.

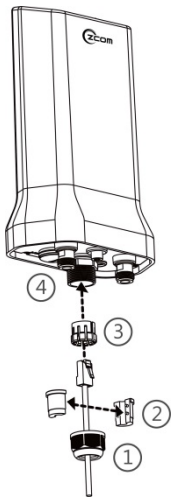


3.5. Safety Notice

1. Do not install the device close to any electrical grounding device or lightning protection system. Place the device's own grounding and lightning protection system apart from any electrical grounding device and lightning protection system as far as possible.

2. Protect components from electrostatic discharge: Please wear an ESD wrist strap or handle the power adapter by its edge and do not touch any component or printed circuit boards, especially for module device.
3. Make sure to keep the temperature and humidity of the installation location at an optimal level.
4. An excellent grounding system guarantees the stable operation of device, as well as to protect device from lightning, interference and electrostatic discharges.
5. The device may be damaged by lightning. We recommend that you install additional lightning protection devices if necessary, considering the conditions in your area.
6. Supply stable power to the device. Unstable power may cause the device to malfunction. The device supports PoE power supply and is recommended if the device is installed near grid lines within less than 100 meters radius.

3.6. Installing a Waterproof Cable Gland for Ethernet Port (Optional accessory_ SP-WP-CM20)



① Dismantle all the components of waterproof cable gland, and plug the cable through it. Thread and assemble one by one: sealing nut, plastic ring, rubber, finally is locking nut. Securely tighten all the components.

3.7. Powering the Access Point

Connect the PoE cable into the WAN/PoE IN port of the device, then it will power on.

Note: Please wait for 5-10 seconds while powering on.

Note: For PoE Out applications, the LAN port provides DC 48V, Max. 208mA, and up to 10W power supply. The positive side of the 48V is connected to pin 4 and 5, the negative side is connected to pin 7 and 8.

Warning: Do **NOT** attempt to connect any **non-PoE** devices to LAN port and make sure the input power should comply with PoE Out standard.

Chapter 4. THE HTTP INTERFACE

The AP can be configured through its supported software interface HTTP. The HTTP interface can be accessed using any standard web browsing software through any network. This chapter explains all the elements that are available on the HTTP interface of the AP.

Note: The default Username is **root** and Password is **password**.

Note: Click the icon to add a new entry. Click the icon to remove an entry.

Note: Click Reset Reset button to return the parameters on the page to their previously saved state.

Note: Click Save Save button to accept and save the modifications made on the page.

Note: Click Save & Apply Save & Apply button to save and apply the modifications made on the page.

4.1. Login to the HTTP Interface

① To access the HTTP interface on the AP, enter the IP address of the AP into the web browser's address bar and press the Enter key.

② Enter the Username and Password in the respective textboxes and click the Login button. To return the information, displayed in the textboxes to the defaults, click the Reset button.

③ In a default access point configuration, the SP230 default AP mode is TAP mode, and SP230-S5 is FAP mode.

4.2. Thin AP (TAP) Mode

The procedure for completing the access point's essential configuration depends on whether you want it to be managed by wireless LAN controllers (WLC).

To configure the access point to be managed by the WLC, you must ensure that the APs will be able to locate and connect to the WLC when powered on. When connected to the network, each AP is assigned a valid IP address.

4.2.1. Access Point Configuration

Note: In TAP mode, the AP must be able to go with wireless LAN controllers (WLCs) for bulk configuration and performing other commands of access points. Please refer to WLC QSG for settings first, then go back to finish the AP configuration.

https://www.zcom.com.tw/index/downloads?keyword=&meterial_type=49

Step 1. Power on the AP. As the status of LED indicator from flashing change to steady green, the connection is successful.

Note: Please make sure DHCP is enabled on the network once accomplished WLC settings. The access point must receive its IP address through DHCP.

Note: Switching from DHCP to assign a static IP address or DNS and L2 discovery mode to the access point, please refer to the user manual for more information. https://www.zcom.com.tw/index/downloads?keyword=&meterial_type=25

If the access point cannot connect to WLC by DHCP broadcast, please refer to the following optional settings.

Optional: Set up a static IP address

Note: The following procedure assumes that Windows 10 is the operating system. Procedures for other operating systems are similar.

Step 1. On your computer, configure your network adapter from the "Local Area Connection "settings as follows:

- Start→Control Panel→Network & Internet→Change Adapter Options→Ethernet

Step 2. Edit the TCP/IPv4 address setting as follows:

- Properties→Internet Protocol Version 4(TCP/IPv4)

Step 3. Select "Use the following IP address" and make the following entries:

- IP address: 192.168.1.168 (or any available address in the 192.168.1.x network, except 192.168.1.1)
- Subnet mask: 255.255.255.0

Leave the "Use the following DNS server address" field empty.

Step 4. Click "OK" to save your changes.

Login into the access point

Step 5. Launch a Web browser; type default URL https://192.168.1.1 to connect to the access point. When a security alert dialog box appears, click OK/Yes to proceed.

Step 6. When login page appears, enter the following: Username: **root**/Password: **password**

Step 7. Click login.

Customizing the Wireless Settings

On the Web interface menu, Select Status→General in the menu bar. Check your switchmod item to select "Connect with via IP", and setup your WLC IP address on "Wireless Switch Address 1".

Note: IP address of WLC needs to be assigned (ex. 192.168.1.228) while on operation.

Note: If you need a standalone access point, please change to FAP mode.

4.2.2. Status

4.2.2.1. Overview

This page is used to provide an overview of the software settings and status of the AP. The following parameters are available in this section:

Parameter	Description
Kernel Version	Displays the Linux kernel version.
Load Average	Displays the average system load calculated over a given period of time of 1, 5 and 15 minutes.

The following parameters are available in this section:

Parameter	Description
Total Available	Displays the total memory supported by the AP in kilobytes and percentage.
Free	Displays the free memory on the AP in kilobytes and percentage.
Cached	Displays the cached memory on the AP in kilobytes and percentage.
Buffered	Displays the buffered memory on the AP in kilobytes and percentage.

The following parameters are available in this section:

Parameter	Description
IPv4 WAN Status	Displays the IPv4 WAN (Wide Area Network) connection status.
Active Connections	Displays the number of active network connections in integers and percentage.

4.2.2.2. General

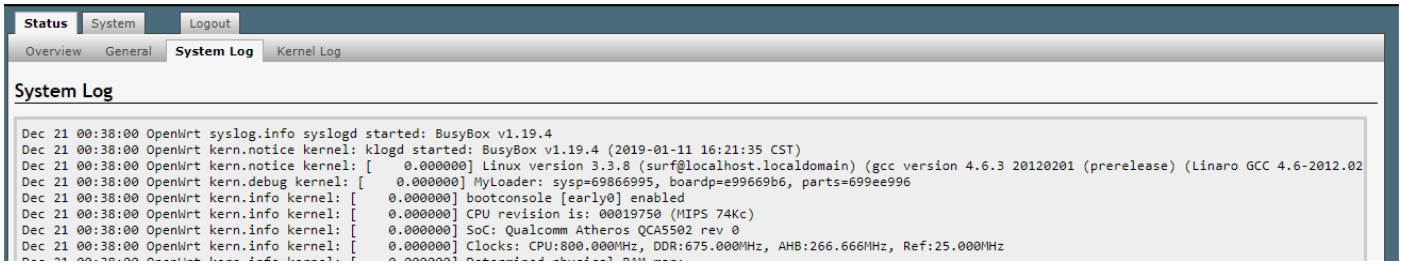
Next click the General Button. Once login, first assign a fixed IP address or a DHCP IP to the AP under Current IP Setting. Under Wireless Switch Setting, select Connect with Wireless Switch via IP and input the IP address of the AP access controller, then click save & apply to take effect.

Parameter	Description
ipMod	Displays basic mode information of the ipMod. IPv4 – Select IPv4 mode. IPv6 - Select IPv6 mode. Auto – Auto detected if it is IPv4 or IPv6.
DHCP Client	Choose the DHCP Client, which is Close, or Open by default it will be Open.
Default Gateway	Enter the IPv4 address of the gateway for the interface.
Primary/Secondary DNS Server	Enter primary/secondary DNS server. (if require the second one)

Parameter	Description
IPv6 Address	Enter the IPv6 address.
IPv6 Prefix	Enter the IPv6 prefix IP address.
Default Gateway	Enter the IPv6 address of the gateway for the interface.
IPv6 Primary/Secondary DNS Server	Enter primary/secondary DNS server. (if require the second one)
Switch mod	Displays basic information of the switch mod: Connect with via DHCP – connect the AP via DHCP of the network or provided by the Access controller DHCP IP address. IP – Connect the AP via Access controller IP address. DNS - Displays the MAC address of the interface.
Wireless Switch Address 1/2/3/4	Enter wireless access controller IPv4 IP address.
Wireless Switch IPv6 Address1/2/3/4	Enter wireless access controller IPv6 IP address.
Wireless Switch Name1/2/3/4	Enter access controller DNS value.
Management VLAN ID	Enter specific management VLAN ID which is providing from the Network.

4.2.2.3. System Log

This page is used to display the system log on the AP. Information on this page is useful for troubleshooting.



4.2.3. System

4.2.3.1. AP Mode

This page is used to displayed and changed AP modes.

- Thin AP - Specifies to use and configure this AP with a wireless controller in the network. The wireless controller will be responsible for the configuration of this AP. Only a few functions are available to be configured on this AP in this mode.
- Fat AP - Specifies to use and configure this AP without a wireless controller in the network. More functions are available to be configured on this AP in this mode.

4.2.3.2. Reboot

Click the Perform reboot link to reboot the device. Any unsaved configuration changes will be lost.

4.3. Fat AP (FAP) Mode

A FAT AP is suitable for family and small-scaled networks and provides full features. This Fat AP is wireless equipment used to control and manage wireless clients. A FAT AP may support both 2.4GHz and 5GHz band in a single logic management domain. This Fat AP is used for wireless terminals to access a wired network; also it can communicate the bridge between the wireless clients and wired network. Before configuring the fat AP make sure that AP is in fat AP mode. If the AP is in Thin AP mode, please change into Fat AP mode and precede the following essential configuration.

4.3.1. Status

4.3.1.1. Overview

This page is used to provide an overview of the software settings and status of the AP. Please refer to page 10.

The following parameters are available in the DHCP Leases:

Parameter	Description
Hostname	Displays the hostnames of active DHCP clients connected to the AP. DHCP stands for Dynamic Host Configuration Protocol.
IPv4 Address	Displays the IP addresses of active DHCP clients connected to the AP. IP stands for Internet Protocol.
MAC Address	Displays the MAC addresses of active DHCP clients connected to the AP. MAC stands for Medium Access Control.
Lease Time Remaining	Displays the DHCP lease time remaining for the DHCP clients connected to the AP.

The following parameters are available in the DHCPv6 Leases:

Parameter	Description
Hostname	Displays the hostnames of active DHCPv6 clients connected to the AP.
IPv6 Address	Displays the IPv6 addresses of active DHCPv6 clients connected to the AP.
DUID	Displays the DUID (DHCP Unique Identifier) of active DHCPv6 clients connected to the AP.

The following parameters are available in the Wireless section:

Parameter	Description
Generic 802.11bgn Wireless Controller (wifi0)/(wifi1)	Displays information about the generic 802.11bgn wireless controller (wifi0)/(wifi1). SSID - Displays the SSID (Service Set Identifiers) for this wireless interface. Click on the hyperlink to configure this wireless interface. For more information, refer to Wireless Overview on page 46. Mode - Displays the mode of the wireless interface. Channel - Displays the wireless channel (frequency) hosted by this wireless interface. TX Power - Display the Wi-Fi transmit power from this wireless interface. Bitrate - Display the bitrate provided through this wireless interface.

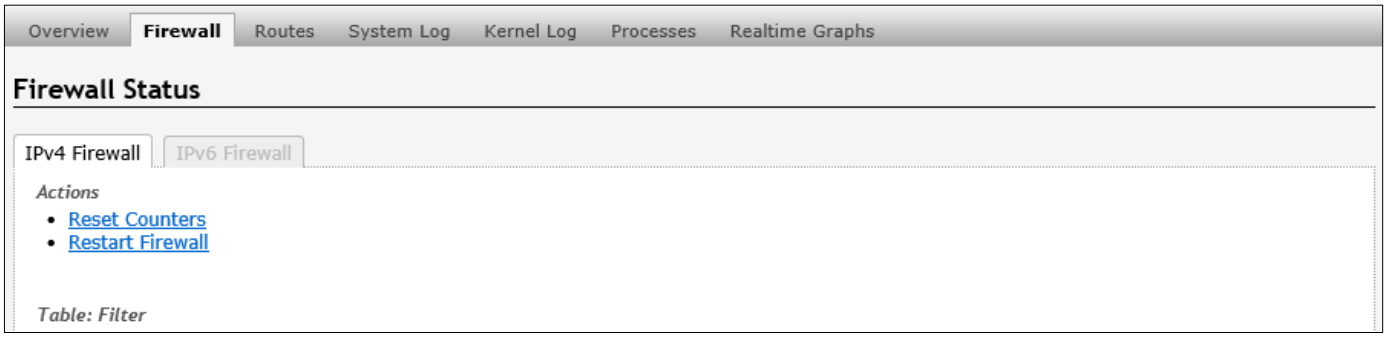
The following parameters are available in the Associated Stations section:

Parameter	Description
Network	Click on the hyperlink to configure this wireless interface. For more information, refer to Wireless Overview on page 46.
RX Rate	Displays the RX (receiving) data rate provided to/from the associated wireless station.
TX Rate	Displays the TX (transmitting) data rate provided to/from the associated wireless station.

4.3.1.2. Firewall

4.3.1.2.1. IPv4/IPv6 Firewall

This page is used to display the detailed status of the IPv4 and IPv6 firewall features provided on the AP.



4.3.1.3. Routes

This page is used to display the IPv4/IPv6 routing information. The following parameters are available in this section:

Parameter	Description
IPv4 Address	Displays the IPv4 address of the ARP (Address Resolution Protocol) entry.

Parameter	Description
MAC Address	Displays the MAC address of the ARP entry.
Interface	Displays the physical interface that the ARP entry resides on.

The following parameters are available in the Active IPv4/IPv6 Routes section:

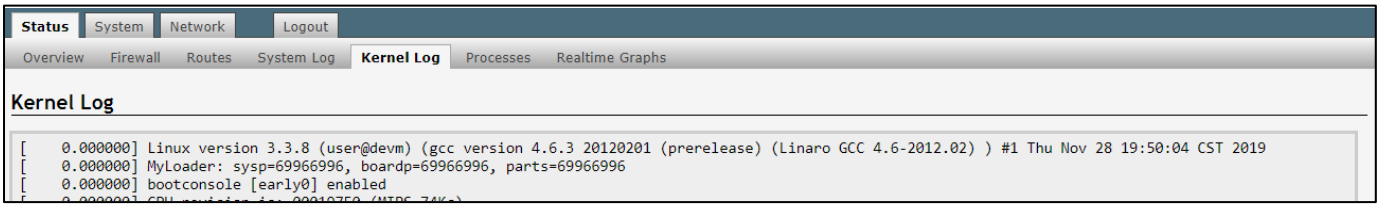
Parameter	Description
Network	Displays the physical or logical interface the active IPv4/IPv6 route resides on.
Target	Displays the target IPv4 network range of the active IPv4/IPv6 route.
IPv4/IPv6 Gateway	Displays the IPv4 gateway address used by the active IPv4/IPv6 route.
Metric	Displays the metric used by the active IPv4/IPv6 route.

4.3.1.4. System Log

This page is used to display the system log on the AP. Information on this page is useful for troubleshooting.

4.3.1.5. Kernel Log

This page is used to display the kernel log on the AP. Information on this page is useful for troubleshooting.



4.3.1.6. Real-time Graphs

4.3.1.6.1. Load

This page is used to display the load graph in real time. The following parameters are available in the Realtime Load section:

Parameter	Description
1/5/15 Minute Load	Displays the 1/5/15-minute load in real time. • Average - Displays the average measurement for the 1/5/15-minute load. • Peak - Displays the peak measurement for the 1-minute load.

4.3.1.6.2. Traffic

This page is used to display the inbound and outbound data traffic graph for each physical and logical interface in real time.

The following parameters are available in bond0/br-lan/eth0/eth0.1/eth0.2/milreg section:

Parameter	Description
Inbound	Displays the inbound data traffic measurement (kilobits and kilobytes per second) in real time. • Average - Displays the average measurement for inbound data traffic. • Peak - Displays the peak measurement for inbound data traffic.
Outbound	Displays the outbound data traffic measurement (kilobits and kilobytes per second) in real time. • Average - Displays the average measurement for outbound data traffic. • Peak - Displays the peak measurement for outbound data traffic.

4.3.1.6.3. Wireless

This page is used to display the wireless signal strength and noise graph in real time. The following parameters are available in signal strength and noise measurement section:

Parameter	Description
Signal/Noise	Displays the wireless signal strength and noise measurement (decibel-milliwatts) on the wireless interface in real time. • Average - Displays the average value on the wireless interface. • Peak - Displays the peak value on the wireless interface.

The following parameters are available in this section:

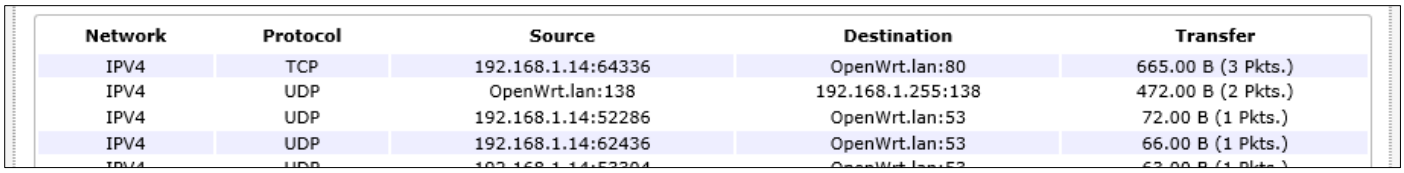
Parameter	Description
Phy Rate	Displays the physical wireless data rate (megabytes per second) through the wireless interface in real time. • Average - Displays the average physical wireless data rate through the wireless interface. • Peak - Displays the peak physical wireless data rate through the wireless interface.

4.3.1.6.4. Connections

This page is used to display a graphical overview of active network connections in real time. The following parameters are available in UDP/TCP/Other section:

Parameter	Description
UDP/TCP/Other	Displays the number of UDP (User Datagram Protocol)/TCP (Transmission Control Protocol) and other (other than TCP/UDP) network connections in real time. • Average - Displays the average number of UDP network connections.

Parameter	Description
	• Peak - Displays the peak number of UDP network connections.



Network	Protocol	Source	Destination	Transfer
IPV4	TCP	192.168.1.14:64336	OpenWrt.lan:80	665.00 B (3 Pkts.)
IPV4	UDP	OpenWrt.lan:138	192.168.1.255:138	472.00 B (2 Pkts.)
IPV4	UDP	192.168.1.14:52286	OpenWrt.lan:53	72.00 B (1 Pkts.)
IPV4	UDP	192.168.1.14:62436	OpenWrt.lan:53	66.00 B (1 Pkts.)

The following parameters are available in this section:

Parameter	Description
Network/Protocol	Display the network/Protocol used by the active network connection.
Source/Destination	Displays the source/destination IP address and TCP/UDP port number of the active network connection.
Transfer	Displays the transfer data rate (bytes and packets) of the active network connection.

4.3.2. System

4.3.2.1. System

This page is used to display and configure basic system settings like the logging and the date/time settings.

4.3.2.2. Administration

4.3.2.2.1. Router Password

This page is used to change the password for accessing on the AP.

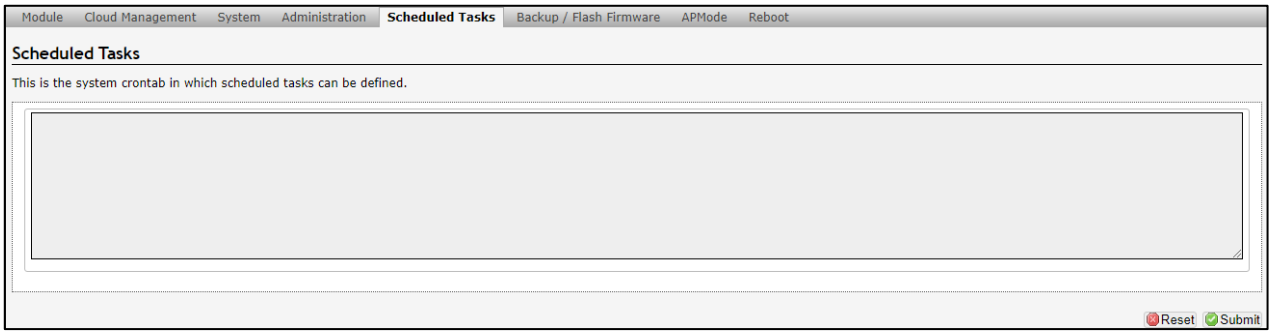
4.3.2.2.2. SSH Access

The following parameters are available in this section:

Parameter	Description
Port	Enter the TCP/UDP port number for the SSH connection. The default port number is 22.

4.3.2.3. Scheduled Tasks

This page is used to display and configure the scheduled tasks settings on the AP.



4.3.2.3.1. Task specification

Each line is a separate task written in the specification:

```
* * * * * command to execute
- - - - -
| | | | |
| | | | ----- Day of week (0 - 6) (Sunday =0)
| | | ------- Month (1 - 12)
| | --------- Day (1 - 31)
| ----------- Hour (0 - 23)
------------- Minute (0 - 59)
```

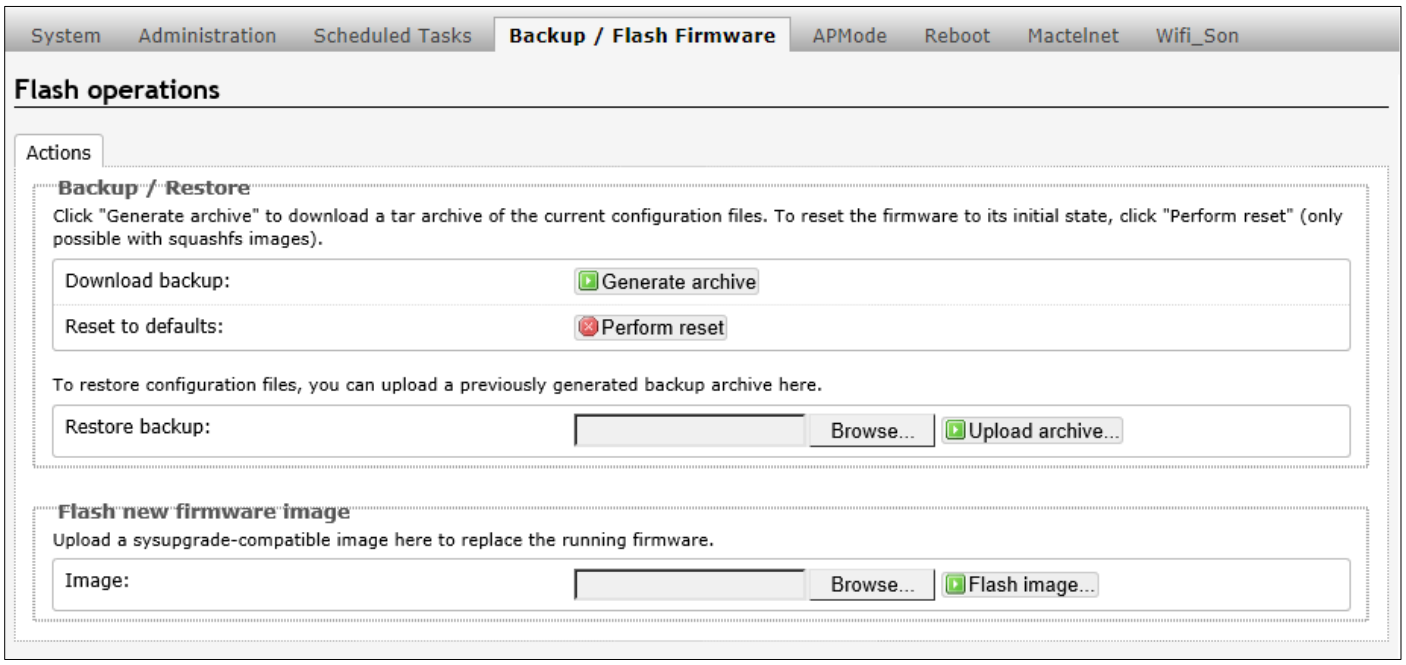
4.3.2.3.2. Crontab Examples

A line in crontab file like below removes the tmp files from /home/someuser/tmp each day at 6:30 PM.

30 18 * * * rm /home/someuser/tmp/*

4.3.2.4. Backup / Flash Firmware

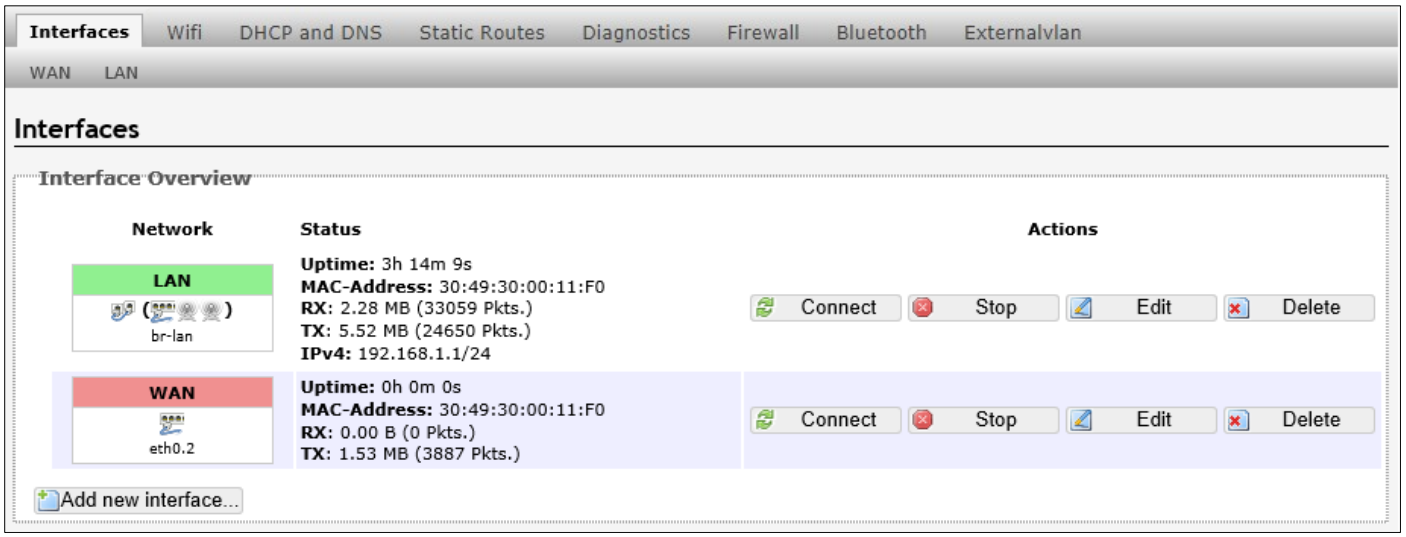
This page is used to backup/restore the configuration or to update the firmware on the AP. A factory reset of the software configuration can also be performed on this page.



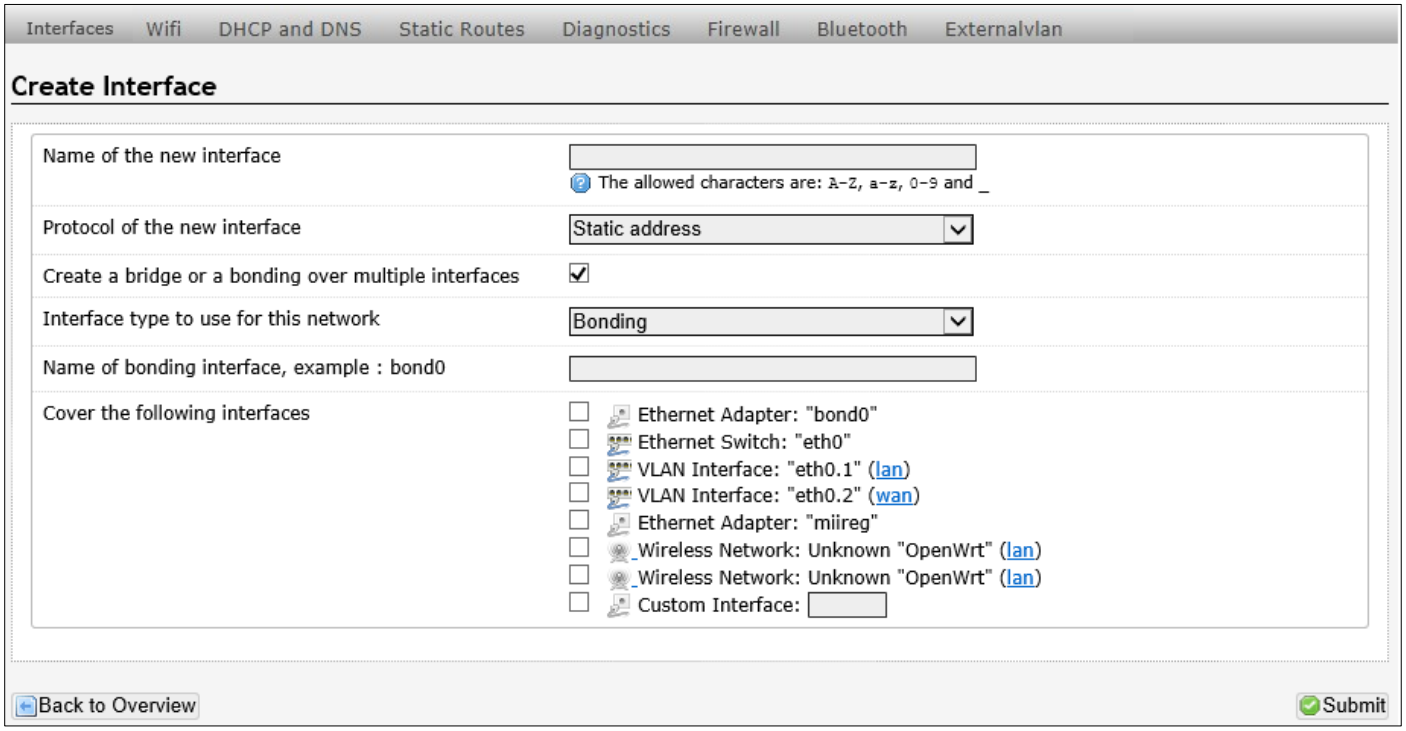
4.3.3. Network

4.3.3.1. Interfaces

This page is used to display and configure the LAN and WAN interface on the AP.

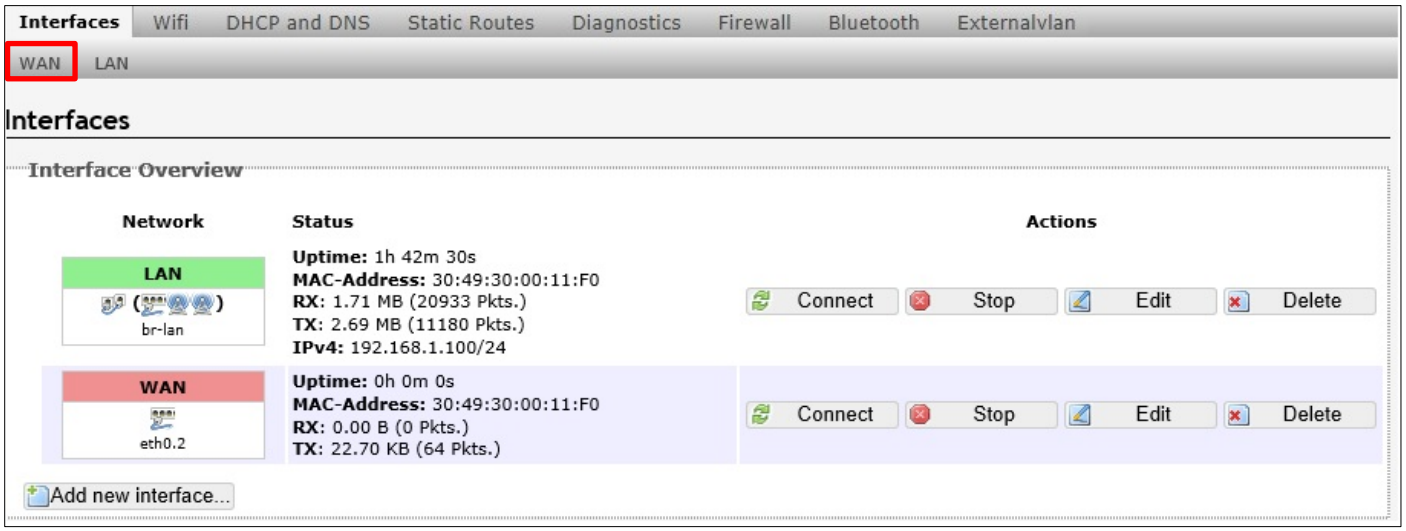


After clicking the Add new interface button, the following page will appear:



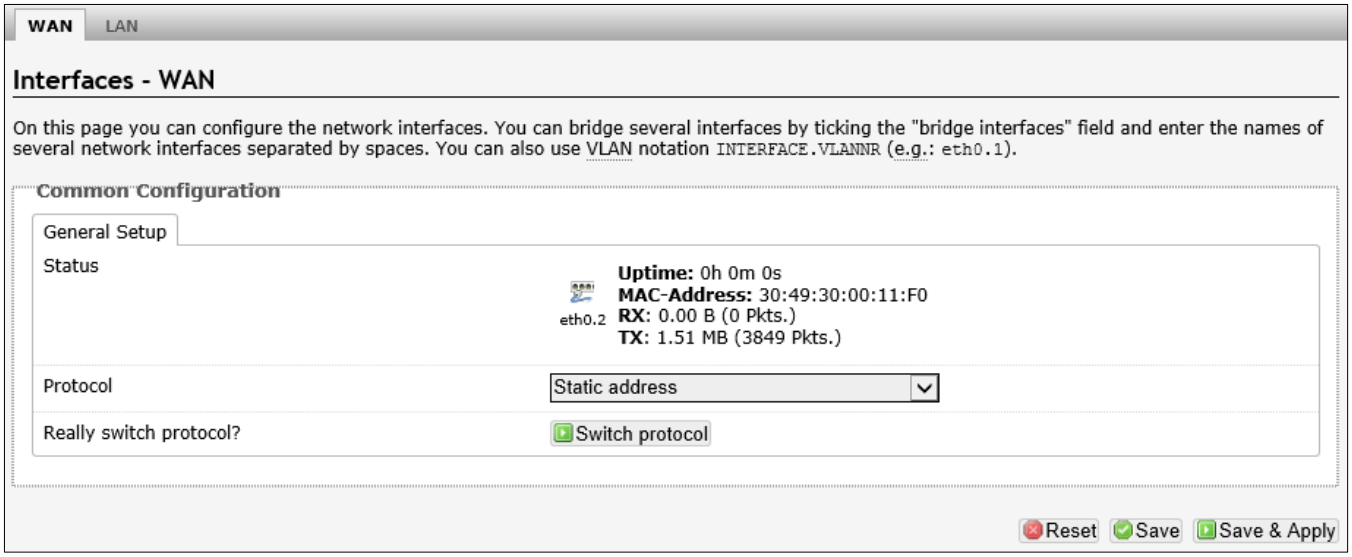
To configure the WAN/LAN interfaces, click the Edit button.

Note: The following web page take WAN interfaces for example, LAN interfaces are similar.



4.3.3.1.1. Static Address

This page is used to display and configure the WAN interface settings.

