

# Ruijie Reyee Mesh Wi-Fi Knowledge Base

Cookbook



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#### Preface

#### **Intended Audience**

This document is intended for:

- Network engineers
- Technical support and servicing engineers
- Network administrators

## **Technical Support**

- The official website of Ruijie Reyee: <a href="https://www.ruijienetworks.com/products/reyee">https://www.ruijienetworks.com/products/reyee</a>
- Technical Support Website: <a href="https://www.ruijienetworks.com/support">https://www.ruijienetworks.com/support</a>
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- Technical Support Email: <a href="mailto:service\_rj@ruijienetworks.com">service\_rj@ruijienetworks.com</a>

#### **Conventions**

#### 1. GUI Symbols

Interface symbol	Description	Example
Boldface	Button names     Window names, tab name, field name and menu items     Link	<ol> <li>Click OK.</li> <li>Select Config Wizard.</li> <li>Click the Download File link.</li> </ol>
>	Multi-level menus items	Select System > Time.

# 2. Signs

This document also uses signs to indicate some important points during the operation. The meanings of these signs are as follows:



Warning

An alert that calls attention to important rules and information that if not understood or followed can result in data loss or equipment damage.



Note

An alert that calls attention to essential information that if not understood or followed can result in function failure or performance degradation.

I

# Instruction

An alert that contains additional or supplementary information that if not understood or followed will not lead to serious consequences.

# Specification

An alert that contains a description of product or version support.

#### 3. Instruction

This manual is used to guide users to understand the product, install the product, and complete the configuration.

- The example of the port type may be different from the actual situation. Please proceed with configuration according to the port type supported by the product.
- The example of display information may contain the content of other product series (such as model and description). Please refer to the actual display information.
- The routers and router product icons involved in this manual represent common routers and layer-3 switches running routing protocols.

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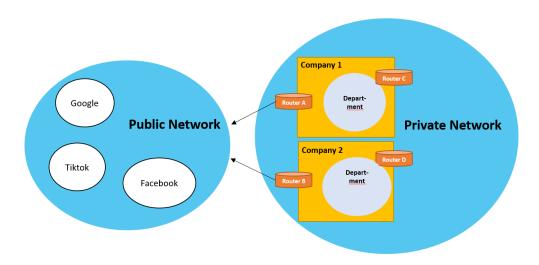
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Cookbook Network Basic

# 1. Network Basic

# 1.1 What Is a Public Network, Private Network, Intranet, and Extranet?



#### (1) Public network

The public network can be simply regarded as the Internet where the publicly accessible servers such as Google and TikTok are located. All the IP addresses on the public network are public network IP addresses.

#### (2) Private network

Private networks include enterprise, home, and hospital networks. IP addresses on a private network cannot access the public network.

#### (3) Intranet and extranet

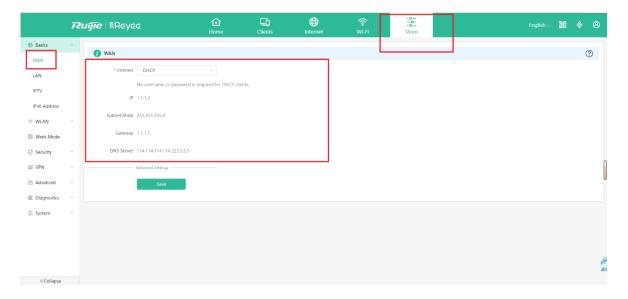
Intranet and extranet are comparative.

As shown in the figure above, enterprise 1 has one department (yellow part) where router D is deployed. Router D connects to the enterprise network (red part). In this case, the department connects to the router D network. For router D, the yellow part is the intranet and the red part is the extranet. Similarly, for router B, the enterprise network is the intranet and the network outside the enterprise is the extranet.

# 1.2 How to Connect to an Intranet and Extranet Using a Router?

Home routers have WAN and LAN ports (or LAN interfaces) which are used to connect different devices.

Cookbook Network Basic

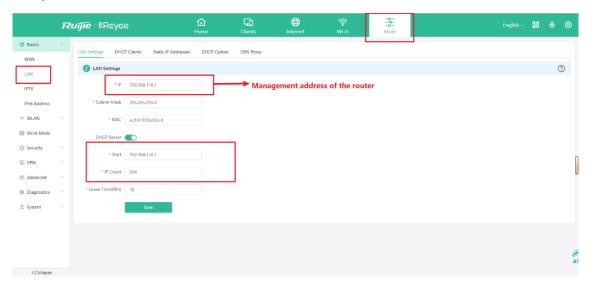


## (1) WAN port

WAN ports are used to connect to an extranet. WAN ports also connect to upper-level networks such as home optical modems and network cables. Each WAN port has an IP address. When a phone or computer tries to connect to an extranet, its IP address needs to be converted to the WAN port IP address.

#### (2) LAN port

LAN ports are used to connect to devices like computers, printers, and switches. As shown in the following figure, the address pool configured for the LAN port, which includes IP addresses ranging from 192.168.110.1 to 192.168.110.254, is allocated to wired and wireless devices like phones and computers.



#### Note:

WAN ports cannot be used to connect to computers. Similarly, LAN ports cannot be used to connect to optical modems and network cables because that may cause router Internet access failures.

Cookbook Network Basic

## 1.3 What Is a Random MAC Address?

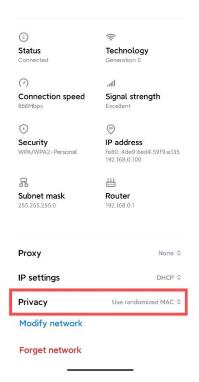
On the Wi-Fi settings page on your phone, you may find that the MAC address is labeled as random. What does a random MAC address mean? What are the impacts of it?



MAC addresses can be seen as IDs of devices which are unique. When making phones or other electronic devices, the manufacturer allocates a MAC address to each device. In the past, our phones have only the device MAC address. Therefore, when our phones try to connect to a network, our device MAC information will be obtained by others for them to track our phones and to obtain other information stored in our phones.

The current phones now have a random MAC address in addition to the device MAC address. When connecting to the Wi-Fi, you can choose to use the device MAC address or the random MAC address.

If you use a random MAC address, the phone randomly generates a MAC address and uses the MAC address to connect to the Wi-Fi. Externally, others only see the random MAC address. If you switch to another Wi-Fi, the random MAC address changes accordingly, which improves the security of your phone. Random MAC addresses also have disadvantages. For example, the allowlist or blocklist you set on the router may be disabled after the MAC address changes.



# 1.4 What Are the Differences Between 5G Wi-Fi and Operators' 5G?

(1) 5G Wi-Fi

Here, 5G indicates the band which is 5 GHz. That means the Wi-Fi uses the 5 GHz band to transmit data. The letter *G* is a unit.

(2) Operators' 5G

Here, the letter *G* is the initial of Generation and 5G is short for 5th Generation Mobile Communication Technology. As it evolves, 5G will greatly advance the development of technologies and applications across the IoT, VR/AR, Smart City, and autonomous driving sectors. Compared with 4G, 5G features great improvements in transmission rate, power consumption, and delay. Therefore, services based on 5G will also see great improvements. The Internet is evolving from mobile to intelligent.

# 2. Wireless Communications Basics

# 2.1 Bands (2.4 GHz and 5 GHz)

(1) Wireless communications media

Computers connect to routers via network cables for wired communications. They can also connect to the Wi-Fi for wireless communications. The medium of wired data transmission is network cables while that of wireless data transmission is electromagnetic waves. Today, many devices use electromagnetic waves as the data transmission medium. Therefore, the frequencies of

electromagnetic waves are used to differentiate the functions and purposes of these devices. (Pay attention to the frequencies marked as red.)

Type	Frequency	Wavelength	Usage
Extra low frequency (ELF)	3 Hz-30 Hz	10000 km-100000 km (extra long wave)	Submarine communications or conversion to voice
Super low frequency (SLF)	30 Hz-300 Hz	1000 km-10000 km (super long wave)	Conversion to voice or AC power transmission system
Ultra low frequency (ULF)	300 Hz-3 KHz	100 km-1000 km (ultra long wave)	Mining site communications or conversion to voice
Very low frequency (VLF)	3 KHz-30 KHz	10 km-100 km (very long wave)	Conversion to voice, ultrasound, or earth physics
Low frequency (LF)	30 KHz-300 KHz	1 km-10 km (long wave)	International broadcast
Medium frequency (MF)	300 KHz-3 MHz	100 m-1 km (medium wave)	AM broadcast, maritime affairs, and aeronautic communications
High frequency (HF)	3 MHz-30 MHz	10 m -100 m (short wave)	Short waves and civilian radio stations
Very high frequency (VHF)	30 MHz-300 MHz	1 m-10 m (meter wave)	FM broadcast, TV broadcast, and aeronautic communications
Ultra high frequency (UHF)	300 MHz-3 GHz	10 cm-1 m (decimeter wave)	TV broadcast, radio communications, wireless networks, and microwave ovens
Super high frequency (SHF)	3 GHz-30 GHz	1 cm-10 cm (centimeter wave)	Wireless networks, radar, and artificial satellite signal receiving
Ultra high frequency (EHF)	30 GHz-300 GHz	1 mm-10 mm (millimeter wave)	Radio astronomy, remote sensing, and security scanners

#### (2) Wireless network bands

- a) In the table above, there are two frequency ranges that can be used in wireless networks. The detailed ranges are 2.4 GHz–2.4835 GHz, 5.725 GHz–5.850 GHz, and 5.170 GHz–5.330 GHz. The bands that can be used in wireless networks are 2.4 GHz, 5.8 GHz, and 5.2 GHz.
- b) These bands can be classified into 2.4 GHz and 5 GHz bands. The differences between the two bands are as follows:

	2.4 GHz	5 GHz
Frequency Range 2.4 GHz–2.4835 GHz		5.725 GHz-5.850 GHz and 5.170 GHz-5.330 GHz
	The signal attenuation is low when penetrating	
Advantage	obstacles thanks to the long wavelength and low	The channel interference is low and the transmission rate is high because of
Advantage	frequency. Therefore, signals using this band	the high frequency.
	cover a large area and travel a long distance.	
	Many home appliances use the 2.4 GHz band,	Compared with the 2.4 GHz band, the signal attenuation is high when
Disadvantage	including TV and microwave ovens. Therefore,	penetrating obstacles because of the short wavelength and high frequency.
	the interference is high compared with the 5	Therefore, signals using this band cover a small area and travel a short
	GHz band.	distance.

#### (3) Dual-band devices

- a) Phone of older models may support only the 2.4 GHz band. When connecting to a Wi-Fi, they can only search for and connect to 2.4 GHz signals. Today, many devices support both the 2.4 GHz and 5 GHz bands. That is why some routers, phones, and computers brand themselves as dual-band in the advertisements.
- b) Dual-band means that the device supports both the 2.4 GHz and 5 GHz Wi-Fi. When the router transmits 2.4 GHz and 5 GHz signals separately, you need to manually choose a Wi-Fi signal. If 2.4 GHz and 5 GHz signals are combined and use the same Wi-Fi name, terminals automatically choose a band when connecting to the Wi-Fi.

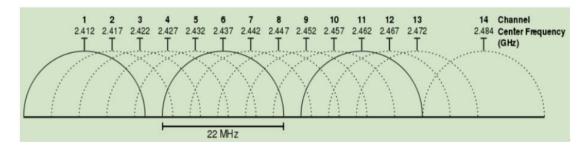
## 2.2 Channel and Bandwidth

As mentioned above, the 2.4 GHz and 5 GHz bands have three frequency ranges: 2.4 GHz–2.4835 GHz, 5.725 GHz–5.850 GHz, and 5.170 GHz–5.330 GHz. The following uses the 2.4 GHz band as an example to describe channel and bandwidth basics.

#### (1) Channel

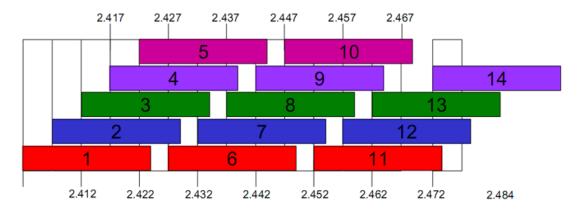
The total width of the band is 0.0835 GHz (83.5 MHz). The band is divided into 14 channels (13 of which are used in China). The width of each channel is 22 MHz of which 20 MHz is valid width and the rest 2 MHz is used as buffer. In this case, adjacent channels overlap each other. As shown in the

following figure, each semicircle indicates a channel. When using the 2.4 GHz band to transmit data, a terminal can choose a channel for transmission.



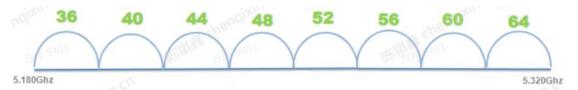
#### a) 2.4 GHz channels

In China, the numbers of the available channels range from 1 to 13. Of the channels, there are three groups of channels that do not overlap each other: channel 1/6/11, channel 2/7/12, and channel 3/8/13.

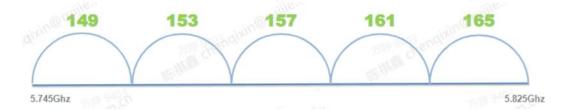


#### b) 5 GHz channels

• The 5.2 GHz band has eight non-overlapping channels whose numbers are 36, 40, 44, 48, 52, 56, 60, and 64.



• The 5.8 GHz band has five non-overlapping channels whose numbers are 149, 153, 157, 161, and 165.



#### (2) Bandwidth

Bandwidth is the frequency range of a channel, namely the width. As mentioned above, the valid bandwidth of a channel is 20 MHz. Therefore, you can bond two channels to achieve 40 MHz width. For example, channel 1 can only bond with channel 5 to offer 40 MHz width.

# 2.3 Antenna

#### (1) Functions

In wired communications, devices are connected using physical media like twisted pairs and optical fibers. In wireless communications, the transmission medium is electromagnetic waves. Data is transmitted in the form of current in network cables and routers. How to convert currents to electromagnetic waves that can be transmitted in the air?

Here come antennas. Antennas are mainly used to radiate and receive electromagnetic waves and inter-convert currents and electromagnetic waves.

#### (2) Antenna classification

- By usage: communications, TV, and radar antennas
- By operating band: short wave, super short wave, and microwave antennas
- By directionality: omnidirectional and directional antennas (main classification)
- By appearance: linear and panel antennas

The omnidirectional antenna, as its name implies, provides a 360-degree horizontal radiation pattern. Featuring directivity, directional antennas provide better electromagnetic wave transmission and receiving in a certain direction. Omnidirectional antennas have a greater beam width while directional antennas cover a larger area.

# 2.4 Spatial Streams

#### (1) Background

The spectrum of an electromagnetic wave can be seen as a land and 2.4 GHz band is a road on the land. The frequency range of 2.4 GHz–2.4835 GHz is the width of the road. The road can be further divided into lanes (channels) and each lane has a valid width of 20 MHz. Vehicles can only run on one of these lanes. The number of vehicles running on the road simultaneously is limited because the road is narrow.

#### (2) MIMO in Wi-Fi 4

In Wi-Fi 4, MIMO (Multiple-Input Multiple-Output) is like an overpass above a narrow road. This is called spatial reuse. In this case, with one more road, the number of vehicles running simultaneously is doubled, greatly improving the transmission rate.



As you may find in advertisements, some routers feature 4X4 MIMO. That means, the router has four Tx/Rx antennas. If a phone or computer supports 4X4 MIMO (having four Tx/Rx antennas), there will be four spatial streams between the router and phone or computer. If a phone supports only 2X2 MIMO, the router and phone will negotiate and agree to use two spatial streams.

Therefore, you may find that the transmission rate is 1200 Mbps although the router supports 4x4 MIMO (up to 2400 Mbps). That is because most phones support only 2 spatial streams. Very few phones support three or four spatial streams because the more the antennas, the higher the power consumption and faster the battery is drained.

#### (3) MU-MIMO

MIMO in Wi-Fi 4 is also called SU-MIMO (Single-User MIMO) because the router can communicate with only one terminal simultaneously although spatial streams are increased. The router can communicate with another terminal only when it finishes communication with the current one.

MU-MIMO (Multi-User MIMO) in Wi-Fi 5 supports simultaneous data transmission between a router and multiple terminals. However, it supports simultaneous transmission only for downlink data like file download and TV broadcast. Uplink data needs to queue up for transmission.

