WoMaster

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User Manual

COVER

# WR315GR-2C-LTE6-GAX-EC

## Industrial Secure Cellular Router, 2C (Dual Core), WLAN 6 + LTE 6-G, EC OS

EC OS Web interface and SSH commands
Jun.2026 V1.3e

Original version:

**WR315GR-M2 Series**

**Industrial Secure Cellular Router, 2C (Dual Core) Series**

www.womaster.eu

# WoMaster

## WR315GR –M2 Series
## WR315GR-2C-LTE6-GAX-EC
Industrial Secured Cellular Router, 2C (Dual Core) Series

# User Manual

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## About This Manual

This user manual is intended to guide a professional installer to install and to configure the WoMaster Industrial Secured and Rugged LTE Serial Router. It includes procedures to assist you in avoiding unforeseen problems.

**NOTE:**

Only qualified and trained personnel should be involved with installation, inspection, and repairs of this router.

### Disclaimer

WoMaster reserves the right to make changes to this Manual or to the product hardware at any time without notice. Information provided here is intended to be accurate and reliable. However, it might not cover all details and variations in the equipment and does not claim to provide for every possible contingency met in the process of installation, operation, or maintenance. Should further information be required or should particular problem arise which are not covered sufficiently for the user's purposes, the matter should be referred to WoMaster. Users must be aware that updates and amendments will be made from time to time to add new information and/or correct possible unintentional technical or typographical mistakes. It is the user's responsibility to determine whether there have been any such updates or amendments of the Manual. WoMaster assumes no responsibility for its use by the third parties.

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# Declaration of Conformity

**CE RED (Radio Device Directive)**

While you see the CE Marking print in our product, it indicates the product comfort to the requirement of the CE RED.
We provide the CE RED Declaration of Conformity (DoC) for our Wireless Router products in our web site. The DoC includes the Brand Name, Product Name, Model Name, Description, compliant standards and Manufacture information. Different product may comfort to different standards of Safety, Health, EMC, Radio and other specific standard. You can download the formal document of the product in our Web site or apply from our Sales/Technical people.

The DoC in this product manual applied to below models:
Brand Name: **WoMaster**
Product Name: **Industrial Grade Dual-Core Secure 5GNR/LTE Router**
Model Name: **WR315GR-2C-M2**
Serial Model Name: **WR315GR-2C-5GM2-EU, WR315GR-2C-5GM2-GL, WR315GR-2C-LTE6-GAX-EC, WR315GR-2C-LTE6, WR315GR-2C-LTE**
Compliant Standard:
Safety: EN IEC 62368-1
EMC: EN301489-1/17/52, EN50121-4
MPE: EN IEC 62311
RF(By Module): EN301908-1/2/13, EN300328, EN301893

The declaration of CE RED is authorized at the following company and address.

**WoM ASIA CO., LTD**

( Manufacturer Name )

**13F, No.190, Sec.2, Zhongxing Rd., Xindian Dist., New Taipei 231, Taiwan**

( Manufacturer Address )

# I. U.S. Federal Communications Commission (FCC)

**Model Name: WR315GR-2C-LTE6-GAX-EC**

**FCC ID: 2AXAMWR315GM2**

**Contains ID: 2AXAM8XM0004**

## FCC Part 15 Compliance

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:

• This device may not cause harmful interference.

• This device must accept any interference received, including interference that may cause undesired operation.

## FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## Class A Digital Device Notice

Note: 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.

## FCC RF Exposure Compliance

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with FCC RF exposure compliance requirement, please follow operation instruction as documented in this manual.

## Radiation Exposure Statement:

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter

## II. Innovation, Science and Economic Development Canada (ISED)

**ISED (IC Certification Information)**

| English | Français (French) |
|---|---|
| **Model:** WR315GR-2C-LTE6-GAX-EC | **Modèle:** WR315GR-2C-LTE6-GAX-EC |

**Contains Transmitter Module IC ID:** 34378-WR315GRLTE6, 34378-WR315GRGAX

**Industry Canada ICES-003 Compliance:**

This Class A digital apparatus complies with Canadian ICES-003. **CAN ICES-003 (A)/NMB-003 (A)**

**Avis de conformité à la réglementation d'Industrie Canada :** Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

**ISED Compliance Statement**

| English (ISED Standard Statement) | Français (Déclaration ISED Standard) |
|---|---|
| This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. | L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage; (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. |

**ISED RF Exposure Compliance (RSS-102)**

| English | Français |
|---|---|
| This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20 cm** between the radiator and your body. | Cet équipement est conforme aux limites d'exposition aux radiations ISED CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de **20 cm** entre le radiateur et votre corps. |

**Transmitter Antenna Information (RSS-Gen Section 6.8)**

This radio transmitter **IC:** 34378-WR315GRLTE6, 34378-WR315GRGAX has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated for each antenna type. Antenna types not included in this list, having a gain greater than the maximum gain

indicated for any type listed, are strictly prohibited for use with this device.

### Français

Le présent émetteur radio **IC:** 34378-WR315GRLTE6, 34378-WR315GRGAX a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste sont strictement interdits pour l'exploitation de cet appareil.

| Model | Frequency Band | Antenna type | Max gain(dBi) | Note |
|---|---|---|---|---|
| WR315GR-2C-LTE6-GAX-EC | Wi-Fi 2400-2500 MHz/<br>5150–5850 MHz (see note) | Dipole | 4.4/<br>5.0 | Tri-band-P1/<br>Tri-band-P4 |
| | LTE 617-960 MHz/<br>1710-2700 MHz | Dipole | 4.1<br>6.9 | LTE-P2,P4/<br>LTE-P1 |

**Note:** Although the antenna datasheet specifies a frequency range of 5150–7125 MHz, the device's transmitter is firmware-locked to operate strictly within the 5150–5850 MHz band. **Remarque :** Bien que la fiche technique de l'antenne indique une plage de fréquences de 5150 à 7125 MHz, l'émetteur de l'appareil est verrouillé par micrologiciel pour fonctionner uniquement dans la bande 5150 à 5850 MHz.

## III. Operation and Installation Restrictions

**5 GHz Operation Restriction (FCC §15.407(e) / RSS-247 §6.4)**

| English (Mandatory Restriction) | Français (Restriction Obligatoire) |
|---|---|
| **Operation in the band 5150–5350 MHz is restricted to indoor use only.** | **L'exploitation de la bande 5150-5350 MHz est limitée à une utilisation à l'intérieur seulement.** |

## Installer Compliance Responsibility (KDB 353028 D01 Compliant)

**Model WR315GR-2C-LTE6-GAX-EC is restricted to professional installation only.**

**Professional Installation Requirement:** This device is restricted to **Professional Installation** only.

1. Distribution Channel: The equipment is intended for industrial and commercial applications and is marketed and sold only through authorized distributors and system-integrator partners; it is not sold through general retail channels or directly to the general public.
2. Installation Expertise: Installation and configuration must be performed by trained professional installers who are familiar with RF planning and local regulatory requirements.
3. Antenna Restriction:

   - Any antenna substitution or replacement must be performed by a professional installer.

   - The professional installer is responsible for ensuring that the chosen antenna type and gain, when combined with the device's output power settings, results in an Equivalent Isotropically Radiated Power (EIRP) that remains compliant with local FCC and ISED regulatory limits.

   - End-users are prohibited from replacing the antenna or adjusting antenna-related configuration parameters.

4. Installer Responsibility: The professional installer is responsible for ensuring that the device is operated in accordance with local country regulatory requirements, including antenna selection, output power settings, and permitted operating frequency bands.
5. End-User Control Restriction: End-users do not have access to controls that could change the operational parameters of the device (such as antenna gain or output power) that would violate FCC and ISED regulatory compliance.

**Le modèle WR315GR-2C-LTE6-GAX-EC est réservé à une installation professionnelle. Exigence d'installation professionnelle : Cet appareil est limité à une installation professionnelle uniquement.**

1. Canal de distribution (Distribution Channel) : L'équipement est destiné aux applications industrielles et commerciales et est commercialisé et vendu uniquement par l'intermédiaire de distributeurs agréés et de partenaires intégrateurs de systèmes ; il n'est pas vendu par les canaux de vente au détail généraux ni directement au grand public.
2. Expertise en installation (Installation Expertise) : L'installation et la configuration doivent être effectuées par des installateurs professionnels formés qui connaissent la planification des radiofréquences (RF) et les exigences réglementaires locales.
3. Restriction relative à l'antenne (Antenna Restriction) :
   - Toute substitution ou remplacement d'antenne doit être effectué par un installateur professionnel.
   - L'installateur professionnel est responsable de s'assurer que le type d'antenne et le gain choisis, lorsqu'ils sont combinés aux réglages de puissance de sortie de l'appareil, entraînent une puissance isotrope rayonnée équivalente (PIRE) qui reste conforme aux limites réglementaires locales de la FCC et de l'ISDE.
   - Il est interdit aux utilisateurs finaux de remplacer l'antenne ou de modifier les paramètres de configuration liés à l'antenne.
4. Responsabilité de l'installateur (Installer Responsibility) : L'installateur professionnel est responsable de s'assurer que l'appareil est utilisé conformément aux exigences réglementaires du pays local, y compris la sélection de l'antenne, les réglages de puissance de sortie et les bandes de fréquences de fonctionnement autorisées.
5. Restriction du contrôle par l'utilisateur final (End-User Control Restriction) : Les utilisateurs finaux n'ont pas accès aux commandes qui pourraient modifier les paramètres opérationnels de l'appareil (tels que le gain de l'antenne ou la puissance de sortie) qui violeraient la conformité réglementaire de la FCC et de l'ISDE.

# SAFETY PRECAUTION

- **Statement regarding restricted access:** ⚠ The equipment is intended to be used in a restricted access location. Access should only be given to skilled person or instructed person who has been trained in the operation of the equipment and informed of the potential hazards.
- **Power Specification:** Follow the power installing instruction of the user manual, it indicates the available input voltage range, V+/V- pin assignment, power consumption and other notice. Only operate the device within the specified input voltage range as indicated in the user manual and the device label.

> **!** Connecting power with reverse polarity or using the wrong type of power supply may damage the equipment. Make sure that the power supply is connected correctly and of the recommended type.

- **Disconnect Device:** A readily accessible disconnect device (such as a circuit breaker or switch) shall be incorporated in the building installation wiring for permanently connected equipment.
- **Overcurrent Protection:** To ensure protection against short circuits and fire hazards in the supply circuit, it is recommended to install an external fuse or circuit breaker rated at 2A (for 24V) or 3A (for 12V) on the power input line.
- **Switch ON Notice:** Only switch on the supply voltage after verifying that the housing is closed, the input voltage is correct, and the terminal blocks are wired correctly.
- **Grounding: To avoid system damage, the equipment should be connected to ground.** Reliable grounding is essential for EMC compliance and safety. Ensure the equipment is properly connected to the protective earth (PE) ground before connecting the power supply. Use a grounding wire with a minimum cross-sectional area of 18 AWG. For better EMC performance (noise immunity), a thicker and shorter grounding wire is recommended.
- **Wiring:** Use connection cables that are rated for the specified voltage, current, wire diameter, and temperature range. For reliable data transmission in harsh environments, use high-quality industrial-grade RJ45 connectors to prevent signal loss or intermittent connection.

  **Note for PoE application (if used):** If the equipment is installed in a PoE (Power over Ethernet) environment (e.g., using a PoE splitter), use high-quality industrial-grade RJ45 connectors. In harsh environments, inferior quality plugs may cause arcing, short circuits, or damage to the PD (Powered Device).

- **Hot Surface Warning: Caution:** The metal housing may become very hot during operation (especially when PoE power is supplied), avoid touching the surface directly. Allow the equipment to cool down before handling or maintenance.

- **Mounting:** ⚠ The equipment is only suitable for mounting at height ≦2m.
- **Environment:** Only operate the device at the specified ambient temperature and humidity. Do not expose the device to rain or moisture unless it is rated for such environments.
- **SIM Card:** ⚠ **Caution:** Disconnect the power supply before removing the SIM cover or inserting/removing the SIM card.
- **SIM Card:** ! Ensure that the SIM card is installed correctly to avoid damage to the SIM card or the router. The SIM cover must be mounted again before power is reapplied.
- **NOT allow to open the housing:** There are no user-serviceable parts inside. Only technicians authorized by the manufacturer are permitted to service the equipment.

# 1. INTRODUCTION

## 1.1 OVERVIEW

New industrial high-performance router WR315GR-M2 Series with dual-core 880MHz CPU has a M2 expansion socket for 5GNR Cellular as well as 4G LTE, 3G/2G networks. One Gigabit WAN port and four Gigabit LAN ports provide switch functions as well as WAN redundancy upon cellular networks.

The **WR315GR-2C-LTE6-GAX-EC** series supports LTE Cat.6 and Wi-Fi 6 for cellular and Wireless LAN connectivity and latest OpenWRT operating system.

| Model Name | Description |
|---|---|
| **WR315GR-M2** | Industrial Secure Router, **Dual Core**, 5GbE, 1 Relay, 2SIM, 1x Expansion M2 socket |
| **WR315GR-2C-LTE6-G-EC** | Industrial Secure Router, Dual Core, 5GbE, 1 Relay, EC OS, LTE6-G |
| **WR315GR-2C-LTE6-GAX-EC** | Industrial Secure Router, Dual Core, 5GbE, 1 Relay, EC OS, 802.11ax WLAN6 client, LTE6-G |
| | **EC OS: Embedded Computing based on OpenWRT OS.**<br>**Note: The web GUI/SSH command is different than standard WOM OS version, it supports one SIM only.**<br>5GNR/LTE Frequency/Bands:<br>*choose one by region: For other frequency bands not listed, please inquire with our sales.<br>List the available 4G LTE module/region in below<br>*1/2 Serial Port support by request, please inquire with our sales. |
| © WoMaster Inc. All rights reserved. Specifications are subject to change without notice. Please ask our sales for the most up-to-date product information. | |

## 1.2 MAJOR FEATURES

Below are the major features of WR315GR-2C-LTE6-GAX-EC:

- Dual Core High Speed Processor
- 5 x 100/1000MBase-T RJ45, Auto Negotiation, supports routing mode with 1xWAN and 4xLAN ports
- Extended M2 socket for 4G LTE Cat.6, up to 300Mbps DL speed, backward compatible with 3G
- Supports Wi-Fi 6 Client WAN connectivity, 2.4G/5GHz Wi-Fi 6 station with up to 1800Mbps peak rate
- Support Nano SIM for 4G LTE connectivity
- The **EC OS** version software supports **LTE Cat.6 Global band + Wi-Fi 6 Client mode (Mode with LTE6-GAX-EC)**
    - Features: OpenWRT 23.05, Router mode of 1xWAN+4xLAN, SSH terminal, LuCI web GUI includes System Setting, NTP Setting, Router Password setting with strength check, SSH Access and Key upload, HTTPS, init script startup setting, configuration backup/restore, firmware upgrade, system reboot, watchcat(watchdog), ser2net, Interface configuration, Wi-Fi interface setting, DHCP server/client, DHCP Relay, DNS, firewall setting, static router, Diagnostic Ping, traceroute, Nslookup, Device Status and Mobile Information.
    - WLAN Configuration: Support Wi-Fi Client mode.

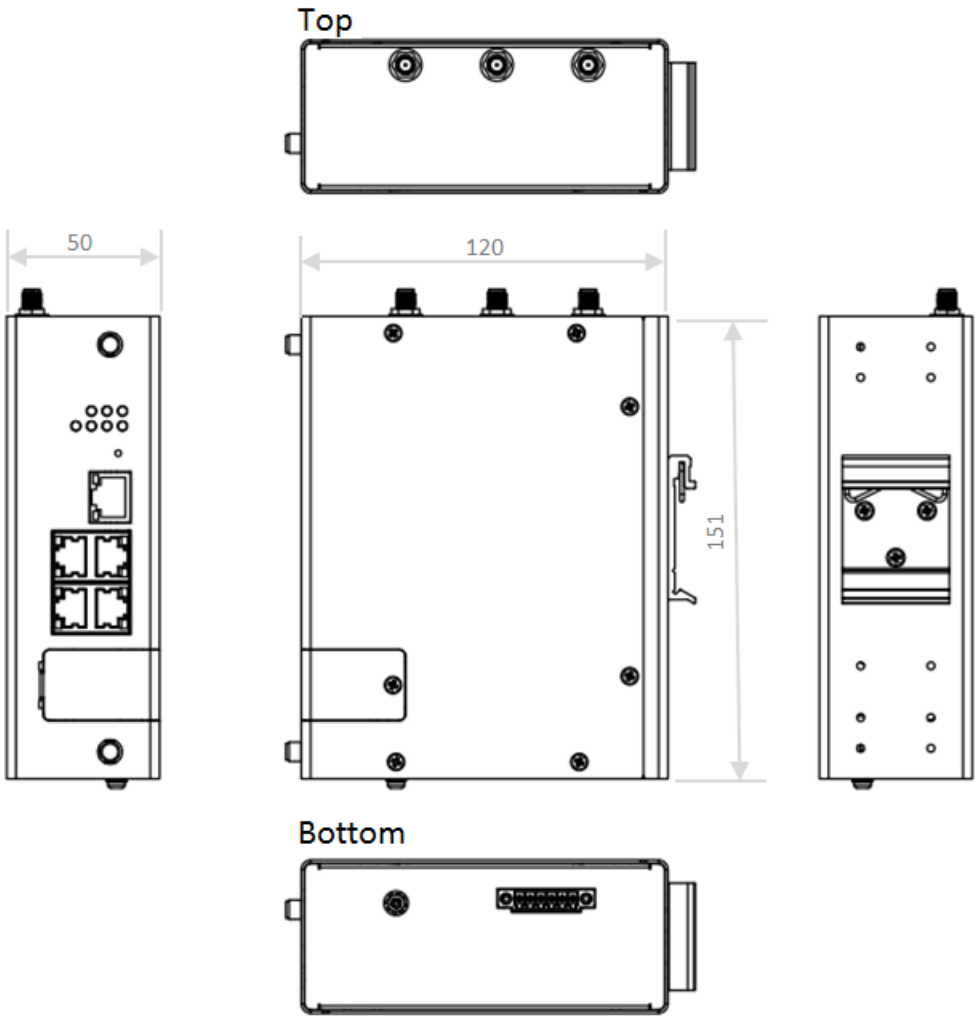
      WLAN Basic Settings: Radio on/off, mode selection, 2.4G/5G 11ax Band and Frequency selection, SSID, Hide SSID, Wireless Security encryption includes WPA3-SAE and WPA2-PSK/WPA-PSK/Open, advanced WLAN settings, WLAN MAC Filter, 802.11r fast transition
    - Cellular Configuration: Support Modem manager tool for Radio on/off, 4G LTE/3G HSPA Configuration, APN, SIM Security, Connection Status and Cellular diagnostic
- Steel Metal Housing and aluminum heat sinks inside for heat dissipation
- Wide range operating temperature -40~70˚C
- Typical 24V (9-48V) power input
- IP30 ingress protection

# 2. HARDWARE INSTALLATION

This chapter introduces hardware and contains information on installation and configuration procedures.

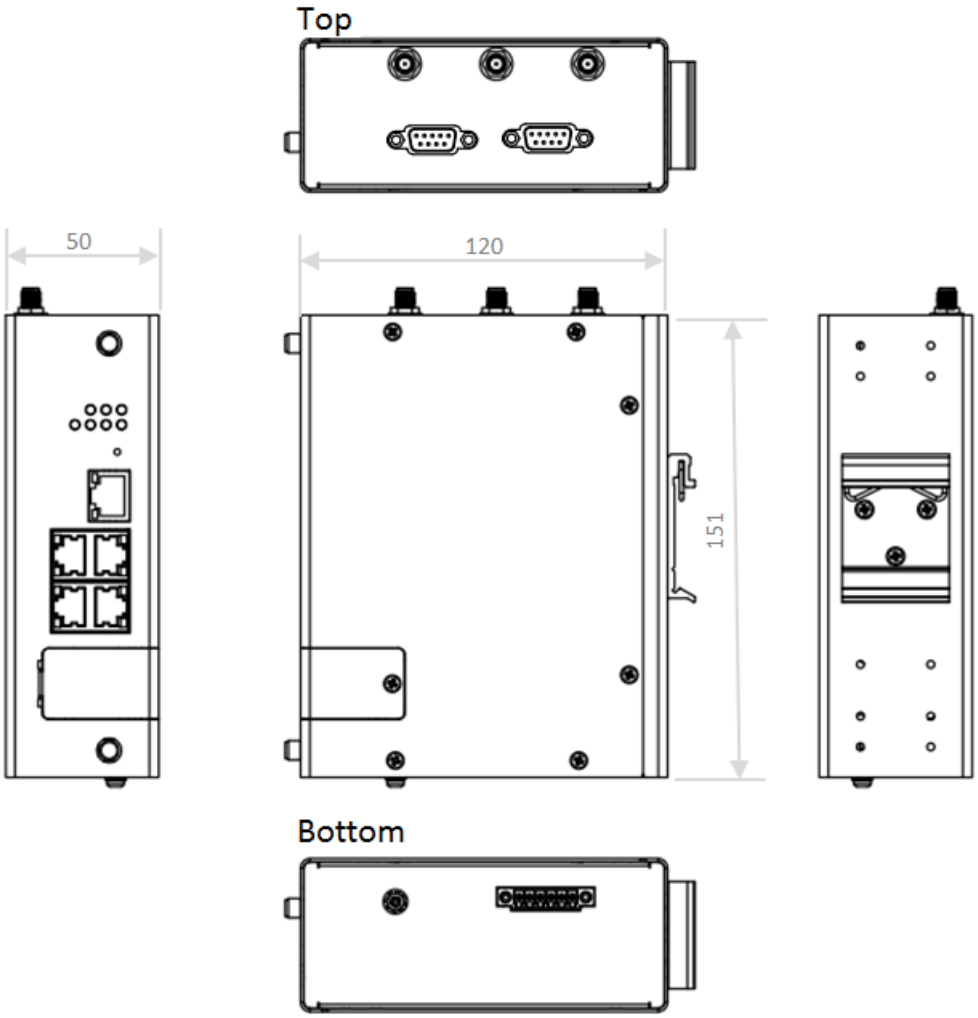
## 2.1 HARDWARE DIMENSION

Dimensions of WR315GR-M2: 50 x 151 x 120 (W x H x D) / without DIN Rail Clip



Dimensions of WR315GR-M2+2COM: 50 x 151 x 120 (W x H x D) / without DIN Rail Clip

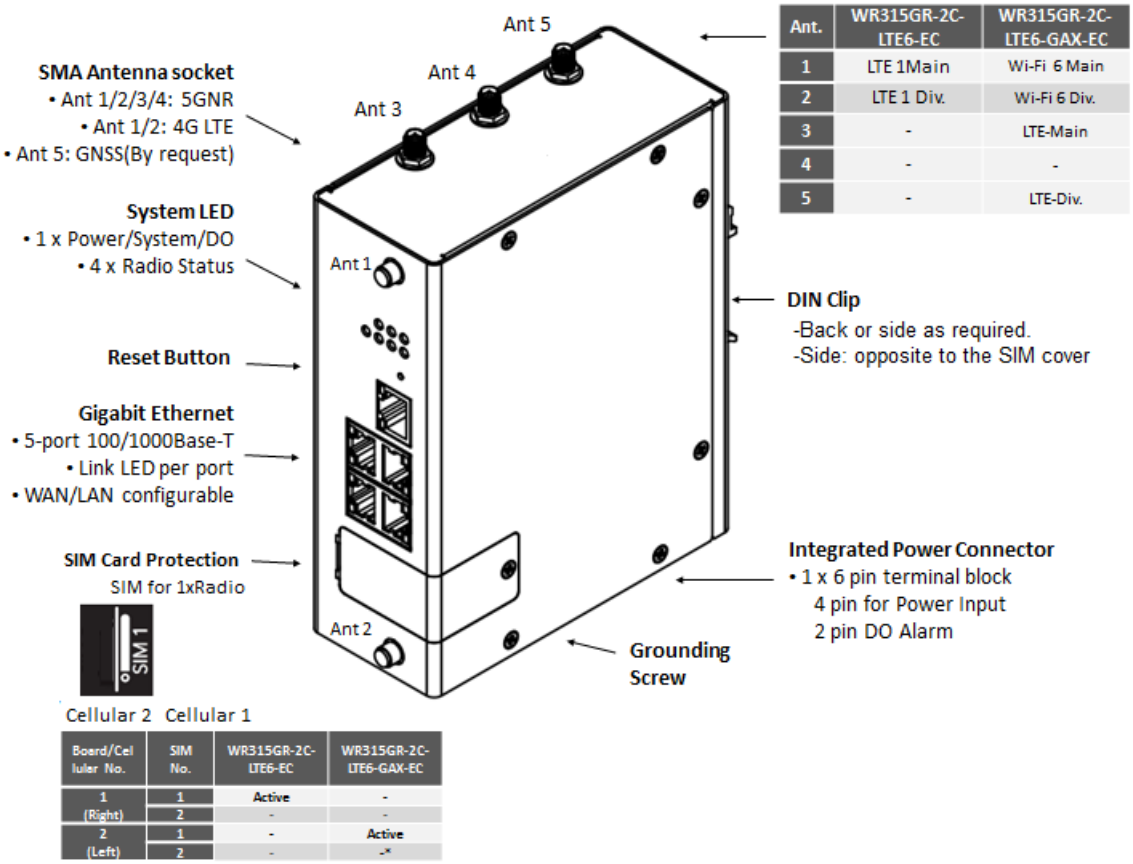
(Model with 1 or 2 Serial ports)



## Front Panel Layout

The front panel from WR315GR routers include 5 ports Giga Ethernet (100/1000 Base-T, RJ45), System + Ethernet + Radio LEDs, Reset button, 1 x 6-pin terminal block connector (4 pin for power inputs and 2 pin for Relay Output) and 1 chassis grounding screw on bottom side. There are 5 SMA antenna sockets, 5GNR connection usually requires 4 antennas, 4G LTE connection usually requires 2 antennas and one is reserved for GPS/GNSS. On the rear side of the device, there is DIN rail clip attached.

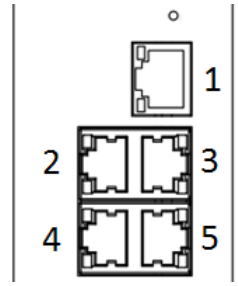
**WR315GR-2C-LTE6-GAX-EC**




| Ant. | WR315GR-2C-LTE6-EC | WR315GR-2C-LTE6-GAX-EC |
|---|---|---|
| 1 | LTE 1Main | Wi-Fi 6 Main |
| 2 | LTE 1 Div. | Wi-Fi 6 Div. |
| 3 | - | LTE-Main |
| 4 | - | - |
| 5 | - | LTE-Div. |

| Board/Cellular No. | SIM No. | WR315GR-2C-LTE6-EC | WR315GR-2C-LTE6-GAX-EC |
|---|---|---|---|
| 1 (Right) | 1 | Active | - |
| | 2 | - | - |
| 2 (Left) | 1 | - | Active |
| | 2 | - | -* |

**Ethernet Port Map:**

| Port Map | Port Number | Bridge Mode | Router Mode(1xWAN) |
|---|---|---|---|
|   | **Port 1** | LAN | WAN 1 (Default) |
| | **Port 2** | | LAN |
| | **Port 3** | | |
| | **Port 4** | | |
| | **Port 5** | | |

Default port configuration is **Router** Mode in WR315GR-2C-LTE6-GAX-EC, the default IP of the interface LAN ports: 192.168.10.1. Default IP of the interface WAN is DHCP Client

**Antenna Map:**

| | WR315GR-2C-LTE/LTE6-EC | WR315GR-2C-LTE6-GAX-EC |
|---|---|---|
| **Ant 1** | LTE/LTE6 Main | Wi-Fi Main |
| **Ant 2** | LTE/LTE6 Div. | Wi-Fi Div. |
| **Ant 3** | - | LTE6 Main |
| **Ant 4** | - | - |
| **Ant 5** | - | LTE6 Div. |

Note: *GNSS software by request

Note: Due to the different number of antennas used by 5GNR/4G LTE/3G/2G model, the feature of the antenna number may be different, the unused antenna positions will be covered by caps (even it has no functionality).

Note: If you only connect one antenna, please always connect the Main Ant. With one antenna attached, the connection speed, signal quality, and performance will be affected and cannot be guaranteed.

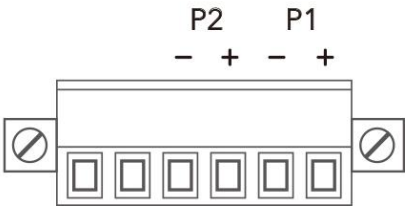
## 2.2 INSTALLATION

After unpack the box, follow the steps below in order to properly connect the device. For better signal/performance, put the device in a clearly visible spot, as obstacles such as walls and doors hinder the signal.

1. First, assemble router by attaching the necessary antennas and inserting the SIM card.
2. To power up router, please use the qualified power supply, connect the power input and reserved 24V@3A for the router.

## 2.3 WIRING THE POWER INPUTS

Power Input port in the router provides 2 sets of power input connections (P1 and P2) on the terminal block. On the picture below is the power connector.




**Wiring the Power Input**

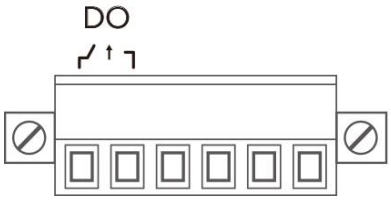
1. Insert the positive and negative wires into the V+ and V- contact on the terminal block connector.
2. Tighten the wire-clamp screws to prevent the power wires from being loosened.
3. Connect the power wires to suitable DC Switching type power supply. The typical input DC voltage is 24V,

range of 9VDC to 48VDC.

**WARNING:** Turn off DC power input source before connecting the Power to the terminal block connectors, for safety purpose. Don not turn-on the source of DC power before all of the connections were well established.

## 2.4 WIRING THE ALARM RELAY OUTPUT (DO)

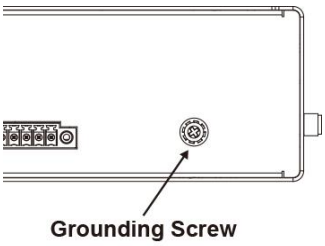
The relay output contacts are located on the front panel of the router. The relay output consists of the 2-pin terminal block connector that used to detect user-configured events. The two wires attached to the fault contacts form a close circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains open. The fault conditions such as Ethernet port link down or other pre-defined events (by customized) which can be configured in the device. Screw the DO wire tightly after digital output wire is connected.




**NOTE:** The relay contact only supports 1 A current, DC 24V. Do not apply voltage and current higher than the specifications.

