# LTE Router BaiCE_BQ_2.0.x

## 5G User Manual

Document version: 01

## About This Document

This document introduces the GUI and configuration operation of Atom CPE version BaiCE_BQ_2.0.x.

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## Revision Record

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# Contents

# Figures

# Tables

# 1. GUI Introduction

Baicells provides a GUI to configure CPE devices.

## 1.1 Computer Requirements

The computer you use to connect with the CPE GUI must meet the requirements shown in Table 1-1.

Table 1-1 Computer Requirements

| Item | Description |
|---|---|
| CPU | Pentium 500 MHz or higher |
| Memory | 128 MB RAM or higher |
| Hard Disk | 50MB available space |
| Operating System | • Microsoft: Windows XP, Windows 7 or higher<br>• Mac: MacOSX 10.6 or higher |
| Screen Resolution | 1024 x 768 pixels or higher |
| Browser | • Google Chrome 22 or later<br>• Internet Explorer 8.0 or later<br>• Mozilla Firefox 18.0 or later<br>• Safari 5.1 or later |

## 1.2 CPE Software

The firmware of the CPE should be BaiCE_BQ_2.0.x or above, if the CPE is not running this version, please contact Baicells support to get the corresponding software version.

## 1.3 Applicable CPE Model

The GUI is matched with the software version of CPE products and is applicable to all models of CPE products with the same software version.

The CPE product model of software version BaiCE_BQ_2.0.x is shown in Table 1-2.

Table 1-2 CPE Model List

| Indoor / Outdoor | Product Model |
|---|---|
| Indoor | EG3661M-NR6 |

## 1.4 Log In

The CPE comes preloaded with a GUI to configure the device. With the CPE turned on and connected to the router, access the GUI login page by opening a Web browser and entering http://192.168.150.1.

The user name and password for the initial login are **admin admin**.

Figure 1-1 Login

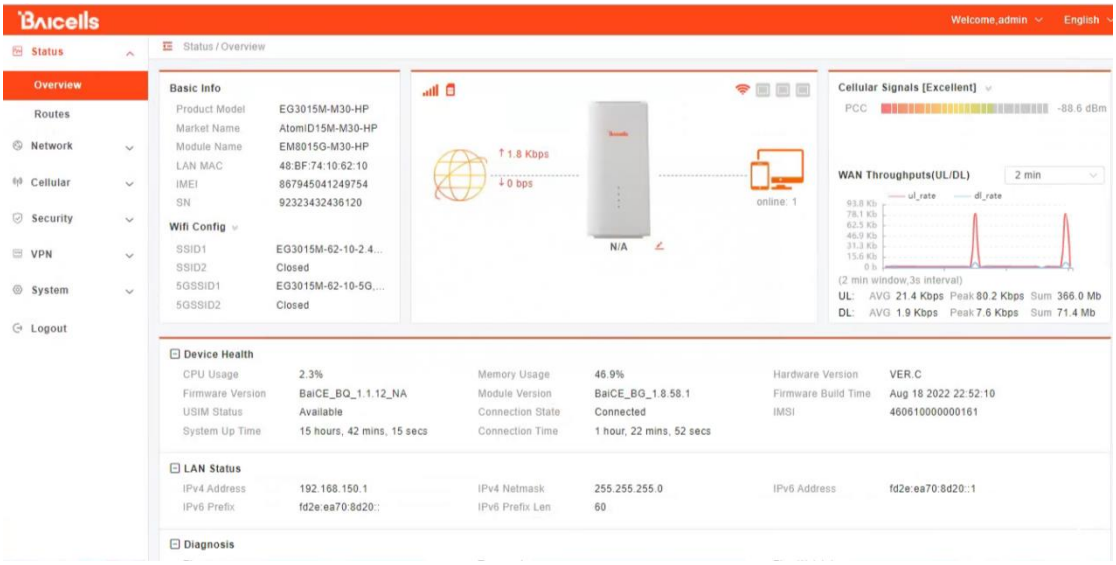
# 2. Configuration

## 2.1 Status Menu

### 2.1.1 Overview

After logging in, the GUI opens to the Status > Overview page (Figure 2-1). This page is a dashboard of key information regarding the CPE.

Figure 2-1 Overview

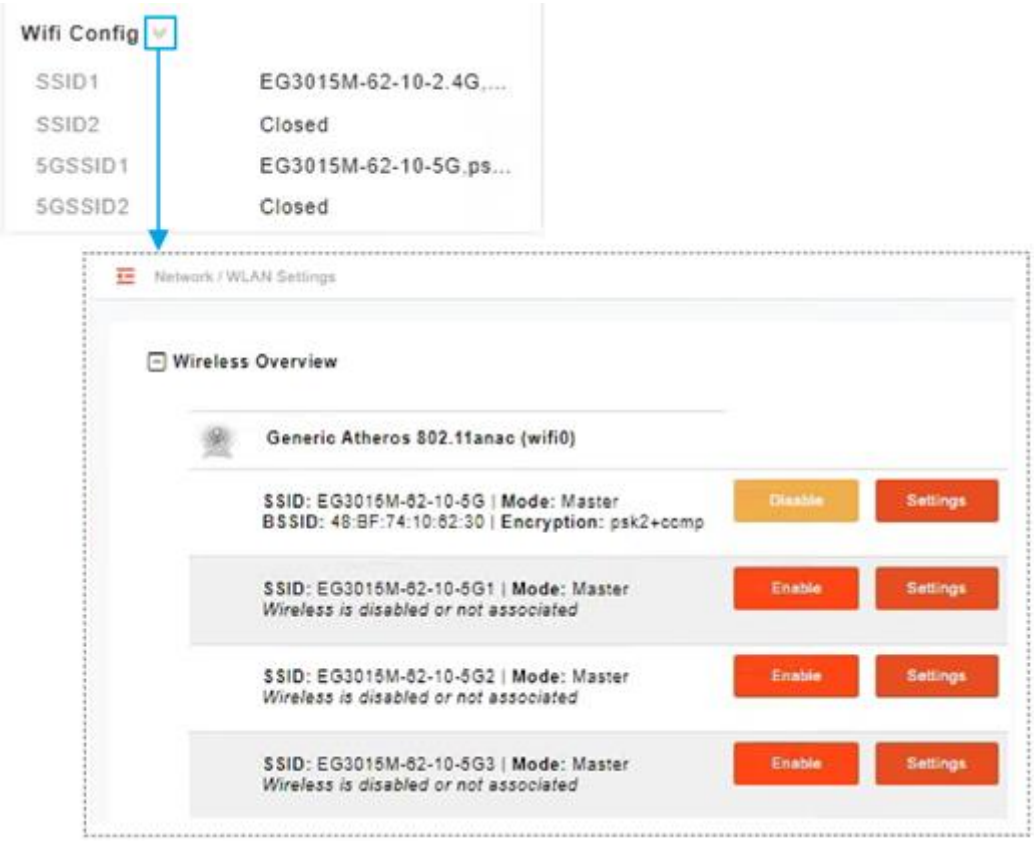



- The equipment connection status pane displays the connection status of CPE equipment with LTE network and WAN network. The icons are described as follows:

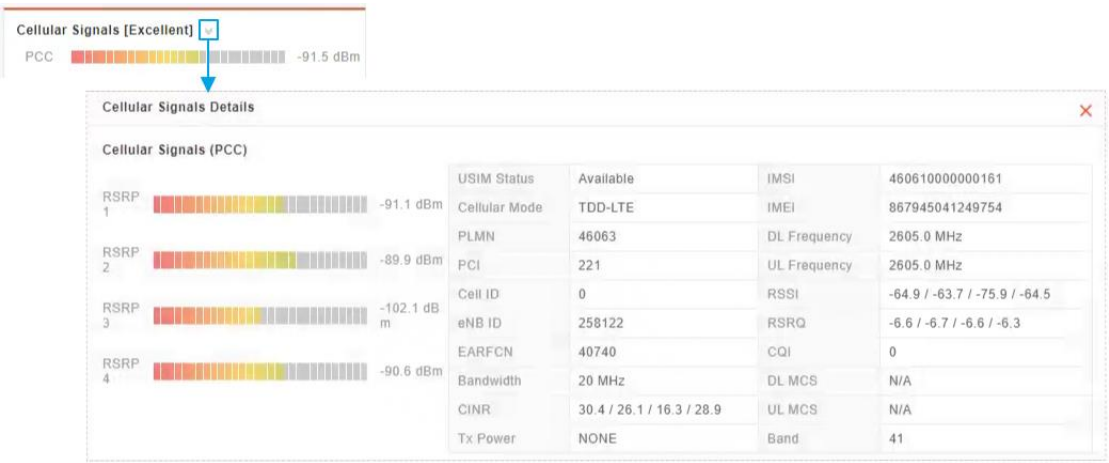
| | |
|---|---|
| | LTE signal |
| | For SIM card, it is gray when checking SIM / disconnect, orange when SIM card is recognized, and red after network access. |
| | WiFi signal: red when WiFi is on and gray when WiFi is off. |
| | Wired interface, gray when there is no link, orange when negotiating 100M, and blue when negotiating 1000M. |
| | LTE network bearer. It is gold in case of bearing and gray in case of no bearing. The number next to the icon is WAN uplink and downlink data rate. |
| online: 2 | User Number under LAN |
| | CPE equipment icon, click to modify the equipment name. |

- The *Basic Info* pane displays the product model, module name, LAN MAC, IMEI, serial number, etc.

- The *Wifi Config* pane displays the SSIDs of the CPE device. Click the icon to jump to the WLAN settings page for WiFi configuration.

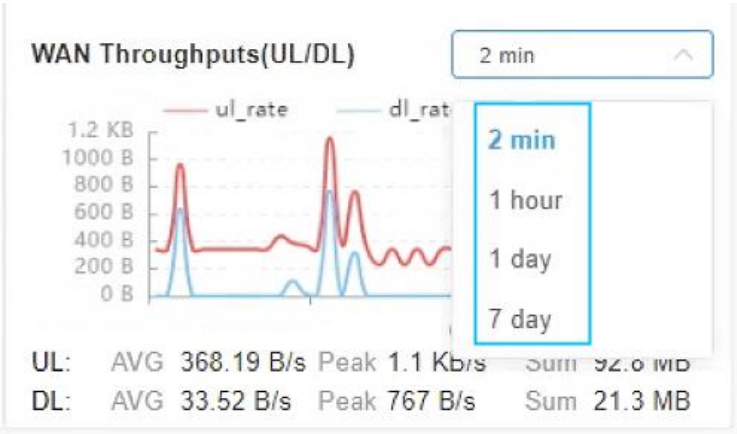



- The *Cellular Signals* pane shows the signal quality of primary cell. Click icon to view LTE details, such as the CPE's SIM card status and its IMSI and IMEI numbers, wireless frequency being used, eNB connection status, and current signal strength and quality.




