5G CPE

SB5GCPE-302

User Manual

V 1.0.4

Revision History

Date	Version	Declaration	Author
2022-09-28	V1.0.0	Initial version	
2023-02-25	V1.0.1	1.Modify the signal light value range 2. Improve the introduction of configuration functions	
2023-03-01	V1.0.2	Add FCC and CE declarations.	
2023-8-14	V1.0.3	English Version Update	
2023-10-26	V1.0.4	Add AT Command	

Product Applicability Statement

This user manual explains how to configure the following devices:

- SB5GCPE-302

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

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

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

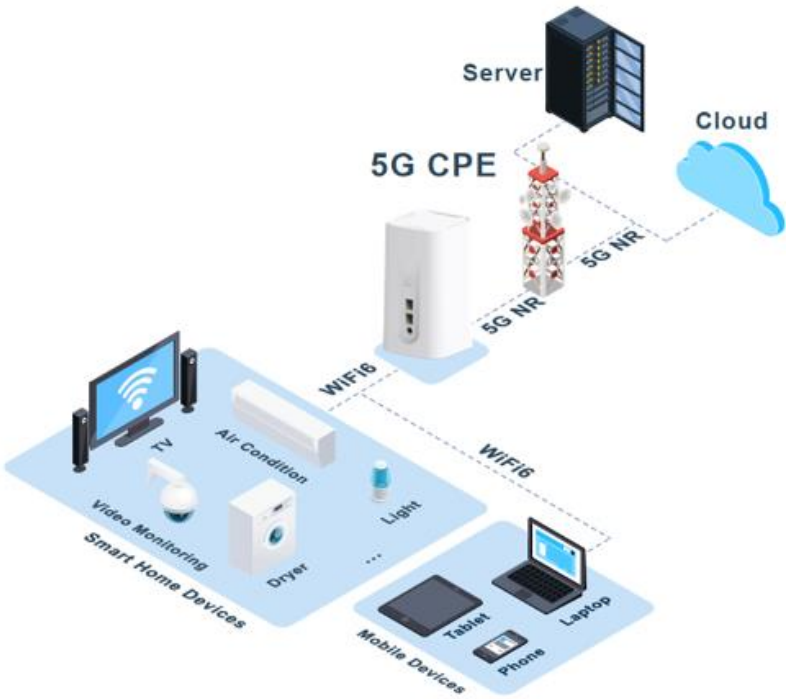
FCC Radiation Exposure statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Contents

Chapter 1 Product Introduction

1.1 Product Overview

The SB5GCPE-302 is a high-performance 5G indoor CPE that supports NR (SA&NSA), TDD-LTE, and FDD-LTE. It converts cellular network data into WiFi and wired Ethernet data, supporting one 1G LAN port, one 2.5G LAN/WAN port, and 2.4G+5G dual-band WiFi-AP. It is suitable for home or commercial scenarios that require fast deployment of wired broadband networks and WiFi hotspots.

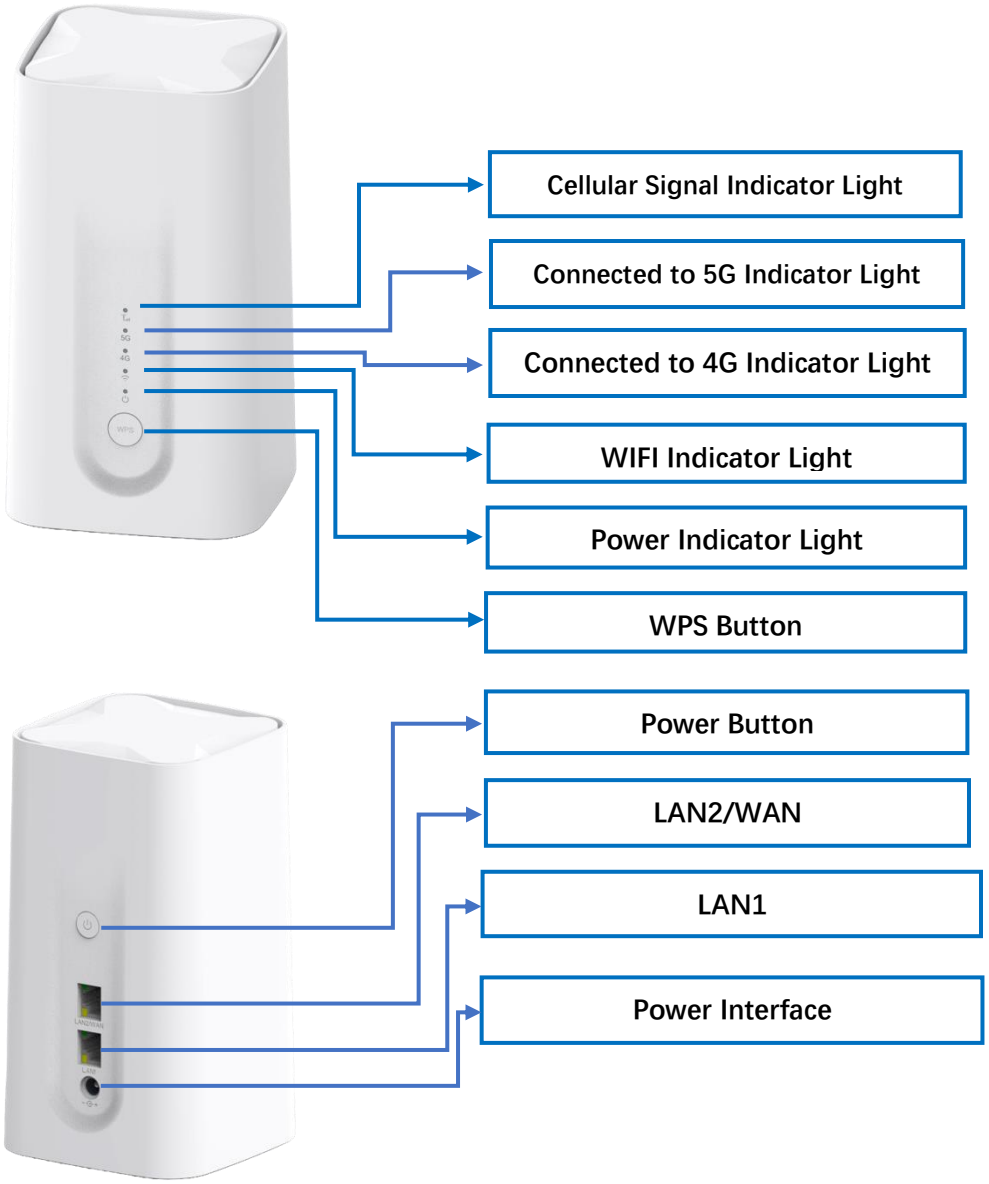


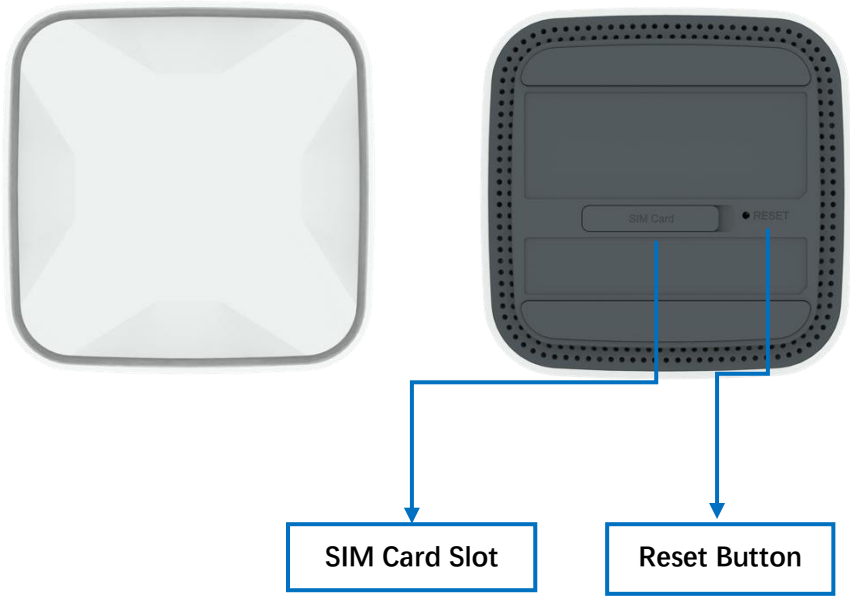
1.2 Product Features

- **Utilizes High-performance Processor**
  Ensures high-speed processing performance for 5G networks, ushering in a new era of 5G, and bringing you more exciting experiences at your fingertips.
- **Full Network Coverage**
  Compatible with SA and NSA modes. Circular unobstructed layout ensures 360-degree signal capture without dead zones. Built-in dual-polarized 4x4 WiFi antennas, 20% reduction in antenna volume, high isolation, enhancing transmission and reception performance.
- **WIFI 6**
  High-speed WiFi 6 technology, envisioning 5G high rates; provides higher transmission rates, lower latency, and broader coverage for simultaneous communication of multiple devices.

- **Plug and Play**
  The backend performs real-time detection and automatic repair of network issues, eliminating the need for manual restarts or network reconfigurations. This simplifies internet connectivity, requiring no manual intervention.
- **Efficient Heat Dissipation**
  Uses high-conductivity material for heat dissipation, streamlined design, top chimney design, enhances heat dissipation significantly through fan convection, ensuring stable operation even during prolonged high-speed operation.