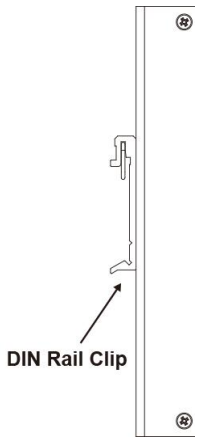
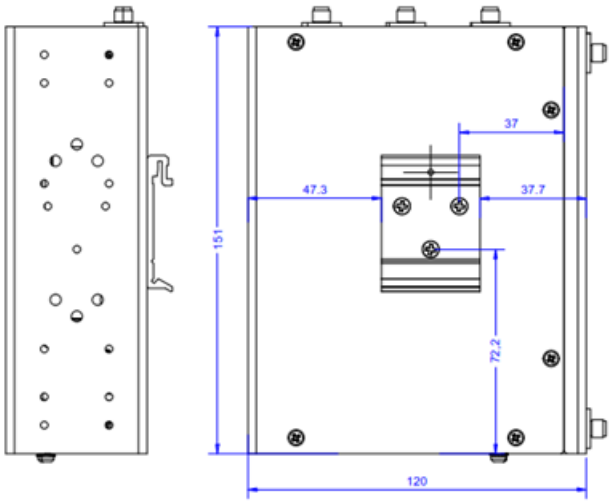
## 2.5 CONNECTING THE GROUNDING SCREW

Grounding screw is located on the bottom side of the router. Grounding Screw helps limit the effects of noise due to electromagnetic interference (EMI) such as lighting or surge protection. Run the ground connection from the ground screw to the grounding surface prior to connecting devices. And tighten and wire to chassis grounding for better durability.



## 2.6 DIN RAIL MOUNTING

The EN50022 DIN-Rail plate should be already attached to the Side/back panel of the device screwed tightly. If user needs to reattach the DIN-Rail attachment plate to the device, make sure the plate is situated towards the top, as shown by the following figures.

| Back (By Manually Change) | Rear/Side mounting: opposite to the SIM cover (WR315GR-2C-LTE6-GAX-EC) |
|---|---|
|  |  |

To mount the router on DIN Rail track, do the following instruction:

1. Insert the top side of DIN Rail track into the slot of DIN Rail clip.
2. Lightly clip the bottom of DIN-Rail to the track and make sure it attached well.
3. To remove the device from the track, reverse the steps.

**Note**: In WR315GR-2C-LTE6-GAX-EC, the DIN Clip is pre-installed at the factory for Side mounting. The DIN clip is located opposite to the SIM card cover. If you need to change to rear mounting, move the DIN to the rear screw hole.

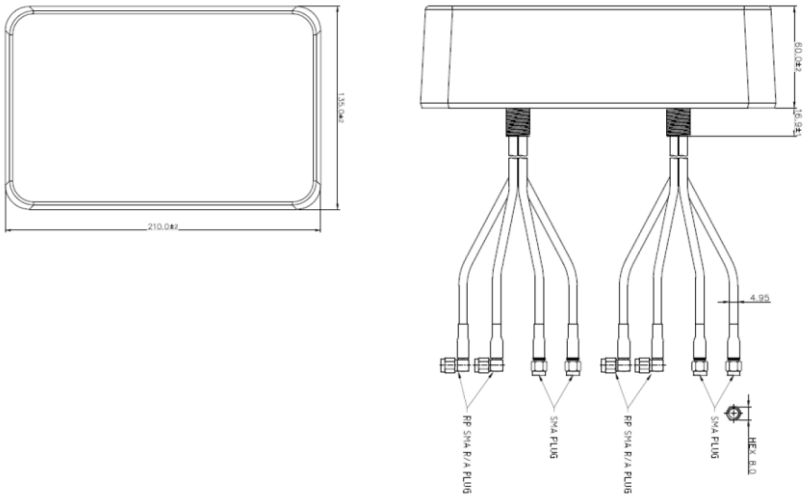
## 2.7 Optional ANTENNA

**WR315GR-2C-LTE6-GAX-EC** supports 4 antenna sockets, where 2G/3G/4G LTE and Wi-Fi antennas are supported. In the charging station project, the **RFA-J21-T565-13701** antenna connectors will be connected together with the router, and the antenna will be roof-mounted on the top of the chassis box. **Note: This antenna was custom-made for this project and is for professional installation only.** For information on the context of choosing this antenna, or if you have similar application needs, please contact our sales team for details.

**RFA-J21-T565-13701 Major Spec.:**

| | |
|---|---|
| **Multi-band Roof Mount**<br>**2x (LTE + Wi-Fi) Antenna**<br>**RFA-J21-T565-13701**<br>**(WR315G-2C-LTE6+GAX-EC)**<br> | **Frequency of Wi-Fi:** 2400~2500/5150~7120MHz |
| | **Peak Gain & Ave. Efficiency of Wi-Fi:** (Frequency: Connector Number:; Peak Gain(Efficiency))<br>**2400~2500MHz:** P1:4.4dbi(47%); P4:4.0dbi(49%); P2:3.9dbi(44%); P3:3.8dbi(44%)<br>**5150-7125MHz:** P1:4.9dBi(27%); P4:5.0dBi(29%); P2:4.2dBi(24%); P3:4.6dBi(28%) |
| | **Connector of Wi-Fi:** 2x2 RP SMA PLUG (Professional Engineer for Installation Required) |
| | **Frequency of LTE:** 617-960MHz / 1710~2700MHz |
| | **Peak Gain & Ave. Efficiency of LTE:** (Frequency: Connector Number:; Peak Gain(Efficiency))<br>**617-960MHz:** P1:2.8dBi(34%); P4:4.1dBi(42%); P2:4.1dBi(44%); P3:3.6dBi(44%)<br>**1710-1755MHz:** P1:4.3dBi(52%); P4:4.8dBi(47%); P2:4.1dBi(41%); P3:3.2dBi(48%)<br>**1785-2170MHz:** P1:6.9dBi(51%); P4:5.1dBi(49%); P2:6.4dBi(51%); P3:6.5dBi(51%)<br>**2300-2400MHz:** P1:3.2dBi(42%); P4:2.5dBi(40%); P2:3.9dBi(39%); P3:2.7dBi(45%)<br>**2400-2500MHz:** P1:4.7dBi(37%); P4:3.4dBi(38%); P2:2.4dBi(38%); P3:2.8dBi(38%) |
| | **Connector of LTE:** 2x2 SMA PLUG |
| | **Dimension:** 210(L) x 135(W) x 60(H)mm; 76.9(H)mm include through-hole mounting ring |
| | **Mounting:** Roof-mount/Through-hole mount |
| | **Cable Length:** 2x4 RG58 / Length=2M |
| | **Environment:** Temperature: -40~70℃, Humidity: 95%@25℃ |

**Dimension:**


60.0±2
16.5±1
4.95
HEX. 8.0
RF SMA R/A PLUG
SMA PLUG
RF SMA R/A PLUG
SMA PLUG
135.0±1
210.0±2

**WR315GR-2C-M2** series are supported with up to 5 antenna sockets, where 2G/3G/4G LTE/5GNR and GPS/GNSS antennas are supported. All of the antennas are connected to the router by screwing the SMA connector on the front panel of the router. **WR315GR-5GM2-2C does not come with default antennas while shipment**, please order them separately. You can also order the Router with below Antennas in the package, please contact our sales if necessary.

**Optional 5GNR Antenna by request**

| | | |
|---|---|---|
| | **Frequency** | 690 ~ 960 MHz / 1710 ~ 2700 MHz/ 3200~3800MHz/ 4400~5900MHz |
| | **V.S.W.R** | <= 2.5 |
| | **Peak Gain (major)** | Up to 5.7dBi<br>690MHz: 0.73dBi, 960MHz: 2.98dBi,<br>1710MHz: 3.11dBi, 1800MHz: 2.54dBi,<br>1900MHz: 2.42dBi, 3300MHz: 5.6dBi,<br>3500MHz: 4.12dBi, 3800MHz: 4.92dBi,<br>4000MHz: 3.75dBi, 5000MHz: 4.18dBi |
| | **Directional** | Omni-directional |
| | **Impedance** | 50 Ohm |
| | **Connector Type** | SMA Male |
| | **Dimension** | 222xΦ13 mm, 27mm width |
| | **Operational Temperature** | - 10 °C ~ +70 °C |

**Optional 4G LTE Antenna by request**

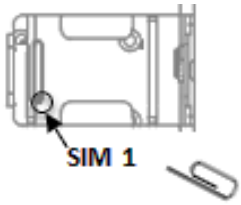
| | | |
|---|---|---|
| | **Frequency** | 690 ~ 960 MHz / 1710 ~ 2700 MHz |
| | **V.S.W.R** | <= 3.0 |
| | **Radiation** | Omni |
| | **Peak Gain** | 3.15dBi<br>690MHz: 1.36dBi, 960MHz: 1.37dBi,<br>1710MHz: 3.12dBi, 1800MHz: 1.29dBi<br>1900MHz: 2.63dBi, 2100MHz: 1.47dBi,<br>2170MHz: 1.14dBi, 2500MHz: 3.15dBi<br>2600MHz: 2.46dBi, 2700MHz: 1.89dBi |
| | **Directional** | Omni-directional |
| | **Impedance** | 50 Ohm |
| | **Connector** | SMA Male |
| | **Dimension** | 200xΦ13 mm |
| | **Operational Temperature** | - 20 °C ~ +65 °C |

## 2.8 SIM CARD INSTALLATION

### SIM Card Slot

The SIM Card Slot is used to insert the cellular card. The WR315GR-2C-LTE6-GAX-EC supports one SIM. It is SIM 1 location of the CELL 2 PCBA board.

(**Note:** EC OS version software supports one SIM only due to the restriction of current OpenWRT OS.)




SIM indication on front panel

Cellular 2 Cellular 1

| Board/Cellular No. | SIM No. | WR315GR-2C-LTE6-EC | WR315GR-2C-LTE6-GAX-EC |
|---|---|---|---|
| 1 (Right) | 1 | Active | - |
| | 2 | - | - |
| 2 (Left) | 1 | - | Active |
| | 2 | - | -* |

To install/uninstall SIM card:

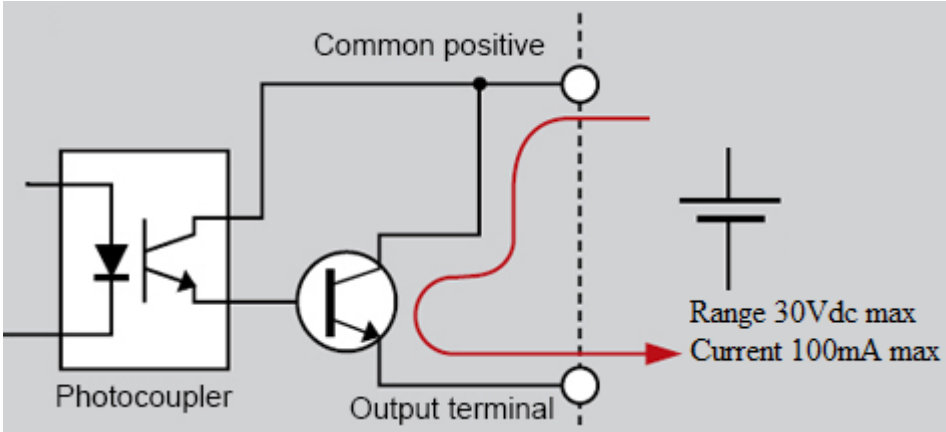
1. Use screwdriver to loosen screws and remove SIM cover.
2. Insert a paper clip or a SIM-eject tool into the hole beside the SIM socket. Push in towards the device, but don't force it. The SIM 1 is the primary SIM in the default configuration.
3. (When install) Draw out SIM tray and install SIM card on top side of tray
   (When uninstall) Draw out SIM tray and uninstall SIM card

   **WARNING:** Be careful when install the SIM Card, wrong installation procedure will cause damage. Please follow the mechanical print out to install the SIM Card.

4. Insert tray back to SIM socket and reattach SIM cover.

## 2.9 WIRING THE DIGTIAL OUTPUT (Reserved)

The digital output of the terminal block is used to detect user-configured events. The two wires attached to the fault contacts form a close circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains opened.




**Wiring the Digital Output**

1. Insert the positive and negative wires into the DO+ and DO- contact on the terminal block connector.
2. Tighten the wire-clamp screws to prevent the wires from being loosened.

**WARNING:** Please confirm the wire installation according to the above steps, otherwise it would not work properly. It only supports 0.1 A current, DC 30V. Do not apply voltage and current higher than the specifications.

**Note:** WR315-M2 supports Relay Output. Not every model of WR315 series supports Digital Input and Digital Output. The feature is reserved for the WR315GR-M2 with Digital Output model only.

## 2.9 HARDWARE WATCHDOG

The device provides a hardware watchdog mechanism for critical event, such as system reboot is to cut the power of the whole device to get a clean restart of all components.

The device also provides a “dying gasp” alert. The router can generate syslog event or SNMP trap to target server when the router loses power. (Note: The dying gasp alarm software feature is not supported in current EC OS.)

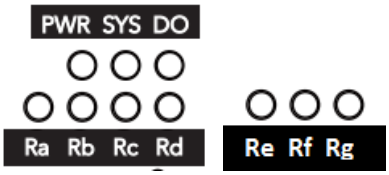
Some of the features are also available as watchdog. Refer to:

Ping Watchdog

Periodic Reboot/Restart Inteface

## 2.10 LED INDICATION

**WR315GE-2C-LTE6-GAX-EC (Model with LTE Cat.6 + Wi-Fi 6 client modules)**




| LED | | Status | Description |
|---|---|---|---|
| WR315GR-2C-LTE6 -GAX-EC | Ra | Green On | 11ax 5GHz Client mode |
| | | Green Blinking | 11ax 5GHz Transmitting |
| | | Off | Disabled |
| | Rb | Green On | 11ax 2.4G Client mode |
| | | Green Blinking | 11ax 2.4G Transmitting |
| | | Off | Disabled |
| | Rc | OFF | N/A |
| | Rd | (Reserved) | (Controlled by module) |
| | Re | Green On | SIM detected |
| | | Off | SIM not insert |
| | Rf | Green On | 4G/3G/2G Signal Strength Good (-90≦rsrp) |
| | | Green Blinking | 4G/3G/2G Signal Strength Medium(-100≦rsrp≦-90) |
| | | Off | 4G/3G/2G Signal Strength Low(rsrp≦-100) |
| | Rg | (Reserved) | (Controlled by LTE module) |

Rc LED is not used in this model.

Rd/Rg LED is applied to Radio module's LED, its behavior is depends on radio module.

# 3. WR315G-2C-LTE6-GAX-EC EC OS Introduction

## 3.1 EC OS Software Specification:

| Software (EC OS Version, OpenWRT, WR315GR-2C-LTE6-GAX-EC series) | |
|---|---|
| **Applied Model** | **WR315GR-2C-LTE6-G-EC, WR315GR-2C-LTE6-GAX-EC, WR315GR-2C-M2-EC, WR315GR-2C-LTE-G-EC, WR315GR-2C-LTE-GAX-EC** |
| **OS** | OpenWRT 23.05 |
| **Web Server** | luCI Web Interface |
| **Terminal Server (SSH)** | Secure encrypted communications between two untrusted hosts over an insecure network |
| **Kernel** | GNU/Linux kernel v5.15 |
| **Internet Protocol Suite** | TCP, UDP, IPv4, IPv6, ICMP, ARP, HTTP, DHCP, NTP, SSH, PPP, SFTP, SSL, SCP |
| **Internet Security Suite** | OpenVPN, IPSec, Netfilter/iptables |
| **Network Control Protocol** | Router mode (1xWAN+4xLAN), NAT/PAT, VLAN, QoS, NTP client/server, IGMP, PPP, PPPoE, SSL, port forwarding |
| **Network Security** | HTTPS, SSH, VPN tunnels, SFTP, DMZ, firewall<br>(IP filtering, MAC address filtering, inbound/outbound port filtering) |
| **Cryptographic** | AES, SHA, OpenSSL, random generator |
| **Cellular Networking** | Features: Cellular Configuration Radio on/off, 2G/3G and 4G modes configurable, Enter PIN code for SIM Security, Connection status, display module info, GPS positioning(by model*)<br>Modem manager: uQMI(user QMI) for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol.<br>*EC version doesn't support dual SIM due to uQMI restriction. |
| **Time Management** | NTP, Cellular Time(by module) |
| **Watchdog** | Periodic Reboot, Ping watchdog for keep-Alive connection monitoring, Restart interface for mobile modem, run script |
| **Web GUI Management** | Based on LuCI WebGUI<br>System Setting, NTP Setting, Router Password setting with strength check, SSH Access and Key upload, HTTPS, init script startup setting, configuration backup/restore, firmware upgrade, system reboot, watchcat(watchdog), ser2net, Interface configuration, Wi-Fi interface setting, DHCP server/client, DHCP Relay, DNS, firewall setting, static router, Diagnostic Ping, traceroute, Nslookup, Device Status and Mobile Information |
| **WLAN Configuration (Model with WLAN module)** | Support Wi-Fi Client mode.<br>WLAN Basic Settings: Radio on/off, mode selection, 2.4G/5G 11ax Band and Frequency selection, SSID configuration, Wireless Security encryption includes WPA3-SAE and WPA2-PSK/WPA-PSK/Open, advanced WLAN settings, WLAN MAC Filter, 802.11r fast transition |

## 3.2 WR315G-2C-LTE6-GAX-EC QIG

This chapter introduces the Quick Installation Guide of the WR315G-2C-LTE6-GAX-EC.

### Overview

The **WR315GR-2C-LTE6-GAX-EC** is a high-performance industrial router featuring **4G LTE and Wi-Fi 6** connectivity. Powered by a **dual-core 880 MHz CPU**, it includes two expansion sockets—one for an **LTE Cat.6 cellular module** and one for a **Wi-Fi 6 client module**. The router provides **five Gigabit Ethernet ports**, including **one WAN port** and **four LAN ports**, supporting routing between Ethernet LAN and WAN networks. Either the **4G cellular module** or the **Wi-Fi 6 client module** can function as a **Wireless WAN interface**, enabling wireless Internet connectivity. The router runs on the **OpenWrt-based embedded operating system**, referred to as **EC OS**, which offers both the **UCLI web interface** and **SSH access** for management, along with a rich set of software features.

| Model | Description |
|---|---|
| **WR315GR-2C-LTE6-G-EC** | Industrial Secure Router, Dual Core, 5GbE, 1 Relay, EC OS, LTE6-G |
| **WR315GR-2C-LTE6-GAX-EC** | Industrial Secure Router, Dual Core, 5GbE, 1 Relay, EC OS, 802.11ax WLAN6 client, LTE6-G |

**Power Input:** 24VDC (9V~48VDC)

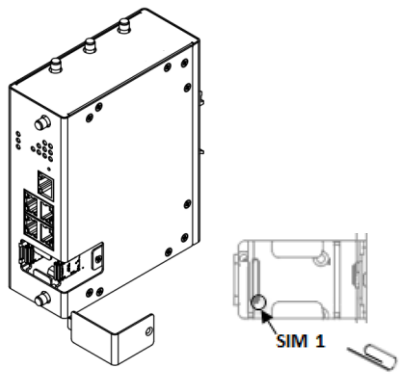
**LTE6-G:** (FCC ID: 2AJYU-8XM0004)

LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66

LTE-TDD: B38/B40/B41/B42/B43/B46/B48

**WLAN 6:** 2.4GHz/5GHz 802.11ax/ac/n/g/a/b, MU-MIMO 2T2R (FCC ID RAS-MY7922A22M)

### Installation




- **SIM Card Slot**

To install/uninstall SIM card:

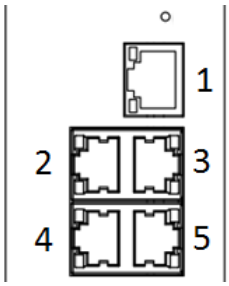
1. Use screwdriver to loosen screws and remove SIM cover.
2. Insert a paper clip or a SIM-eject tool into the hole beside the SIM socket. Gently push inward, do not use excessive force. SIM 1 is the primary SIM in the default configuration.
3. To Install: Draw out SIM tray and place the SIM card on top side of tray
   To uninstall: Draw out SIM tray and remove SIM card
4. WR315G-2C-LTE6-GAX-EC supports only one SIM card due to limitation of OpenWrt system.

***Warning**: Be careful when install the SIM Card, wrong installation procedure will cause damage. Make sure the SIM Card is facing the correct position.*

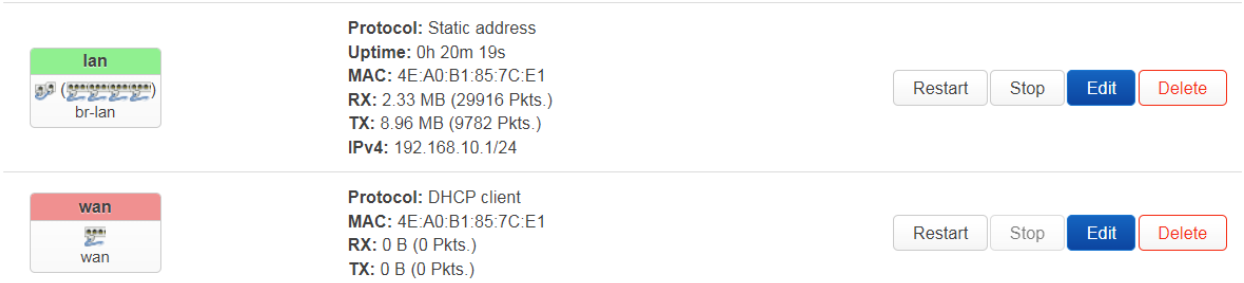
- **Interface - Ethernet**

**WR315G-2C-LTE6-GAX Ethernet Port Map:**

Default Ethernet port configuration in WR315G-2C-LTE6-GAX is Router Mode, LAN to WAN routing enabled.

| Port Map | Port Number | Router Mode(Default) |
|---|---|---|
|  | **Port 1** | WAN (Default: DHCP Client) |
| | **Port 2** | LAN<br>(Default IP: 192.168.10.1)<br>(Web GUI: Lan 2/3/4/5) |
| | **Port 3** | |
| | **Port 4** | |
| | **Port 5** | |

Interface Name:

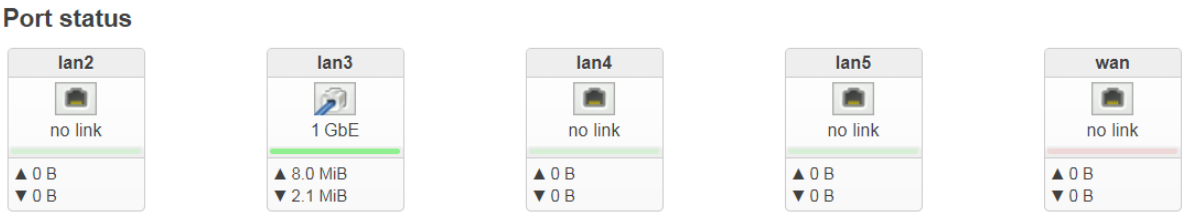



The default IP of the interface LAN ports: 192.168.10.1

The default IP of the interface WAN port: DHCP Client

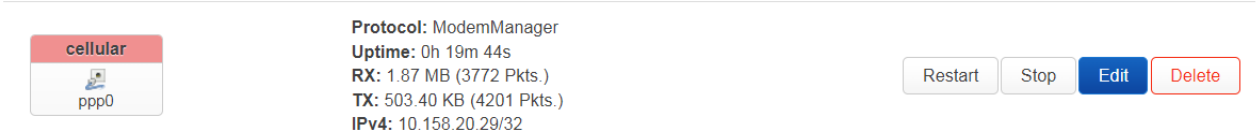
Note: “wan6” is the IPv6 configuration of WAN interface. It is usually not used.

Port Status in Web GUI- Status:



- **Interface - Cellular**

The router support 4G LTE Cat.6 cellular interface.




Cellular Interface: Default is Enabled.

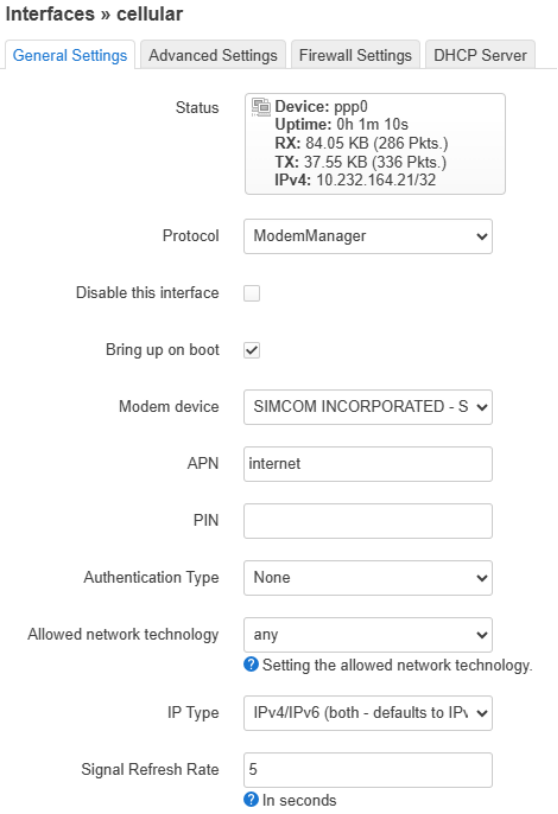
Logical name: cellular (ppp), works as WAN interface.

Apn: internet

Auth: none

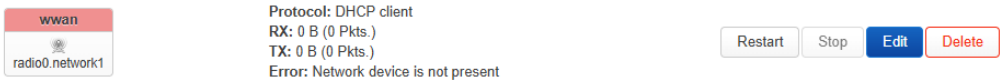
Iptype: ipv4v6

Signal Refresh Rate: 5 second



- **Interface – Wi-Fi**

The router supports Wi-Fi 6 (client) interface.




Wireless LAN:

Default is Disabled.

Default value after enabled:

Wireless Mode: Client Mode

Radio Setting: IEEE802.11ax, 5G, Auto channel, Bandwidth 20Mhz

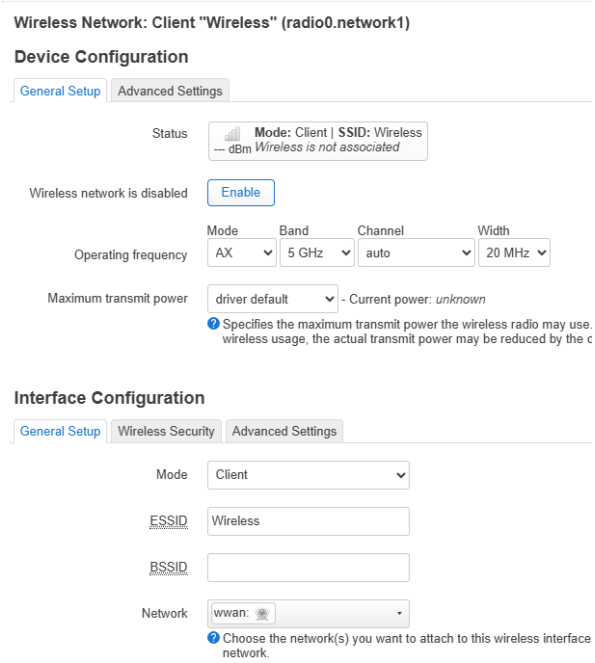
SSID: Wireless

Encryption: None

Network Interface: wwan

Default IP: DHCP Client

Web GUI:




- **Antenna**

WR315G-2C series supports max. 5 SMA socket, which are for 4G LTE/5GNR, GPS/GNSS or Wi-Fi antennas. User must install the antennas to correct socket while use. WR315G-2C-LTE6-GAX-EC uses the Antenna 1/2/3/5 sockets as shown in the table on the left.

**Note:** Due to the different number of antennas used by LTE/WLAN models, the unused antenna positions will be covered by caps.

| | **WR315GR-2C-LTE6-GAX-EC** |
|---|---|
| **Ant 1** | Wi-Fi Main |
| **Ant 2** | Wi-Fi Div. |
| **Ant 3** | LTE6 Main |
| **Ant 4** | - |
| **Ant 5** | LTE6 Div. |

• **Wiring the Power Input**

1) Insert positive and negative wires into V+ and V- contact on the terminal block connector.

2) Tighten the wire-clamp screws to prevent the power wires from being loosened.

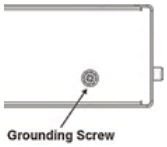
3) Connect the power wires to suitable DC Switching type power supply. The typical input DC voltage is 24V.

• **Wiring the Relay Output/DO Alarm**

The relay output of the 6-pin terminal block connector is used to detect user-configured events, for example the Ethernet port link down. The two wires attached to the fault contacts form a close circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains opened.

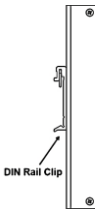
• **Grounding Screw**

The grounding screw is located on the bottom side of the router. For avoiding system damage by noise or electric shock, establish a direct connection between the ground screw and the grounding surface prior to connecting devices.



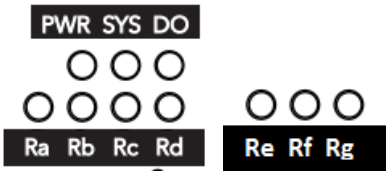

• **DIN Rail mount**

To mount the router on the DIN Rail track, insert the upper end of the DIN-Rail clip into the back of the DIN-Rail track from its upper side and lightly push the bottom of the DIN-Rail clip into the track. The DIN Rail should comply with DIN EN50022 standard. Using wrong DIN rail may cause unsafe installation.



• **LED:**

**WR315GE-2C-LTE6-GAX-EC (Model with LTE Cat.6 + Wi-Fi 6 client modules)**




| LED | | Status | Description |
|---|---|---|---|
| **WR315GR-2C-LTE6 -GAX-EC** | Ra | Green On | 11ax 5GHz Client mode |
| | | Green Blinking | 11ax 5GHz Transmitting |
| | | Off | Disabled |
| | Rb | Green On | 11ax 2.4G Client mode |
| | | Green Blinking | 11ax 2.4G Transmitting |
| | | Off | Disabled |
| | Rc | OFF | N/A |
| | Rd | (Reserved) | (Controlled by module) |
| | Re | Green On | SIM detected |
| | | Off | SIM not insert |
| | Rf | Green On | 4G/3G/2G Signal Strength Good (-90≦rsrp) |
| | | Green Blinking | 4G/3G/2G Signal Strength Medium(-100≦rsrp≦-90) |
| | | Off | 4G/3G/2G Signal Strength Low(rsrp≦-100) |
| | Rg | (Reserved) | (Controlled by LTE module) |

Rc LED is not used in this model.

Rd/Rg LED is applied to Radio module's LED, its behavior is depends on radio module.

## 3.3 PREPARATION for Management

To access the management interface of the **EC OS based on the OpenWrt** operating system, WoMaster routers provide two primary access methods over the network: web-based management and SSH/Telnet command-line management.