In Wi-Fi 6, MU-MIMO supports simultaneous transmission of both uplink and downlink data.

## 2.5 Wi-Fi 4/5/6

Wi-Fi 4/5/6 indicate the forth-, fifth-, and sixth-generation of Wi-Fi technologies. The following table describes the differences between the Wi-Fi technologies.

Wi-Fi technologies are compatible downwards if they use the same bands. Take Wi-Fi 5 as an example. It supports only the 5 GHz band. Therefore, it is compatible with Wi-Fi 2 (802.11a) and Wi-Fi 4 (802.11n). Wi-Fi 6 supports both the 2.4 and 5 GHz bands. Therefore, it is compatible with Wi-Fi technologies that use the 2.4 or 5 GHz band.

	802.11	802.11b(Wi-Fi 1)	802.11a(Wi-Fi 2)	802.11g(Wi-Fi 3)	802.11n(Wi-Fi 4)	802.11ac(Wi-Fi 5)	802.11ax(Wi-Fi 6)
Release Time	1997	1999	1999	2003	2009	2013	2017
Operating Band	2.4 GHz	2.4 GHz	5 GHz	2.4 GHz	2.4/5 GHz	5 GHz	2.4/5 GHz
Non-Overlapping Channels	3	3	13	3	3+13	13	3+13
Spatial Streams	N/A	N/A	N/A	N/A	1–4	1–8	1–8
Data Transmission Rate	< 2 Mbps	< 11 Mbps	< 54 Mbps	< 54 Mbps	Up to 600 Mbps	Up to 6.9 Gbps(currently 1.3 Gbps)	Up to 10 Gbps
Actual Throughput	200 Kbps	5 Mbps	22 Mbps	22 Mbps	100+ Mbps	900 Mbps	Over 1 Gbps
Compatibility	N/A	Compatible with 802.11g	Incompatible with 11b/g	Compatible with 802.11g	Compatible with 11a/b/g	Compatible with 11a/n	Compatible with 11a/b/g/n/ac

Each generation of Wi-Fi technology has evolved features improving the transmission rate. Examples:

#### 2.5.1 Wi-Fi 4 (802.11n)

- (1) Orthogonal frequency division multiplexing (OFDM)
- (2) Forward Error Correction (FEC)
- (3) Short Guard Interval (Short GI)
- (4) Channel bonding/40 MHz bonding
- (5) MIMO

## 2.5.2 Wi-Fi 5 (802.11ac)

802.11ac Wave1 (Wi-Fi 5 first release)

- (1) Channel bonding/80 MHz bonding
- (2) 256-QAM
- (3) MIMO

802.11ac Wave2 (Wi-Fi 5 second release)

(1) Downlink MU-MIMO

## 2.5.3 Wi-Fi 6 (802.11ax)

- (1) Rate improvement (1024-QAM)
- (2) Multi-STA transmission
  - Orthogonal frequency-division multiple access (OFDMA)
  - Uplink and downlink MU-MIMO
- (3) Spatial reuse (SR) (anti-interference)
  - BSS fast identification
  - Dynamic CCA threshold
- (4) TWT power saving management technology

# 2.6 Calculating Router Rates

#### 2.6.1 Wireless Rate

- 1. Maximum rate 54 Mbps of Wi-Fi 2/3 (802.11a/g) (single spatial stream)
  - (1) OFDM provides 52 subcarrier channels of which 48 are used for data transmission.
  - -48 lanes are available out of total 52 lanes
  - (2) The 64-quadrature amplitude modulation (QAM) encoding mode allows every subcarrier channel to carry 6 bits of data in a transmission.
  - -Six seats in each vehicle in each lane
  - (3) In 64-QAM, 3/4 of the bits are used for transmission and the rest are used for verification.
  - —3/4 of the six seats are available.
  - (4) The time of a transmission is  $4 \mu s$ .
  - —One vehicle leaves in each lane every 4 μs.

Therefore, the maximum rate (maximum passengers each second) of 802.11a/g is as follows:

 $(1s/4 \mu s) x (6 bits x 48 x 3/4) = 54 Mbps$ 

\_\_\_\_\_

#### 2. Maximum rate 150 Mbps of Wi-Fi 4 (802.11n) (single spatial stream)

- (1) Wi-Fi 4 has optimized OFDM to provide 56 subcarrier channels of which 52 are used for data transmission.
- -52 lanes are available out of total 56 lanes
- (2) Wi-Fi 4 extends the operating bandwidth to 40 MHz which allows more channels. The total number of subcarrier channels is increased from 56 to 112, among which 108 can be used for data transmission.
- —108 lanes are available out of total 112 lanes
- (3) The 64-QAM encoding mode allows every subcarrier channel to carry 6 bits of data in a transmission.
- -Six seats in each vehicle in each lane
- (4) Wi-Fi 4 has optimized 64-QAM to increase the percentage of data transmitted from 3/4 to 5/6.
- —5/6 of the six seats are available.
- (5) Wi-Fi 4 reduces the transmission time by 400 ns to 3.6 μs.
- —One vehicle leaves in each lane every 3.6 μs.

Therefore, the maximum rate (maximum passengers each second) of Wi-Fi 4 is as follows:

 $(1s/3.6 \mu s) \times (6 \text{ bits } \times 108 \times 5/6) = 150 \text{ Mbps}$ 

3. Maximum rate 433.33 Mbps of Wi-Fi 5 (802.11ac) (single spatial stream)

(1) Wi-Fi 5 uses OFDM optimized by Wi-Fi 4 and provides 56 subcarrier channels of which 52 are used for data transmission.

#### -52 lanes are available out of total 56 lanes

(2) Wi-Fi 5 extends the operating bandwidth to 80MHz which allows more channels. The total number of subcarrier channels is increased from 112 to 242, among which 234 can be used for data transmission.

#### -234 lanes are available out of total 242 lanes

- (3) The 256-QAM encoding mode allows every subcarrier channel to carry 8 bits of data in a transmission.
- -Eight seats in each vehicle in each lane
- (4) In 256-QAM, 5/6 of the bits are used for transmission and the rest are used for verification.
- —5/6 of the six seats are available.
- (5) The time of a transmission is 3.6 µs.
- —One vehicle leaves in each lane every 3.6 μs.

Therefore, the maximum rate (maximum passengers each second) of Wi-Fi 5 is as follows:

 $(1s/3.6 \mu s) \times (8 \text{ bits } \times 234 \times 5/6) = 433.33 \text{ Mbps}$ 

#### 4. Maximum rate 1201 Mbps of Wi-Fi 6 (802.11ax) (single spatial stream)

- (1) Wi-Fi 6 adopts OFDMA and provides 242 subcarrier channels on a 20-MHz-wide band, of which 234 are used for data transmission.
- -234 lanes are available out of total 242 lanes
- (2) Wi-Fi 6 extends the operating bandwidth to 160 MHz which allows more channels. The total number of subcarrier channels is increased. 980 x 2 channels can be used for data transmission.
- -980 x 2 lanes are available
- (3) The 1024-QAM encoding mode allows every subcarrier channel to carry 10 bits of data in a transmission.
- -10 seats in each vehicle in each lane
- (4) In 1024-QAM, 5/6 of the bits are used for transmission and the rest are used for verification.
- —5/6 of the six seats are available.
- (5) The time of a transmission is  $13.6 \mu s$ .
- —One vehicle leaves in each lane every 13.6 μs.

Therefore, the maximum rate (maximum passengers each second) of Wi-Fi 5 is as follows:

 $(1s/13.6 \mu s) x (10 bits x 980 x 2 x 5/6) = 1201 Mbps$ 

## 2.6.2 Factors Affecting Router Rates

Code rate, that is, the average number of passengers in a vehicle

	Before Wi-Fi 4	Wi-Fi 4 and later
Code Rate	3/4	5/6

Transmission time, that is, the average interval at which one vehicle leaves in each lane

	Wi-Fi 2/3	Wi-Fi 4	Wi-Fi 5	Wi-Fi 6
Transmission Time	4 μs	3.6 µs	3.6 µs	13.6 µs

Bit rate mediated by modulation method, that is, the number of seats in a vehicle

	BPSK	QPSK	16-QAM	64-QAM	256-QAM	1024-QAM
Bit Rate	1	2	4	6	8	10

Bandwidth which determines the number of subcarrier channels (lanes)

	Bandwidth	Wi-Fi 2/3	Wi-Fi 4	Wi-Fi 5	Wi-Fi 6
Technology Used	N/A	N/A	OFDM	OFDM	OFDMA
	20	48	52	52	234
Valid Subcarrier Channels	40	N/A	108	108	468
valid Subcarrier Charlines	80	N/A	N/A	234	980
	160	N/A	N/A	234 x 2	980 x 2

Spatial streams. The preceding examples assume that there is only one spatial stream. The total maximum transmission rate equals the maximum rate of a single spatial stream multiplying the number of spatial streams. In Wi-Fi 4, the maximum rate of a single spatial stream is 150 Mbps. If there are four spatial streams, the total maximum rate is 600 Mbps (150 Mbps x 4).

	Wi-Fi 2/3	Wi-Fi 4	Wi-Fi 5	Wi-Fi 6
Maximum Spatial Streams	1	4	8	8

# 2.7 Uplink/Downlink Rates, Negotiated Rate, and Actual Rate

## (1) Uplink rate

The uplink rate is the rate at which data is uploaded, that is, the speed at which local information is uploaded to the network. Or, it can be seen as the transmitting rate of a terminal.

#### (2) Downlink rate

The downlink rate is the rate at which data is downloaded, that is, the speed at which data on the network is downloaded to the local terminal. Or, it can be seen as the receiving rate of a terminal.

#### (3) Negotiated rate

Communications entail two peer parties. The negotiated rate, as its name suggests, is the rate negotiated and agreed upon by the router and terminal. What do the router and the terminal negotiate?

They negotiate factors that affect the wireless rate, including the Wi-Fi technology (wireless protocol), modulation method, bandwidth, spatial streams, and code rate. If a router supports Wi-Fi 6, dual-band, and 4 x 4 MIMO while a phone supports Wi-Fi 6, dual-band, and 2 x 2 MIMO, the negotiation results are Wi-Fi 6, dual-band, and 2 x 2 MIMO. Whereas the negotiated rate is calculated based on these factors, it is still a theoretical rate.

#### (4) Actual rate

Wireless communications use the half-duplex mode which allows only data transmission or receiving at a given time. For example, the negotiated rate can be seen as the sum of the uplink and downlink rates. And in most cases, the downlink rate is greater than the uplink rate. Therefore, if the negotiated rate is 1200 Mbps, the uplink and downlink rates may be 200 and 1000 Mbps respectively. (This example is for reference only.)

That is why the measured actual rate is less than the negotiated rate. In addition, the prerequisite of the assumed negotiated, downlink and uplink rates above is that the conditions are optimal, which is nearly impossible because there are other factors affecting transmission rates as well.

- Signal strength (number of walls between the router and terminal)
- Interference of other router signals in the environment
- Interference of other devices such as microwave ovens and refrigerators if the 2.4 GHz band is used
- Other terminals connected to the router, which may occupy more resources
- Messages in wireless transmission mechanisms that take up resources

These factors may reduce the theoretical rates by 10% to 40%. Therefore, if the negotiated rate is 1200 Mbps, the most possible downlink rate is about 600 Mbps. The rate may reach 800 Mbps and over if the wireless environment is very clean. In addition, the network cable specifications, port specifications, and extranet bandwidth also play a part. If the extranet bandwidth is 100 Mbps, the negotiated rate 800 Mbps is useless.

#### (5) Rate conversion

You may wonder why your download rate is less than the labeled 100 Mbps bandwidth.

That is because of the differences between units. The differences are as follows:

Mb indicates megabit. 1 Mb equals 1024 Kb, just as 1 km equals 1000 m and 1 Kg equals 1000 g.

Other common conversions include: 1 Tb = 1024 Gb, 1 Gb = 1024 Mb, 1 Mb = 1024 Kb, and 1 Kb = 1024 b.

• The letter *b* indicates bits. Eight bits equal one byte (B). 8 Mb/s equals 1 MB/s.

Based on these conversions, we can conclude:

 $100 \text{ Mb/s} = (100 \times 1024) \text{ Kb/s} = 102400 \text{ Kb/s} = (102400/8) \text{ KB/s} = 12800 \text{ KB/s} = (12800/1024) \text{ MB/s} = 12.5 \text{ MB/s}.$ 

Common download rate units are KB/s and MB/s. Your actual download rate may be less than the labeled rate because the rate units are different.

#### Note:

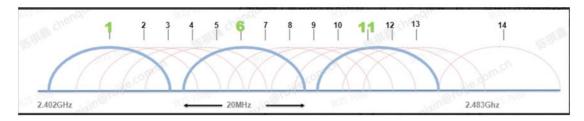
The rates raised above are theoretical values. The actual values depend on the network environment and may be less than the theoretical values.

## 2.8 Wireless Interferences

## 2.8.1 Types of Interferences

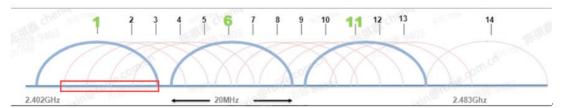
#### 1) Co-channel interference

Co-channel interference exists when two WLAN devices use the same frequency (2.4/5 GHz). As shown in the figure below, there are three non-overlapping channels 1, 6, and 11 in the 2.4 GHz band. In places with many routers deployed, a channel may be used by multiple routers. Co-channel interference exists in the areas where the signals of these routers overlap.



#### 2) Adjacent-channel interference

As shown in the figure below, channels 1–5 overlap each other. Therefore, interference may exist in the areas where the signals of two routers overlap even if the routers do not use the same channel.



#### 3) External interference

Some non-WLAN devices use the 2.4 GHz band as well, including microwave ovens, Bluetooth devices, wireless cameras, and wireless mouses, which also have interference in WLAN signals.

#### 2.8.2 Interference Mitigation Methods

## (1) Plan router locations appropriately

Do not deploy two routers near each other even if they use non-overlapping channels because the transmitting powers have interference as well. When setting channels, download the Wi-Fi Moho app to test the signals around and check the channel usage. Choose a less used channel if possible.

## (2) Use the 5 GHz band

Compared with the 2.4 GHz band, the 5 GHz band has a cleaner wireless environment. Therefore, use the 5 GHz band if possible.

(3) Keep distance with or eliminate the interference sources

Do not place the router near microwave ovens, mobile phones, and hot spot devices to avoid strong interference.

# 3. Mesh Wi-Fi Product Introduction

## 3.1 General Introduction

Reyee EW series products are gigabit dual-band Wi-Fi 6 wireless routers designed for large flat space, villas,

small shops, SOHO, and other scenarios. It is designed to meet the needs of high-quality next-generation Wi-Fi

services. Reyee EW series products support various local and remote management platforms, such as web and

Ruijie Cloud App. This wireless router also provides multiple home-care-based function, including the parental

control mode, health mode, and Xpress mode, and is exclusively designed for Smart Life Kit System, meeting

needs of all household scenarios.

## 3.2 RG-EW1200R

## 3.2.1 Highlight Features

- Cover your whole home network with one-click
- Built-in signal amplifiers, unbreakable Wi-Fi signal throughout your home
- Three-bar signal indicator guides you to find the best spot
- Reyee Mesh brings you unlimited signal connection everywhere you go
- More wireless mode options, more surprise
- Take control of your home network at your fingertips

## 3.2.2 Product Appearance







## 3.2.3 LED and Button

## 2 System Status LED

Status		Description	
Solid on		The device is functioning properly. / The port has made a successful link.	
Green	Blinking	The device is starting up. / The device is restoring factory settings.	
0	Solid on	The device fails to access the Wi-Fi network of the primary router.	
Orange	Blinking	The device is accessing the Wi-Fi network of the primary router.	
Red Solid on The network is unreachable.		The network is unreachable.	

## 3 Signal Status LED

Status		Description	
Blinking alte	ernately	The device is accessing the Wi-Fi network of the primary router.	
	Three bars on	The signal strength is high.	
White	Two bars on	The signal strength is medium.	
	One bar on	The signal strength is low	
Off		The device is set to the router mode.     The device fails to access the Wi-Fi network of the primary router.	

## 4 Mesh/WPS Button

Action	Description	
Long press for more than 5s	The device restores factory settings.	
Short press for less than 2s	Three functions are triggered at the same time:  1.Turn on or off the signal status LED.  2.Perform mesh networking as the Reyee primary device.  3.Establish a WPS network with other routers.	