1.3 Product Appearance Overview





1.4 Product Specifications

SB5GCPE-302	
Wireless Parameters	
Frequency Bands and MIMO	**5G NR NSA:** n2/ 5/ 7/ 12/ 13/ 14/ 25/ 26/ 29/ 30/ 38/ 41/ 48/ 66/ 70/ 71/ 77/ 78 **5G NR SA:** n2/ 5/ 7/ 12/ 13/ 14/ 25/ 26/ 29/ 30/ 38/ 41/ 48/ 66/ 70/ 71/ 77/ 78 **LTE-FDD:** B2/ 4/ 5/ 7/ 12/ 13/ 14/ 17/ 25/ 26/ 29/ 30/ 66/ 71 **LTE-TDD:** B38/ 41/ 42/ 43/ 48 **LAA:** B46
Theoretical Maximum Speed	**5G:** DL 3.4Gbps/ UL 900Mbps **LTE:** DL Cat 19/ UL Cat 18
Hardware Parameters	
CPU	MTK7621 CPU@880MHz, Dual-core
FLASH	128MB
DDR3	512MB
WIFI Specification	
WIFI	IEEE802.11 a/b/g/n/ac/ax

Protocol	
Frequency	2.4GHz+5GHz
Theoretical Maximum Bandwidth	2.4GHz 2x2MIMO 11ax,0.573 Gbps 5GHz 2x2MIMO 11ax, 1.2 Gbps
Channel Bandwidth	20MHz, 40MHz, 80MHz
Power Supply	
Standard Power Supply	DC 12V/3A
Power supply range	DC 9~24V
Operating current	< 1.1A (12V)
Interface Parameters	
LAN 2 / WAN	1 x 1G Ethernet (RJ45), auto MDI/MDIX
LAN 1	1 x 1G Ethernet (RJ45), auto MDI/MDIX
Phone	1 x RJ11 (Optional)
Indicator Lights	Signal, 5G, 4G, WIFI, Power
SIM Card	Nano-SIM interface (Compatible with eSIM)
Power Interface	Three-core DC locomotive power socket, built-in power reverse protection.
USB	Type C
Reset Button	Can restore parameter configuration to factory settings.
Physical Characteristics	
Enclosure	ABS material
Dimensions	178x99x99mm
Weight	638g
Working temperature	-20~+60°C
Storage Temperature	-40~+85°C
Relative Humidity	95% (non-condensing)

1.5 Indicator Light Function Description

Indicator Light	Name	Definition Explanation
	**Cellular Signal Indicator Light**	Cellular Signal Indicator Light 1. Blue: Indicates signal strength with RSRP > -95dBm or RSCP > -80dBm. 2. Yellow: Indicates signal strength with RSRP ≤ -95dBm or RSCP ≤ -80dBm."
	**5G Connection Indicator Light**	Connected to 5G Network 1. Steady on: Indicates connection to a 5G network. 2. Off: Indicates no network connection. 3. Blinking: Indicates dialing; blinking frequency is 500ms/time.
	**4G Connection Indicator Light**	Connected to 4G/3G Network 1. Steady on: Indicates connection to a 4G/3G network. 2. Off: Indicates no network connection. 3. Blinking: Indicates dialing; blinking frequency is 500ms/time.
	**WiFi Signal Indicator Light**	WiFi Signal Indicator Light 1. Steady on: Indicates WiFi is enabled. 2. Blinking: After pressing the WPS button, blinks every 500ms, lasting for 2 minutes. 3. Off: Indicates WiFi is disabled.
	**Power Indicator Light**	Power Indicator Light 1. Steady on: Indicates normal power supply. 2. Off: Indicates abnormal power supply.

1.6 Button Function Description

Button	Definition Explanation
	1.Pressing this button will cause the WiFi indicator light to blink every 500ms for 2 minutes. After successful connection, the WiFi light will stop blinking and remain steadily blue. 2.User devices can establish a secure WiFi connection without manually entering the password.
	1.Default startup: Press and hold the power button for about 3 seconds to shut down. 2.Shutdown state: Replug the power to automatically turn on.

	3.Shutdown state: Press and hold the power button for about 3 seconds to power on. Note: For F-NR300 V2, long press is for reboot and not for shutting down.
• RESET	Press and hold the button for >10 seconds to restore factory settings.

1.7 Interface Definition Explanation

Interface	Name	Definition Explanation
Phone (optional)	**Telephone Interface**	Telephone RJ11 Interface Can directly connect a telephone for making calls.
LAN2/WAN	**Ethernet port**	1. If the interface's green indicator light is solid, it indicates a normal connection. 2. If the interface's yellow indicator light is flashing, it indicates data transmission or reception.
LAN1	**Ethernet port**	1. If the interface's green indicator light is solid, it indicates a normal connection. 2. If the interface's yellow indicator light is flashing, it indicates data transmission or reception.
-⊂+	**Power Interface**	DC 12V/3A
SIM Card	**Nano-SIM Card Slot**	Install Nano-SIM Card
USB Interface	**Type-C Interface**	The Type-C interface is for development personnel debugging only.

Chapter 2 Install Internet Configuration

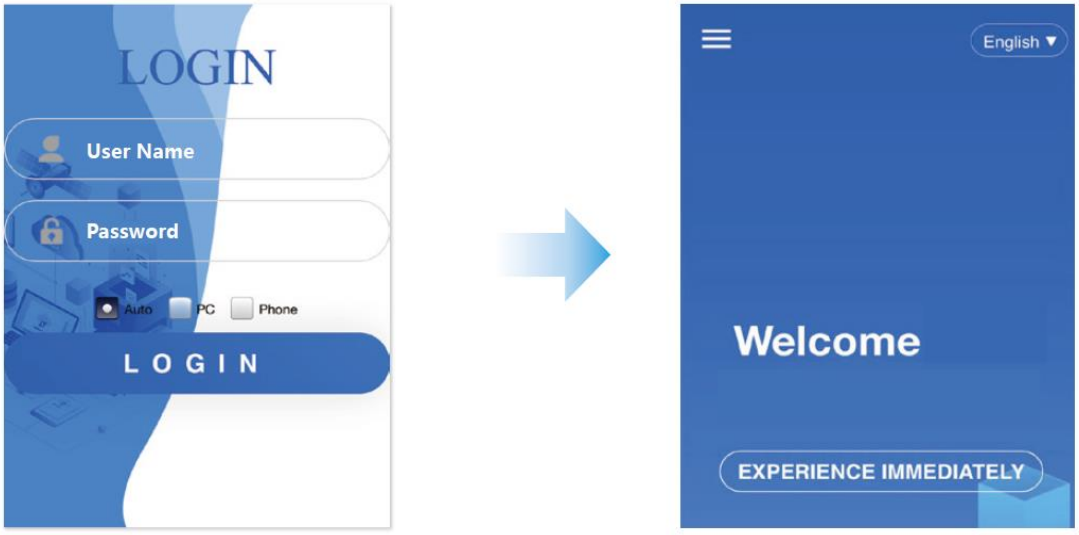
2.1 SIM Card Internet

Step 1: Insert the SIM card as shown (chip facing down, notch inward).

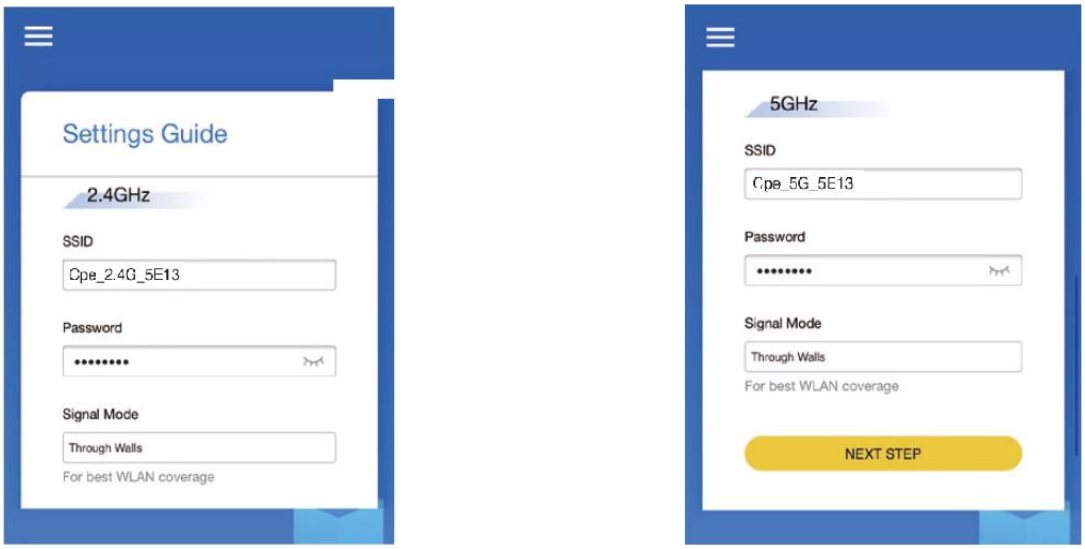
Step 2: Power on the device, it will automatically boot up. The signal indicator light will stay solid, and the 5G/4G indicator light will also stay solid, indicating successful dial-up.

Step 3: Connect the terminal device to the CPE via LAN port or WiFi to access the external network.

Step 4: If you need to make further configurations, open a web browser and manually enter: 192.168.1.1. Initial username: admin, initial password: admin.



Step 5: Set the username and password for WLAN.

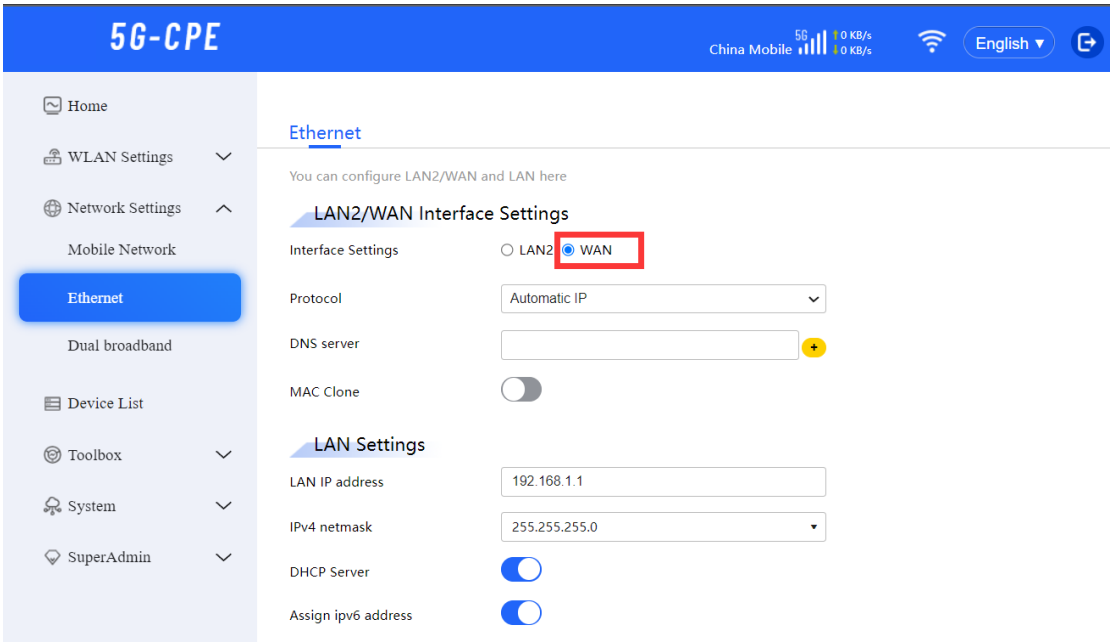


2.4GHz　　5GHz

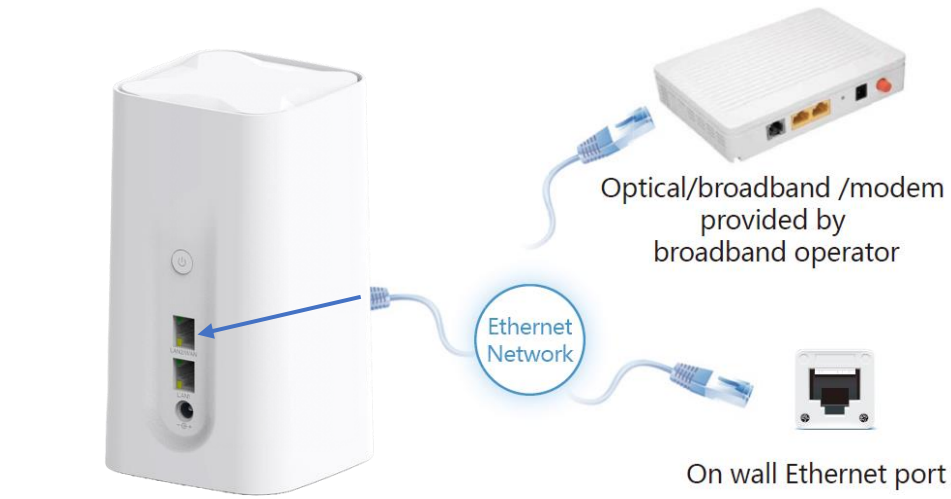
Step 6: Set the login password for the host device. After applying the settings, the page will redirect to the login page. Enter the newly set username and password (Username: admin, password is the newly set value), and click login. Configuration is complete!