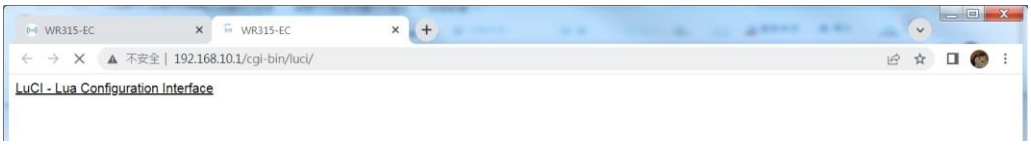
Web management is the most commonly used and user-friendly method. It allows users to monitor device status and perform basic configuration tasks through a standard web browser via the built-in **LuCI web interface**. This interface provides access to system information, network settings, and essential router controls.

If the web interface is unavailable due to network issues or misconfiguration, users can alternatively access the router via **SSH** or Telnet. This method provides full access to the router's command-line interface (CLI), allowing advanced configuration and troubleshooting.

### ***PREPARATION FOR WEB MANAGEMENT***

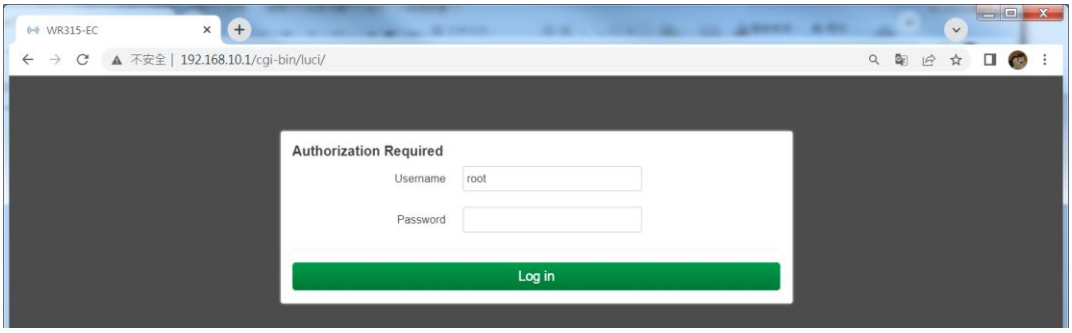
WoMaster router running OpenWrt-based EC OS provides a LuCI Web-based management interface accessible through standard web-browser such as Microsoft Internet Explorer, or Mozilla, or Google Chrome, to access and configure the router management on the network.

1. Plug the DC power to the router and connect router to computer via Ethernet.
2. The router's default IP address is **192.168.10.1**.
3. Check that PC has an IP address on the same subnet as the router. For example, assign your PC and IP address like **192.168.10.2, with a** subnet mask of **255.255.255.0** and a default gateway of **192.168.10.1**
4. Alternatively, if the router's DHCP Server is enabled, set your PC to DHCP Client mode to obtain an IP address automatically.
5. Open a command prompt and ping **192.168.10.1** to verify that the router is reachable.
6. Launch the web browser (Internet Explorer or Mozilla Firefox or Google Chrome) on the PC.
7. Type **http://192.168.10.1** (or the IP address of the router) in the address bard. Press **Enter** and the login page will appear.

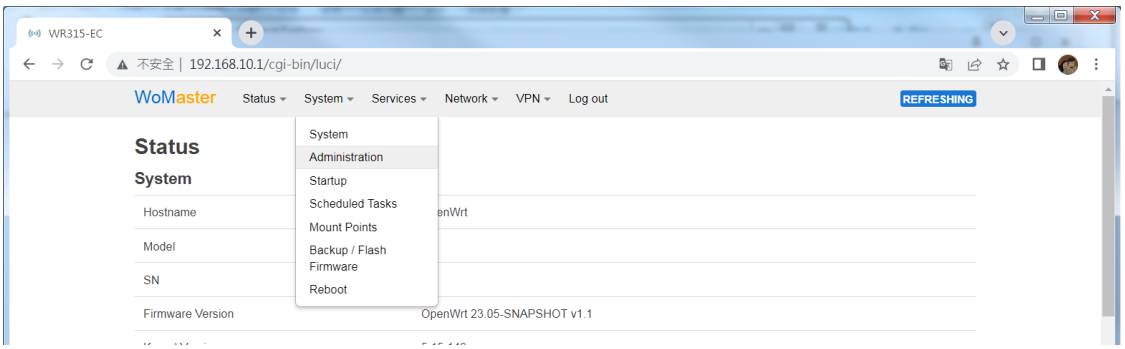



8. Type user name and the password.

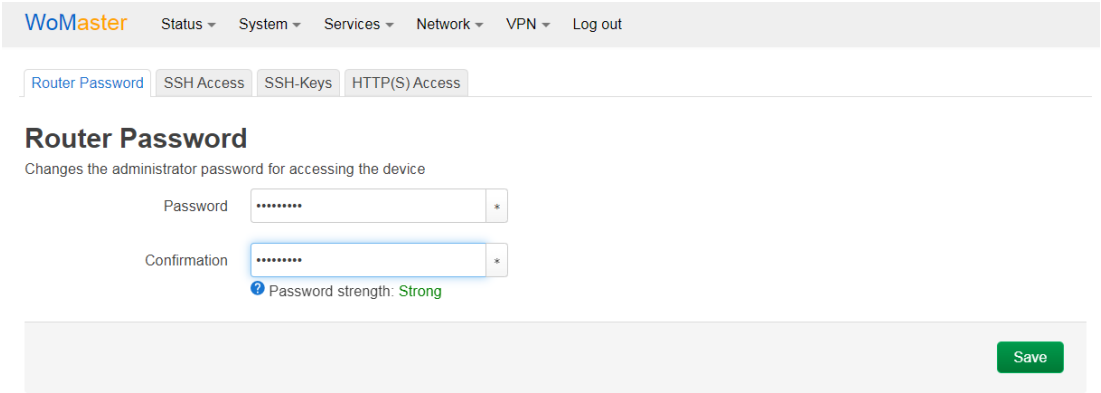
The default user name: **root** and password: **root**. Then click **Login**.



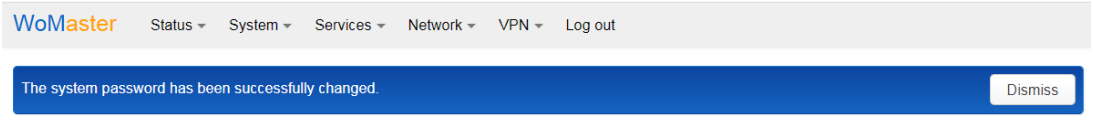
9. **For security concern, it is commend to change the default password with a new password in first Login.** Go to "**System" –> "Administrator**" page, you can enter new password and Save to apply the change. Please follow the prompt to enter new password.




Then enter with the new password and click "Save" to apply the change.




After clicking "Save", a prompt message will appear saying "The system password has been successfully changed." Click "Log out", you will be required to use the new password in the next time you login.

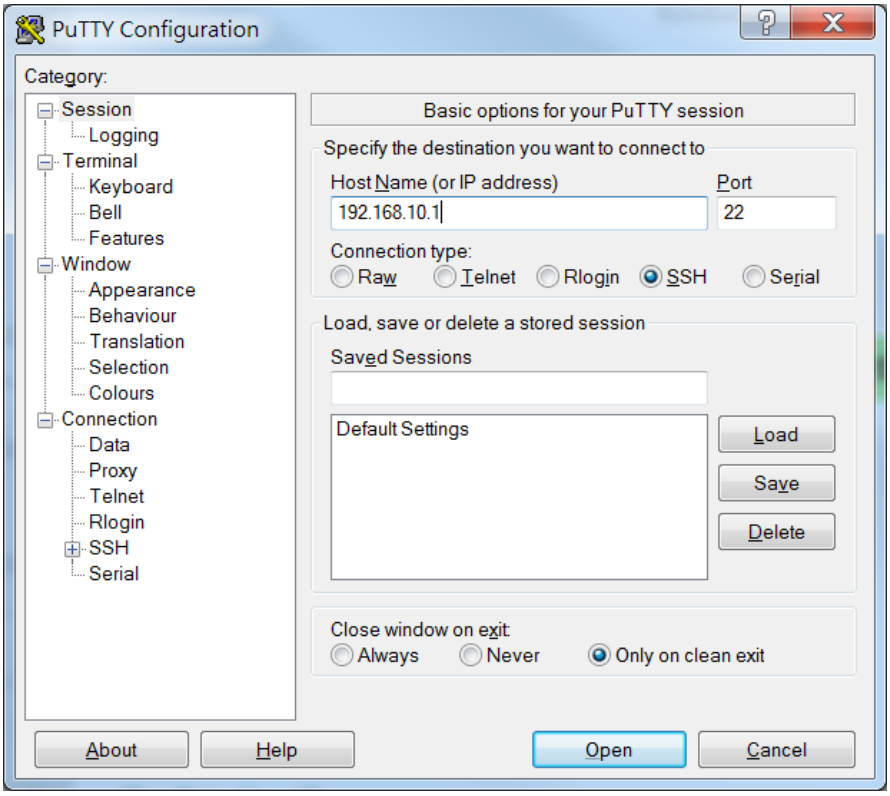



## ***Using SSH to Configure OpenWrt***

OpenWrt supports remote command-line access via SSH, allowing users to perform advanced configurations and troubleshooting.

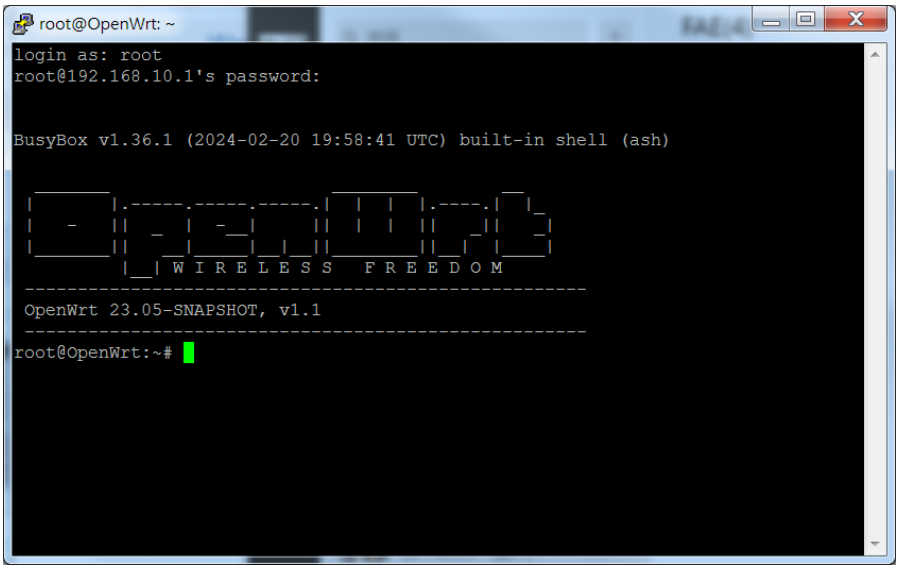
1. Ensure network connectivity between your PC and the OpenWrt router (e.g., same subnet or reachable IP).
2. On your PC, open a terminal or SSH client (such as PuTTY, download OpenSSH for Windows or a Linux terminal).
3. Using Putty:

   Type the IP address of the router and use the access Port 22.




The SSH console will appear:

The default user name: **root** and password: **root**.



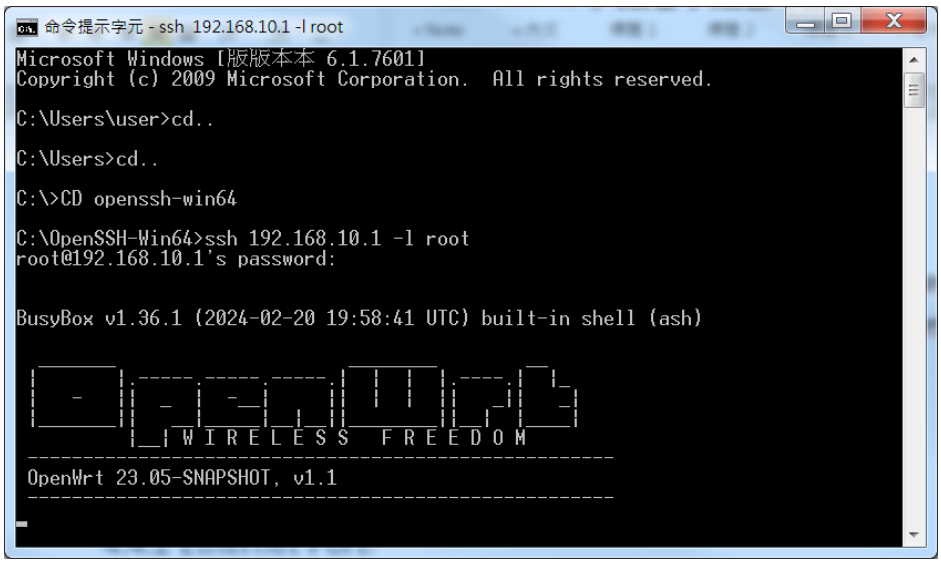

4. In Window OS 10 1809+, the SSH(OpenSSH) console is built-in. For earlier OS version, please download the OpenSSH through internet for your windows.

   Through the Window Command prompt, you can enter the following command to connect.

   *ssh 192.168.10.1 -l root*

   (Replace 192.168.10.1 with your router's actual IP address.) [ -l login_name]

   When prompted, enter the root password. (default password: root)


命令提示字元 - ssh 192.168.10.1 -l root
Microsoft Windows [版版本本 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\user>cd..
C:\Users>cd..
C:\>CD openssh-win64
C:\OpenSSH-Win64>ssh 192.168.10.1 -l root
root@192.168.10.1's password:
BusyBox v1.36.1 (2024-02-20 19:58:41 UTC) built-in shell (ash)
W I R E L E S S F R E E D O M
OpenWrt 23.05-SNAPSHOT, v1.1

## 3.4 LuCI Web Management

The following content mainly introduces the major Web GUI settings. Since openwrt is a public system, if it is not listed here, you can also find its web gui settings through the Internet or the openwrt website.

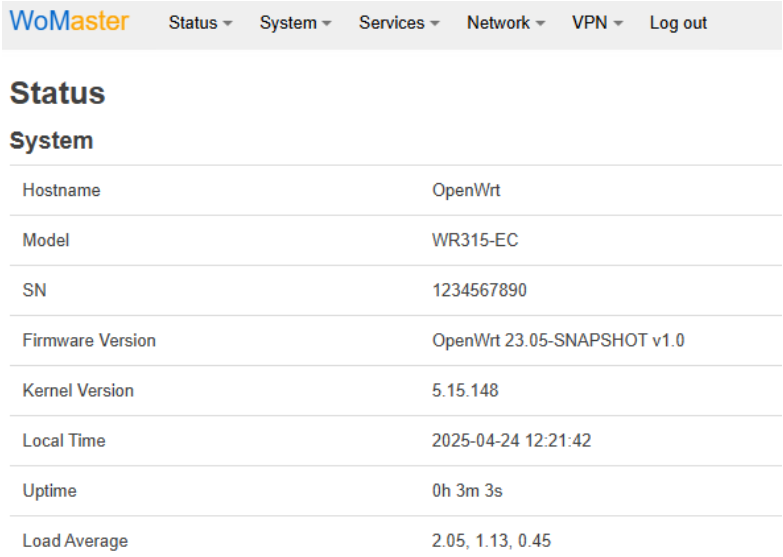
### 3.4.1 STATUS

In the **OpenWrt LuCI web interface**, the **Status** section provides a comprehensive overview of the system's current state and runtime information. It is commonly used for diagnostics, monitoring, and quick verification of network and system status.

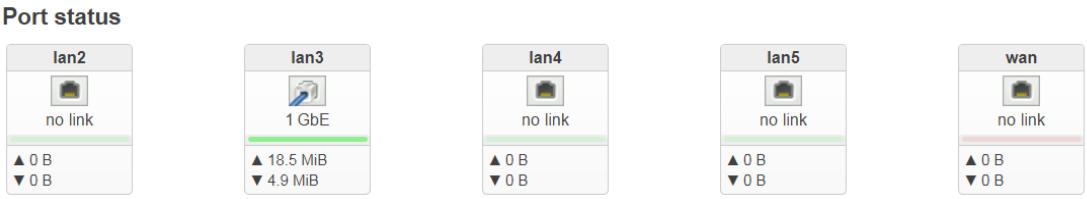
Key Features Available Under the Status Menu:

**Overview**

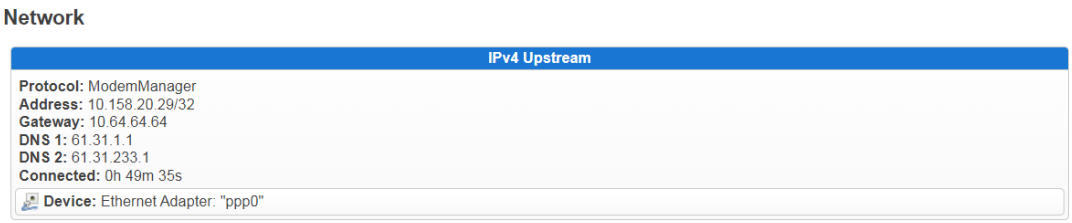
General system information: Hostname, Model, SN, Firmware version, Kernel Version, Local Time, Uptime, Load average, memory usage, Storage space…etc.




Port Status: It indicates the link status of the LAN port 2/3/4/5 and WAN port (port 1).




Network: It provides the information of the upstream interface, includes the IP addresses, connected time, active interface, DHCP status.



### Active DHCP Leases

| Hostname | IPv4 address | MAC address | Lease time remaining | Static Lease |
|---|---|---|---|---|
| Porsche-P5430UA (Porsche-P5430UA.lan) | 192.168.10.142 | 38:D5:47:94:13:35 | 11h 8m 57s | Set Static |

Wireless: It shows the Wi-Fi Client status (default is disabled) and associated Stations. It shows the real-time view of wireless interfaces and modes and associated stations.

### Wireless

**radio0**

**Type:** MAC80211 802.11ac/ax/b/g/n
**Channel:** 0 (0.000 GHz)
**Bitrate:** -

**SSID:** Wireless
**Mode:** Client
*Wireless is disabled*

### Associated Stations

| Network | MAC address | Host | Signal / Noise | RX Rate / TX Rate |
|---|---|---|---|---|
| *No information available* | | | | |

**Routes**

Lists active IPv4 and IPv6 routing tables.

Active IPv4 Routes can check the IP address of the activated interfaces.

## Routing

The following rules are currently active on this system.

IPv4 Routing | IPv6 Routing

### IPv4 Neighbours

| IP address | MAC address | Interface |
|---|---|---|
| 192.168.10.142 | 38:D5:47:94:13:35 | lan |

### Active IPv4 Routes

| Device | Target | Gateway | Metric | Table | Protocol |
|---|---|---|---|---|---|
| cellular | 0.0.0.0/0 | 10.64.64.64 | 0 | main | static |
| cellular | 10.64.64.64 | - | 0 | main | kernel |
| lan | 192.168.10.0/24 | - | 0 | main | kernel |

**Note: The entry of "Target 0.0.0.0/0" is very important!**

Once you have more than one default gateway, for example both the 4G cellular and Wifi client enabled to internet, the device's routing table will be constantly changing, and if it's missing entries, that means you can access the router, but can't access the Internet.

~~cellular 0.0.0.0/0 10.64.64.64 0 main static~~

For example: If you are missing the cellular interface's 0.0.0.0/0 entry, it means the 4G network is not available, you will need to restart the cellular interface and remove the unused wan/wwan (wireless client) interfaces in case it happen again.

**Mobile Service**

In Mobile Service, it shows the information of the Modem, Network Registration, Cell Location and SIM card.

## Mobile Service

/sys/devices/platform/1e1c0000.xhci/usb1/1-2/1-2.2

### Modem Info

| | |
|---|---|
| Manufacturer | SIMCOM INCORPORATED |
| Model | SIMCOM_SIM7906G-M2 |
| Revision | 2110B03X12M22A-M2 |
| IMEI | 869951070078591 |
| Device Identifier | 0c7ed2200358499533e0c6463a431c265c88e230 |
| Power State | on |
| State | connected |

### Network Registration

| | |
|---|---|
| Own Numbers | |
| Access Technologies | lte |
| Operator | TW Mobile |
| Operator Code | 46697 |
| Registration State | home |
| Packet Service State | attached |
| Signal Quality | 77 % |

### Cell Location

| | |
|---|---|
| CID | 038735E8 |
| LAC | 0000 |
| MCC | 466 |
| MNC | 97 |
| TAC | 002CC4 |

## SIMs

### SIM 1

| | |
|---|---|
| Active | yes |
| ICCID | 89886972401703558791 |
| IMSI | 466977005873795 |

**Firewall**

Displays current firewall zones and rules.

Shows active connections and NAT rules.

**System Log**

Shows the system's kernel and service logs.

Helpful for debugging service behavior and startup issues.

System Log | Kernel Log

## System Log

Scroll to tail

```
Mon May  5 02:44:50 2025 daemon.debug [22006]: <debug> [1746413090.494620] [ttyUSB3/at] <-- '<CR><LF>+CESQ: 99,99,255,255,10,44<CR><LF><CR><LF
Mon May  5 02:44:50 2025 daemon.debug [22006]: <debug> [1746413090.496447] [modem0] lte extended signal information updated
Mon May  5 02:44:50 2025 daemon.debug [22006]: <debug> [1746413090.498087] [ttyUSB3/at] device open count is 1 (close)
Mon May  5 02:44:55 2025 daemon.debug [22006]: <debug> [1746413095.486811] [ttyUSB3/at] device open count is 2 (open)
Mon May  5 02:44:55 2025 daemon.debug [22006]: <debug> [1746413095.487304] [ttyUSB3/at] --> 'AT+CESQ<CR>'
Mon May  5 02:44:55 2025 daemon.debug [22006]: <debug> [1746413095.498636] [ttyUSB3/at] <-- '<CR><LF>+CESQ: 99,99,255,255,7,44<CR><LF><CR><LF>
Mon May  5 02:44:55 2025 daemon.debug [22006]: <debug> [1746413095.500643] [modem0] lte extended signal information updated
Mon May  5 02:44:55 2025 daemon.debug [22006]: <debug> [1746413095.502907] [ttyUSB3/at] device open count is 1 (close)
Mon May  5 02:45:00 2025 daemon.debug [22006]: <debug> [1746413100.486250] [ttyUSB3/at] device open count is 2 (open)
Mon May  5 02:45:00 2025 daemon.debug [22006]: <debug> [1746413100.486756] [ttyUSB3/at] --> 'AT+CESQ<CR>'
Mon May  5 02:45:00 2025 daemon.debug [22006]: <debug> [1746413100.498405] [ttyUSB3/at] <-- '<CR><LF>+CESQ: 99,99,255,255,11,44<CR><LF><CR><LF
Mon May  5 02:45:00 2025 daemon.debug [22006]: <debug> [1746413100.500216] [modem0] lte extended signal information updated
Mon May  5 02:45:00 2025 daemon.debug [22006]: <debug> [1746413100.501828] [ttyUSB3/at] device open count is 1 (close)
Mon May  5 02:45:05 2025 daemon.debug [22006]: <debug> [1746413105.486061] [ttyUSB3/at] device open count is 2 (open)
Mon May  5 02:45:05 2025 daemon.debug [22006]: <debug> [1746413105.486567] [ttyUSB3/at] device open count is 3 (open)
Mon May  5 02:45:05 2025 daemon.debug [22006]: <debug> [1746413105.488224] [ttyUSB3/at] --> 'AT+CGACT?<CR>'
```

**Processes**

Shows currently running processes with PID, memory usage, and CPU usage...

This list gives an overview over currently running system processes and their status.

## Processes

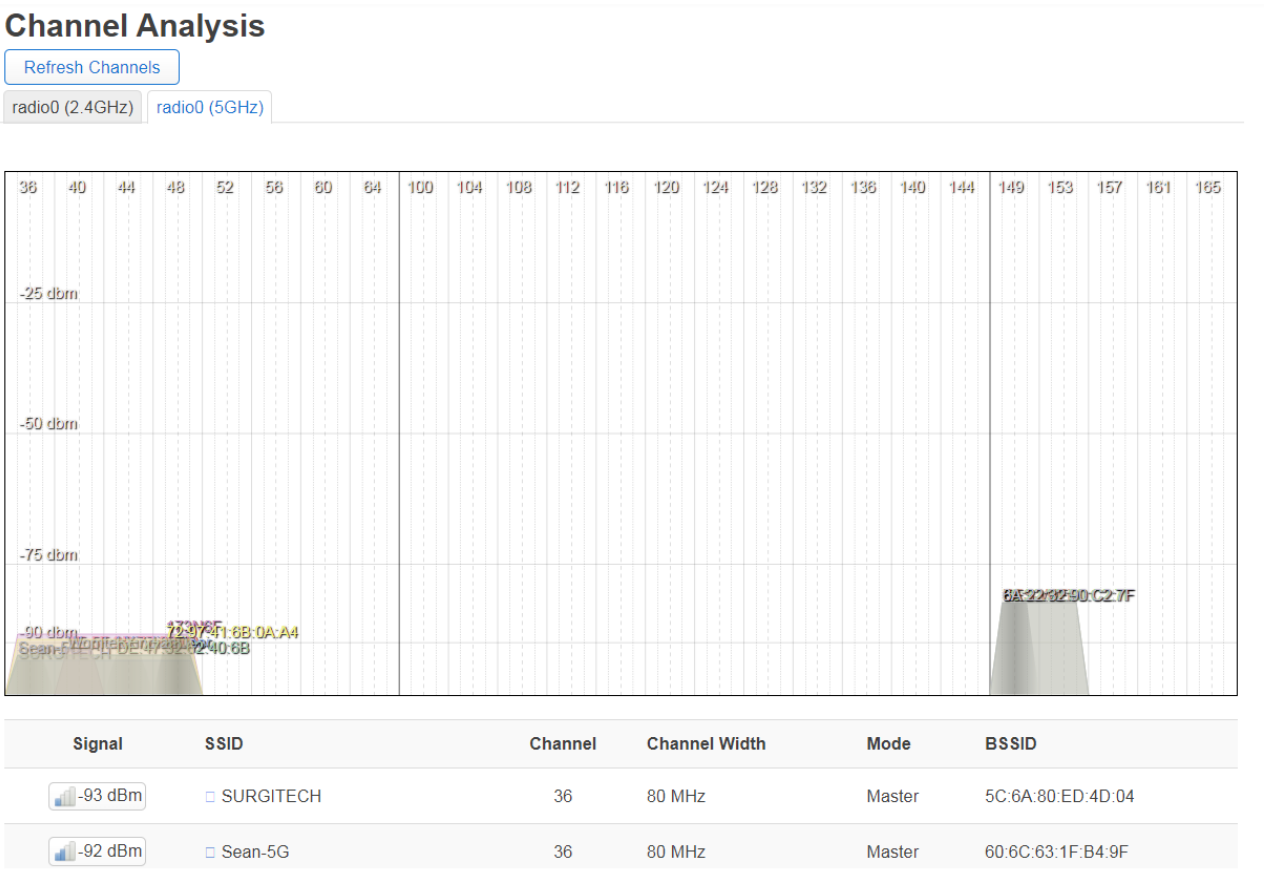
This list gives an overview over currently running system processes and their status.

| PID | Owner | Command | CPU usage (%) | Memory usage (%) | |
|---|---|---|---|---|---|
| 1 | root | /sbin/procd | 0% | 1% | Hang Up Terminate Kill |
| 2 | root | [kthreadd] | 0% | 0% | Hang Up Terminate Kill |
| 3 | root | [rcu_gp] | 0% | 0% | Hang Up Terminate Kill |
| 4 | root | [rcu_par_gp] | 0% | 0% | Hang Up Terminate Kill |
| 5 | root | [slub_flushwq] | 0% | 0% | Hang Up Terminate Kill |

**Channel Analysis**

Shows the current channel detected by the Wi-Fi radios.

It helps to understand the radio network status while you need to optimize the WLAN performance.