# 3.2.4 Unboxing Video

https://video.ruijienetworks.com/videoDetail?videoId=64

# 3.3 RG-EW300R

# 3.3.1 Highlight Features

- Plug and Play, Easy and Strong
- Two built-in signal amplifiers boost 2X signal strength
- Three-bar Signal Indicator, Guides You to Find the Best Spot
- Flexible Placement, One-click Connection
- More Wireless Mode Options, Meet All Your Needs
- Take control of your home network at your fingertips

# 3.3.2 Product Appearance







## 3.3.3 LED and Button

## **2**LED/RESET Button

Action	Description
Long press for more than 5s	The device restores factory settings.
Short press for less than 2s	Turn on or off the signal status LED.

# Signal Status LED

Status		Description	
Blinking alternately		The device is accessing the Wi-Fi network of the primary router.	
Three bars on		The signal strength is high.	
White	Two bars on	The signal strength is medium.	
	One bar on	The signal strength is low.	
Off		<ol> <li>The device is set to the router mode.</li> <li>The device fails to access the Wi-Fi network of the primary router.</li> </ol>	

# **4**System Status LED

Status		Description
Blue	Solid on Blinking	The device is functioning properly. / The port has made a successful link.  The device is starting up. / The device is restoring factory settings.
Red	Solid on	The network is unreachable.

## **6**WPS Button

Action	Description
Short press for less than 2s	Establish a WPS network with other routers.

# 3.3.4 Unboxing Video

https://video.ruijienetworks.com/videoDetail?videoId=68

# 3.4 RG-EW1200G PRO

# 3.4.1 Highlight Features

- Supports 802.11ac wave2
- 6 omnidirectional antennas provide strong Wi-Fi signal

- Full coverage, easy setup, seamless roaming
- Parental Control & Health Mode
- Concurrently support up to 64 devices connection
- Easy network management at your fingertips with Reyee Router App

# 3.4.2 Product Appearance

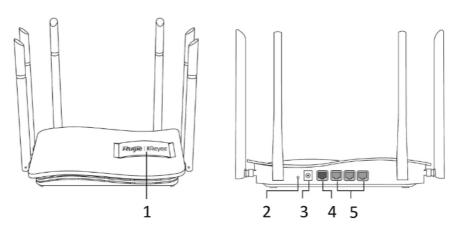






# 3.4.3 LED and Button

Indicator	Status	Description
	Off	The router is powered off
	Steady On	The router is running normally
System Status Indicator	Fast Blinking	Restoring factory
System Status indicator		settings/Rebooting
	Slow Blinking	Reyee Mesh is being paired or
		repeater stops
	Off	The port is not connected or the
Port Indicator		cable disconnects
Fort indicator	Steady On	The port is connected normally
	Blinking	Data is being transmitting



1	System Status Indicator
2	pairing/Reset Button press >10s to reset press <1s to pair
3	Power
4	WAN Port/ndicator
5	LAN1-3 Port/ndicator

# 3.5 RG-EW1200

# 3.5.1 Highlight Features

- Supports 802.11ac wave2
- 4 omnidirectional antennas provide strong wifi signal
- Reyee Mesh builds up flexible multi-solutions for your network
- Parental Control & Health Mode
- Concurrently support up to 64 devices connection
- Easy network management at your fingertips with Reyee Router App

# 3.5.2 Product Appearance

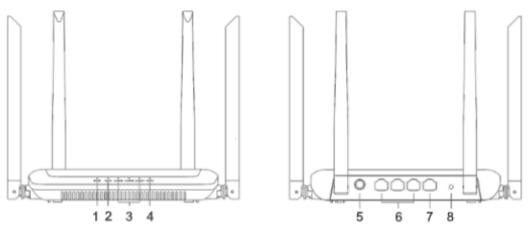






# 3.5.3 LED and Button

Indicator	Status	Description
	Off	The router is powered off
System Status Indicator	Steady On	The router is running normally
	Fast Blinking	Restoring factory settings/Rebooting
	Steady On	Reyee Mesh is running normally
WiFi Indicator	Slow	Reyee Mesh is being paired or
	Blinking	repeater stops
	Off	The port is not connected or the
Port Indicator	Oll	cable disconnects
	Steady On	The port is connected normally



1	System Status Indicator		
2	WAN Port Indicator		
3	LAN1-3 Port/Indicator		
4	WiFi Indicator		
5	Power		
6	LAN1-3 Port/Indicator		
7	WAN Port/Indicator		
8	Pairing/Reset Button Press>10s to reset Press<1s to pair		

# 3.5.4 Unboxing Video

https://video.ruijienetworks.com/videoDetail?videoId=65

# 3.6 RG-EW1800GX PRO

# 3.6.1 Highlight Features

- An Unprecedented Wireless Experience with Wi-Fi 6
- Enter the Era of Wi-Fi 6 Speed
- Strong Signal Received, Feels like "wall-less"
- Exclusive Reyee Mesh provides full space coverage Wi-Fi solution
- Born For Multi-user
- Take control of your home network at your fingertips

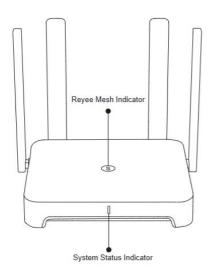
# 3.6.2 Product Appearance

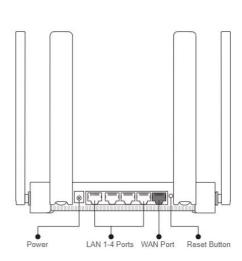






# 3.6.3 LED and Button





# 3.7 EG-EW3200GX PRO

# 3.7.1 Highlight Features

- Next-Gen Gigabit Wi-Fi 6 Standard
- Ultra-fast Wi-Fi Speed
- Strong Signal Received, Feels like "wall-less"
- Exclusive Reyee Mesh provides full space coverage Wi-Fi solution
- Better stability under heavy load
- Take control of your home network at your fingertips

# 3.7.2 Product Appearance







## 3.7.3 LED

LED		Color/Status	Description
	Green	Blinking	The router is being paired.
Mesh LED		Solid on	The router is paired and Wi-Fi signals are normal.
	Orange	Solid on	The router is paired but Wi-Fi signals are weak.
	Red	Solid on	Device pairing is disconnected.
	Blue	Solid on	The router is running normally.
System Status LED		Fast blinking (on for 62.5 ms, off for 62.5 ms)	The router is restored to factory settings. The router restarts. The firmware is upgraded.
		Slow blinking (one interval of 1.75 seconds: on for 250 ms , off for 250 ms)	The router is initialized. The router does not access the Internet.

# 3.7.4 Unboxing video

https://video.ruijienetworks.com/videoDetail?videoId=67

# 3.8 RG-M32

# 3.8.1 Highlight Features

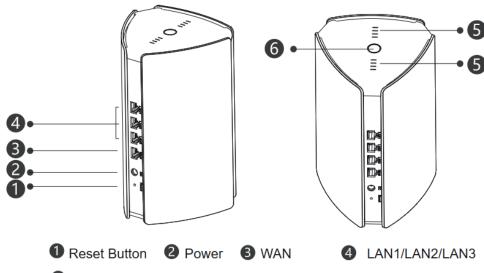
- Next-gen gigabit Wi-Fi 6 standard
- 4x4 Enterprise-level chipset, better stability under heavy load
- 4 Dual-band antennas and 8 signal amplifiers, provide whole-home network coverage
- Exclusive Reyee Mesh solution, one click to mesh up multiple Reyee Mesh devices
- Smart signal indicator, find the best spot to place a sub-router
- Take control of your home network at your fingertips

# 3.8.2 Product Appearance





## 3.8.3 LED and Button



**5** Reyee Mesh Indicator

Status	Description
Blinking white	The device is being paired.
Four bars are solid white	The Mesh network signal is excellent.
Three bars are solid white	N/A
Two bars are solid white	The Mesh network signal is average.
One bar is solid white	The Mesh network signal is poor.
Off	The Mesh network is disconnected or not set up.

## 3.9 RG-M18

## 3.9.1 Highlight Features

- An unprecedented wireless experience with Wi-Fi 6
- Strong signal received, feels like"wall-less"
- Born for multi-user, support up to 192 terminals
- Exclusive Reyee Mesh provides full space coverage Wi-Fi solution
- Smart signal indicator, find the best spot to place a sub-router
- Take control of your home network at your fingertips

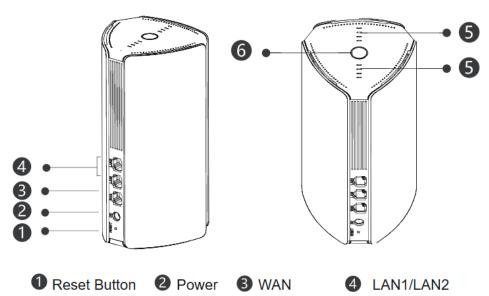
# 3.9.2 Product Appearance







## 3.9.3 LED and Button



5 Reyee Mesh Indicator

Status	Description
Blinking white	The device is being paired.
Four bars are solid white	The Mesh network signal is excellent.
Three bars are solid white	N/A
Two bars are solid white	The Mesh network signal is average.
One bar is solid white	The Mesh network signal is poor.
Off	The Mesh network is disconnected or not set up.

## 3.10 EW300 PRO

## 3.10.1 Highlight Features

- Stronger signal with 4 x 5dBi antenna and signal amplifiers
- WISP & Repeater Mode supported
- Life-time free cloud management supported
- Easy management, easy life
- Three-year warranty guaranteed

# 3.10.2 Product Appearance







## 3.10.3 LEDs

#### **LEDs**

LED	Status	Description
	Off	The router is not powered on.
	Steady On	The router is running normally.
System	Fast Blinking	The router is starting or powering off.
Status	Slow Blinking	The Internet cannot be accessed.
Indicator	Fast Blinking Twice	The router is restoring factory settings or upgrading.
	Slow Blinking Once and Fast Blinking	The firmware is faulty.
	Three Times	

# 4. Device Management and Configuration

## 4.1 Device Management

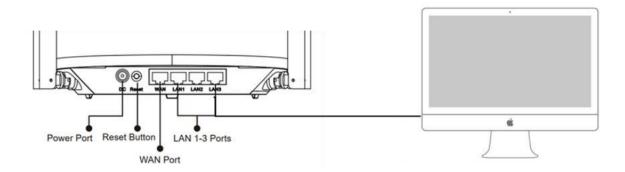
## 4.1.1 How to login EW Mesh Wi-Fi?

#### Connecting to the Router

You can open the management page and complete Internet access configuration only after connecting a PC or a mobile phone to the router. You can connect a PC to the router in either of the following ways, and connect a mobile phone to the router in wireless connection mode.

#### Wired connection

Connect a local area network (LAN) port of the router to the network port of the PC, and configure Obtain an IP address automatically on the PC. The EW300 is used as an example. The following figure shows the connection between the router and laptop.



#### Wireless connection

On a mobile phone or laptop, search for a Wi-Fi network **@Ruijie-sXXXX** (XXXX is the last four digits of the MAC address of each device). The default SSID and login address can be found on the bottom label of the router.

#### Logging In

When a PC or a mobile phone connects to a router in initial state, the configuration wizard page appears. If the configuration page does not appear, enter the device IP address into the address bar of the browser to navigate to the login page, and then enter the password for login.

Item	Default Value
Device IP address	192.168.110.1
Username/Password	No username and password are required at your first login. You can configure the router directly.

If you forget the IP address or password, hold down the Reset button for more than 5 seconds to restore factory settings. Then you can use the default IP address and password to log in.



#### Note

Restoring factory settings will delete existing configuration, and you are required to configure Internet access again at your next login. Therefore, exercise caution when performing this operation

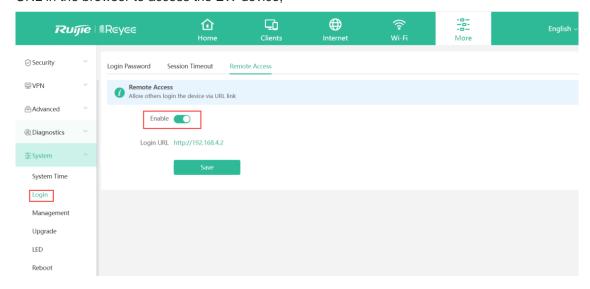
If the router in initial state detects that the IP address of the primary router is 192.168.110.1, the router automatically changes its own IP address to 192.168.111.1 to avoid an IP address conflict. You may fail to log in to the router during the IP address change, but can reconnect to the Wi-Fi network and complete configuration 1 minute later.

## 4.1.2 How to login EW via its WAN IP address?

There are two ways to login EW via its WAN IP address:

#### (1) Remote Access:

It's needed to enable the Remote Access feature on eweb of device first, and then copy the Login URL in the browser to access the EW device;



## (2) Cloud Access

Besides, this device can be accessed via Cloud if it's in online status. You can click the SN to check the device information.



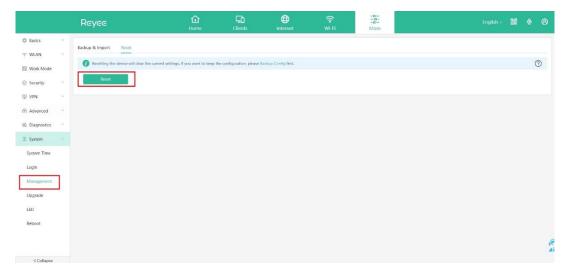
Then click eweb to login the EW device.



#### 4.1.3 How to restore EW Mesh Wi-Fi?

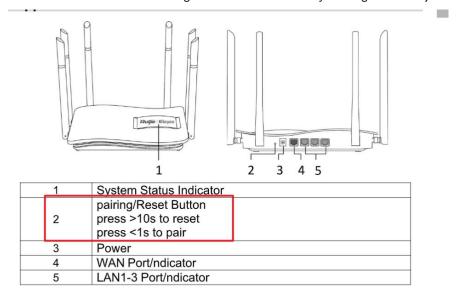
There are two ways to restore your Reyee EW device:

(a) Access the eweb of Reyee EW, then click 'Management'>'Reset' to restore this device.



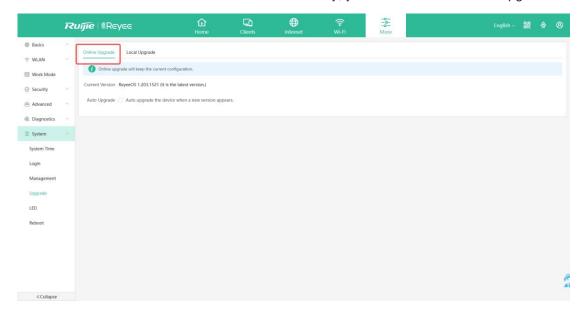
(b) Press and hold the Reyee Mesh button for more than 5 seconds. When the LED starts blinking, the device is restoring factory settings. The device will automatically restart after the

restoration is completed. After the device is started, that is, the LED is solid on, reconfigure Internet access. The wireless signal name in the factory settings is @Ruijie-sXXXX.

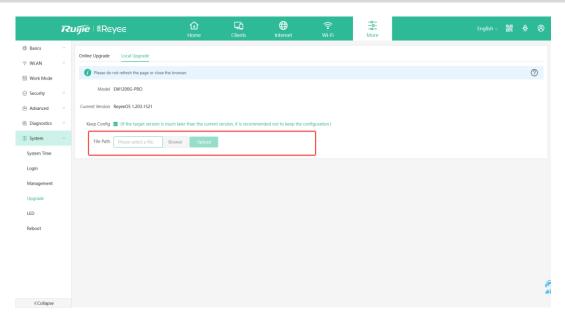


## 4.1.4 How to upgrade the EW Mesh Wi-Fi?

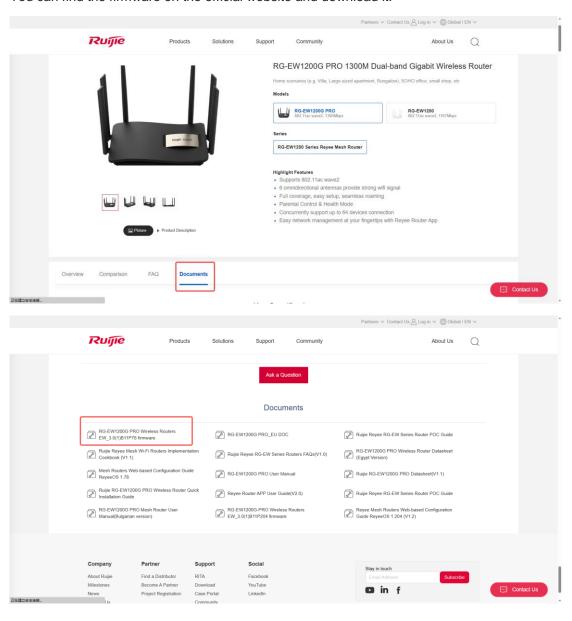
If the device can be connected to the Internet normally, you can choose an online upgrade.