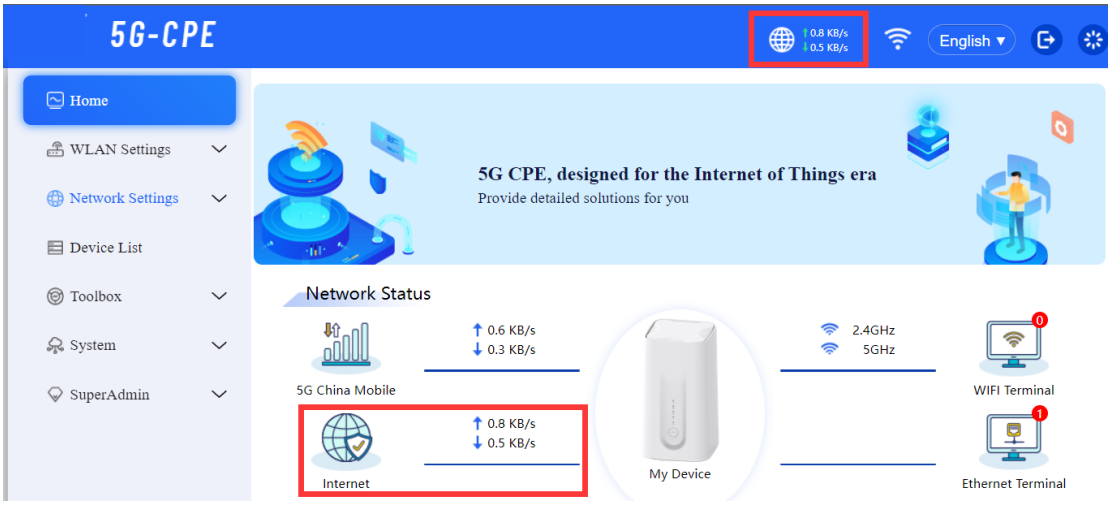
2.2 Wired Broadband Internet Access

Step 1: By default, the LAN2/WAN port is configured as a LAN port. It needs to be configured as a WAN port. Connect the power supply, the device will boot up automatically. After connecting a terminal device to the CPE, access the WEB page, configure the LAN2/WAN port as a WAN port, then save and apply the setting.



Step 2: Connect one end of the Ethernet cable to the upstream device (ONT/broadband modem/modem/wall-mounted Ethernet jack, etc.), and connect the other end to the CPE's LAN2/WAN port. The status bar and homepage on the WEB page will display the Internet uplink and downlink traffic icons, indicating that the wired broadband is functioning properly.

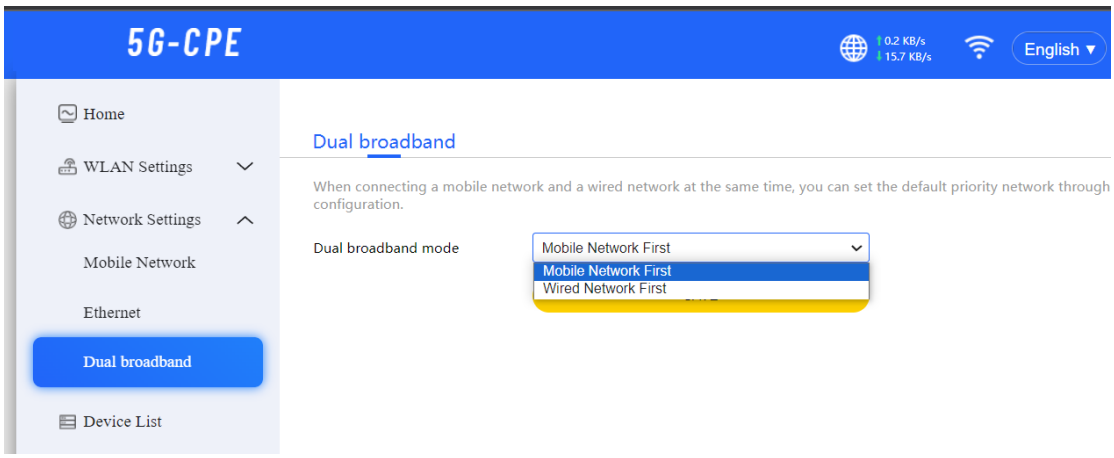




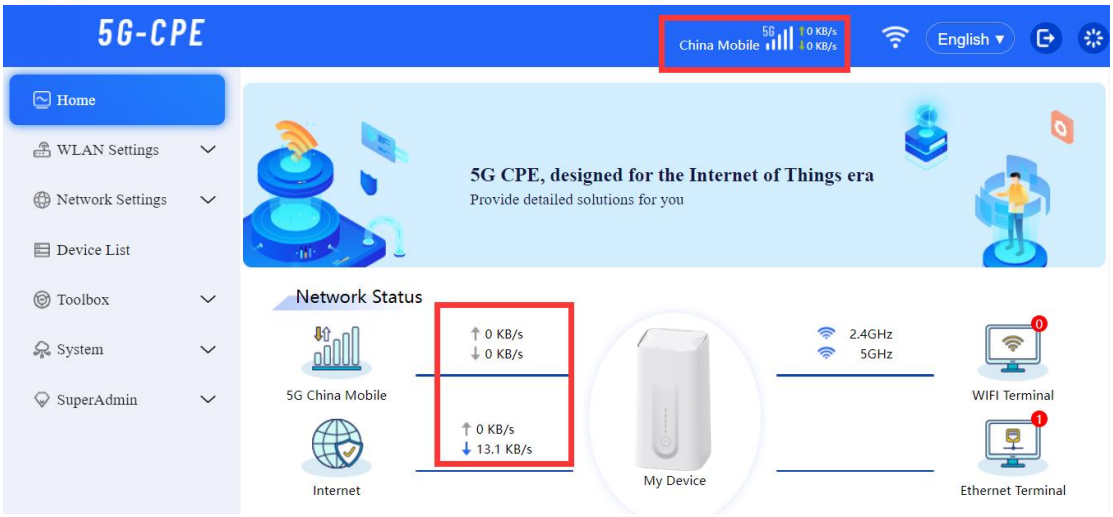
Step 3: Connect your terminal device to the CPE's LAN port using an Ethernet cable or connect to the CPE's WiFi network. This will allow your terminal device to access the internet.

2.3 Dual-Band Bandwidth Priority Setting.

The WEB configuration page allows you to set the priority between mobile network and Ethernet, with mobile network being the default priority (i.e., SIM card network).



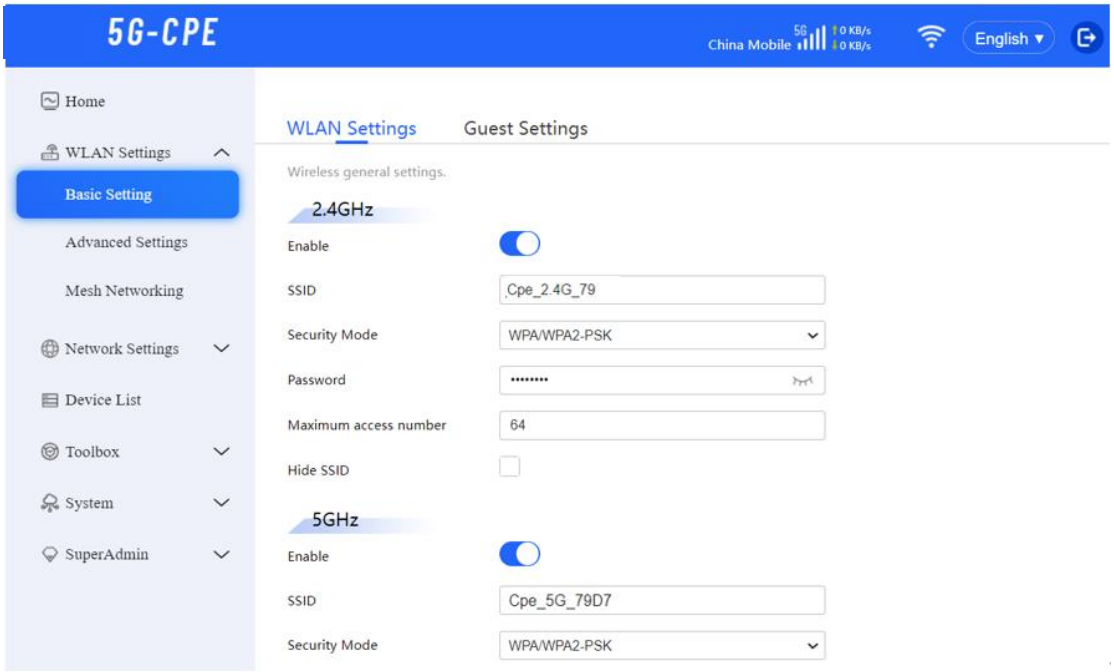
Insert the SIM card into the device and connect the LAN2/WAN port to the upstream device as the WAN port. The device will prioritize using the mobile network. When the mobile network is unavailable, it will automatically switch to using the Ethernet connection.