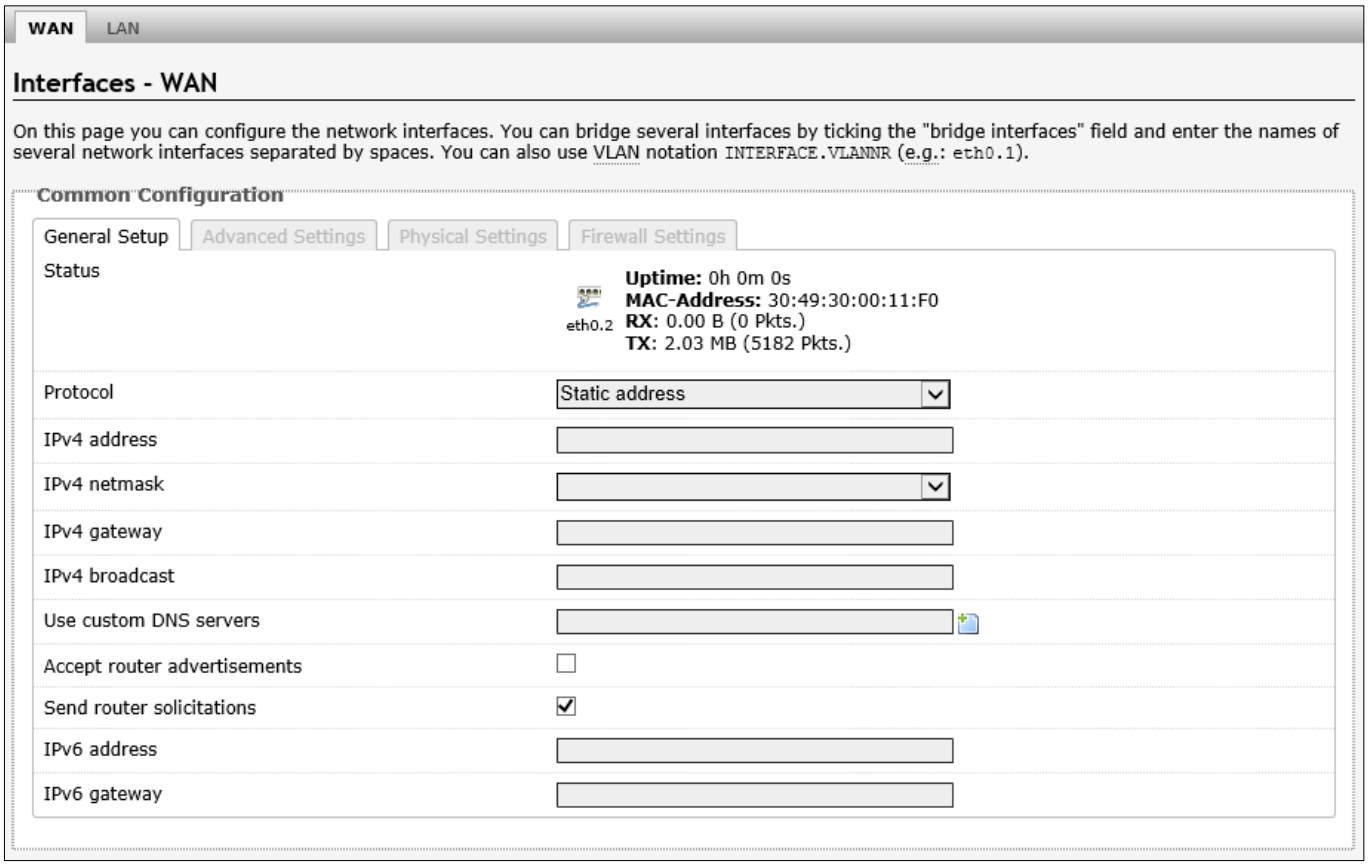


The following parameters are available in this section:

Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • Uptime - Displays the how long the interface is active. • MAC Address - Displays the MAC address of the interface. • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the interface.

After clicking the Switch protocol button, the following will appear:

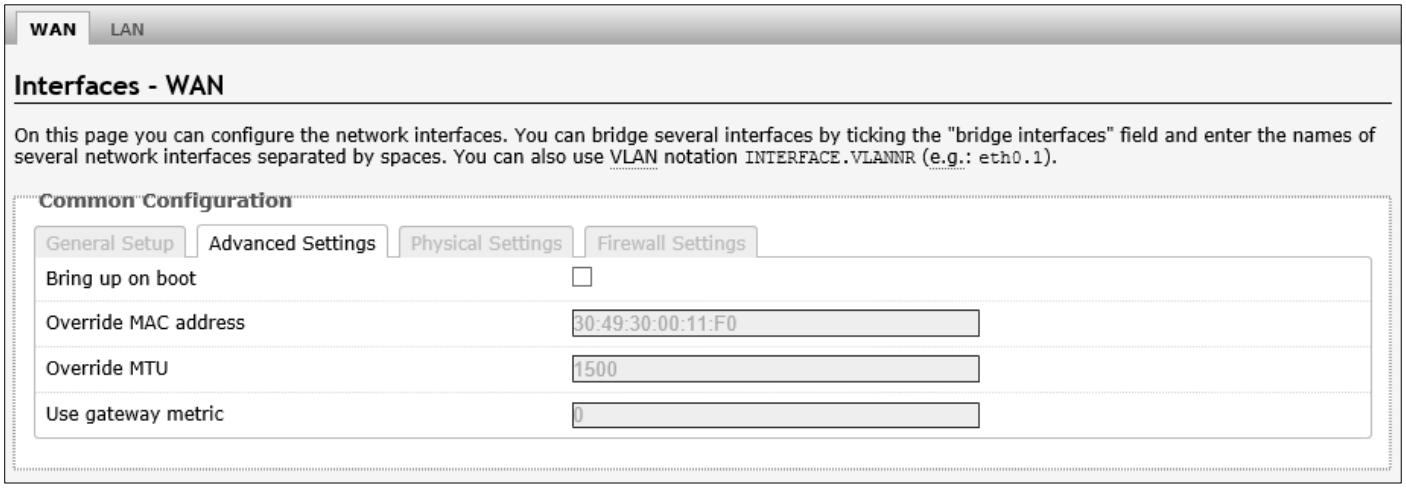
4.3.3.1.1.1. General Setup



The following parameters are available in this section:

Parameter	Description
Status	Please refer to page 20.
Use custom DNS servers	Enter the IPv4 address or domain name of the DNS (Domain Name System) server for the WAN connection here. More than one entry can be created.
Accept router advertisements	Select this option to accept router advertisement on this interface.
Send router solicitations	Select this option to send router solicitations from this interface. **Note:** This option is only available if Accept router advertisements is enabled.
IPv6 address/gateway	**Note:** This option is only available if Accept router advertisements are enabled.

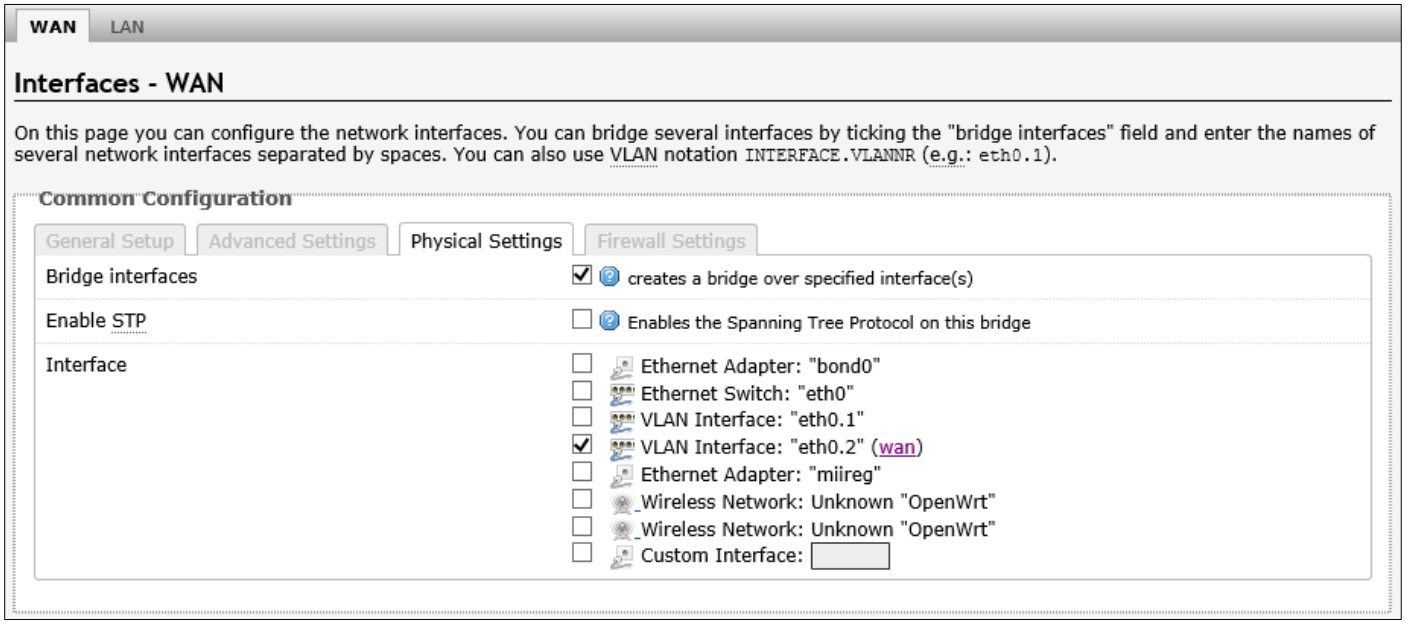
4.3.3.1.1.2. Advanced Settings



The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Override MAC address	Enter a MAC address here to override the default MAC address for this interface.
Override MTU	Enter the MTU (Maximum Transmission Unit) value here to override the default MTU value used on this interface.
Use gateway metric	Enter the metric for the gateway here.

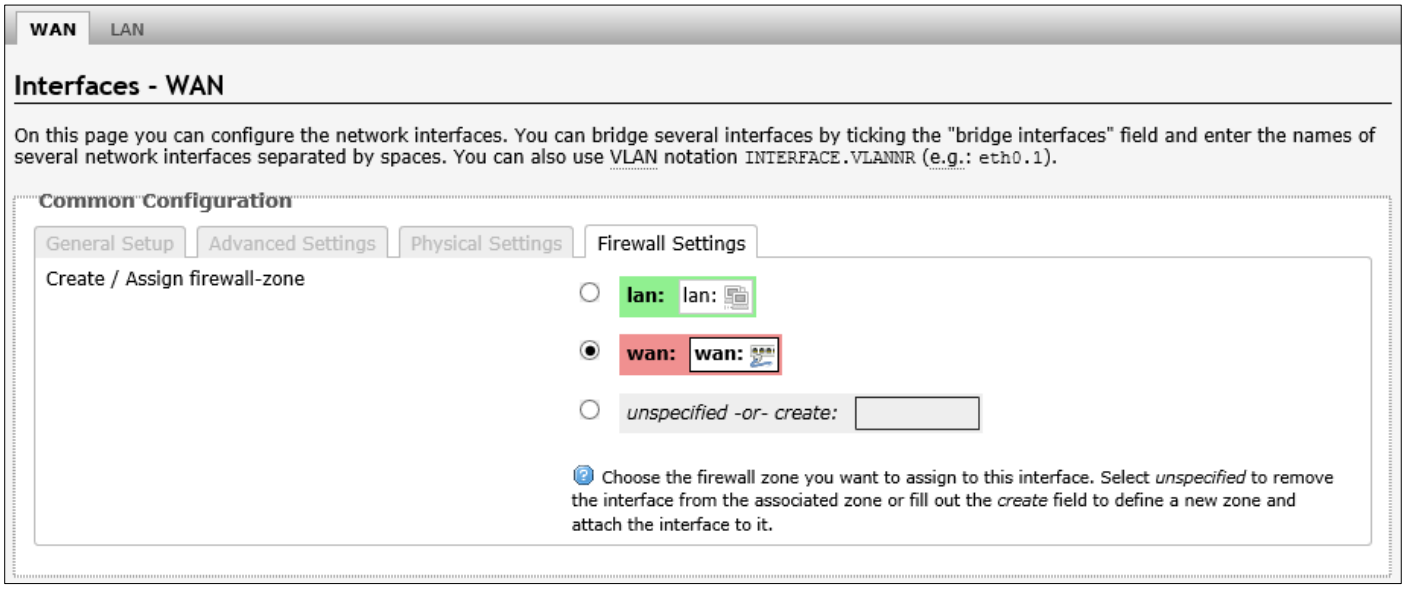
4.3.3.1.1.3. Physical Settings



The following parameters are available in this section:

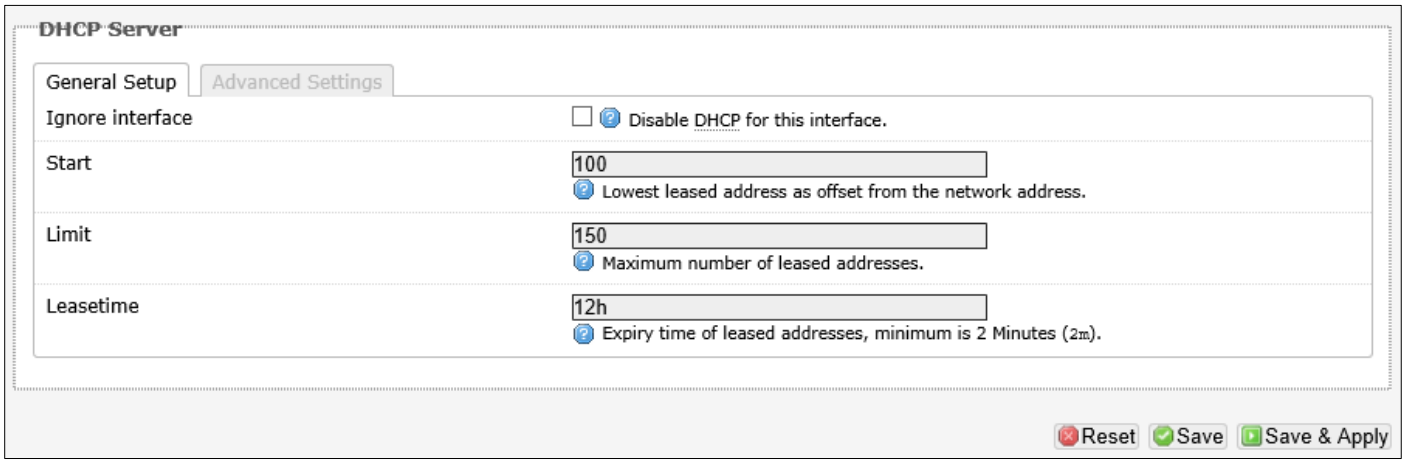
Parameter	Description
Bridge interfaces	Select this option to bridge this interface with another interface.
Enable STP	**Note:** This option is only available if Bridge interfaces are enabled.
Interface	If desired, select and enter a Custom Interface name in the textbox provided. **Note:** Multiple selections are only available when the Bridge interfaces option is selected. Normally, only one interface can be selected here.

4.3.3.1.1.4. Firewall Settings



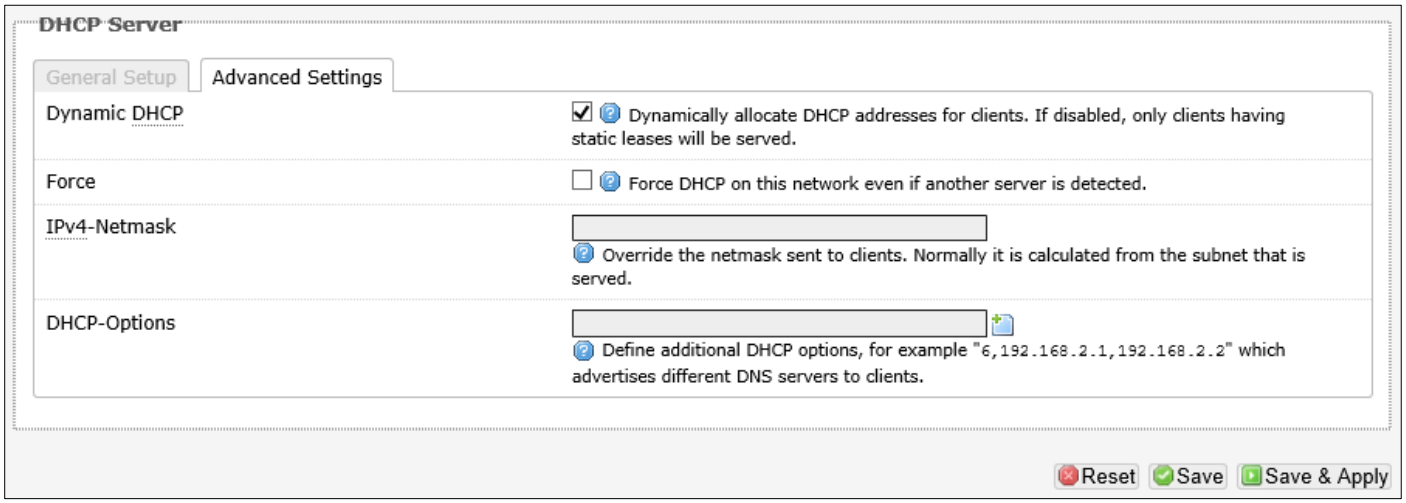
The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Select the firewall zone that is assigned to this interface. Select unspecified to remove the interface from a firewall zone. To create a new firewall zone, enter the name of the new firewall zone in the space provided.



The following parameters are available in this section:

Parameter	Description
Start	Enter the starting IPv4 address in the DHCP pool here.
Limit	Enter the maximum number of IPv4 addresses allowed in the DHCP pool here.
Lease time	Enter the lease time for DHCP clients here. The lease time can be in minutes, for example, 2m. The lease time can be in hours, for example, 12h.

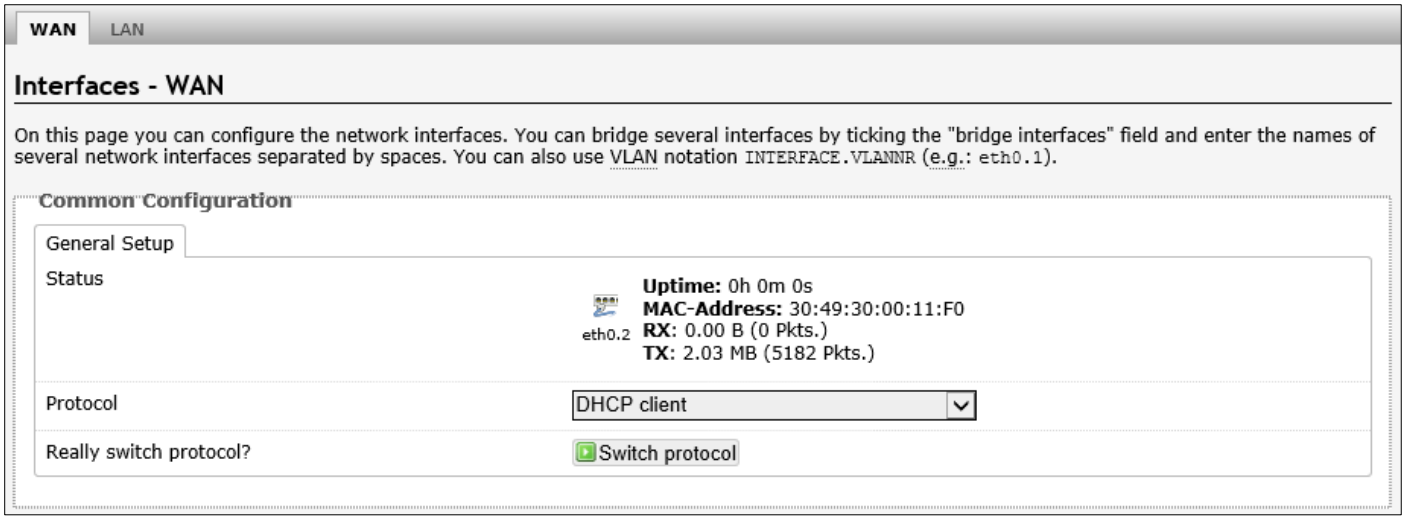


The following parameters are available in this section:

Parameter	Description
Dynamic DHCP	When not selected, only statically assigned DHCP clients will be served.

Parameter	Description
Force	Select this option to force the DHCP server function on the AP to assign IPv4 addresses to DHCP clients on the network even if another DHCP server is detected.
DHCP Options	Enter the DHCP Option string for DHCP clients here.

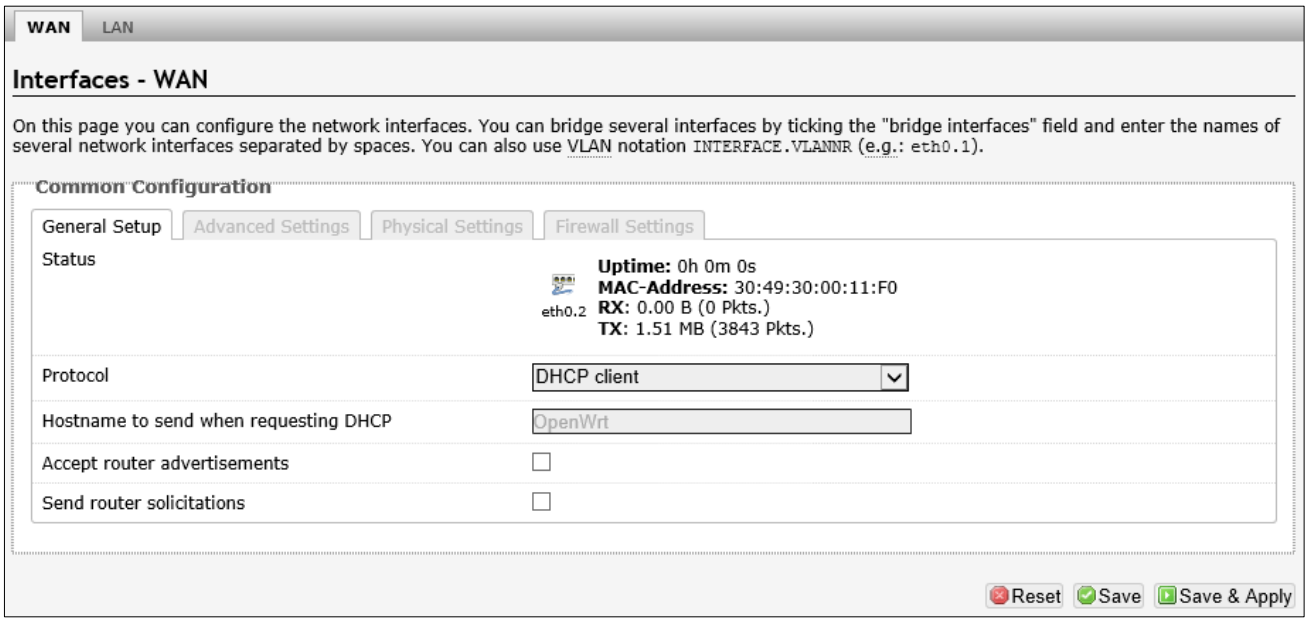
4.3.3.1.2. DHCP Client



The following parameters are available in this section:

Parameter	Description
Status	Please refer to page 20.

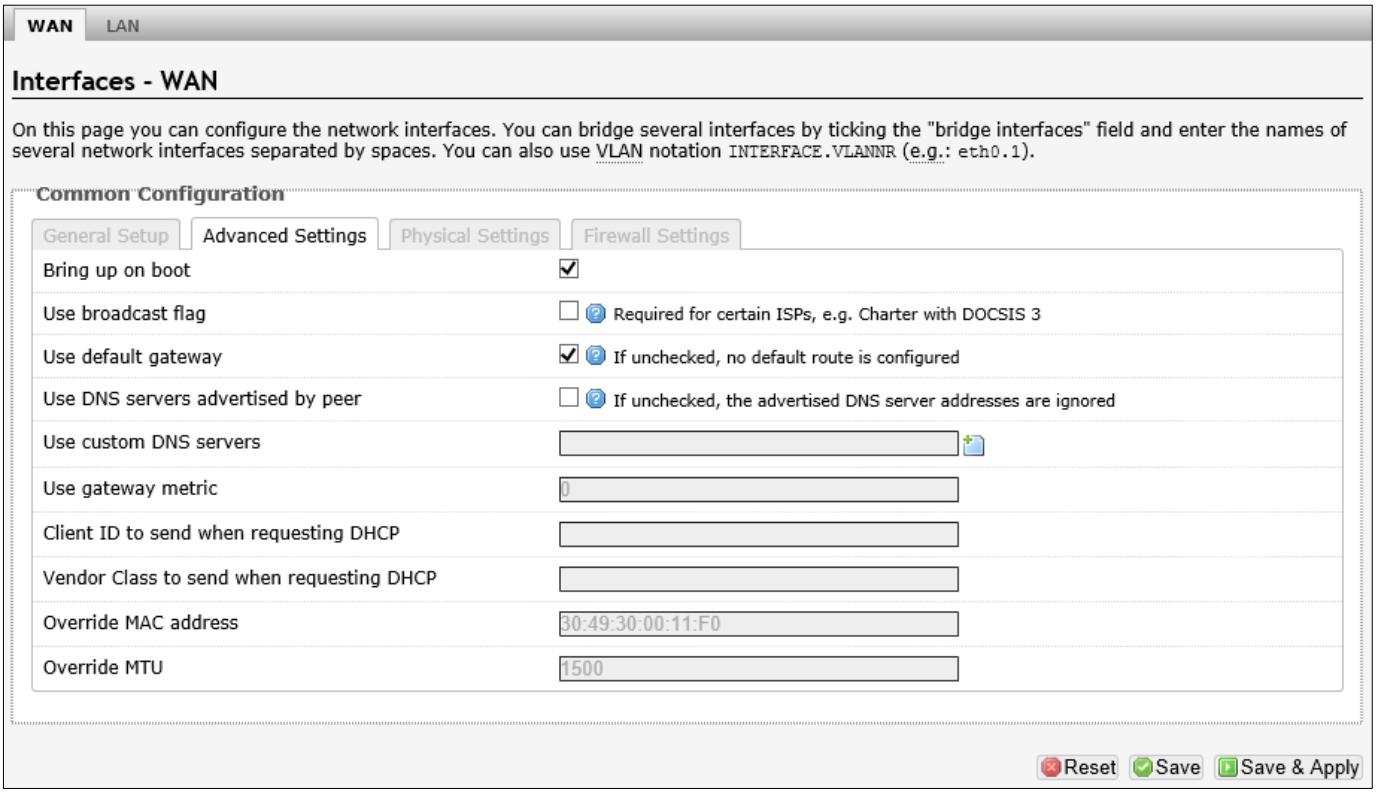
After clicking the Switch protocol button, the following will appear:



The following parameters are available in this section:

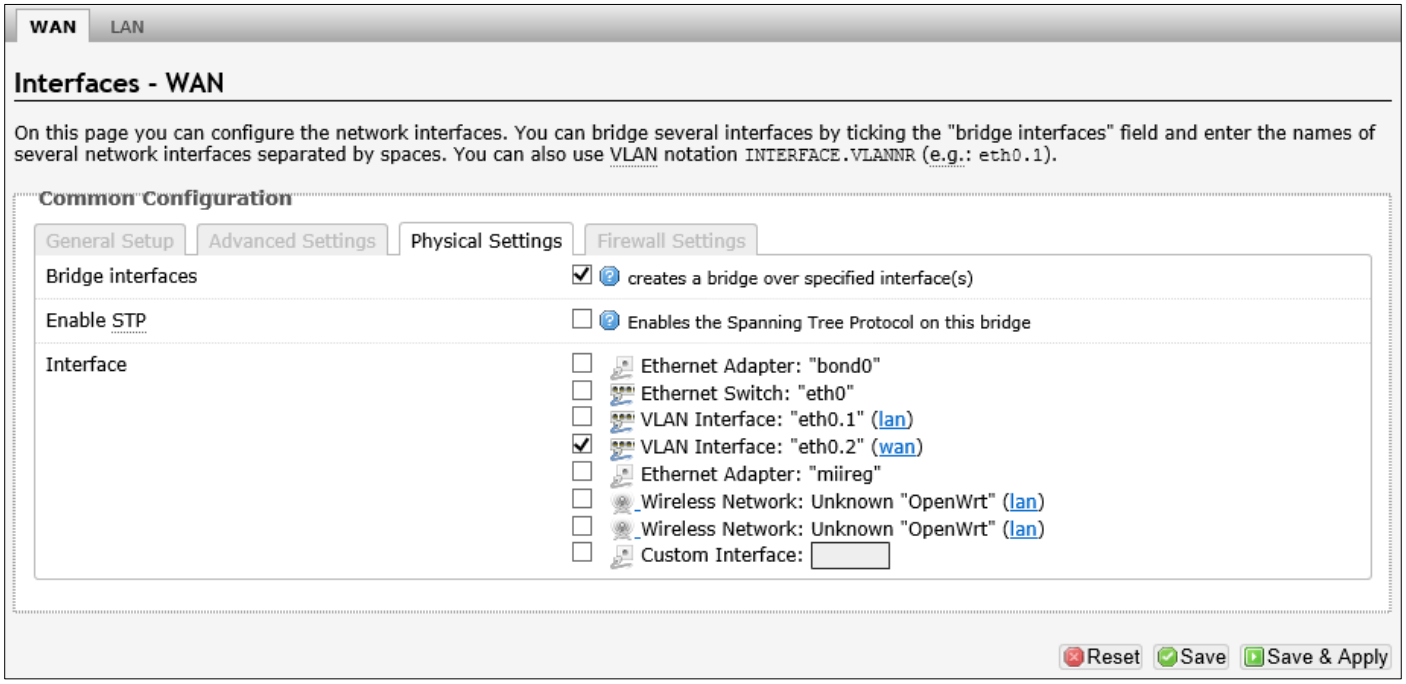
Parameter	Description
Status	Please refer to page 20.
Hostname to send when	Enter the hostname that is sent when requesting DHCP here.

Parameter	Description
requesting DHCP	
Accept router advertisements	Select this option to accept router advertisement on this interface.
Send router solicitations	Select this option to send router solicitations from this interface. **Note:** This option is only available if Accept router advertisements is enabled.



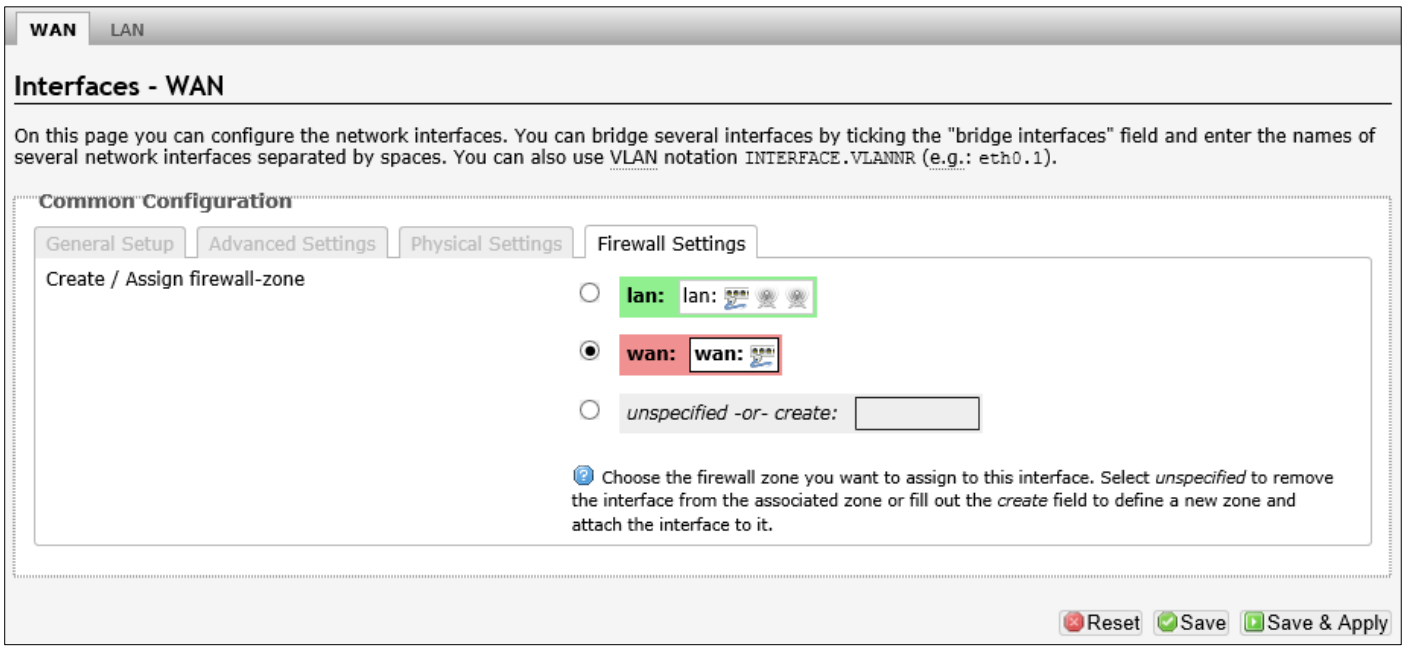
The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Use broadcast flag	Select this option to use the broadcast flag on this interface.
Use default gateway	Select this option to use the DHCP assigned default gateway on this interface.
Use DNS servers advertised by peer	Select this option to use the DHCP assigned DNS server addresses on this interface.
Use custom DNS servers	Enter the IP address or domain name for a custom DNS server here. More than one entry can be created.
Use gateway metric	Enter the metric for the gateway here.
Client ID/Vendor Class to send when requesting DHCP	Enter the ID/vendor class of the DHCP client that is sent when the DHCP service is requested here.
Override MAC address/MTU	Enter a MAC address/ MTU value here to override the default MAC address/MTU value for this interface.