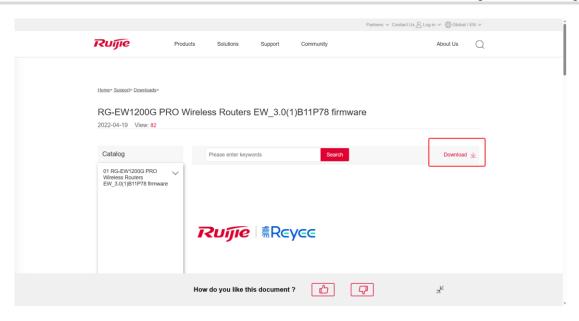


If the device cannot be connected to the Internet, you need to download Firmware from the official website first, and then click Local upgrade to upload.



You can find the firmware on the official website and download it.

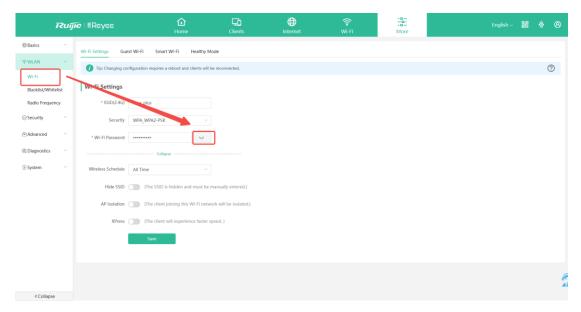




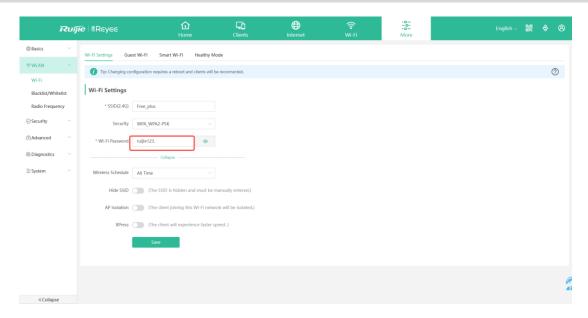
## 4.1.5 How to check and change Wi-Fi password of EW Mesh Wi-Fi?

You can log in it according to these steps below:

- 1. Log in the web interface
- 2. Click 'Wi-Fi'->'Wi-Fi Password'



3. You can check and change WiFi password here and then click 'Save'

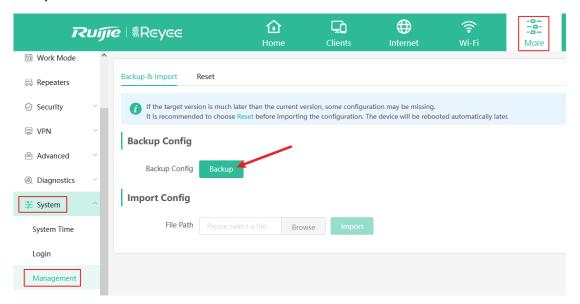


## 4.1.6 How to perform the EW Mesh Wi-Fi quick start?

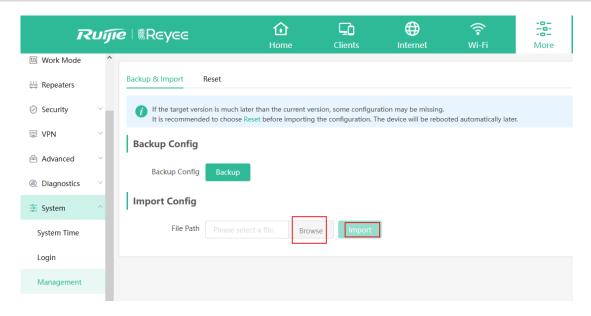
Please refer to the following guide to configure it: <u>RG-EW300 PRO Web-based Configuration Guide</u>
ReyeeOS1.59 - Ruijie Networks

## 4.1.7 How to configure Config Backup and import Config on EW Mesh Wi-Fi?

- 1. Login to the eweb page of Reyee EW router.
- 2. Choose **More** > **System** > **Management**, click **Backup** button to download a configuration file locally.

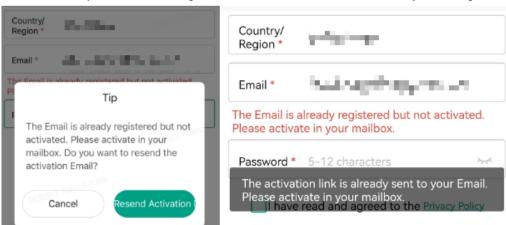


Click **Browse**, select a configuration file backup on the local PC, and click **Import** to import the configuration file. The device will restart.

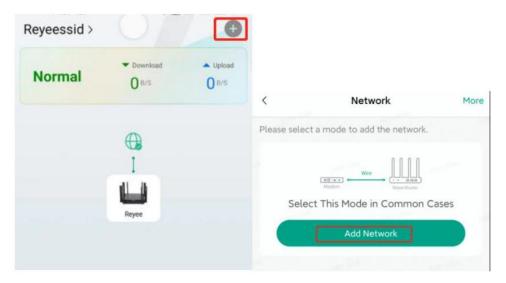


## 4.1.8 How to add EW mesh Wi-Fi into my Reyee Router APP?

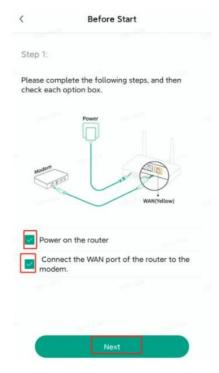
1. Download Reyee Router APP, register an account and activate it first, then you can login:



2. Click+in the upper right corner, and click Add Network.



After connecting the Reyee EW router properly as shown in the figure, check each option box and click **Next** 

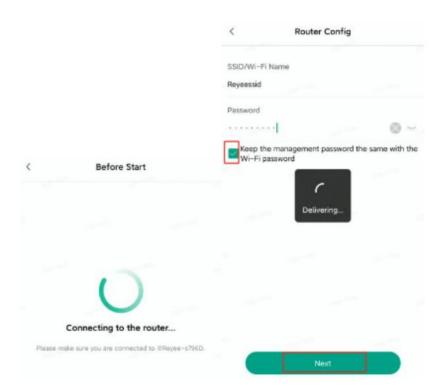


Click Open Wi-Fi List to enter the WLAN list on your phone.

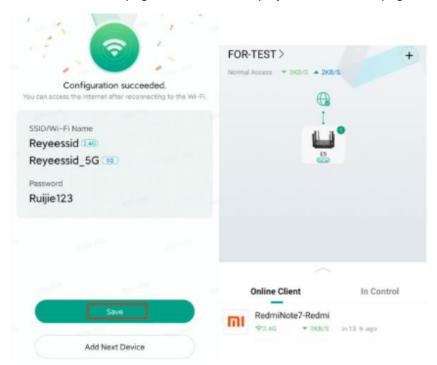
Connect to the default SSID @Reyee-sXXXX and return to the Reyee Router App.



After the router is detected, you can set the SSID and password on the **Router Config** page. Select the item below the password to keep the management password the same as the Wi-Fi password. Click **Next**.



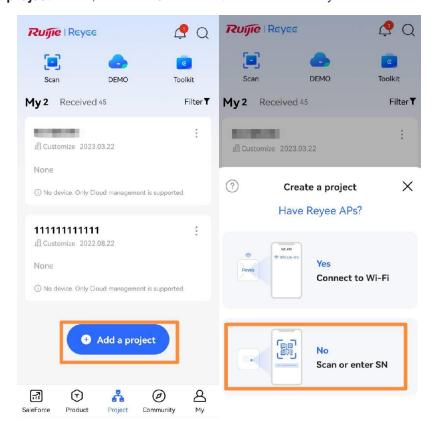
Click **Save** and return to the Home page. The router is displayed on the Home page.



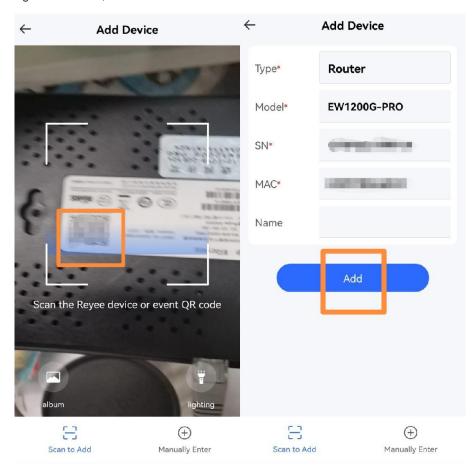
## 4.1.9 How to add EW mesh Wi-Fi into my Ruijie Reyee APP?

1. Download Ruijie Reyee APP, register an account and activate it first, then login to your Ruijie Cloud account.

2. Click Add a project button, choose No to scan QR Code in the Reyee EW series router:

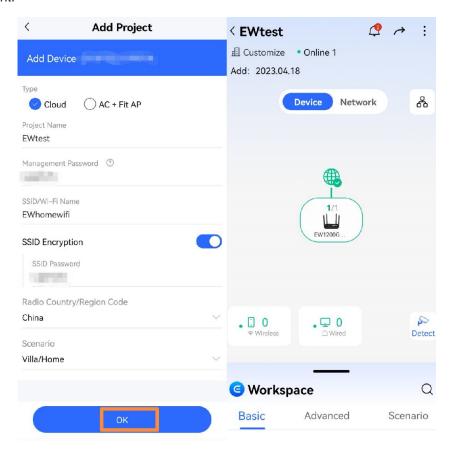


3. After scanning the QR Code, the device info will be detected. You can click the **Add** button.



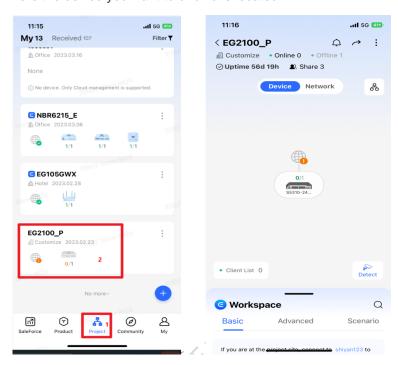
4. Choose the project type, enter the related parameters on this page, and then click **OK**.

When Reyee EW series router can access the Internet, you can see the device online on your account.

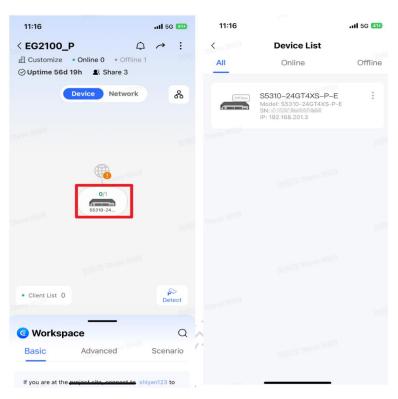


## 4.1.10 How to unbind device from Ruijie Reyee APP?

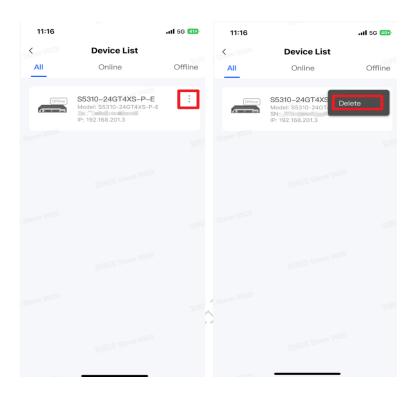
1. Select the project where the device you want to unbind is located



## 2. Select the device you want to unbind



#### 3. Delete Device



#### Note:

- 1. Currently, only offline devices can be unbound. Online devices cannot be unbound
- 2. Only devices in your own project can be unbound. The received project does not support unbinding

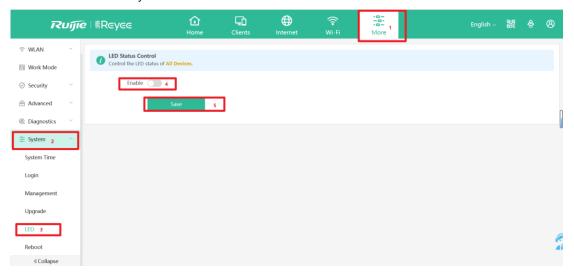
## 4.1.11 How to unbind EW Mesh Wi-Fi from Reyee Router APP?

Sorry, Ruijie Router APP cannot support unbind Reyee EW.

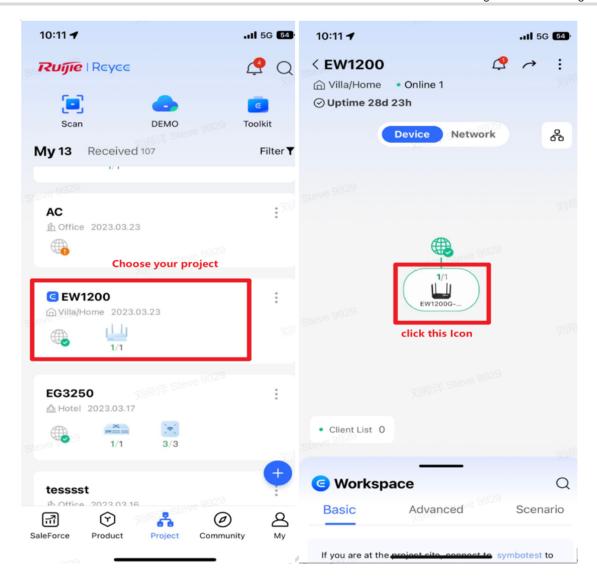
## 4.1.12 How to turn off the LED lights of EW Mesh Wi-Fi?

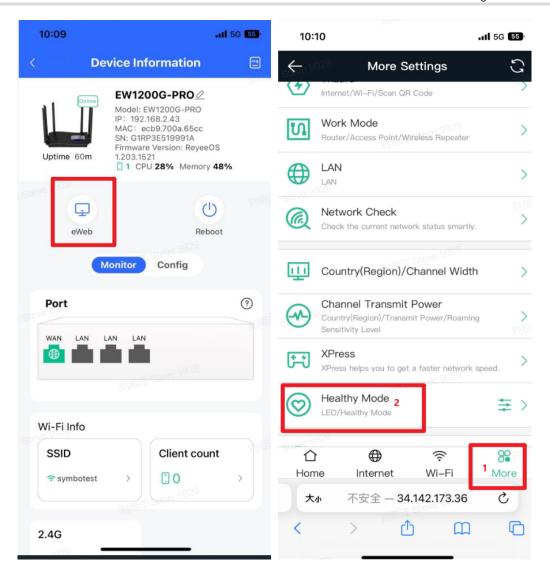
You can turn off the LED lights of Reyee EW as follows:

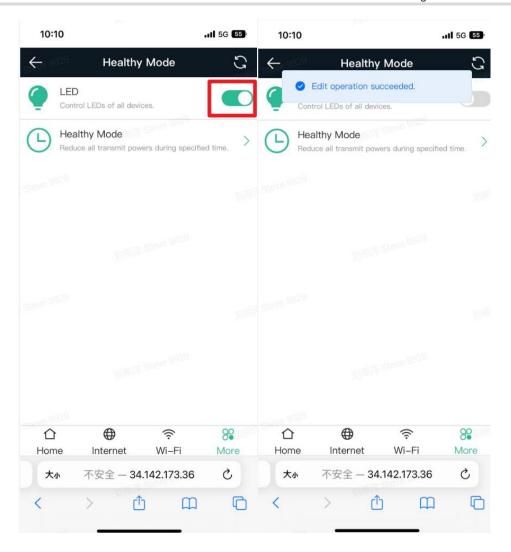
1. On the Eweb of Reyee EW:



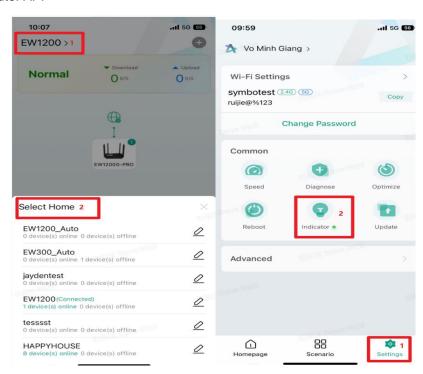
2. On Ruijie Reyee APP







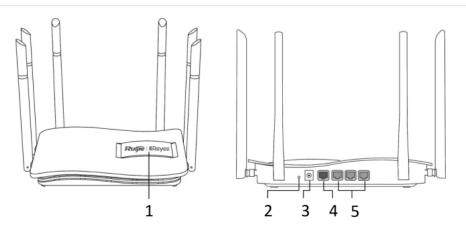
#### On Reyee Router APP



#### 4.1.13 What's the LED Indicator mean?

A: There are two LED Indicators on the EW device (EW1200G PRO)

#### **System LED Indicator means:**



1	System Status Indicator
	pairing/Reset Button
2	press >10s to reset
	press <1s to pair
3	Power
4	WAN Port/ndicator
5	LAN1-3 Port/ndicator

When the device is first turned on, the LED will blink for 2-3 minutes until the device is fully turned on. The LED light will become stable and no longer blink.