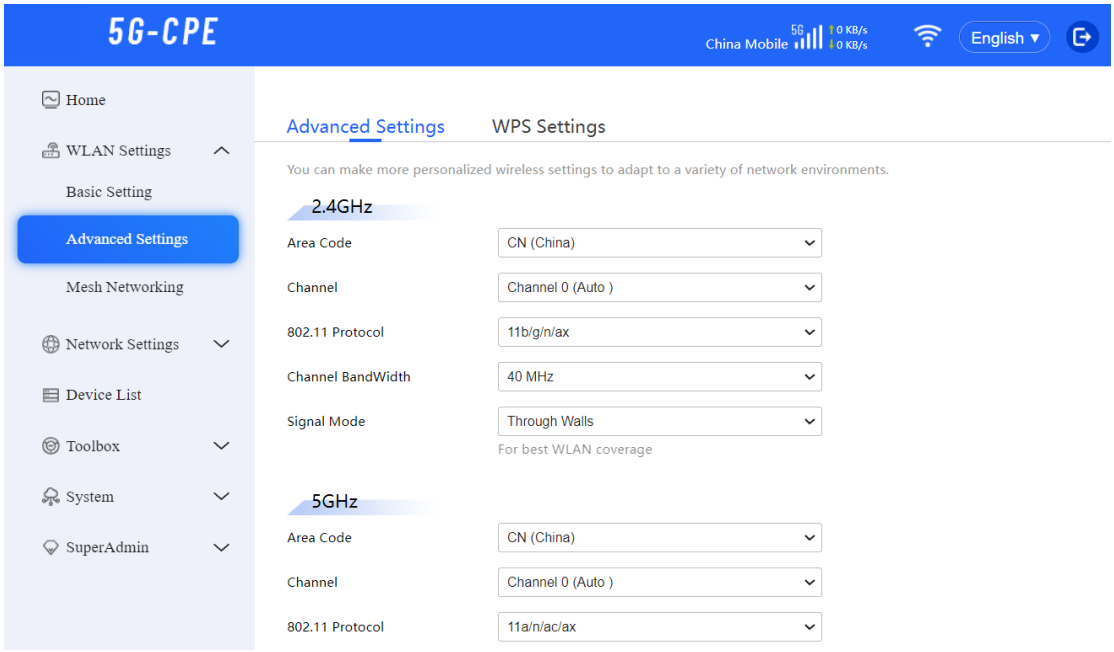
Chapter 3 Configuration of Related Features

3.1 WLAN Configuration

The WLAN settings are divided into basic settings and advanced settings. Basic settings allow you to configure the SSID, security mode, password, connection limit, broadcast hiding, and guest WiFi. By using the guest WiFi, terminal devices can connect to the CPE and access the internet, but they won't be able to perform any WEB configuration operations.



Advanced settings pertain to configuring channels, protocols, and bandwidth. The WPS (Wi-Fi Protected Setup) feature allows terminal devices to quickly connect to the CPE using methods such as PIN codes or Push Button Configuration (PBC).

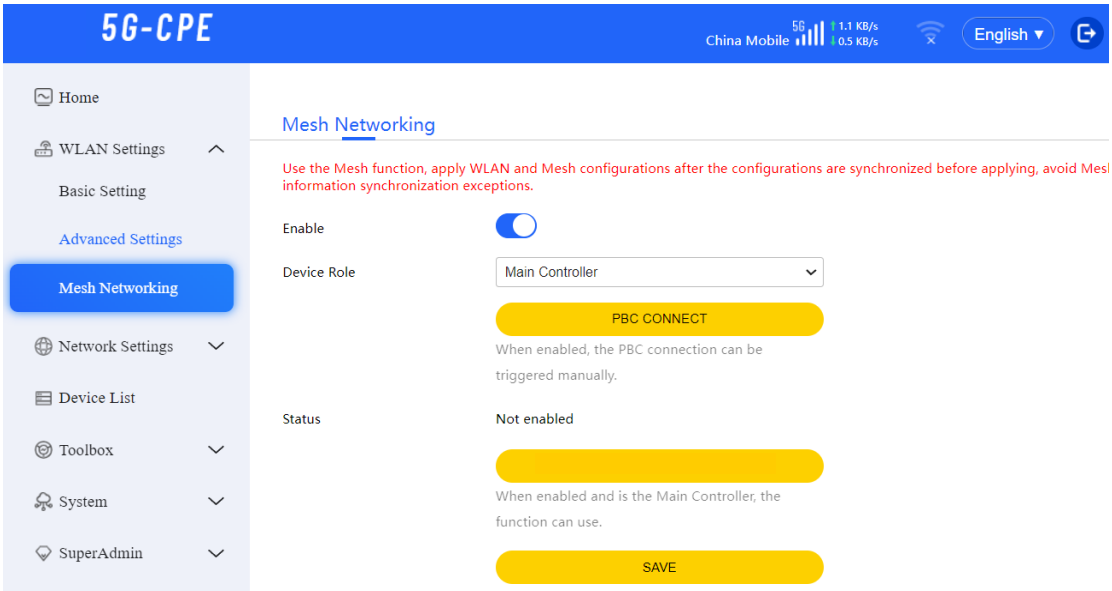


3.2 Mesh Network Configuration

Mesh network devices are divided into the Main Controller and sub nodes. Only one Main Controller is required, while multiple sub nodes can be added. The MESH function is disabled by default and needs to be enabled through the web interface.

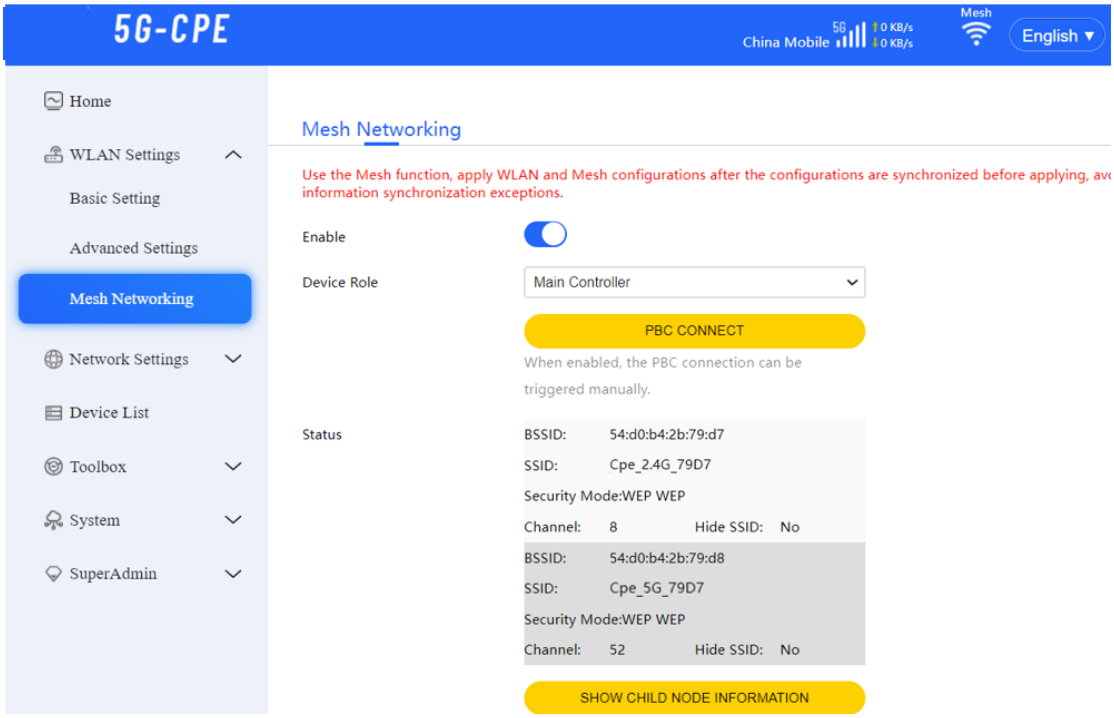
Step 1: Configuring the Main Controller

Connect the LAN port of the main controller device to your PC and log in to the WEB configuration page. In the WLAN settings, go to the Mesh Network page and click on "Enable". Choose the device role as "Main Controller", then save and apply the settings.



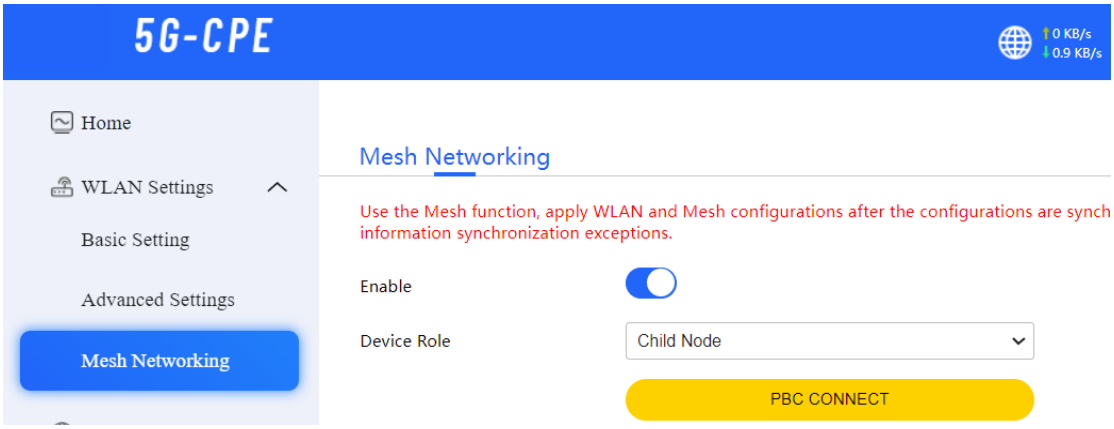
Wait for about 40 seconds. In the status section of the page, you'll see the information of the

main controller device. The white "Mesh" label will appear next to the WIFI icon in the status bar, indicating that the Mesh function of the main controller is now enabled.

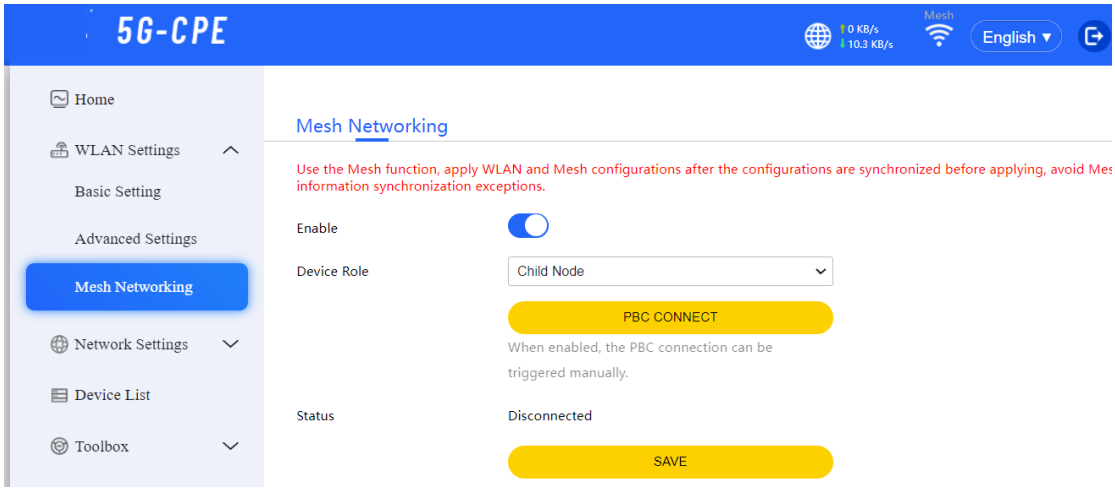


Step 2: Configure Sub-Nodes

Connect the child node device to the PC using the LAN port, then access the WEB configuration page. In the WLAN settings, go to the Mesh networking page and click on Enable. Choose 'Sub Node' as the device role, then save and apply the settings.