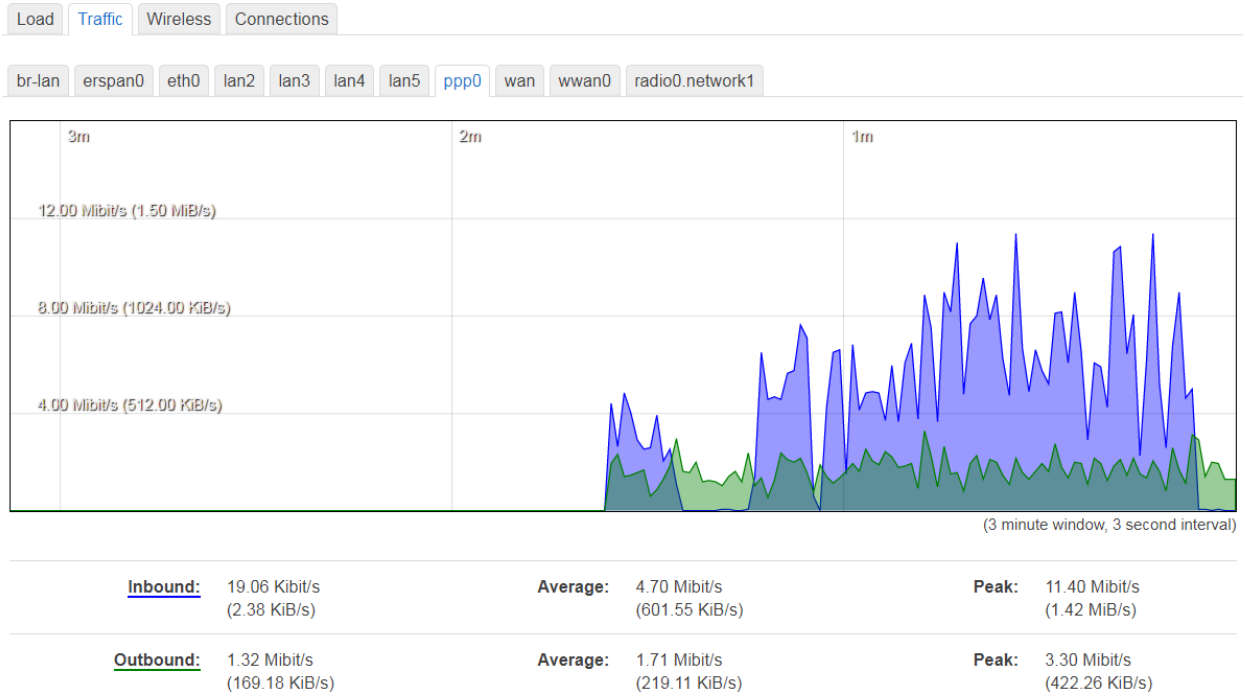

| Signal | SSID | Channel | Channel Width | Mode | BSSID |
|---|---|---|---|---|---|
| -93 dBm | SURGITECH | 36 | 80 MHz | Master | 5C:6A:80:ED:4D:04 |
| -92 dBm | Sean-5G | 36 | 80 MHz | Master | 60:6C:63:1F:B4:9F |

**Realtime Graphs**

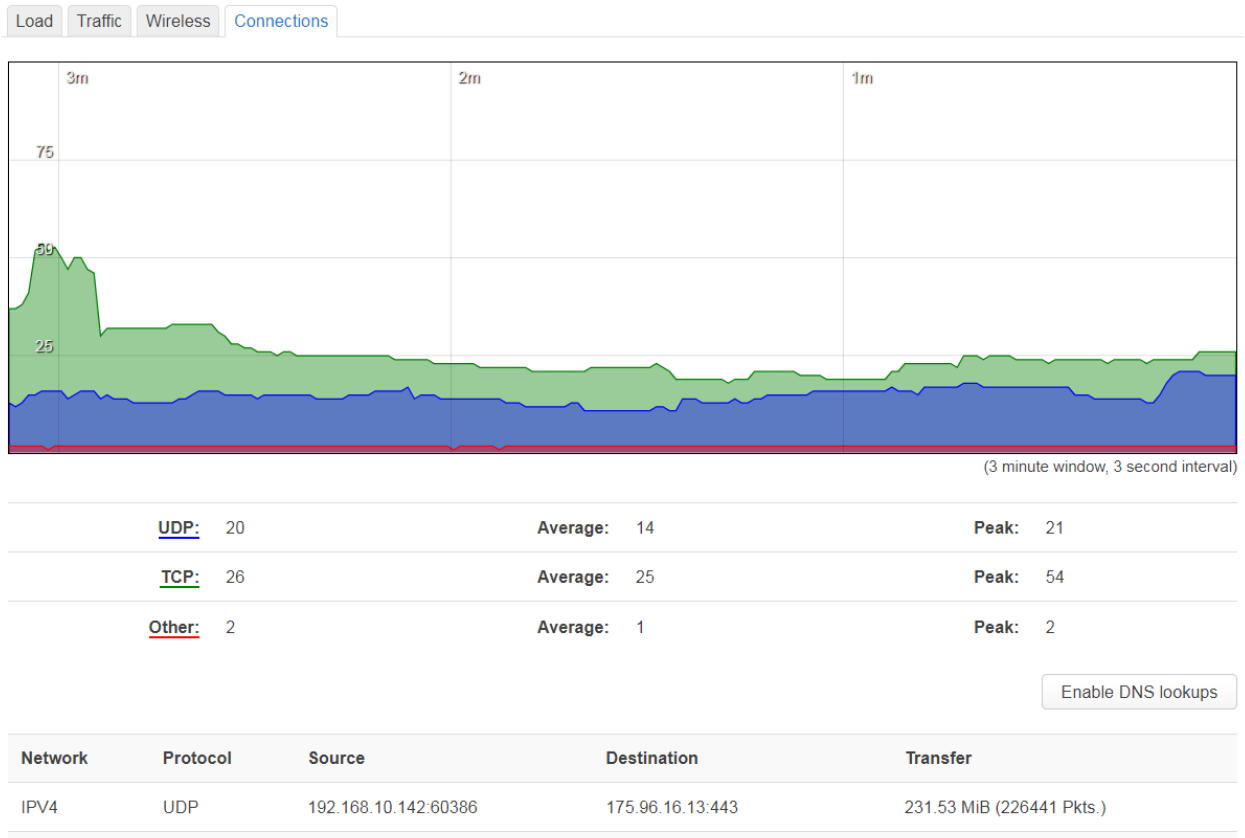
Show the system **Load**, network **Traffic** usage, **Wireless** and **Connection** load graphs in real-time.

Helps visually monitor resource load and interface throughput.

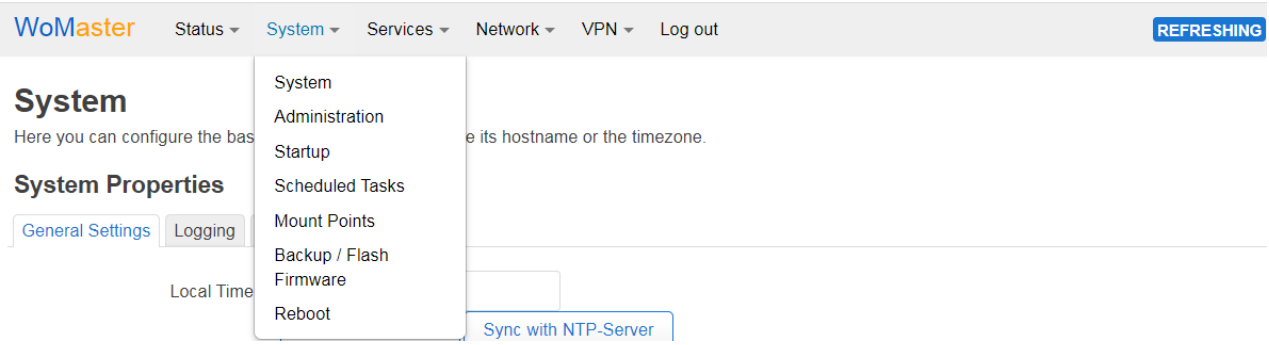
Example of the 4G LTE network Traffic usage:




Example of the Connection usage and source device:



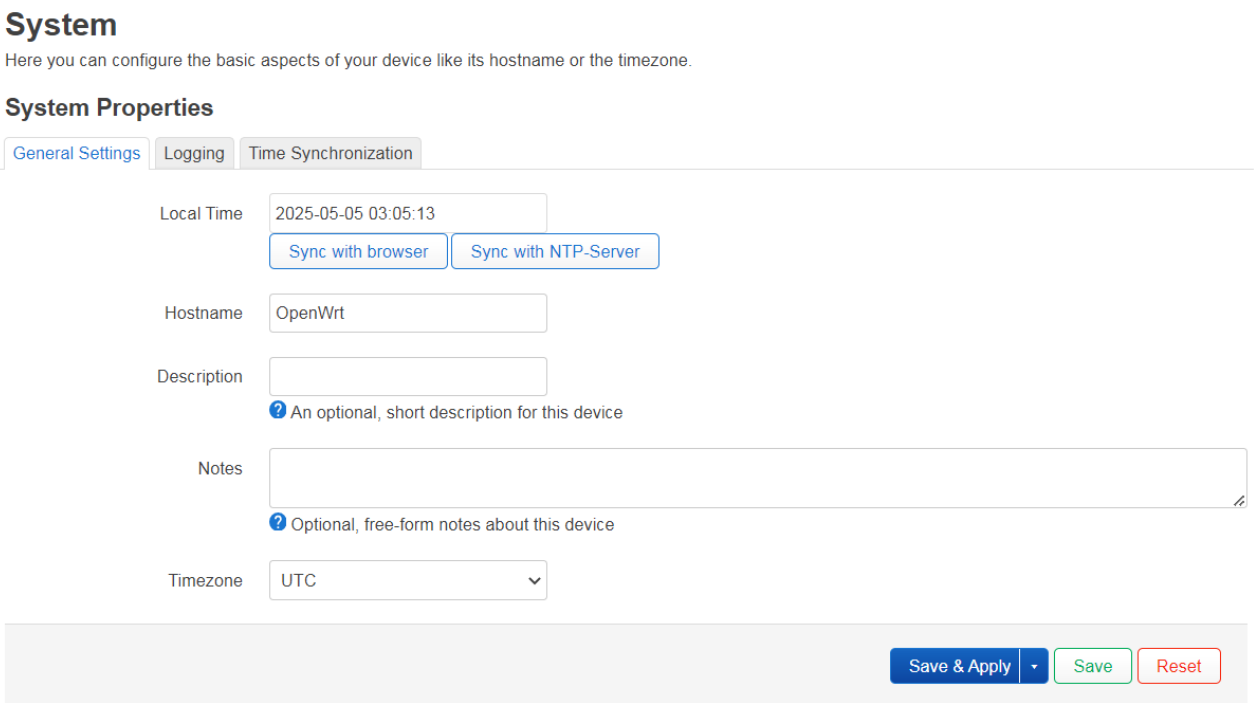
## 3.4.2 SYSTEM

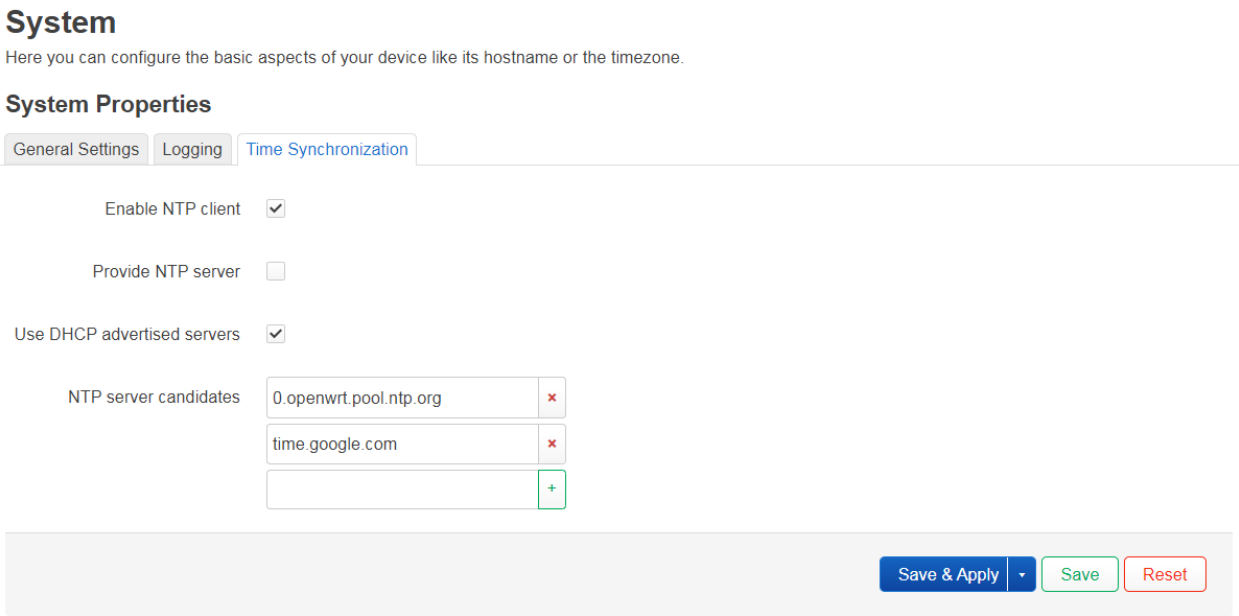



### 3.4.2.1 System → System

System Properties allows you to configure Device Settings, Log setting and NTP Server settings.

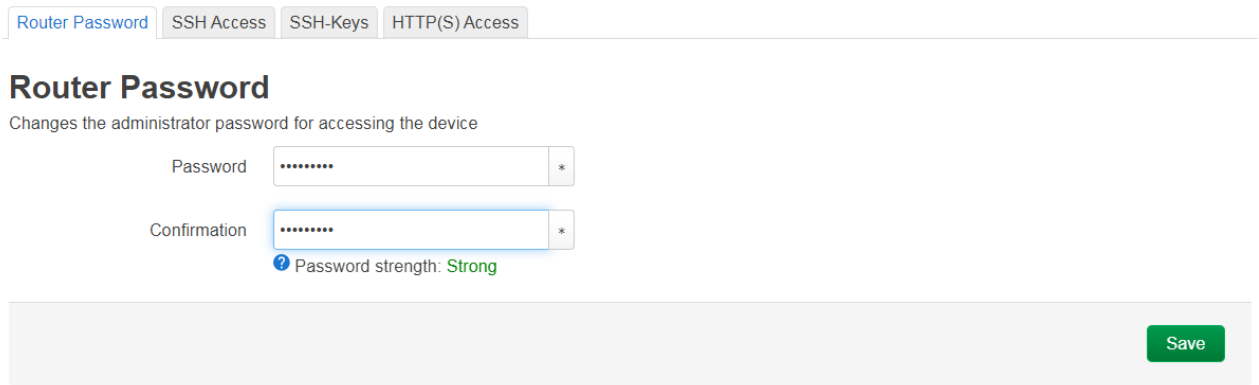
- **General Settings:** It shows the **Local Time** and allow you to select "Sync with browser" or "Sync with NTP Server". Set **hostname, Description** and "**Notes**" about this device. And configure the **Timezone.**
- Configure **Logging** settings
- Configure the **NTP Server Setting.** Default is NTP Client. You can add your prefer NTP server here. Ex: time.google.com (Google NTP Server)





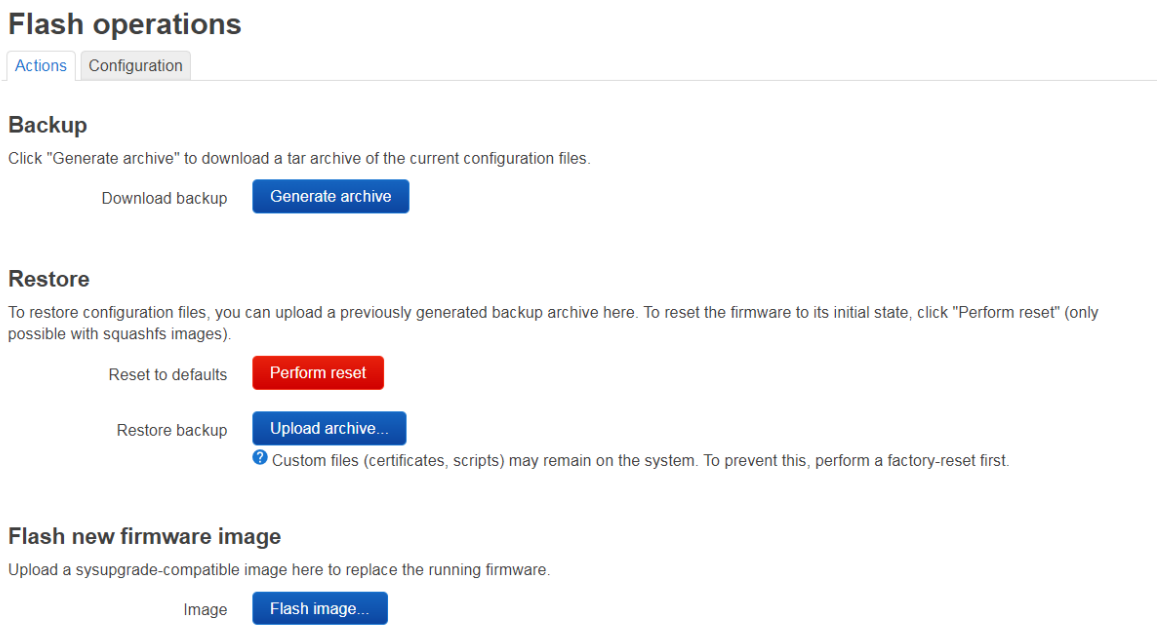

### 3.4.2.2 System → Administration

- **Router Password:** Change **web GUI and SSH password.** Password Strength indicates whether the password you enter is strong enough or not.
- **SSH Access:** Set **SSH access settings**. You can assign the given interfaces. Select “unspecified” means all interfaces.
- **SSH-Keys:** Upload and manage SSH public keys
- **HTTP(S) Access:** Enable automatic redirection of HTTP requests to HTTPS port.



### 3.4.2.3 System → Flash Operation

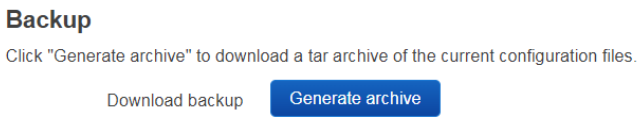
The Flash operations allow you to backup/restore the configuration file and firmware upgrade.



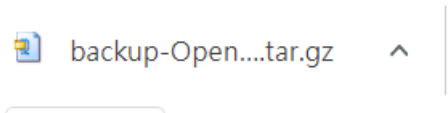

- **Backup:** Download or upload configuration backups
- **Restore:** Restore settings from a backup file. Perform Reset to default.
- **Flash new firmware image:** (with or without keeping settings)

## ■ Flash Operation: Backup/Restore

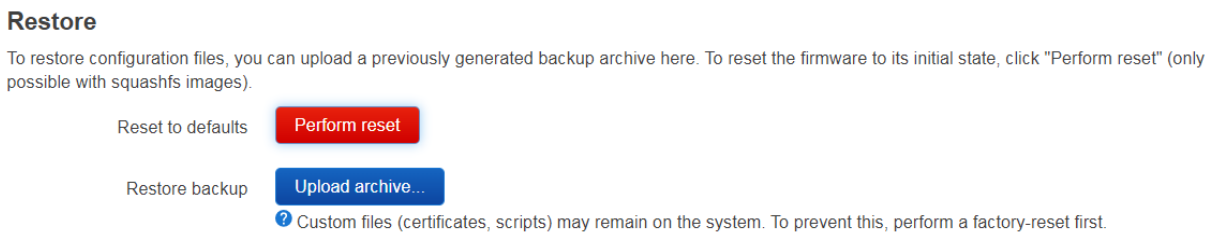
To **Backup** the configuration file. Execute the "**Generate archive**" command and you will see a configuration file automatically generated at the bottom of the web GUI screen. This file is usually saved in your default Download folder.




Example: A back file name: "backup-OpenWrt-2025-05-05.tar.gz" is generated.

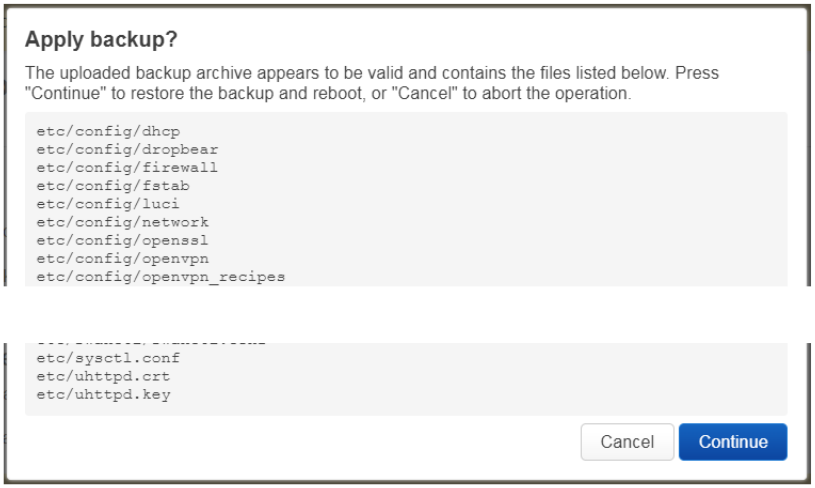


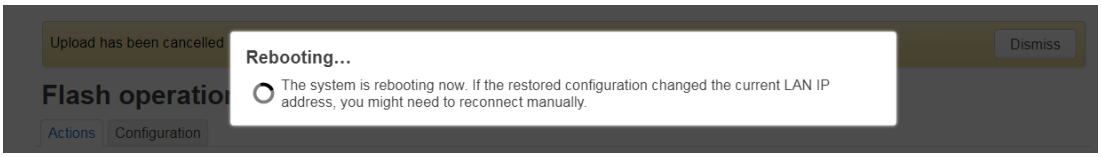
To **Restore** the configuration file from one device to the device. Execute the “**Upload archive**” command and you will see a pop-up window for uploading file.




Browse the folder of the configuration file, ex: “backup-OpenWrt-2025-05-05.tar.gz”. You can see the file name on the pop-up window. Click “**Upload**” to restore the configuration file to the router.

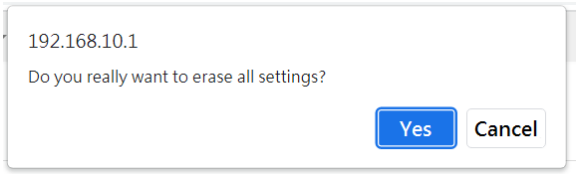
A pop-up window will ask confirm “**Apply backup**?” Press “**Continue**” to restore the configuration file and the router will reboot automatically.



## ■ Flash Operation: Reset to Default

Click "**Perform reset**". A pop-up window will ask you "Do you really want to erase all settings?"



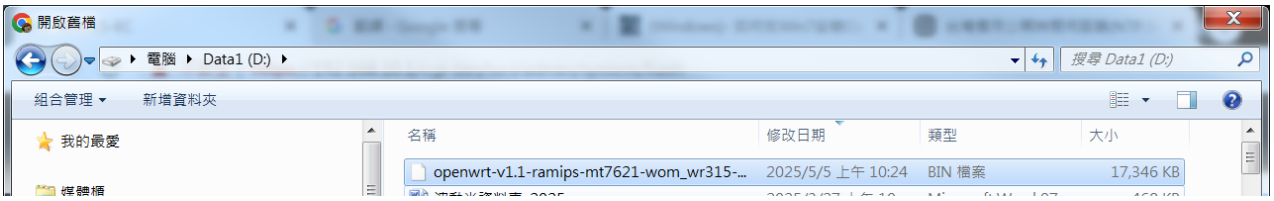

Click "**Yes**". The router will erase the configuration and will reboot itself with the default configuration.

If the system cannot automatically reconnect to the web GUI due to the removal of the IP and settings, please reconnect to the web GUI with the default IP Address.

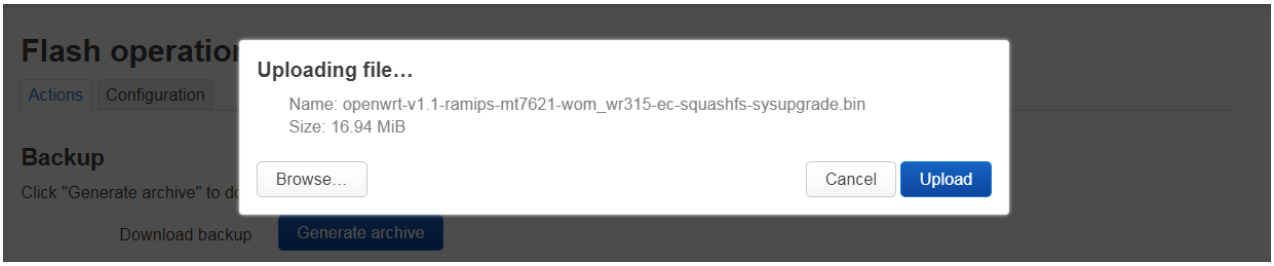
## ■ Flash Operation: Firmware Upgrade

Click “**Flash image…**”, you can see the below popup window.

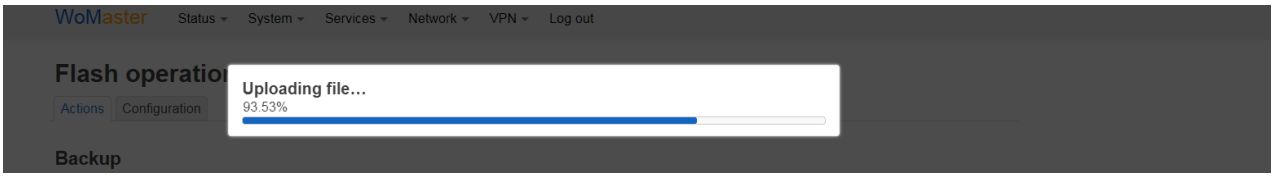
Then click “**Browse…**”, browse the folder of the firmware file and select the correct new firmware image file.



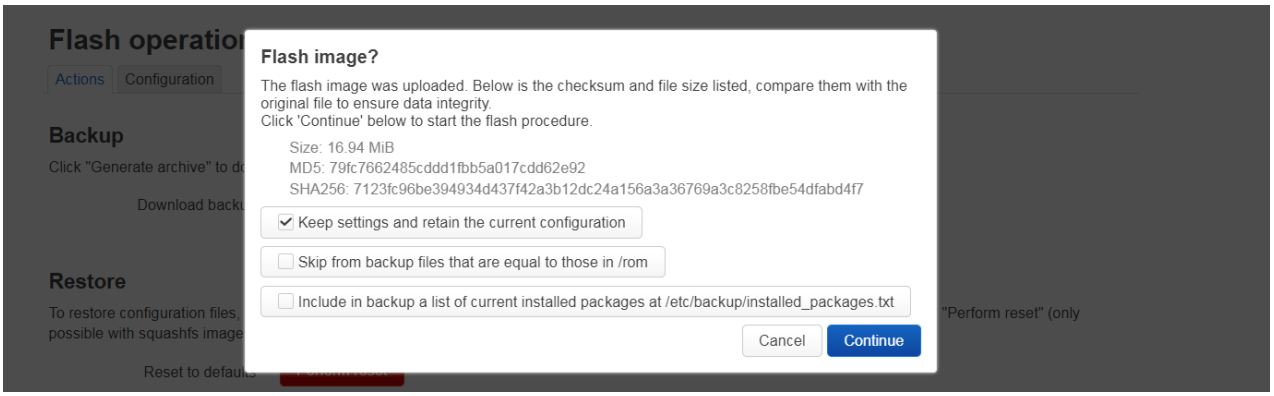

After selected the file, you will be the file name at the popup window.




Click “**Upload**”, the file will be uploading…

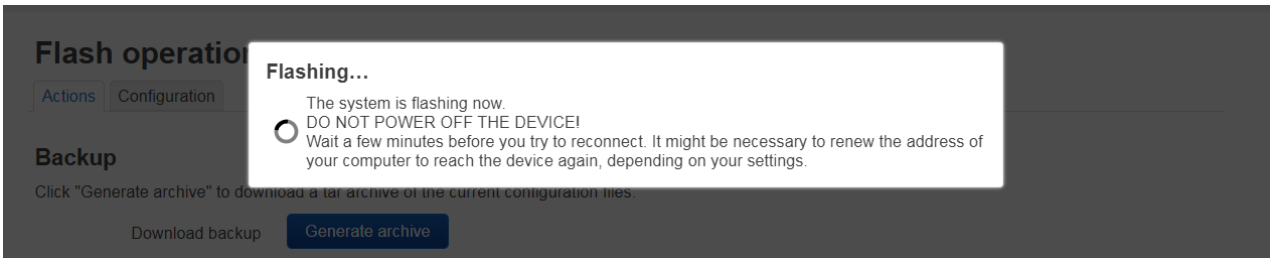



After uploaded, you can keep current configuration by selecting the “Keep Settings and retain the current configuration”.




After "**Continue"**, you will see the Flashing… The system is flashing the image…

**Warming!! DO NOT POWER OFF THE DEVICE while Flashing…!!**

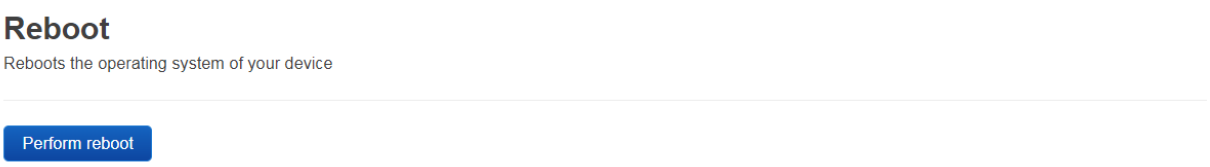



The router will automatically reboot after finished the progress.

**Note:** Since OpenWrt is based on an open system architecture, system settings may be altered after a firmware update. If an external device (such as a 4G or Wi-Fi module) fails to activate properly, try restarting the device or modifying its settings, then apply and save the changes to reactivate it.

### 3.4.2.4 System → Reboot

Reboot the device manually.

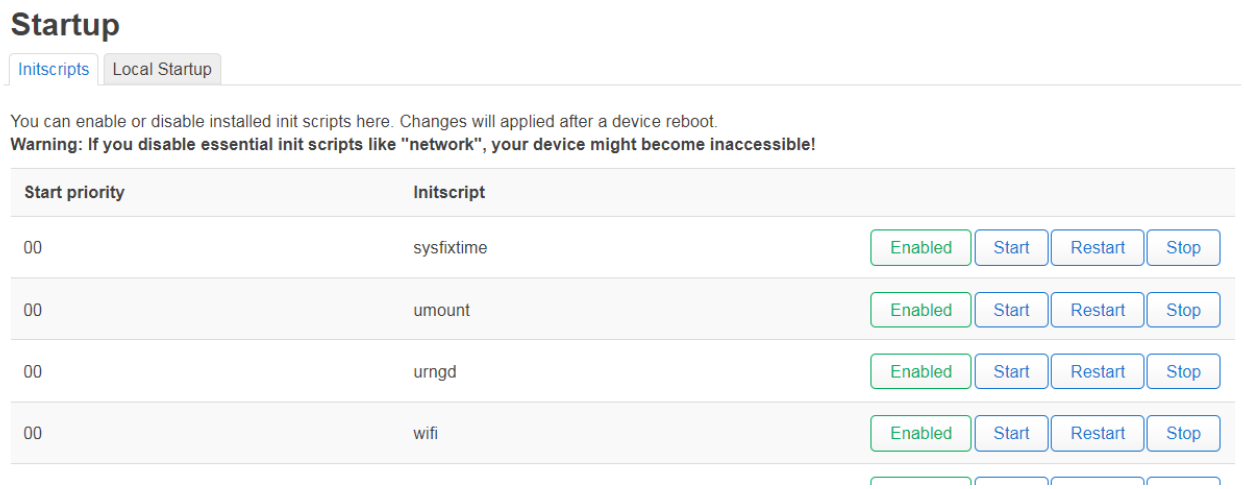


### 3.4.2.5 Advanced Settings:

The OpenWrt system provides some advanced settings to change the router's initial state. However, these functions are only suitable for engineers who are familiar with the OpenWrt system.

## ■ System → Startup

You can enable or disable installed init scripts here. Changes will applied after a device reboot.




- View and manage **init.d scripts** (boot-time services). Enable/disable services…
- Control startup order and status.