#### Reyee Mesh LED Indicator means:

The Reyee Mesh indicator on the primary router will blink in white, indicating that the primary router is searching nearby routers for pairing. The Reyee Mesh indicator on the secondary router will also blink in white, indicating the secondary router is being paired with the primary router. In about 2 minutes, the Reyee Mesh indicators on both routers will turn solid white, indicating Mesh pairing is complete.

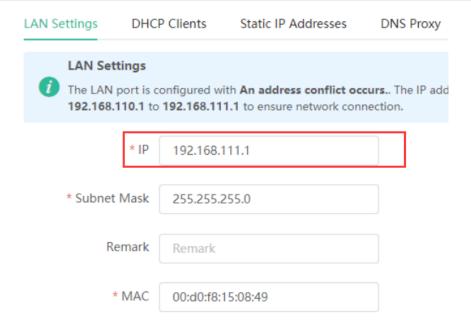
Note: Not all EW series devices have the Reyee Mesh LED Indicator.

## 4.2 Basic Configuration

## 4.2.1 How to configure LAN Port on EW Mesh Wi-Fi?

You can click [More]-->[Basics]--[LAN]

**Note:** Devices connected to the LAN interface will obtain the IP address what LAN Settings configured

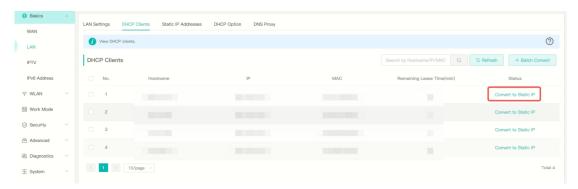


## 4.2.2 How to configure DHCP Clients on EW Mesh Wi-Fi?

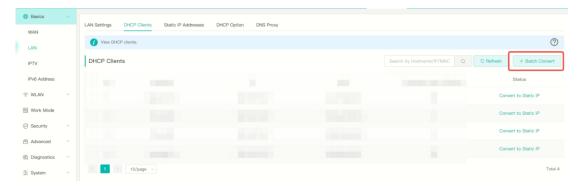
You can click [More]-->[Basics]--[LAN]

You can configure the DHCP Client in the following ways

**Convert to Static IP:** You can change the IP address obtaining mode of the device to static or change the way to obtain the IP address into static in batches.



**Batch Convert:** You can also change the IP address obtaining mode of connected users to static in batches



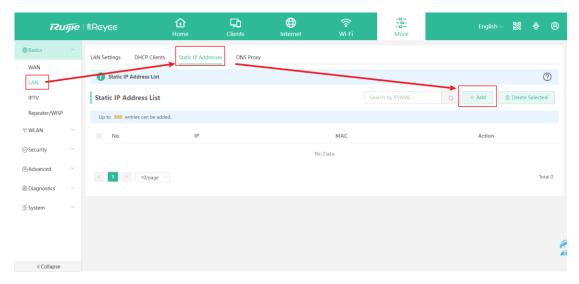
**Note**: EW device is not supported enabling the DHCP Server on the mode of **Access Point** and **Wireless Repeater** 

#### 4.2.3 How to bind DHCP users to static addresses on EW Mesh Wi-Fi?

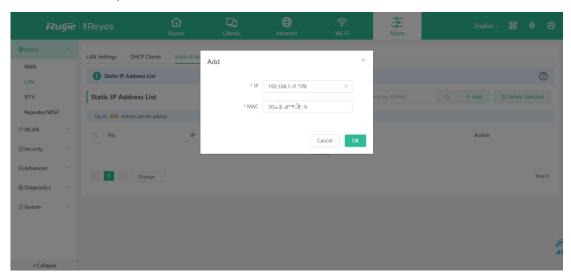
Mobile phone view: Choose More > Switch to PC view > More > LAN > Static IP Addresses.

PC view: Choose More > LAN > Static IP Addresses. Click Add.

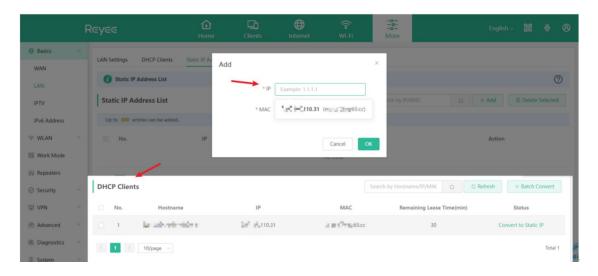
In the displayed static IP address dialog box, enter the MAC address and IP address of the target client, and click OK. After a static IP address is bound, the client obtains the IP address each time when it connects to the router



Please note that only 300 IP addresses can be bind to static here



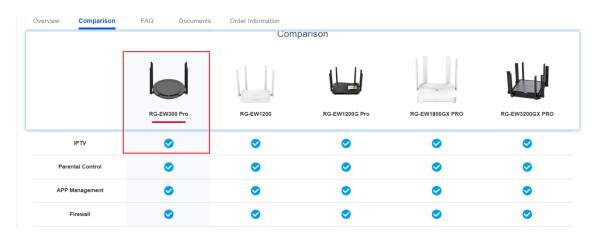
If user has DHCP address on EW, you can click "IP", then it will be shown below, then you can choose directly.



## 4.2.4 Does EW Mesh Wi-Fi support IPTV function?

Yes, it supports.

https://www.ruijienetworks.com/products/REYEE-MeshWi-Fi/RG-EW1200-Series/ew300pro



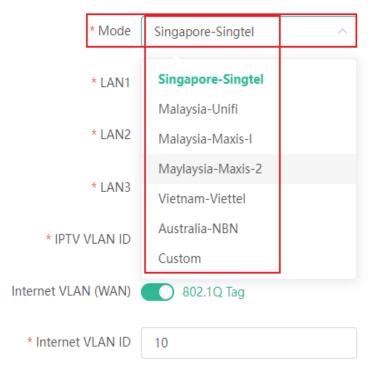
## 4.2.5 How to configure IPTV on EW Mesh Wi-Fi?

 $\textbf{Mobile phone view:} \ \ \text{Choose More} > \text{Switch to PC view} > \text{More} > \text{Basics} > \text{IPTV/VLAN}$ 

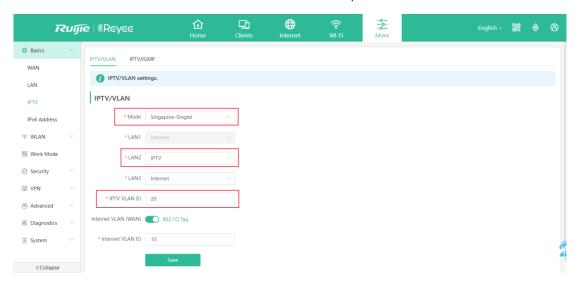
PC view: Choose More > Basics > IPTV/VLAN

Select the local ISP mode, click the drop-down list of the target port, and select IPTV from the drop-down list

# IPTV/VLAN



Then enter the VLAN ID provided by the ISP. If a VLAN ID needs to be set for the Internet access service, enable the Internet VLAN function and enter a VLAN ID. The VLAN tag function is disabled by default. You are advised to disable the function unless in special cases.



After the configuration, confirm that the IPTV STB is connected to the specified port properly. In the above figure, the IPTV STB is connected to LAN2.



#### Note

Enabling this function will disconnect some devices from the network. Therefore, exercise caution when performing this operation.

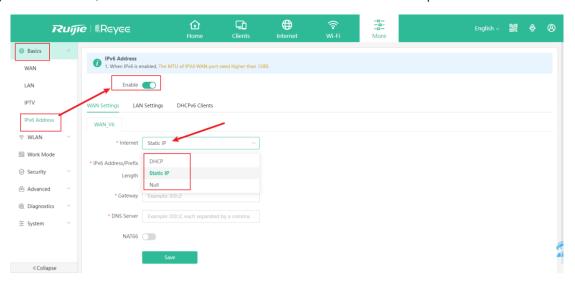
#### 4.2.6 How to enable IPv6 address function on EW Mesh Wi-Fi?

Internet Connection Type:

If you select DHCP, and the device will get an IPv6 address from the upstream device.

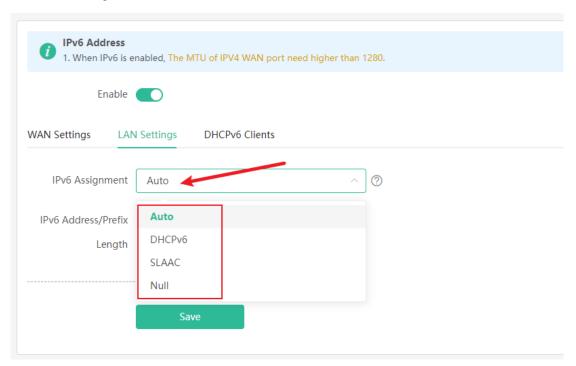
If you select Static IP, please configure the IPv6 address, gateway address and DNS server address manually.

If you select NULL, the IPv6 address function will be disabled on the WAN port



#### Click LAN Setting:

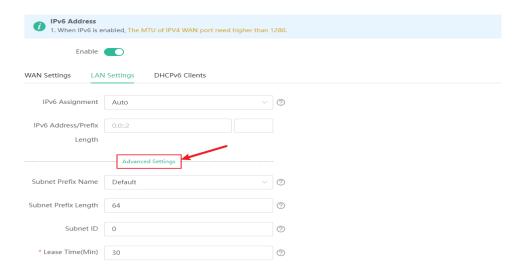
IPv6 Assignment: Choose Auto to use both DHCPv6 mode and SLAAC mode to allocate address. Choose Null to assign no address. You are advised to choose Auto.



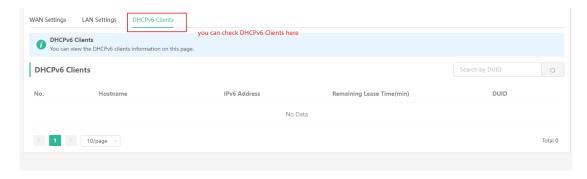
IPv6 Address/Prefix Length: If the router fails to obtain an IPv6 prefix, you can configure one manually. Set the subnet prefix length to a value smaller than or equal to 64.



Click Advanced Settings to perform the advanced settings. See the following figure for the recommended configuration.



Click DHCPv6 Clients to view the list of clients that have obtained IPv6 addresses from the router.



#### 4.2.7 What is the difference between the four modes on EW Mesh Wi-Fi?

- 1. EW in **Router Mode** works as the primary router and allocates IP address to users to access the Internet.
- 2. EW in **Access Point Mode** works as the secondary router which is wired connected to the primary router to expand the network of the primary router. The device and the user are on the same network which both get IP from the primary router.

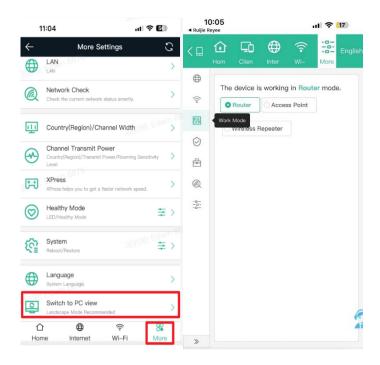
- 3. EW in **Wireless Repeater Mode** works as the secondary router, but it is wireless connected to the primary router to expand the network of the primary router, and the device and user are on the same network which both get IP from the primary router, which is same as Access Point Mode.
- 4. EW in **WISP Mode** is also wireless connected to the primary, but the router and the user will get different IP addresses, the router WAN IP address comes from the primary router, and the user IP address is obtained from the secondary router.

## 4.2.8 How to change the work mode of the EW Mesh Wi-Fi?

#### On the eweb page

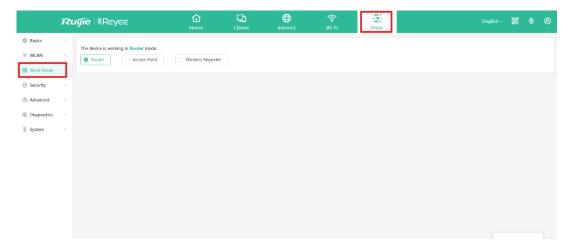
Mobile Phone View:

Choose More > Switch to PC view > More > Work mode



#### PC view:

#### choose More > Work mode

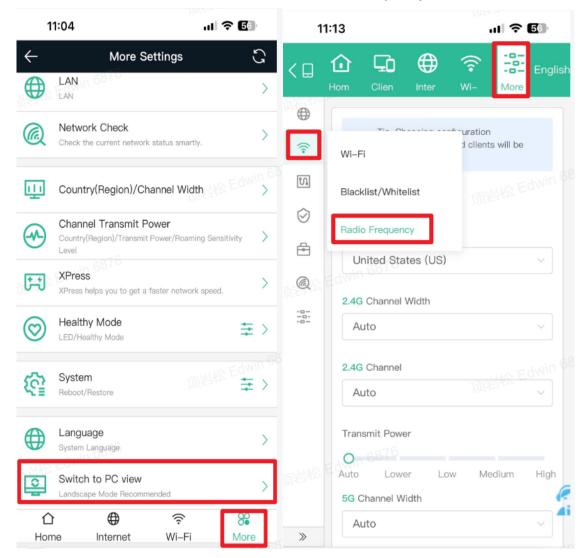


## 4.2.9 How to modify radio settings on EW Mesh Wi-Fi?

On the eweb page

Mobile Phone View:

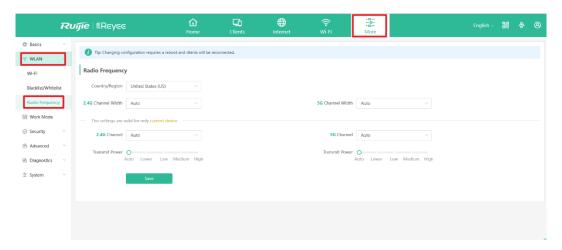
1) Choose More > Switch to PC view > More > WLAN > Radio Frequency



2) Then you can see the radio settings page and set the parameters as what you want.

#### PC View:

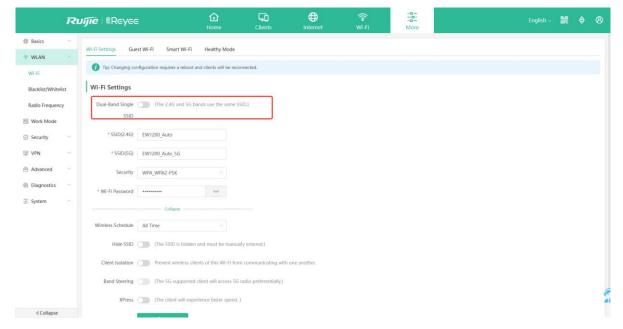
1) Choose More > WLAN > Radio Frequency



2) Then you can see the radio settings page and set the parameters as what you want.