The following parameters are available in this section:

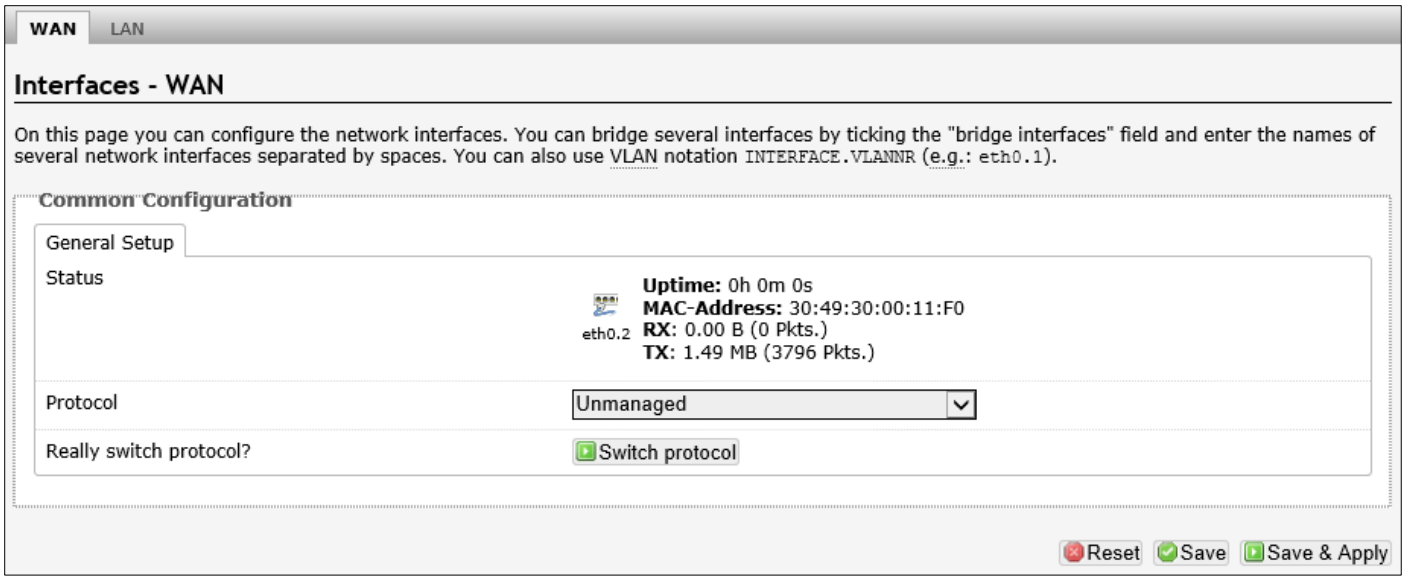
Parameter	Description
Bridge interfaces	Select this option to bridge this interface with another interface.
Enable STP	Select this option to enable the STP function on this interface. **Note:** This option is only available if Bridge mode is enabled.
Interface	Select the physical interface that will be associated with this interface configuration here. If desired, select and enter a Custom Interface name in the textbox provided. **Note:** Multiple selections are only available when the Bridge interfaces option is selected. Normally, only one interface can be selected here.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

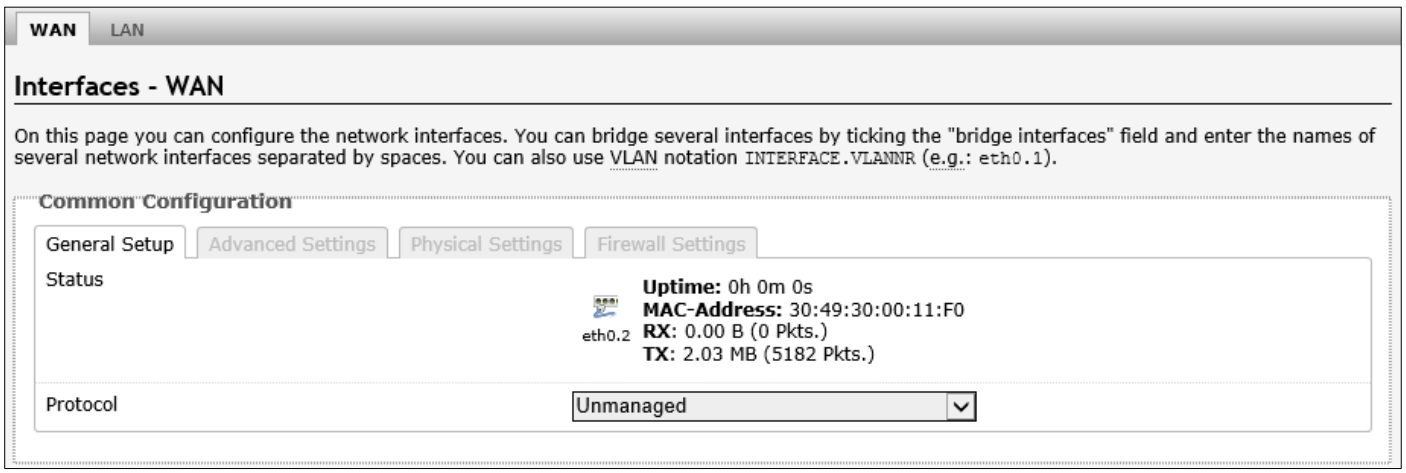
4.3.3.1.3. Unmanaged



The following parameters are available in this section:

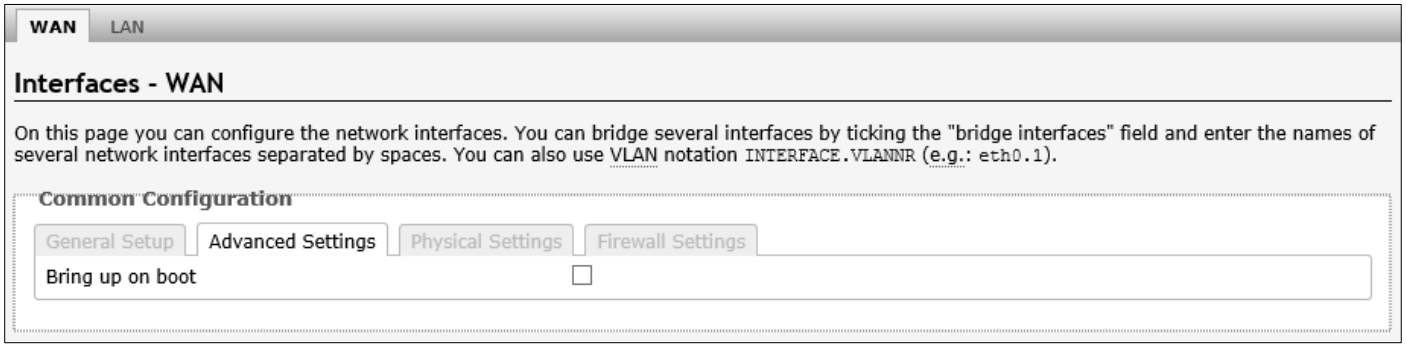
Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear:



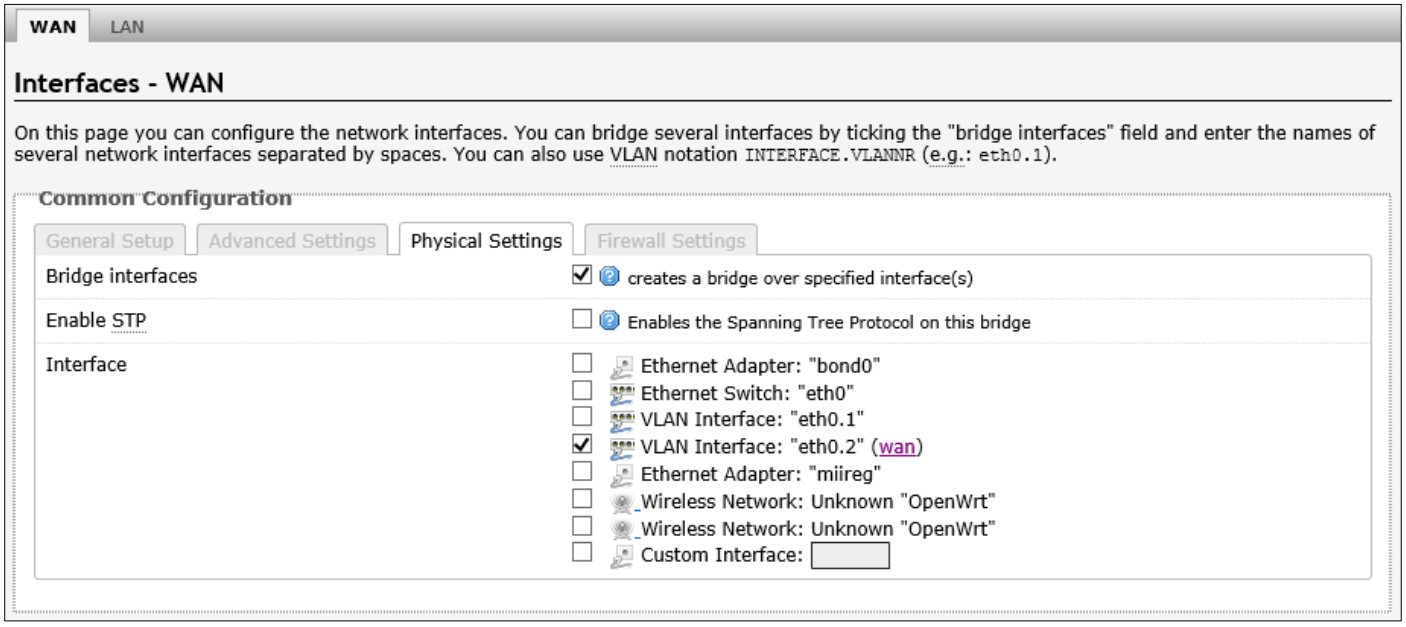
The following parameters are available in this section:

Parameter	Description
Status	Please refer to page 20.
Protocol	For this section, we'll discuss the Unmanaged option.



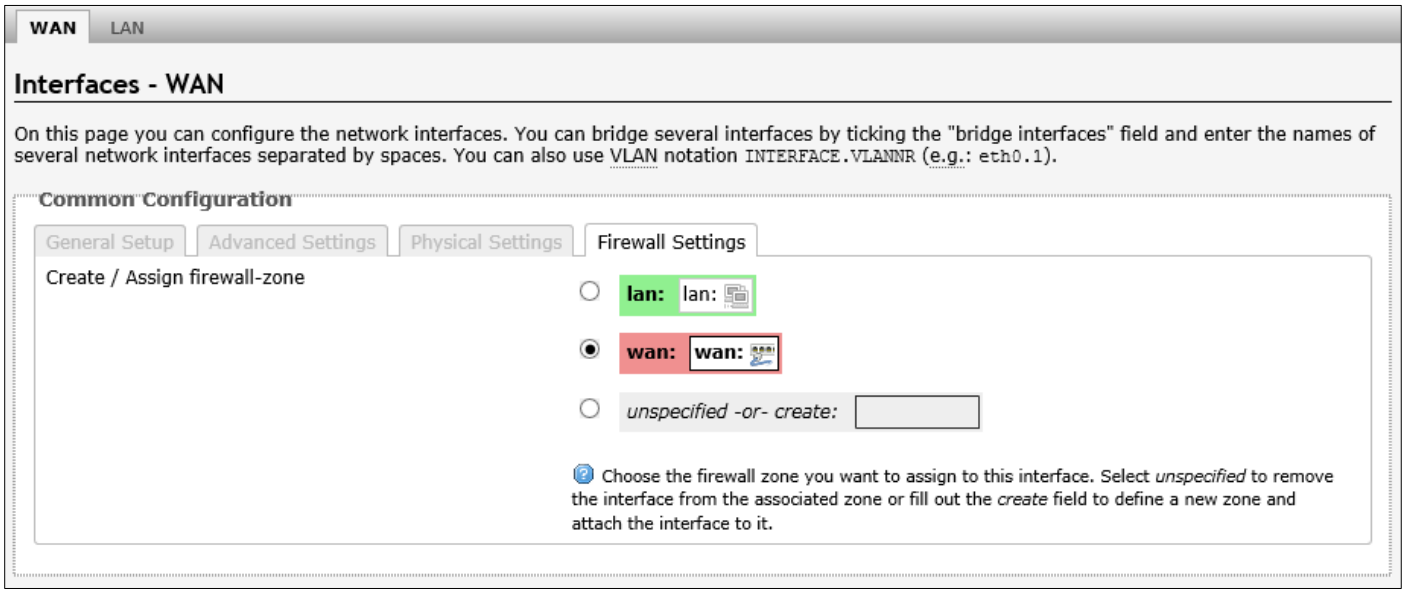
The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.



The following parameters are available in this section:

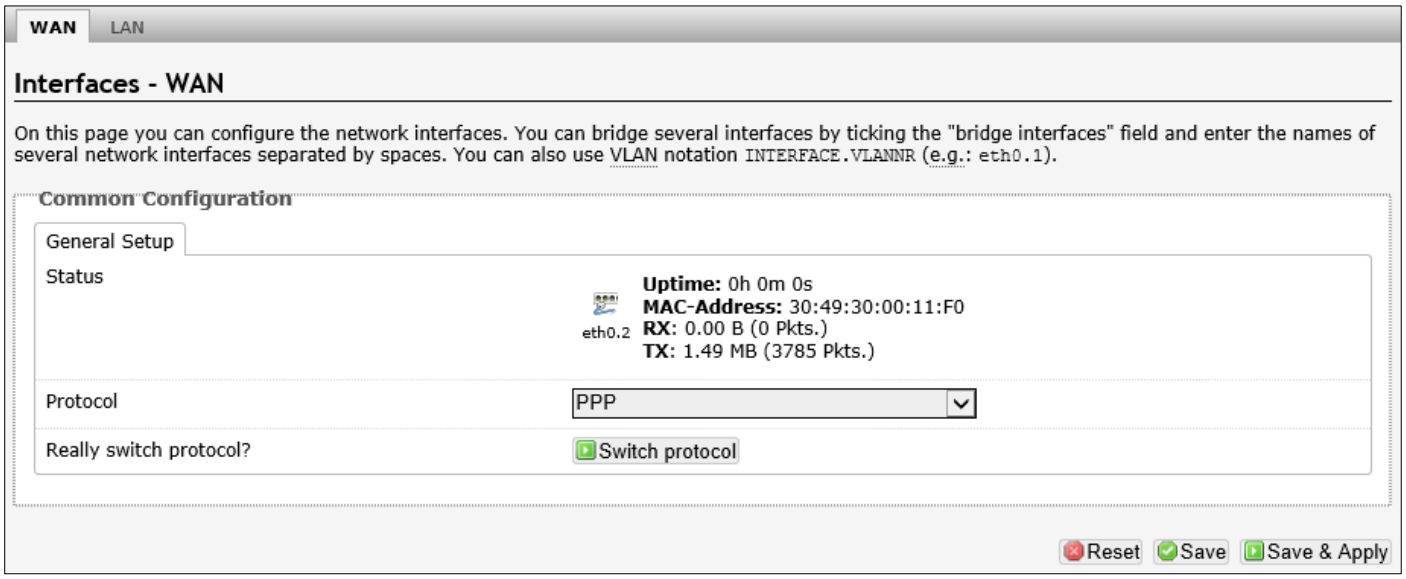
Parameter	Description
Bridge interfaces	Select this option to bridge this interface with another interface.
Enable STP	Select this option to enable the STP function on this interface. **Note:** This option is only available if **Bridge interfaces** are enabled.
Interface	Select the physical interface that will be associated with this interface configuration here. If desired, select and enter a Custom Interface name in the textbox provided. **Note:** Multiple selections are only available when the Bridge interfaces option is selected. Normally, only one interface can be selected here.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

4.3.3.1.4. PPP



The following parameters are available in this section:

Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear common configuration settings:

The following parameters are available in this section:

Parameter	Description
Status	Please refer to page 20.
Protocol	For this section, we'll discuss the PPP (Point-to-Point Protocol) option.

Parameter	Description
Modem device	Select the modem for this interface here. Select the custom option to manually enter the modem device string here.
PAP/CHAP username	Enter the PAP/CHAP username for the PPP account here. PAP stands for Password Authentication Protocol. CHAP stands for Challenge-Handshake Authentication Protocol.
PAP/CHAP password	Enter the PAP/CHAP password for the PPP account here.

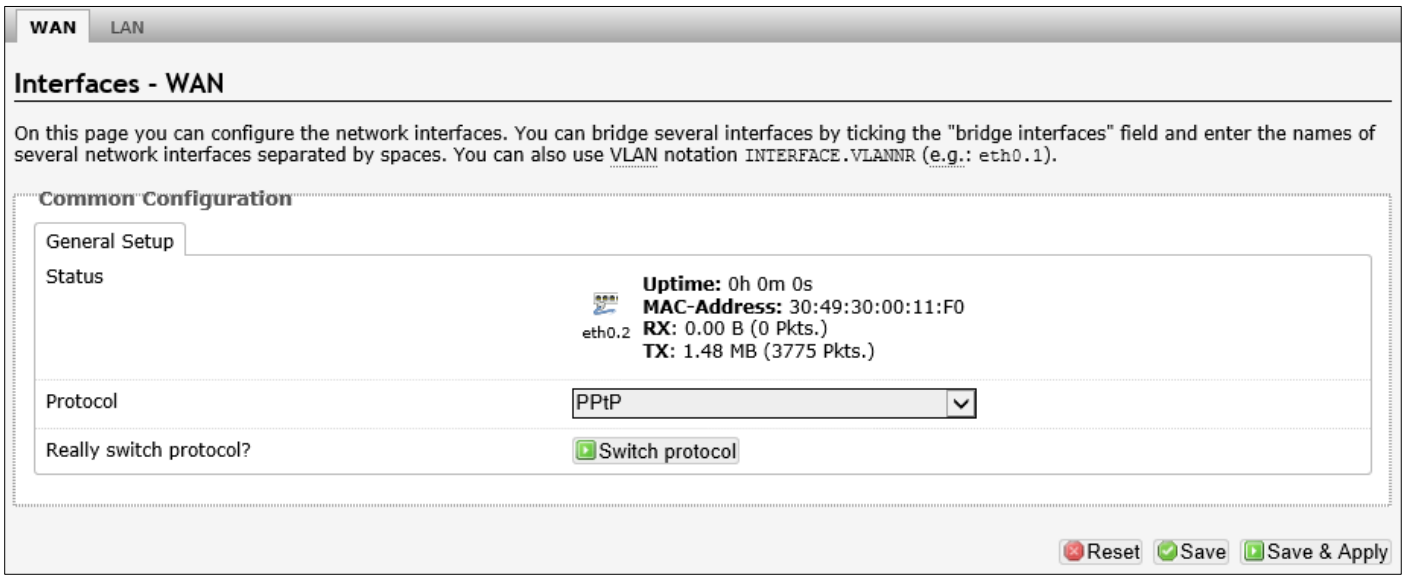
The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Enable IPv6 negotiation on the PPP link	Select this option to enable IPv6 negotiation on the PPP link.
Use default gateway	Select this option to use the DHCP assigned default gateway on this interface.
Use gateway metric	Enter the metric for the gateway here.
Use DNS servers advertised by peer	Select this option to use the DHCP assigned DNS server addresses on this interface.
Use custom DNS servers	More than one entry can be created.
LCP echo failure threshold	The peer will be presumed to be dead after the given amount of LCP echo failures are reached. Enter 0 to ignore failures.
LCP echo interval	LCP echo request are sent at this specified interval. This function is only effective in conjunction with the failure threshold function.
Inactivity timeout	The connection is closed after the inactivity timer reached the timeout value. Enter 0 to never timeout the connection.
Override MTU	Enter the MTU value here to override the default MTU value used on this interface.

The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

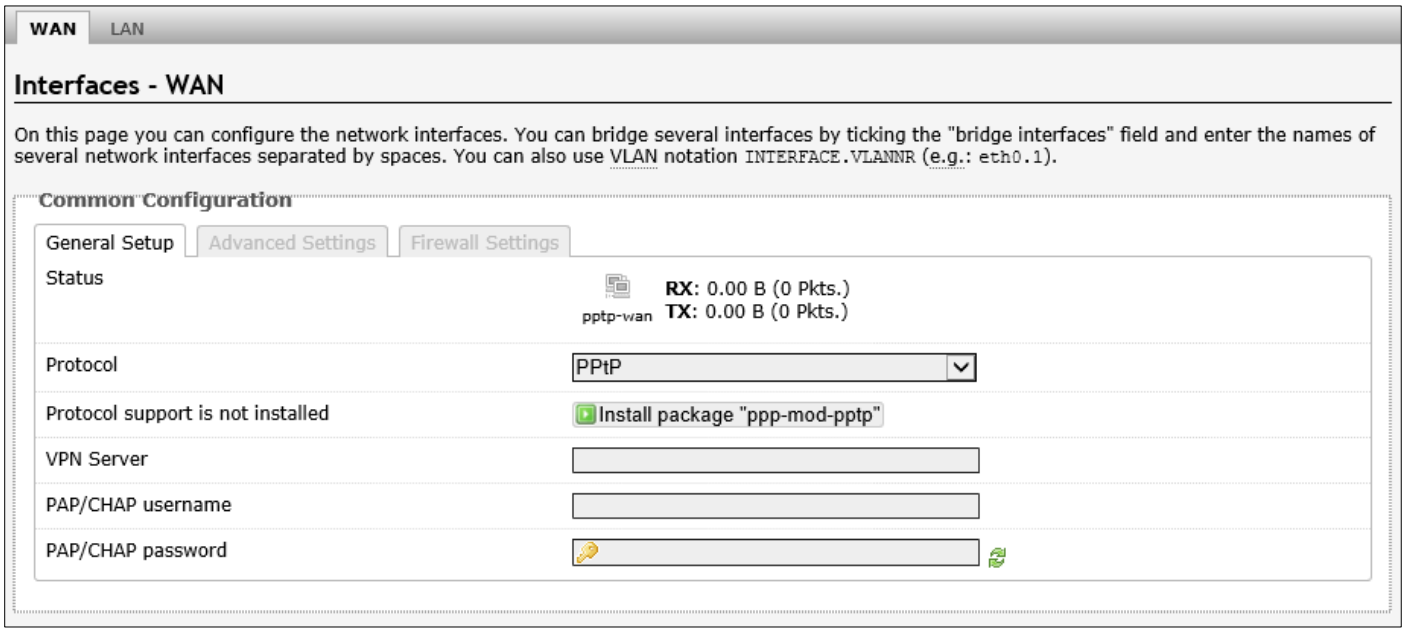
4.3.3.1.5. PPtP



The following parameters are available in this section:

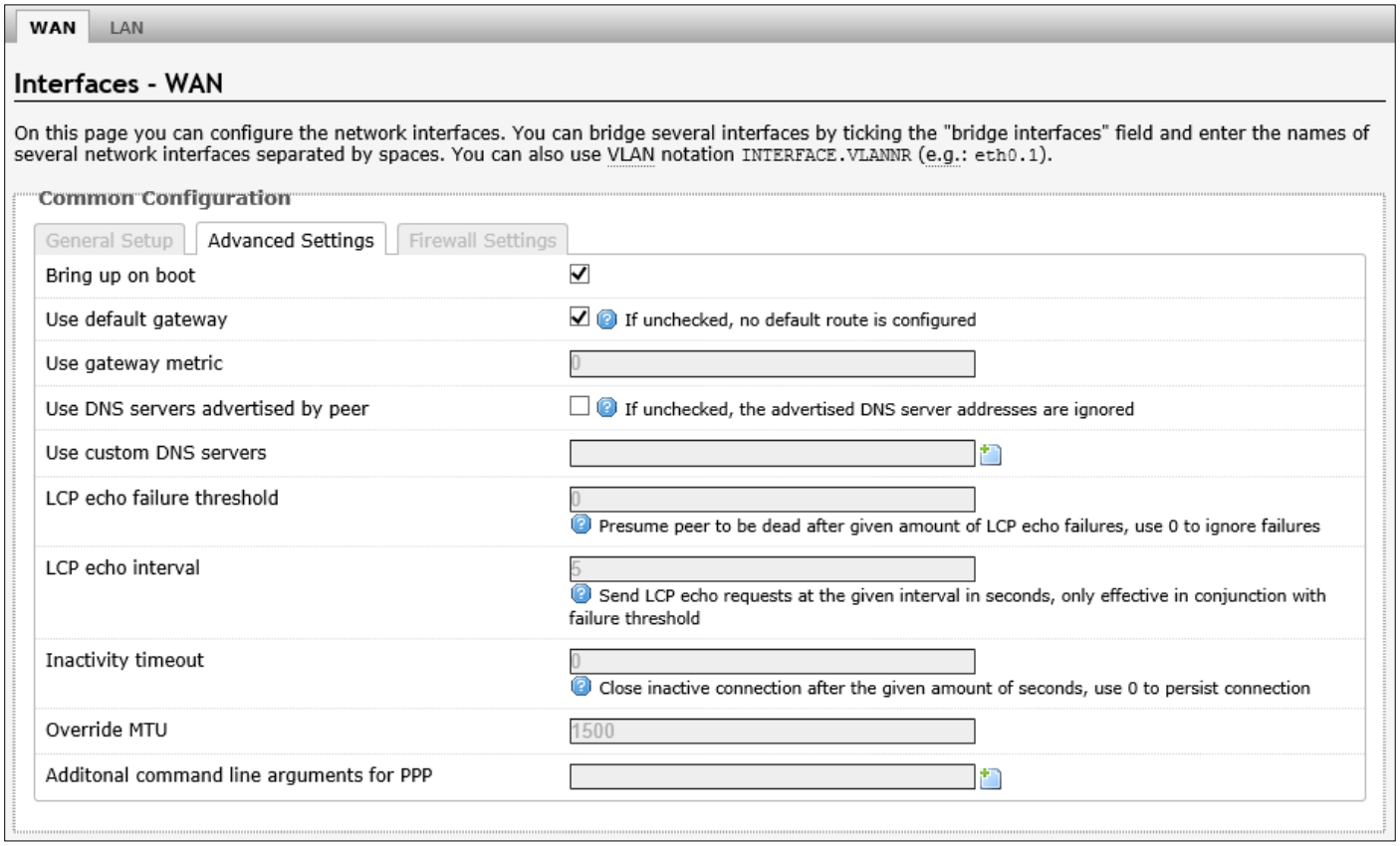
Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear:



The following parameters are available in this section:

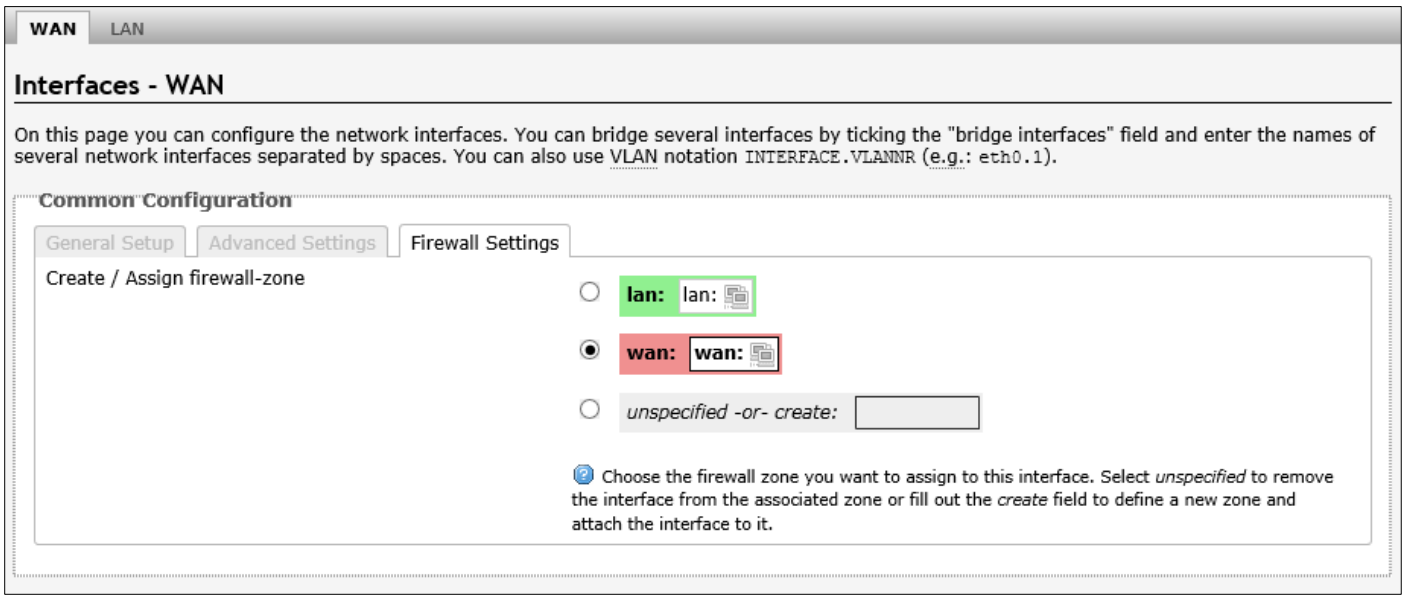
Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the interface.
Protocol support is not installed	Click the Install package button to install the package needed for this protocol.
VPN Server	Enter the IP address or domain name of the VPN server here.
PAP/CHAP username/password	Enter the PAP/CHAP username/password for the PPTP account here.



The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Use default gateway	Select this option to use the DHCP assigned default gateway on this interface.
Use gateway metric	Enter the metric for the gateway here.
Use DNS servers advertised by peer	Select this option to use the DHCP assigned DNS server addresses on this interface.
Use custom DNS servers	Enter the IP address or domain name for a custom DNS server here. More than one entry can be created.
LCP echo failure threshold	The peer will be presumed to be dead after the given amount of LCP

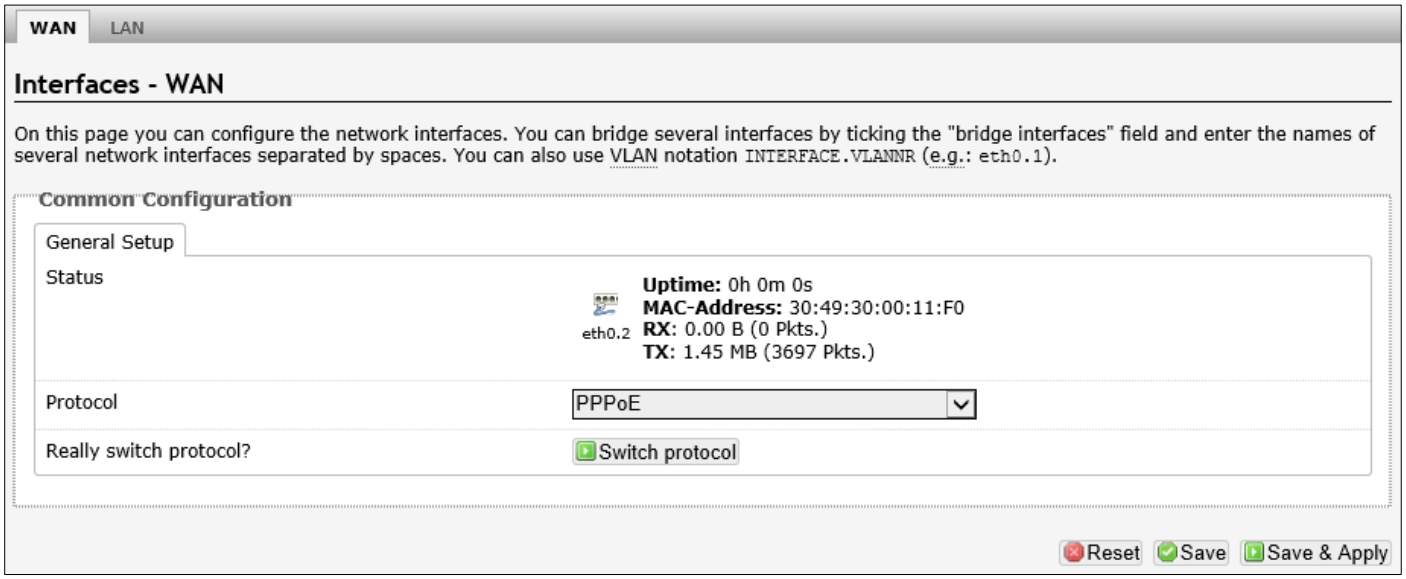
Parameter	Description
	echo failures are reached. Enter 0 to ignore failures.
LCP echo interval	LCP echo request are sent at this specified interval. This function is only effective in conjunction with the failure threshold function.
Inactivity timeout	The connection is closed after the inactivity timer reached the timeout value. Enter 0 to never timeout the connection.
Override MTU	Enter the MTU value here to override the default MTU value used on this interface.
Additional command line arguments for PPP	Enter additional command line arguments for PPP here.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

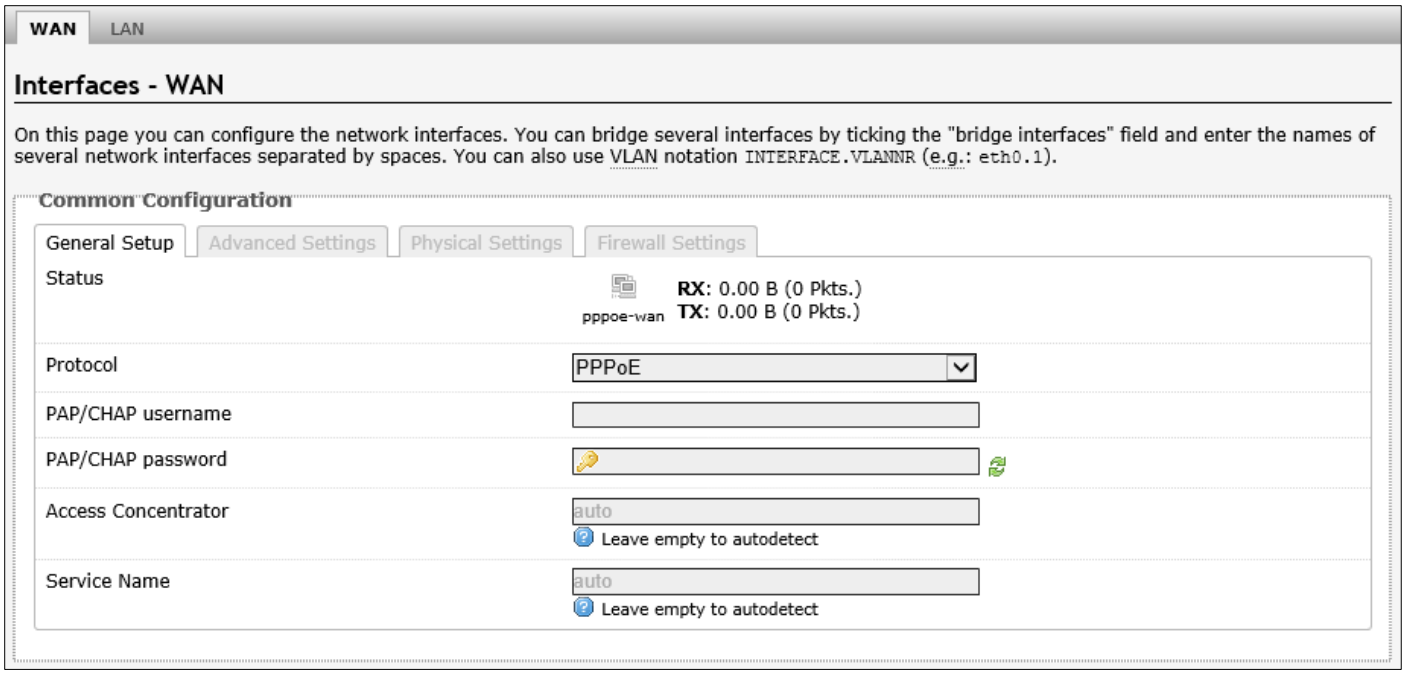
4.3.3.1.6. PPPoE



The following parameters are available in this section:

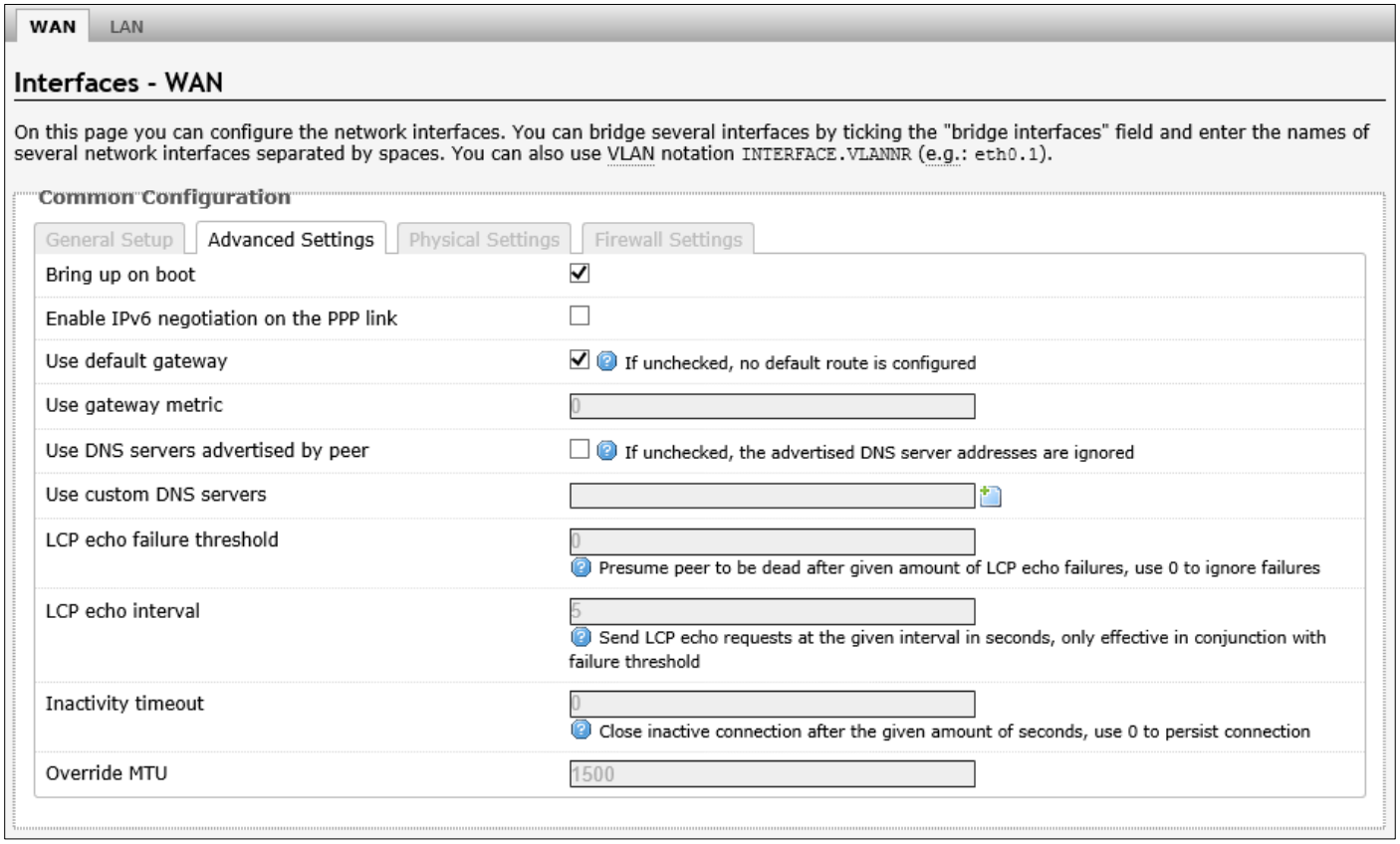
Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear:



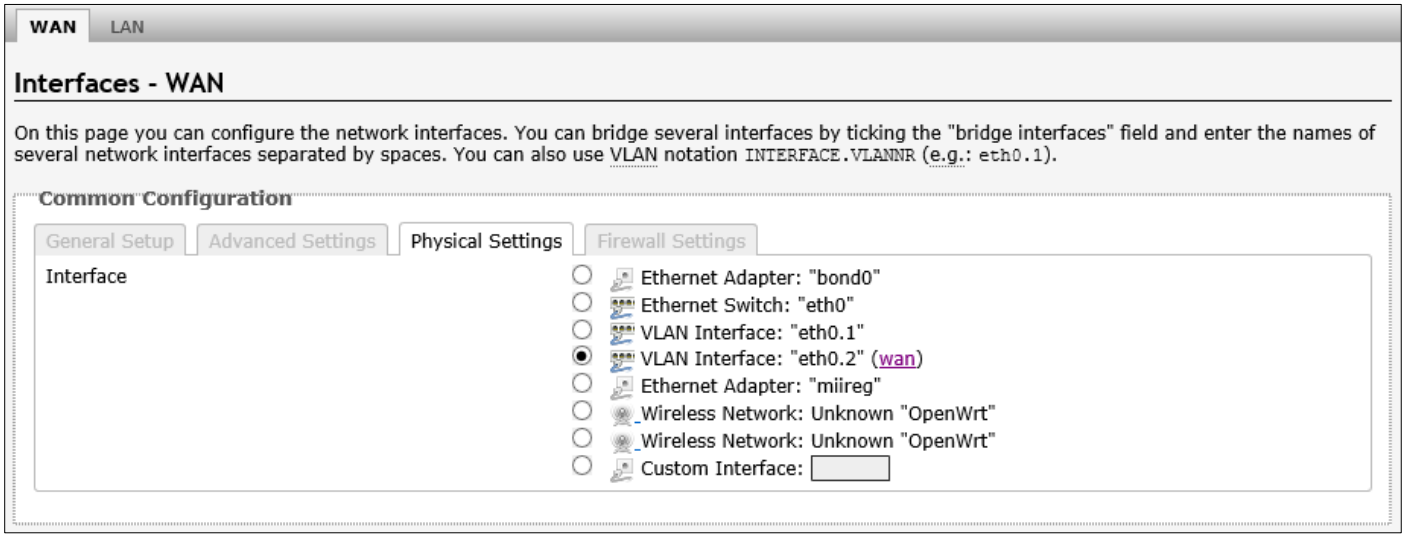
The following parameters are available in this section:

Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the interface.