- Under *WAN Throughput* you will see downlink (DL) and uplink (UL) data rates for current throughput (kbps), average rates, peak rates, and total throughput. The flow statistics can be carried out at different times, including 2 min, 1 hour, 1 day and 7

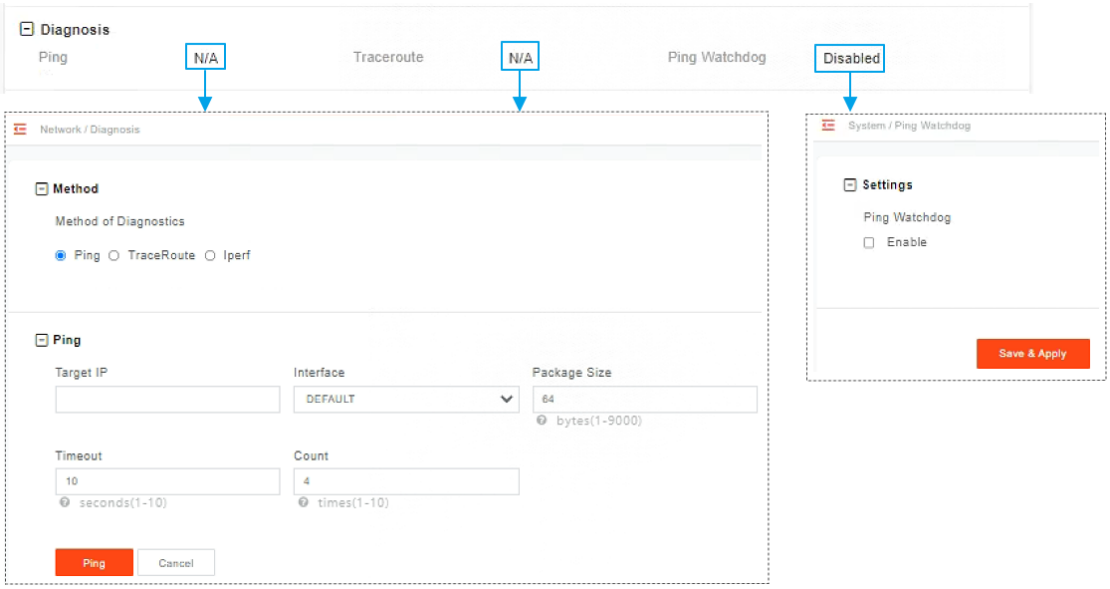
days.




- The *Device Health* pane shows device health data, such as CPU Usage, Memory Usage, USIM Status, Connection Time, System Up Time, etc.


- The *LAN Status* pane shows LAN settings information, such as IP Address, IPv4 Netmask, IPv6 Prefix, etc.


- The *Diagnosis* pane shows Ping diagnosis results, Traceroute diagnosis results, Ping Wathchdog configuration data. Click the displayed data to quickly enter the configuration page.




- The *WAN Connections* pane displays configured APN, IP address of gateway and DNS.


- The *LAN Connections* pane will show details about all smart devices currently connected through the CPE.


- The *WiFi Associated Stations* pane shows the device information currently accessing WiFi.


Refer to Table 2-1for a description of the *Status* fields.

Table 2-1 Status

| Field Name | Description |
|---|---|
| Basic Info | |
| Product Model | CPE model number |
| Market Name | Market name of CPE products |
| Module Name | Type of LTE module in the CPE |
| LAN MAC | The MAC address of the LAN port. The same as the MAC on the label. |
| IMEI | International Mobile Equipment Identity is like a serial number for the SIM card |
| SN | Serial Number |
| Wifi Config | |
| SSID | 2.4G service set ID |
| 5GSSID | 5G service set ID |
| Cellular Signals | |
| USIM Status | The Universal Subscriber Identity Module, or SIM, card status is either available or not ready in the CPE |
| IMSI | The unique International Mobile Subscriber Identity (IMSI) number associated with the SIM card in the subscriber's CPE. The IMSI must be identifiable by the operator's LTE network in order to access it. |
| LTE Mode | The LTE network operates with either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD) |
| IMEI | International Mobile Equipment Identity is like a serial number for the SIM card |
| PLMN | The Public Land Mobile Number (PLMN), or operator network ID, to which the CPE is connected |
| Band | The range of frequencies within the band the CPE may use for wireless communications with an eNB, expressed in MHz |
| Cell ID | The operator's cell site ID to which the CPE is connected. A cell site may comprise more than one eNB. Each eNB is given a PCI to identify it. |
| RSRQ | Reference Signal Receiving Quality indicates the quality of the wireless signal |
| eNB ID | The operator's cell site ID to which the CPE is connected. A cell site may comprise more than one eNB. Each eNB is given a PCI to identify it. |
| EARFCN | The E-UTRA Absolute Radio Frequency Channel Number (band and frequency) within which the CPE operates |
| PCI | The Physical Cell Identifier (PCI) unique to each eNB. PCI indicates to which eNB the CPE is connected. An operator can have multiple eNBs serving the same cell. |

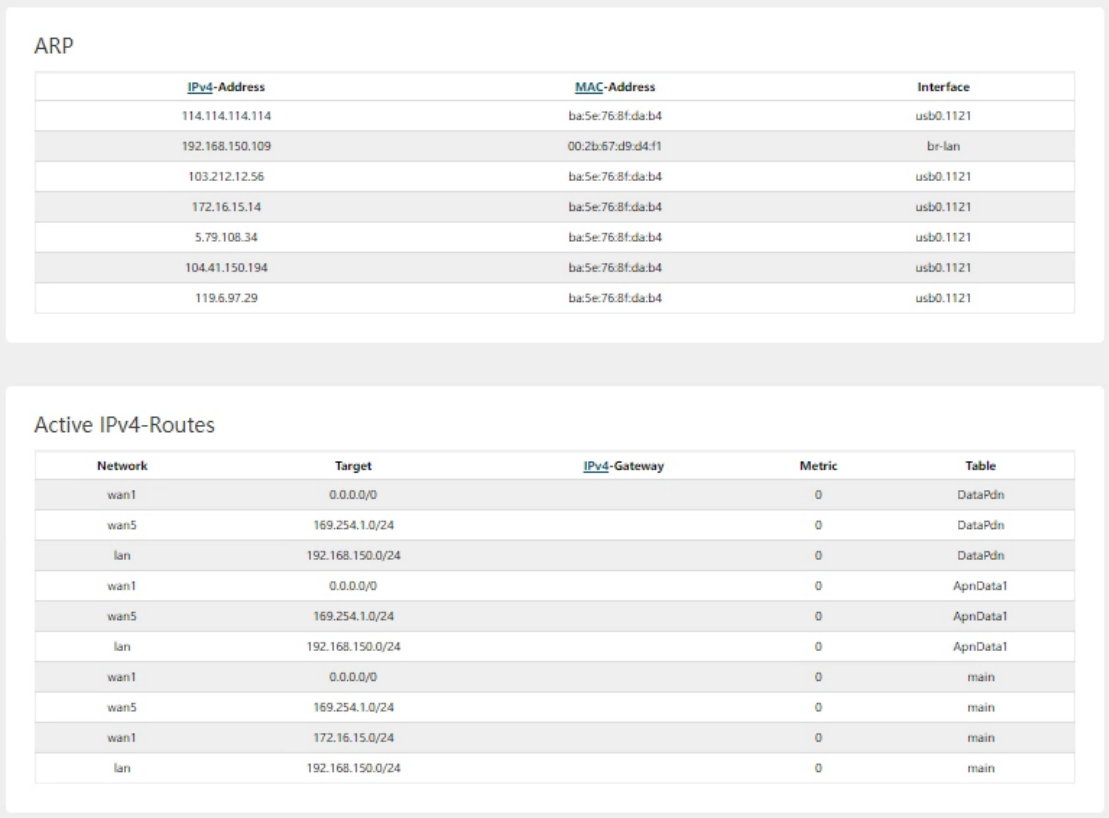
| Field Name | Description |
|---|---|
| DL Frequency | The frequency, in MHz, being used in the downlink (eNB to CPE). In LTE, the carrier frequency in the uplink and downlink is designated by the EARFCN, which identifies the LTE band and carrier frequency. |
| UL Frequency | The frequency, in MHz, that the CPE is using in the uplink (CPE to eNB). In LTE, the carrier frequency in the uplink and downlink is designated by the EARFCN, which identifies the LTE band and carrier frequency. |
| CINR | The Channel Signal-to-Interference-plus-Noise Ratio reflects the signal strength of the signal received from the two antennas in the eNB, expressed in decibels (dB)<br>NOTE: Additional SINR values are reported when a transmitting device is using more than two antennas. |
| RSRP1 ~ RSRP4 | The Signal-to-Interference-plus-Noise Ratio reflects the signal strength of the signal received from the two antennas in the eNB, expressed in decibels (dB)<br>NOTE: Additional SINR values are reported when a transmitting device is using more than two antennas. |
| WAN Throughputs | |
| DL | The current downlink data throughput rate, in Kbps |
| UL | The current uplink data throughput rate, in Kbps |
| Average | The average DL and UL data throughput rates, in Kbps, for this CPE in the last 2 minutes |
| Peak | The peak DL and UL data throughput rates, in Kbps, for this CPE in the last 2 minutes |
| Sum | The total (sum) DL and UL data throughput rates, in Mb |
| Device Health | |
| CPU Usage | CPU real-time usage rate, updated every 3s |
| Memory Usage | The memory usage rate of CPE, updated every 3s |
| USIM Status | The Universal Subscriber Identity Module, or SIM, card status is either available or not ready in the CPE |
| Connection State | Connection status between the CPE and the network –Checking SIM, Scanning, Registering, Acquiring IP, Connected, Disconnected. |
| IMSI | The unique International Mobile Subscriber Identity (IMSI) number associated with the SIM card in the subscriber's CPE. The IMSI must be identifiable by the operator's LTE network in order to access it. |
| System Up Time | CPE start time |
| Connection Time | Network access success time |
| Firmware Version | Version number of the module |
| Firmware Build Time | Software version compilation time |

| Field Name | Description |
|---|---|
| Hardware Version | CPE hardware version |
| Module Version | CPE LTE module firmware version |
| LAN Status | |
| IPv4 Address | The IPv4 address of the LAN device |
| IPv4 Netmask | The subnet mask of the LAN device |
| IPv6 Address | The IPv6 address of the LAN device |
| IPv6 Prefix | IPv6 address prefix of LAN device |
| IPv6 Prefix Len | Length of IPv6 address prefix of LAN device |
| Diagnosis | |
| Ping | Ping diagnosis results |
| Traceroute | Traceroute diagnosis results |
| Ping Watchdog | Ping Watchdog configuration result |
| WAN Connections | |
| Profile Name | APN Number |
| IPv4 Address/ IPv6 Address | IPv4or IPv6 address of the APN gateway |
| IPv4 DNS/ IPv6 DNS | IPv4 or IPv6 DNS |
| LAN Connections | |
| Device Name | The name of each smart device connected through the CPE |
| MAC Address | The MAC address of each smart device connected through the CPE |
| IP Address | The IP address of each device connected through the CPE |
| Lease Time | Amount of time a smart device's IP address has been leased |
| Type | Type of smart device connection |
| WiFi Associated Stations | |
| SSID | WIFI SSID |
| MAC Address | MAC address of the device accessing the SSID |
| IP Address | IP address of the device accessing the SSID |
| Signal | The signal strength of the connected device |
| Noise | WiFi signal noise |
| RX Rate | Wi-Fi real-time receiving rate |
| TX Rate | Wi-Fi real-time transmission rate |

### 2.1.2 Routes

The Overview > Routes table lists all of the configured routing rules, including Allocation and Retention Policy (ARP) tables and active IPv4/IPv6 routes (Figure 2-2). For each item in the list, the IP address, MAC address, and interface type are displayed.