After waiting for about 40 seconds, the WiFi icon in the sub node status bar will display the gray 'Mesh' label. The signal light on the child node device will remain solid yellow, indicating that the configuration of the sub node is complete.



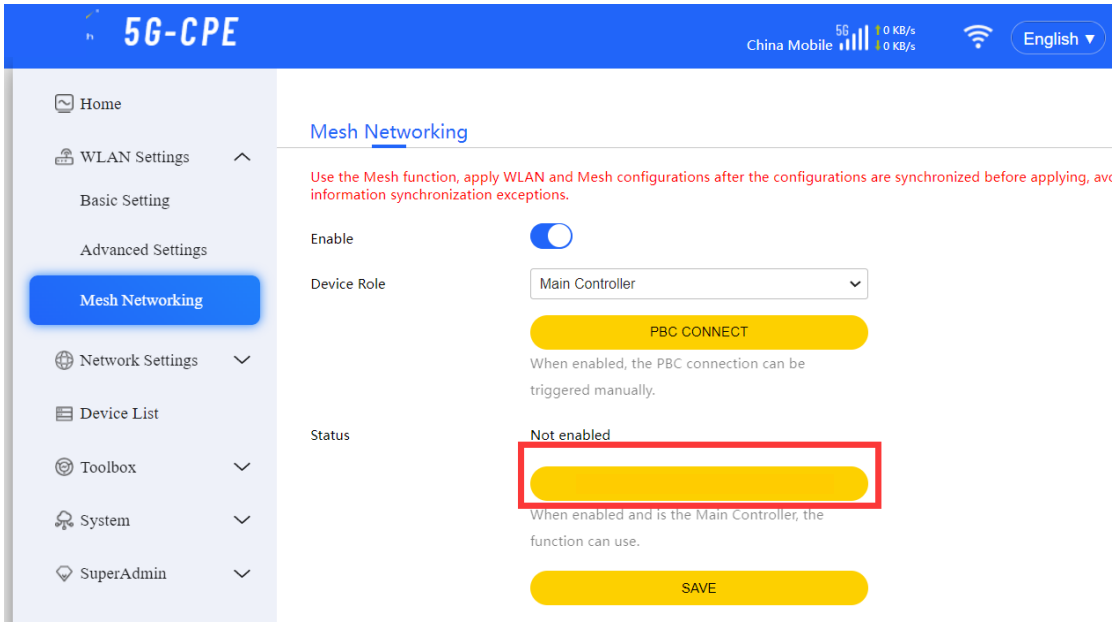
Step 3: Establishing the Connection

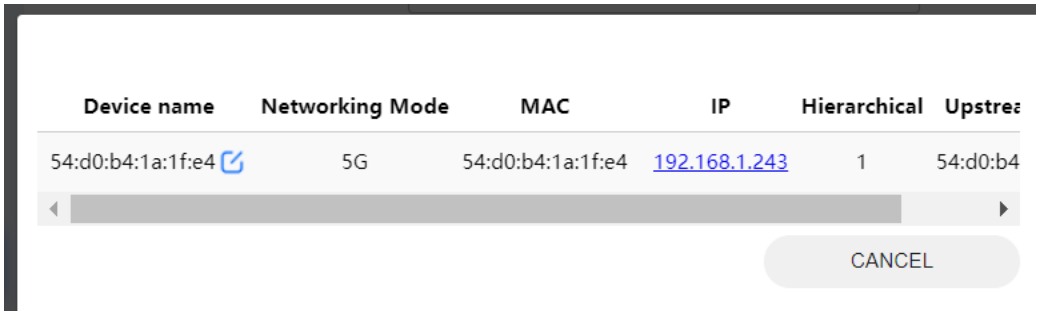
There are three methods for establishing the connection.

Method 1: Direct Ethernet Connection

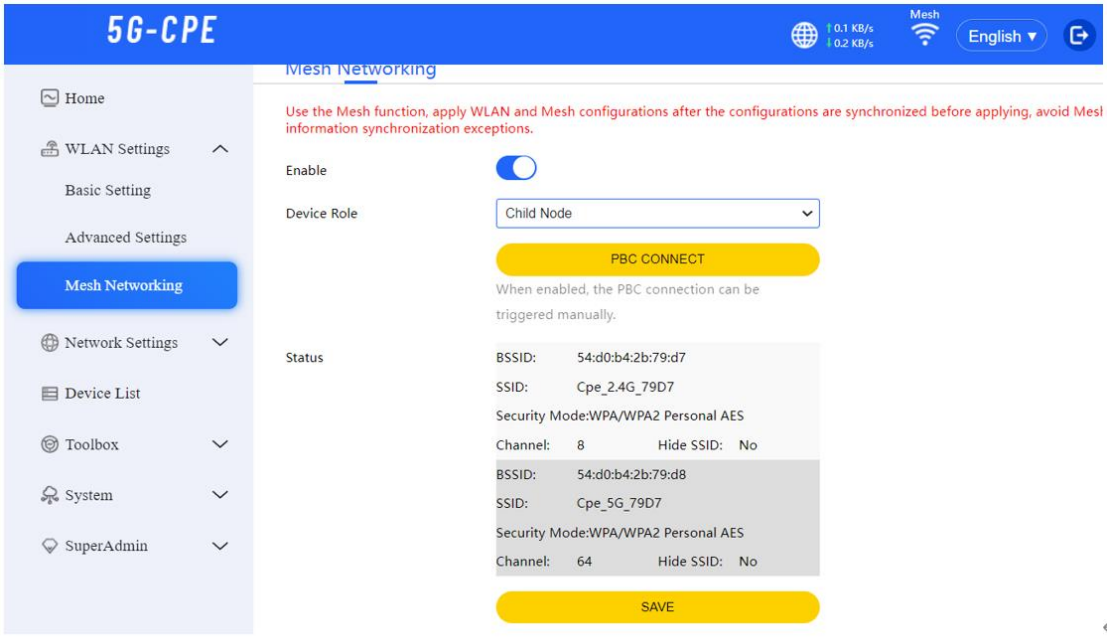
Connect the LAN port of the main control device and the LAN port of the child node device using an Ethernet cable. If the signal light on the child node device turns blue, it indicates successful mesh networking.

Access the main control device's WEB page by entering 192.168.1.1 in your web browser. Click on "Display Sub Node Information" to view details about the sub nodes. You can see information about the sub nodes, and by clicking on their respective IP addresses, you can access the WEB configuration pages of the individual child node devices.



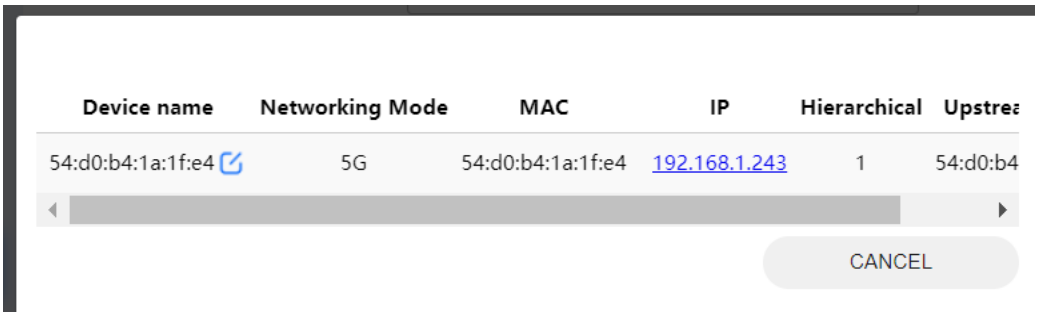


On the sub node device page, you can see that the status section displays information about the main control device. The WiFi icon in the status bar features a white "Mesh" label.



Method 2: Pressing the WPS Button

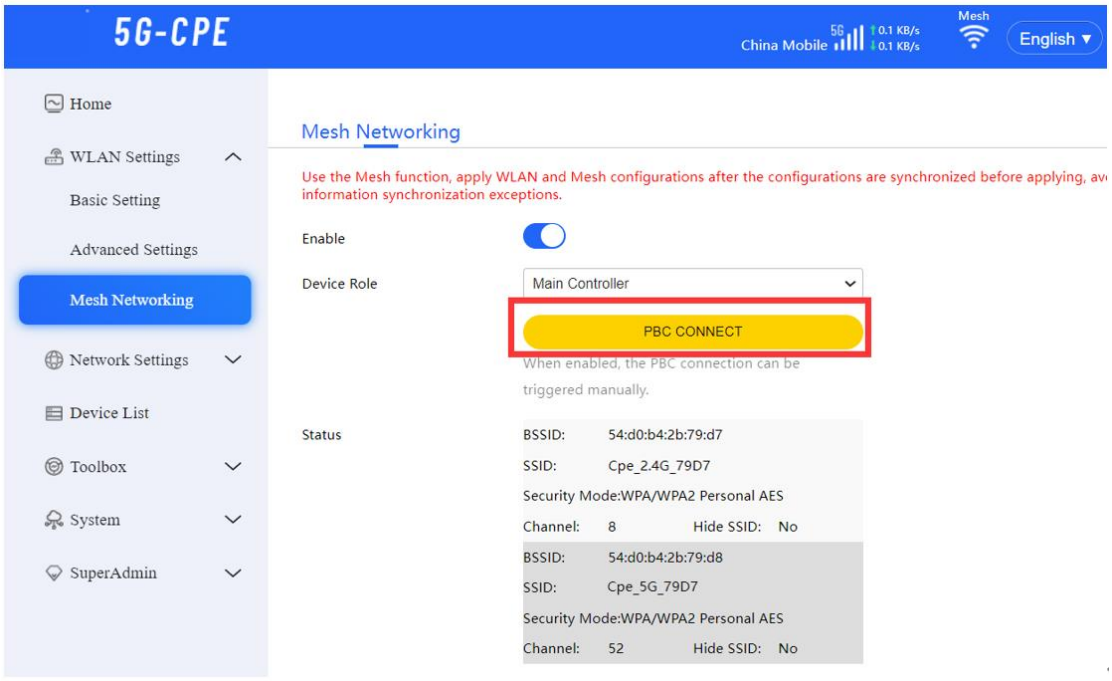
Simultaneously press the WPS buttons on both the main control device and the sub node device. The WiFi signal lights will start flashing, indicating the network formation process. Once the network is successfully established, the WiFi signal lights will immediately stop flashing and remain solid blue. The signal light on the sub node device will change from a solid yellow to a solid blue, indicating successful network connection.