**Warning: If you disable essential init scripts like "network", your device might become inaccessible!**

## ■ System → Scheduled Tasks (crontab)

- Add scheduled jobs using **cron syntax**
- Useful for automating tasks like reboots, interface resets, or logging

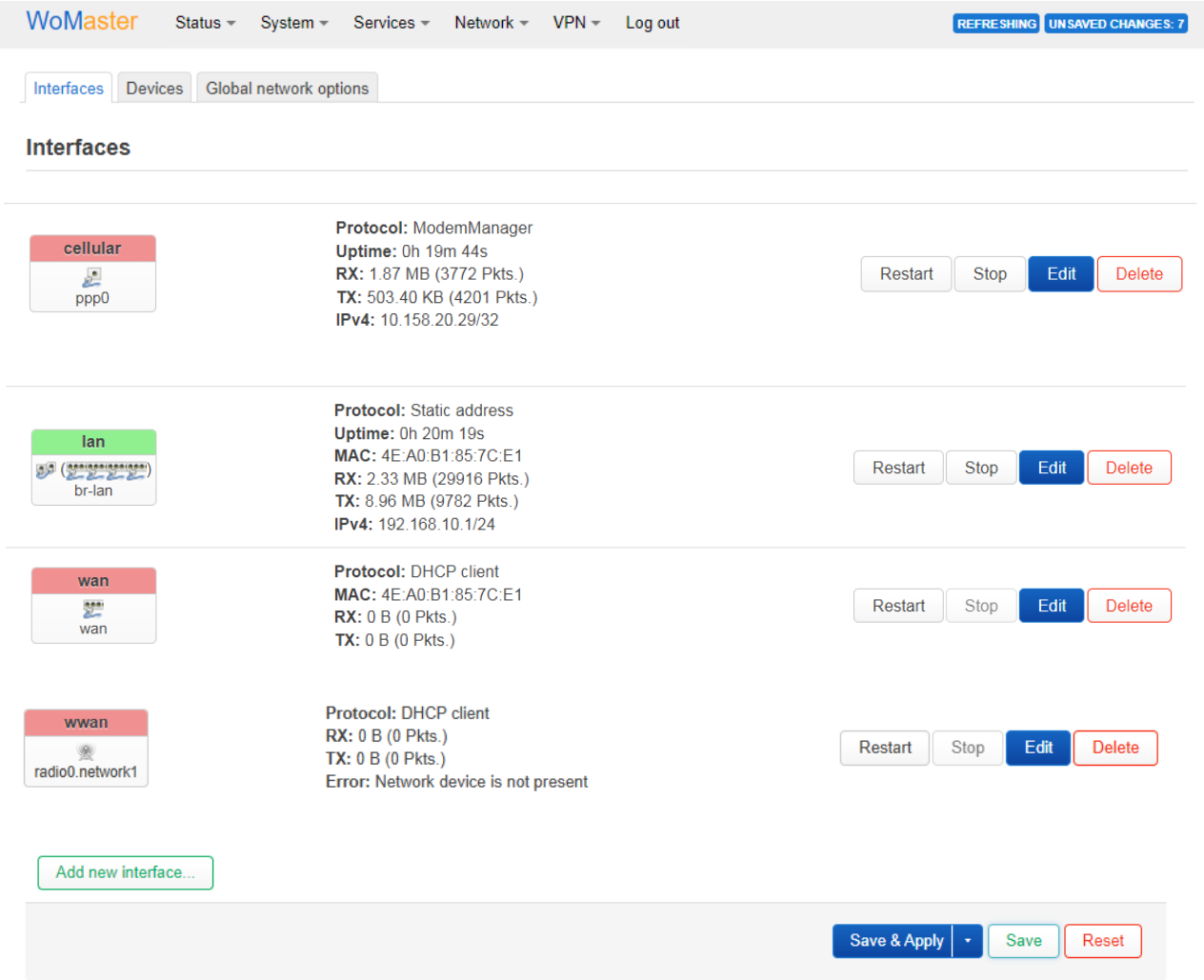
## ■ System → Mount Points

- Configure **external storage (USB drives, SD cards)**
- Set up automatic mounting of storage volumes

## 3.4.3 Network

### 3.4.3.1 Interfaces

The router has created the existed interfaces of the WR315G-2C-LTE6-GAX-EC, such as Cellular(4G LTE), lan (Ethernet-LAN, physical port 2/3/4/5), wan(Ethernet-Wan, physical Port 1), and wwan (Wi-Fi 6 client mode) as below.



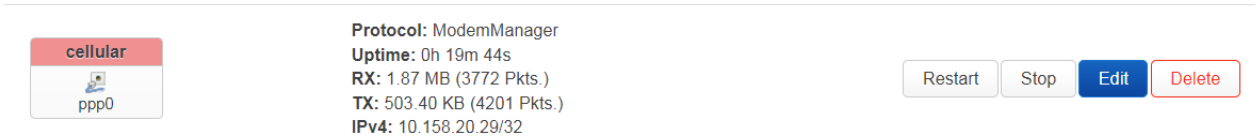

**Note:** "wan6" is the IPv6 configuration of WAN interface. It is usually not used.

The "**Add new interface"** allows you to add additional interfaces, or recreate an interface after you have deleted it. Click "**Save & Apply**" after you changed the settings.

**Note:** The Router has already created the current user interface for you. If you want to delete or add other interfaces, please be careful and be familiar with the working principle of OpenWrt operating system. If you delete it by mistake and don't know how to restore it, you can use reset to default to restore the factory settings.

**The following page explains the meanings of each interfaces.**

## ■ Interface: Cellular




The Cellular interface displays the status of the mobile broadband (4G/5G) connection used by the device to access the internet. It is typically used as a primary or backup WAN interface, especially in remote or mobile environments. This status panel provides real-time information about the cellular connection:

- **Interface Name**: Shown as ppp0, this is the system-assigned name for the point-to-point (PPP) cellular connection.
- **Protocol**: Indicates the connection manager used, such as ModemManager, which controls and communicates with the cellular modem.
- **Uptime**: Shows how long the current cellular session has been active.
- **RX / TX**: Displays the amount of data received (RX) and sent (TX) over the cellular network, along with the number of packets transferred.
- **IPv4 Address**: Shows the assigned IP address and subnet, typically used for routing cellular traffic.

Control buttons on the right allow the user to:

- **Restart** the interface (reconnect),
- **Stop** the interface (disconnect),
- **Edit** configuration settings, or
- **Delete** the interface (use cautiously).

**Warming:** Do **NOT** delete this interface unless you use other non-default 4G/5G cellular modules and you are quite familiar with how OpenWrt works. Generally, we do not recommend or authorize users to replace the 4G module by themselves. Any self-replacement of the hardware module is not covered under the product warranty or support services. The manufacturer shall not be held liable for any damage or malfunction resulting from unauthorized hardware modifications.

### **Edit** interface

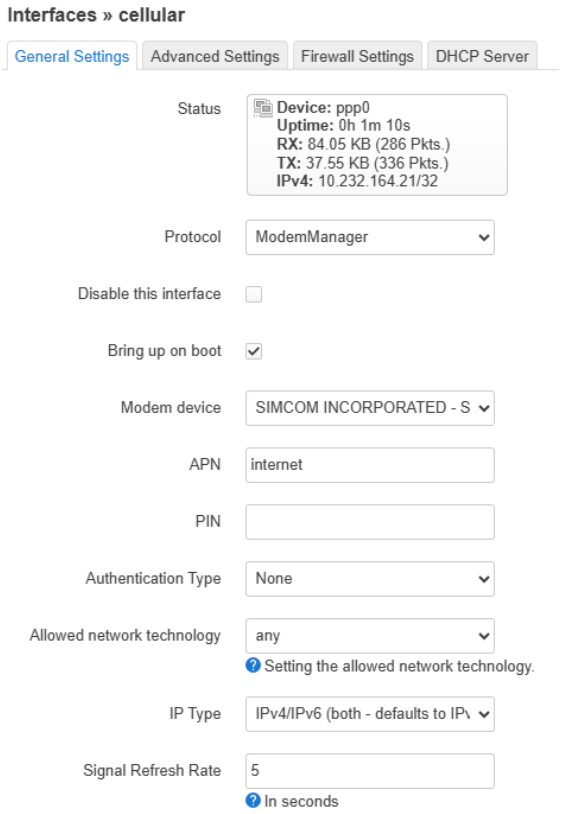
After clicking "**Edit**" on a Cellular interface (usually named wwan, 4G, ppp0, or similar), you'll be taken to a configuration page that allows you to modify various connection and network parameters.

The page is mainly used to modify the APN, Disable the interface if you do not use 4G/Cellular...etc.

The default APN name is internet which is popular used in worldwide.

You can type SIM PIN number (password) if it is configured, but, do not allow you to modify the PIN number.

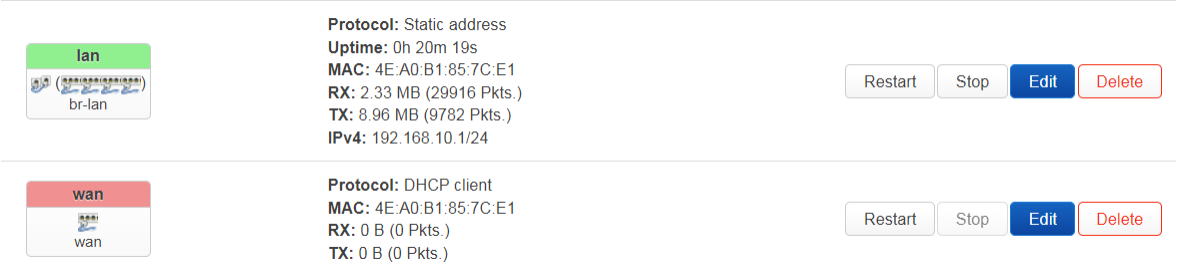
The cellular interface is enabled in default setting, while it will start the connection automatically on boot.




This is where you set the **main connection parameters**:

- **Protocol**: ModemManager
- **Modem device**: Automatically detected (e.g., SIMCOM… module)
- **APN(Access Point Name)**: The APN provided by your mobile operator, default: internet
- **PIN**: SIM card PIN (if enabled) (Modify the SIM Card PIN is not supported)
- **Authentication**:
    - Options: None, PAP, CHAP
    - Some networks require this for authentication.
- **Allowed Network Topology:** any
- **IP Type**:
    - IPv4, IPv6, or IPv4v6
    - Select based on what your mobile operator supports.
- **Signal Refresh Rate:** 5 (in seconds)

## ■ 3.4.3.2 Interface: lan/wan




This section shows the status of the **LAN (Local Area Network)**, which connects local devices (like PCs or IoT nodes) to the router. And the **WAN (Wide Area Network)** interface, used for internet access via a wired uplink (e.g., fiber, DSL, cable modem).

Displayed information of the **LAN interface** includes:

- **Interface name** (e.g., br-lan) – This indicates a **bridge** interface that combines multiple physical ports (e.g., LAN port 2, port 3, port 4 and port 5) into one logical network.
- **Protocol** – The IP assignment method. Ex: Static address indicates the Lan interface has a fixed IP.
- **Uptime** – How long the interface has been active.
- **MAC address** – Unique hardware identifier for the interface.
- **RX/TX** – Received and transmitted data, showing current traffic flow.
- **IPv4 address** – The IP address assigned to the interface (default: 192.168.10.1). The IP is usually acts as the default gateway of the connected devices.

The **WAN interface** connects the router to the internet or an upstream network. It commonly uses **DHCP client mode** to obtain an IP address automatically from the internet provider.

Displayed information of the **WAN interface** includes:

- **Interface Name:** wan
- **Protocol:** DHCP client. It tries to get an IP address from your internet provider (or upstream router).
- **MAC:** The hardware address of the WAN interface.
- **RX/TX:** Received and transmitted data. 0B(0 pke/s) means No data has been received or sent yet. This may mean the WAN cable is unplugged or the upstream device is down.
- **IPv4:** The IP address of this interface. Not shown — likely because no IP address has been obtained yet.

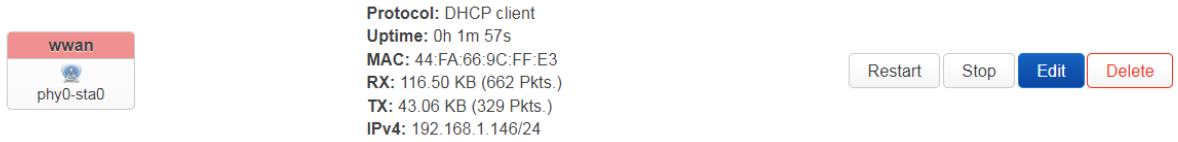
Each interface includes control buttons:

- **Restart** – Re-establish the connection.
- **Stop** – Temporarily disable the interface.
- **Edit** – Change settings like IP, DNS, or protocol type.
- **Delete** – Remove the interface configuration (for advanced users only).

**Note:** The router has one wan interface port 1 and lan interface port 2/3/4/5 by default configuration.

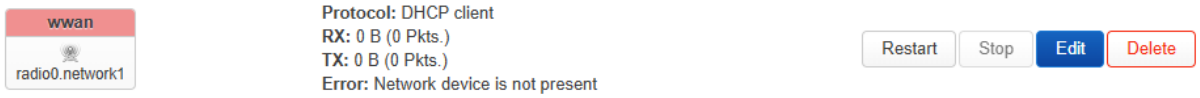
**Note:** “wan6” is the IPv6 configuration of WAN interface. It is usually not used.

## ■ 3.4.3.3 Interface: wwan




The **WWAN (Wireless Wide Area Network)** interface allows the device to connect to an external Wi-Fi network as a **client**, functioning similarly to how a laptop or smartphone connects to a hotspot or access point. This interface is typically used when a wired WAN or cellular connection is unavailable.

By default, this interface is **disabled** to prevent unintentional conflicts with other network interfaces.




**Note:** It is strongly recommended to use **only one wireless interface** for external network access at a time. Using both the **WWAN interface (Wi-Fi client)** and **4G cellular** as uplinks simultaneously can cause routing conflicts. This may lead to unpredictable network behavior, as the system may be unable to clearly determine which interface to use for outgoing traffic.

Key Details Shown in the Status Panel:

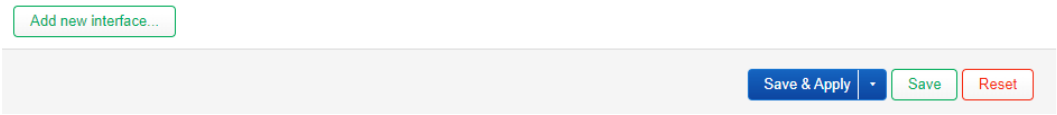
- **Interface Name:** Represents the logical name of the Wi-Fi WAN connection (e.g., wwan).
- **Associated Device:** Indicates the internal wireless radio (e.g., radio0) used for the connection.
- **Protocol:** Usually set to **DHCP client**, meaning the device will automatically request an IP address from the upstream Wi-Fi network.
- **MAC Address:** The MAC address of the radio module.
- **RX/TX:** Shows the amount of data received and transmitted over the wireless link. If values are zero, the connection may not be established.
- **Error Message:** If the message “Network device is not present” appears, it means the wireless hardware is either disabled, unconfigured, or failed to connect. (Not Enable State)
- **IPv4:** The IP address of the interface. Obtain the IP address from the AP in DHCP client mode.

Control Options:

- **Restart** – Attempts to reconnect to the Wi-Fi network.
- **Stop** – Disables the wireless client connection.
- **Edit** – Opens configuration settings to set SSID, password, or network mode.
- **Delete** – Removes the WWAN interface configuration (for advanced users only).

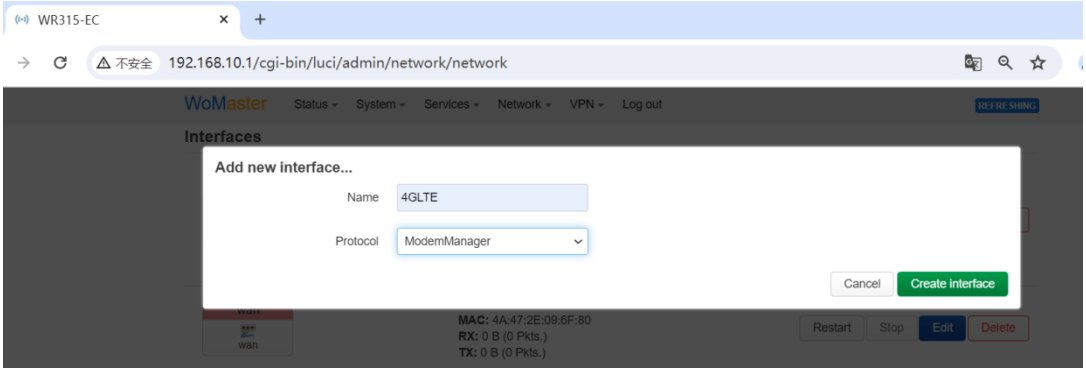
## ■ 3.4.4.4 Add new Interface

The following example demonstrates how to restore a 4G network interface in case it is accidentally deleted. This procedure is provided solely for recovery purposes and should not be used for general configuration or hardware modifications.



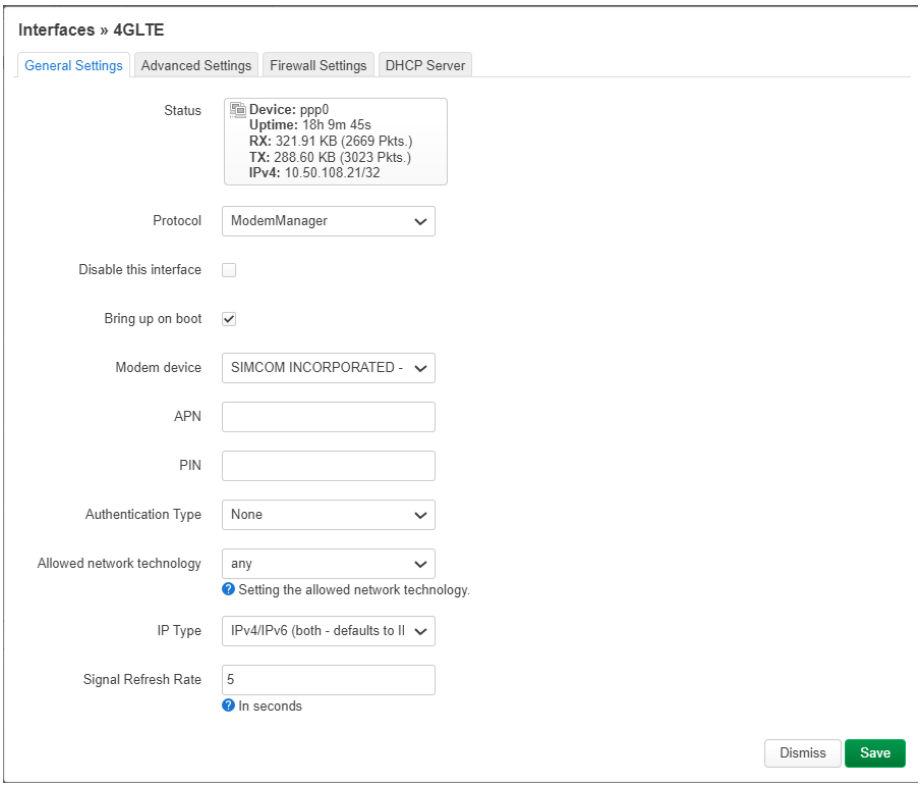

Click on "**Add new interface**".

Set parameters in the pop-up window. Enter the name and select "ModemManager" from the dropdown menu.

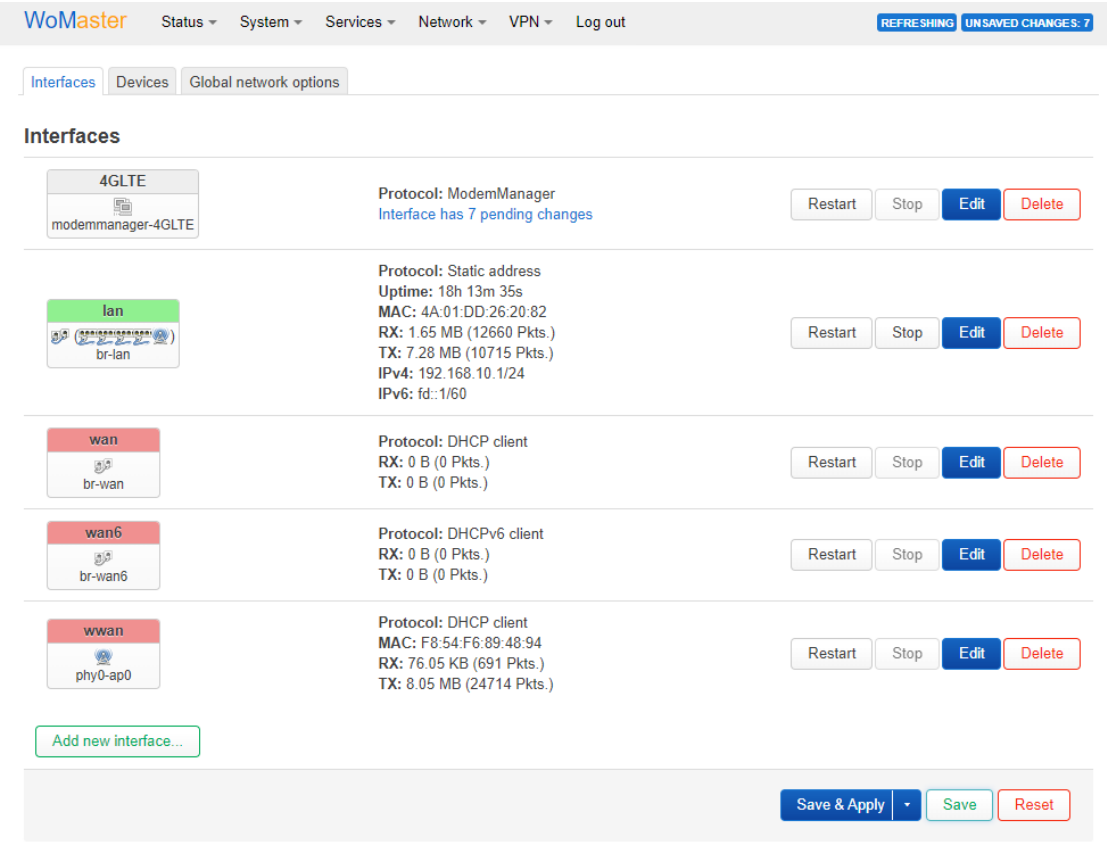



Click on "**Create interface**". The following window will pop up.

Then type the APN…settings.



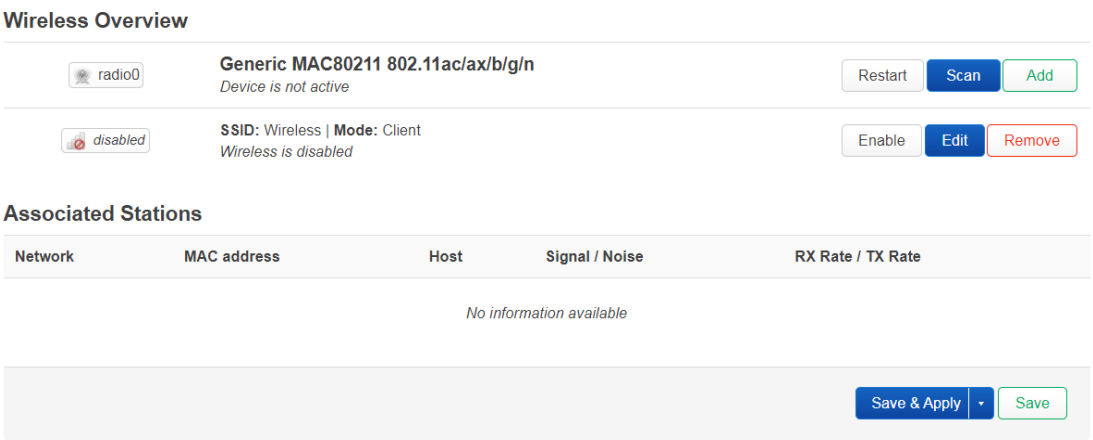

After configured, then click on "**Save**", it will return to the Interfaces page.



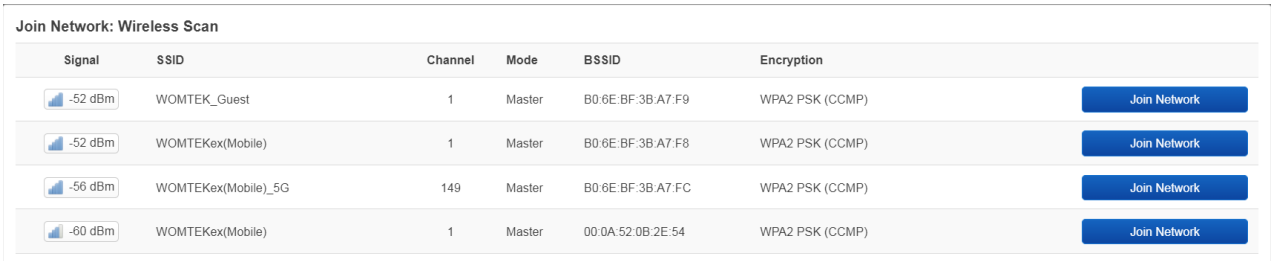

### 3.4.3.2 Wireless(Wi-Fi)

Here is the web interface for you to configure Wi-Fi settings.

In initial state, the Wi-Fi interface is disabled. And there is no associated station.



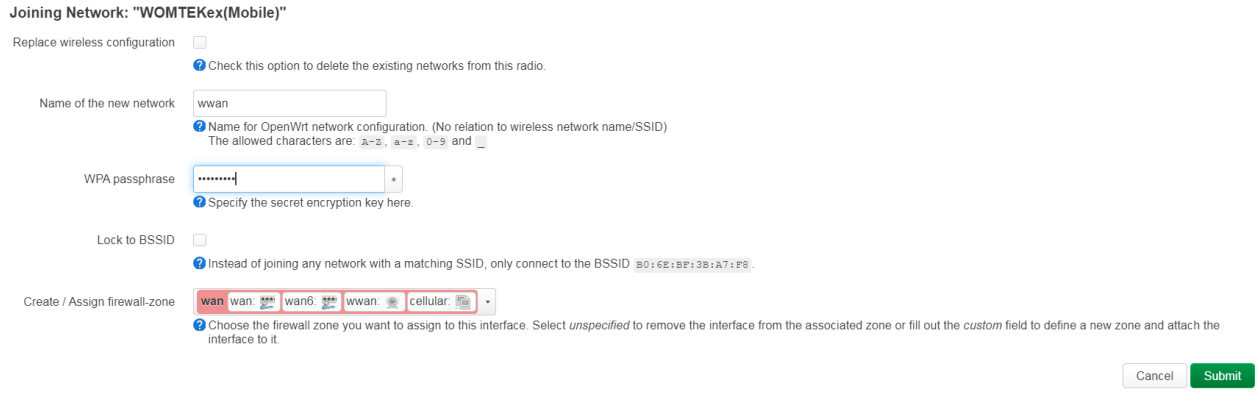

Click "**Scan**" to scan the Wi-Fi network over the air. Below screen shows part of the wireless network the router has discovered…



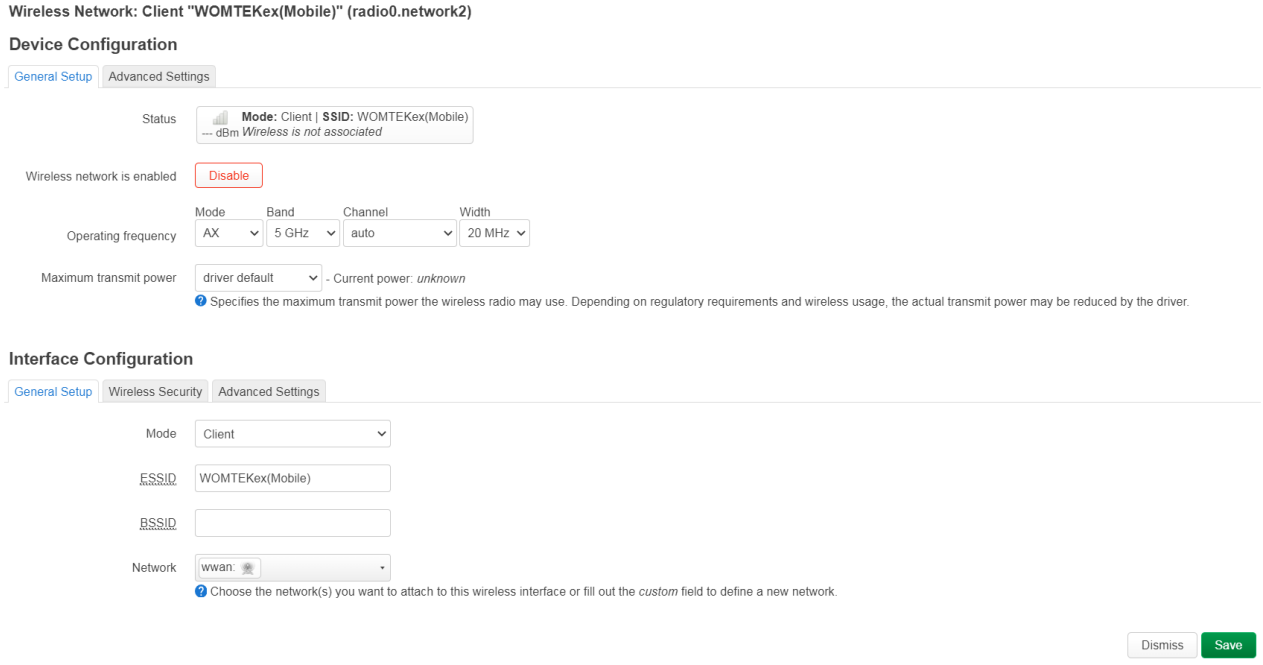
Join Network: Wireless Scan

| Signal | SSID | Channel | Mode | BSSID | Encryption | |
|---|---|---|---|---|---|---|
| -52 dBm | WOMTEK_Guest | 1 | Master | B0:6E:BF:3B:A7:F9 | WPA2 PSK (CCMP) | Join Network |
| -52 dBm | WOMTEKex(Mobile) | 1 | Master | B0:6E:BF:3B:A7:F8 | WPA2 PSK (CCMP) | Join Network |
| -56 dBm | WOMTEKex(Mobile)_5G | 149 | Master | B0:6E:BF:3B:A7:FC | WPA2 PSK (CCMP) | Join Network |
| -60 dBm | WOMTEKex(Mobile) | 1 | Master | 00:0A:52:0B:2E:54 | WPA2 PSK (CCMP) | Join Network |

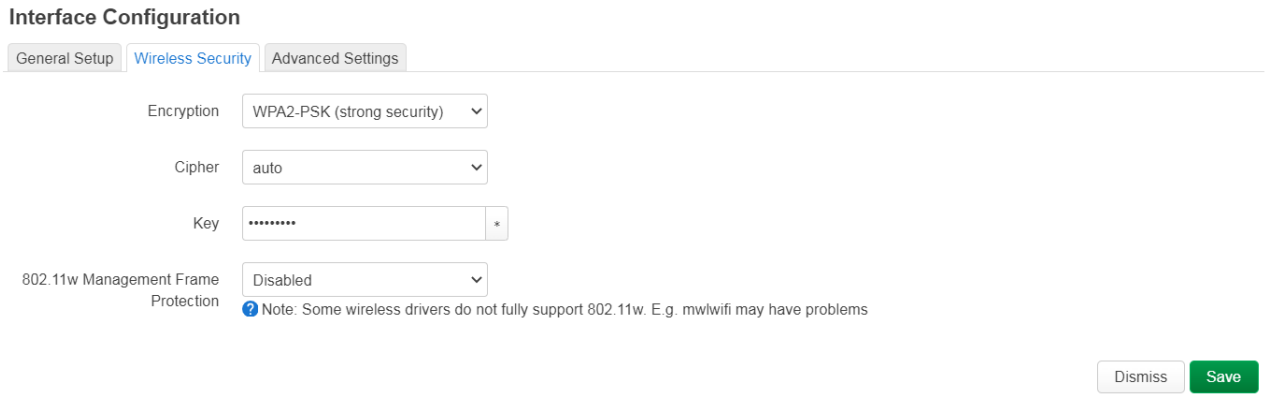
Select the target AP you want to connect and click “**Join Network**”.