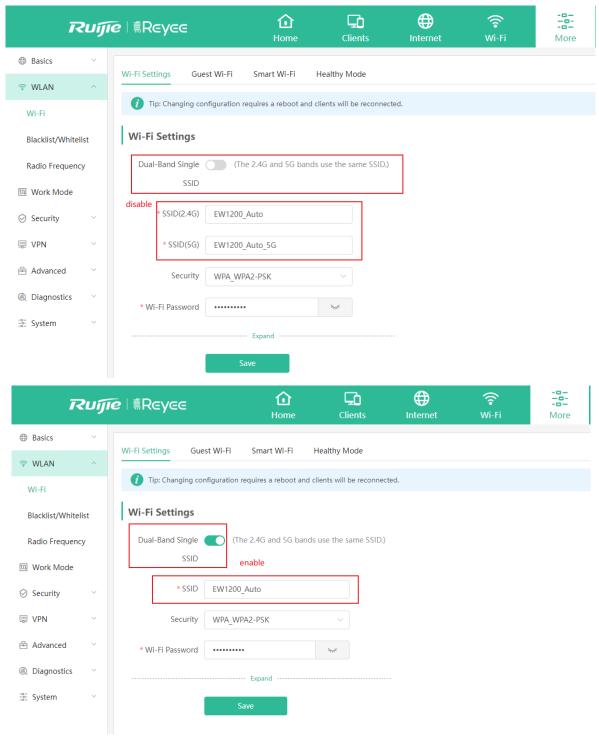
# 4.2.10 How to set 2.4G and 5G different Wi-Fi passwords for the same SSID in EW Mesh Wi-Fi?

EW device can set different SSIDs for 5G and 2.4G by disabling "Dual-Band Single SSID', but can't set different Wi-Fi passwords for 5G and 2.4 G due to the product limitation.

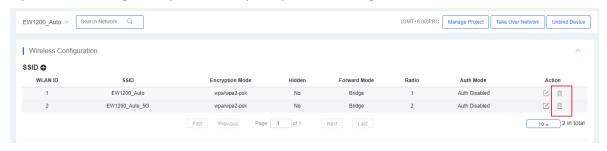


#### 4.2.11 How to delete 2.4G or 5G SSID from EW Mesh Wi-Fi?

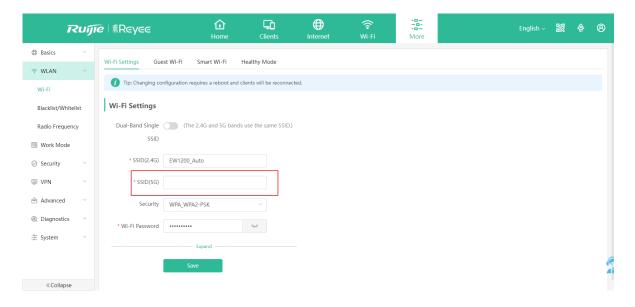
On EW1200G-PRO eweb, it can only support whether to separate the 2.4G and 5G SSIDs



If you want to configure only 2.4G or only 5G, you need configure on Cloud:



After deleting 5G SSID:



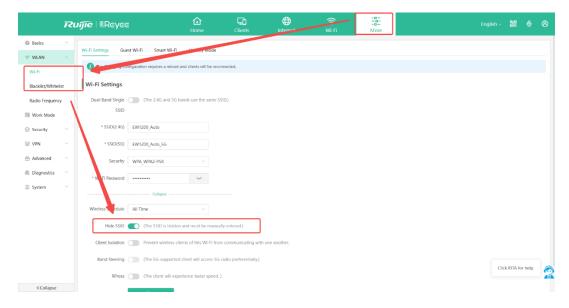
#### 4.2.12 How to set hidden SSID in EW Mesh Wi-Fi?

Hiding the SSID can prevent unauthorized users from accessing the Wi-Fi network and enhance network security. After this function is enabled, a mobile phone or PC cannot search out the SSID. Instead, you have to manually enter the correct SSID and password.

#### **Configuration Steps:**

Choose More> Wireless> Wi-Fi > Wi-Fi Settings > Expand.

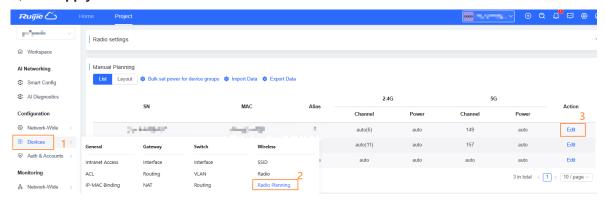
Enable Hide SSID and click Save.

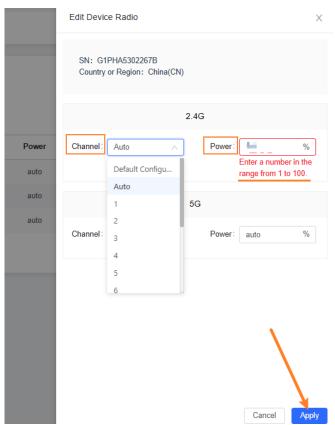


## 4.2.13 How to adjust the channel and power for EW Mesh Wi-Fi?

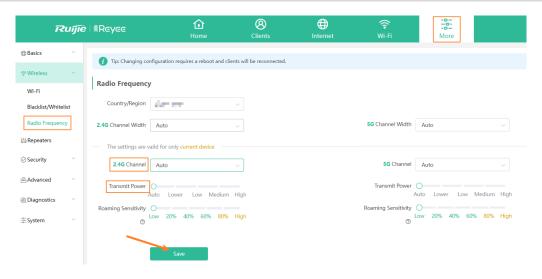
If the Reyee EW series router is online on Ruijie Cloud, you can adjust the channel and power on Ruijie Cloud directly:

**Configuration** > **Devices**> **Radio Planning**, click **Edit**. And adjust the channel and power according to your needs, click **Apply**.





If Reyee EW router is not online on Ruijie Cloud, you can enter the eweb of Reyee EW, and adjust the channel and power:



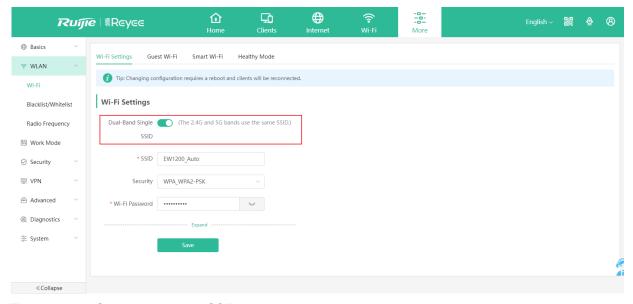
## 4.2.14 How to enable 5G priority on EW Mesh Wi-Fi?

To ease the crowding of 2.4G band and the waste of 5G band caused by wireless terminals using 2.4G band only, you can choose enable 5G priority.

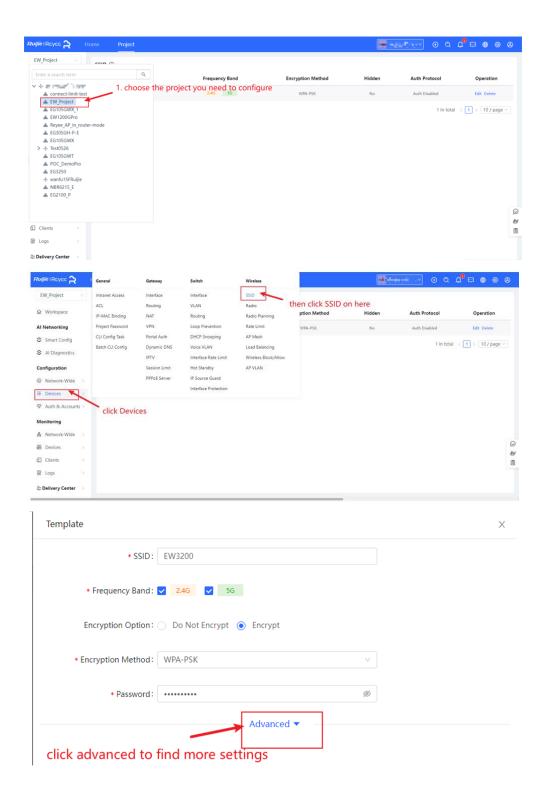
You need to enable Dual-Band Single SSID on EW first.

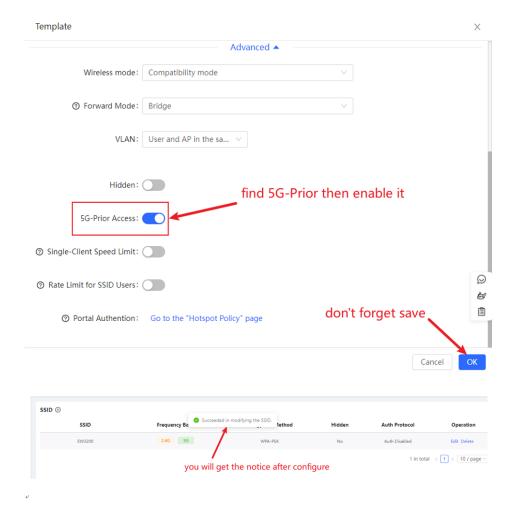
Path: More -> Wlan -> Wi-Fi -> Dual-Band Single SSID

After enabling it, 2.4G and 5G SSID will merge into one



Then enable 5G priority on cloud SSID setting



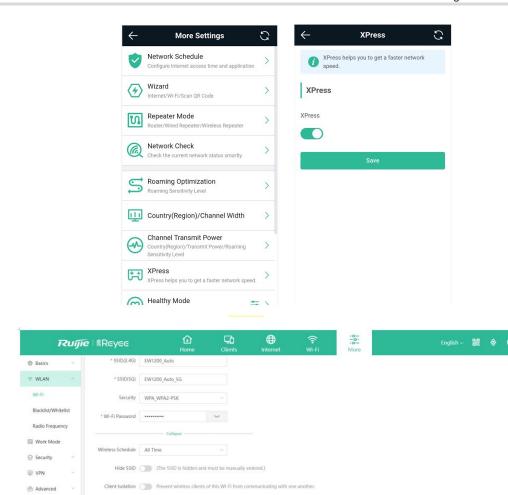


# 4.2.15 How to enable XPress on EW Mesh Wi-Fi?

Mobile phone view: Choose More > XPress.

PC view: Choose More >Wireless > Wi-Fi > Wi-Fi Setting > Expand > XPress.

Enable XPress and click Save to save the configuration. After XPress is enabled, you will have a more stable gaming experience.



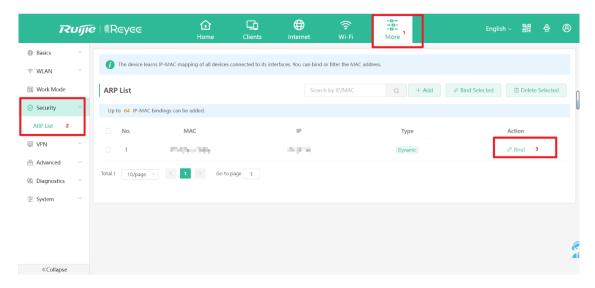
# 4.2.16 How to configure ARP binding on EW Mesh Wi-Fi?

Mobile phone view: Choose More > Switch to PC view > More > Security> ARP List

PC view: Choose More > Security> ARP List

«Collapse

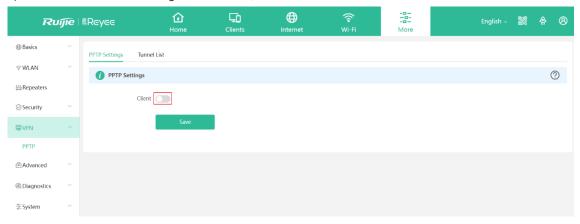
ARP binding means binding of IP addresses and MAC addresses on the LAN.



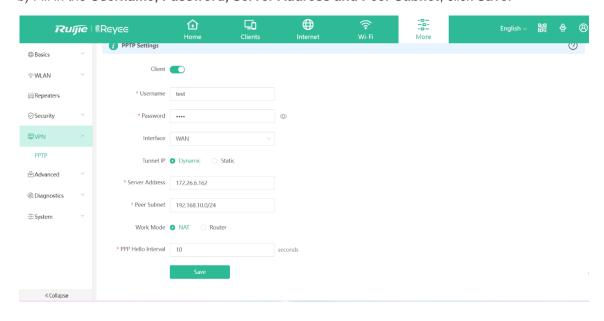
# 4.3 Commonly Used Function

# 4.3.1 How to configure PPTP VPN on the EW Mesh Wi-Fi?

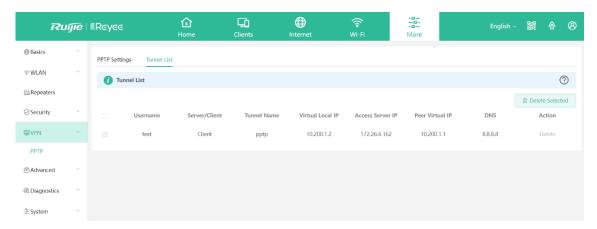
a) Enter the PPTP VPN configuration screen, and turn on PPTP VPN Client function.



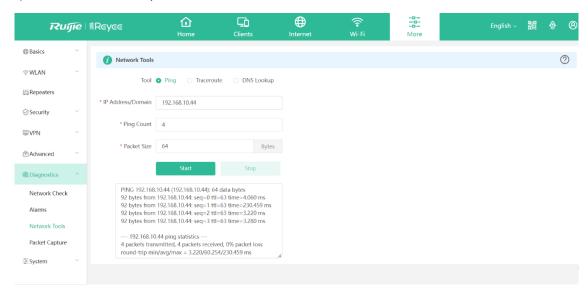
b) Fill in the Username, Password, Server Address and Peer Subnet, click Save.



c) Check the connection status in the **Tunnel List** screen.



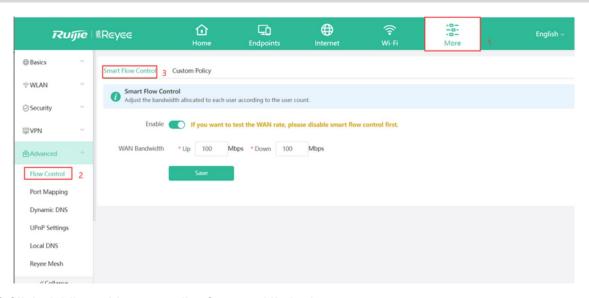
d) Test access to headquarters



# 4.3.2 How to limit user speed on EW Mesh Wi-Fi?

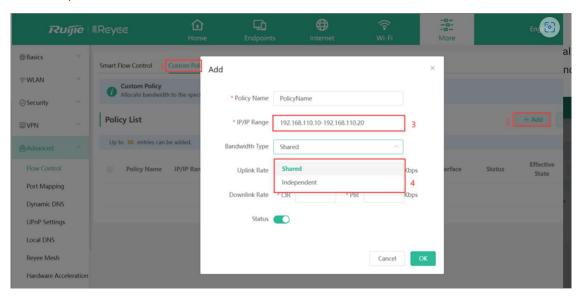
# a) Login to the eweb of EW device.

Click 'Flow control' in the advanced menu. Here are two ways to set speed limit for users. The first one was 'Smart Flow Control', which means adjust the bandwidth allocated to each user according to the user count. The second 'Custom Policy' means can customize the speed for special users range.

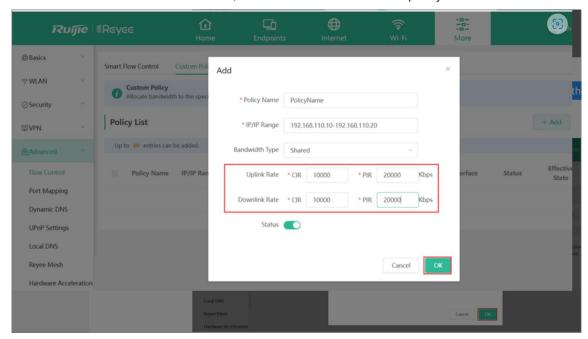


# b) Click 'Add' to add a new policy for speed limitation

Input the policy name and IP range to be limited. Then chose the bandwidth type, if Shared, it means all users in this IP range will share the bandwidth, if Independent, it means each user in that range have independent bandwidth.



Then input the uplink and downlink rate, CIR means the Committed information Rate and PIR means the Peak Information Rate. In the end, click 'OK' button to save the policy.



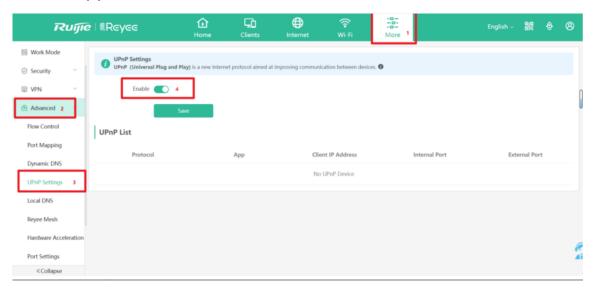
# 4.3.3 How to configure UPNP on EW Mesh Wi-Fi?