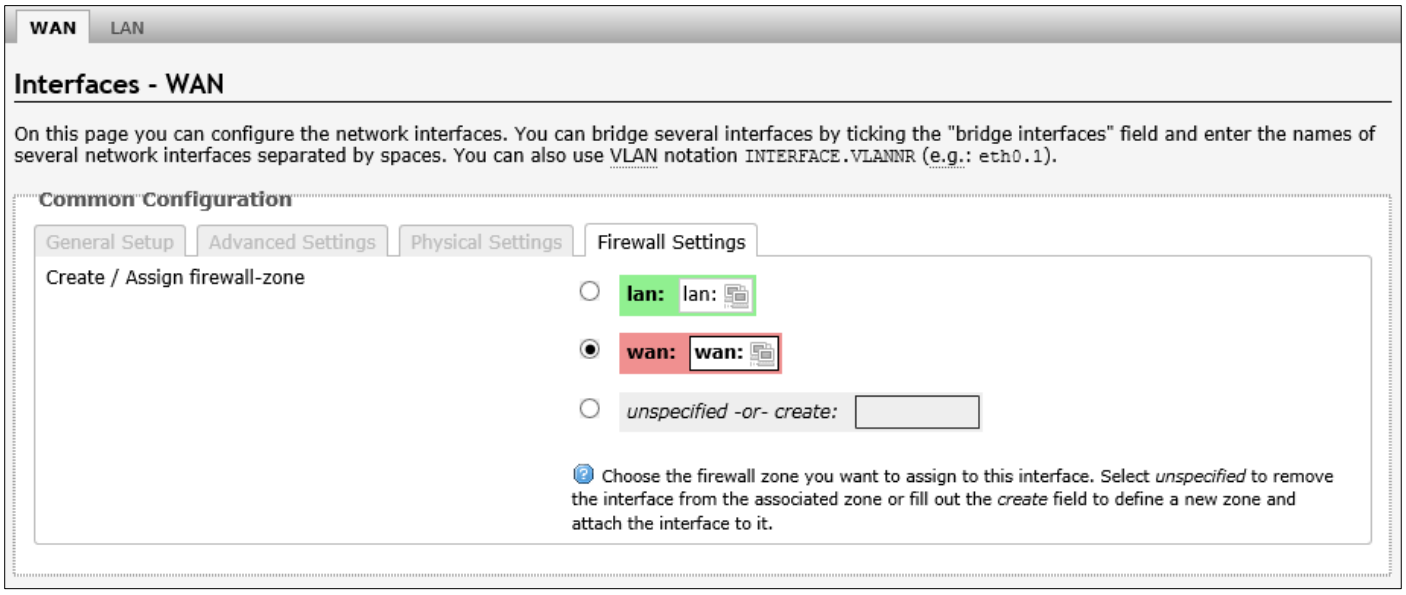
The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Enable IPv6 negotiation on the PPP link	Select this option to enable IPv6 negotiation on the PPP link.
Use default gateway	Select this option to use the DHCP assigned default gateway on this interface.
Use gateway metric	Enter the metric for the gateway here.
Use DNS servers advertised by peer	Select this option to use the DHCP assigned DNS server addresses on this interface.
Use custom DNS servers	Enter the IP address or domain name for a custom DNS server here. More than one entry can be created.
LCP echo failure threshold	The peer will be presumed to be dead after the given amount of LCP echo failures are reached. Enter 0 to ignore failures.
LCP echo interval	LCP echo request are sent at this specified interval. This function is only effective in conjunction with the failure threshold function.
Inactivity timeout	The connection is closed after the inactivity timer reached the timeout value. Enter 0 to never timeout the connection.
Override MTU	Enter the MTU value here to override the default MTU value used on this interface.



The following parameters are available in this section:

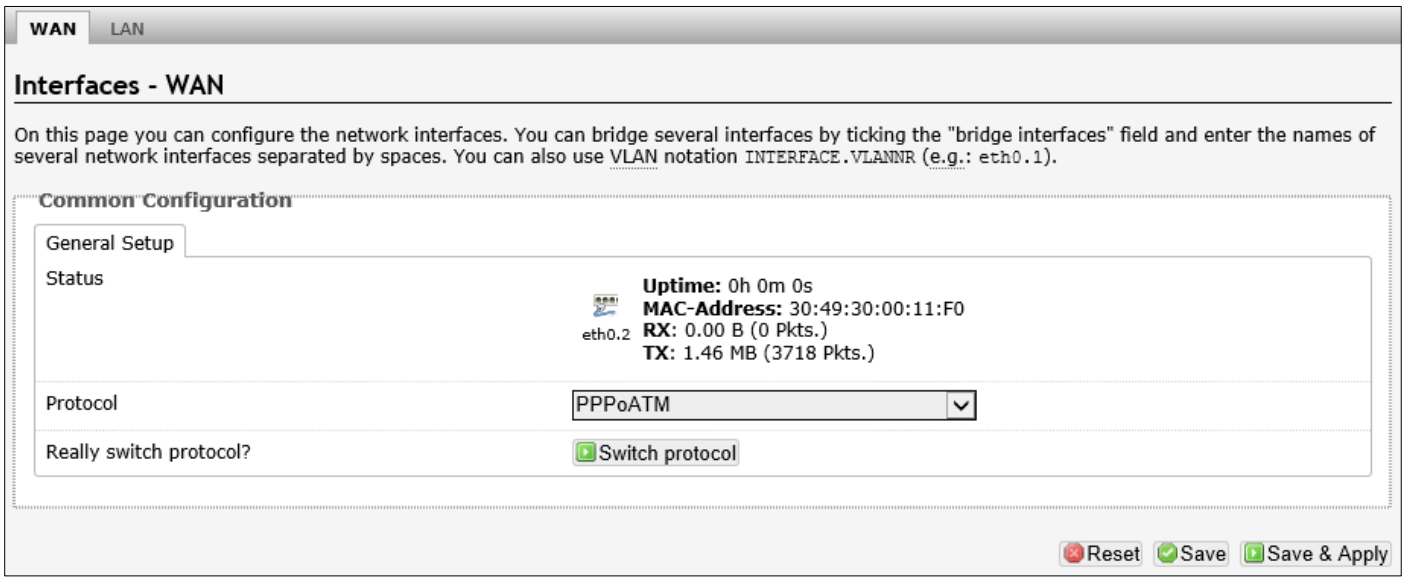
Parameter	Description
Interface	Select the physical interface that will be associated with this interface configuration here. If desired, select and enter a Custom Interface name in the textbox provided.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

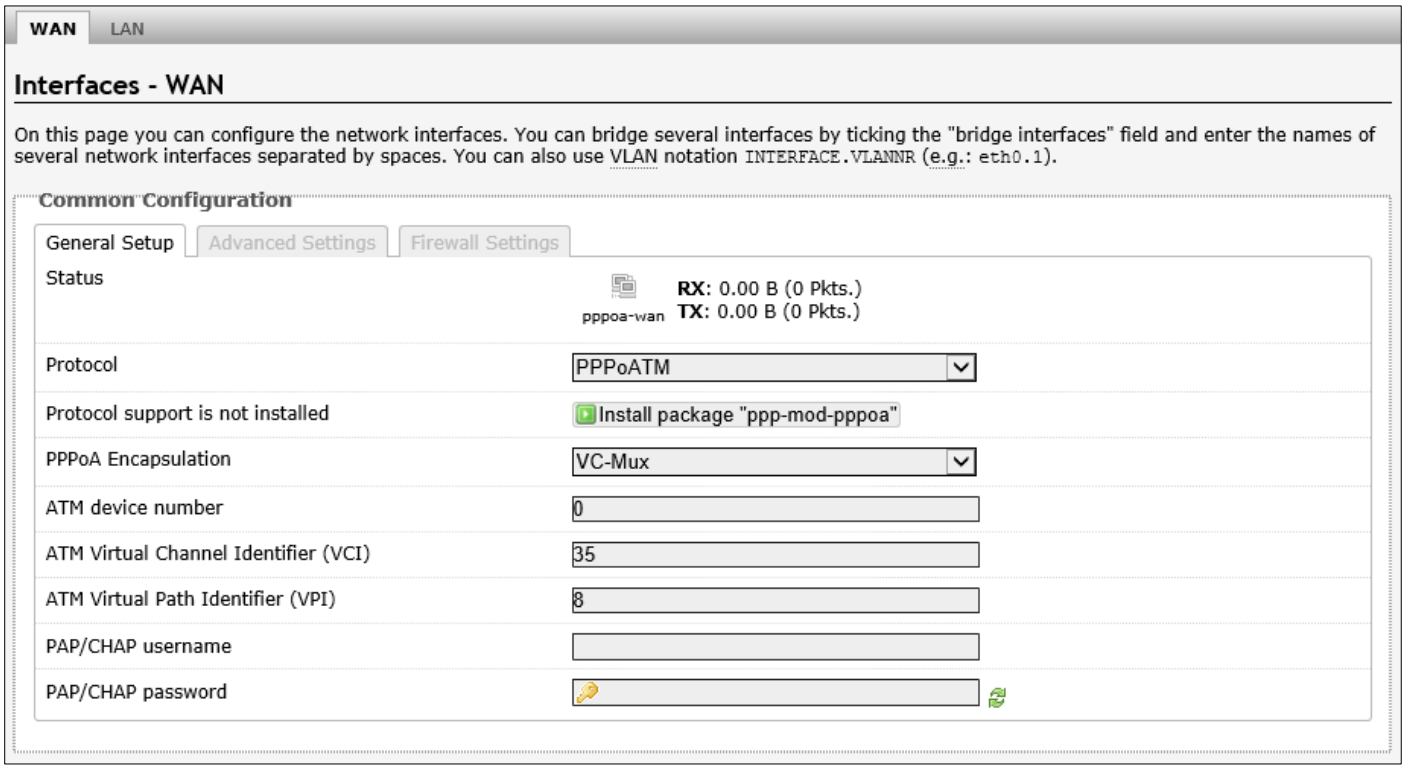
4.3.3.1.7. PPPoATM



The following parameters are available in this section:

Parameter	Description
Status	Please refer to page 20.

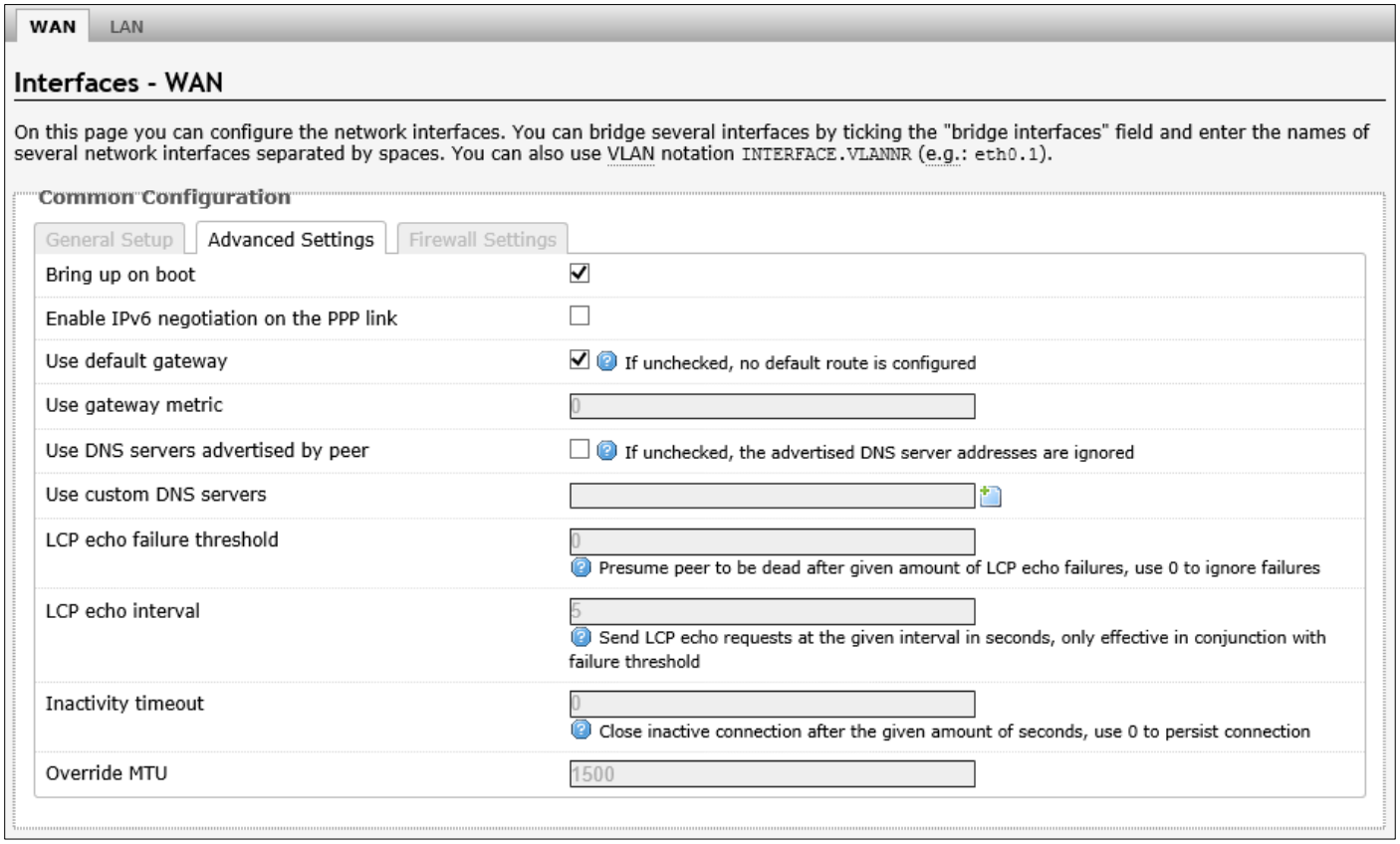
After clicking the Switch protocol button, the following will appear:



The following parameters are available in this section:

Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the

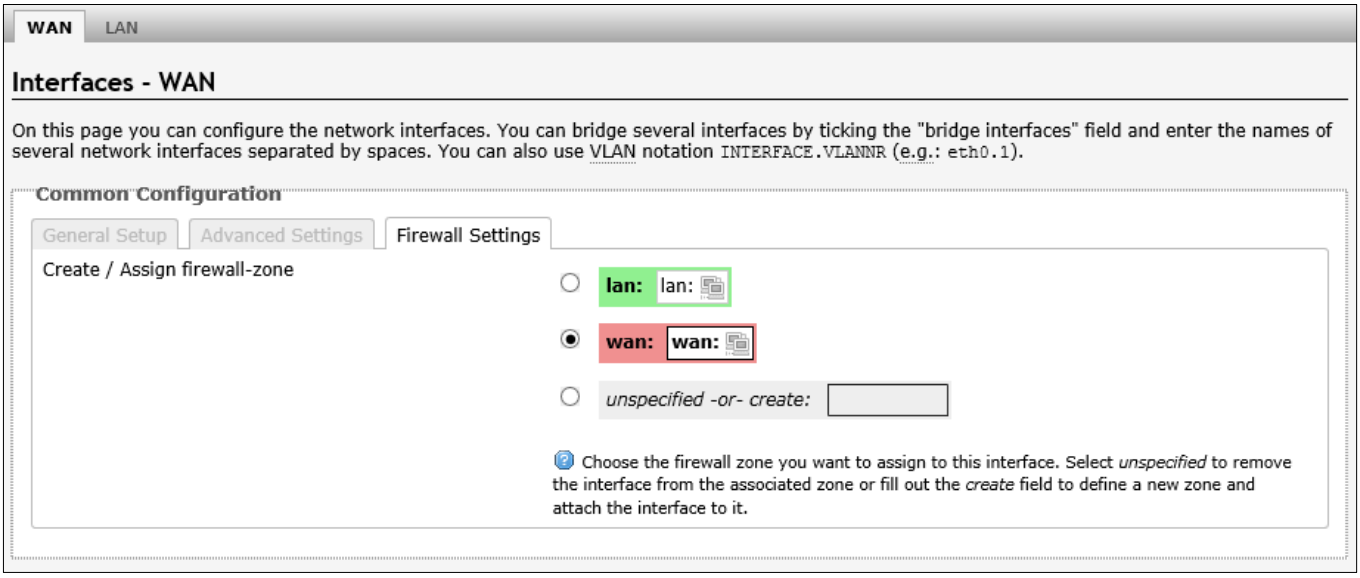
Parameter	Description
	interface.
Protocol support is not installed	Click the Install package button to install the package needed for this protocol.
PPPoA Encapsulation	Select the PPPoA encapsulation method here. Options to choose from are VC-Mux (Virtual Circuit Multiplexing) and LLC (Logical Link Control).
ATM device number	Enter the ATM device number here.
ATM Virtual Channel Identifier (VCI)	Enter the VCI (Virtual Channel Identifier) for the PPPoA account here.
ATM Virtual Path Identifier (VPI)	Enter the VPI (Virtual Path Identifier) for the PPPoA account here.
PAP/CHAP username/password	Enter the PAP/CHAP username/password for the PPPoA account here.



The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Enable IPv6 negotiation on the PPP link	Select this option to enable IPv6 negotiation on the PPP link.
Use default gateway	Select this option to use the DHCP assigned default gateway on this interface.
Use gateway metric	Enter the metric for the gateway here.
Use DNS servers advertised	Select this option to use the DHCP assigned DNS server addresses

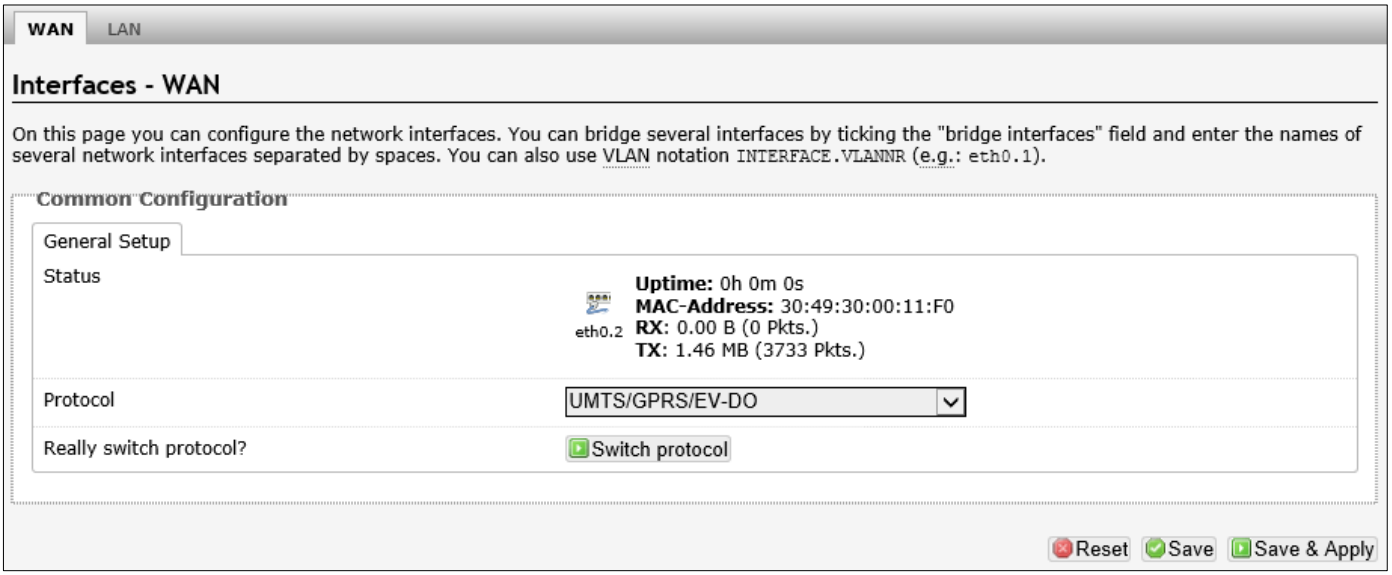
Parameter	Description
by peer	on this interface.
Use custom DNS servers	More than one entry can be created.
LCP echo failure threshold	The peer will be presumed to be dead after the given amount of LCP echo failures are reached. Enter 0 to ignore failures.
LCP echo interval	LCP echo request are sent at this specified interval. This function is only effective in conjunction with the failure threshold function.
Inactivity timeout	The connection is closed after the inactivity timer reached the timeout value. Enter 0 to never timeout the connection.
Override MTU	Enter the MTU value here to override the default MTU value used on this interface.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

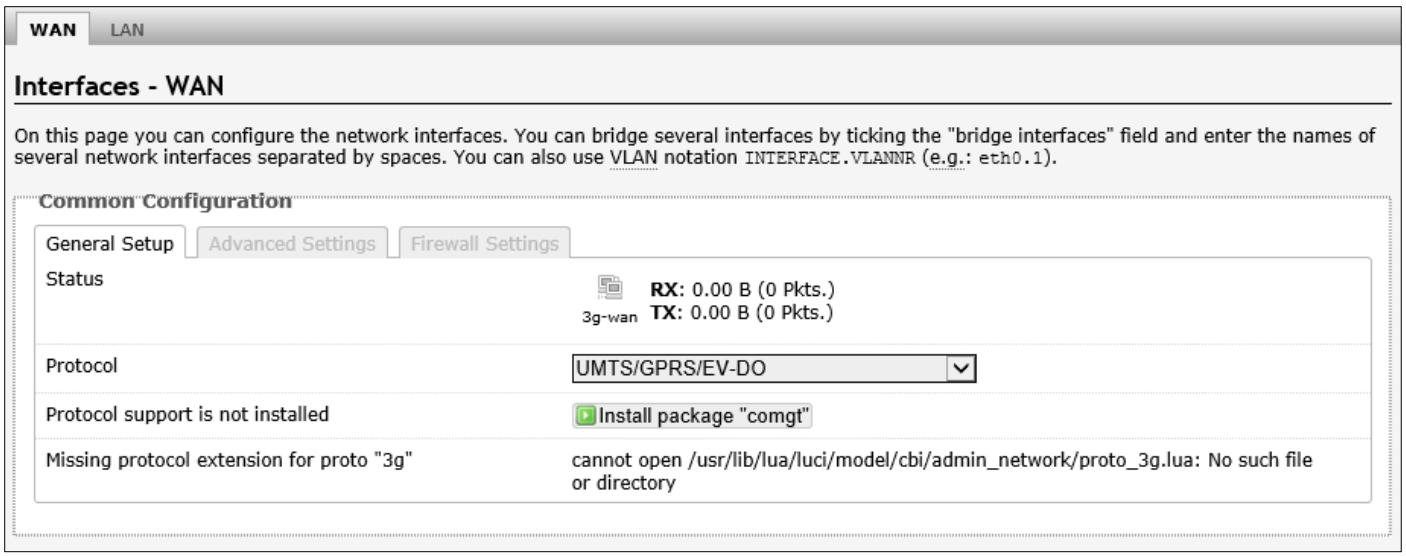
4.3.3.1.8. UMTS/GPRS/EV-DO



The following parameters are available in this section:

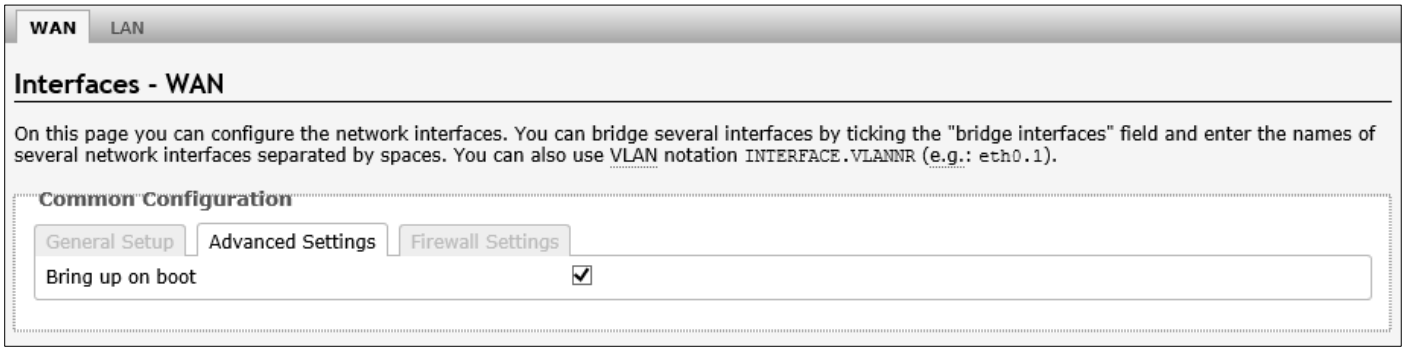
Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear:



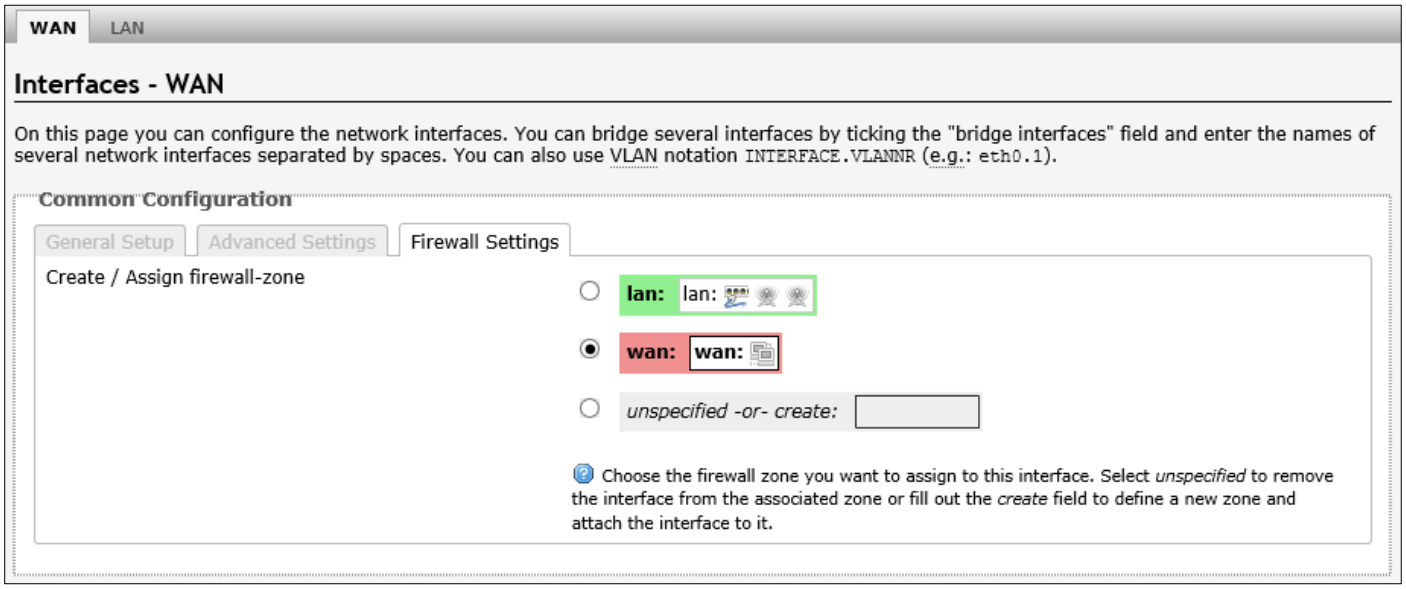
The following parameters are available in this section:

Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the interface.
Protocol	For this section, we'll discuss the UMTS/GPRS/EV-DO option. UMTS stands for Universal Mobile Telecommunications System. GPRS stands for General Packet Radio Service. EV-DO stands for Evolution-Data Optimized.
Protocol support is not installed	Click the Install package button to install the package needed for this protocol.
Missing protocol extension for proto "3g"	Displays the missing protocol extension for the proto "3g".