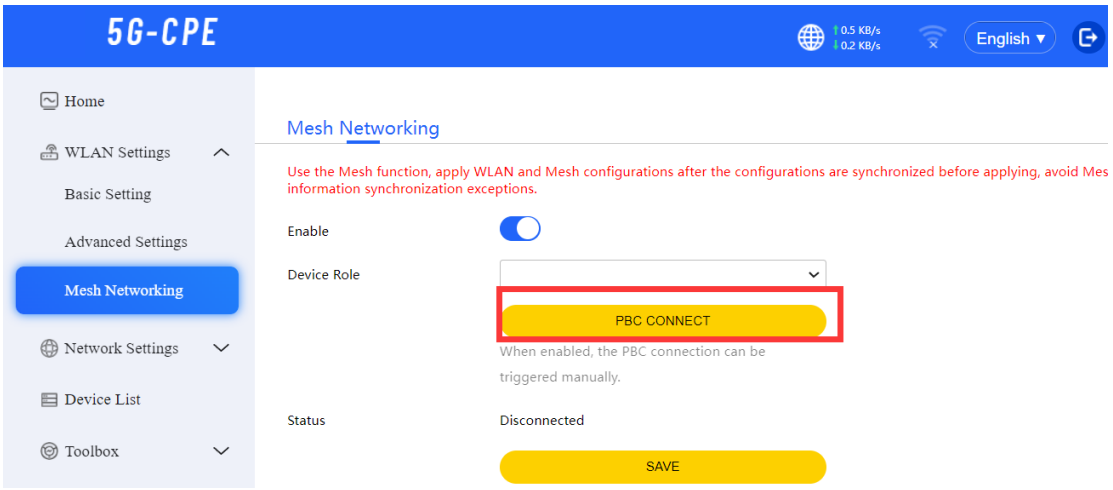


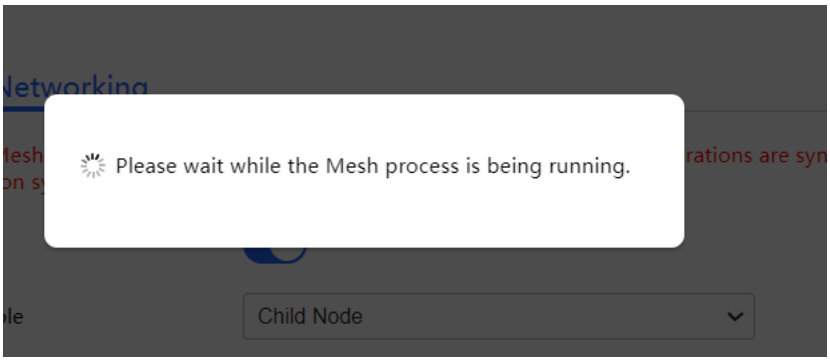
Method 3: Clicking PBC Connection on the WEB Page

Log in to both the main control and sub node web pages separately. Click on PBC Connection. If the network formation is successful, you will receive a prompt indicating "Mesh Connection

Successful."





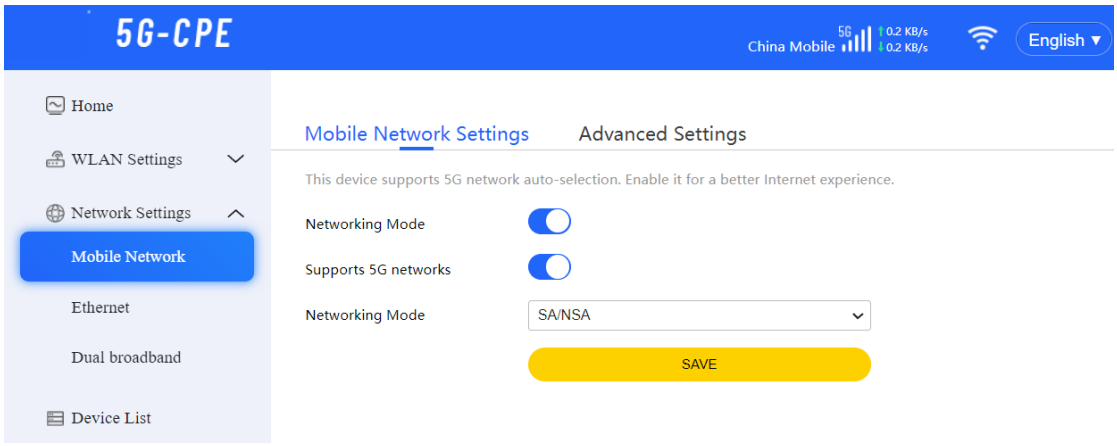


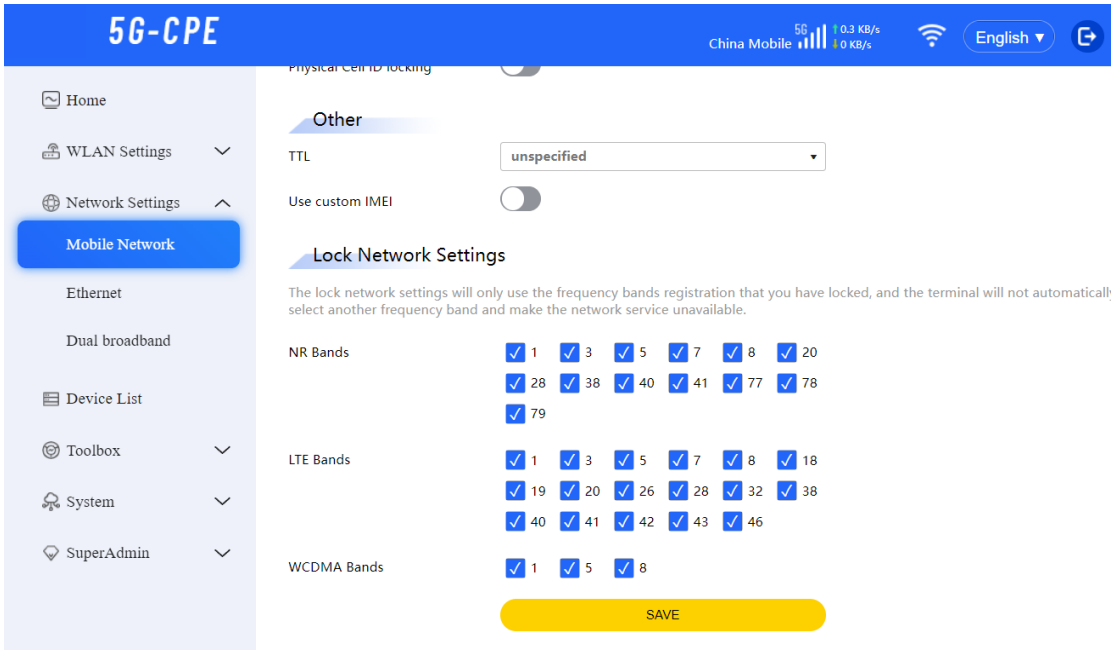
After successful network formation, place the main control and sub node devices in appropriate locations. Clients will only be able to detect the WiFi hotspot of the main control device.

Notice：When setting up the network, please use devices of the same model and version to avoid network setup failures due to driver discrepancies and other issues.

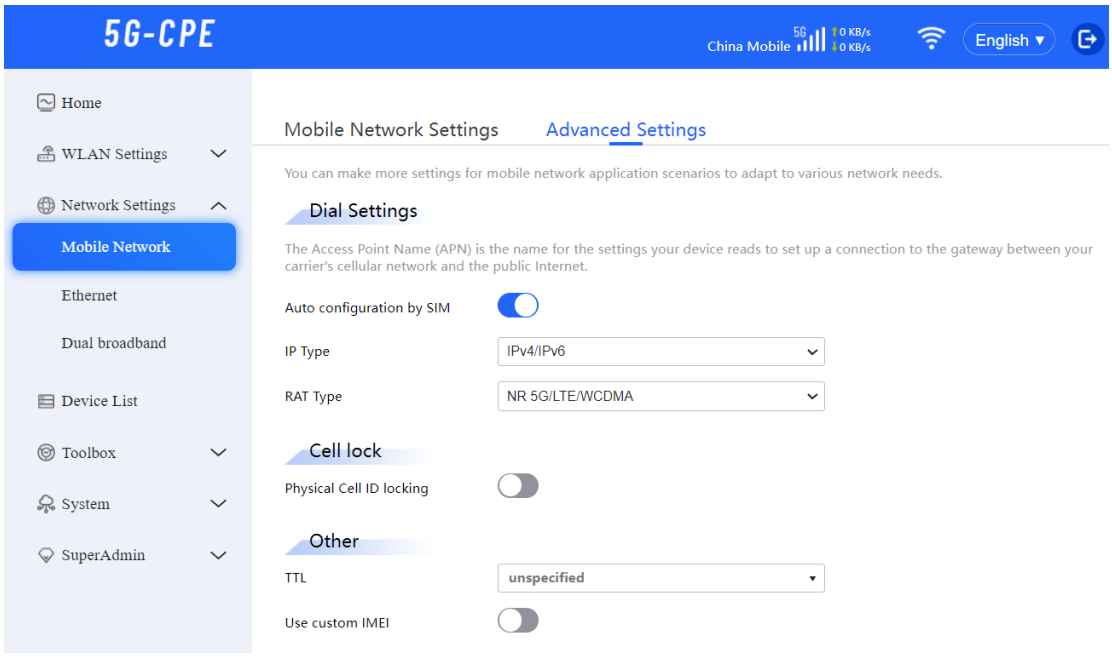
3.3 Mobile Network Configuration

Mobile Network Configuration allows you to enable or disable mobile data, 5G network, modify networking modes, set network modes, IP types, and lock BAND frequencies.



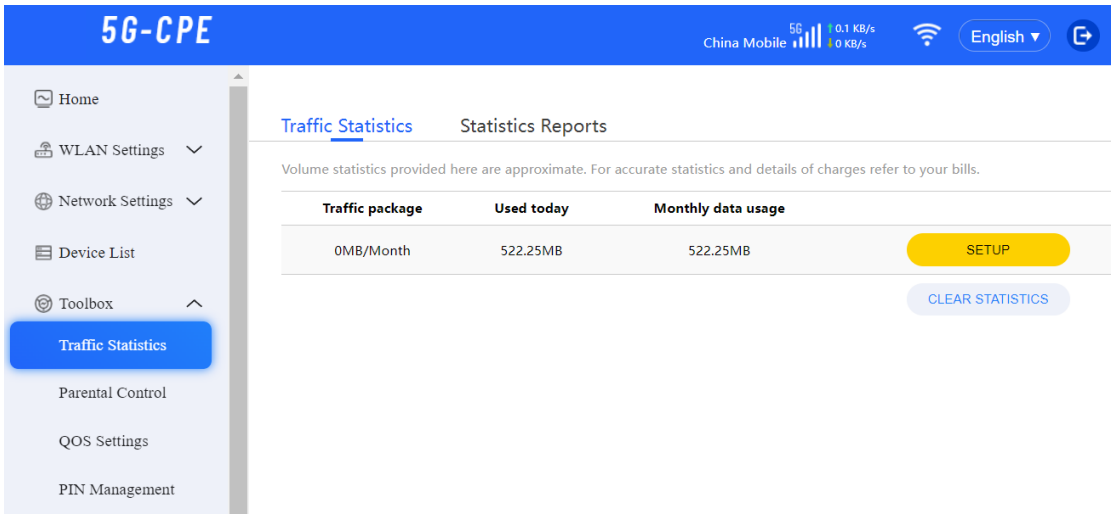


Disabling SIM Card Configuration allows you to set up Access Point Names (APN), authentication methods, usernames, passwords, and more.