The Universal Plug and Play (UPnP) function can map the port used by a client for Internet access according to the client's request so that related applications run more fast or stably. Common applications that support UPnP include MSN Messenger, Xunlei, BT, and PPLive.

# **Configuration Steps:**

Mobile phone view: Choose More > Switch to PC view > More > Advanced > UPnP Settings. PC view: Choose More > Advanced > UPnP Settings.

Click Enable, and then click OK. You are advised to disable the function. Any applications that use UPnP to map ports will be listed below



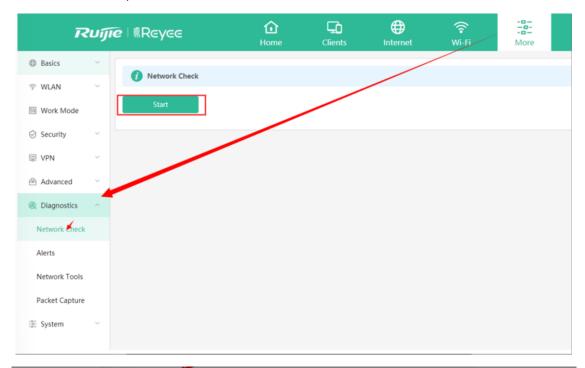
# 4.3.4 How to check the network on the device?

Mobile phone view: Choose More > Network Check.

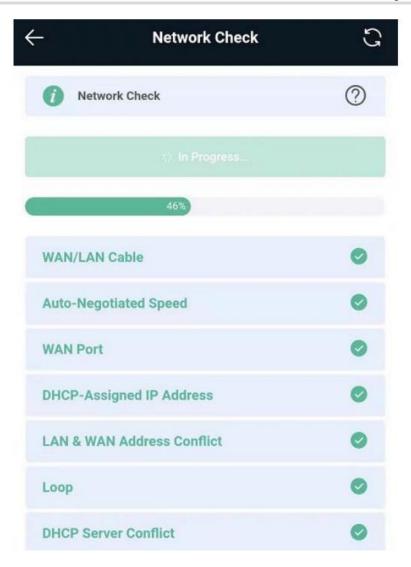
PC view: Choose More > Diagnostics > Network Check. Click Start and then click OK.

The device will check the network for problems, including interfaces, routing, flow control, and Ruijie Cloud platform, and provide solutions and suggestions for risk items.

**Note:** It is recommended to start with this step first. This can be a preliminary examination of where in the network the problem occurred.







# 4.3.5 How to check the alerts on the device?

You can Click [More]-->[Diagnostics]-->[Alerts]

**Note:** If there is an IP address conflict on the network or something similar issue, it will show up in the Alert List.



# 4.3.6 How to use network tools to check network connectivity?

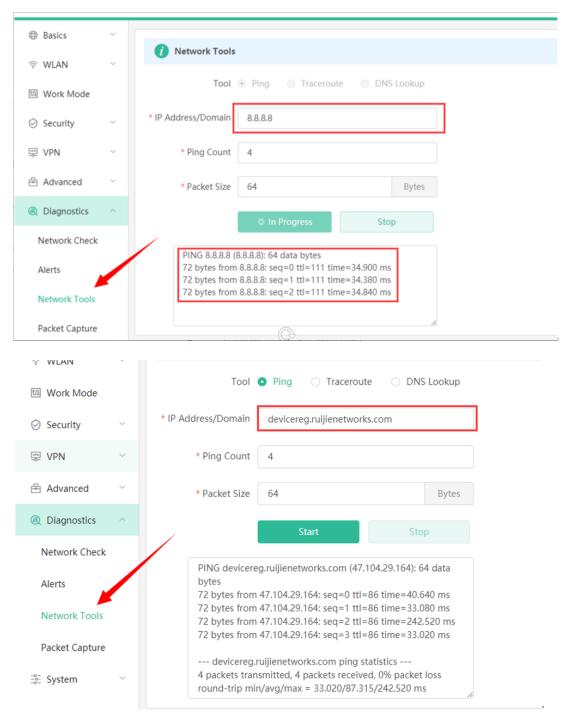
**Mobile phone view:** Choose More > System > Network Tools.

**PC view:** Choose More > Diagnostics > Network Tools

When you select the ping tool, you can enter the IP address or URL and click Start to test the connectivity between the router and the IP address or URL. The message "Ping failed" indicates that the IP address or URL cannot be pinged from the router.

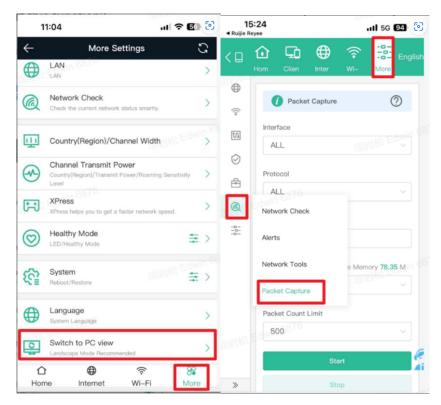
The traceroute tool displays the network path to a specific IP address or URL.

The DNS lookup tool displays the DNS server address used to resolve a URL.

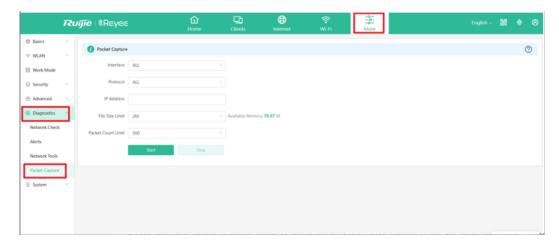


# 4.3.7 How to do packet capture on the EW Mesh Wi-Fi which support this function?

Mobile Phone View: Choose More Settings > Switch to PC view > More > Diagnostics > Packet Capture.



PC View: Choose More > Diagnostics> Packet Capture.



Configure the interface, protocol, and IP address whose packets need to be captured, file size limit, and packet count limit to limit the volume of packets captured. Click Start. Packet capture can be stopped at any time and a link to the generated file is generated. You can use Wireshark and other analysis software to open and view the file.

#### A Note:

Packet capture may occupy many system resources and cause network stalling. Exercise caution when performing this operation.

# 4.4 Typical Scenario Configuration

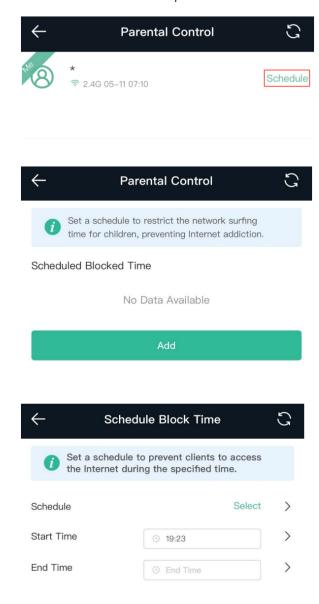
# 4.4.1 How to configure parent control on EW Mesh Wi-Fi?

Mobile phone view: Choose More > Parental Control.

Select a client and click Schedule, click Add, and set the restriction time. The client cannot access the network from the start time to the end time.

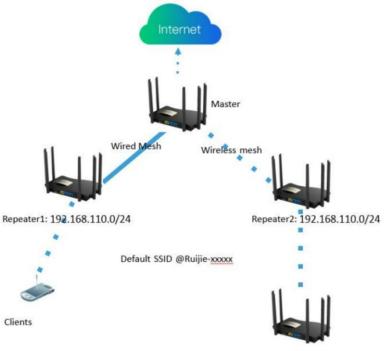
PC view: Choose Clients > Add Blocked Time.

In the PC view, you can select Weekdays or Weekends to prevent a client from accessing the Internet all day long, or set Blocked Time to Custom and set a restriction period



# 4.4.2 How to set up the wireless mesh on EW Mesh Wi-Fi?

Topology:



Repeater3: 192.168.110.0/24

#### a) Master must meet two conditions:

- 1) Finish the quick setup
- 2) The WAN port is connected and the interface indicator is on.

# b) Slave must meet two conditions:

- 1) Slave is the factory state;
- 2) Slave is within 3 meters from the master and is unobstructed (ensure the signal strength is above -35)

# c) Both the master and slave are powered on

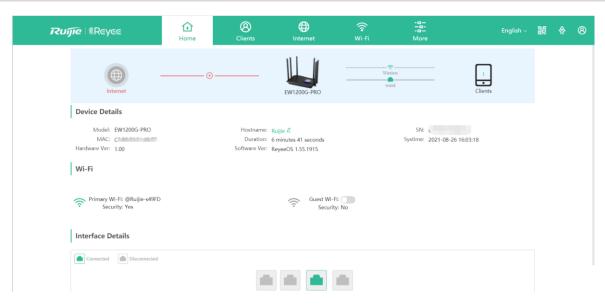
Press the reset button of the master, and the indicator light will flash quickly. After 1-3S, the slave indicator will start to flash quickly. After the indicator lights of the slave and slave are always on again, the wireless mesh is successful.

### Verification

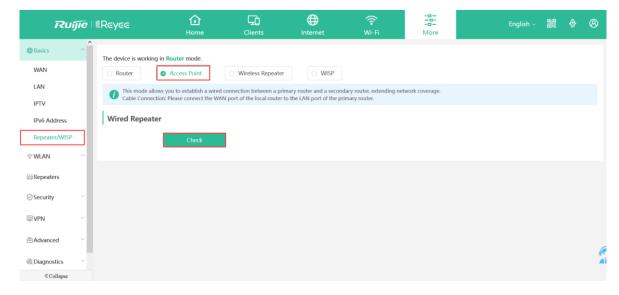
Then take the slave to the place where you need to use it and wait for the indicator light to stay on.

# 4.4.3 How to configure wired repeater?

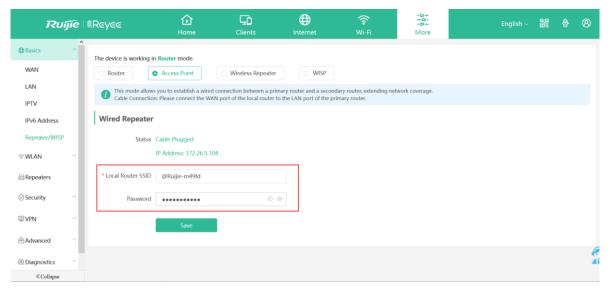
Step 1: Connect your PC to the EW1200G Pro LAN port, and then login it with the default LAN IP 192.168.110.1



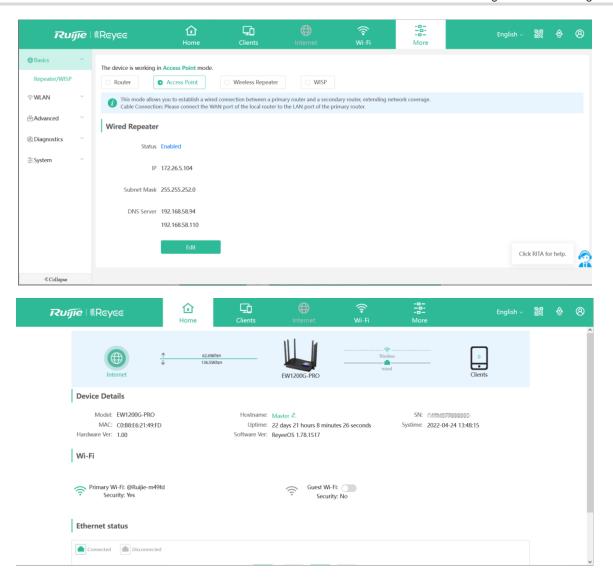
Step 2: Click More -> Repeater/WISP, choose Access Point mode, and then click Check.



Step 3: Configure the Local Router Wi-Fi and Save



Finish

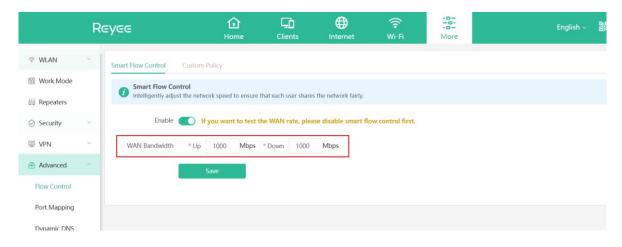


# 4.4.4 Whether EW Mesh Wi-Fi has bandwidth control feature?

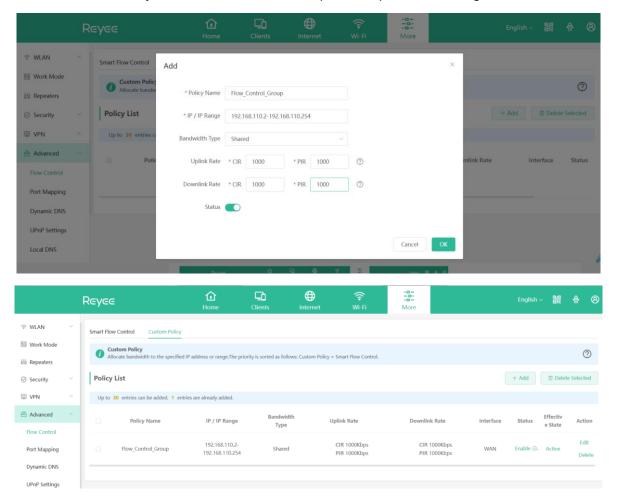
Yes, EW series products support the bandwidth feature.

Please perform the following steps:

Click 'Flow Control' in the 'Advanced' menu. Here are two ways to set speed limit for users. The first one was 'Smart Flow Control', which means adjust the WAN bandwidth limitation for whole network.



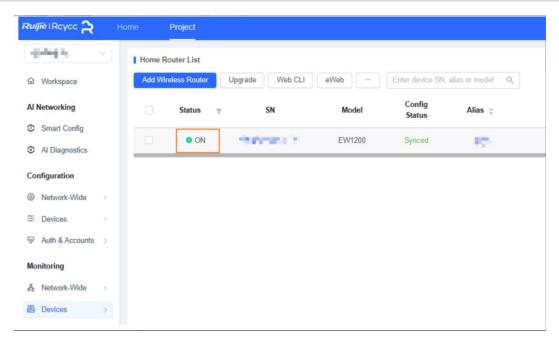
The second 'Custom Policy' means can customize the speed for special users range.



# 4.4.5 What should I do if I forget the Wi-Fi password for the EW Mesh Wi-Fi?

If your Wi-Fi is broadcast by Reyee EW router, you can follow these steps to find your Wi-Fi password back when you forget:

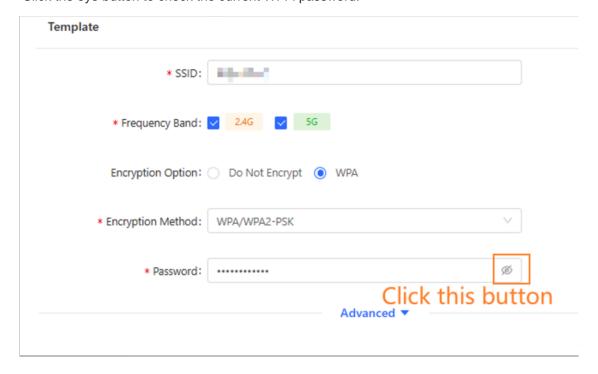
1. Make sure the Reyee EW router is online on Ruijie Cloud first.



2. Enter Configuration> Devices > SSID, click the Edit button:



Click the eye button to check the current Wi-Fi password:

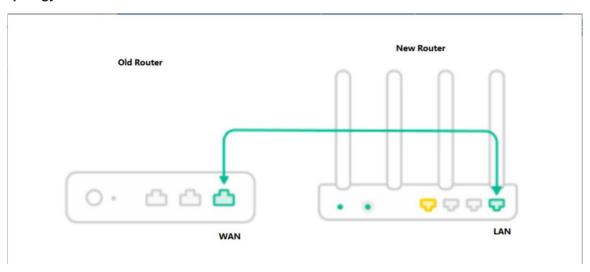


# 4.4.6 What if I forget my broadband account password?

You can refer to the following method:

- 1. Consult your local ISP.
- 2. If you replace the old router with a new one, click Obtain Account from Old Device. Connect the old and new routers to a power supply and start them. Insert one end of an Ethernet cable into the WAN port of the old router and connect the other end to a LAN port of the new router, and click Obtain. The new router automatically fetches the PPPoE account of the old router. Click Save to make the configuration take effect.