Figure 2-2 Routes




# 2.2 Network Menu

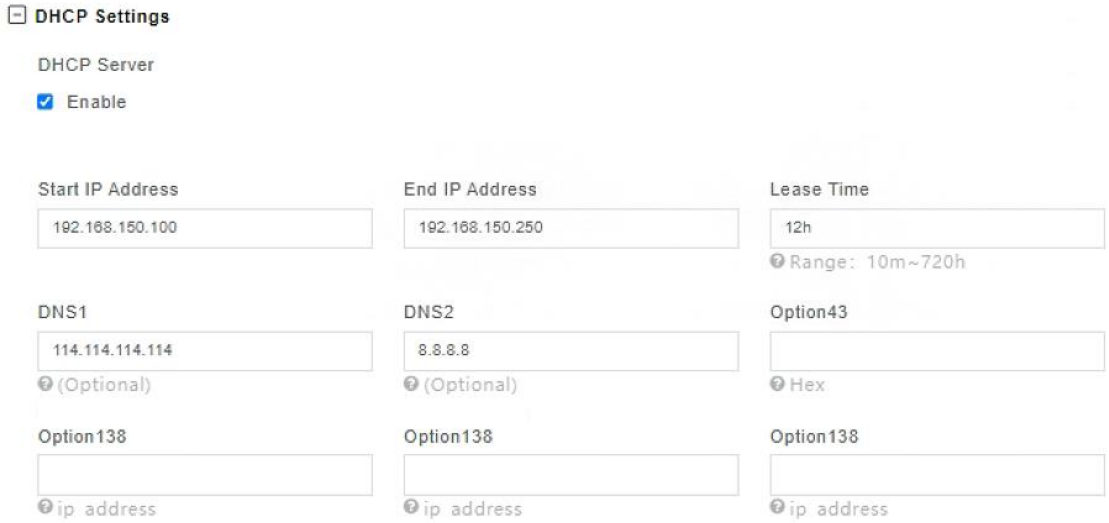
## 2.2.1 LAN Settings

Enter the Network > LAN Settings, it shows host IP address, subnet mask, and the Maximum Transmission Unit (MTU) size, in bytes (Figure 2-3). The range is 1000-1500 bytes. The default is 1500 bytes.

Figure 2-3 LAN host settings


You can enable or disable the DHCP server (Figure 2-4). If enabled, enter the start and end IP addresses, and the lease time for IP address use - from 10 minutes to 720 hours. Optionally, you can enter one or two DNS server IP addresses, and one to three option 138 connection IP addresses for connecting to a Control and Provisioning of Wireless Access Points (CAPWAP) server. When using option 138, the device will connect with the server's LAN port and get an Access Controller (AC) IP address.

Figure 2-4 DHCP settings




The *DHCP Reservations* may be used to bind an IP address to a specific MAC address (Figure 2-5). In the bottom half of the pane, enter the IP address and the MAC address, and click on *ADD*. The IP address must be within the range of DHCP addresses. Any configured bindings will appear at the top of the window.

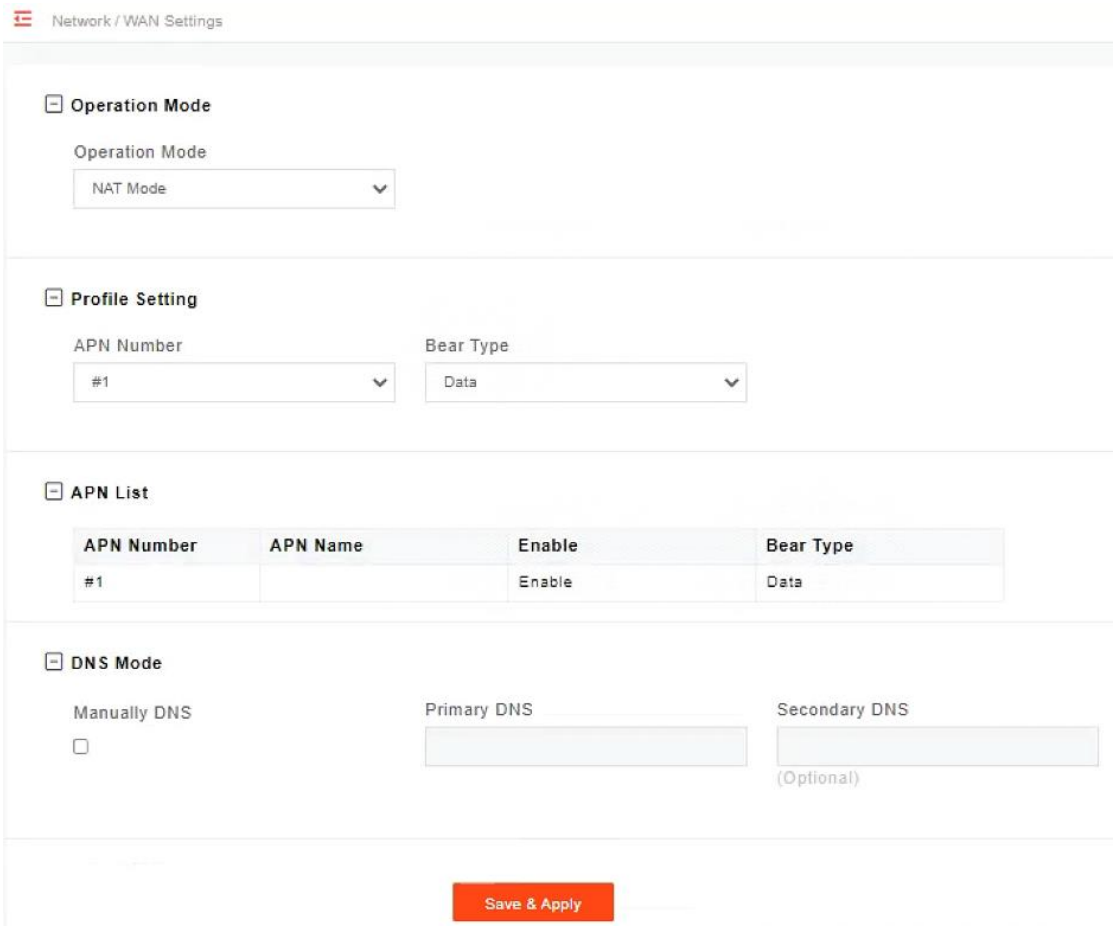
Figure 2-5 Bundled Address List


## 2.2.2 WAN Settings

### 2.2.2.1 NAT Mode

The CPE will be worked at NAT mode, and only 1 APN can be configured by Default Data bear types.

Figure 2-6 WAN Settings



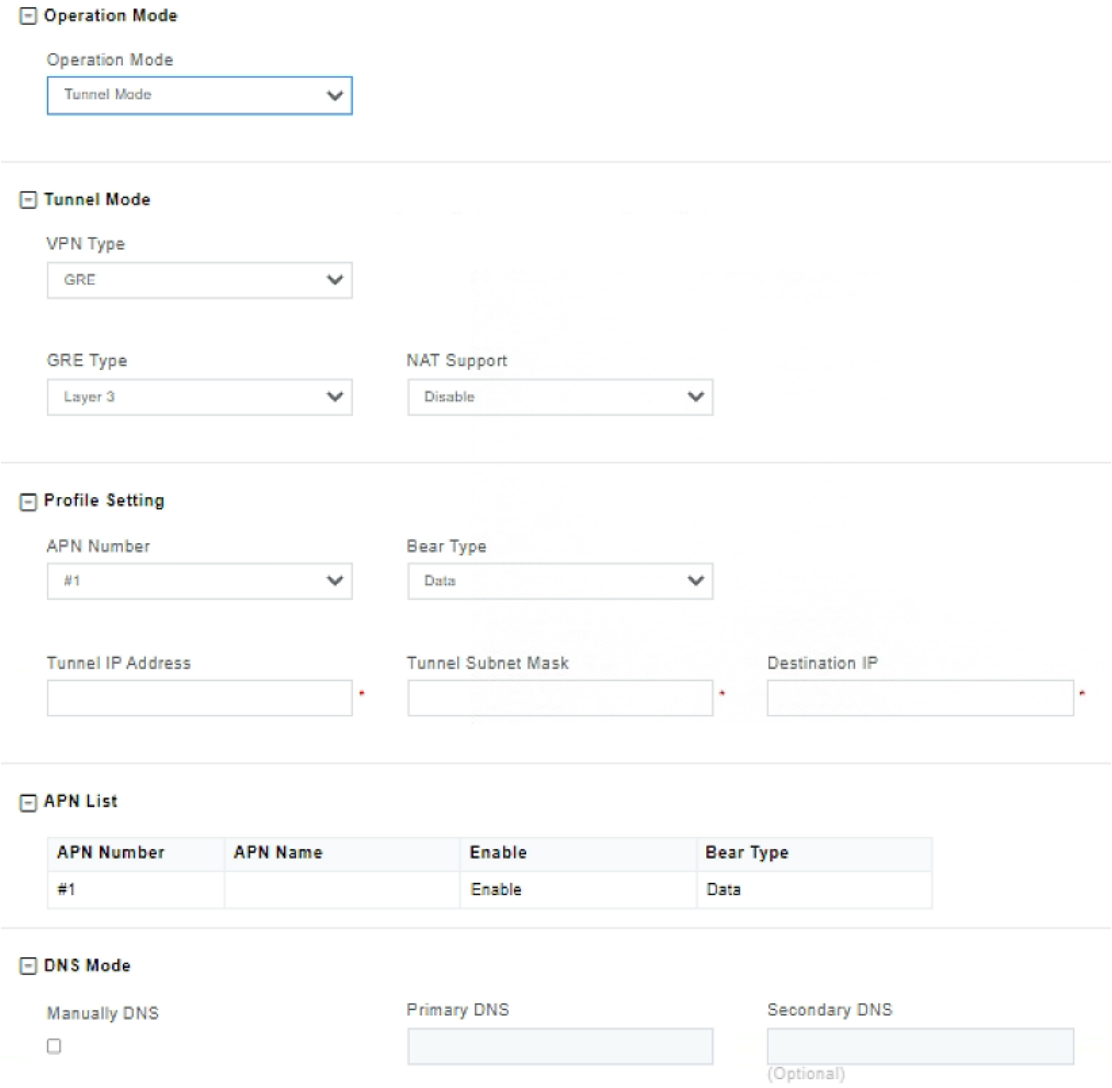

DNS Mode set how to get DNS server IP:

- Automatic: automatically obtain the DNS server IP assigned by EPC. If Manually DNS is not selected, it is automatic mode.
- Manually: manually configure the primary and standby DNS server IP.

### 2.2.2.2 Tunnel Mode

This CPE can support L2TP, GRE, PPTP, and VxLAN VPN type.