3.4 Traffic Usage Monitoring Configuration

Traffic Usage Monitoring is only applicable to mobile networks. The traffic usage monitoring page displays the total data usage for the current day and month. It also allows you to set up actions for exceeding data package limits and data flow restrictions.



To enable data usage exceeded alerts or automatic mobile data disconnection, follow these steps.

Step 1: Configuring Data Usage

Exceeded Data Usage Actions:

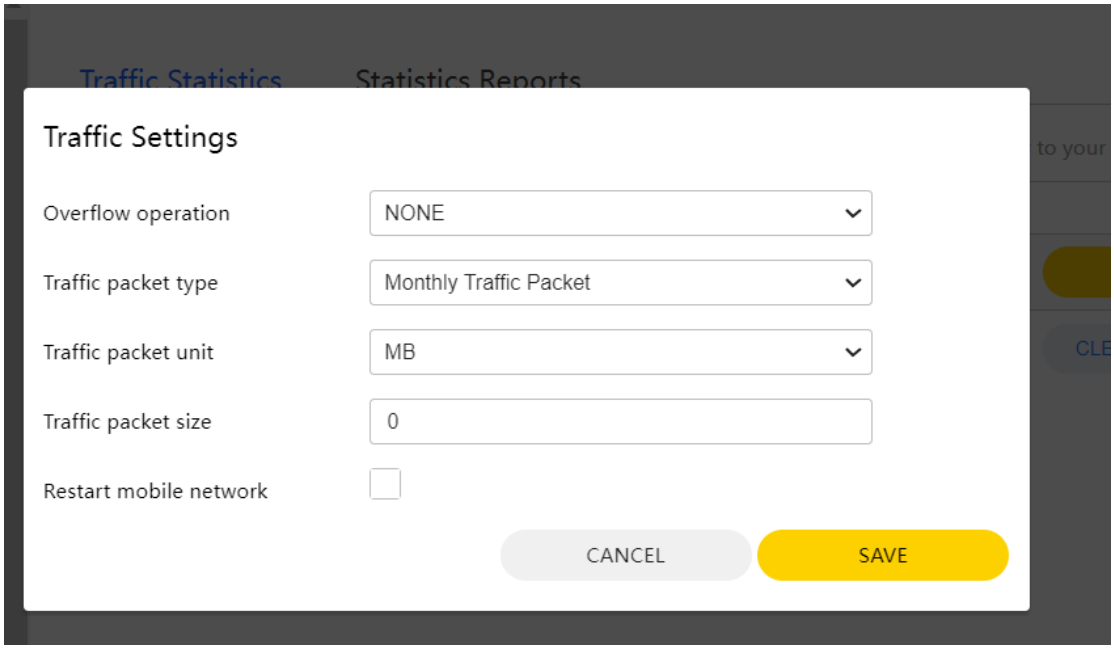
None: When data usage exceeds the set data package limit, a data usage icon will appear in the status bar as a reminder, but the mobile network will not be disconnected, and you can continue to use it.

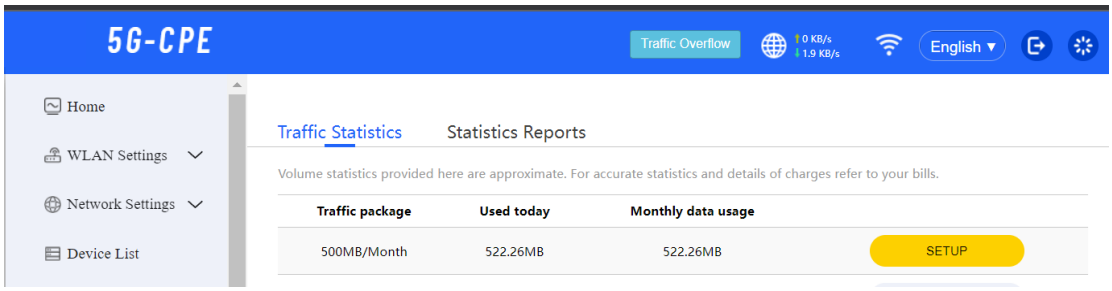
Disconnect: When data usage exceeds the set data package limit, a data usage icon will appear in the status bar as a reminder, and the mobile network will automatically disconnect, rendering it unusable.。

Data Package Type: Choose to restrict usage based on daily or monthly data limits.

Data Package Size: Perform the corresponding action when the set limit is reached. Set to 0 to have no limit.

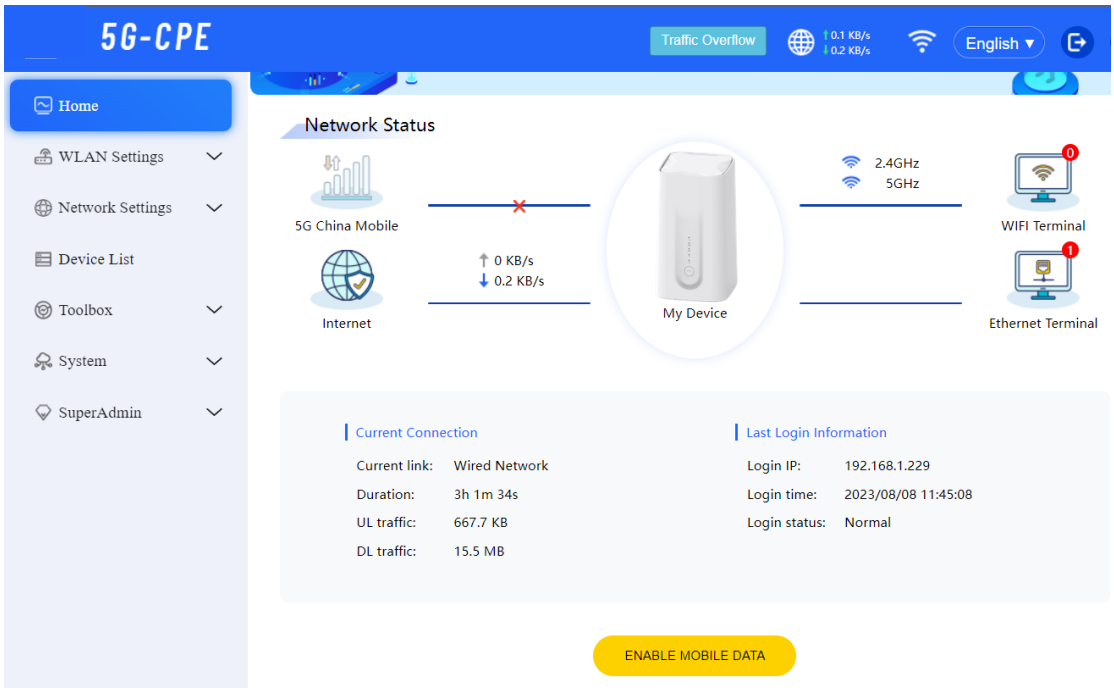
Restart Mobile Network: Check this option and save to enable automatic redialing of the mobile network.

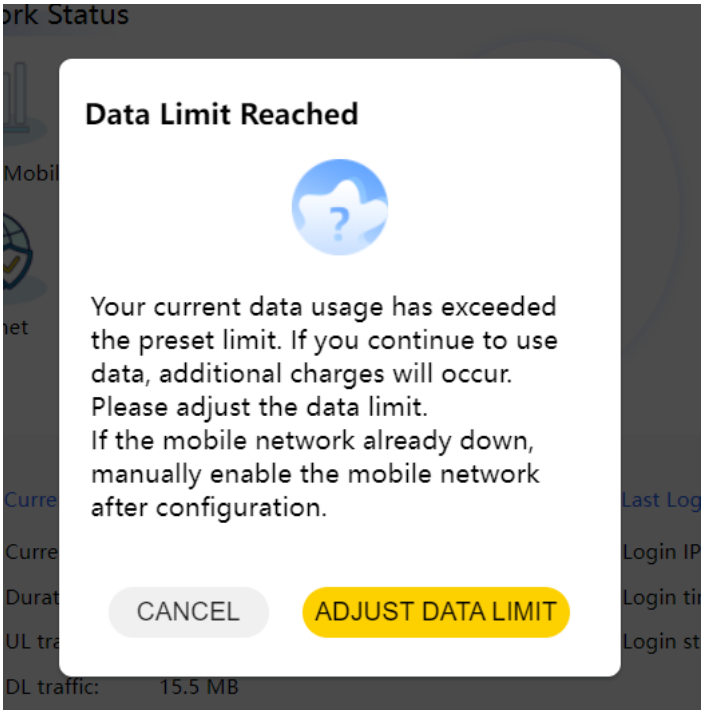


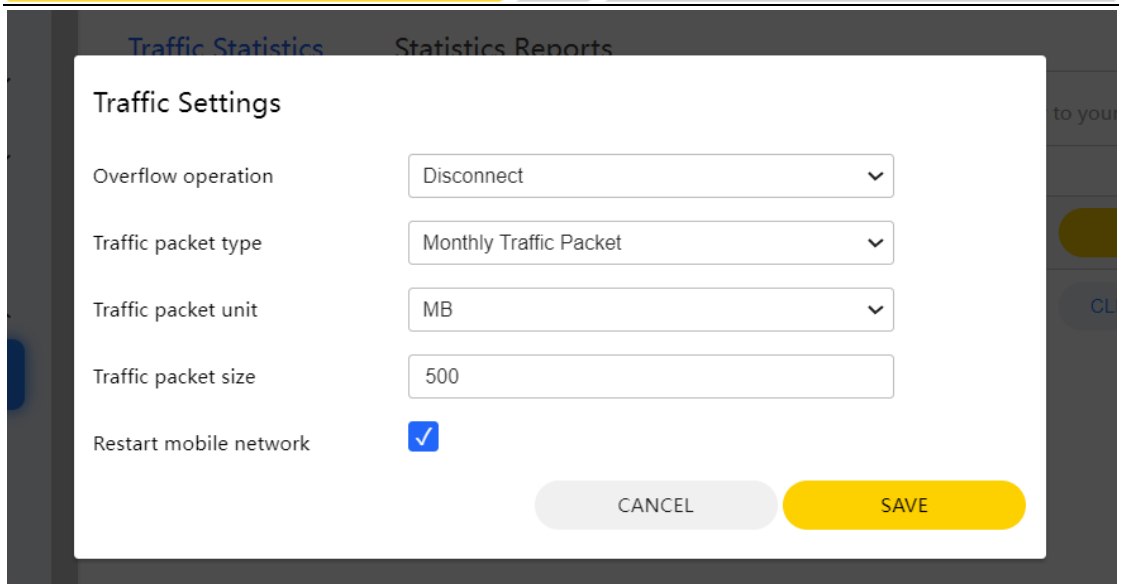


Step 2: Restoring Mobile Network After Data Exceedance

After data usage exceeds the limit and the mobile network disconnects, you will need to manually enable mobile data. On the home screen, click on "Enable Mobile Data." This will display a data usage exceeded notification page. Click on "Reset" to be redirected to the data usage statistics page, where you can reconfigure the data package size. Check the option to enable mobile data and save (if unchecked, after setting the data package size, you will need to manually click "Enable Mobile Data" on the home screen). The mobile network will automatically reconnect and restore connectivity after dialing.