Type the WPA password, and click "**Submit**". Then the Device Configuration pop-up window appears and you can configure the Wi-Fi parameters here.

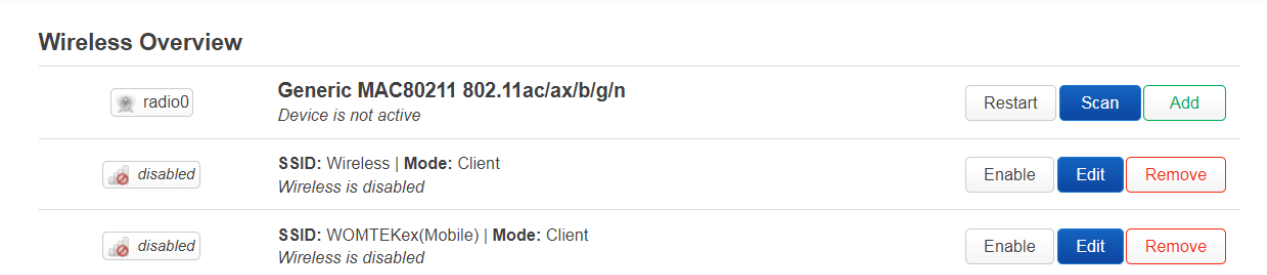



Wireless Security setting:

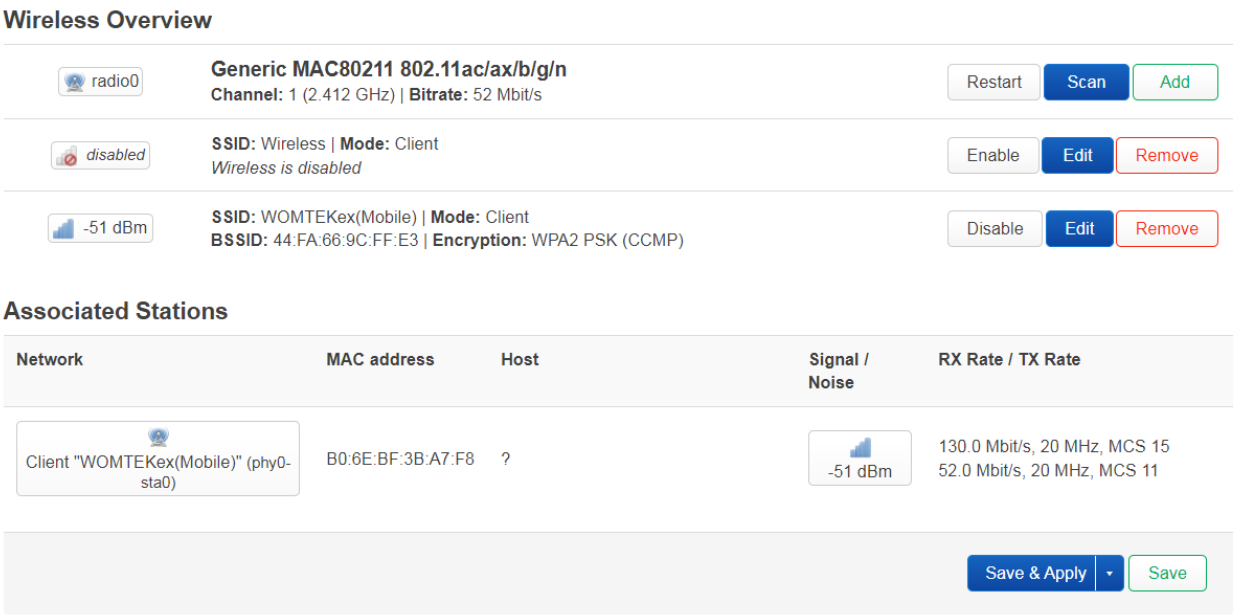



After configured, click "**Save**" to apply the settings.

After applied the settings, you can see the SSID you connect in the Wireless Overview.



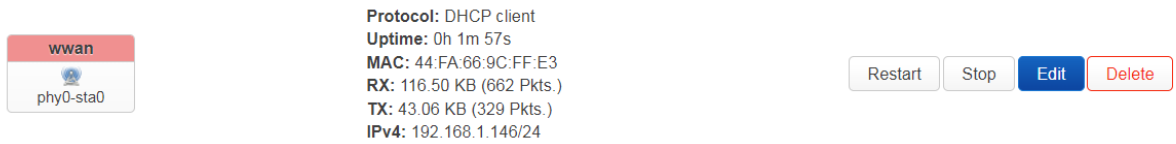

Click "**Enable**" of the interface with SSID you select. While you see the link quality, BSSID and Encryption info, it means you already connect to the target AP. You can also see the Associated Station table on the same page.




In Associated Stations list, you can see the wireless network you join, signal quality, RX/TX rate and bandwidth information. Click "**Save&Apply**" to permanently activate.

To see the Wi-Fi information, you can also find the changed in the **Network Interface** and **STATUS overview.**

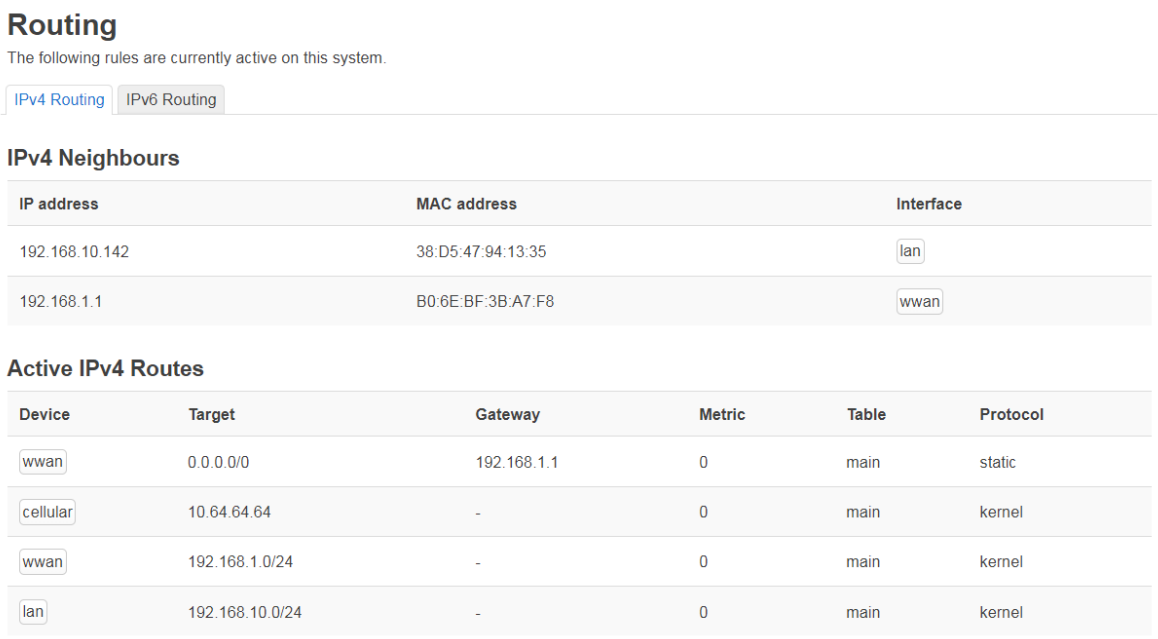
**Network Interface: wwan**



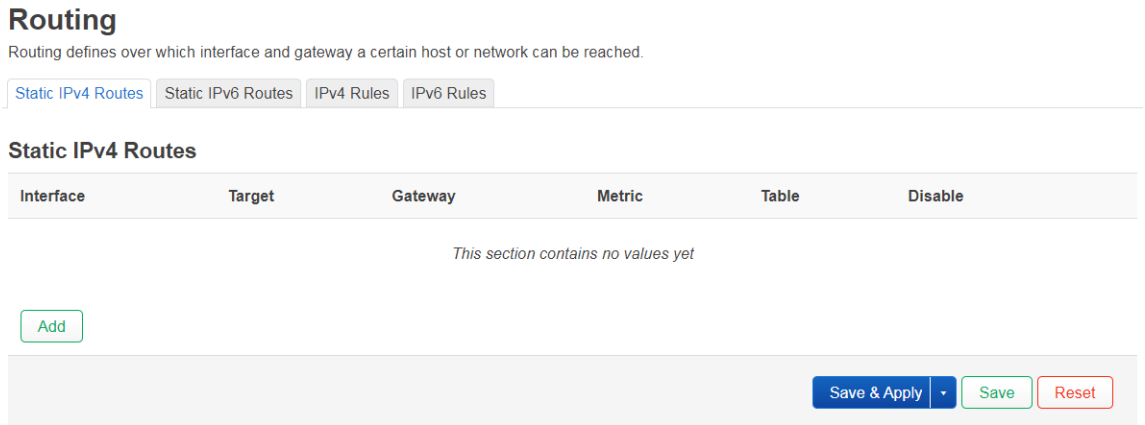
### 3.4.4.3 Routing

Our device has preset **LAN to wwan(Wi-Fi) /cellular(4G LTE)** routing rules. You can find it on the STATUS-Routing page. If it is not enough for your use, you can add new rules here.

**STATUS-Routing:**



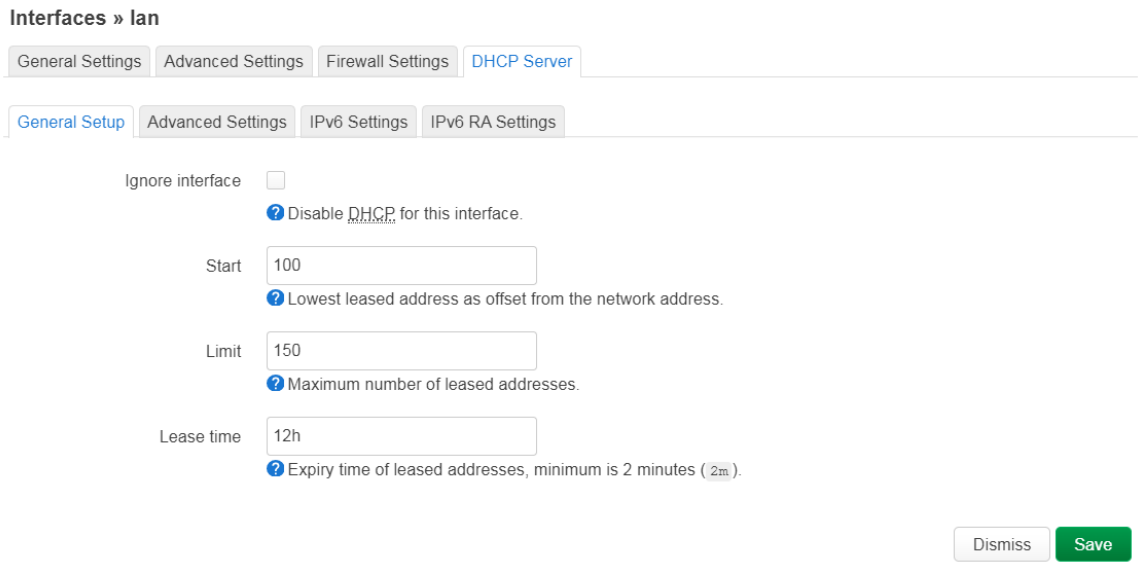

Click "**Add**", you can add new rules, but be careful not to conflict with each other.



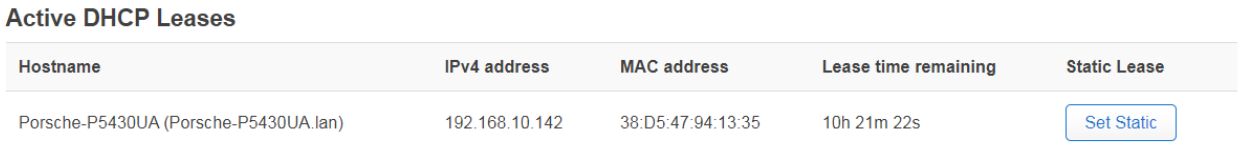
### 3.4.4.4 DHCP and DNS

The DHCP Server feature is enabled by default configuration. You can find this in DHCP Server feature set of the Interface-Lan, as shown in below screen. The default IP of the lan interface is 192.168.10.1. It means the IP poll is started from 192.168.10.100 to 192.168.10.150. The default DHCP lease time is 12h.

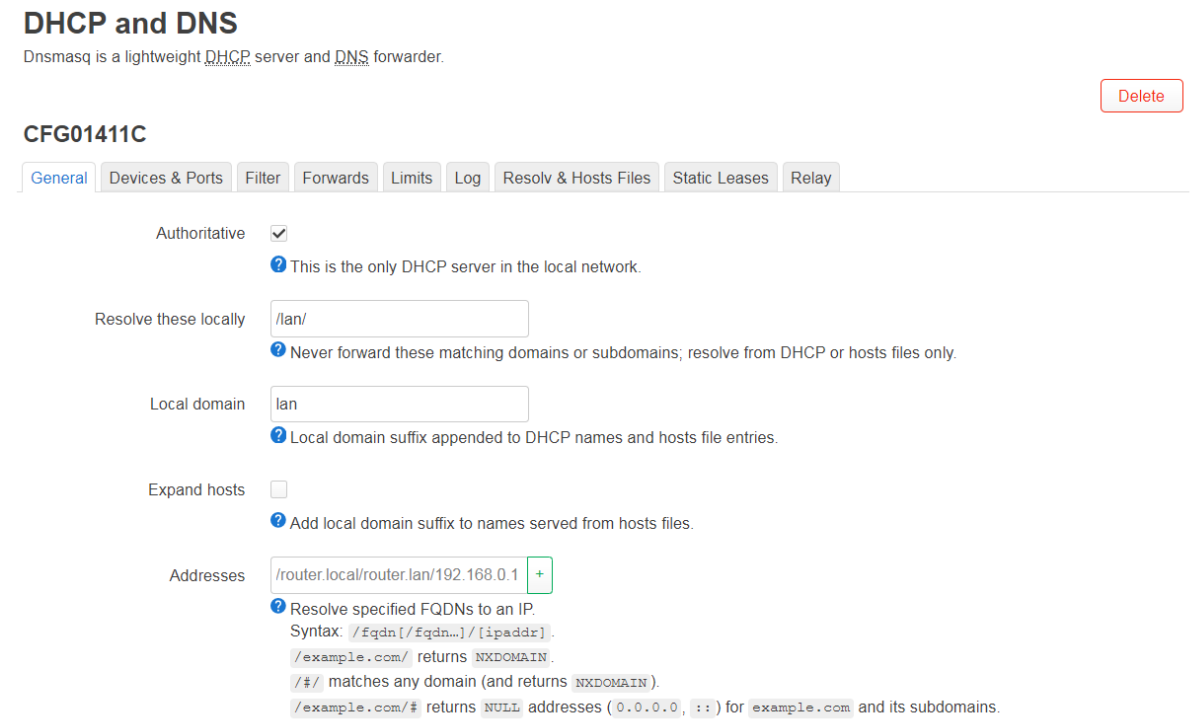
Interface – lan – edit – DHCP Server




In **Status Overview**, you can find the connected clients and the IP address they obtained.

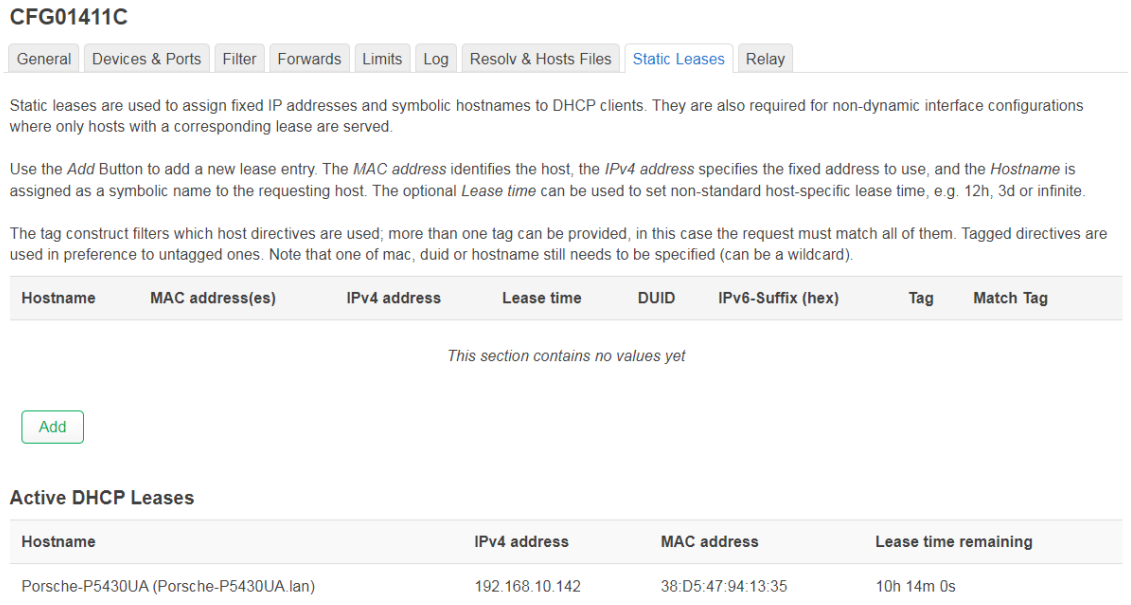



This is the **DHCP and DNS configuration page** in OpenWrt's LuCI web interface, where the system is using **Dnsmasq** as a lightweight **DHCP server** and **DNS forwarder**. Here's a breakdown of what each setting means:



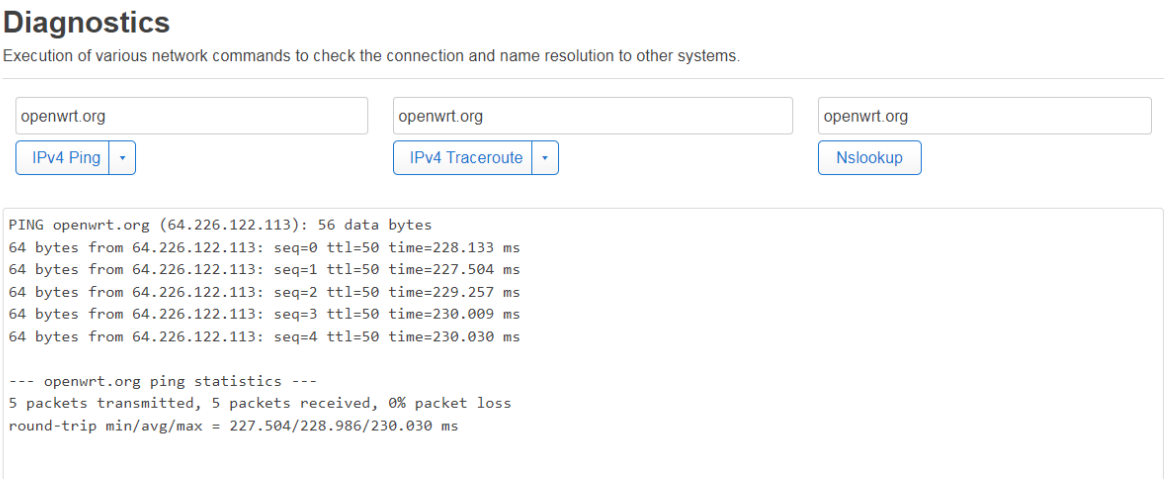

**In General setting, the** Authoritative is Checked. This tells Dnsmasq to **act as the only DHCP server** on the local network. If a device requests an IP and isn't known, Dnsmasq will respond definitively (rather than ignoring the request). The Resolve these locally and Local domain are applied to lan.

In **Static Lease**, you can assign specific MAC to specific host. You can also configure DHCP Relay in **Relay** setting.



### 3.4.4.5 Diagnostics

This section is used to test network connectivity and DNS resolution from the router itself. It provides simple but essential tools to troubleshoot network issues. Type the target IP address and the tool to diagnostic.




- **IPv4 Ping**

Send Ping (ICMP echo requests) to the specified host. It is useful for checking **connectivity** and **response time**. In the screenshot, “openwrt.org” is the target host, you can type target host’s IP address here. The responded successfully with **0% packet loss** and round-trip times between ~227–230ms.

- **IPv4 Traceroute**

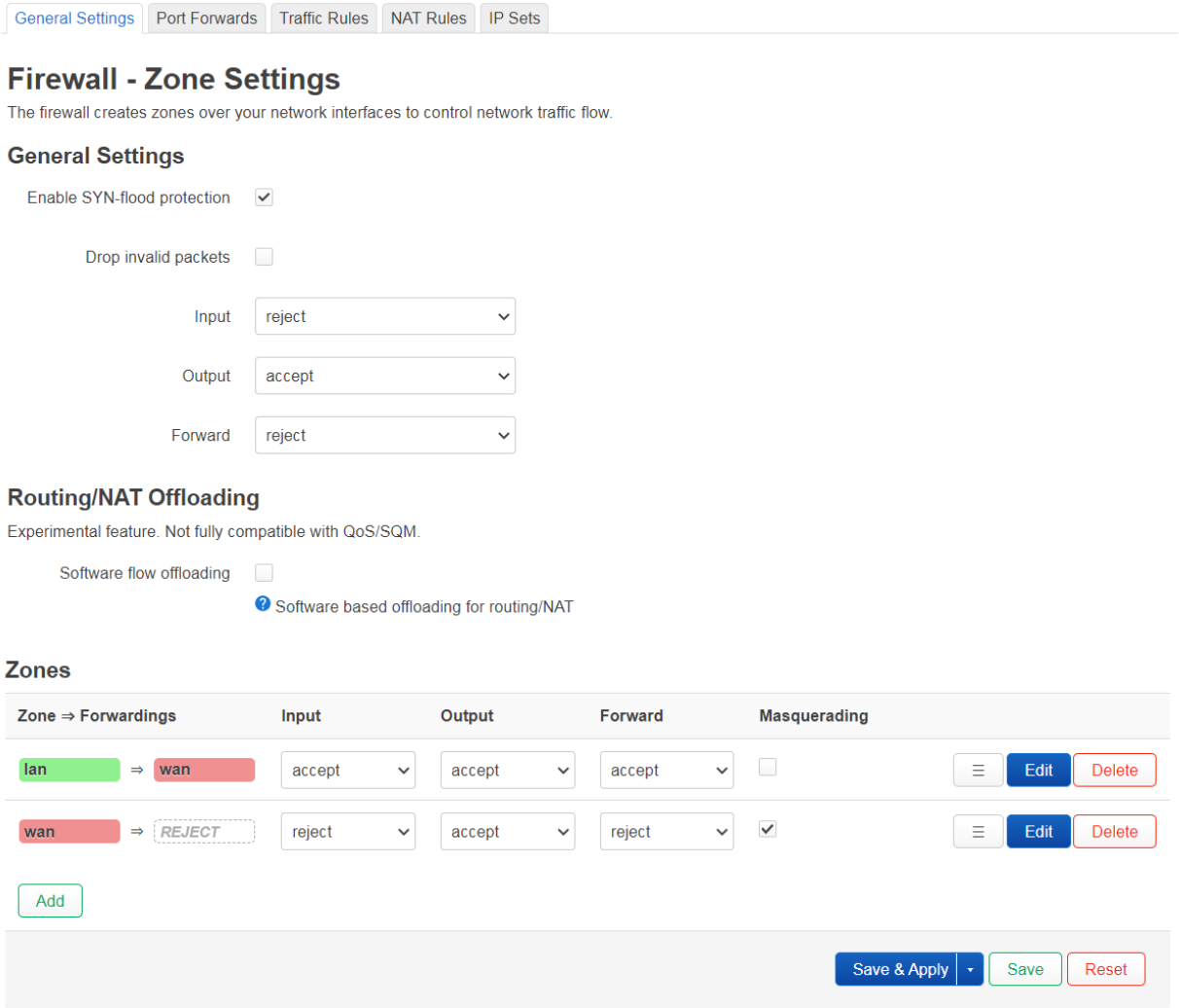
Trace the path (hops) from the router to the target host. It helps diagnose **routing issues** or determine where a connection might be failing.

- **Nslookup**

Perform a DNS lookup to check if the router can **resolve a domain name to an IP address**. It’s useful for checking if DNS is working properly.

### 3.4.4.5 Firewall

The firewall feature manages traffic between network zones (e.g., LAN/WAN) using policies, NAT, and packet filtering. This default firewall setting is very safe and is usually used in WAN interface (4G module, wireless wan, Ethernet-wan to ISP). Prevent external access to the router or internal network. At the same time, allow intranet devices to access the Internet normally through NAT.




Key sections include:

- **General Settings**

**SYN-flood Protection: Checked.**

**Purpose:** To prevent SYN flood attacks, which is a common DDoS (Distributed Denial of Service) attack method.

**Attack method:** Send a large number of TCP SYN packets in a short period of time, so that system resources are exhausted and the connection cannot be established.

**Once enabled**, the router will limit or discard connection requests with abnormal frequencies to reduce the risk of service interruption.

**Drop Invalid Packets**: Discards malformed or suspicious packets (e.g., invalid TCP flags).

**Input**: REJECT (blocks incoming traffic from the internet, ex: SSH, HTTP from internet).

**Output**: ACCEPT (allows outgoing traffic from the router).

**Forward**: REJECT (blocks traffic routed through the router between interfaces).

- **Zones**

Zones define security boundaries for interfaces (e.g., LAN, WAN). Each zone has policies for traffic flow:

Example Zones:

**lan Zone**:

**Forwardings**: wan (routes traffic to the WAN zone).

**Policies**:

Input/Output/Forward: ACCEPT (allows all internal LAN traffic).

**Masquerading**: Enabled (NAT: hides LAN IPs behind the WAN IP).

**wan Zone** (External Network):

**Policies**:

**Input: REJECT** (blocks incoming traffic from the internet, ex: SSH, HTTP from internet is blocked).

Output: ACCEPT (allows the router to send traffic to the internet).

**Forward: REJECT** (blocks traffic from WAN to other zones).

This design is very safe and is usually used in WAN interface (4G module, wireless wan, Ethernet-wan to ISP).

Prevent external access to the router or internal network. At the same time, allow intranet devices to access the Internet normally through NAT.

Actions

**Add**: Create new zones (e.g., VPN, guest network).

**Edit/Delete**: Modify or remove zone rules.

- **Routing/NAT Offloading**

**Software Flow Offloading**: Optimizes routing/NAT performance by offloading tasks to the CPU.

**Note**: Marked as *experimental*; may conflict with QoS/SQM (traffic shaping).

Buttons

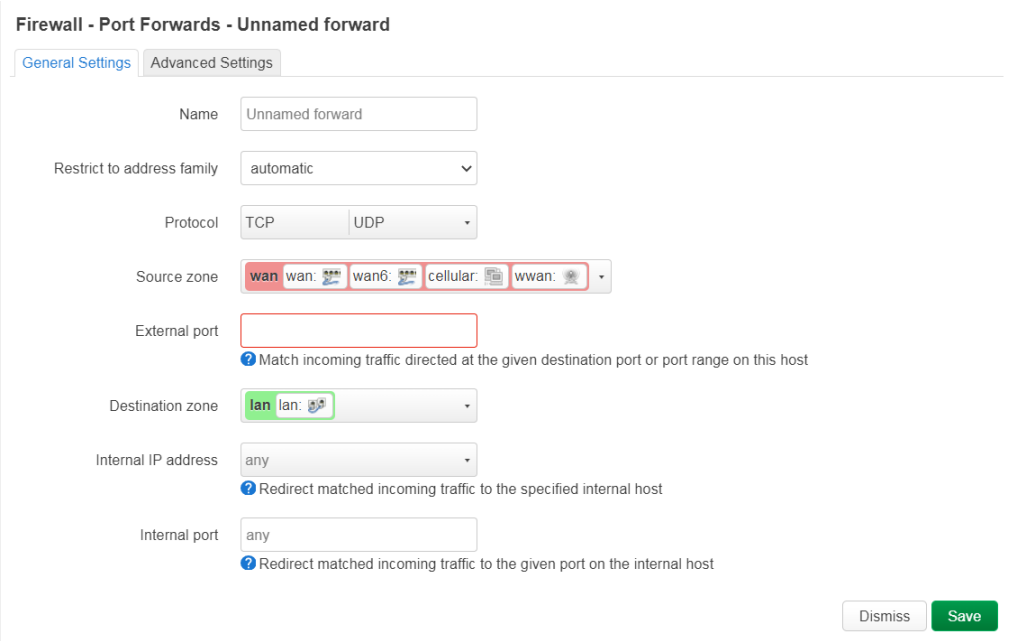
**Save & Apply**: Commit changes and reload the firewall.

**Save**: Store changes without applying.

**Reset**: Discard unsaved changes.

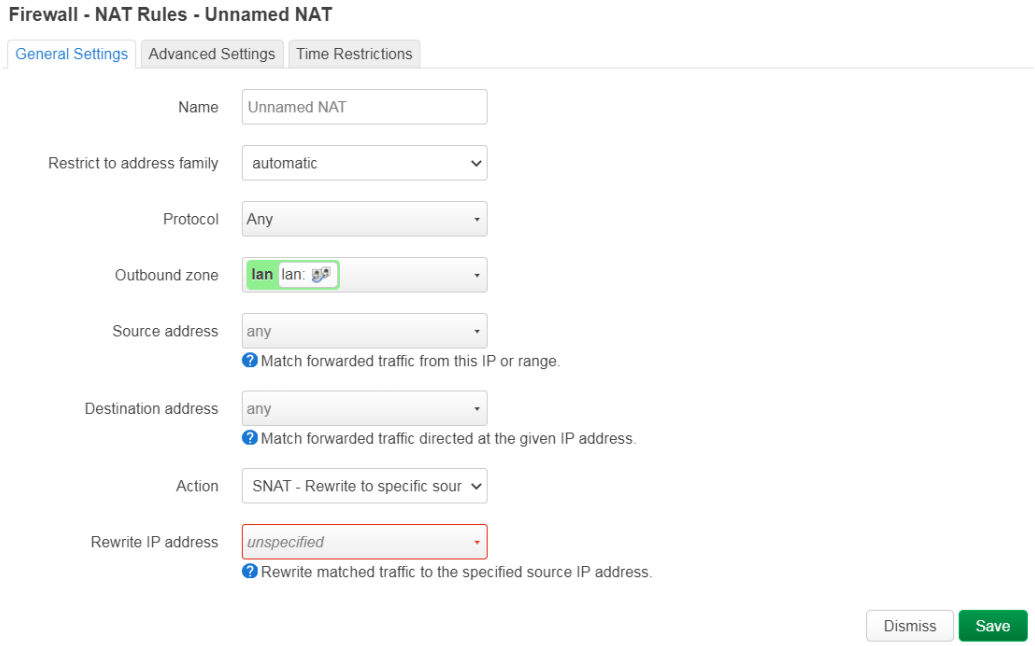
## ■ Additional Tabs

**Port Forwards**: Redirect external traffic to internal services (e.g., hosting a server). You can specify the protocol from the source zone (wan), external port to destination zoon (lan), internal IP address and port.