The following parameters are available in this section:

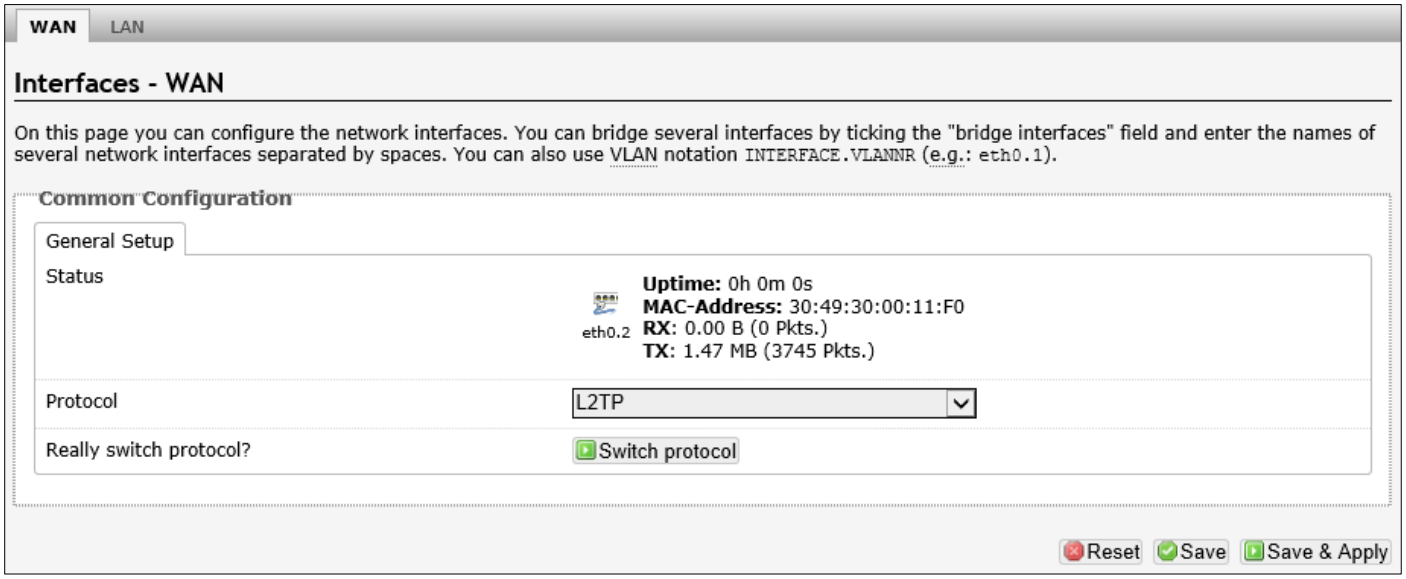
Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

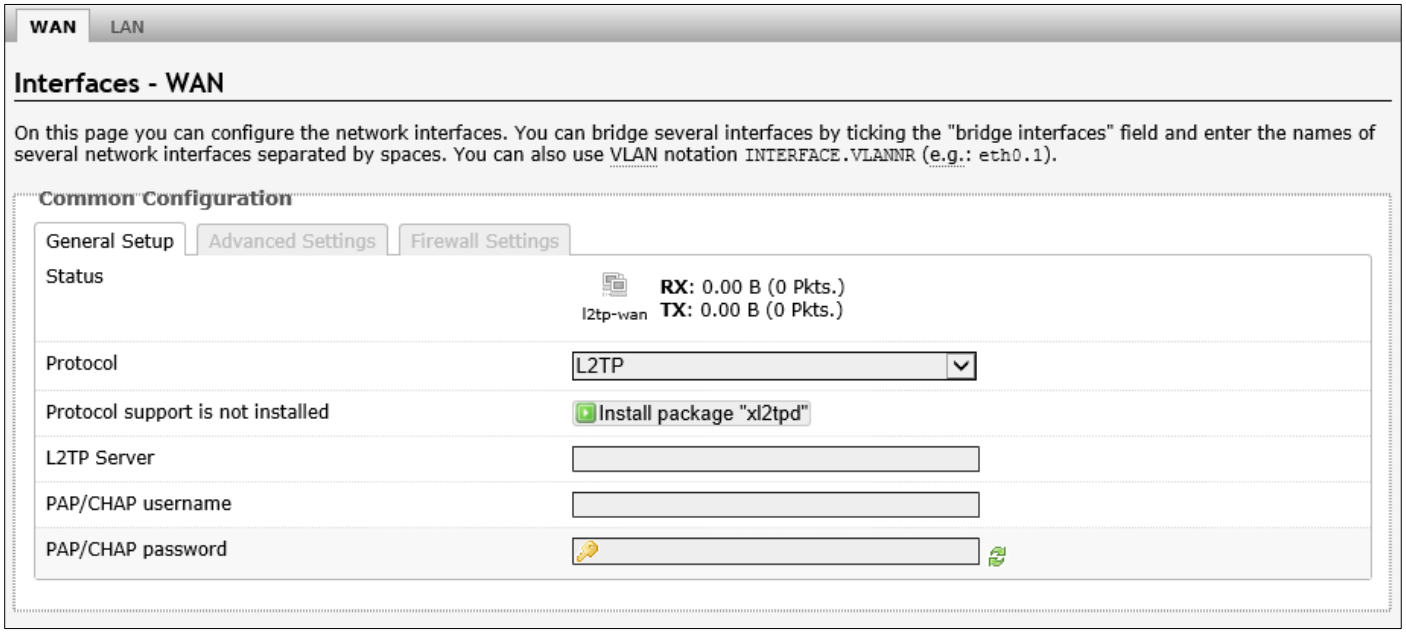
4.3.3.1.9. L2TP



The following parameters are available in this section:

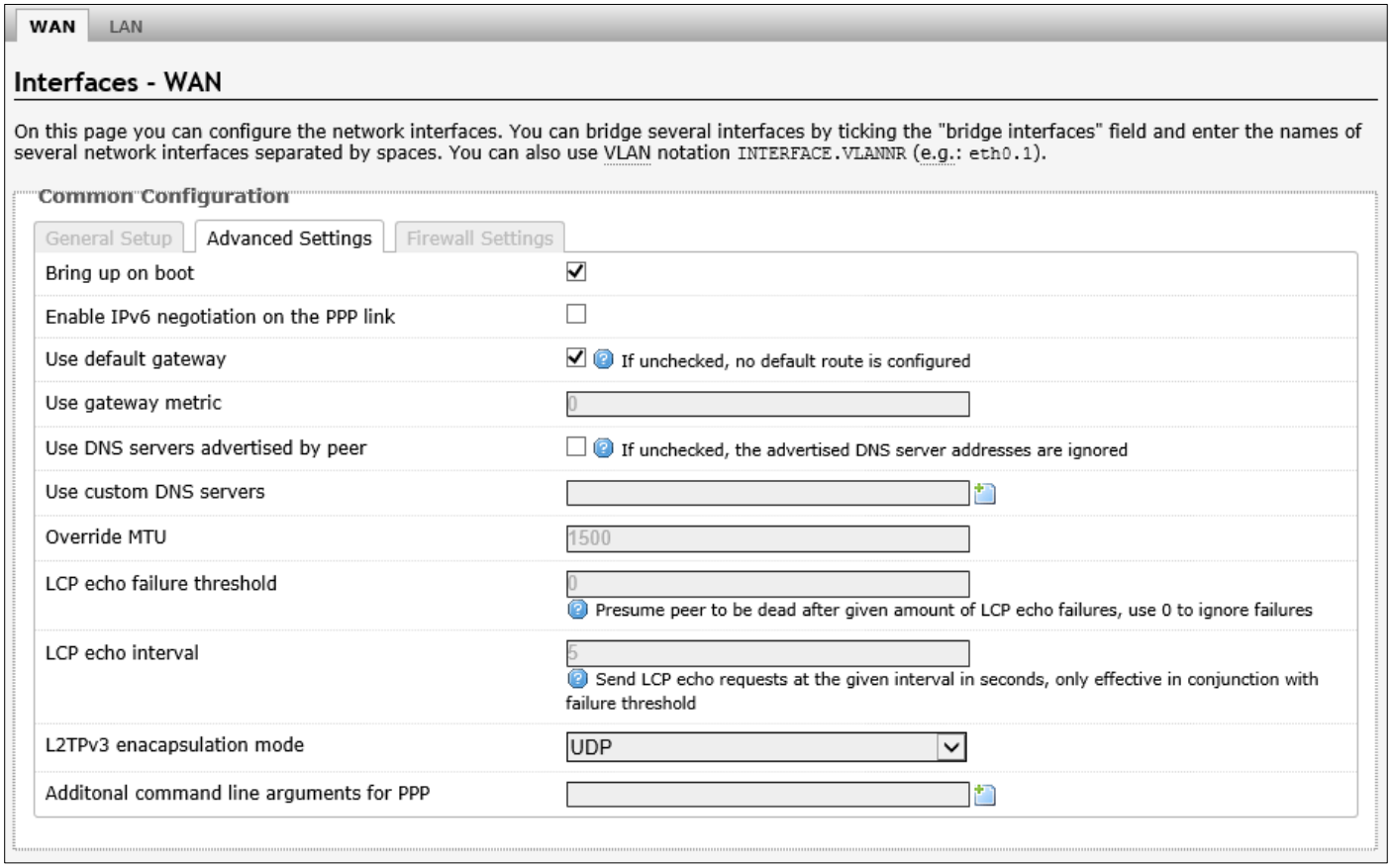
Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear:



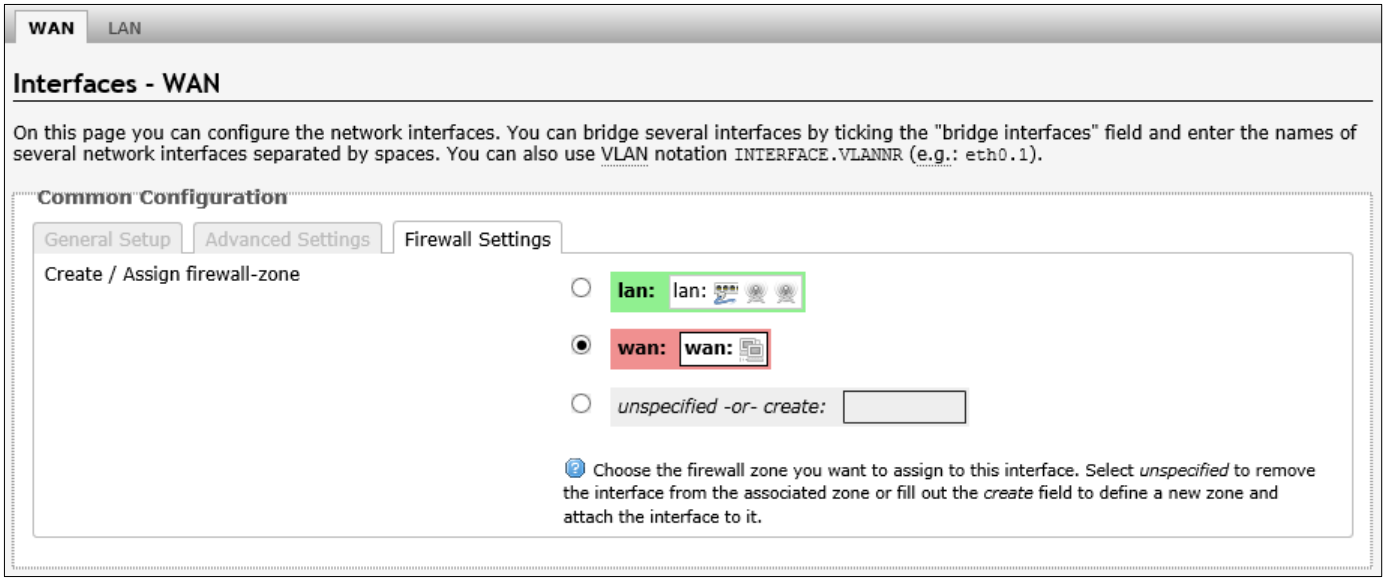
The following parameters are available in this section:

Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the interface.
Protocol support is not installed	Click the Install package button to install the package needed for this protocol.
L2TP Server	Enter the IP address or domain name of the L2TP server here.
PAP/CHAP username/password	Enter the PAP/CHAP username/password for the L2TP account here.



The following parameters are available in this section:

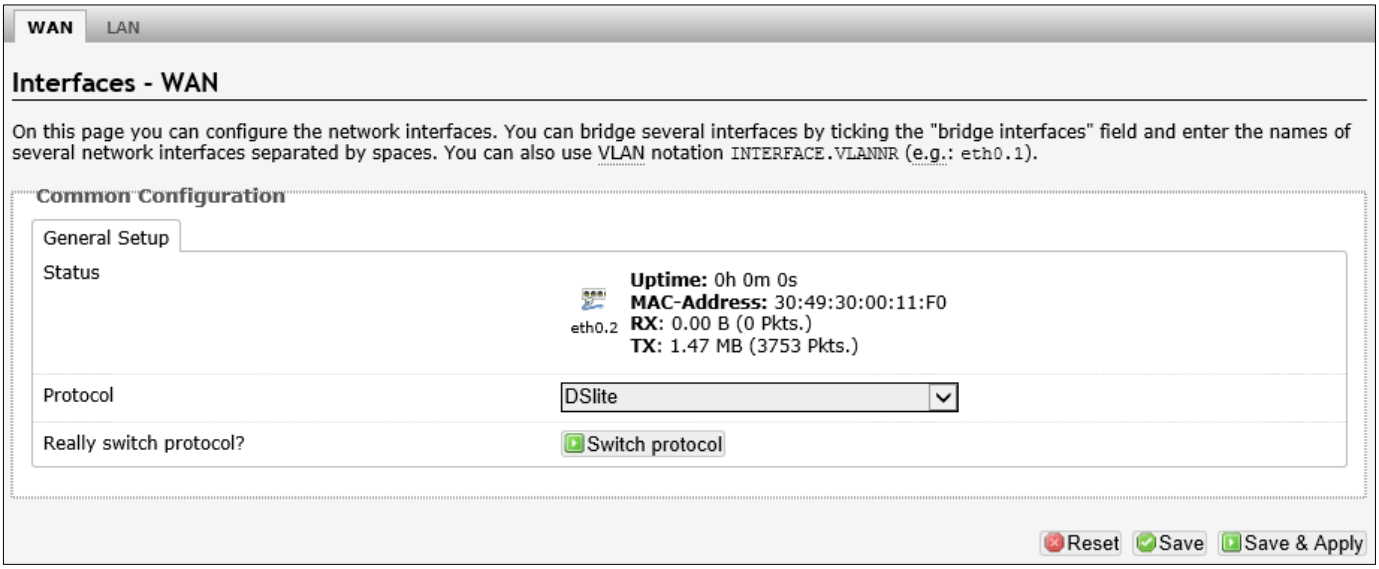
Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Enable IPv6 negotiation on the PPP link	Select this option to enable IPv6 negotiation on the PPP link.
Use default gateway	Select this option to use the DHCP assigned default gateway on this interface.
Use gateway metric	Enter the metric for the gateway here.
Use DNS servers advertised by peer	Select this option to use the DHCP assigned DNS server addresses on this interface.
Use custom DNS servers	Enter the IP address or domain name for a custom DNS server here. More than one entry can be created.
Override MTU	Enter the MTU value here to override the default MTU value used on this interface.
LCP echo failure threshold	The peer will be presumed to be dead after the given amount of LCP echo failures are reached. Enter 0 to ignore failures.
LCP echo interval	LCP echo request are sent at this specified interval. This function is only effective in conjunction with the failure threshold function.
L2TPv3 encapsulation mode	Select the L2TP (Version 3) encapsulation mode here. Options to choose from are UDP and IP.
Additional command line arguments for PPP	Enter additional command line arguments for PPP here.



The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

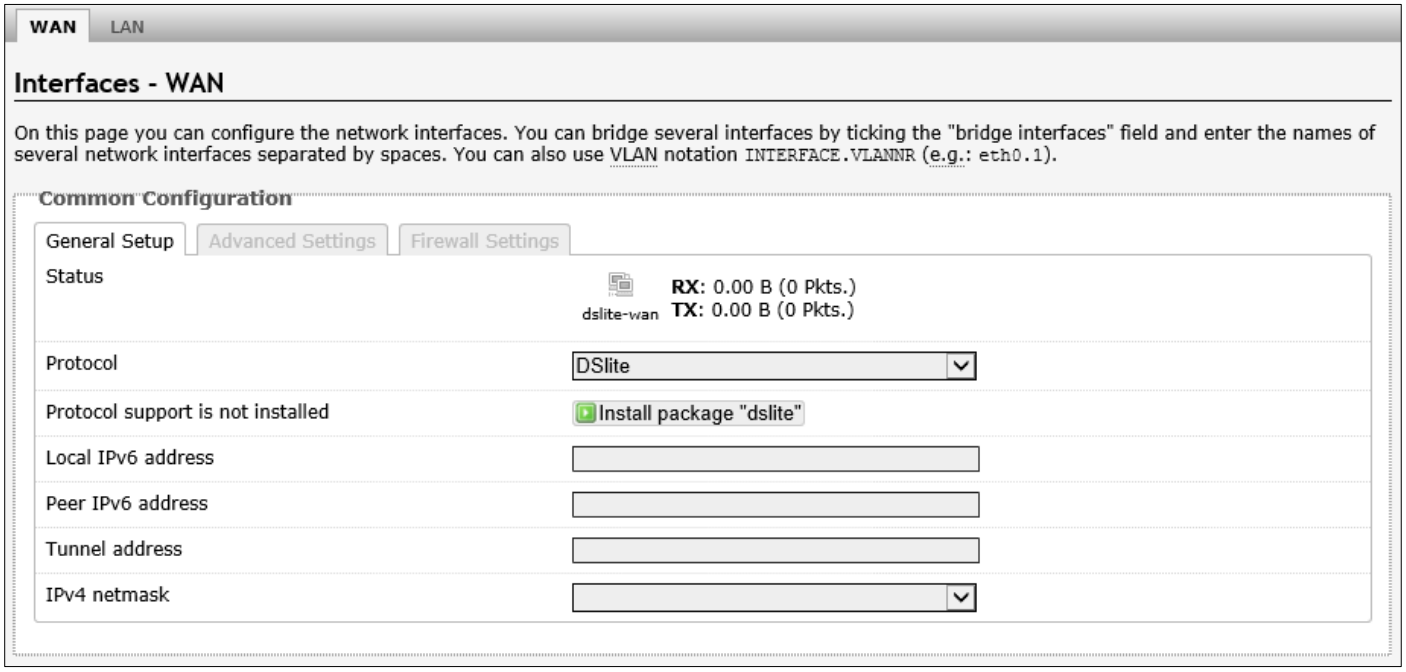
4.3.3.1.10. DSlite



The following parameters are available in this section:

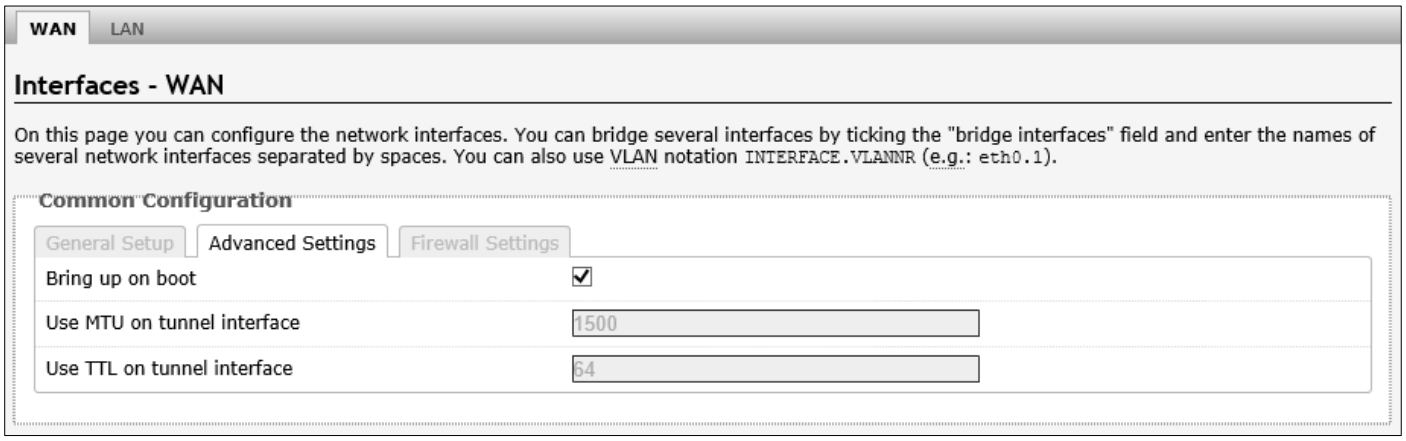
Parameter	Description
Status	Please refer to page 20.

After clicking the Switch protocol button, the following will appear:



The following parameters are available in this section:

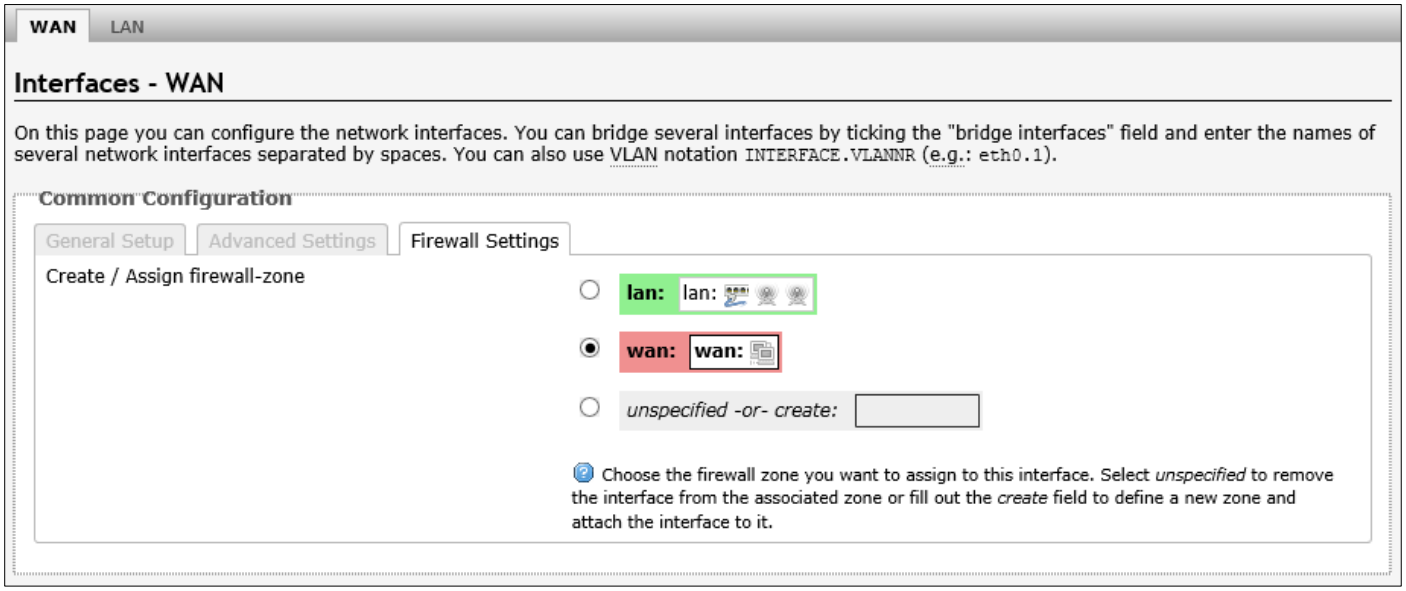
Parameter	Description
Status	Displays basic status information of the interface. • Port - Displays the interface name. For example, "eth0.2". • RX - Displays the RX (receiving) data rate through the interface. • TX - Displays the TX (transmitting) data rate through the interface.
Protocol support is not installed	Click the Install package button to install the package needed for this protocol.
Local/Peer IPv6 address	Enter the local/peer IPv6 address here.
Tunnel address	Enter the IPv4 tunnel address for DS-Lite here.
IPv4 netmask	Select the IPv4 netmask for DS-Lite here. Select the custom option to manually enter the IPv4 netmask.



The following parameters are available in this section:

Parameter	Description
Bring up on boot	Select this option to bring up this interface when the device rebooted.
Use MTU on tunnel	Enter the MTU value for the tunnel interface here.

Parameter	Description
interface	
Use TTL on tunnel interface	Enter the TTL (Time To Live) value for the tunnel interface here.



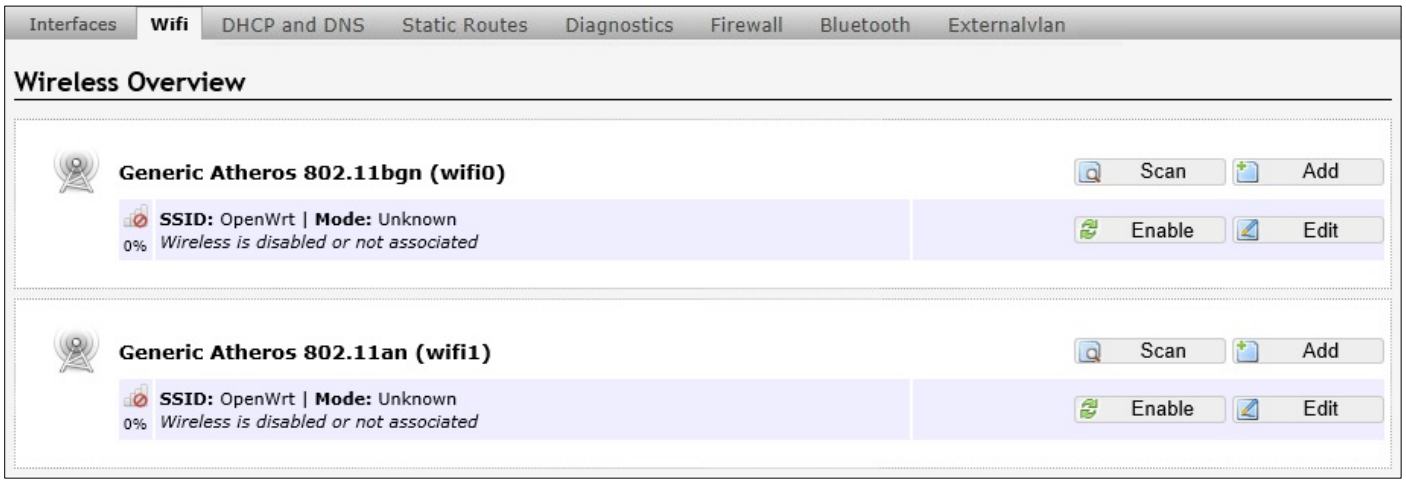
The following parameters are available in this section:

Parameter	Description
Create / Assign firewall-zone	Please refer to page 23.

4.3.3.2. Wifi

4.3.3.2.1. Wireless Overview

This page is used to display and configure the 802.11 wireless settings.

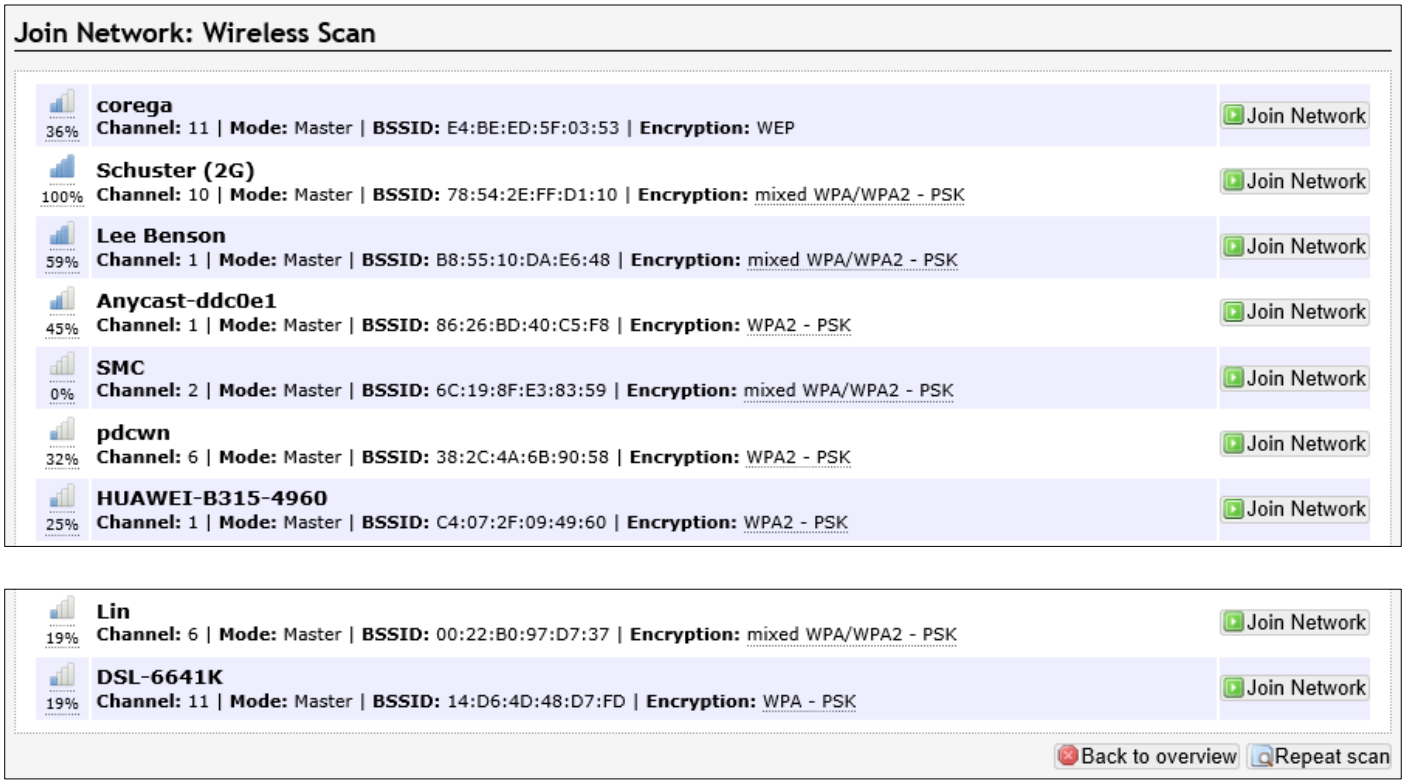


The following parameters are available in this section:

Parameter	Description
Generic Atheros 802.11bgn (wifi0)	Displays information about the generic Atheros IEEE 802.11bgn (wifi0) interface. • Channel - Displays the wireless channel number and frequency.

Parameter	Description
	• Bitrate - Displays the current data rate (in megabits per second) through the wireless interface. • SSID - Displays the SSID hosted by the wireless interface. • Mode - Displays the configuration mode of the wireless interface. • BSSID - Displays the BSSID (Basic Service Set Identifier) hosted by the wireless interface. • Encryption - Displays the wireless encryption used on the wireless interface.
Generic Atheros 802.11a/n (wifi1)	Displays information about the generic Atheros IEEE 802.11a/n (wifi1) interface. • Channel - Displays the wireless channel number and frequency. • Bitrate - Displays the current data rate (in megabits per second) through the wireless interface. • SSID - Displays the SSID hosted by the wireless interface. • Mode - Displays the configuration mode of the wireless interface. • BSSID - Displays the BSSID hosted by the wireless interface. • Encryption - Displays the wireless encryption used on the wireless interface.

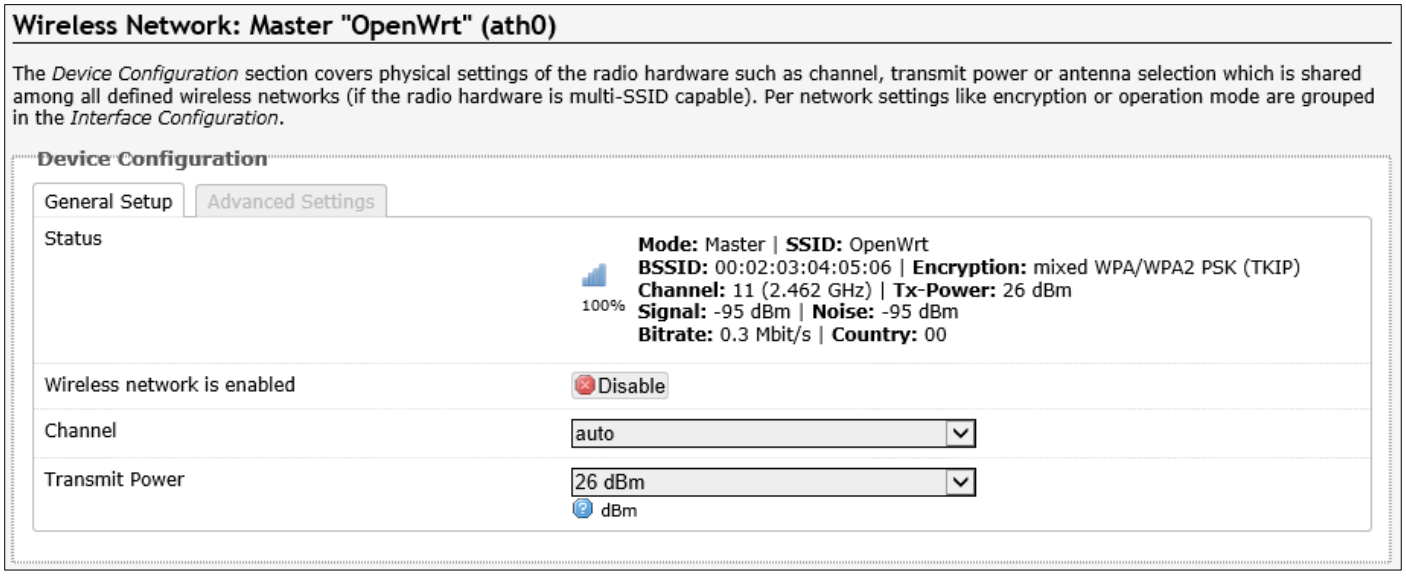
After clicking the Scan button in the Generic Atheros 802.11bgn (wifi0) entry, the following will appear:



After clicking the Scan button in the Generic Atheros 802.11an (wifi1) entry, the following will appear:

4.3.3.2.1.1. Generic Atheros 802.11bgn (ath0)

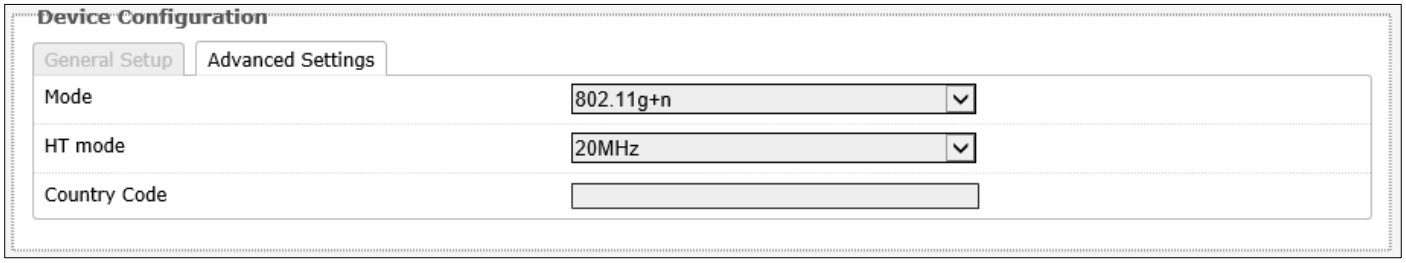
Click Add button, after clicking the Edit button in the Generic Atheros 802.11bgn (ath0) entry, the following will appear:



The following parameters are available in this section:

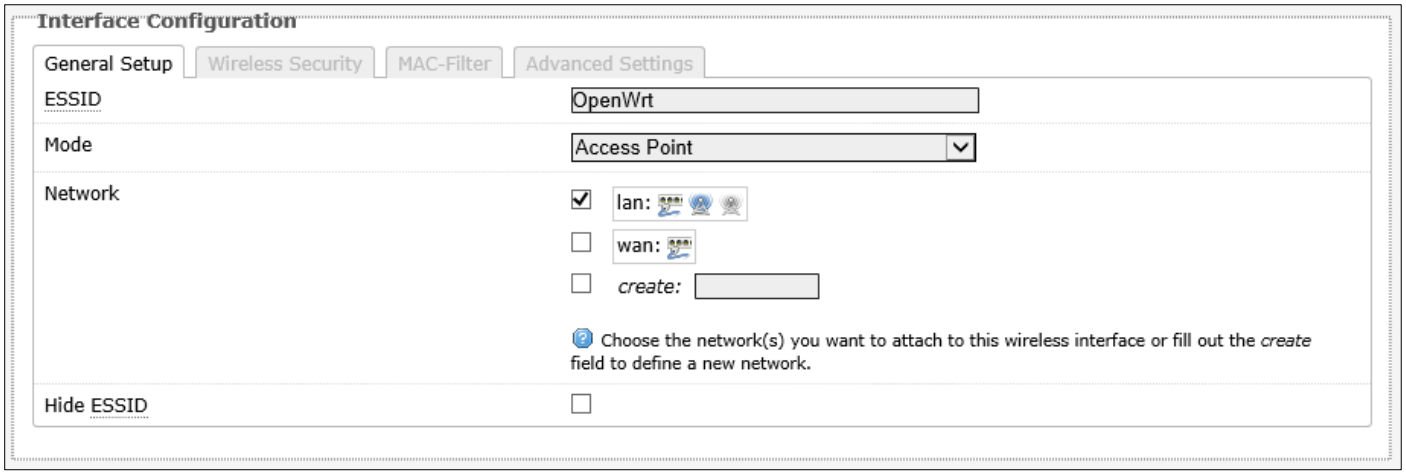
Parameter	Description
Status	Displays a summary of the wireless configuration on this wireless interface. • Signal Strength - Displays the wireless signal strength. • Mode - Displays the wireless operating mode of the wireless interface. • SSID - Displays the SSID hosted by the wireless interface. • BSSID - Displays the BSSID hosted by the wireless interface. • Encryption - Displays the wireless encryption used on the wireless interface. • Channel - Displays the wireless channel number and frequency. • TX-Power - Displays the TX (transmit) power of the wireless interface. • Signal - Displays the wireless signal strength (in dBm) on the wireless interface. • Noise - Displays the wireless noise level (in dBm) on the wireless interface. • Bitrate - Displays the active data bitrate (in megabits per second) through the wireless interface.

Parameter	Description
	• Country - Display the country setting on the wireless interface.
Wireless network is enabled	Displays the current status of the wireless interface.
Channel	Select the wireless channel for the wireless interface here. The range is from 1 (2.412 GHz) to 11 (2.462 GHz). Select the auto option to allow the AP to automatically determine the best wireless channel for this interface. Select the custom option to manually entry the channel number.
Transmit Power	Select the wireless transmit power for the interface here. Options to choose from are 0 dBm, 6 dBm, 10 dBm, 14 dBm, 18 dBm, 22 dBm, 26 dBm, and 30 dBm.



The following parameters are available in this section:

Parameter	Description
Mode	Select the wireless mode on this interface here. Options to choose from are auto, 802.11b, 802.11g, and 802.11g+n.
HT mode	Select the HT mode here. Options to choose from are 20MHz, 40MHz 2nd channel below, 40MHz 2nd channel above, and 80MHz.
Country Code	Enter the country code here.



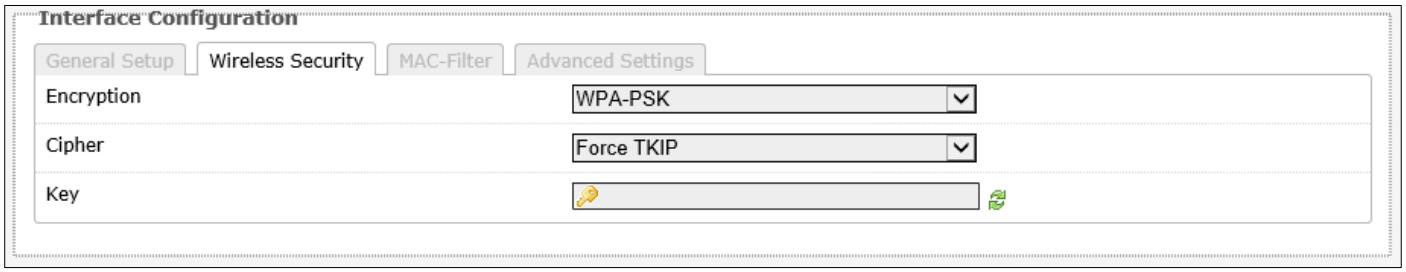
The following parameters are available in this section:

Parameter	Description
ESSID	Enter the ESSID (Extended SSID) here.
Mode	Select the wireless mode for the interface here. Options to choose from are **Access Point**.

Parameter	Description
Network	Select the network interface to attach to this wireless interface here. Select the *create* option to enter and create and new network interface.
Hide ESSID	Select this option to hide the ESSID from wireless clients. Wireless clients will not be able to detect this interface by simply scanning for available wireless networks.