#### (1) Topology

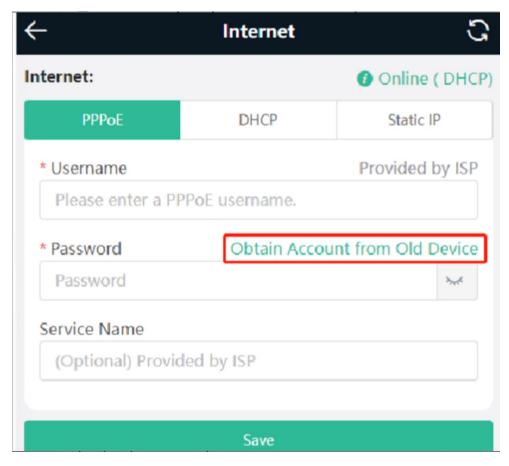


# Steps:

- 1) Transmit power on the old router and new router.
- 2) Connect one end of a cable to the WAN port of the old router and connect the other end to the LAN port of the new router.
- 3) Click "Obtain".

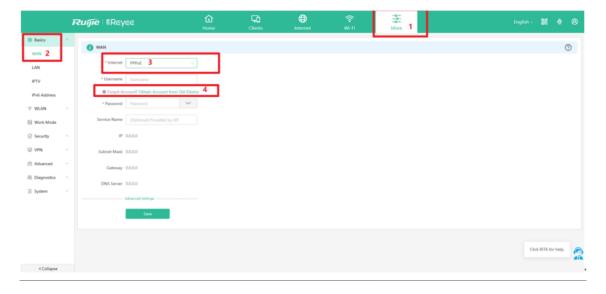
# (2) Mobile phone operation

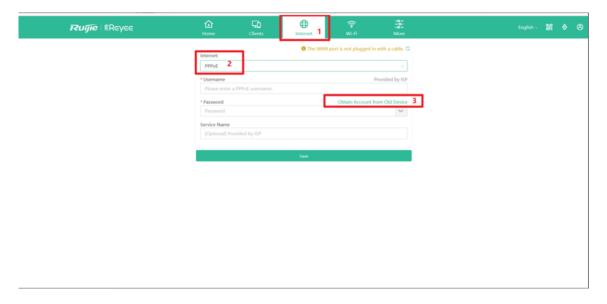
Connect the mobile phone to the Wi-Fi signal from the router. Open the browser and enter 192.168.110.1 to log in to the management interface of the router. Then click "Internet" to enter, select "PPPoE", and click "Obtain Account password from Old Device"



# (3) PC operation

The PC connects to the Wi-Fi signal released by the router. Open the browser and enter 192.168.110.1 to log in to the management interface of the router. Then click "More" - "Basic" -"WAN" or click "Internet ", then select "PPPOE Internet Access", and click "Obtain Account password from Old Device":



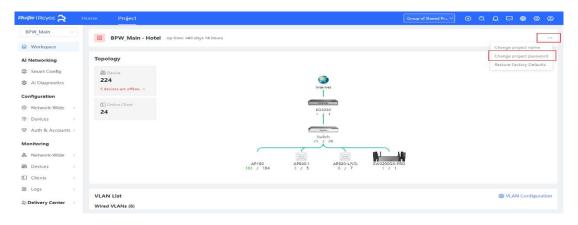


# 4.4.7 What can I do if I forget the EW management password?

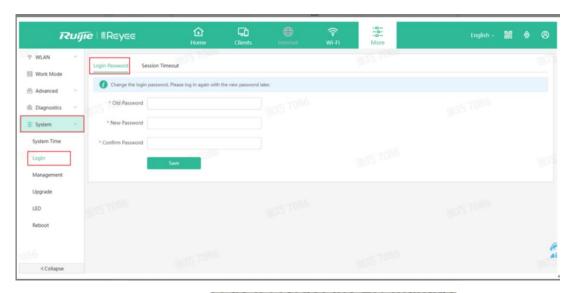
a) If you manage your Reyee device on Ruijie Cloud, you can modify the password through Ruijie Cloud. Old version:

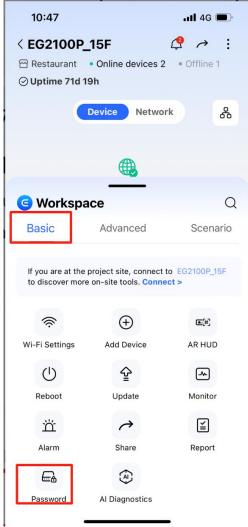


# New version:



If you still can't log in with the new password after changing it, it's possible that the cloud hasn't synchronized the new password to the device. You need to change the password on the device web or cloud APP.



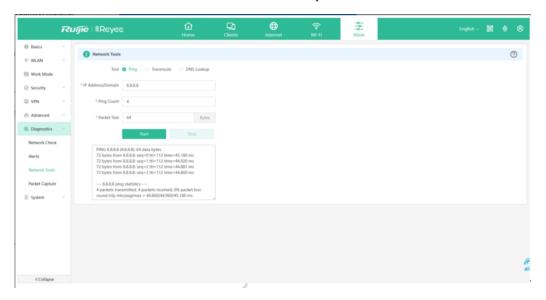


b) If the Reyee device is not on Ruijie Cloud, you can press the reset button on the device for more than 5s to restore the factory settings.

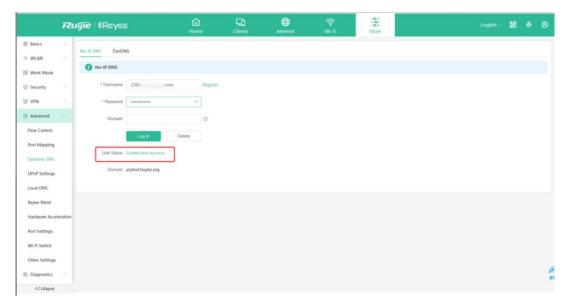
# 4.4.8 How to check if EW's DDNS is not effective?

You can check according to the following steps:

1. Check whether the device can access the Internet normally.



2. Check the DDNS status, whether the connection status is 'Connection success', if not, check whether the account password is correct and activate it.



- 3. Ping the domain name on PC to check whether the domain name can resolve the IP address.
- 4. If the WAN port of the EW is an intranet address, the uplink device needs to configure the port mapping to allow public network users to access the EW.

# 4.4.9 How to check if mesh failed?

# 1. Issue Description:

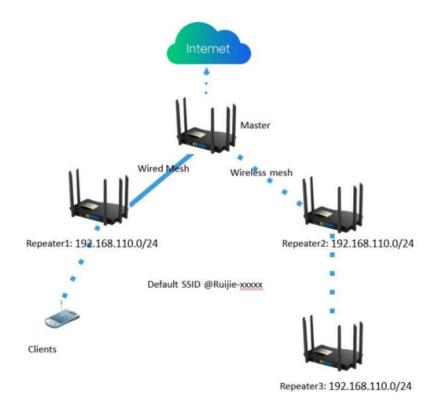
The mesh networking of two Mesh EW devices failed.

**Note:** Ensure that the device in normal use supports the mesh function

# Model support mesh function:

Model	Reyee Mesh	Wi-Fi Standards	Max. Wi-Fi Speed	мімо	Recommended Users
EW300 PRO	Not Support	Wi-Fi 4 (802.11n)	2.4 GHz: 300 Mbps	2.4 GHz: 2×2	16
EW1200	Support	Wi-Fi 5 (802.11ac)	2.4 GHz: 300 Mbps 5 GHz: 867 Mbps	2.4 GHz: 2×2 5 GHz: 2×2	96
EW1200G PRO	Support	Wi-Fi 5 (802.11ac)	2.4 GHz: 400 Mbps 5 GHz: 867 Mbps	2.4 GHz: 2×2 5 GHz: 2×2	96
EW1800GX PRO	Support	Wi-Fi 6 (802.11ax)	2.4 GHz: 574 Mbps 5 GHz: 800 Mbps	2.4 GHz: 2×2 5 GHz: 2×2	192
EW3200GX PRO	Support	Wi-Fi 6 (802.11ax)	2.4 GHz: 800 Mbps 5 GHz: 2400 Mbps	2.4 GHz: 4× 5 GHz: 4×4	192

# 2. Topology



Note: Recommend upgrading the device to the latest version of the firmware

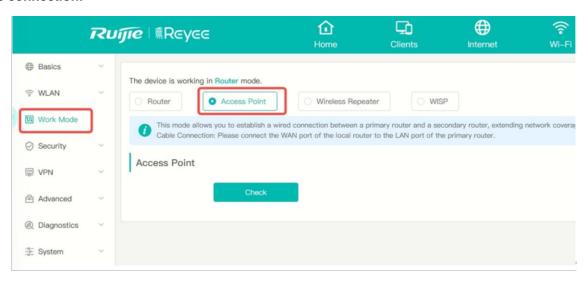
# 3. Troubleshooting:

- 1. Make sure Master gets the DHCP IP address from ISP to access the internet, broadcasts default SSID @Ruijie-mxxxx which is used by clients and broadcasts default hidden mesh Wi-Fi to let repeaters connect.
- 2. Repeater connected with Master using wired or wireless will broadcast the default SSID @Ruijie-mxxx

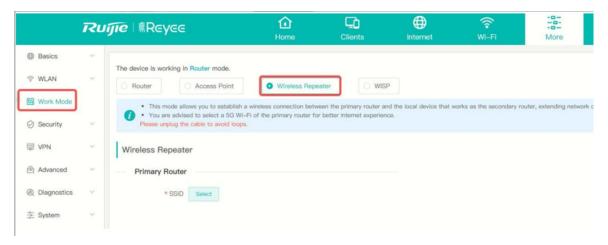
after mesh succeeds.

3. Check the current Work Mode of the slave device.

#### Wire connection:

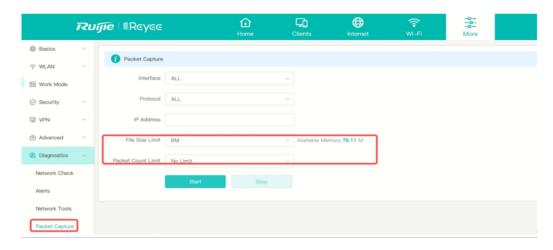


#### Wireless connection:



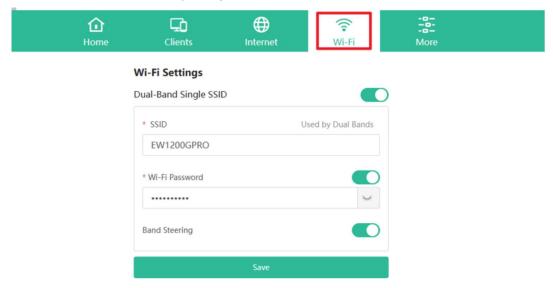
#### Check the distance and the signal strength

- 1. Put the two devices as close as possible and ensure that the AP s can detect the signals of each other. The Slave device should be within two meters of the Master device
- 2. The recommended signal strength is higher than –70 dBm. You can move the devices after the mesh network is established.
- 3. When moving the slave device to another location, Wi-Fi coverage is required. If more than two walls exist between two devices, the mesh rebuild may fail.
- 4. If the previous steps do not detect the cause of the mesh formation failure, you can try to capture the packet from the device

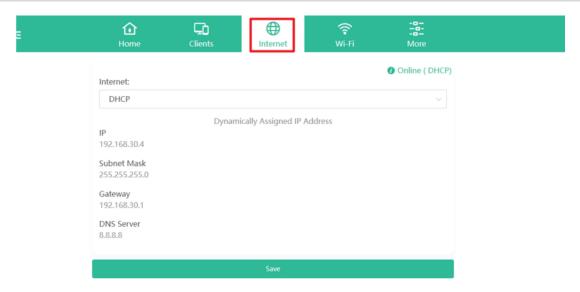


# 4.4.10 How to troubleshoot if the EW's wireless repeater fails?

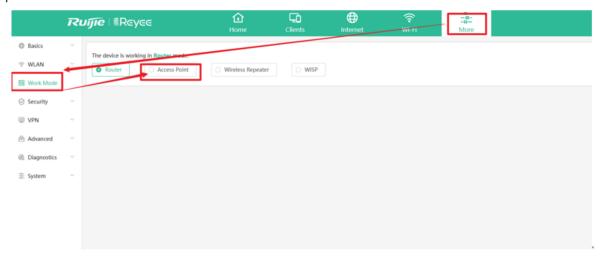
1) Check whether the SSID can be searched, if it fails, check the primary router status and test if other devices can search the SSID of the primary router.



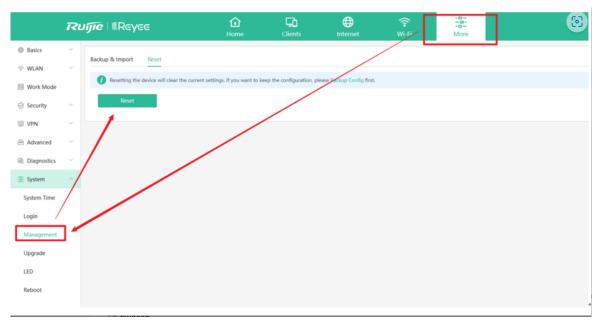
2) If the primary EW's SSID can be searched. Check whether the EW router can get an IP address via DHCP successfully. If it fails, please check the DHCP configuration on DHCP server and test if other devices connecting to the same SSID can get IP successfully.



- 3) Put the secondary router and the primary router closer and do wireless bridge once again.
- 4) Connect the LAN port of the primary router to the WAN port of the secondary router, and configure it to **Access point**, after it has bridged successfully, disconnect the network cable and switch as wireless repeater.



5) Restore factory setting and bridge once again



6) If the problem is still unsolvable, you may start a Live Chat with our Support Engineer for assistance: RITA Live Chat

# 4.4.11 What should I do if I fail to do WISP on my Reyee EW Mesh Wi-Fi?

When you fail to do WISP on Reyee EW1200G Pro, you may follow these steps to troubleshooting first:

- 1. Check the distance between Reyee EW1200G Pro and the other router to see if the distance is too long or not. If so, please try to make them closer.
- 2. Check if there are obstacles between Reyee EW1200G Pro and another router, how thick, etc.
- 3. Check if you choose the right mode on Reyee EW1200G Pro
- 4. Check if the WiFi password is correct or not when you do WISP on Reyee EW1200G Pro.
- 5. Check the LED status of Reyee EW1200G Pro and the other router is normal or not.
- 6. Check if the uplink main router has set blacklist for blocking Reyee EW1200G Pro or not.
- 7. You may try factory reset this Reyee EW1200G by pressing the reset button for more than 10 seconds.

# 4.4.12 Why EW Mesh Wi-Fi cannot detect the 5G Wi-Fi?

#### Fault phenomenon:



# Please click Re-scan.

# **Troubleshooting:**

Check whether the main router releases this SSID.

Check what channel this SSID is in



#### Solution:

Change to another channel if the SSID is in the range of following channel:

Please check if the wireless channel of the master device is one of the following: CH52, CH56, CH60,
 CH64, CH100, CH104, CH108, CH112, CH116, CH120, CH124, CH128, CH132, CH136, CH140, if so,
 please try to change the wireless channel of the master device to other channels.

# 4.4.13 What should I do if I fail to do PPPoE on EW Mesh Wi-Fi?

Topology: ISP modem --- EW3200GX PRO

1. You can connect your PC to ISP modem directly and configure PPPoE on your PC, which is supposed to check whether your PPPoE account is normal or not. If you fail, you may contact the

local ISP for account issue.

- 2. If the ISP has done the relevant MAC binding, so when your PC directly connected to ISP modem can access Internet via PPPoE, then the MAC address of WAN port on EW3200GX PRO can be modified to the MAC address of the PC network card. (The way to modify: **More> Basics> WAN> Advanced Settings>MAC**)
- 3. If the ISP's PPPoE server requires the MTU value to match, you may change the MTU value of the EW3200GX PRO's WAN port to match the ISP's side. (The way to modify: **More>Basics>WAN> Advanced Settings>MTU**)
- 4. If the ISP has requirement for VLAN, you may need to enable 802.1Q under the WAN port of the EW3200GX PRO. (The way to modify: **More> Basics> WAN> Advanced Settings>802.1Q**)
- 5. If you have tried all of the above and still can't get IP address, you can use the packet capture feature in EW3200GX PRO. Capture a packet on the WAN port and send it to us for analysis. (The way to capture: **More> Diagnostics> Packet Capture**, Select WAN as the packet capture interface and No limit as the Packet Count Limit)