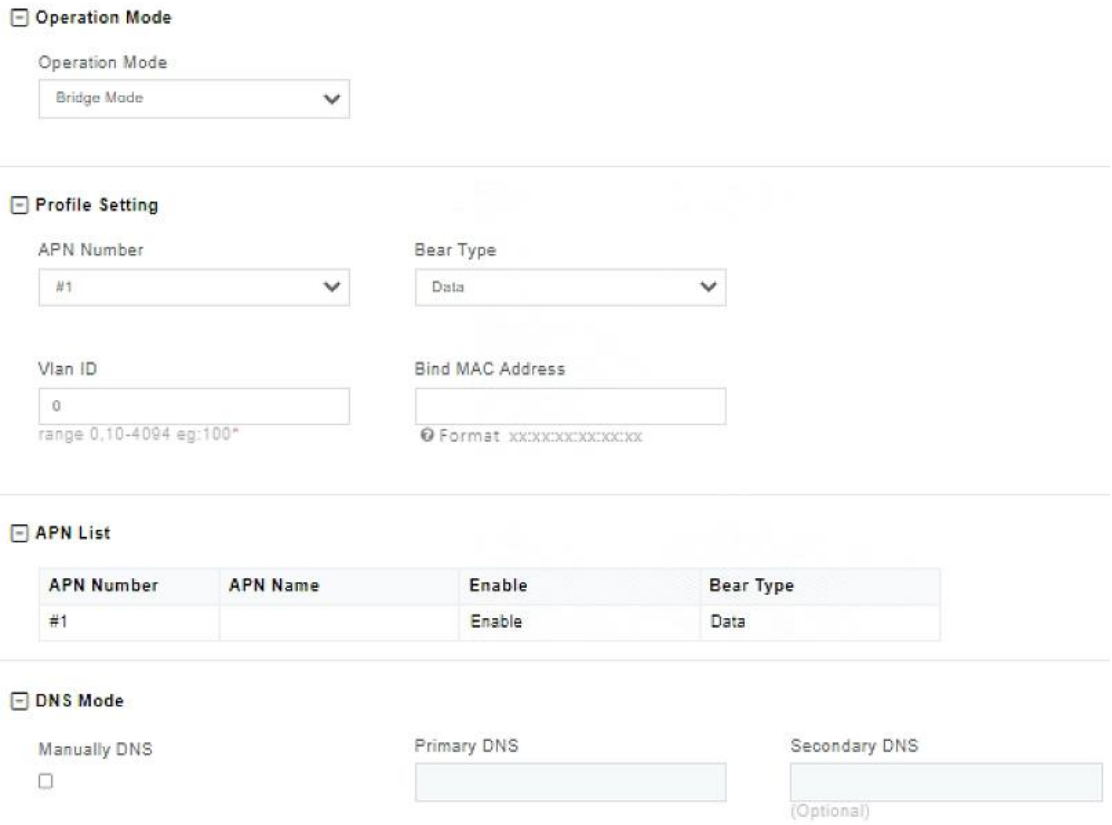
Figure 2-7 Tunnel Mode




### 2.2.2.3 Bridge Mode

When the CPE worked at Bridge mode, the WAN ports address will bridge to LAN port, and the LAN port will work at trunk mode.

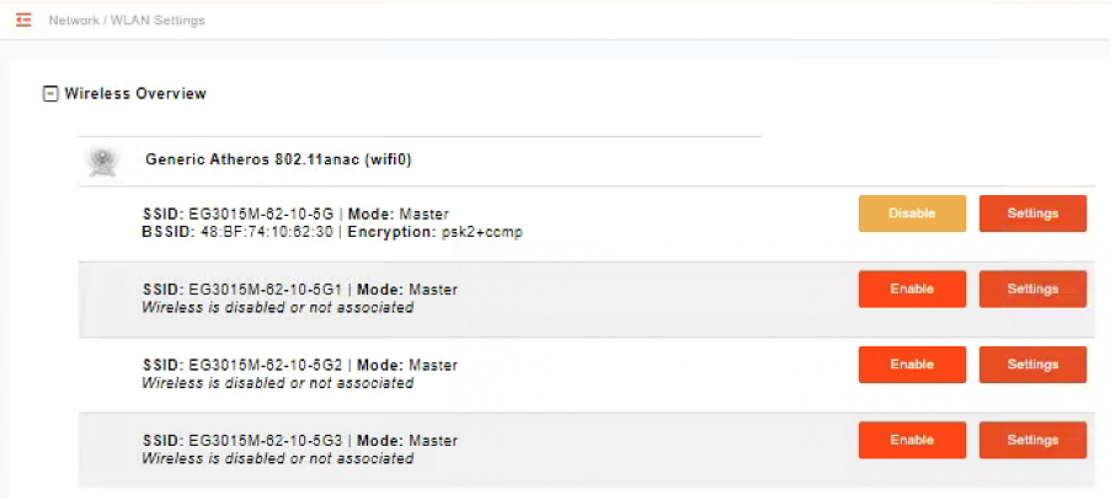
Figure 2-8 Bridge Mode




## 2.2.3 WLAN Settings

Select **Network > WLAN Settings**, and set the WLAN Network.

Figure 2-9 WLAN Overview




The overview page displays the relevant information of the devices connected to the Wi-Fi hotspot. For each device displayed, you can operate enable / disable and settings.

Click the "**SETTINGS**" button to enter the network settings page. As shown in Figure 2-10.

Figure 2-10 WLAN Settings

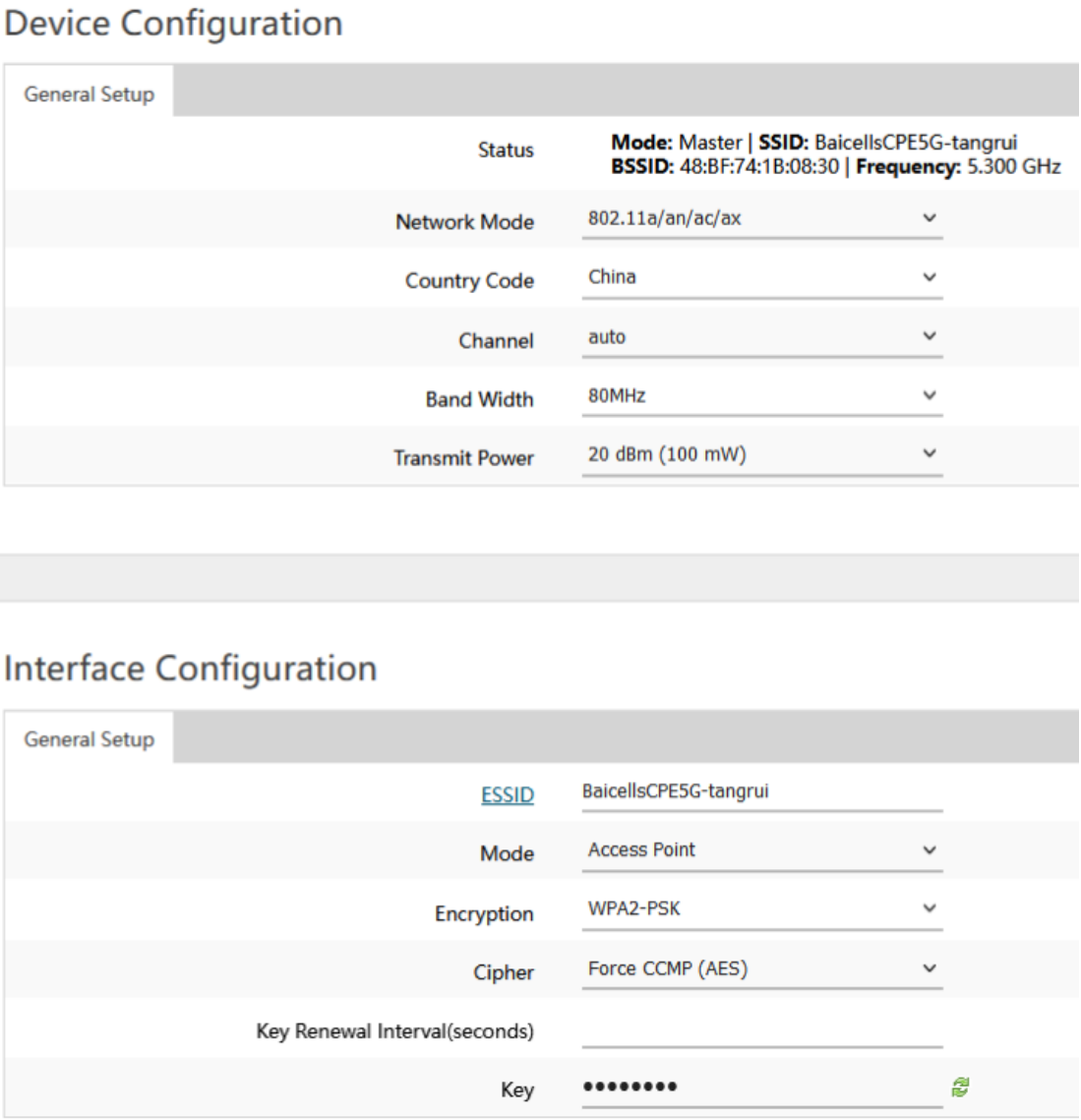



Table 2-2 WLAN Settings Parameters

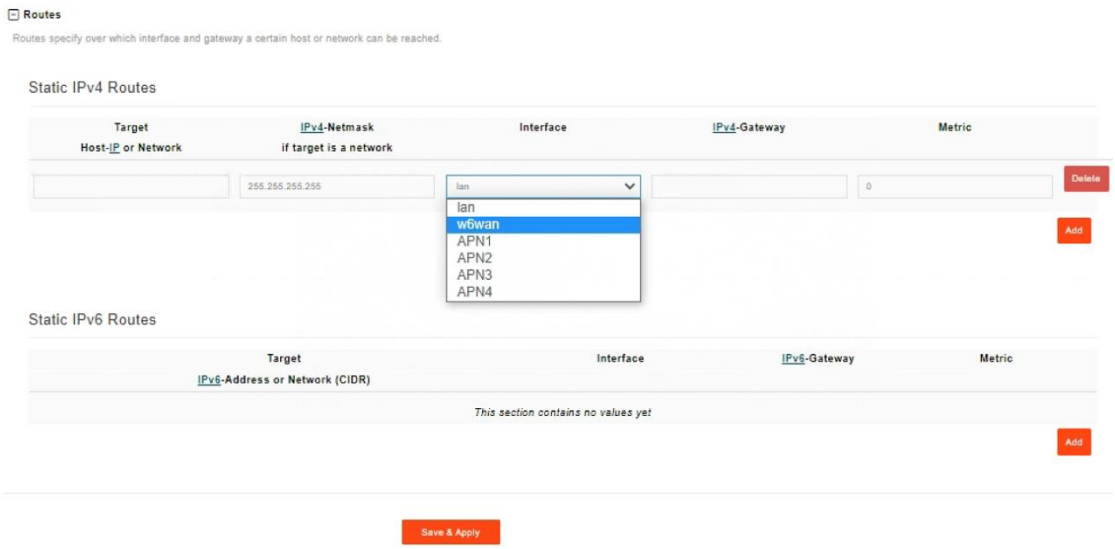
| Field Name | Description |
|---|---|
| Device Configuration | |
| Network Mode | Support 80211 Wireless Protocol |
| Country Code | Country code |
| Channel | Configurable channel |
| Band Width | Wireless Supported Bandwidth |
| Transmit Power | Maximum power sent by WIFI |
| Interface Configuration | |
| ESSID | Service set ID. Wi-Fi assic string seen after the phone turns on Wi-Fi. |
| Mode | WIFI working mode: WIFI hotspot, WIFI STA. Default WIFI hotspot |

| Field Name | Description |
|---|---|
| Encryption | Encryption mode. Support No Encryption, WPA-PSK, and WPA2-PSK. |
| Cipher | Algorithm mode. Support CCMP (AES), TKIP, TKIP and CCMP (AES) |
| Key Renewal Interval(seconds) | Set the lifetime of the key used in secure sessions when WPA PSK is encrypted |
| Key | WIFI password |

## 2.2.4 Static Routes

Select **Network > Static Routes**, and set the Static Routes.
To add a route, click on the *ADD* button to open a dialogue window where you can input the target IP address, netmask, interface type (APN, LAN, or WAN), and gateway address.