**Traffic Rules**: Define custom rules. Traffic rules define policies for packets traveling between different zones, for example to reject traffic between certain hosts or to open WAN ports on the router.

**NAT Rules**: Configure advanced Network Address Translation.




**IP Sets**: Manage groups of IPs/networks for simplified rule creation.

When configuring NAT features in OpenWrt, it is important to understand how source and destination zones are

defined. The following table summarizes common NAT use cases and their typical zone settings:

| NAT Function | Source Zone (Outbound) | Destination Zone (Inbound) | Description |
|---|---|---|---|
| Masquerading (Source NAT) | LAN | WAN | Allows internal devices to access the internet by translating their IP to the router' s public IP address. |
| Port Forwarding | WAN | LAN | Redirects incoming traffic from the internet to specific internal devices or services. |
| SNAT/DNAT Rules | Usually LAN | WAN or LAN | Enables custom translation of source or destination IP addresses for advanced routing needs. |

**Notes:**

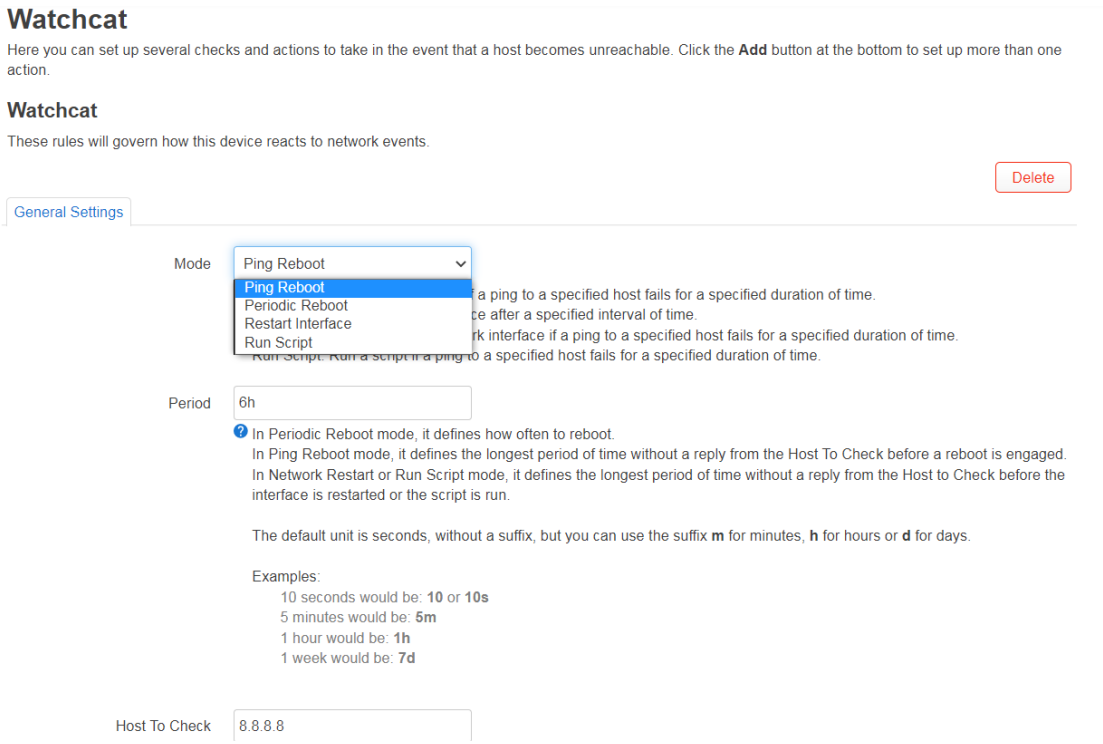
**Masquerading** is used for outbound traffic from LAN to WAN.

**Port Forwarding** handles inbound connections to internal services from the WAN.

**Incorrect zone assignments may cause NAT to fail or create security vulnerabilities.**

## 3.4.4 Services/Watchcat

Here's an overview of **Watchcat** features in OpenWrt's web UI (LuCI):




- **Ping Reboot for connectivity monitoring**

**Ping-Based Monitoring**: Continuously checks internet connectivity by pinging a reliable server (e.g., 8.8.8.8 or a custom IP/domain).

**Period:** In Periodic Reboot mode, it defines how often to reboot.

**Host To Check:** Target IP address or hostname to ping. Ex: 8.8.8.8 (google)

**Check (Ping) Interval**: Adjust the frequency of connectivity checks (e.g., every 10 seconds). Examples: 10 seconds would be: 10 or 10s, 5 minutes would be: 5m, 1 hour would be: 1h, 1 week would be: 7d

**Force Reboot Delay:** Applies to Ping Reboot and Periodic Reboot modes. When rebooting the router, the service will trigger a soft reboot. Entering a non-zero value here will trigger a delayed hard reboot if the soft reboot were to fail. Enter the number of seconds to wait for the soft reboot to fail or use 0 to disable the forced reboot delay

- Scheduled **Periodic Reboots**

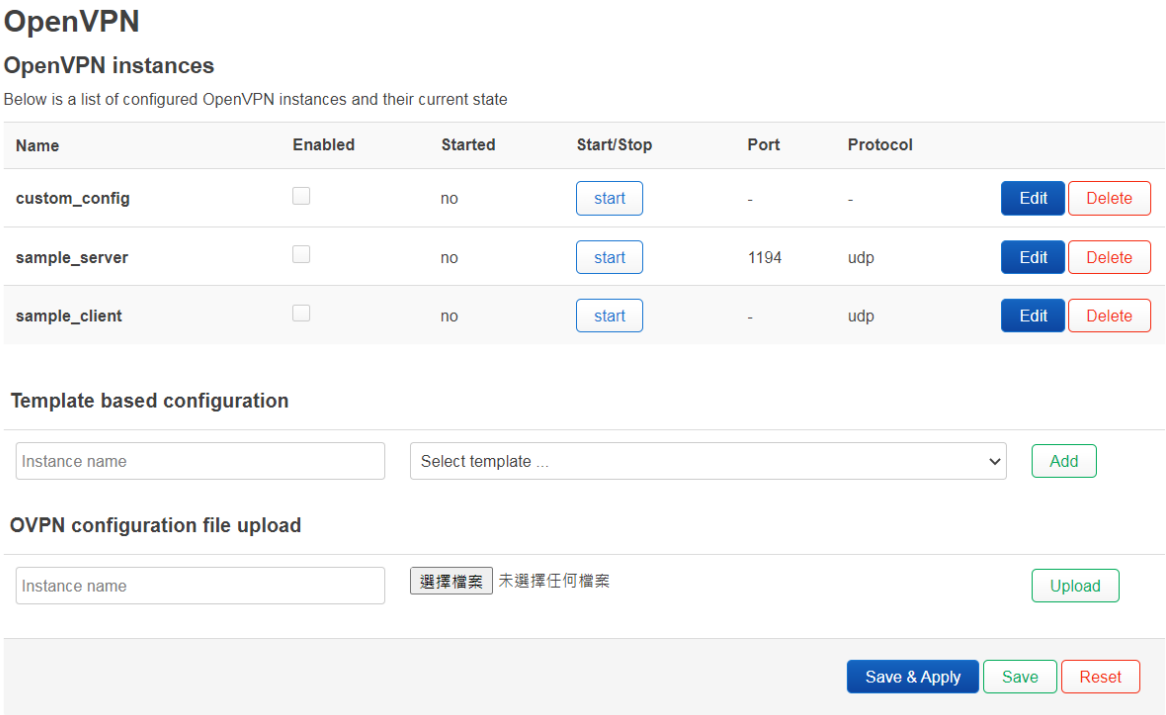
**Periodic Reboot:** Forces the router to reboot at defined intervals (e.g., daily/weekly) to prevent memory leaks or software instability.

**Period:** Configure specific reboot times (e.g., every 24 hours) or use cron-like syntax for precise scheduling. Examples: 10 seconds would be: 10 or 10s, 5 minutes would be: 5m, 1 hour would be: 1h, 1 week would be: 7d

## 3.4.5 VPN

In UCLI web interface, it provides the OpenVPN.

For IPSec or others, please use SSH to configure.

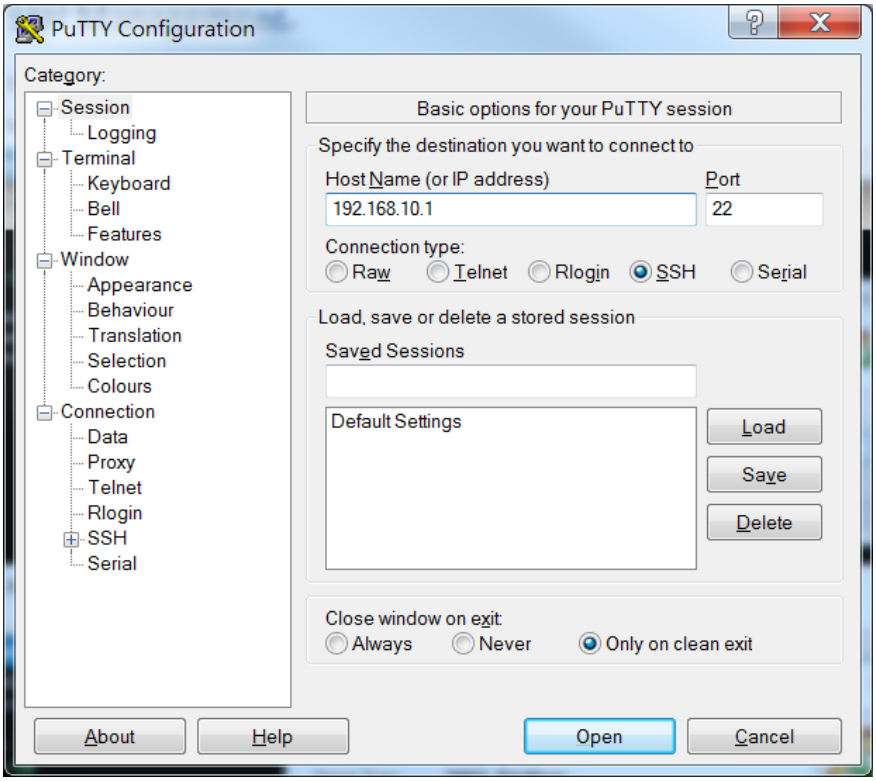


# 4. SSH Management

## 4.1 Login the router through SSH

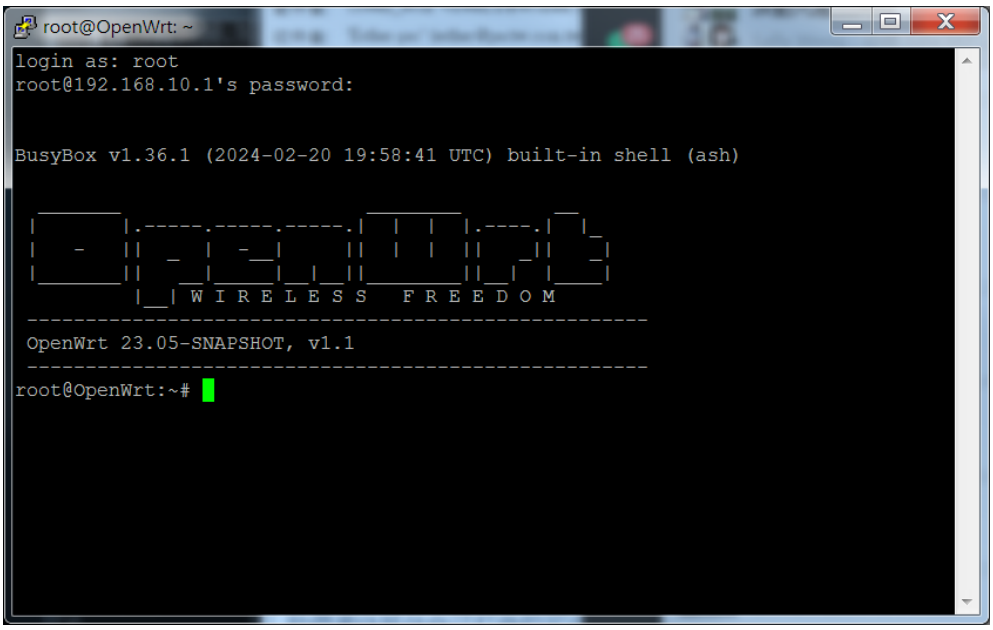
There are both paid and free SSH terminal software available online, for example Putty, OpenSSH, XShell, MobaXterm…etc. Below is an example by using PuTTY.

Open SSH Terminal Tool, type the IP address and SSH port of the router. Ex: 192.168.10.1, port 22




**Enter username：root**

**Enter Password：root (default)**


root@OpenWrt: ~
login as: root
root@192.168.10.1's password:
BusyBox v1.36.1 (2024-02-20 19:58:41 UTC) built-in shell (ash)
W I R E L E S S  F R E E D O M
OpenWrt 23.05-SNAPSHOT, v1.1
root@OpenWrt:~#

**Read Configuration File:**

root@OpenWrt:~# uci show

```
root@OpenWrt: ~
root@OpenWrt:~# uci show
dhcp.@dnsmasq[0]=dnsmasq
dhcp.@dnsmasq[0].domainneeded='1'
dhcp.@dnsmasq[0].boguspriv='1'
dhcp.@dnsmasq[0].filterwin2k='0'
dhcp.@dnsmasq[0].localise_queries='1'
dhcp.@dnsmasq[0].rebind_protection='1'
dhcp.@dnsmasq[0].rebind_localhost='1'
dhcp.@dnsmasq[0].local='/lan/'
dhcp.@dnsmasq[0].domain='lan'
dhcp.@dnsmasq[0].expandhosts='1'
dhcp.@dnsmasq[0].nonegcache='0'
dhcp.@dnsmasq[0].cachesize='1000'
dhcp.@dnsmasq[0].authoritative='1'
dhcp.@dnsmasq[0].readethers='1'
dhcp.@dnsmasq[0].leasefile='/tmp/dhcp.leases'
dhcp.@dnsmasq[0].resolvfile='/tmp/resolv.conf.d/resolv.conf.auto'
dhcp.@dnsmasq[0].nonwildcard='1'
dhcp.@dnsmasq[0].localservice='1'
dhcp.@dnsmasq[0].ednspacket_max='1232'
dhcp.@dnsmasq[0].filter_aaaa='0'
dhcp.@dnsmasq[0].filter_a='0'
dhcp.lan=dhcp
dhcp.lan.interface='lan'
dhcp.lan.start='100'
dhcp.lan.limit='150'
dhcp.lan.leasetime='12h'
dhcp.lan.dhcpv4='server'
dhcp.lan.dhcpv6='server'
dhcp.lan.ra='server'
dhcp.lan.ra_slaac='1'
dhcp.lan.ra_flags='managed-config' 'other-config'
dhcp.wan=dhcp
dhcp.wan.interface='wan'
dhcp.wan.ignore='1'
dhcp.odhcpd=odhcpd
dhcp.odhcpd.maindhcp='0'
dhcp.odhcpd.leasefile='/tmp/hosts/odhcpd'
dhcp.odhcpd.leasetrigger='/usr/sbin/odhcpd-update'
```

Scroll up/down to view all the configurations for the device.

Find the interface/configuration you want to manage, then you can use “uci set” command to modify the settings. And you may need to restart that interface/service to activate.

Since there are lots of CLI commands, the manual can only list some of them. If the command is not listed in this manual, you can contact our technical support, find the command through internet, such as the openwrt web site, Chatgpt…etc.

## 4.2 Major OpenWRT CLI

This chapter introduces a selected subset of commonly used OpenWrt CLI commands for basic configuration and troubleshooting. Some commands have been customized for this product and may differ from the standard OpenWrt implementation, syntax, or default behavior. It does not cover every available Linux/OpenWrt command.

For further details on generic OpenWrt commands, please consult the official OpenWrt website (https://openwrt.org) or other reputable technical resources on the Internet. In case of any differences, please follow the behavior and examples described in this manual for this device.

**A set of product-specific customized CLI commands is described in the next chapter, 4.3 Customized CLI.** Where customized commands are provided for a given function, please follow the customized commands in preference to the generic OpenWrt commands shown in this chapter.

### 4.2.1 CLI - Cellular

The default configuration of the Cellular interface is enabled.

Use "**uci show network**", you can find the default network related settings.

```
root@OpenWrt: ~
root@OpenWrt:~# uci show network
network.loopback=interface
network.loopback.device='lo'
network.loopback.proto='static'
network.loopback.ipaddr='127.0.0.1'
network.loopback.netmask='255.0.0.0'
network.globals=globals
network.globals.ula_prefix='fdb8:6493:9c6a::/48'
network.globals.packet_steering='1'
network.wwan=interface
network.wwan.proto='dhcp'
network.cellular=interface
network.cellular.proto='modemmanager'
network.cellular.device='/sys/devices/platform/1e1c0000.xhci/usb1/1-2/1-2.2'
network.cellular.apn='internet'
network.cellular.auth='none'
network.cellular.iptype='ipv4v6'
network.cellular.signalrate='5'
network.cellular.loglevel='ERR'
network.@device[0]=device
network.@device[0].name='br-lan'
network.@device[0].type='bridge'
network.@device[0].ports='lan2' 'lan3' 'lan4' 'lan5'
network.lan=interface
network.lan.device='br-lan'
network.lan.proto='static'
network.lan.ipaddr='192.168.10.1'
network.lan.netmask='255.255.255.0'
network.lan.ip6assign='60'
network.wan=interface
network.wan.device='wan'
network.wan.proto='dhcp'
network.wan6=interface
network.wan6.device='wan'
network.wan6.proto='dhcpv6'
root@OpenWrt:~#
```

- **Parameter change:**

Below is an example of changing cellular's APN name and signal refresh rate. Use "**uci commit network"** to activate the setting.

```
root@OpenWrt:~#uci set network.cellular.apn='chtapn'
root@OpenWrt:~# uci set network.cellular.signalrate='10'
root@OpenWrt:~# uci commit network

root@OpenWrt:~# uci show network.cellular
  network.cellular=interface
  network.cellular.proto='modemmanager'
  network.cellular.device='/sys/devices/platform/1e1c0000.xhci/usb1/1-2/1-2.2'
  network.cellular.apn='chtapn'
  network.cellular.auth='none'
  network.cellular.iptype='ipv4v6'
  network.cellular.signalrate='10'
  network.cellular.loglevel='ERR'
```

### After modified the configuration, use below command to reload/restart the network interfaces:

```
root@OpenWrt:~# /etc/init.d/network reload      (reload the modified network interface)
root@OpenWrt:~# /etc/init.d/network restart     (restart all network interfaces)
```

### Below is another command to watch the status of the cellular module.

- **show cellular status**

```
root@OpenWrt:~# mmcli -m 0          (index 0, you can use Any if it is not 0)
```

```
root@OpenWrt:~# mmcli -m 0
  --------------------------------
  General  |                 path: /org/freedesktop/ModemManager1/Modem/0
           |            device id: 981d3c47f8d7ff641b7b8faf200a20d4973309d0
  --------------------------------
  Hardware |         manufacturer: SIMCOM INCORPORATED
           |                model: SIMCOM_SIM7906G-M2
           |    firmware revision: 2110B03X12M22A-M2
           |            supported: gsm-umts, lte
           |              current: gsm-umts, lte
           |         equipment id: 869951070080837
  --------------------------------
  System   |               device: /sys/devices/platform/1e1c0000.xhci/usb1/1-2/1-2.2
           |              drivers: option1
           |               plugin: simtech
           |         primary port: ttyUSB2
           |                ports: ttyUSB0 (ignored), ttyUSB1 (gps), ttyUSB2 (at),
           |                       ttyUSB3 (at), ttyUSB4 (audio)
  --------------------------------
  Status   |       unlock retries: sim-pin (3), sim-puk (10), sim-pin2 (3), sim-puk2 (10)
           |                state: connected
           |          power state: on
           |       signal quality: 93% (cached)
  --------------------------------
  Modes    |            supported: allowed: 2g; preferred: none
           |                       allowed: 3g; preferred: none
           |                       allowed: 2g, 3g; preferred: none
           |                       allowed: 2g, 3g; preferred: 2g
           |                       allowed: 2g, 3g; preferred: 3g
           |              current: allowed: any; preferred: none
  --------------------------------
  IP       |            supported: ipv4, ipv6, ipv4v6
  --------------------------------
  3GPP     |                 imei: 869951070080837
           |          operator id: 46011
           |        operator name: CHN-CT
           |         registration: home
           | packet service state: attached
  --------------------------------
  3GPP EPS | ue mode of operation: csps-2
  --------------------------------
  SIM      |     primary sim path: /org/freedesktop/ModemManager1/SIM/0
  --------------------------------
  Bearer   |                paths: /org/freedesktop/ModemManager1/Bearer/1
root@OpenWrt:~#
```

## ■ query the signal

root@OpenWrt:~# mmcli -m 0 --signal-get

```
root@OpenWrt:~# mmcli -m 0 --signal-get
  ------------------------------
  Signal |         refresh rate: 5 seconds
         |       rssi threshold: 0 dBm
         | error rate threshold: no
  ------------------------------
  LTE    |                 rsrq: -9.50 dB
         |                 rsrp: -85.00 dBm
root@OpenWrt:~#
```

## ■ 3) query the cellular time

root@OpenWrt:~# mmcli -m 0 --time

```
root@OpenWrt:~# mmcli -m 0 --time
  -------------------
  Time     | current: 2025-04-29T16:18:30+08
  -------------------
  Timezone | current: 480
root@OpenWrt:~#
```

root@OpenWrt:~# mmcli -m 0 --sim=0

```
root@OpenWrt:~# mmcli -m 0 --sim=0
  -------------------------------
  General    |              path: /org/freedesktop/ModemManager1/SIM/0
  -------------------------------
  Properties |            active: yes
             |              imsi: 460115134842244
             |             iccid: 89860321745151703140
             |       operator id: 46011
             |     operator name: CT
root@OpenWrt:~#
```

### 4.2.2 CLI– lan

Use "**uci show network.lan**", you can find the default network lan settings.

```
root@OpenWrt:~# uci show network.lan
network.lan=interface
network.lan.device='br-lan'
network.lan.proto='static'
network.lan.ipaddr='192.168.10.1'
network.lan.netmask='255.255.255.0'
network.lan.ip6assign='60'
```

## ■ Remove specific port/ports from the bri-lan interface.

Below is an example of removing the LAN port 4 and port 5 from the bridge-lan interface. This means that the port 4 and 5 are no longer used on the network.

```
root@OpenWrt:~# uci set network.@device[0].ports='lan2 lan3'
root@OpenWrt:~# uci commit network
root@OpenWrt:~# /etc/init.d/network reload
```

After changed the settings, use "**uci commit network**" and "**/etc/init.d/network reload**" to activate the new setting.

## ■ Change Router's IP address:

```
root@OpenWrt:/# uci set network.lan.ipaddr='192.168.10.2'
root@OpenWrt:/# uci commit network
root@OpenWrt:/# /etc/init.d/network restart
```

## ■ Interface Shutdown

**Interface shutdown** command. But, this command can't be saved in the configuration file, for temporary use.

```
root@OpenWrt:~# ifconfig lan3 down
```

## ■ Default Route

Use "**ip route**", you can find the default route of the lan interface.

```
root@OpenWrt:~# ip route
default via 10.64.64.64 dev ppp0 proto static          (WAN: cellular ppp0 interface)
10.64.64.64 dev ppp0 proto kernel scope link src 10.128.173.51
192.168.10.0/24 dev br-lan proto kernel scope link src 192.168.10.1
```

**NOTE:** Currently, multiple default gateways are not supported. Therefore, if you enable multiple network segments simultaneously and disable the original default gateway, it may cause the default route to be lost. Please restart the default gateway interface or restart all network interfaces.

SSH command: **/etc/init.d/network restart**

### 4.2.3 CLI – WIFI(Wireless)

The default configuration of the Wi-Fi interface is **Enabled**.

The standard SSH commands described in this chapter are intended to be used in **station (client) mode only**.

Use "**uci show**"/"**uci show wireless**", you can find the default settings of the wireless interface. For example:

```
====Default: Wi-Fi radio is Disabled====
    wireless.radio0=wifi-device
    wireless.radio0.type='mac80211'
    wireless.radio0.path='1e140000.pcie/pci0000:00/0000:00:00.0/0000:01:00.0'
    wireless.radio0.channel='auto'
    wireless.radio0.band='5g'
    wireless.radio0.htmode='HE20'
    wireless.radio0.disabled='1'
    wireless.default_radio0=wifi-iface
    wireless.default_radio0.device='radio0'
    wireless.default_radio0.network='wwan'
    wireless.default_radio0.mode='sta'
    wireless.default_radio0.ssid='Wireless'
    wireless.default_radio0.encryption='none'
=====================
```

**Enable/Disable Wi-Fi Interface**

| Setting | Level | Function | Example |
|---|---|---|---|
| `wireless.radio0.disabled` | Physical layer (radio / PHY) | Controls whether the entire wireless radio (e.g., 2.4GHz or 5GHz module) is enabled. If set to `1`, the radio is completely disabled and the driver will not load. | Turns off the whole 2.4GHz or 5GHz hardware |
| `wireless.default_radio0.disable` | Logical layer (interface) | Controls whether a specific wireless interface (like an SSID in AP mode) is enabled under an active radio. The radio can be on, but individual SSIDs can be selectively turned off. | Keeps the radio on, but hides a specific SSID from broadcasting |

**Enable/Disable Physical Radio0:**

root@OpenWrt:~# uci set wireless.radio0.disabled='0' --Enable Wireless Radio0 interface

root@OpenWrt:~# uci set wireless.radio0.disabled='1' --Disable Wireless Radio0 interface

**Enable/Disable logical layer (SSID)**

root@OpenWrt:~# uci set wireless.default_radio0.disable='0' --Enable default wireless radio

root@OpenWrt:~# uci set wireless.radio0.disabled='1' --Disable default wireless radio

- wireless.radio0.disabled='1' → The radio is off, so no wireless signal is broadcast.
- wireless.radio0.disabled='0' and wireless.default_radio0.disable='1' → The radio is on, but SSID is disabled — interface won't broadcast.
- wireless.radio0.disabled='0' and wireless.default_radio0.disable='0' → Both the radio and SSID are active, so the Wi-Fi network is visible and working.

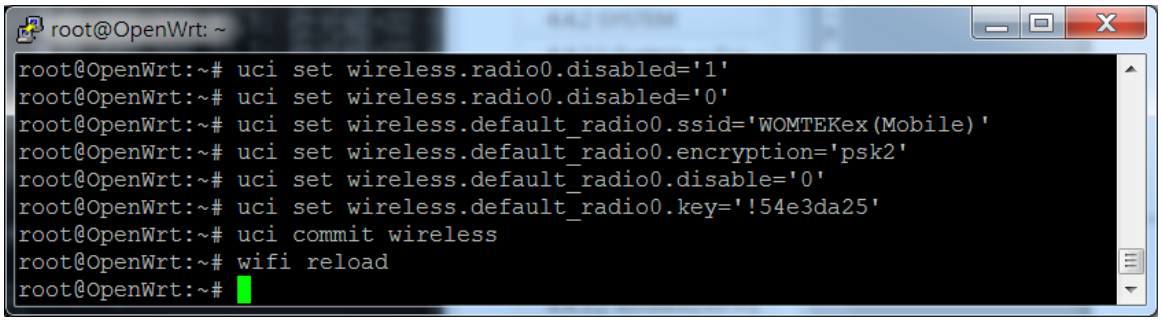
After changed the settings, use "**uci commit wireless**" and "**wifi reload**" to activate the new setings.

**Change SSID Settings:**

The router supports one physical radio interface and the default mode setting is client mode, you don't need to change the setting. You just need enter correct SSID, Encryption, Key and apply the settings.

Below is the example to use "**uci set**" to configure the wireless settings.

```
root@OpenWrt:~# uci set wireless.radio0.disabled='0'
root@OpenWrt:~# uci set wireless.default_radio0.ssid='WOMTEKex(Mobile)'
root@OpenWrt:~# uci set wireless.default_radio0.encryption='psk2'
root@OpenWrt:~# uci set wireless.default_radio0.disable='0'
root@OpenWrt:~# uci set wireless.default_radio0.key=' !54e3da25'
root@OpenWrt:~# uci commit wireless
root@OpenWrt:~# wifi reload
```




After changed the settings, use "**uci commit wireless**" and "**wifi reload**" to activate the new setings.

Use "**uci show wireless**" to check the new settings:

```
====Enabled Wi-Fi radi0 interface and add new SSID/encryption/Key===============
    wireless.radio0=wifi-device
    wireless.radio0.type='mac80211'
    wireless.radio0.path='1e140000.pcie/pci0000:00/0000:00:00.0/0000:01:00.0'
    wireless.radio0.channel='auto'
    wireless.radio0.band='5g'
    wireless.radio0.htmode='HE20'
    wireless.radio0.disabled='0'
    wireless.default_radio0=wifi-iface
    wireless.default_radio0.device='radio0'
    wireless.default_radio0.network='wwan'
    wireless.default_radio0.mode='sta'
    wireless.default_radio0.ssid='WOMTEKex(Mobile)'
    wireless.default_radio0.encryption='psk2'
    wireless.default_radio0.disable='0'
    wireless.default_radio0.key='!54e3da25'
=====================
```

**Note:** When Cellular and WiFi are enabled at the same time, the default route may be changed to the wwan (wifi) interface. At this time, if you turn off the WiFi radio, the default route may be deleted. Please restart your cellular interface or reload/restart the network interface to restore it.