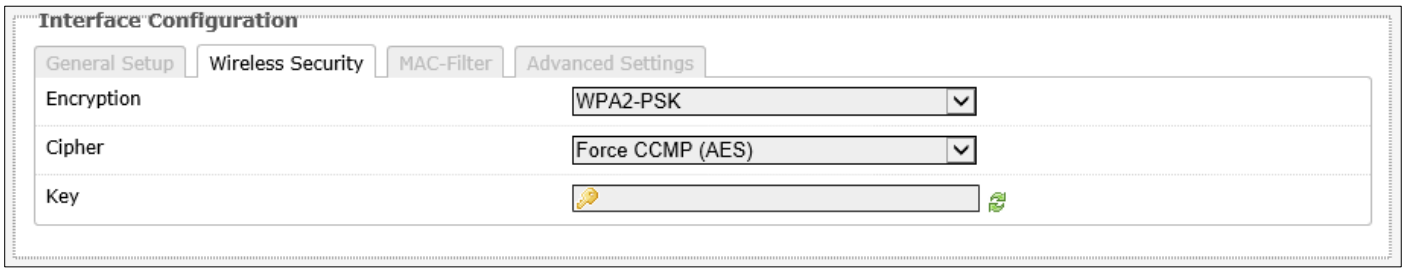
The following parameters are available in this section:

Parameter	Description
Encryption	Select the wireless encryption for this interface here. Options to choose from are No Encryption, WPA-PSK, WPA2-PSK, and WPA-PSK/WPA2-PSK Mixed Mode. WPA stands for Wi-Fi Protected Access. WPA2 stands for Wi-Fi Protected Access II. PSK stands for Pre-Shared Key.



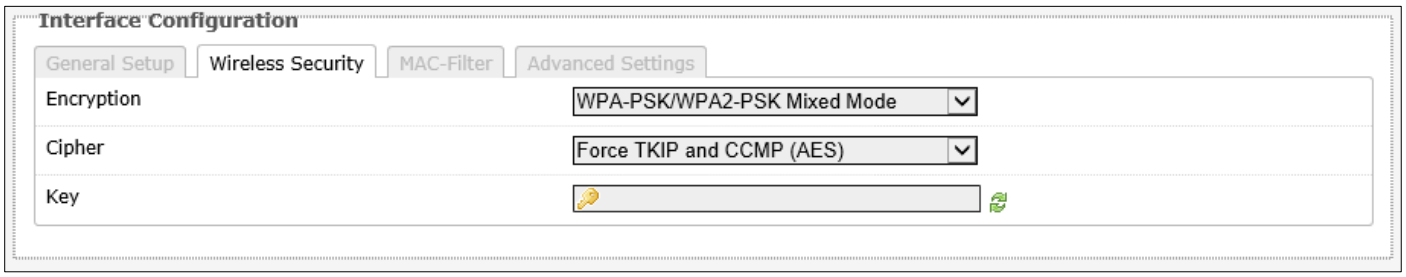
The following parameters are available in this section:

Parameter	Description
Encryption	After selecting the WPA-PSK option, the following settings are available.
Cipher	Select the cipher method here. Options to choose from are Force TKIP (Temporal Key Integrity Protocol).
Key	Enter the WPA passphrase here.



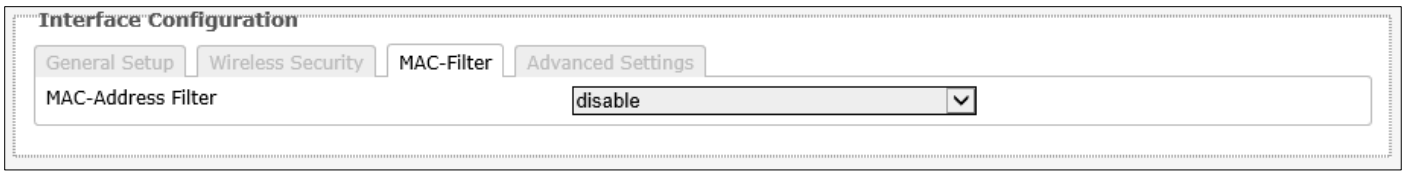
The following parameters are available in this section:

Parameter	Description
Encryption	After selecting the WPA2-PSK option, the following settings are available.
Cipher	Select the cipher method here. Options to choose from are Force CCMP (AES). CCMP stands for CCM Mode Protocol. CCM stands for Counter with CBC-MAC. CBC-MAC stands for Cipher Block Chaining Message Authentication Code. AES stands for Advanced Encryption Standard.
Key	Enter the WPA2 passphrase here.



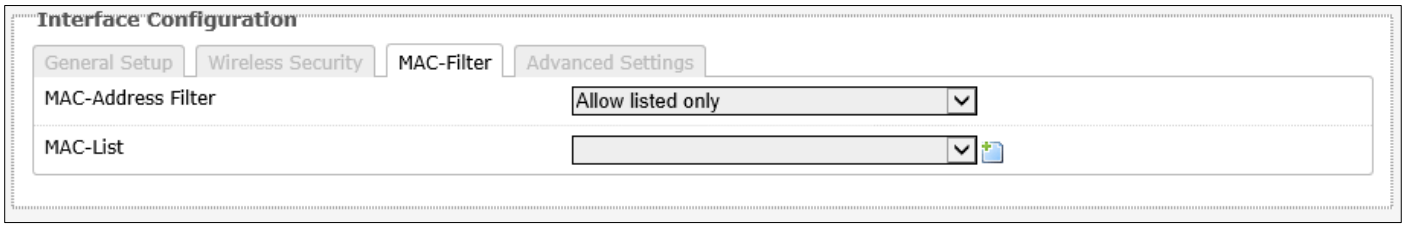
The following parameters are available in this section:

Parameter	Description
Encryption	After selecting the WPA-PSK/WPA2-PSK Mixed Mode option, the following settings are available.
Cipher	Select the cipher method here. Options to choose from are Force TKIP and CCMP (AES).
Key	Enter the WPA/WPA2 passphrase here.



The following parameters are available in this section:

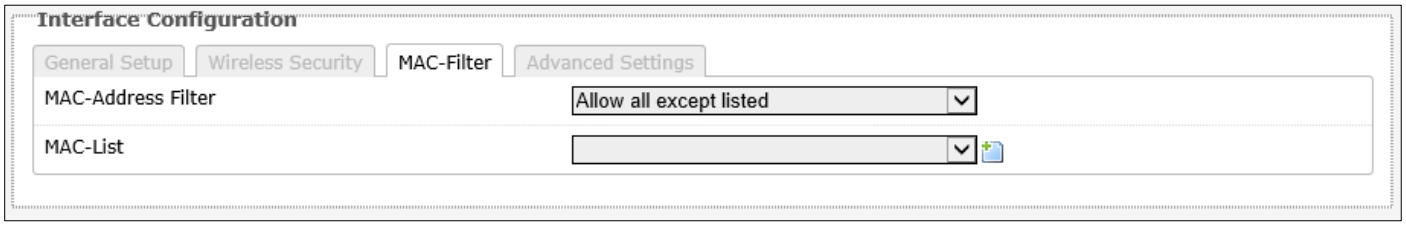
Parameter	Description
MAC Address Filter	Select to enable or disable MAC address filtering here. Options to choose from are disable, allow listed only, and allow all except listed.



The following parameters are available in this section:

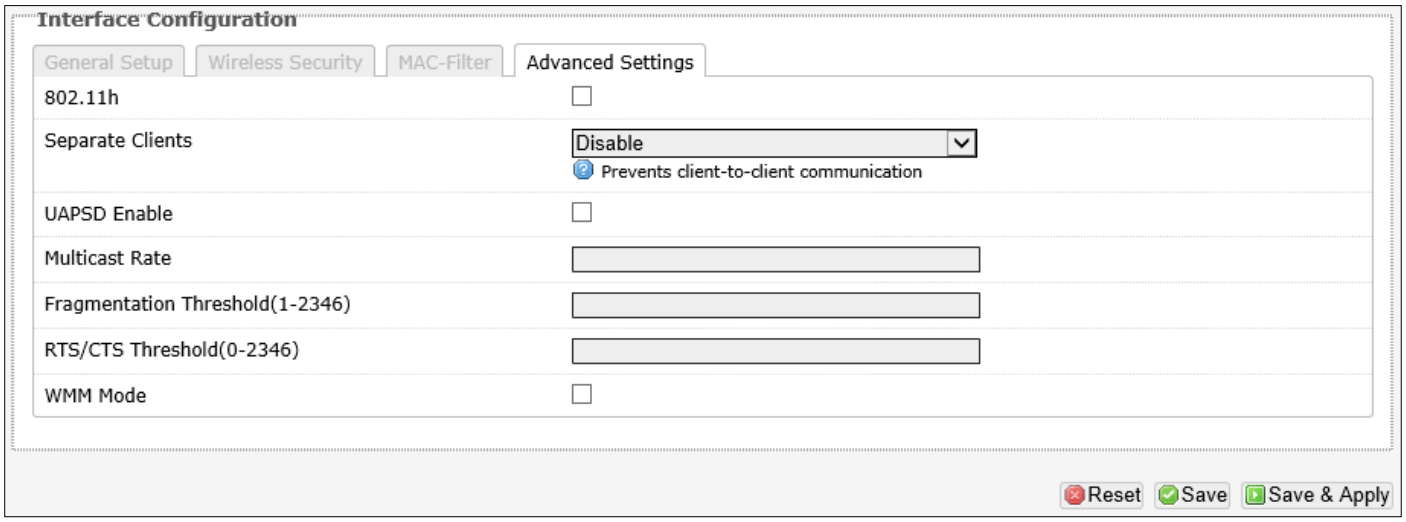
Parameter	Description
MAC Address Filter	After selecting the Allow listed only option, the following setting is available.

Parameter	Description
MAC List	Select the MAC address that is allowed access to the wireless interface here. Select custom option to manually enter the MAC address here.



The following parameters are available in this section:

Parameter	Description
MAC Address Filter	After selecting the Allow all except listed option, the following setting is available.
MAC List	Select the MAC address that is denied access to the wireless interface here. Select custom option to manually enter the MAC address here.

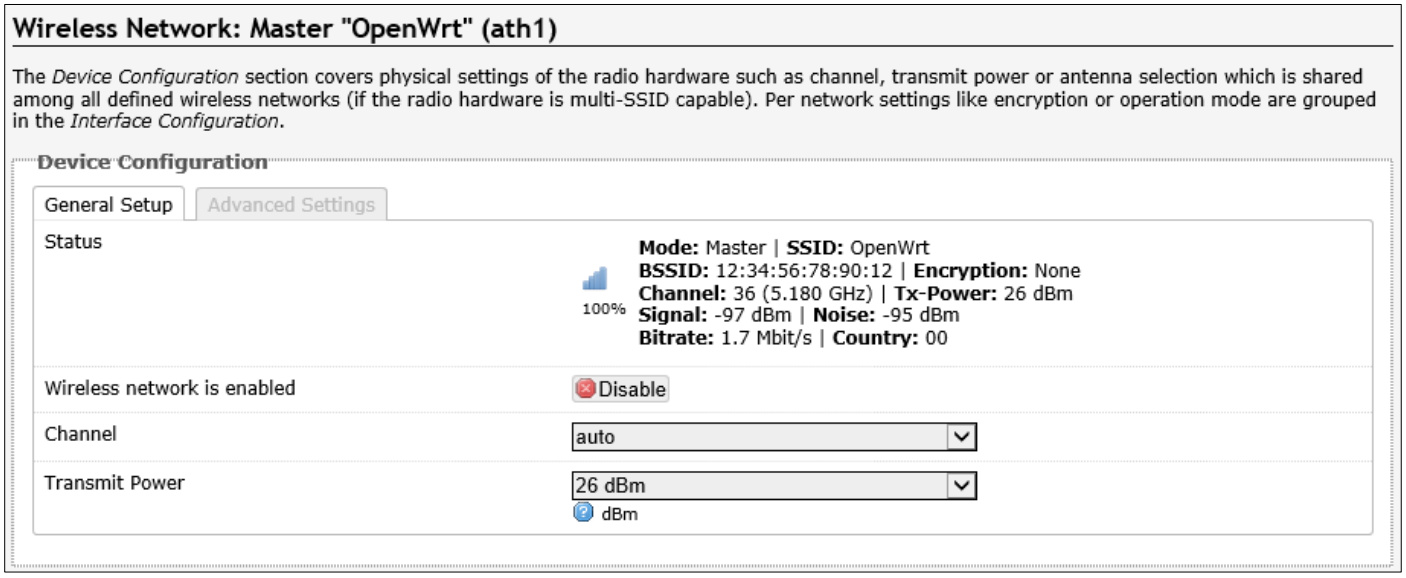


The following parameters are available in this section:

Parameter	Description
802.11h	Select this option to enable 802.11h amendment here.
Separate Clients	Select to enable the function that separates client-to-client communication here.
UAPSD Enable	Select to enable the UAPSD (Unscheduled Automatic Power Save Delivery) function here.
Multicast Rate	Enter the multicast rate here.
Fragmentation Threshold	The range is from 1 to 2346.
RTS/CTS Threshold	The range is from 0 to 2346.
WMM Mode	Select this option to enable the WMM (Wi-Fi Multimedia) mode here.

4.3.3.2.1.2. Generic Atheros 802.11an (ath1)

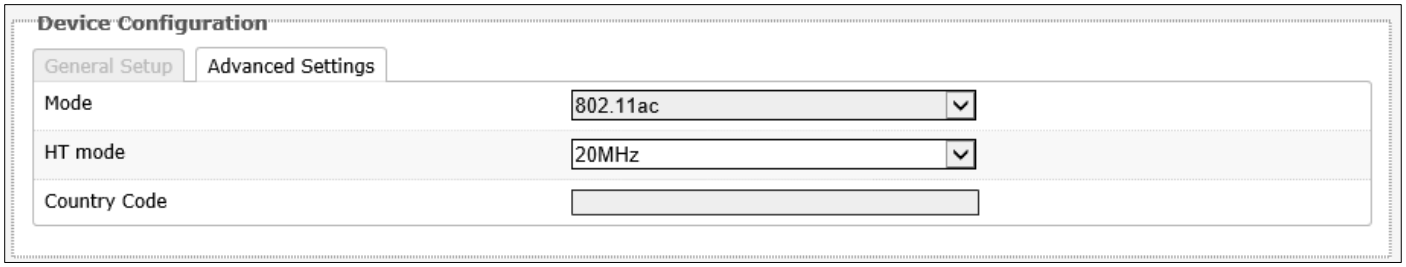
After clicking the Edit button in the Generic Atheros 802.11an (ath1) entry, the following will appear:



The following parameters are available in this section:

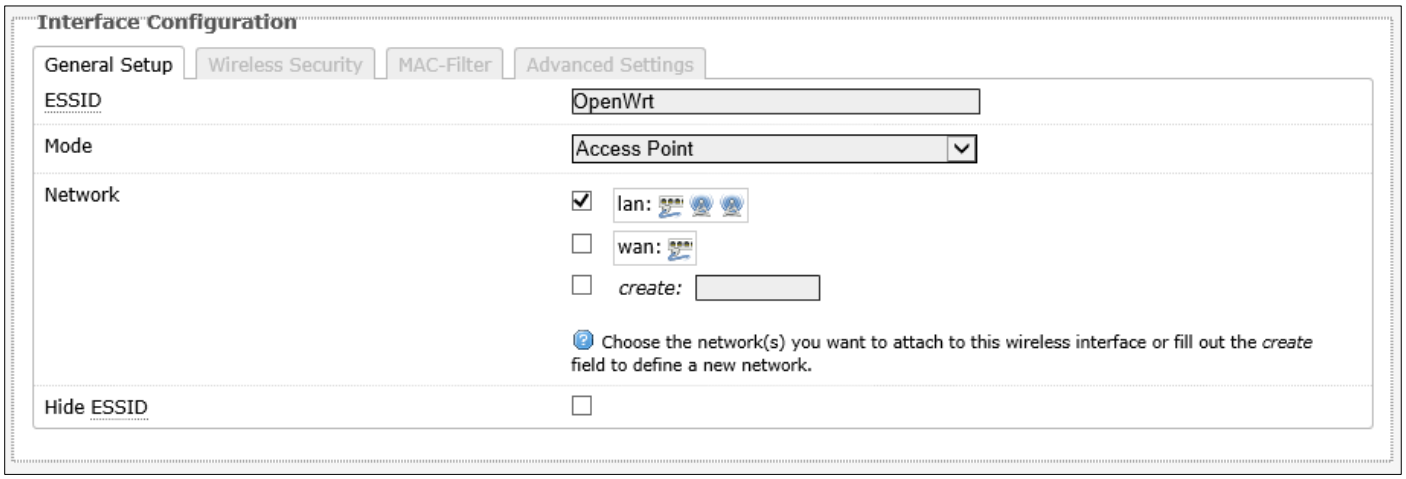
Parameter	Description
Status	Displays a summary of the wireless configuration on this wireless interface. • Signal Strength - Displays the wireless signal strength. • Mode - Displays the wireless operating mode of the wireless interface. • SSID - Displays the SSID hosted by the wireless interface. • BSSID - Displays the BSSID hosted by the wireless interface. • Encryption - Displays the wireless encryption used on the wireless interface. • Channel - Displays the wireless channel number and frequency. • TX-Power - Displays the TX (transmit) power of the wireless interface. • Signal - Displays the wireless signal strength (in dBm) on the wireless interface. • Noise - Displays the wireless noise level (in dBm) on the wireless interface. • Bitrate - Displays the active data bitrate (in megabits per second) through the wireless interface. • Country - Display the country setting on the wireless interface.
Wireless network is enabled	Displays the current status of the wireless interface.
Channel	Select the wireless channel for the wireless interface here. The range is from 36 (5.180 GHz) to 165 (5.825 GHz). Select the auto option to allow the AP to automatically determine the best wireless channel for this interface. Select the custom option to manually entry the channel number.
Transmit Power	Select the wireless transmit power for the interface here. Options to choose from are 0 dBm, 6 dBm, 10 dBm, 14 dBm, 18 dBm, 22 dBm,

Parameter	Description
	26 dBm, and 30 dBm.



The following parameters are available in this section:

Parameter	Description
Mode	Select the wireless mode on this interface here. Options to choose from are auto, 802.11a, 802.11a+n, and 802.11ac.
HT mode	Select the HT mode here. Options to choose from are 20MHz, 40MHz 2nd channel below, 40MHz 2nd channel above, and 80MHz.
Country Code	Enter the country code here.

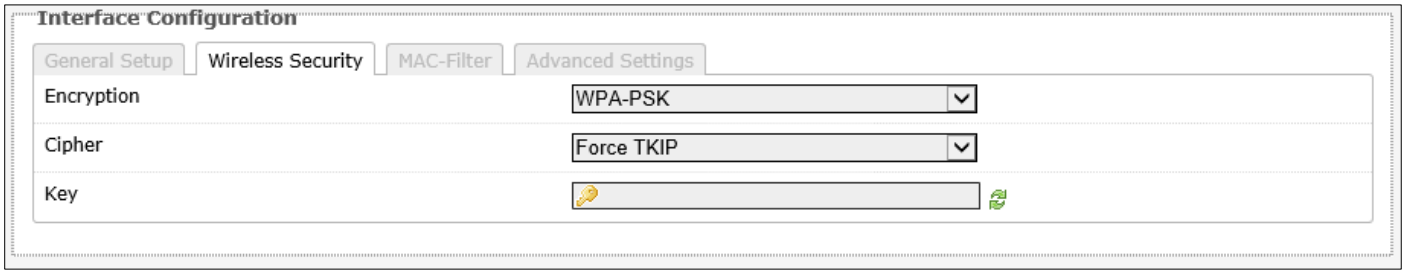


The following parameters are available in this section:

Parameter	Description
ESSID	Enter the ESSID here.
Mode	Select the wireless mode for the interface here. Options to choose from are Access Point.
Network	Select the network interface to attach to this wireless interface here. Select the create option to enter and create and new network interface.
Hide ESSID	Select this option to hide the ESSID from wireless clients. Wireless clients will not be able to detect this interface by simply scanning for available wireless networks.

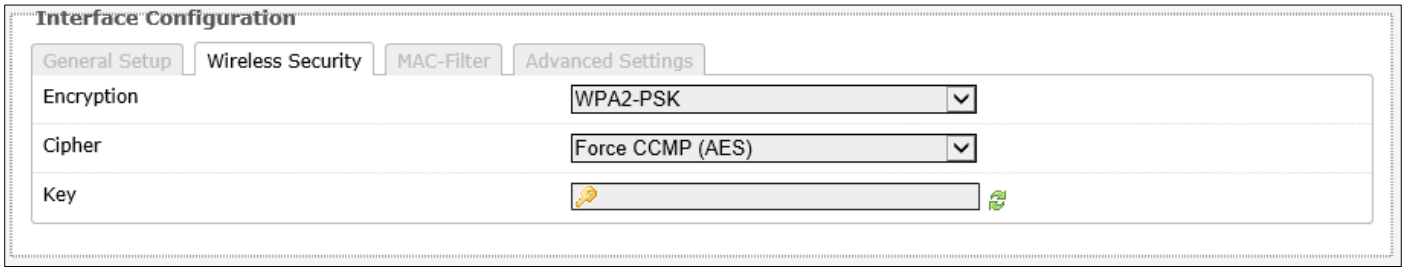
The following parameters are available in this section:

Parameter	Description
Encryption	Select the wireless encryption for this interface here. Options to choose from are No Encryption, WPA-PSK, WPA2-PSK, and WPA-PSK/WPA2-PSK Mixed Mode.



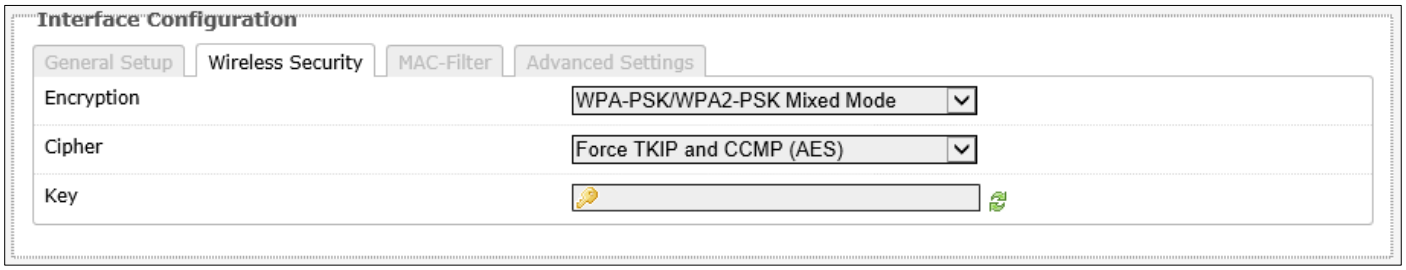
The following parameters are available in this section:

Parameter	Description
Encryption	After selecting the WPA-PSK option, the following settings are available.
Cipher	Select the cipher method here. Options to choose from are Force TKIP.
Key	Enter the WPA passphrase here.



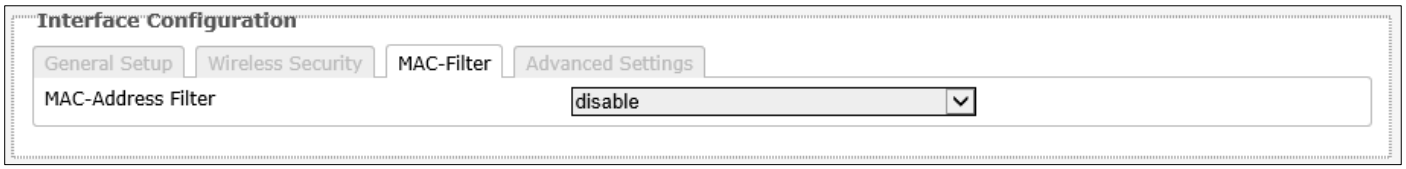
The following parameters are available in this section:

Parameter	Description
Encryption	After selecting the WPA2-PSK option, the following settings are available.
Cipher	Select the cipher method here. Options to choose from are Force CCMP (AES).
Key	Enter the WPA2 passphrase here.



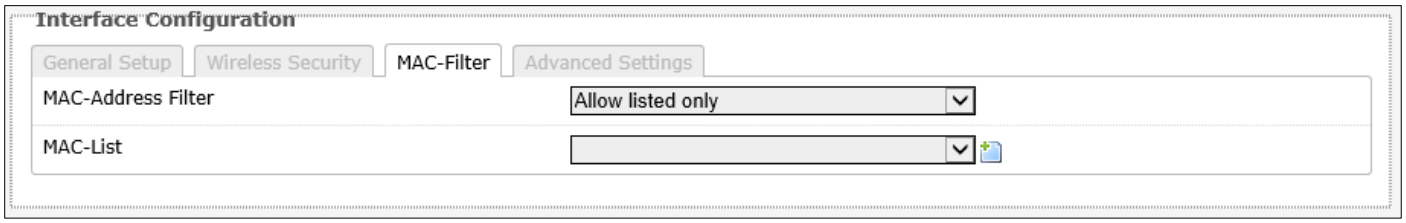
The following parameters are available in this section:

Parameter	Description
Encryption	After selecting the WPA-PSK/WPA2-PSK Mixed Mode option, the following settings are available.
Cipher	Select the cipher method here. Options to choose from are Force TKIP and CCMP (AES).
Key	Enter the WPA/WPA2 passphrase here.



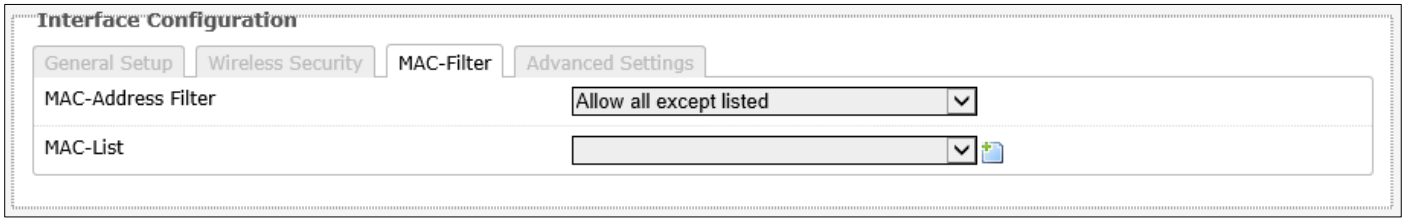
The following parameters are available in this section:

Parameter	Description
MAC Address Filter	Select to enable or disable MAC address filtering here. Options to choose from are disable, allow listed only, and allow all except listed.



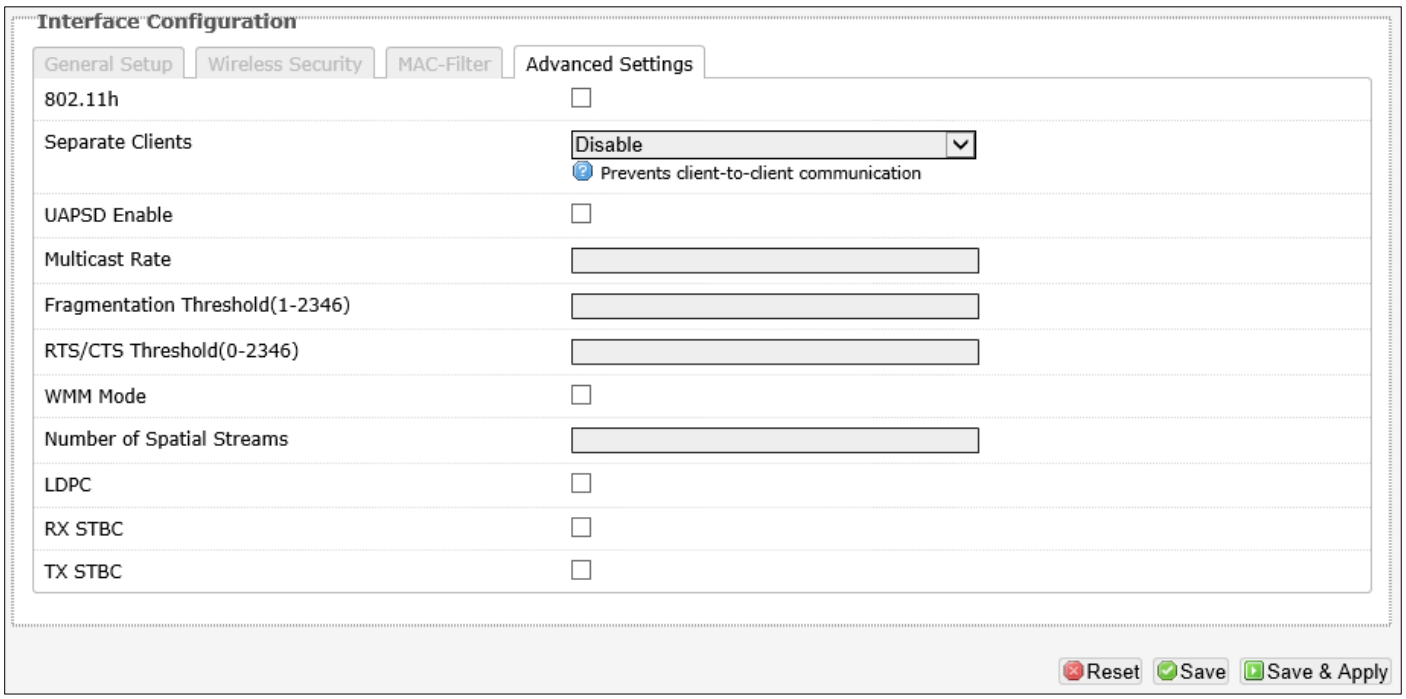
The following parameters are available in this section:

Parameter	Description
MAC Address Filter	After selecting **Allow listed only** option, the following setting is available.
MAC List	Select the MAC address that is allowed access to the wireless interface here. Select custom option to manually enter the MAC address here.



The following parameters are available in this section:

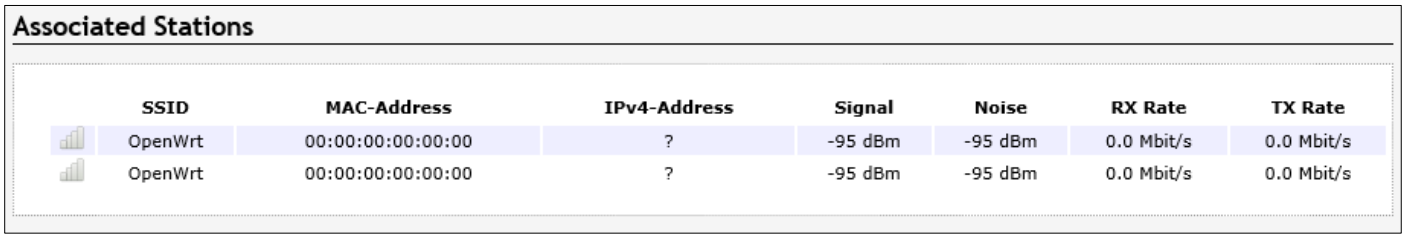
Parameter	Description
MAC Address Filter	After selecting **Allow all except listed** option, the following setting is available.
MAC List	Select the MAC address that is denied access to the wireless interface here. Select custom option to manually enter the MAC address here.



The following parameters are available in this section:

Parameter	Description
802.11h	Select this option to enable 802.11h amendment here.
Separate Clients	Select to enable the function that separates client-to-client communication here.
UAPSD Enable	Select to enable the UAPSD function here.
Multicast Rate	Enter the multicast rate here.
Fragmentation Threshold	The range is from 1 to 2346.
RTS/CTS Threshold	The range is from 0 to 2346.
WMM Mode	Select this option to enable the WMM mode here.
Number of Spatial Streams	Enter the number of spatial streams here.
LDPC	Select this option to enable the LDPC function here.
RX STBC	Select this option to enable the RX (received) STBC (Space–Time Block Code) function here.
TX STBC	Select this option to enable the TX (transmitted) STBC function here.

4.3.3.2.1.3. Associated Stations

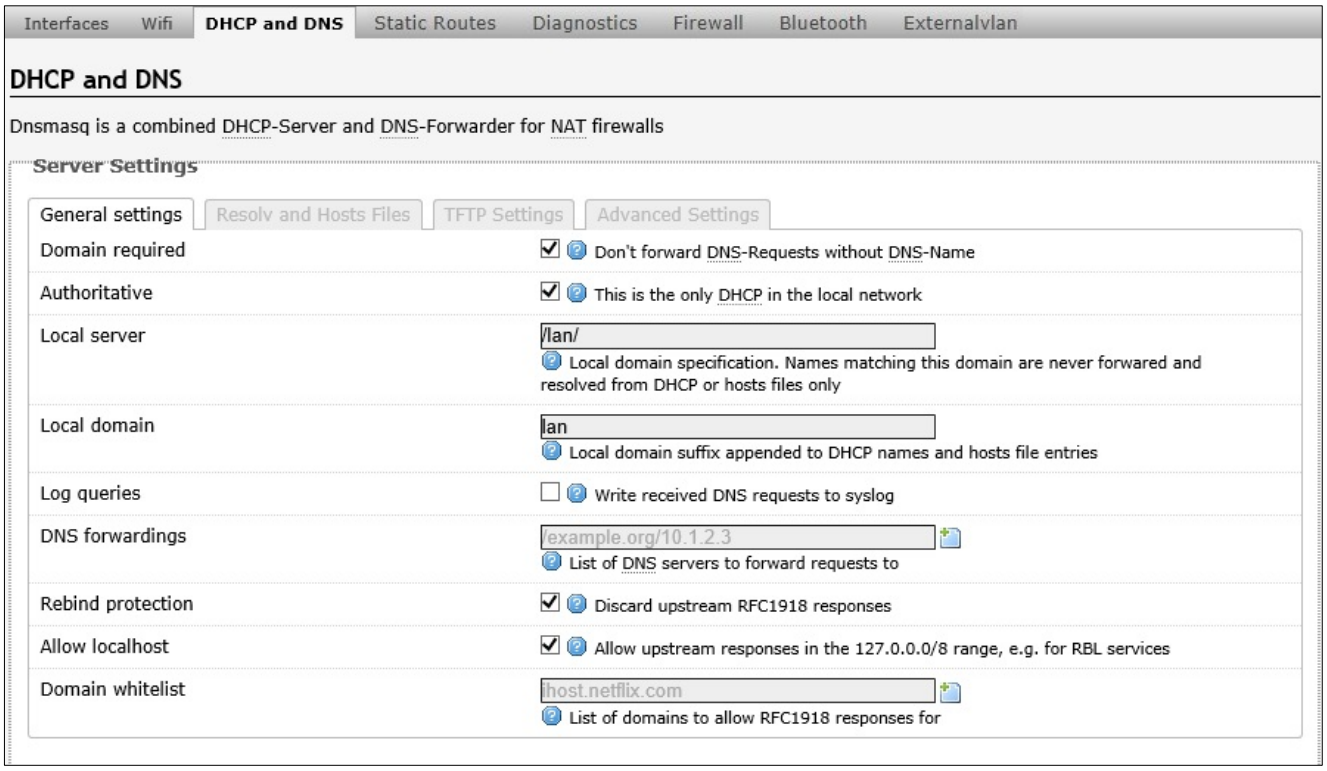


The following parameters are available in this section:

Parameter	Description
Signal Strength	Displays the signal strength of the associated wireless station.
SSID	Displays the SSID of the associated wireless station.
MAC Address	Displays the MAC address of the associated wireless station.
IPv4 Address	Displays the IPv4 address of the associated wireless station.
Signal	Displays the signal strength of the associated wireless station.
Noise	Displays the wireless signal noise of the associated wireless station.
RX Rate	Displays the RX (receiving) wireless data rate of the associated wireless station.
TX Rate	Displays the TX (transmitting) wireless data rate of the associated wireless station.