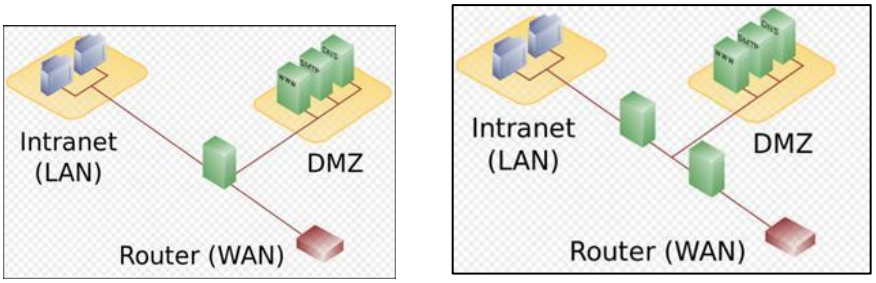
Figure 2-11 Static Routes




## 2.2.5 DMZ

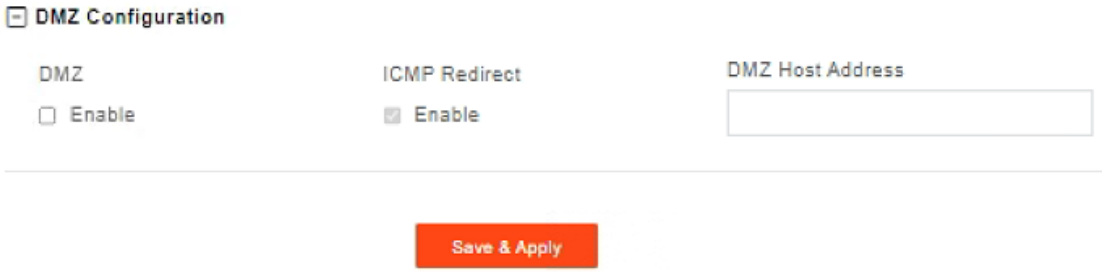
In technology, the DMZ refers to a firewall between incoming WAN traffic and the LAN to which the CPE is connected. Two basic DMZ methods are (a) using a single firewall, also known as the three-legged model, and (b) using dual firewalls (Figure 2-12). These architectures can be expanded to create complex architectures depending on the network requirements.

Figure 2-12 DMZ Examples




When the LAN has a DMZ/firewall server, you can enable DMZ on the CPE so that packets from the WAN are forwarded to the firewall (Figure 2-13). Alternatively, you can enable Internet Control Message Protocol (ICMP) redirect error messages to support Layer 2 multicast features.

Figure 2-13 DMZ



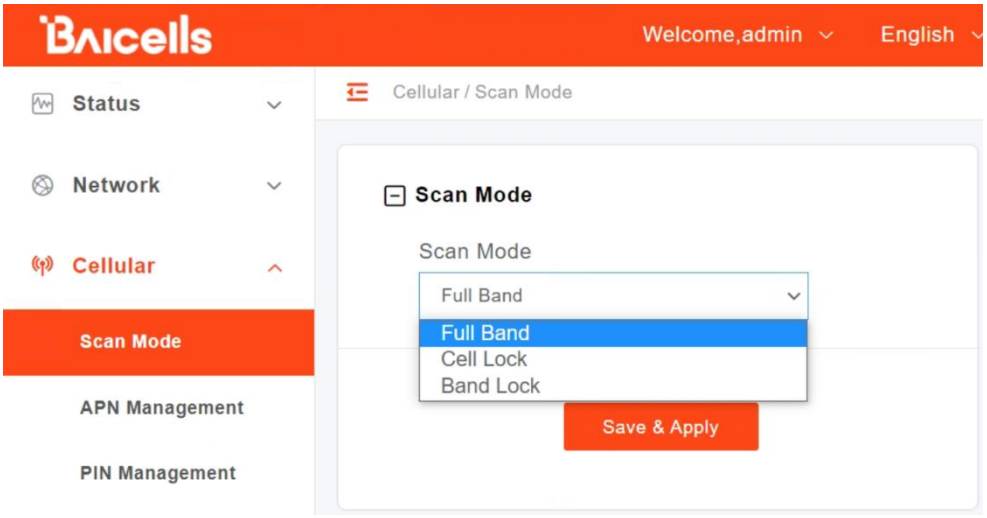

# 2.3 Cellular Menu

## 2.3.1 Scan Mode

The Scan Mode determines which frequencies the CPE's routine scan of available frequencies will cover. Scanning is a process of tuning to a specific frequency and measuring the simplest signal quality [e.g., Received Signal Strength Indication (RSSI)].

As part of the cell selection and reselection process, the CPE performs the scan first and then selects a small number of candidate cells to go through the next step of measuring and evaluating signals to select the best eNB that can serve it. The CPE frequently (milliseconds) performs the scan to ensure it has the best possible connection to the network. Refer to Figure 2-14.

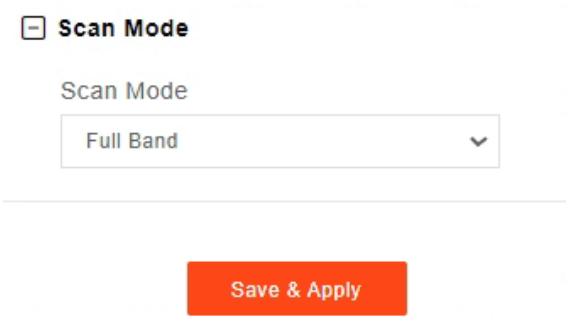
Figure 2-14 Scan Mode



Select one of the following options:

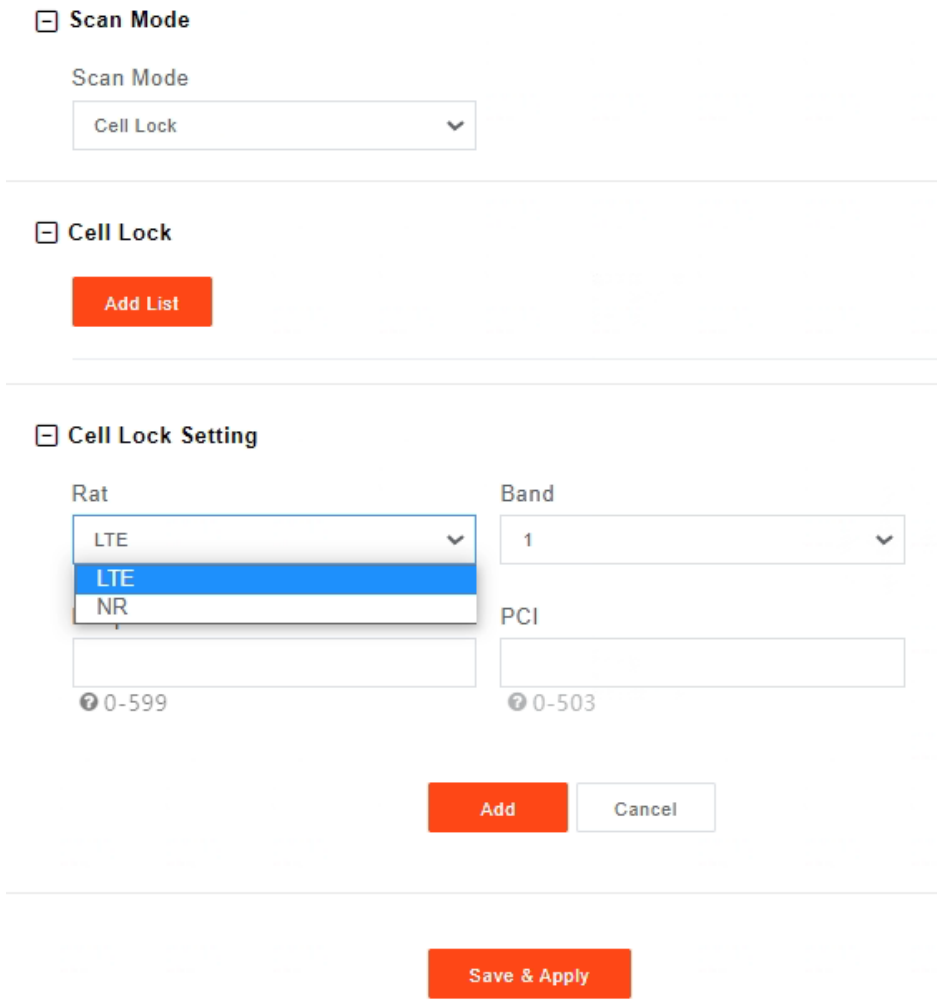
- **Full Band** (default) – All channels in the band. (Figure 2-15)
  - The CPE will routinely scan all channels in the band, increasing the time it takes to connect compared to the other modes. The band is dependent on the CPE model.

Figure 2-15 Full Band




- **Cell Lock** –Specific cell only. (Figure 2-16)
  - The CPE will scan the list of eNBs with the specified cells when accessing the network. Using this mode can accelerate network access time. 5G CPE supports access to LTE and NR networks, and the locked frequency can be specified according to the accessed network.