**SSH command: /etc/init.d/network restart**

```
root@OpenWrt:~# /etc/init.d/network restart
```

**Wi-Fi Status: iwinfo**

**Station mode:**

```
root@OpenWrt:/# iwinfo
phy0-sta0 ESSID: "Wireless_5G_1E8D10"
          Access Point: DE:56:7B:D6:9B:A9
          Mode: Client    Channel: 36 (5.180 GHz)    HT Mode: HE80
          Center Channel 1: 42 2: unknown
          Tx-Power: 3 dBm    Link Quality: 63/70
          Signal: -47 dBm    Noise: unknown
          Bit Rate: 1200.9 MBit/s
          Encryption: WPA2 PSK (CCMP)
          Type: nl80211    HW Mode(s): 802.11ac/ax/b/g/n
          Hardware: 14C3:7922 105B:E132 [Generic MAC80211]
          TX power offset: unknown
          Frequency offset: unknown
          Supports VAPs: no    PHY name: phy0


root@OpenWrt:~# iw dev phy0-sta0 info
Interface phy0-sta0
    ifindex 159
    wdev 0x2b
    addr de:56:7b:d6:9b:a9
    ssid Wireless_5G_1E8D10
    type managed
    wiphy 0
    channel 36 (5180 MHz), width: 80 MHz, center1: 5210 MHz
    txpower 3.00 dBm
    multicast TXQ:
        qsz-byt    qsz-pkt    flowsdrops    marks    overlmt    hashcol    tx-bytes    tx-packets
        0    0    0    0    0    0    0    0    0
```

## 4.3 Customized CLI & Script

This chapter describes product-specific scripts and customized CLI commands. These commands are mainly provided for collecting device information, alarm control configuration, configuring Wi-Fi operating modes, and handling related precautions. In particular, Wi-Fi configuration on this product follows a specific design and command sequence; please configure Wi-Fi strictly according to the recommended procedures and examples in this chapter to ensure correct operation and regulatory compliance.

### 4.3.1 Get Information Script: wr-info-get.sh

**Cellular Information Retrieval Script (wr-info-get.sh)**

This script is a customized script after firmware V1.8 released. The script can help you to get the information of the router quickly.

This guide outlines how to use the command-line utility wr-info-get.sh to retrieve detailed information about your device's cellular modem, connection, and signal quality. The output for all commands is provided in JSON format.

**Execution Command**

To use the script, execute it with the desired information keyword as the argument:

Script name: wr-info-get.sh

Usage syntax:

wr-info-get.sh [OPTIONS...] [-J]

- Multiple options can be passed in one call; the script will output all requested fields in a single JSON object.
- JSON output is enabled by default. The `-J` flag is currently accepted but does not change the output format.

**Available Information Keywords (Grouped)**

**1. System and Hardware information ⚙**

| Keyword | Description | Information Retrieved |
|---|---|---|
| sys_all | Comprehensive system summary (various data points). | A single query to fetch all system-related parameters. |
| version | Firmware/Software Version | The current operating system or firmware version. |
| model | Device Model Name | The hardware model of the device. |
| imei | International Mobile Equipment Identity | Unique identifier for the modem hardware. |
| meid | Mobile Equipment Identifier | Used primarily for CDMA networks. |
| provider | Modem Vendor/Supplier | The manufacturer of the cellular modem. |

**2. Modem and SIM Status 💳**

| Keyword | Description | Information Retrieved |
|---|---|---|
| modem_state | Modem Operating Status | The current state of the modem (e.g., powered on, ready, |

| | | |
|---|---|---|
| | | error). |
| sim_info | SIM Card Summary | Comprehensive information about the SIM card status. |
| imsi | International Mobile Subscriber Identity | Unique identifier for the subscriber (your account). |
| iccid | SIM Card Serial Number | The unique serial number of the inserted SIM card. |
| pin | SIM Card PIN Status | Indicates if the PIN is required, verified, or disabled. |

**3. Network Registration and APN Settings 📡**

| Keyword | Description | Information Retrieved |
|---|---|---|
| connection_info | Connection Status Summary | A combined view of network registration and data service status. |
| operator_name | Mobile Network Operator Name | The name of the currently connected carrier (e.g., AT&T, O2). |
| operator_state | Network Registration Status | Indicates if the device is registered to the network (e.g., registered, searching).<br>0: not registered<br>1: registered, home network<br>2: not registered, but MT is trying to attach or searching an operator to register to<br>3: registration denied<br>4: unknown (ex: out of E-UTRAN coverage)<br>5: registered, roaming<br>(not list, please check with our support engineer.) |
| data_service_state | Data Service Status | Indicates if the data connection is active (e.g., connected, disconnected). |
| operator_id | Operator ID | The numerical identifier for the network (e.g., MCC + MNC). |
| mcc / mnc | Mobile Country/Network Code | Codes identifying the country and the specific operator. |
| apn | Access Point Name | The name of the configured data access point. |
| auth | APN Authentication Type | The authentication protocol used for the APN (e.g., PAP, CHAP). |
| cell_user / cell_password | APN Credentials | Username and password for APN authentication (if required). |
| interface_addr / interface_addr_ipv6 | Interface IP Address | The device's assigned IPv4 and IPv6 addresses on the cellular interface. |
| conn_date | Connection Timestamp | The time and date when the current connection was established. |

**4. Signal Strength and Quality Metrics**

These metrics are crucial for evaluating cellular performance.

| Keyword | Description | Typical Use |
|---|---|---|
| rssi / scc_rssi | **Received Signal Strength Indicator** (Primary/Secondary Carrier) | General measurement of signal power. Higher (closer to 0) is better. |
| rsrp / scc_rsrp | **Reference Signal Received Power** (Primary/Secondary Carrier) | A more accurate measure of the power from the serving cell tower. Higher (closer to 0) is better. |
| rsrq / scc_rsrq | **Reference Signal Received Quality** (Primary/Secondary Carrier) | Measures the quality of the signal, considering noise and interference. Higher (closer to 0) is better. |
| sinr | **Signal-to-Interference-plus-Noise Ratio** | Measures the useful signal power relative to interference. Positive values are good. |
| rscp | **Received Signal Code Power** | Used for 3G (WCDMA) networks. |
| band_info | Detailed Cell/Band Information | Includes Cell ID, Band, EARFCN, DL/UL Bandwidth, and Carrier Aggregation (SCC) details. |

**5. Connection Details and Data Usage**

| Keyword | Description | Information Retrieved |
|---|---|---|
| band_info | Detailed Cell/Band Information | Detailed metrics including Cell ID, Band, EARFCN (Frequency Channel), DL/UL Bandwidth, and Carrier Aggregation (SCC) details. |
| data_transmission_info | Data Transmission Summary | Combined summary of band, bandwidth, signal metrics, and data usage. |
| interface_addr / interface_addr_ipv6 | Interface IP Address | The device's assigned IPv4 and IPv6 addresses on the cellular interface. |
| conn_date | Connection Timestamp | The time and date when the current connection was established. |
| cell_rx_bytes / cell_tx_bytes | Data Traffic (Received/Transmitted) | The total number of bytes downloaded (rx) and uploaded (tx) since the last modem restart or reset. |
| cell_rx_tx_bytes | Total Data Traffic | A combined output of both received and transmitted bytes. |

**6. Wi-Fi Client Connection Information (STA)**

These commands are used when the device operates as a client (Station) connecting to an upstream Wi-Fi network.

| Keyword | Description | Information Retrieved (Equivalent to) |
|---|---|---|

| | | |
|---|---|---|
| sta_info | Summary STA Connection Status | sta_state (Connection Status), ESSID, and Channel.<br>Aggregates STA state, association, signal and data rates into a single JSON object. |
| sta_state | Detailed STA Connection Info | Returns the STA mode state, enabled or disabled. |
| sta_assoc | | Returns association status and BSSID/SSID info. |
| sta_signal | | Returns the Wi-Fi RSSI/Signal level for the STA link. |
| sta_rx_rate | | Returns the current RX data rate of the STA link. |
| sta_tx_rate | | Returns the current TX data rate of the STA link. |
| sta_addr | | Returns the MAC address of the STA interface. |

> Note: `sta_tx_power` is implemented internally but its CLI option is commented out in this version.

**7. Multi-WAN path selection**

- `network_used` – Returns which uplink path is currently used by the system (e.g. wired WAN vs. cellular vs. Wi-Fi), based on routing and interface checks.

**8. Alarm State and Status**

These commands are used to monitor the alarm state and status.

| **Keyword** | **Description** | **Information Retrieved (Equivalent to)** |
|---|---|---|
| alarm_state | Alarm state enabled or not enabled | Return: "alarm_state":0 |
| alarm_status | Monitor the status of Ping alarm, high temperature alarm, Cellular and Wi-Fi module's hardware ready or not | You can see the specific alarm is activated or not.<br>There are five different return types:<br>"alarm_state":0, =>alarm state<br>"alarm_ping":0, =>Ping alarm/watchdog<br>"alarm_temperature":0, =>High Temperature alarm<br>"alarm_hw_cellular":0, =>Cellular module hardware status<br>"alarm_hw_wireless":0 =>Wi-Fi module hardware status |

**9. Formatting / flags**

* `-J` – Reserved flag for JSON output. In this version it is accepted but does not modify behavior (JSON output is always enabled).

### 4.3.2 Wireless Operation Mode Script: wr-wireless-mode.sh

**Wireless Operating Modes User Manual**

Your device's Wi-Fi module is primarily designed to function as a client (Station), allowing it to connect to an external network. You can control the mode using the dedicated command line utility: wr-wireless-mode.sh.

## Station (STA) Mode (Primary Client Mode)

**Purpose:** The default and most stable mode for accessing an external network.

| Feature | Description |
|---|---|
| **Role** | Your device acts as a standard Wi-Fi client. |
| **Connectivity** | Connects to an external Wi-Fi router or access point (the upstream network). |
| **Status** | Active only when authenticated and connected. |

**Command:** wr-wireless-mode.sh sta

**Expected Output:** return: success

## Dynamic Frequency Selection (DFS)

**What are DFS Bands?**

DFS (Dynamic Frequency Selection) bands are a set of 5 GHz channels shared with high-priority radar systems. Wi-Fi equipment operating on these channels must constantly listen for radar and, if detected, **immediately cease transmission** and switch channels.

**DFS Regulatory Declaration:**

"DFS (Dynamic Frequency Selection) channel capability is enabled by default in STA (Client) mode, requiring no additional user configuration or commands. When operating as a client, the device automatically complies with the upstream AP's channel decisions and follows its operation within the DFS band. **All hardware and firmware restrictions regarding DFS parameters are strictly defined in accordance with regulatory requirements and are completely locked from user modification.**"

### 4.3.3 Alarm-Ctl Function

The **alarm-ctl** function monitors various hardware and network conditions and drives a GPIO output when an alarm is triggered. Each alarm type is configured as a separate **alarm-ctl** section in UCI and uses a common GPIO pin (default: gpio491) as the alarm output.

This chapter describes the following alarm types:

- Network Condition: Ping alarm (network reachability)
- Hardware Condition: Temperature alarm (LTE module temperature), Wireless module alarm (Wi-Fi hardware errors), LTE module alarm (cellular module presence)

**Uci show to list all the alarm-ctl setting as below:**

```
root@OpenWrt:/# uci show alarm-ctl
alarm-ctl.@alarm-ctl[0]=alarm-ctl
alarm-ctl.@alarm-ctl[0].gpio='gpio491'
alarm-ctl.@alarm-ctl[0].mode='none'
alarm-ctl.@alarm-ctl[0].target_ip='8.8.8.8'
alarm-ctl.@alarm-ctl[0].count='1'
alarm-ctl.@alarm-ctl[0].timeout='1'
alarm-ctl.@alarm-ctl[0].defer_time='15'
alarm-ctl.@alarm-ctl[0].interval='10'
alarm-ctl.@alarm-ctl[0].fail_limit='3'
alarm-ctl.@alarm-ctl[1]=alarm-ctl
alarm-ctl.@alarm-ctl[1].gpio='gpio491'
alarm-ctl.@alarm-ctl[1].mode='temperature'
alarm-ctl.@alarm-ctl[1].high='80'
alarm-ctl.@alarm-ctl[1].low='-30'
alarm-ctl.@alarm-ctl[1].interval='15'
alarm-ctl.@alarm-ctl[2]=alarm-ctl
alarm-ctl.@alarm-ctl[2].gpio='gpio491'
alarm-ctl.@alarm-ctl[2].mode='hw-wireless'
alarm-ctl.@alarm-ctl[2].interval='10'
alarm-ctl.@alarm-ctl[3]=alarm-ctl
alarm-ctl.@alarm-ctl[3].gpio='gpio491'
alarm-ctl.@alarm-ctl[3].mode='hw-cellular'
alarm-ctl.@alarm-ctl[3].interval='10'
```

#### 4.3.3.1 Network Ping Alarm

The **Ping Alarm** function periodically sends ICMP echo requests (ping) to a target IP address. When consecutive ping failures reach the configured limit, the alarm state is triggered and the corresponding GPIO output can be used as an alarm signal.

```
root@OpenWrt:/# cat /etc/config/alarm-ctl

config alarm-ctl
        option gpio 'gpio491'
        option mode 'none'
        option target_ip '8.8.8.8'
        option count '1'
        option timeout '1'
        option defer_time '15'
        option interval '10'
        option fail_limit '3'
```

**i. gpio:** Specifies the GPIO pin used for the alarm output. Default: gpio491 (No need to change this!!)

**ii. mode:** Controls whether the ping alarm function is enabled.

"ping" – enable ping alarm function

"none" – disable ping alarm function

**iii. target_ip:** Specifies the target IP address to be pinged (e.g. gateway, server, or DNS).

**iv. count:** Number of ping packets sent in each check cycle.

**v. timeout:** Ping timeout for each packet, in seconds.

**vi. defer_time:** Initial delay before the first ping check is started, in seconds.

**vii. interval:** Interval between ping check cycles, in seconds.

**viii. fail_limit:** Number of **consecutive** failed ping check cycles required to trigger the alarm.

**Configuration Examples**

**(1) Enable Ping Alarm**

The following example enables the ping alarm and pings 8.8.8.8 periodically:

```
uci set alarm-ctl.@alarm-ctl[0].mode='ping'
uci set alarm-ctl.@alarm-ctl[0].target_ip='8.8.8.8'
uci set alarm-ctl.@alarm-ctl[0].count='1'
uci set alarm-ctl.@alarm-ctl[0].timeout='1'
uci set alarm-ctl.@alarm-ctl[0].defer_time='15'
uci set alarm-ctl.@alarm-ctl[0].interval='10'
uci set alarm-ctl.@alarm-ctl[0].fail_limit='3'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

In this example:

The first ping check starts after **15 seconds** (defer_time='15'). Then the device sends **1 ping** every **10 seconds** (count='1', interval='10'). If **3 consecutive cycles** fail (fail_limit='3'), the alarm is triggered.

**(2) Disable Ping Alarm**

```
uci set alarm-ctl.@alarm-ctl[0].mode='none'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

#### 4.3.3.2 Hardware Condition Alarm

There are three different types Hardware Condition alarms: **Temperature alarm** (LTE module temperature), **Wireless module alarm** (Wi-Fi hardware errors), **LTE module alarm** (cellular module presence)

### 1. Temperature Alarm (LTE Module Temperature)

The **temperature alarm** monitors the temperature reported by the LTE module. If the measured temperature is higher than the configured **high** limit or lower than the configured **low** limit, the alarm is triggered and the GPIO output will indicate an alarm condition.

**1)Parameters**

**gpio:** Specifies the GPIO pin used for the alarm output. Default: gpio491

**mode**

Controls whether the temperature alarm is enabled.

"temperature" – enable temperature alarm

"none" – disable this alarm

**High:** High temperature threshold in degrees Celsius (integer).

**Low:** Low temperature threshold in degrees Celsius (integer).

**Interval:** Measurement interval in seconds.

**2) Default configuration**

Status: **Enabled**

gpio: gpio491

high: 80 °C

low: -30 °C

interval: 15 seconds

**3) Configuration examples**

**Enable temperature alarm**

```
uci set alarm-ctl.@alarm-ctl[1].mode='temperature'
uci set alarm-ctl.@alarm-ctl[1].high='10'
uci set alarm-ctl.@alarm-ctl[1].low='-10'
uci set alarm-ctl.@alarm-ctl[1].interval='15'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

**Disable temperature alarm**

```
uci set alarm-ctl.@alarm-ctl[1].mode='none'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

## 2. Wireless Module Alarm (Wi-Fi Hardware Errors)

The **wireless module alarm** checks for hardware-related errors during system boot and periodically scans the kernel log (dmesg) for Wi-Fi error messages.

**1) Parameters**

gpio: Specifies the GPIO pin used for the alarm output. Default: gpio491

mode: Controls whether the wireless-module alarm is enabled.

"hw-wireless" – enable wireless hardware alarm

"none" – disable this alarm

Interval: Polling interval in seconds for checking the kernel log.

**2) Default configuration**

Status: **Enabled**

gpio: gpio491

interval: 10 seconds

**3) Configuration examples**

**Enable wireless module alarm**

```
uci set alarm-ctl.@alarm-ctl[2].mode='hw-wireless'
uci set alarm-ctl.@alarm-ctl[2].interval='15'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

**Disable wireless module alarm**

```
uci set alarm-ctl.@alarm-ctl[2].mode='none'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

## 3. LTE Module Alarm (Cellular Presence/Health)

The **LTE module alarm** periodically checks the LTE/cellular module hardware health.

**1) Parameters**

Gpio: Specifies the GPIO pin used for the alarm output. Default: gpio491

Mode: Controls whether the LTE-module alarm is enabled.

"hw-cellular" – enable LTE hardware alarm

"none" – disable this alarm

Interval: Polling interval in seconds for checking the LTE module status.

**2) Default configuration**

Status: **Enabled**

gpio: gpio491

interval: 10 seconds

**3) Configuration examples**

**Enable LTE module alarm**

```
uci set alarm-ctl.@alarm-ctl[3].mode='hw-cellular'
uci set alarm-ctl.@alarm-ctl[3].interval='15'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

**Disable LTE module alarm**

```
uci set alarm-ctl.@alarm-ctl[3].mode='none'
uci commit alarm-ctl
/etc/init.d/alarm-ctl restart
```

#### 4.3.3.3 Reading Alarm Status

**Get Alarm State**

You can query the current alarm state using the following command:

**Command:** wr-info-get.sh alarm_state

Return values:

0 – alarm is not triggered

```
root@OpenWrt:/# wr-info-get.sh alarm_state
{
    "alarm_state":0
}
```

1 – alarm is triggered

```
root@OpenWrt:~# time wr-info-get.sh alarm_state
{
    "alarm_state":1
}
real    0m 0.04s
user    0m 0.02s
sys     0m 0.01s
root@OpenWrt:~#
```

**Get Alarm Status**

**Command:** wr-info-get.sh alarm_status

Ex:

```
root@OpenWrt:/# wr-info-get.sh alarm_status
{
    "alarm_state":1,
    "alarm_ping":0,
    "alarm_temperature":0,
    "alarm_hw_cellular":0,
    "alarm_hw_wireless":1
}
```

It shows the Wireless Module Alarm is trigged.

## 4.4 Firmware upgrade

- User can use **SCP** to upload firmware file to directory **/tmp**

  cd /tmp

  wget http://your-server.com/firmware/openwrt-v1.9-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin

  or

  **scp** /folder/openwrt-v1.9-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin root@192.168.10.1:/tmp/

  (root@192.168.10.1 = Login username is root, Router IP is 192.168.10.1)

- **Firmware upgrade and keep configuration**

  command: sysupgrade -c firmware_name

  example: upgrade /tmp/openwrt-v1.2-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin and keep configuration

```
root@OpenWrt:/# sysupgrade -c /tmp/openwrt-v1.2-ramips-mt7621-wom_wr315-ec-squas
hfs-sysupgrade.bin
Tue Jun  3 05:36:21 UTC 2025 upgrade: Saving config files...
```

- **Firmware upgrade and reload default**

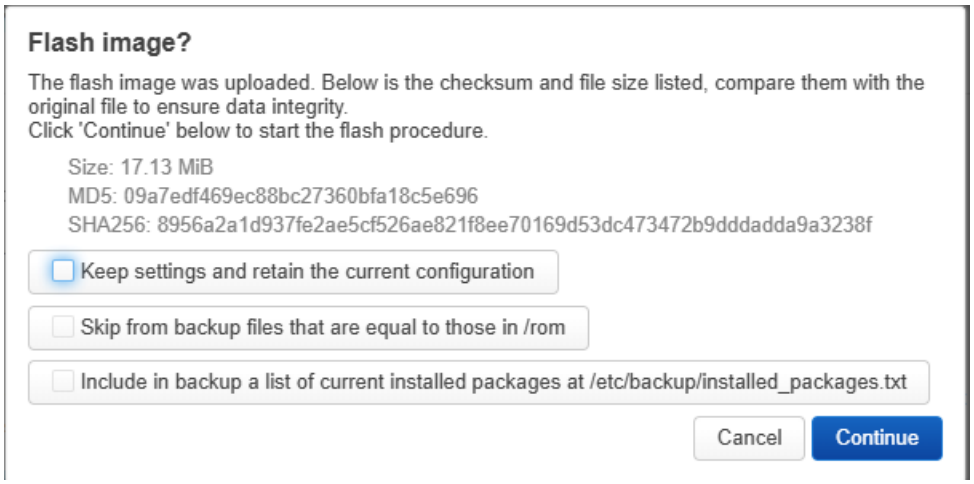
  command: sysupgrade -n firmware_name

  example: upgrade /tmp/openwrt-v1.2-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin and reload default

```
root@OpenWrt:/# sysupgrade -n /tmp/openwrt-v1.2-ramips-mt7621-wom_wr315-ec-squas
hfs-sysupgrade.bin
rmmod mt7915e
rmmod mt7921e
Tue Jun  3 05:44:11 UTC 2025 upgrade: Commencing upgrade. Closing all shell sessions.
```

- **Firmware Upgrade Options Explained (LuCI vs. CLI sysupgrade)**

Below is the screenshot of the firmware upgrading when using LuCI Web GUI. The LuCI options correspond directly to the parameters used in the CLI command **'sysupgrade'**.




**Firmware Upgrade While Keeping Configuration**

(This corresponds to the **checked** "**Keep settings and retain the current configuration**" option shown in the screenshot.)

CLI Equivalent

**1. `sysupgrade -c`**

The `-c` parameter keeps the current configuration and skips all files that are identical to those in `/rom`.

This mode provides the most complete preservation of user settings while avoiding unnecessary backup files.

This is equivalent to:

✔Keep settings and retain the current configuration

✔Skip from backup files that are equal to those in /rom

**2. `sysupgrade` (no parameters)**

Without `-c`, sysupgrade uses the default backup behavior. (The system backs up: `/etc/` and files listed in `/lib/upgrade/keep.d/`)

This is equivalent to:

✔Keep settings and retain the current configuration

✘ Skip from backup files that are equal to those in /rom (not selected)

**Firmware Upgrade and Reset to Factory Defaults**

(This corresponds to **NOT checking** "Keep settings and retain the current configuration".)

CLI Equivalent

**`sysupgrade -n`**

The `-n` parameter discards all current settings.

No configuration is backed up or restored after flashing.

The device boots with factory-default configuration.

This equals leaving all options unchecked:

✘ Keep settings and retain the current configuration

✘ Skip from backup files equal to /rom

✘ Include list of current installed packages

**Summary Table:**

| Mode | LuCI Opton | CLI Equivalent | Behavior |
|---|---|---|---|
| Upgrade + Keep Config (Full) | ✔Keep settings, ✔Keep identical | Sysupgrade -c | Keep config; skip files identical to /rom |
| Upgrade + Keep Config (Default) | ✔Keep settings, ✘ Skip identical | Sysupgrade | Keep config using default backup rules |
| Upgrade + Reset to Default | ✘ Keep settings | Sysupgrade –n | Do not keep any configuration |

- **Below is the example of upgrading firmware V1.9 to the router through the WinXP computer.**

C:\Users\user>pscp -scp c:\deltascrip\openwrt-v1.9-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin root@192.168.10.2:/tmp

'=>upload file to router 192.168.10.2, username is root; (enter the password during the pop-up prompt window)

```
C:\Users\user>pscp -scp c:\deltascrip\openwrt-v1.9-ramips-mt7621-wom_wr315-ec-sq
uashfs-sysupgrade.bin root@192.168.10.2:/tmp
root@192.168.10.2's password:
openwrt-v1.9-ramips-mt762 | 17665 kB | 2523.6 kB/s | ETA: 00:00:00 | 100%

C:\Users\user>_
```

root@192.168.10.1's password: '=>type the login password

openwrt-v1.9-ramips-mt762 | 17665 kB | 2208.1 kB/s | ETA: 00:00:00 | 100% '=>wait until 100% done

root@OpenWrt:~# ls /tmp '=>Check whether the file is uploaded or not. Not must.

```
root@OpenWrt:~# ls /tmp
TZ                                          log
alarm-hw-cellular.state                     modem_info.log
alarm-hw-wireless.state                     openwrt-v1.9-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin
alarm-temperature.state                     overlay
at_clteinfo.log                             resolv.conf
at_cpsi.log                                 resolv.conf.d
at_csq.log                                  run
board.json                                  ser2net.conf
dhcp.leases                                 shm
dnsmasq.d                                   state
etc                                         swanctl
extroot                                     sysinfo
hosts                                       tmp
ipsec                                       trm_runtime.json
lib                                         wr-info-poll.lock
lock                                        wr-wireless-mode.log
root@OpenWrt:~#
```

root@OpenWrt:~# sysupgrade /tmp/openwrt-v1.9-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin

and keep configuration '=>System upgrade and keep the configuration.

```
root@OpenWrt:~# sysupgrade /tmp/openwrt-v1.9-ramips-mt7621-wom_wr315-ec-squashfs-sysupgrade.bin and keep configuration
Wed Nov 26 09:12:01 UTC 2025 upgrade: Saving config files...
rmmod mt7915e
rmmod mt7921e
Wed Nov 26 09:12:03 UTC 2025 upgrade: Commencing upgrade. Closing all shell sessions.
Command failed: Connection failed
root@OpenWrt:~#
Connection closed by foreign host.

Disconnected from remote host(192.168.10.2:22) at 17:12:03.

Type `help' to learn how to use Xshell prompt.
[c:\~]$
```

[c:\~]$ ssh 192.168.10.2 '=>Reconnect the router's SSH interface

```
[c:\~]$ ssh 192.168.10.2


Connecting to 192.168.10.2:22...
Connection established.
To escape to local shell, press 'Ctrl+Alt+]'.



BusyBox v1.36.1 (2024-02-20 19:58:41 UTC) built-in shell (ash)

  _______                     ________        __
 |       |.-----.-----.-----.|  |  |  |.----.|  |_
 |   -   ||  _  |  -__|     ||  |  |  ||   _||   _|
 |_______||   __|_____|__|__||________||__|  |____|
          |__| W I R E L E S S   F R E E D O M
 -----------------------------------------------------
 OpenWrt 23.05-SNAPSHOT, v1.9
 -----------------------------------------------------
```

---

OpenWrt 23.05-SNAPSHOT, v1.9 '=>You can see the firmware version is updated.

---

root@OpenWrt:~# cat /etc/openwrt_release '=>Check Firmware version

```
root@OpenWrt:~# cat /etc/openwrt_release
DISTRIB_ID='OpenWrt'
DISTRIB_RELEASE='23.05-SNAPSHOT'
DISTRIB_REVISION='r23754-60768064ce'
DISTRIB_TARGET='ramips/mt7621'
DISTRIB_ARCH='mipsel_24kc'
DISTRIB_DESCRIPTION='OpenWrt 23.05-SNAPSHOT v1.9'
DISTRIB_TAINTS='no-all busybox'
root@OpenWrt:~#
```

root@OpenWrt:/# wr-info-get.sh sys_all '=>Check System info by WOM script

```
root@OpenWrt:/# wr-info-get.sh sys_all
{
    "version":"OpenWrt 23.05-SNAPSHOT v1.9",
    "model":"WR315GR-2C-LTE6-GAX-EC"
}
```

## 4.5 Configuration backup/restore

- Uer can use SCP to upload/download configuration file to/from directory /tmp
- **Backup**

  command: sysupgrade -b file_name

  example: backup configuration to /tmp/backup.tar.gz

```
root@OpenWrt:/# sysupgrade -b /tmp/backup.tar.gz
Tue Jun  3 05:15:01 UTC 2025 upgrade: Saving config files...
root@OpenWrt:/#
```

- **Restore**

  command: sysupgrade -r file_name

  Note: You need to reboot the router to activate the settings of the uploaded config file!

  example: restore /tmp/backup.tar.gz and reboot

```
root@OpenWrt:/# sysupgrade -r /tmp/backup.tar.gz
Tue Jun  3 05:20:32 UTC 2025 upgrade: Restoring config files...
root@OpenWrt:/# reboot
```

## 4.6 Reset to Default

User can use '**jffs2reset**' to progress the reset default, this command is the same as you user "Reset" button to active reload default.

root@OpenWrt:~# jffs2reset

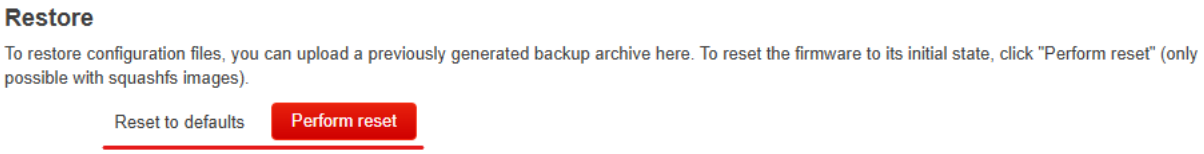
This will erase all settings and remove any installed packages. Are you sure? [N/y]

y

/dev/mtdblock6 is mounted as /overlay, only erasing files

root@OpenWrt:~# reboot

**Compare to the Web GUI:**



# 5. REVISION HISTORY

| Version | Description | Date | Editor |
|---|---|---|---|
| Draft 1 | 1st draft version, modify from WR3x2GR UM, update the Hardware description of the WR315GR-2C. | 2022/11/22 | Orwell |
| Draft 2 | 2nd draft version, update SW functions and web GUI. | 2022/11/23 | Orwell |
| Draft 3 | Modify Antenna to Optional Antenna, update SMA mapping<br>Remove SD features & description | 2022/12/14 | Orwell |
| Draft 4 | Update web configuration function based on firmware v1.3 | 2022/12/16 | Jerry.Lian |
| V1.0 | Change draft 5 to V1.0<br>Add WR315G-LTEx2 | 2023/09/06 | Jerry.Lian /Orwell |
| V1.1 | Update LED Indication of WR315GR-LTEx2<br>Add more description of the Dual SIM dual Active mode | 2024/09/07 | Orwell |
| V1.2 | Add WR315G-2C-LTE6-GAX model<br>Add EC OS in the manual | 2024/4/30 | Orwell |
| V1.2a | Add SSH command of the OpenWrt EC OS | 2024/5/5 | Orwell |
| V1.3 | For WR315G-2C-LTE6-GAX-EC model only.<br>Add customized script to get info, wireless operation configuration and alarm configuration.<br>Add Firmware upgrade, confirmation backup, reset to default CLI. | 2025/12/01 | Orwell |
| V1.3 draft 6 | Add Declaration of comformity, Safety Precausion | 2026/1/8 | Orwell |
| V1.3b/c/d/e | Correct wording<br>Update optional antenna's gain table | 2026/7/30 | Orwell |