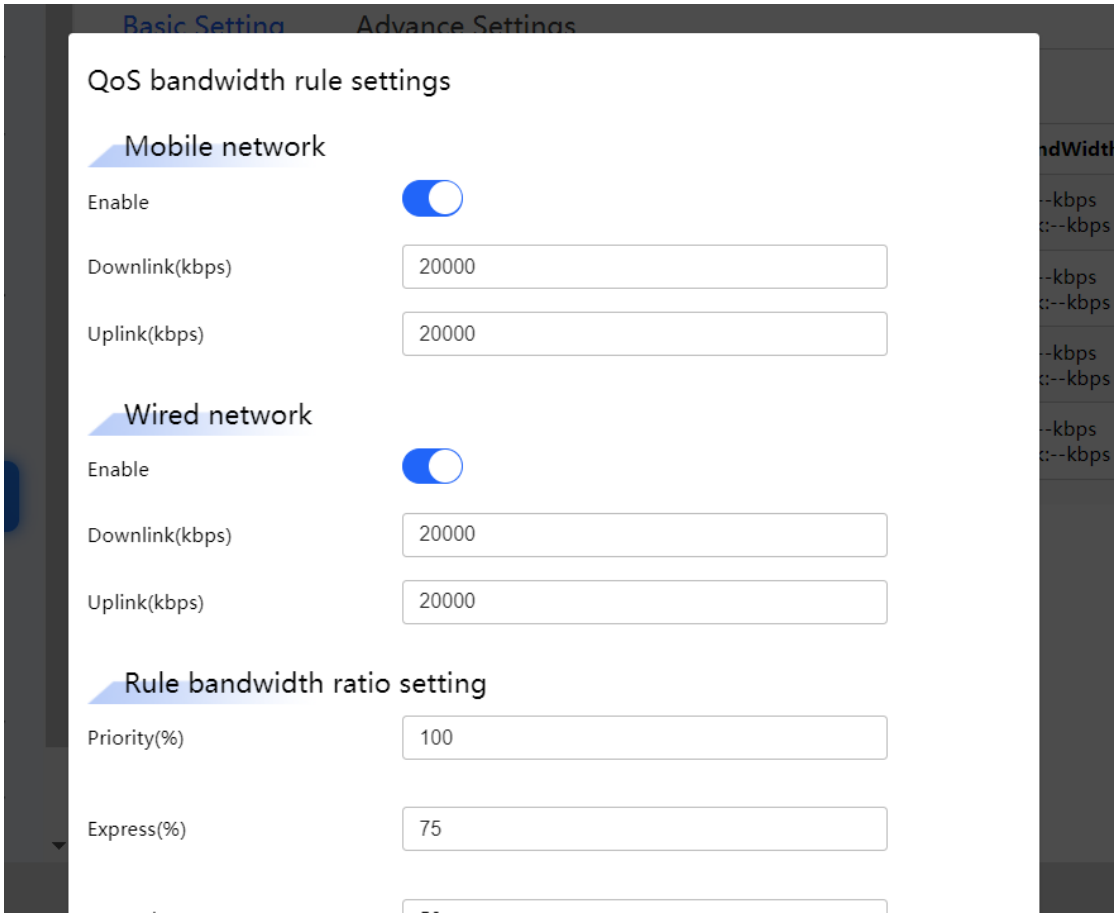

5G-CPE
Traffic Overflow
0.1 KB/s
0.2 KB/s
English
Home
WLAN Settings
Network Settings
Device List
Toolbox
System
SuperAdmin
Network Status
5G China Mobile
Internet
0 KB/s
0.2 KB/s
My Device
2.4GHz
5GHz
WIFI Terminal
Ethernet Terminal
Current Connection
Current link: Wired Network
Duration: 3h 1m 34s
UL traffic: 667.7 KB
DL traffic: 15.5 MB
Last Login Information
Login IP: 192.168.1.229
Login time: 2023/08/08 11:45:08
Login status: Normal
ENABLE MOBILE DATA

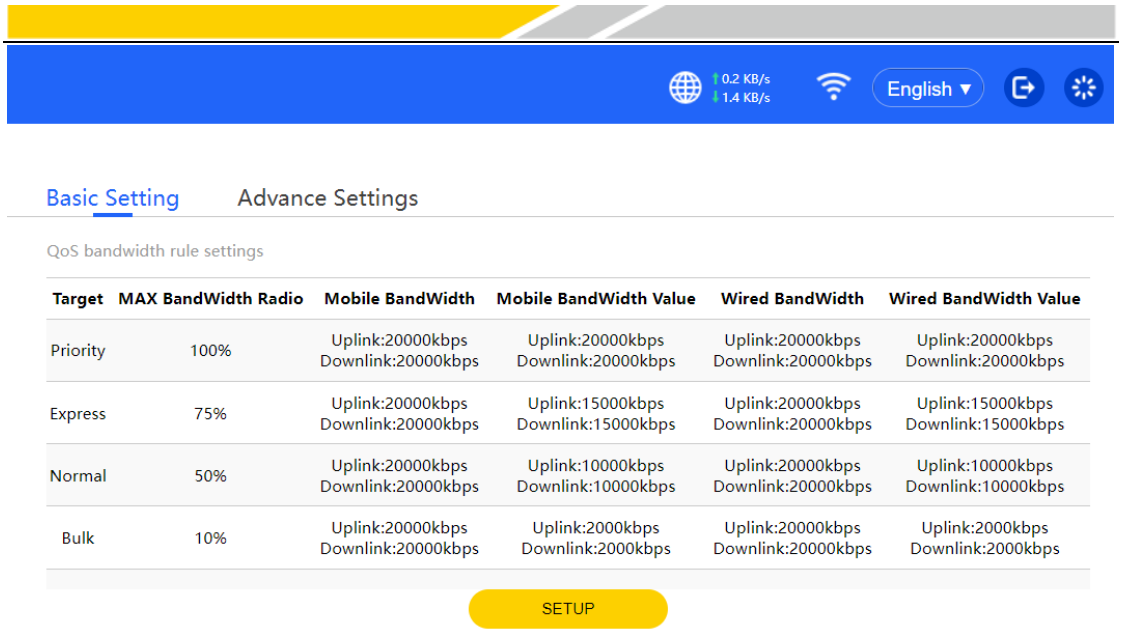

Data Limit Reached
Your current data usage has exceeded the preset limit. If you continue to use data, additional charges will occur.
Please adjust the data limit.
If the mobile network already down, manually enable the mobile network after configuration.
CANCEL
ADJUST DATA LIMIT



3.5 QOS Configuration

The QoS (Quality of Service) function allows you to limit the bandwidth for both mobile networks and Ethernet connections. When the bandwidth policy is enabled and no settings are configured in the advanced settings, the default bandwidth limitation policy for connected terminal devices is set to "Normal.

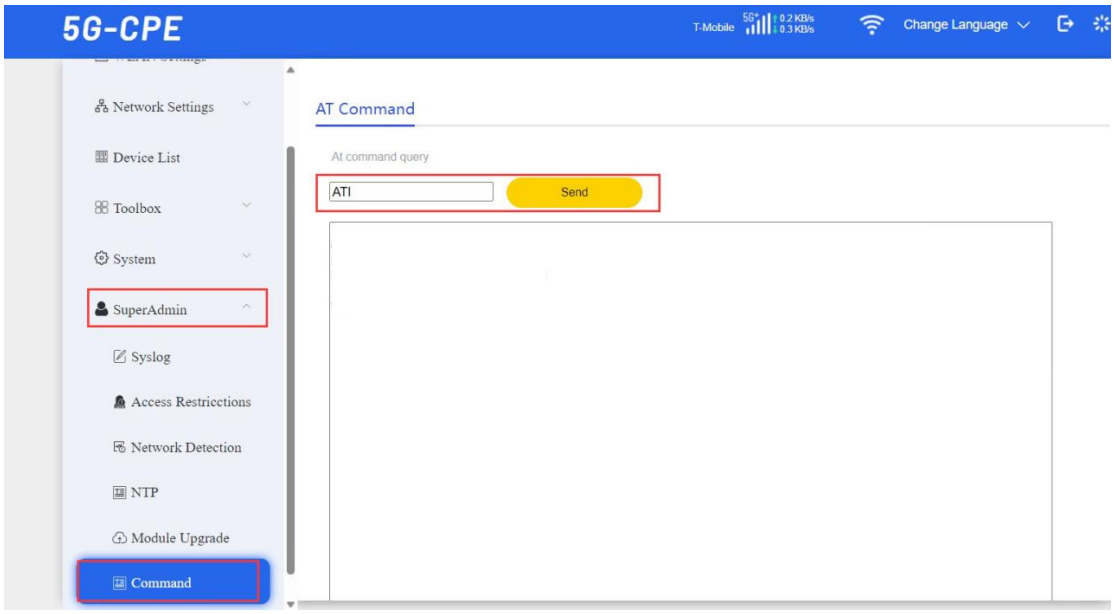




3.6 AT Command Configuration

"AT" stands for "Attention" and is a standardized way of controlling and configuring these devices. These commands typically begin with "AT," followed by specific instructions used to perform various functions, such as dialing, sending SMS, retrieving device information, and more. AT commands are usually sent to the device via a serial port, and the device, upon receiving the command, executes the corresponding operation and returns the result.

Enter the AT Command interface, users input specific AT Command queries, click send, and the command is transmitted to the device.
Common AT commands include:
AT - Test if the device is responsive.
AT+CPIN - Input PIN code for the SIM card.
AT+CGSN - Retrieve the device's IMEI number.
AT+CIFSR - Obtain the device's IP address.
AT+CWMODE - Set the device's WiFi mode.
AT+GMR - Retrieve the device's firmware version information.
ATI - Used to obtain information about the device



After receiving the command, the device executes the relevant instructions, generates the corresponding information, and sends it back to the configuration page.