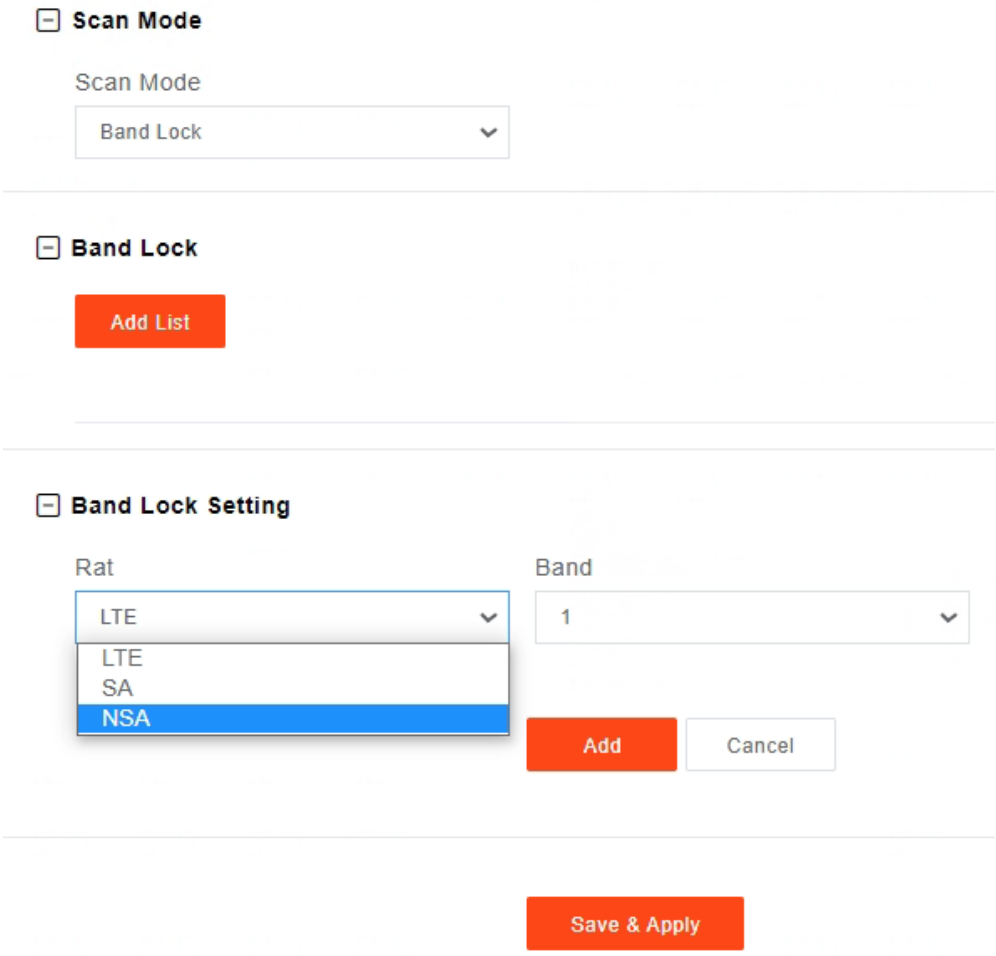
Figure 2-16 Cell Lock




- **Band Lock**– Specific band only.

– Scan the specified band when accessing the network. 5G CPE supports access to LTE, SA and NSA networks, and the locked frequency can be specified according to the accessed network. (Figure 2-17)

Figure 2-17 Band Lock



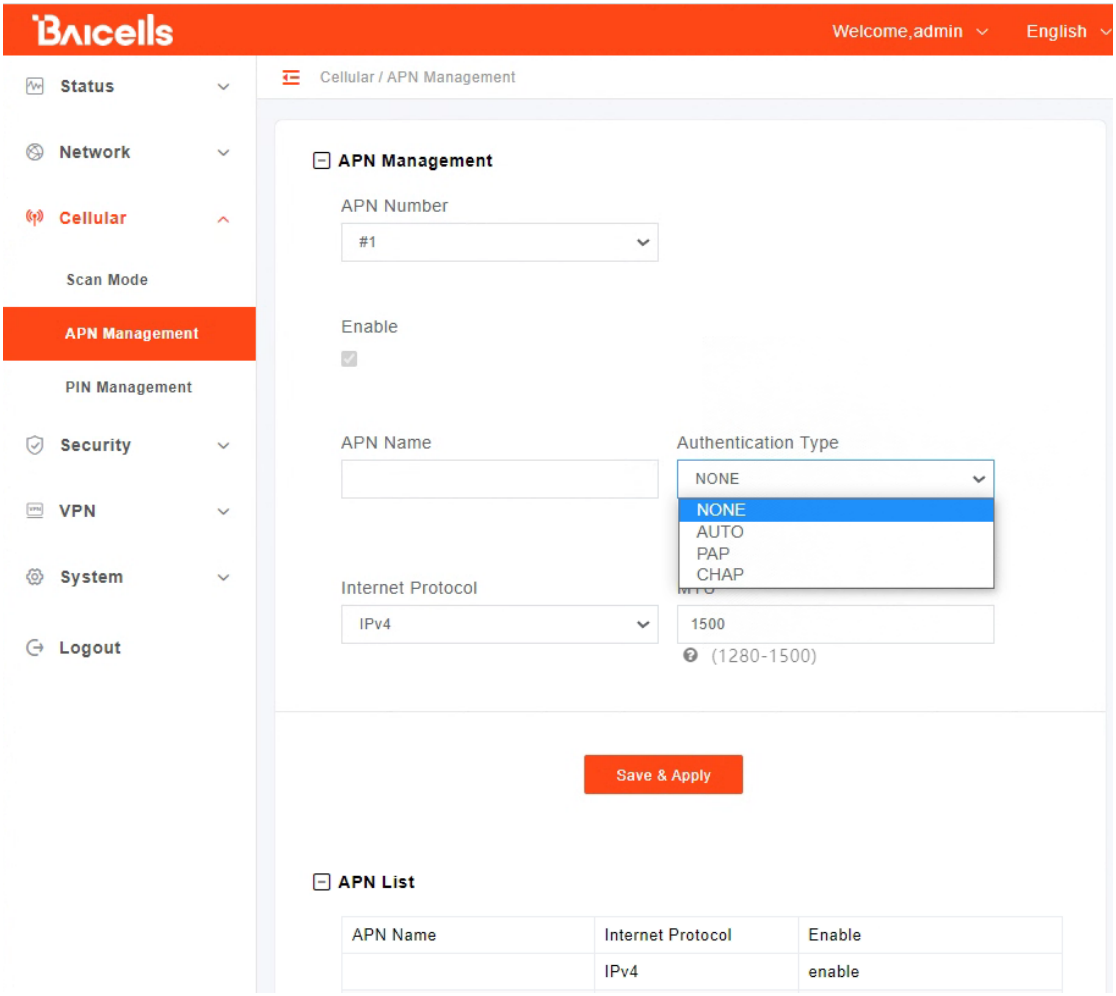

After selecting an option, enter the required information.

## 2.3.2 APN Management

An Access Point Name (APN) is the name of a gateway between a 3G/4G mobile network and another computer network, frequently the public Internet. Generally, multiple APNs are used for different business flows such as TR-069 management, voice, data, etc., and may support different services and QoS levels for different subscribers.

The CPE supports 4 APN configurations. At least one APN (TR-069) must be configured when the CPE/eNB connect to the Baicells CloudCore. In the window (Figure 2-18) you will select the APN number (1-4), enable it, enter an APN Name, select Authentication Type, select the type of IP addressing (IPv4), and set the MTU value for the APN.

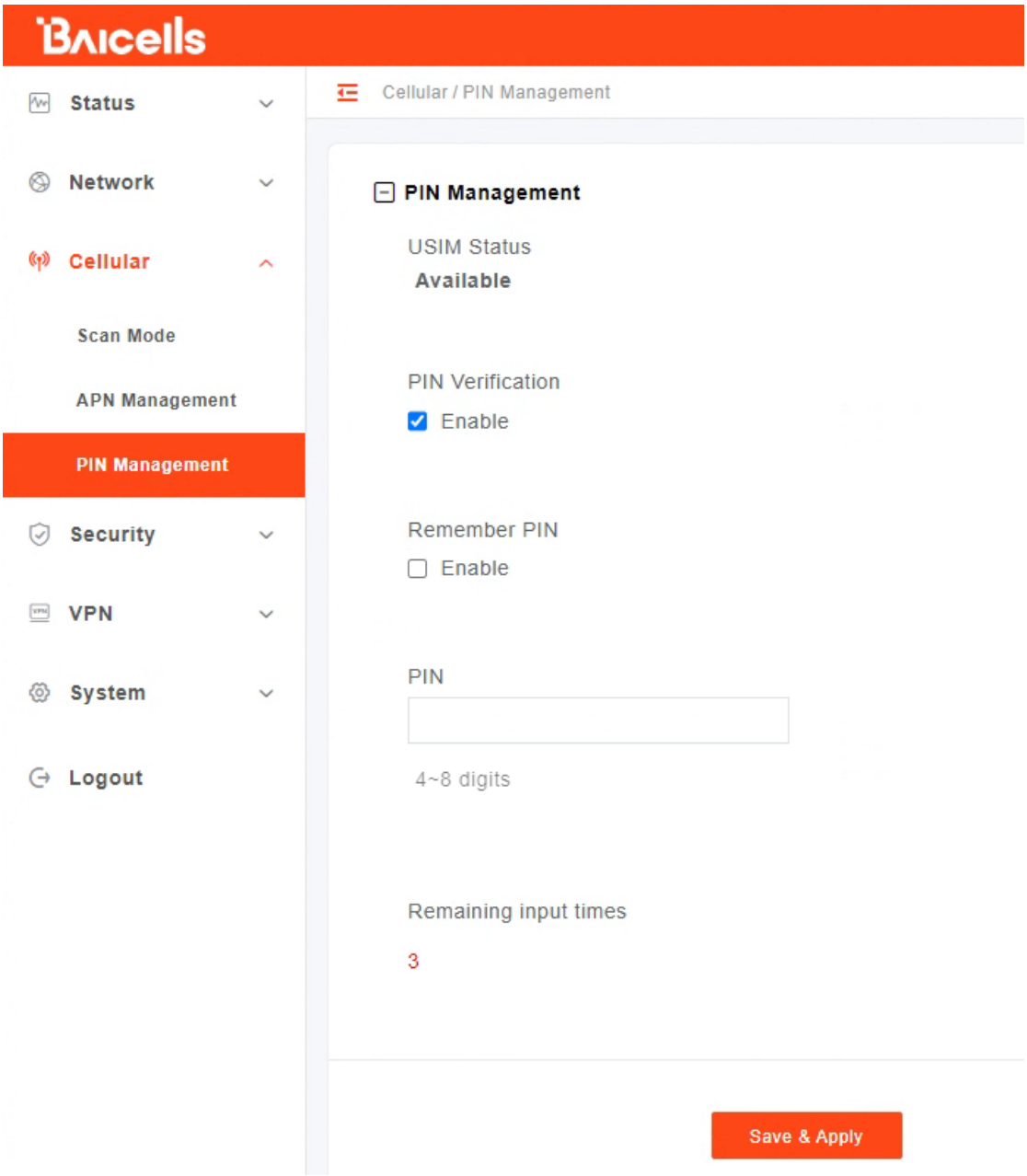
Figure 2-18 APN Management




## 2.3.3 PIN Management

Use the PIN Management feature if you want to require users to enter a PIN code before they can use the CPE to access the network (Figure 2-19). Once the PIN is enabled, you will need to remember it if you want to later modify the number. You are limited to 3 tries to enter the correct PIN code before getting locked out. If this happens, contact your service provider (end-users) or Baicells support (service providers).

Figure 2-19 PIN Management

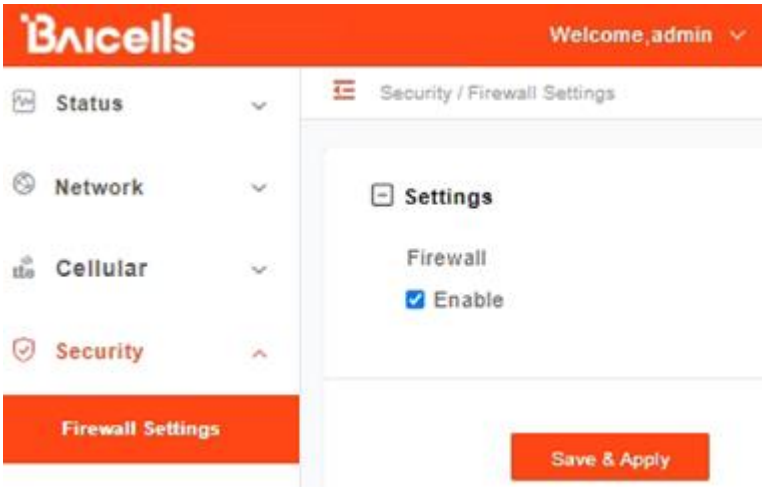



# 2.4 Security Menu

## 2.4.1 Firewall Settings

When using a firewall server in the local network, invoke this setting to enable or disable the firewall for this CPE (Figure 2-20).