4.3.3.3. DHCP and DNS

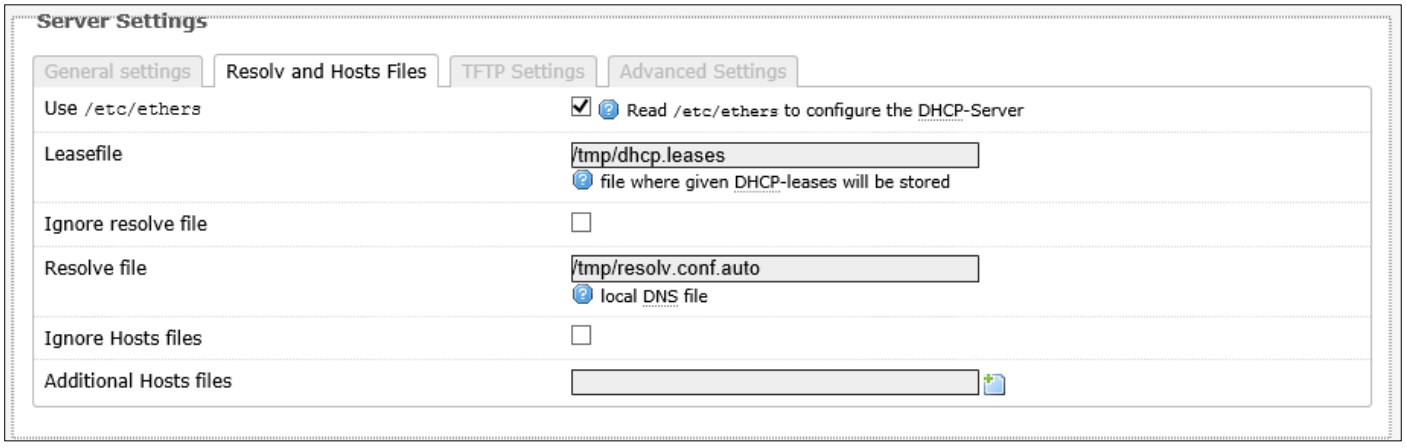
This page is used to display and configure the DHCP server and DNS settings on the AP.



The following parameters are available in this section:

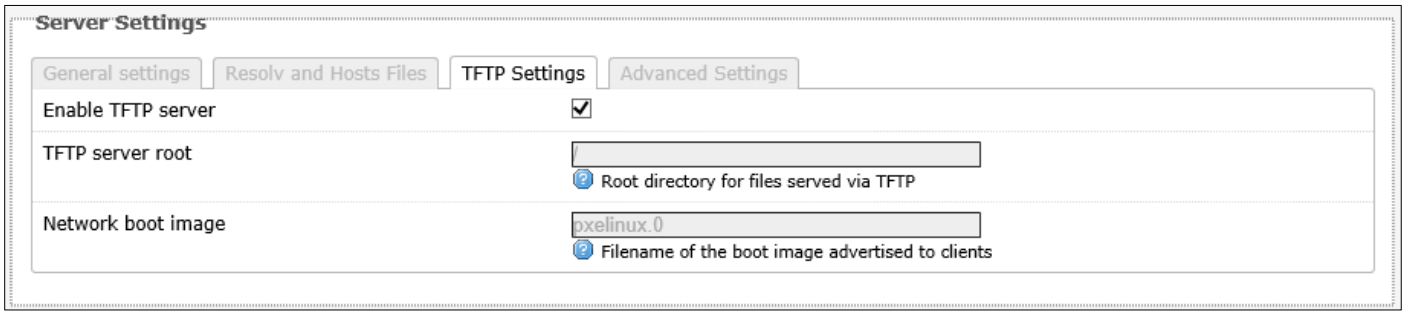
Parameter	Description
Domain required	Select this option to stop forwarding DNS request without the DNS name.

Parameter	Description
Authoritative	Select this option to specify that this DHCP server is the only DHCP server on the local network.
Local server	Enter the domain specification of the local DHCP server here. Names matching this domain are never forwarded and resolved from DHCP or host files only.
Local domain	Ener the local domain here. The local domain suffix is appended to DHCP names and hosts file entries.
Log queries	Select this option to write received DNS requests to the syslog.
DNS forwardings	Enter the IP address or domain name of the DNS server to which DNS requests are forwarded to. More than one entry can be created.
Rebind protection	Select this option to discard upstream RFC 1918 (Address Allocation for Private Internets) responses.
Allow localhost	Select this option to allow upstream responses in the 127.0.0.0/8 (loopback purposes) range.
Domain whitelist	Enter the domain name that is whitelisted for RFC 1918 responses here. More than one entry can be created.



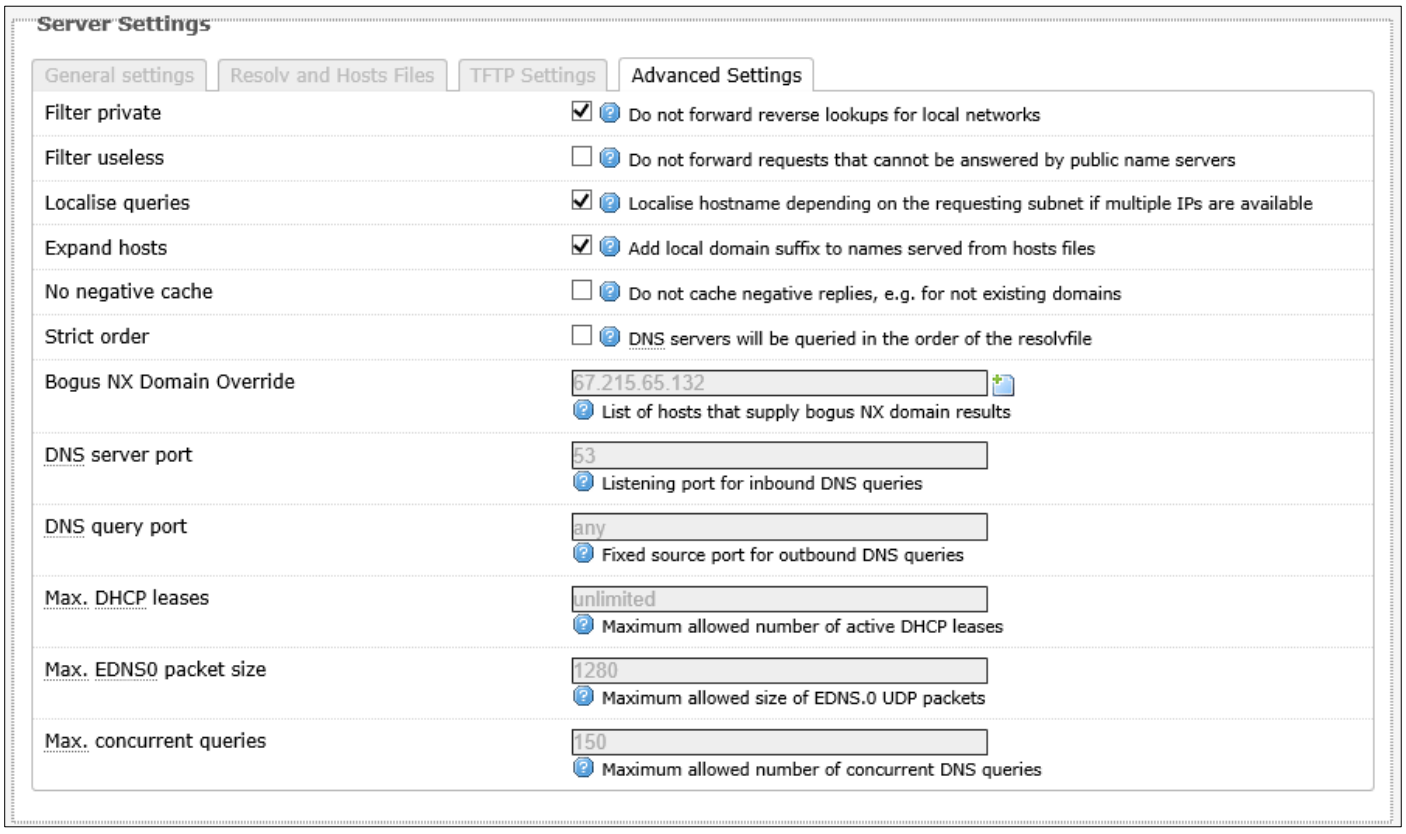
The following parameters are available in this section:

Parameter	Description
Use / etc / ethers	Select this option to use / etc / ethers to configure the DHCP server here.
Leasefile	Enter the name and path where the DHCP lease file will be saved here.
Ignore resolve file	Select this option to ignore the resolve file.
Resolve file	Enter the name and path for the DNS file here.
Ignore Hosts files	Select this option to ignore hosts files.
Additional Hosts files	Enter the name and path of the additional hosts files here. More than one entry can be created.



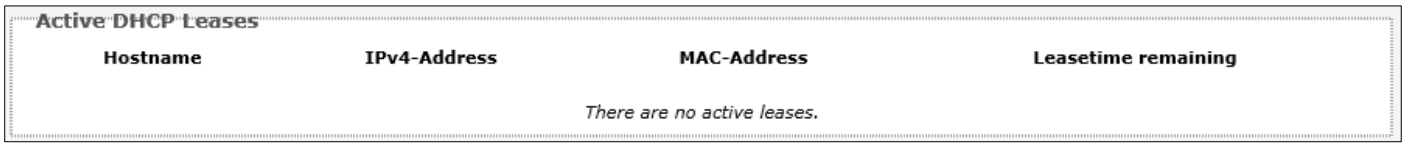
The following parameters are available in this section:

Parameter	Description
Enable TFTP server	Select this option to enable the TFTP (Trivial File Transfer Protocol) server function here.
TFTP server root	Enter the TFTP server root directory here.
Network boot image	Enter the name of the boot image file that is advertised to client here.



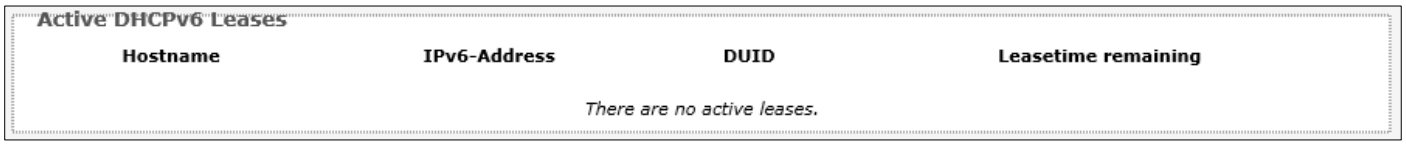
The following parameters are available in this section:

Parameter	Description
Filter private	Select this option not to forward reverse lookups for local networks.
Filter useless	Select this option not to forward requests that cannot be answered by public name servers.
Localize queries	Select this option to localize the hostname depending on the requesting subnet if multiple IP addresses are available.
Expand hosts	Select this option to add a local domain suffix to the names served from the hosts files.
No negative cache	Select this option not to cache negative replies.
Strict order	Select this option to only query DNS server in the order specified in the "resolvfile".
Bogus NX Domain Override	Enter the IP addresses of the host that supply bogus NX domain results here. More than one entry can be created.
DNS server port	Enter the TCP/UDP port number for the DNS server connection here. This port is used for inbound DNS queries.
DNS query port	Enter the TCP/UDP source port number for outbound DNS queries here.
Max. DHCP leases	Enter the maximum number of active DHCP leases allowed here.
Max. EDNS0 packet size	Enter the maximum size allowed for EDNS.0 (Extension mechanisms for DNS) UDP packets here.
Max. concurrent queries	Enter the maximum number of concurrent DNS queries allowed here.



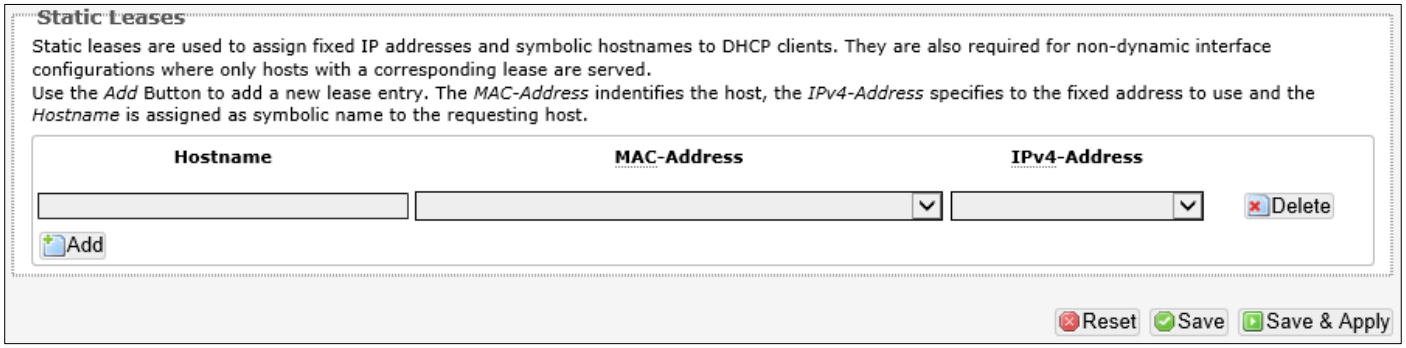
The following parameters are available in this section:

Parameter	Description
Hostname	Displays the hostname of the active DHCP lease.
IPv4/MAC Address	Displays the IPv4/MAC address of the active DHCP lease.
Leasetime remaining	Displays the lease time remaining for the active DHCP lease.



The following parameters are available in this section:

Parameter	Description
Hostname/IPv6 Address/DUID/ Leasetime remaining	Displays the hostname/IPv6 Address/DUID/ Leasetime remaining of the active DHCPv6 lease.

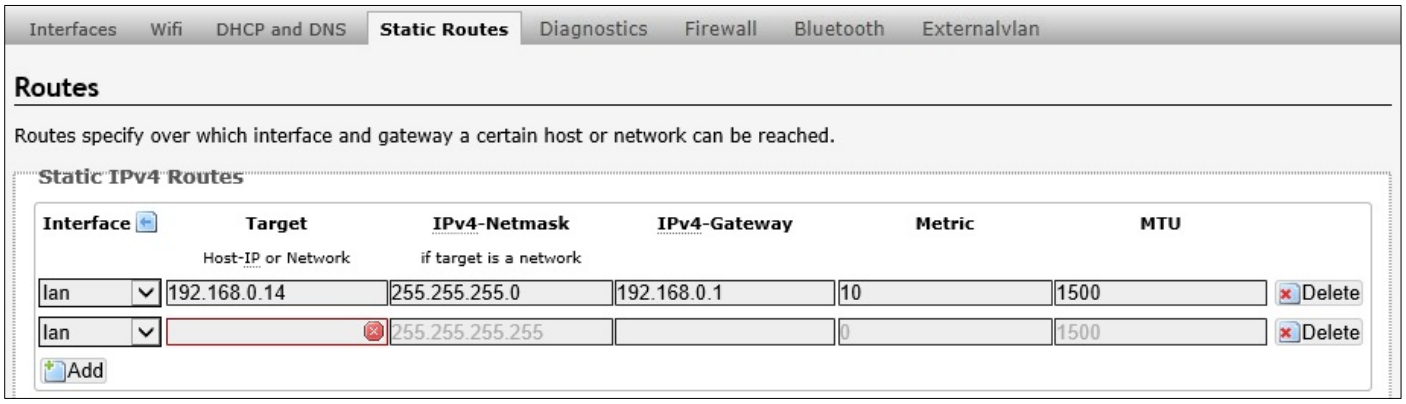


The following parameters are available in this section:

Parameter	Description
Hostname/MAC Address/ IPv4 Address	Enter the hostname/MAC Address/ IPv4 Address for the static DHCP client lease here.

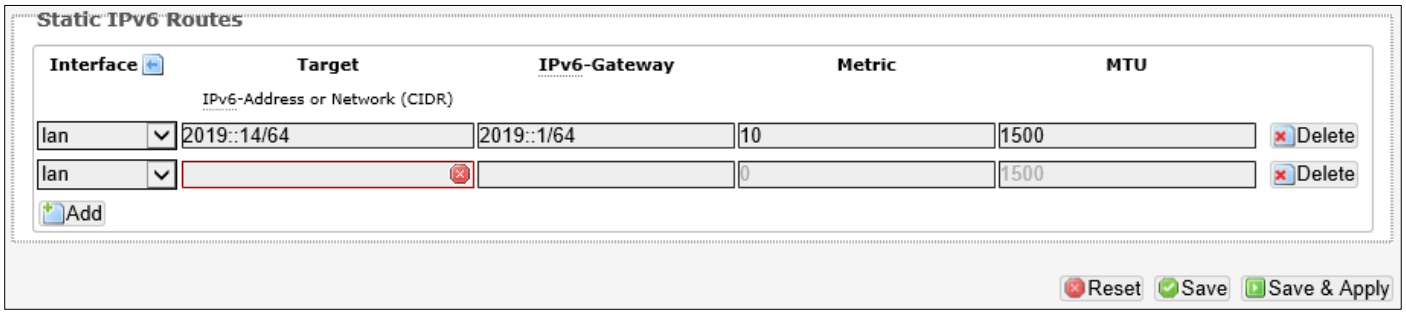
4.3.3.4. Static Routes

This page is used to display and configure static IPv4/IPv6 routes on the AP.



The following parameters are available in this section:

Parameter	Description
Interface	Select the interface for the static IPv4 route here. Options to choose from are lan and wan.
Target	Enter the target IPv4 address or IPv4 network address for the static IPv4 route here.
IPv4 Netmask	Enter the IPv4 subnet mask for the static IPv4 route here.
IPv4 Gateway	Enter the IPv4 address of the gateway for the static IPv4 route here.
Metric/MTU	Enter the metric/MTU for the static IPv4 route here.

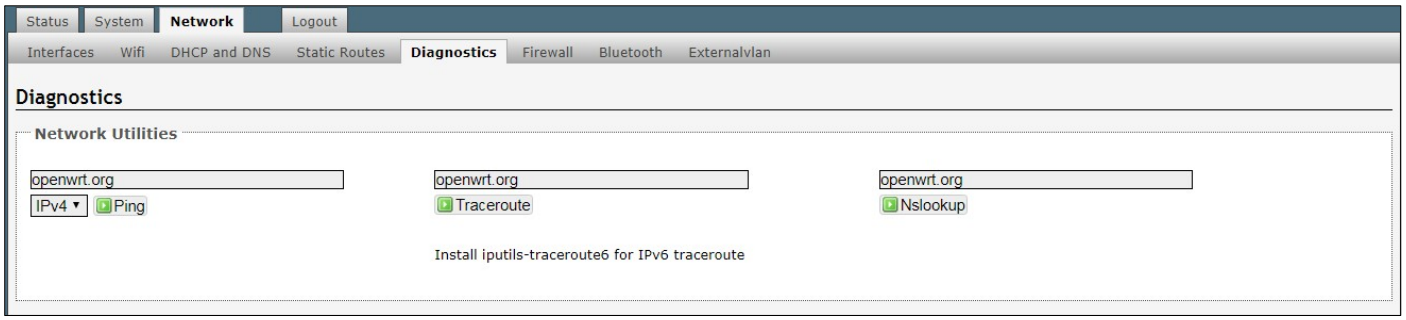


The following parameters are available in this section:

Parameter	Description
Interface	Select the interface for the static IPv6 route here. Options to choose from are lan and wan.
Target	Enter the target IPv6 address or network CIDR (Classless Inter-Domain Routing) for the static IPv6 route here.
IPv6 Gateway	Enter the IPv6 address of the gateway for the static IPv6 route here.
Metric/MTU	Enter the metric/MTU for the static IPv6 route here.

4.3.3.5. Diagnostics

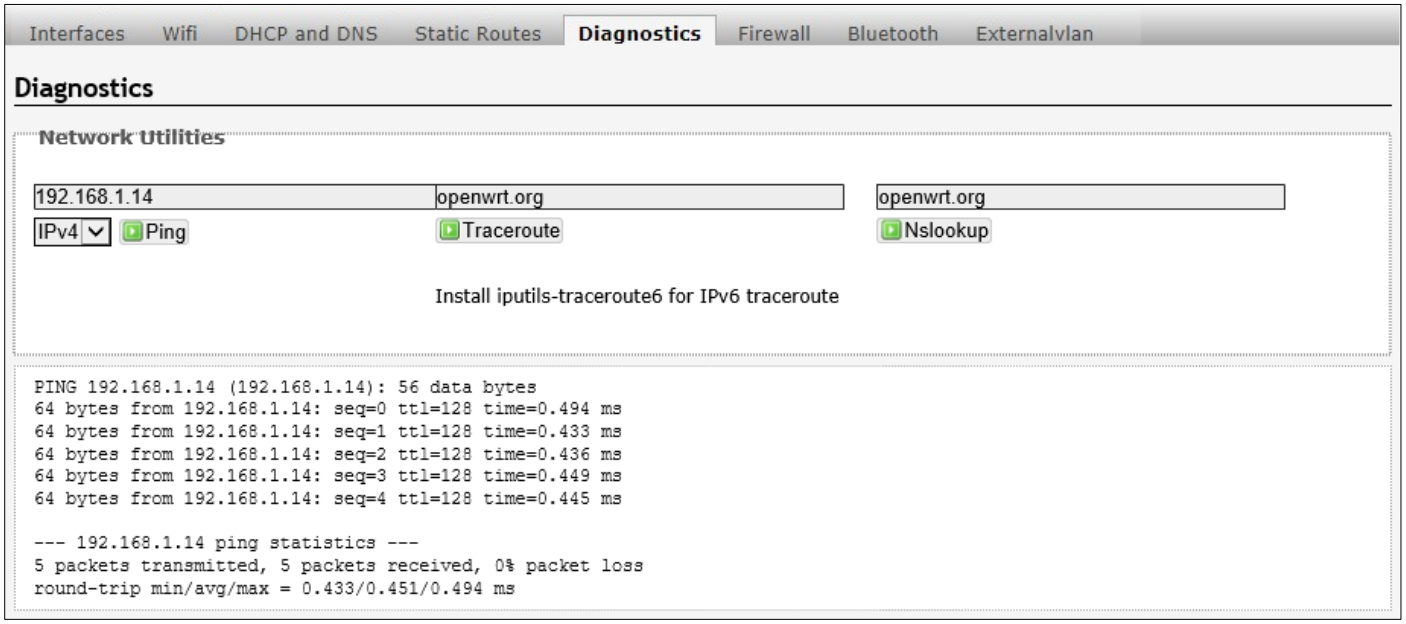
This page provides useful network utilities that can be used to troubleshoot network connectivity between the AP and other networking nodes.



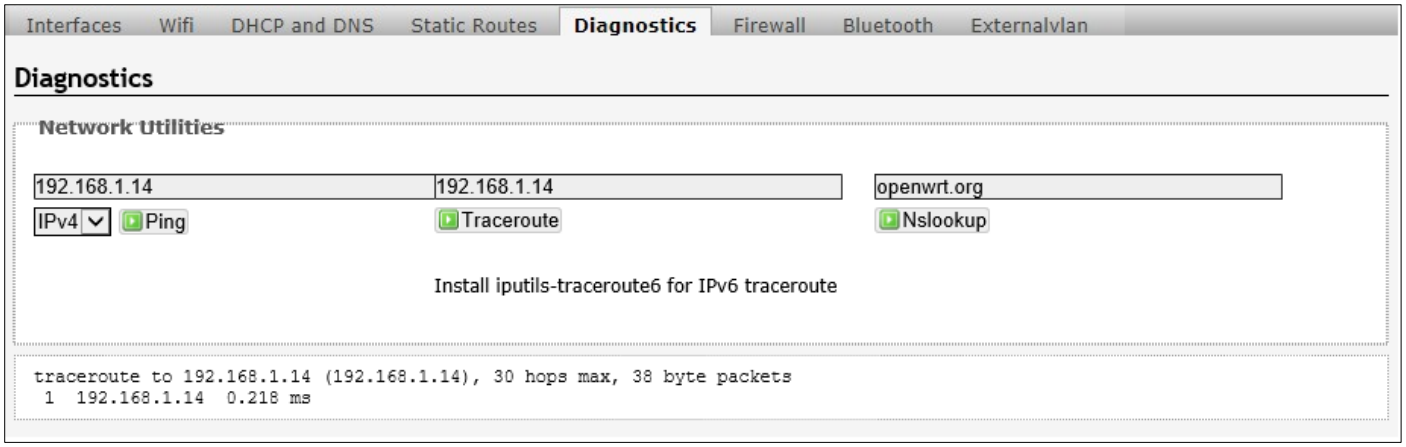
The following parameters are available in this section:

Parameter	Description
Ping	To use the ping utility, enter an IPv4/IPv6 address or domain name in the textbox and click the Ping button. The ping utility is used to send an ICMP request to nodes to probe if the node is active or not.
Traceroute	To use the traceroute utility, enter an IPv4 address or domain name in the textbox and click the Traceroute button. This is used to display the route across the IP network and measure the transit delays of packets from hop to hop.
Nslookup	To use the nslookup (name server lookup) utility, enter an IPv4 address or domain name in the textbox and click the Nslookup button. This is used to querying the DNS to obtain domain name mapping, IP address mapping, and/or DNS records.

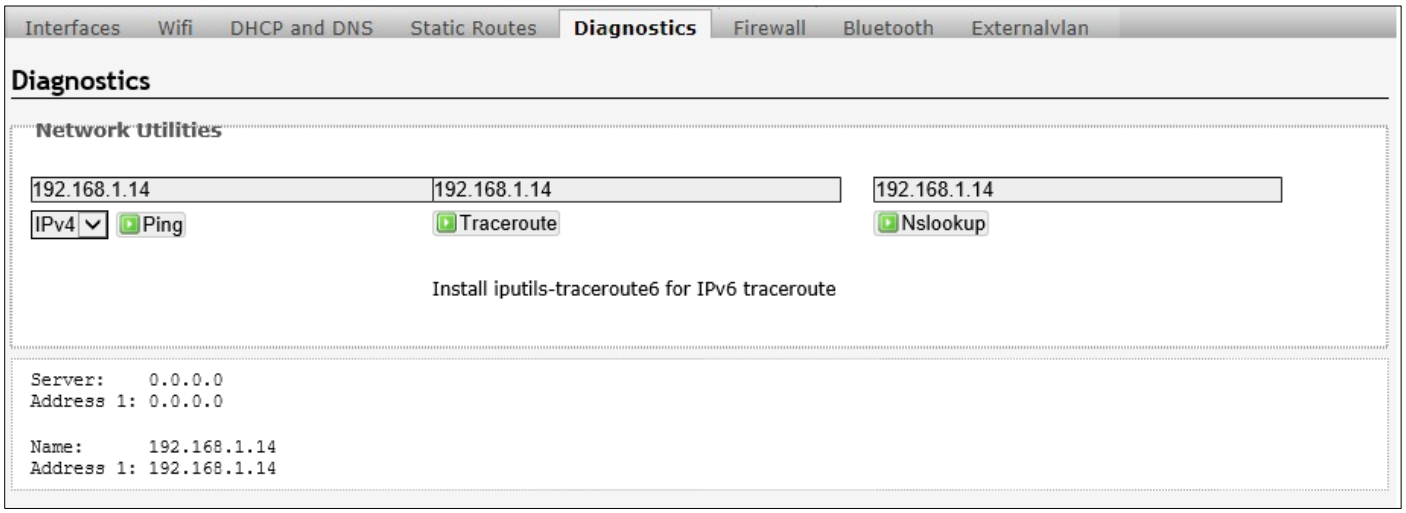
After clicking the Ping button, the following page will appear:



After clicking the Traceroute button, the following page will appear:

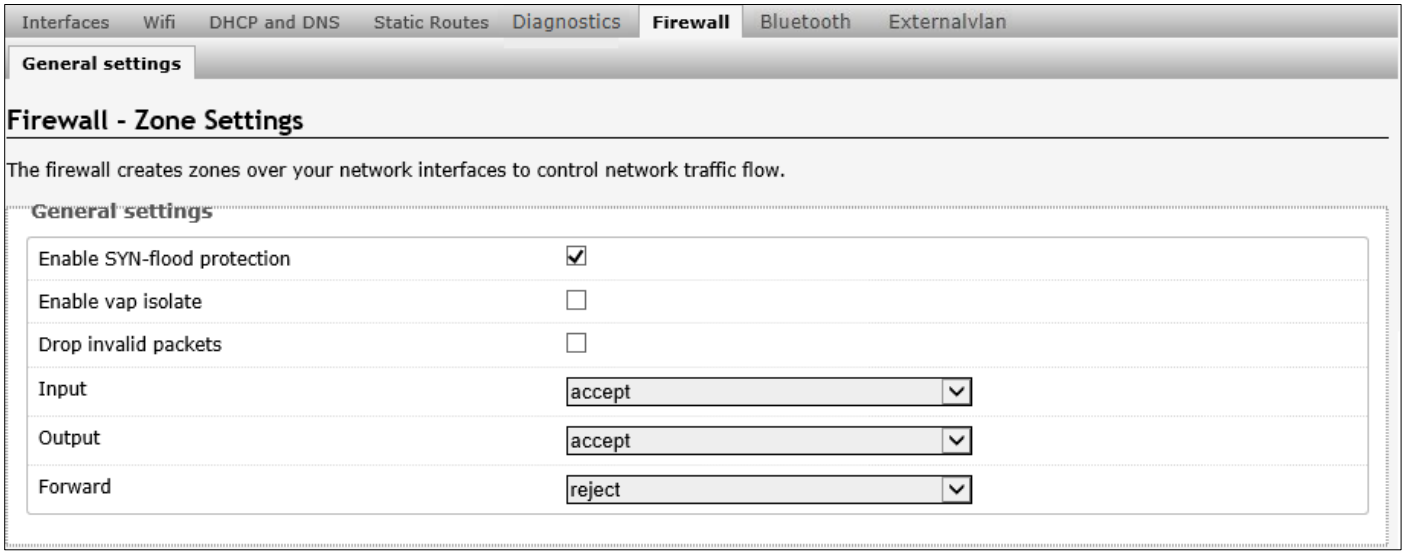


After clicking the Nslookup button, the following page will appear:



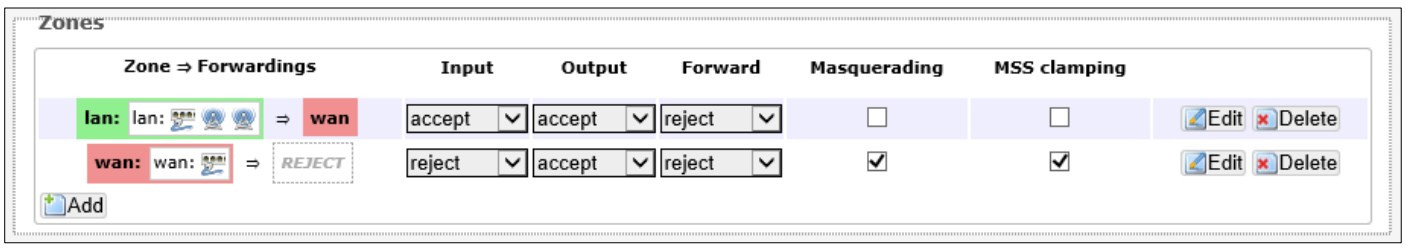
4.3.3.6. Firewall

This page is used to display and configure the firewall settings on the AP.



The following parameters are available in this section:

Parameter	Description
Enable SYN-flood protection	Select this option to enable the SYN-flood protection function. SYN stands for the synchronize step in the TCP three-way handshake.
Enable vap isolate	Select this option to enable the VAP (Virtual Access Point) isolate function.
Drop invalid packets	Select this option to enable the firewall function that will drop invalid received packets in the firewall zone.
Input	Select the input (incoming) action here. Options to choose from are reject, drop, and accept.
Output	Select the output (outgoing) action here. Options to choose from are reject, drop, and accept.
Forward	Select the forwarding action here. Options to choose from are reject, drop, and accept.

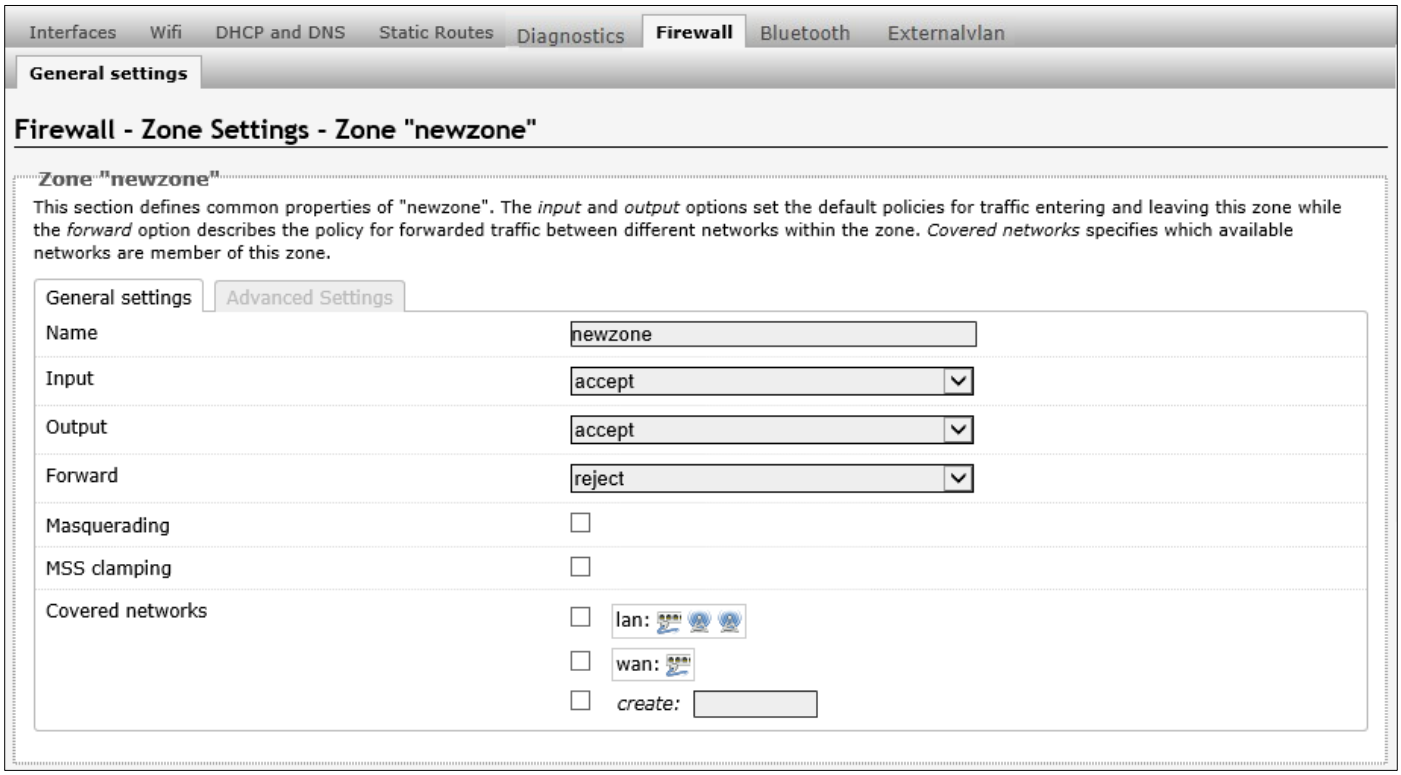


The following parameters are available in this section:

Parameter	Description
Zone → Forwarding	Displays the visual flow for the firewall zone here.