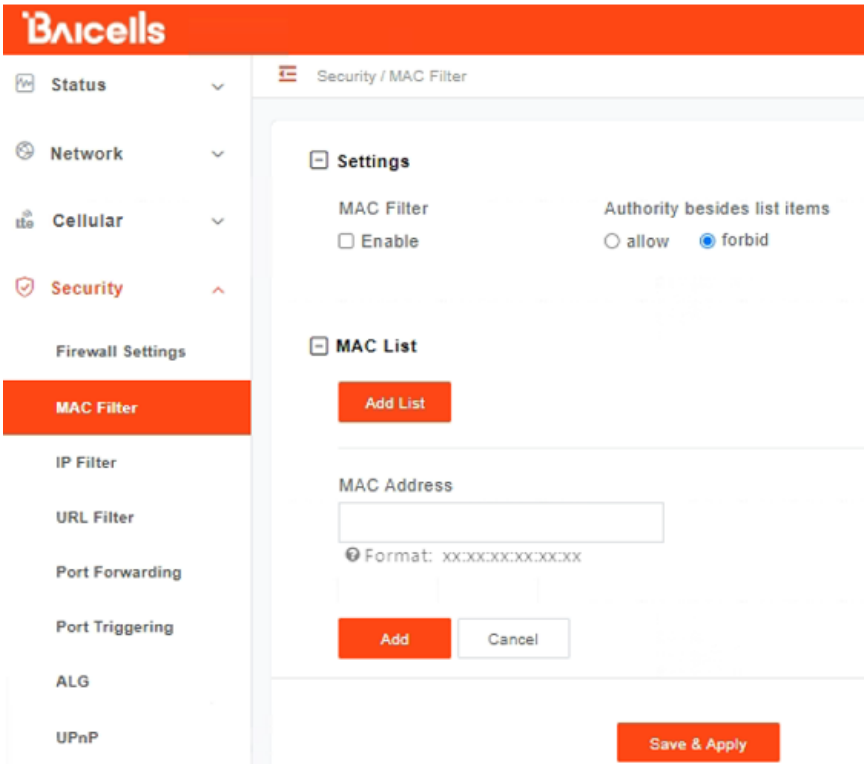
Figure 2-20 Firewall




## 2.4.2 MAC Filter

Media Access Control (MAC) Filtering allows you to identify a list of devices either allowed to access or forbidden from accessing the network through the CPE (Figure 2-21). Select *Enable* to enable MAC filtering, and then determine whether you will allow or forbid the defined MAC addresses to access the network.

Figure 2-21 MAC Filter



## 2.4.3 IP Filter

Internet Protocol (IP) Filtering allows you to filter services based on the IP address of the source device that is using the CPE to access the network (Figure 2-22). You can define a list of devices either allowed or forbidden from accessing the destination address range or port number range you enter.

To use this feature, select the *Enable* check box and then click on ADD LIST to open the settings window. Enter the source devices' IP addresses. Refer to Table 2-3 for a description of each field.

Figure 2-22 IP Filter

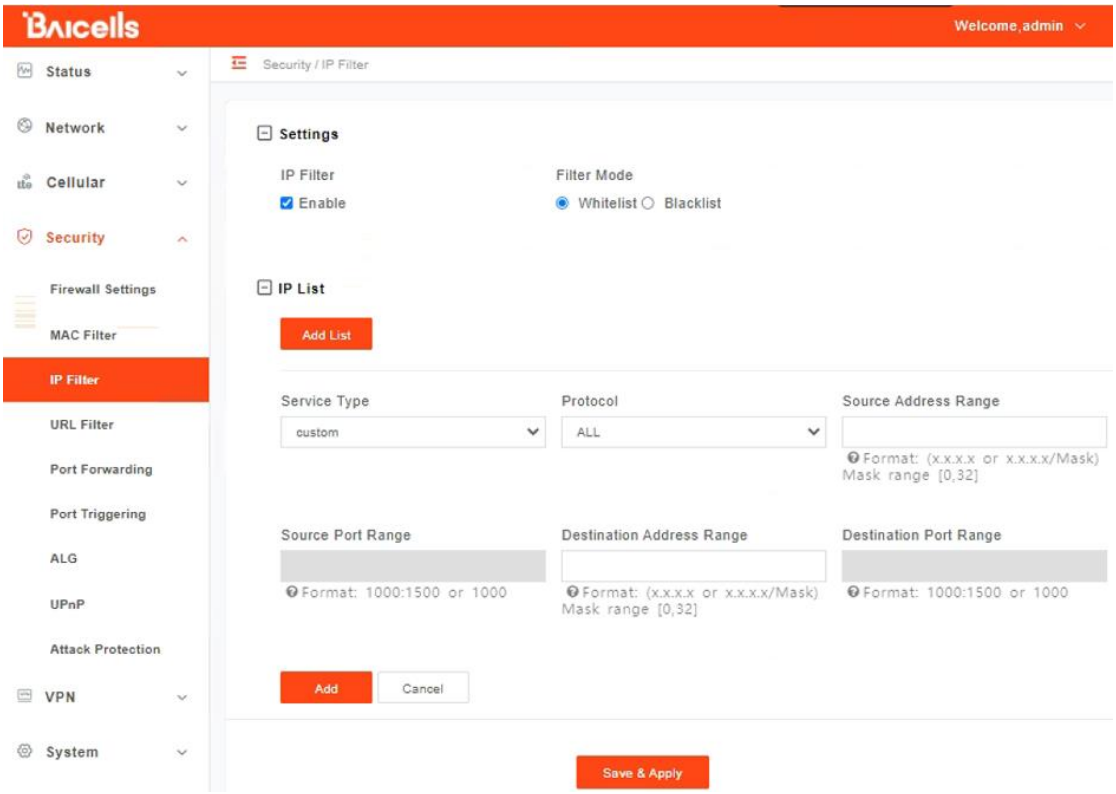


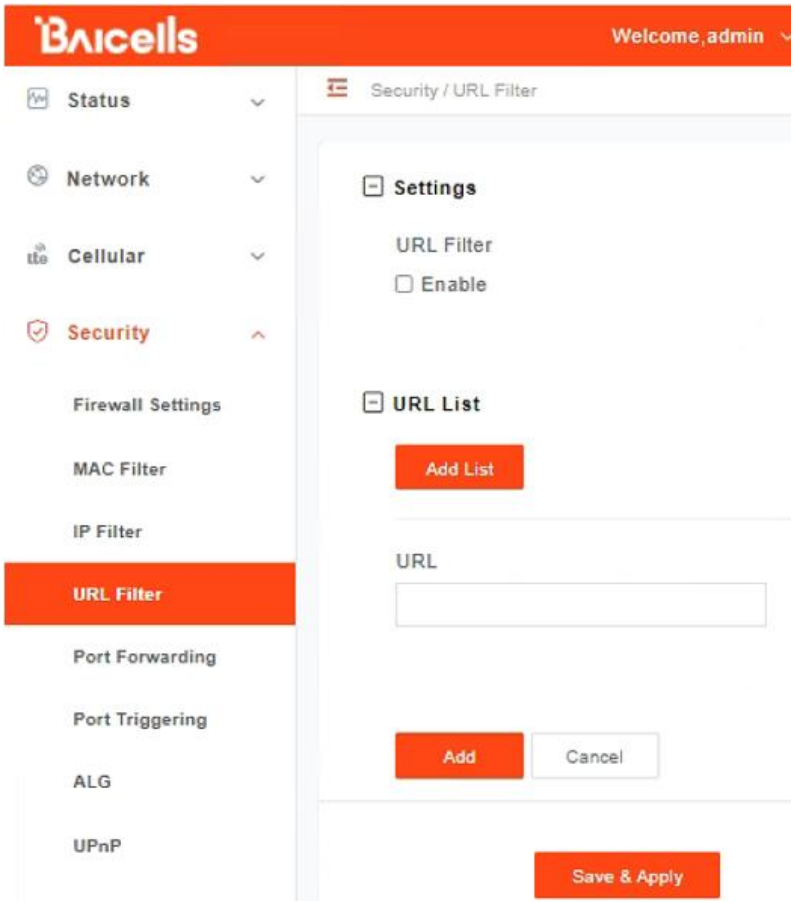
Table 2-3 IP Filter

| Field Name | Description |
|---|---|
| Service Type | Select the type of service, either custom, FTP, SSH, TELNET, SMTP, HTTP, POP3, HTTPs, or HTTP Proxy, the CPE will be allowed or forbidden to use |
| Protocol | Select the type of data protocol, either ALL, TCP, UDP, TCP&UDP, or ICMP the CPE will be allowed or forbidden to use |
| Source Address Range | Enter the IP address range for the source device(s) in the format of x.x.x.x or x.x.x.x/mask. The mask value may be 0 or 32. |
| Source Port Range | Enter the port number range for the source device(s) in the format of 1000 to 1500, or 1000. |
| Destination Address Range | Enter the IP address range for the destination device(s) to be filtered, in the format of x.x.x.x or x.x.x.x/mask. The mask value may be 0 or 32. |
| Destination Port Range | Enter the port number range for the destination device(s) to be filtered, in the format of 1000 to 1500, or 1000. |

### 2.4.4 URL Filter

The Uniform Resource Location Filter (*URL Filter*) allows you to define a list of URL addresses users are forbidden from accessing. When you enable the filter, a *Settings* window appears. Enter the specific URL address users cannot access, as shown in Figure 2-23. To add more URL addresses, click on *ADD*. After entering the addresses and saving, the URL(s) you enter will appear in the URL List.

Figure 2-23 URL Filter




## 2.4.5 Port Forwarding

When NAT mode is enabled as the WAN interface type (section 2.2.2), you can redirect a communication request from one address and port number combination to another. Only the IP address on the WAN side is open to the Internet. If a computer on the LAN is enabled to provide services for the Internet (for example, work as an FTP server), port forwarding is required so that all access requests to the external server port from the Internet are redirected to the server on the LAN.

To add a port forwarding rule, select the *Enable* check box and click on *ADD LIST* (Figure 2-24). Enter the parameters per the field descriptions in Table 2-4.