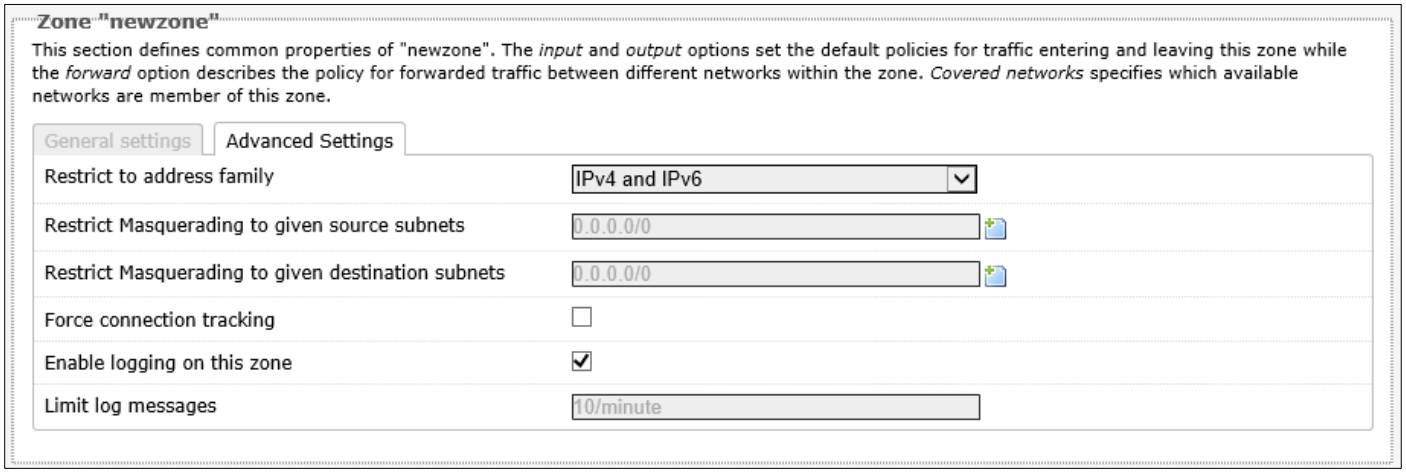
Click the Add/Edit/Delete button to add/ delete a new or modify the existing firewall zone.

After clicking the Add button, the following page will appear:



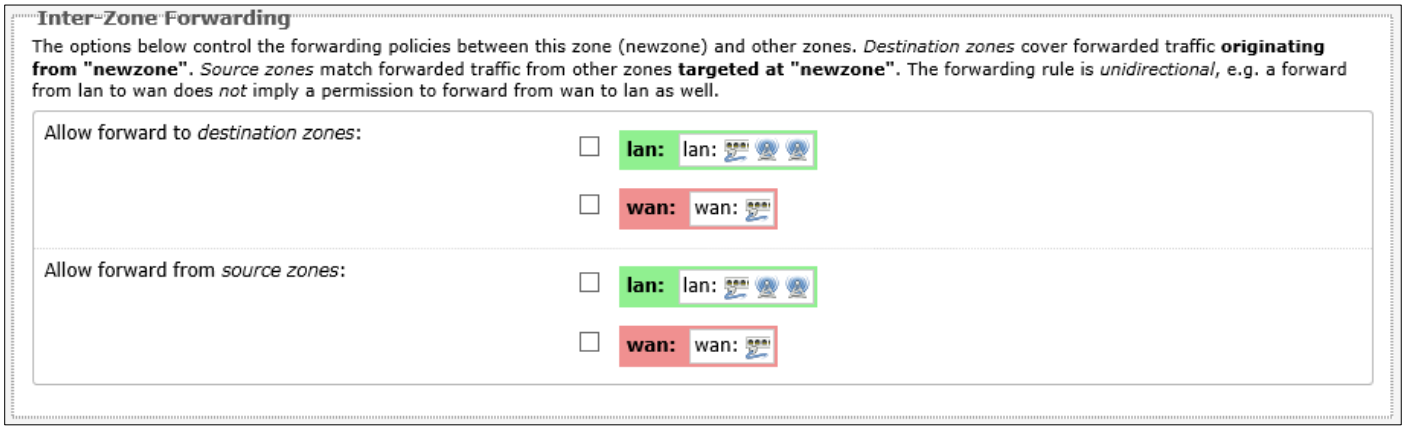
The following parameters are available in this section:

Parameter	Description
Name	Enter the name for the firewall zone here.
Input	Select the input (incoming) action here. Options to choose from are reject, drop, and accept.
Output	Select the output (outgoing) action here. Options to choose from are reject, drop, and accept.
Forward	Select the forwarding action here. Options to choose from are reject, drop, and accept.
Masquerading	Select this option to enable the masquerading function on the firewall zone.
MSS clamping	Select this option to enable the MSS clamping function on the firewall zone.
Covered networks	Select the interfaces that is included in this firewall zone here. Multiple interfaces can be selected. Select the create option to create a new interface for the firewall zone. Enter the name for the new interface in the space provided.



The following parameters are available in this section:

Parameter	Description
Restrict to address family	Select the IP address family that will be restricted here. Options to choose from are IPv4 and IPv6, IPv4 only, and IPv6 only.
Restrict Masquerading to given source subnets	To restrict the masquerading function to a given source subnet, enter the IPv4 subnet of the source here. This option is not available for the IPv6 address family. More than one entry can be created.
Restrict Masquerading to given destination subnets	To restrict the masquerading function to a given destination subnet, enter the IPv4 subnet of the destination here. This option is not available for the IPv6 address family. More than one entry can be created.
Force connection tracking	Select this option to force connection tracking.
Enable logging on this zone	Select this option enable logging on this firewall zone.
Limit log messages	To limit log messages, enter the time limit here.

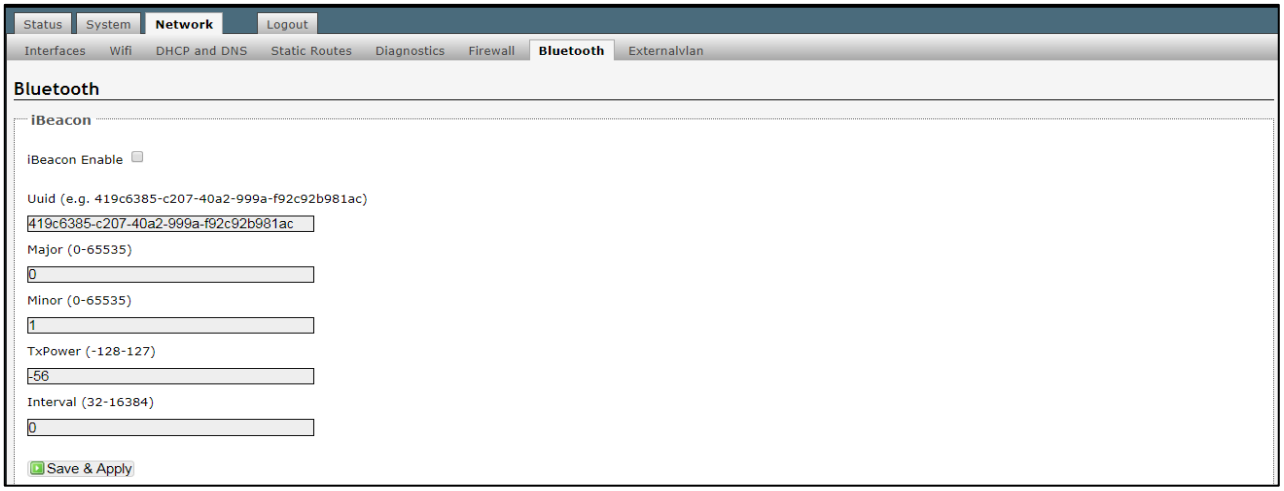


The following parameters are available in this section:

Parameter	Description
Allow forward to destination zones	Select the destination zone here. Traffic is forwarded to this zone from the "newzone".
Allow forward from source zones	Select the source zone here. Traffic is forwarded from this zone to the "newzone".

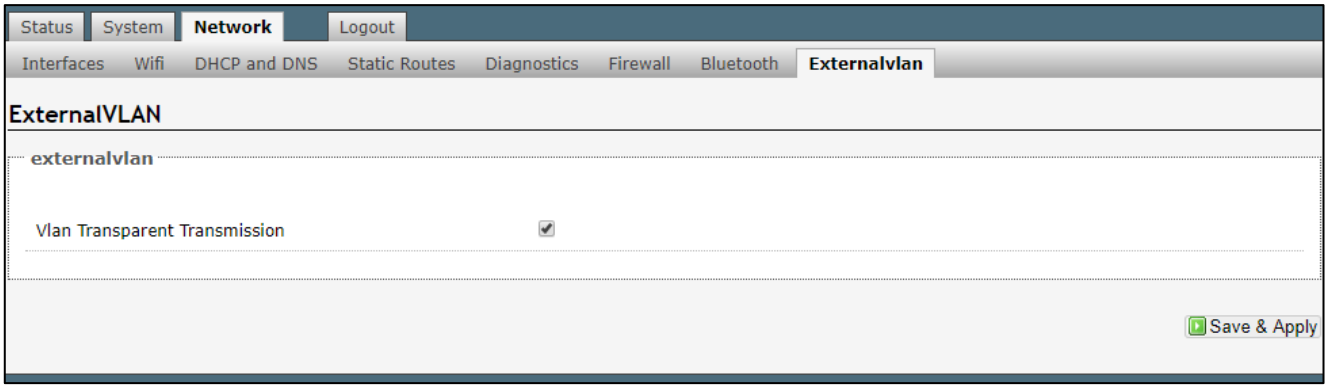
4.3.3.7. Bluetooth

This page is used to display and configure the Bluetooth settings on the AP.



4.3.3.8. Externalvlan

This page is used to enable VLAN transparent transmission settings on the AP.

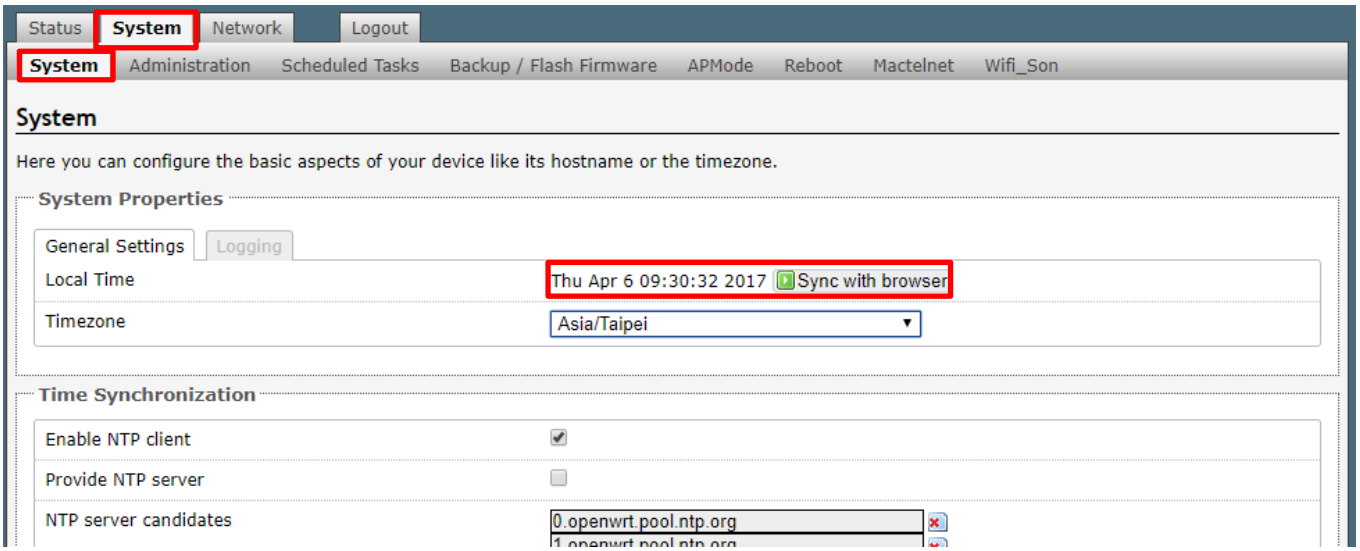


4.4. Bridge Mode

Bridge mode allows two or more wireless access points to communicate with each for the purpose of joining multiple LANs in FAP mode.

4.4.1. Adjust the time zone

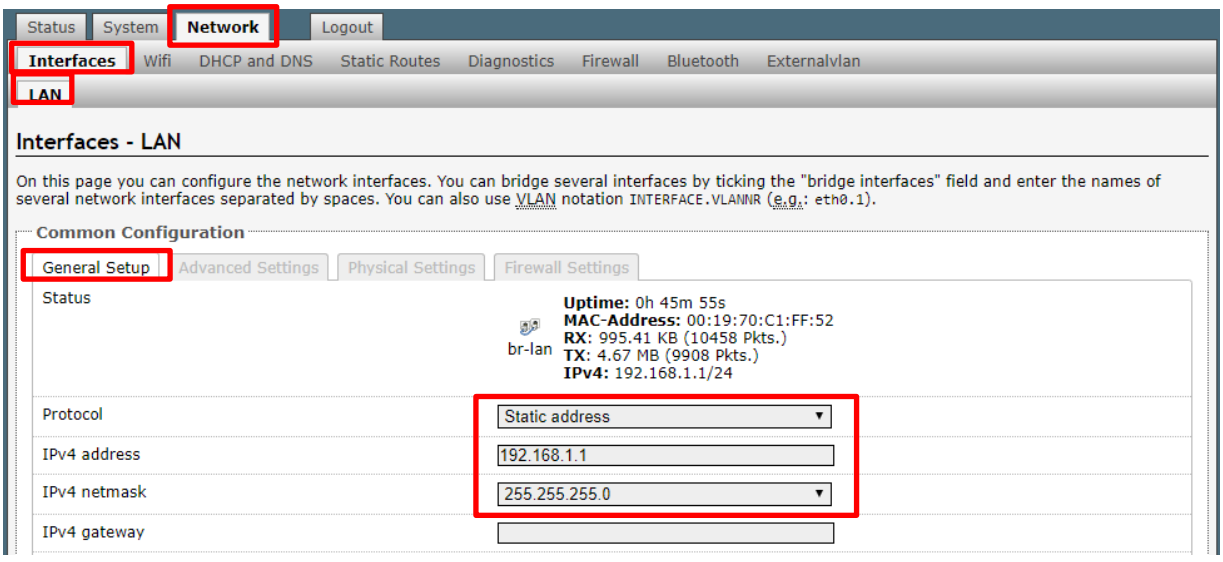
Step 1. Select **System→system**, to select your **Timezone**, and click **Save**



4.4.2. AP General Setup

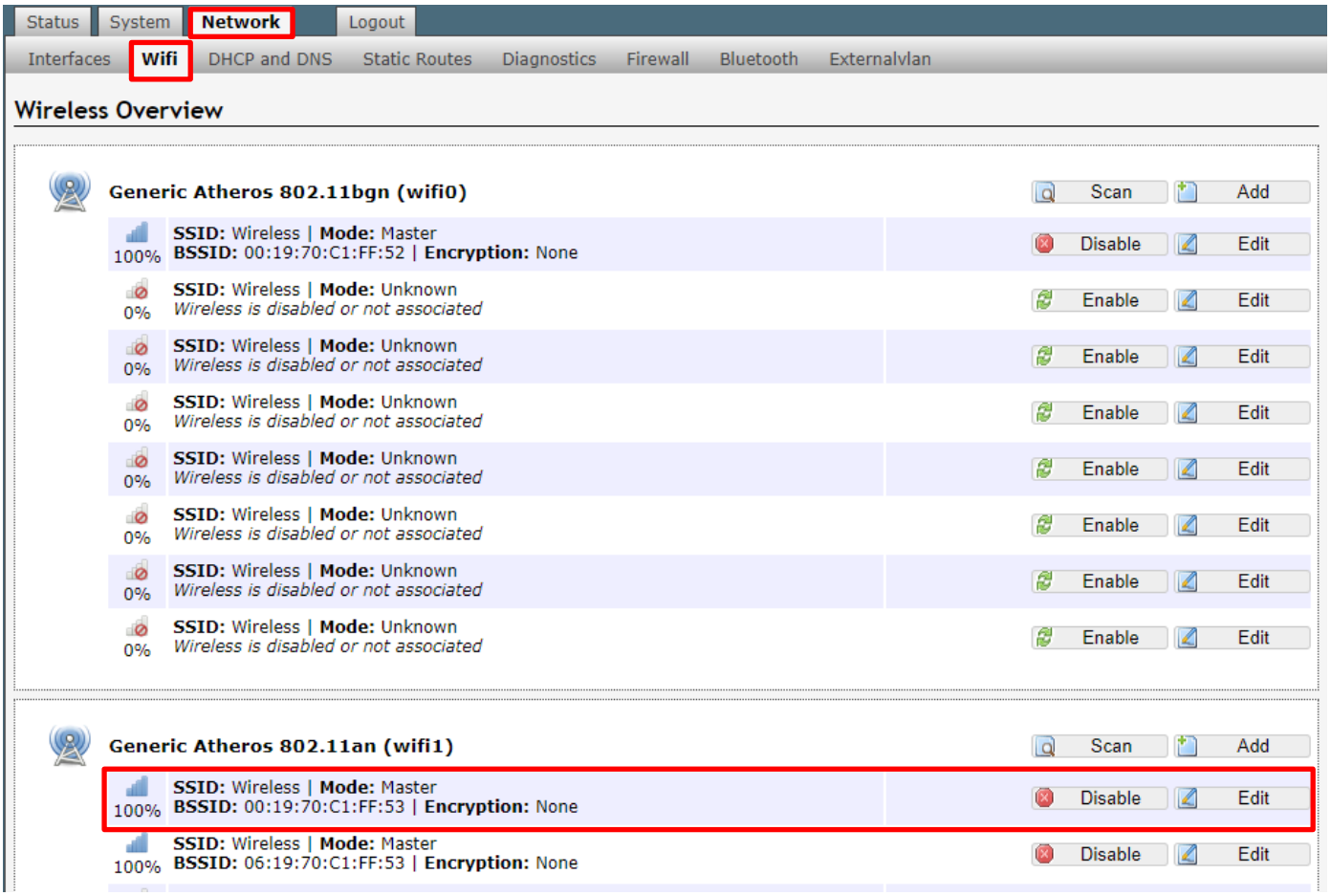
Step 2. Select **Network→Interfaces→LAN→General Setup** in the menu bar to access the following information:
Protocol: Static address
IPv4: 192.168.1.1
IPv4 Netmask: 255.255.255.0

Note: For IPv4 gateway settings, the value can be set according to the needs of deployed environments.



4.4.3. Bridge Mode Setup

Step 3. Select **Network→Wifi**, and choose the first column of Generic Atheros 802.11an(wifi1), then click Edit to setup device and interface configuration.



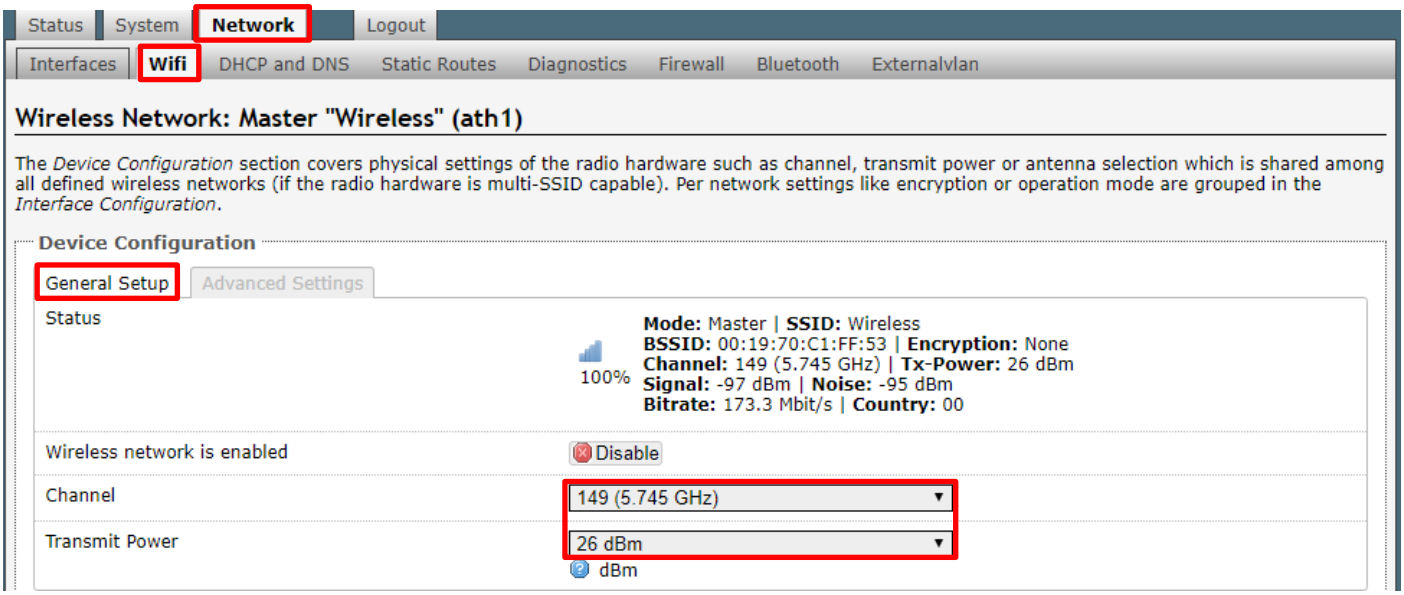
Step 4. There are two steps for device configuration, general setup and advanced settings.

Select **General Setup**, and access the following information:

Channel: 149 (5.745 GHz)

Transmit Power: 26 dBm

Note: For Channel settings, it is recommended to avoid the interference frequency.



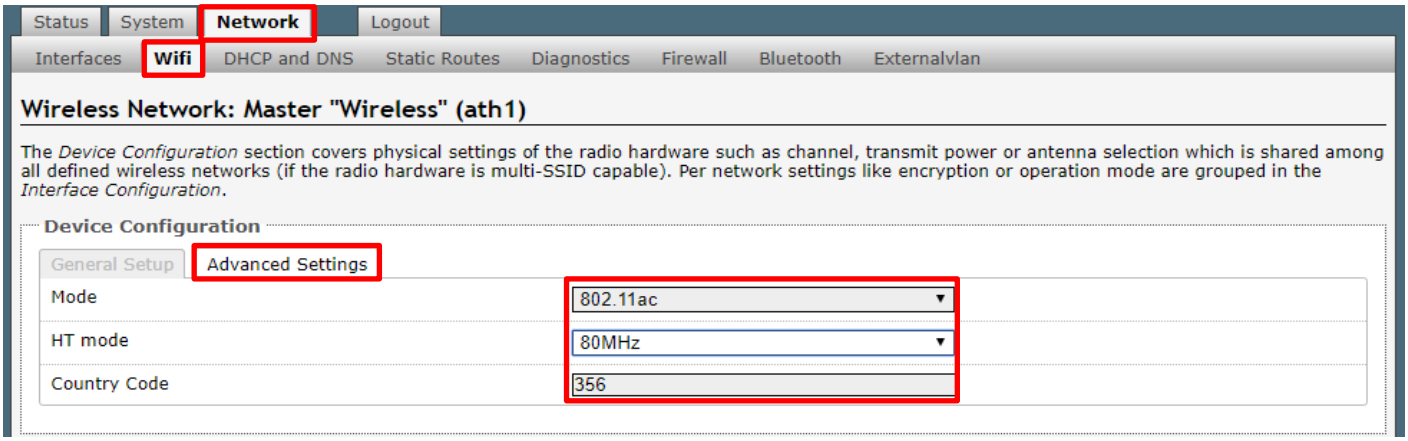
Step 5. Select Advanced Settings, and access the following information:

Mode: 802.11ac

HT Mode: 80MHz

Country Code: 356 (Please select your current country code)

Note: For Mode and HT Mode, the value can be set according to the needs of deployed environments.



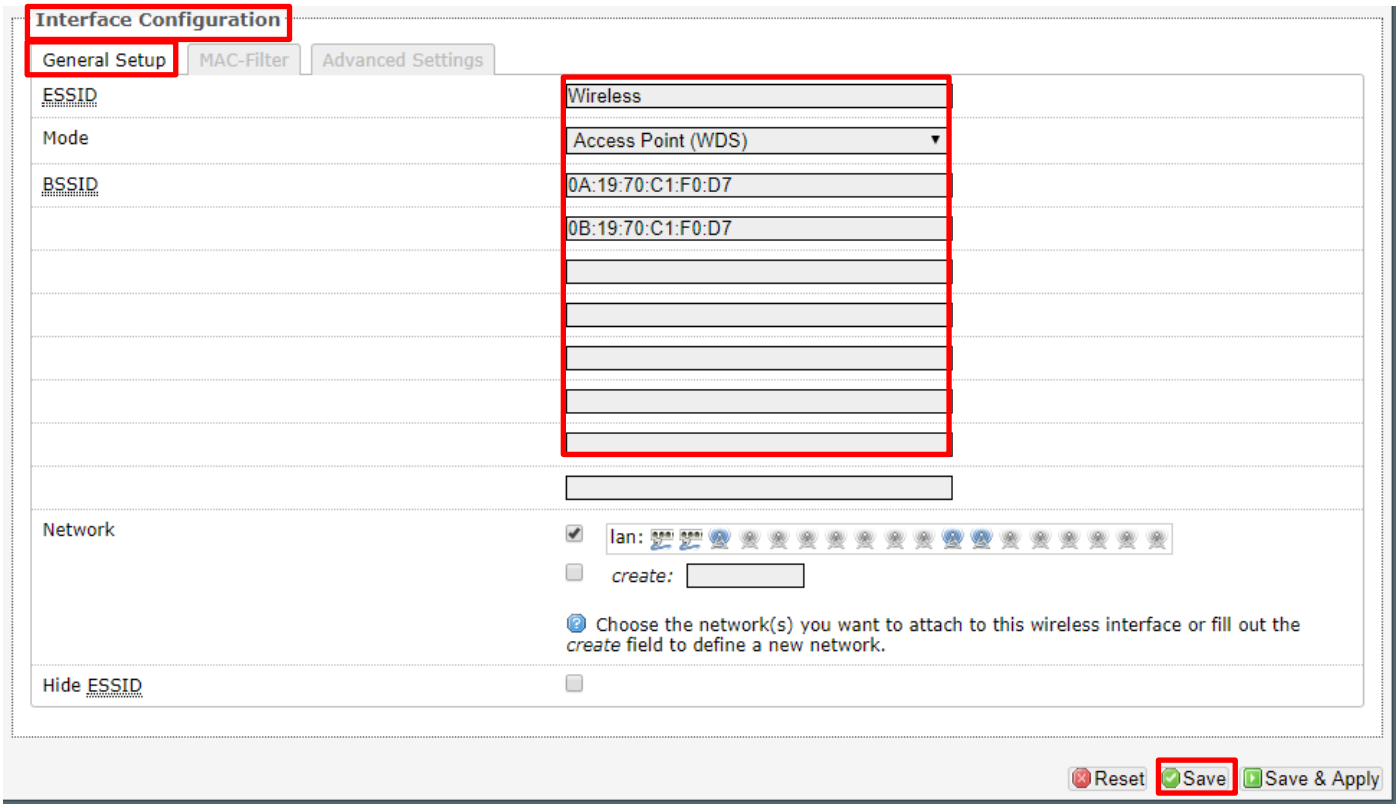
Step 6. For Interface Configuration, Select General Setup, and access the following information.

Mode: Access Point (WDS)

BSSID: Type the MAC address of the AP which should be connected, then click Save

Note: Up to eight APs can be connected.

Note: MAC address is displayed on the label of AP.

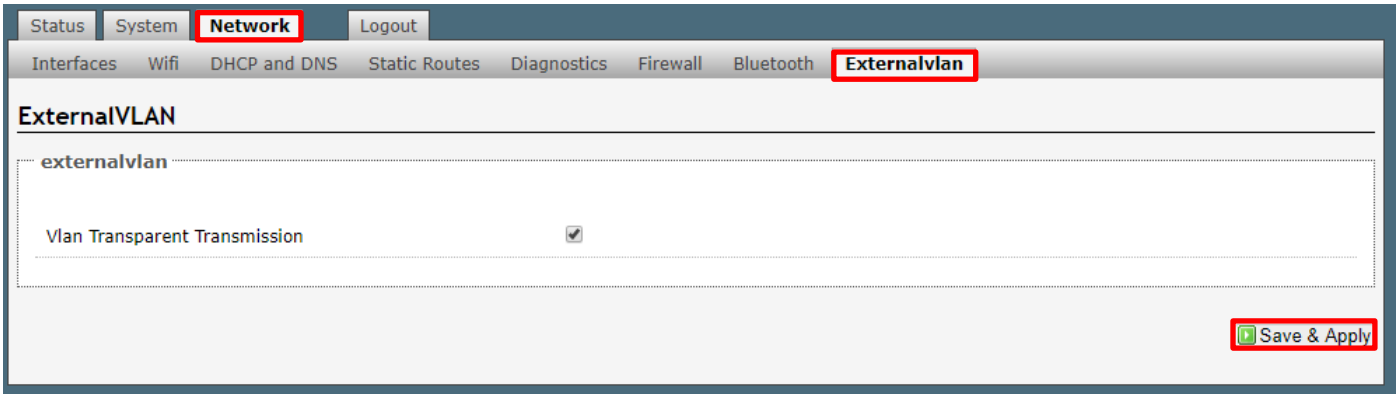


4.4.4. VLAN Trunk

Step 7. Select **Network→Externalvlan**, tick the checkbox, and click Save & Apply 。

Note: Be sure to click Save & Apply to finish the settings.

Note: Repeat Step 1 through Step 8 for the other AP that you want to enable.



Chapter 5. TECHNICAL SPECIFICATIONS

Physical			
Dimensions (L x W x H)	151 x 75.5 x 235 mm (5.94 x 2.97 x 9.25 in)	**WAN/PoE In Port**	One 10/100/1000 Mbps port
Weight	1000 grams (2.2 lbs.)	**LAN Port**	One 10/100/1000 Mbps port
Antenna	**SP230**	2.4GHz: Embedded 5dBi omni antennas 5GHz: Embedded 5dBi omni antennas	
	SP230-S5	2.4GHz: Embedded 5dBi omni antennas 5GHz: Embedded 11dBi directional antennas	
Power Supply	DC 48V, 0.5A PoE		
LAN/PoE Out	48V/10 Watts (Max.), Passive PoE (Pairs 4, 5+; 7, 8 Return)		
Power Consumption	Max. 12 Watts		

Wireless			
Frequency Bands		**2.4GHz Radio**	**5GHz Radio**
	US	2.412 – 2.462GHz	5.15GHz – 5.35GHz 5.47GHz – 5.85GHz
	EU	2.412 – 2.472GHz	5.15GHz – 5.35GHz 5.47GHz – 5.725GHz
	Japan	2.412 – 2.472GHz	5.15GHz – 5.35GHz 5.47GHz – 5.725GHz
	China	2.412 – 2.472GHz	5.15GHz – 5.35GHz 5.725GHz – 5.85GHz
	India	2.412 – 2.472GHz	5.15GHz – 5.35GHz 5.725GHz – 5.85GHz 5.85GHz – 5.875GHz
Operating Channels		**2.4GHz Radio**	**5GHz Radio**
	US	1 – 11	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 132, 136, 140, 149, 153, 157, 161, 165
	EU	1 – 13	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 132, 136, 140
	Japan	1 – 13	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 132, 136, 140
	China	1 – 13	36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, 161, 165
	India	1 – 13	36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, 161, 165, 169, 173
Bandwidth Rate	• 2.4GHz: 20 / 40 MHz • 5GHz: 20 / 40 / 80 MHz		
Wireless Security	**Security:** Open System, 802.1x, WPA-PSK/WPA2-PSK WPA-Enterprise/WPA2-Enterprise		

Wireless	
	Extensible Authentication Protocol (EAP) types: EAP-Transport Layer Security (TLS) EAP-Tunneled TLS (TTLS) Protected EAP (PEAP) EAP-Subscriber Identity Module (SIM) *Above partial functions should be configured by Z-COM Wireless LAN Controllers (WLC)
Operating Mode	SP230: Thin AP (TAP) / Fat AP (FAP) / Bridge SP230-S5: Thin AP (TAP) / Fat AP (FAP) / Bridge / Client
Wireless SSIDs	2.4 GHz (Up to 8 SSIDs), 5.8 GHz (Up to 8 SSIDs)

Bluetooth Low Energy	
BLE	4.1
Frequency	2400-2480MHz
Antenna	1.5dBi (Embedded)

Compliance Standards
IEC/EN 60950 EN55032 & EN55024 EN 62311 & EN 50385 WEEE & RoHS **Radio approvals:** EN 300 328, EN301 893 (Europe) EN 301 489-1 and -17 (Europe) SRRC (China) **IEEE standards:** IEEE 802.11a/b/g/n/ac IEEE 802.11d, e, h, i, j, k, r, u, v time stamp, w, and z standards IEEE 802.3i, u, ab IEEE 802.3af, at (Powered Device) **Multimedia:** Wi-Fi multimedia (WMM)

Environmental		
	Temperature	**Humidity**
Operating	-40°C to 70°C (-40°F to 158°F)	10% to 90% (Non-condensing)
Storage	-40°C to 80°C (-40°F to 168°F)	10% to 90% (Non-condensing)

Chapter 6. APPENDIX

6.1. Warranty

6.1.1. General Warranty

The warranty period stated below replaces the warranty period as stated in the user manuals for the relevant Products. If there is no proof indicating the purchase date, the manufacture date shall be considered as the beginning of the warranty period. The Warranty extends only to the original end-user purchaser and is not transferable to anyone who obtains ownership of the Product from the original end-user purchaser.

1. Z-COM provides one year of conditional warranty depends on different models.
2. Lifetime warranty covers product itself, excluding consumable products, accessories, second-hand products, and software. Lifetime warranty is only effective when products are still in the Z-COM Product list. After the EOL (End of Life) announcement for any Products, the warranty will be one year from the date of such Product EOL announcement. To grant the lifetime warranty, Products should have a proof of purchase (such as the invoice or sales receipt) must be provided upon receiving warranty service. The standard warranty period for any Product had a proof of purchase shall be one year from the date of purchase or manufacture.
3. Products are considered as DOA (Dead on Arrival) after conclusive test within the first 30 days of its shipping date from Z-COM. After 30 days from the shipping date, defective products covered within the warranty are considered as RMA (Return Material Authorization).
4. Z-COM reserves the right to inspect all defective products which must be returned and paid shipping fee by purchasers.

6.1.2. Warranty Conditions

Warranty service will be excluded if following conditions occurred:

1. The product has been tampered, repaired and/or modified by non-authorized personnel
2. The SN (Serial Number) or MAC (Media Access Control) address has been changed, cancelled, or removed
3. The damage is caused by third party software or virus
4. The software loss or data loss that may occur during repair or replacement

6.1.3. Disclaimer

PRODUCTS ARE NOT WARRANTED TO OPERATE UNINTERRUPTED OR ERROR FREE. Z-COM NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE OR USE OF ITS PRODUCTS. Z-COM SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, FOREC MAJEURE EVENT OR ANY OTHER HAZARD. THE INFORMATION CONTAINED HEREIN IS SUBJECT TO CHANGE WITHOUT NOTICE.

6.2. Compliance Information

6.2.1. FCC CAUTION

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.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This radio transmitter has been approved by FCC.

Note: Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user’s authority to operate the equipment.

6.2.2. RF Exposure Warning

The antennas used for this transmitter must be installed to provide a separation distance of at least 26 cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

6.2.3. CE Marking

CE marking on this product represents the product is in compliance with all directives that are applicable to it.

CE

Note: This device meets Max. TX power limit per ETSI regulations.

6.2.4. WEEE Compliance Statement

European Directive 2012/19/EU requires that the equipment bearing this symbol on the product and/ or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

6.2.5. NCC Statement (NCC 警語)

根據 NCC 規定：
經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

- 減少電磁波影響，請妥適使用。
- 本產品使用安裝時，應避免影響附近雷達系統之操作。
- 本產品使用時，建議至少距離人體 26cm 以上。

6.3. Declaration of Conformity

Hereby, Z-COM, Inc. declares that the radio devices are in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: https://www.zcom.com.tw/index/downloads?keyword=&meterial_type=56

6.4. Optional Accessories

PN	Item	Picture	SP230	SP230-S5
SP-CBM5	Anti-theft steel rope + Allen wrench + Four screws		V	V
SP-MKM5	Two-dimensional mounting kit • Two-dimensional mounting bracket • Pole-supported bracket • Intermediate steel plate • Two Flat head screws • Four Self-tapping screws • Four screw anchors • Four Machine screws (M4) • Four Machine screws (M5)		V	V
SP-WP-CM20	Waterproof cable gland		V	V
SP-48063-XX	48V PoE Injector + power cord		V	V

Note: When ordering power adaptors, you must specify the destination region by indicating -US, -EU instead of -XX.

6.5. Contact Information

All information may be changed by Z-COM at any time without prior notice or explanation to the user. For further information please refer to our website: www.zcom.com.tw