Figure 2-24 Port Forwarding

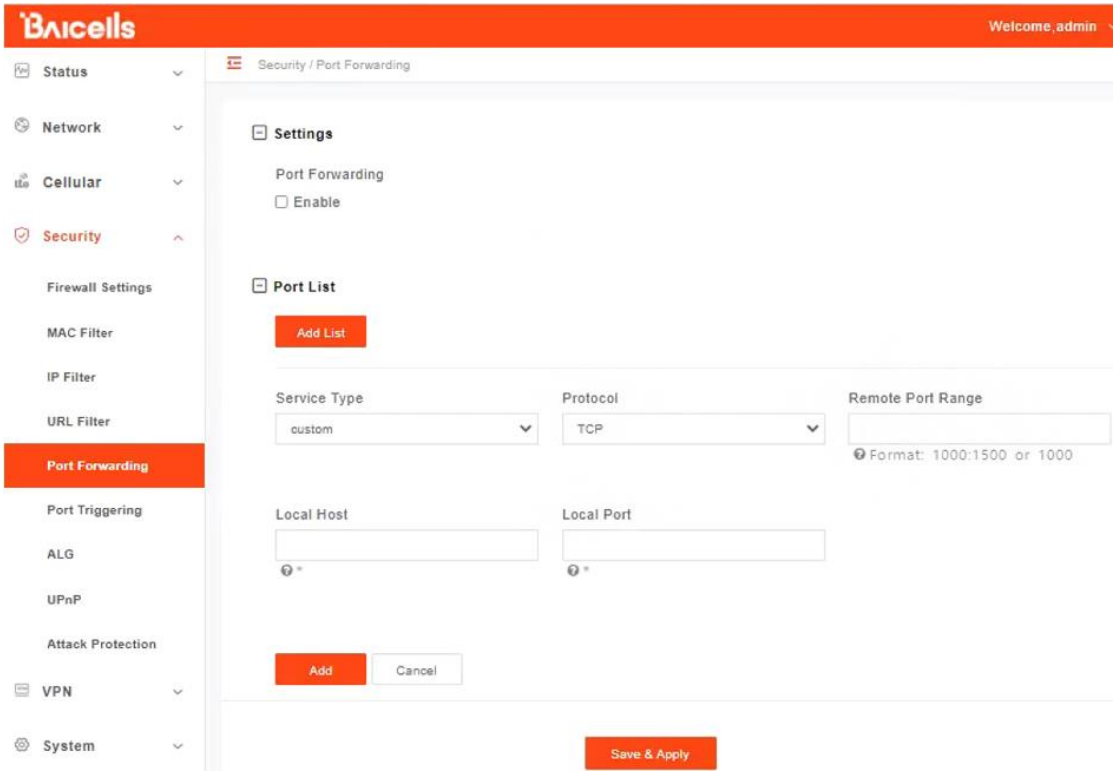



Table 2-4 Port Forwarding

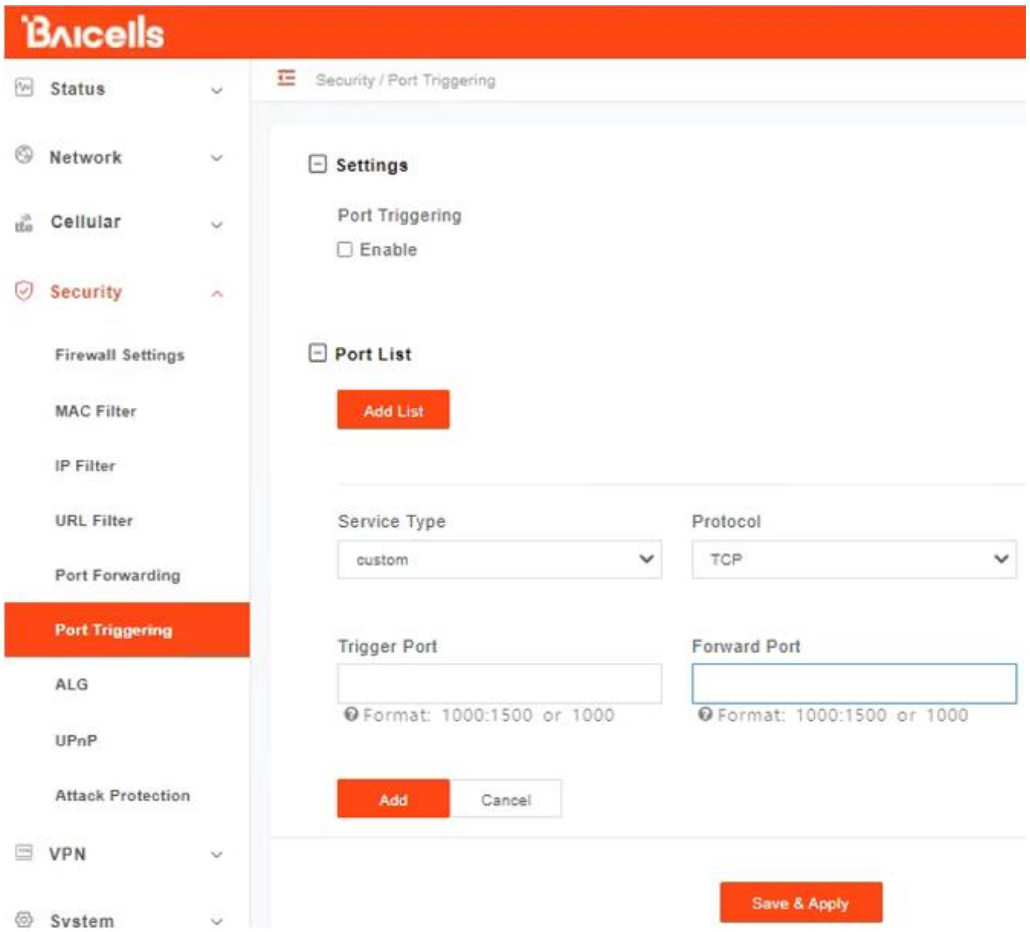
| Field Name | Description |
|---|---|
| Service Type | Select the type of service, either Custom, DNS, FTP, IPSec, POP3, SMTP, PPTP, Realplay, SSH, HTTPs, SNMP, SNMP Trap, Telnet, TFTP, or HTTP |
| Protocol | Select the type of data protocol, either TCP, UDP, or TCP&UDP |
| Remote Port Range | Enter the port number range for the remote device in the format of 1000 to 1500. Value range is 0~65535. |
| Local Host | Enter the local host IP address. The address must be different from the IP address that is set for the LAN Host Settings parameter, but they must be on the same network segment. |
| Local Port | Enter the local port number. Range is 1 to 65,535. |

## 2.4.6 Port Triggering

Port Triggering is a configuration option on a router - in this case, the CPE - if it is operating in NAT mode as the WAN interface type (section 2.2.2). When an application uses a trigger port to build a connection, the CPE will forward the data to the forward port.

To configure the feature, click on the check box next to *Enable* and then click on *ADD LIST* to enter the service type, protocol, trigger port, and forward port (Figure 2-25).

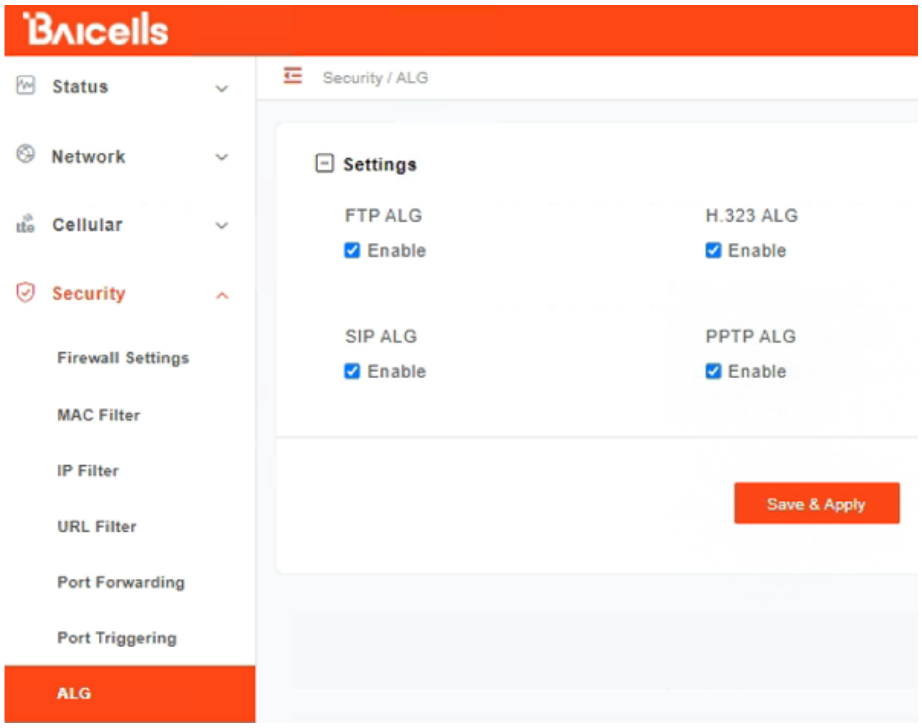
Figure 2-25 Port Triggering




## 2.4.7 ALG

The Application Layer Gateway (ALG) function provides a security component that augments a firewall or the NAT used by the CPE (if WAN Network Mode = NAT). It allows customized NAT traversal filters to be plugged into the gateway to support address and port translation for certain application layer control/data protocols such as FTP, H.323 ALG, SIP, and PPTP. You can enable the different types of application protocols by clicking on the check box next to the protocol name (Figure 2-26).

Figure 2-26 ALG

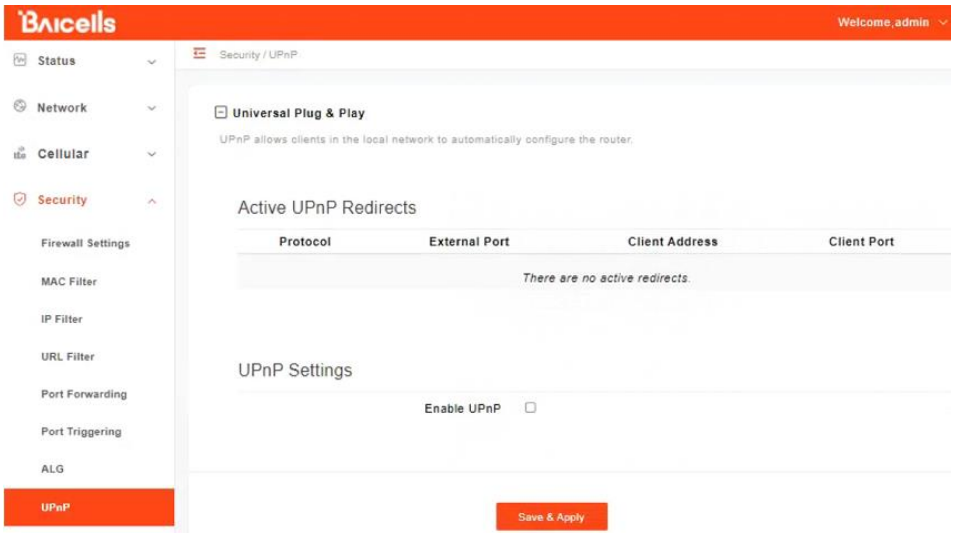



## 2.4.8 UPnP

The *Universal Plug & Play* (UPnP) function provides a set of networking protocols that allows device-to-device networking on a local network. When UPnP is enabled, devices seamlessly and dynamically discover each other's presence on the network and attach to one another and to network services. Often, UPnP is used for streaming media between devices on the network.

Go to Security > UPnP to enable the CPE to be searched by other devices (Figure 2-27). Once enabled, any redirects of traffic will display in the *Active UPnP Redirects* section of the window.

Figure 2-27 UPnP

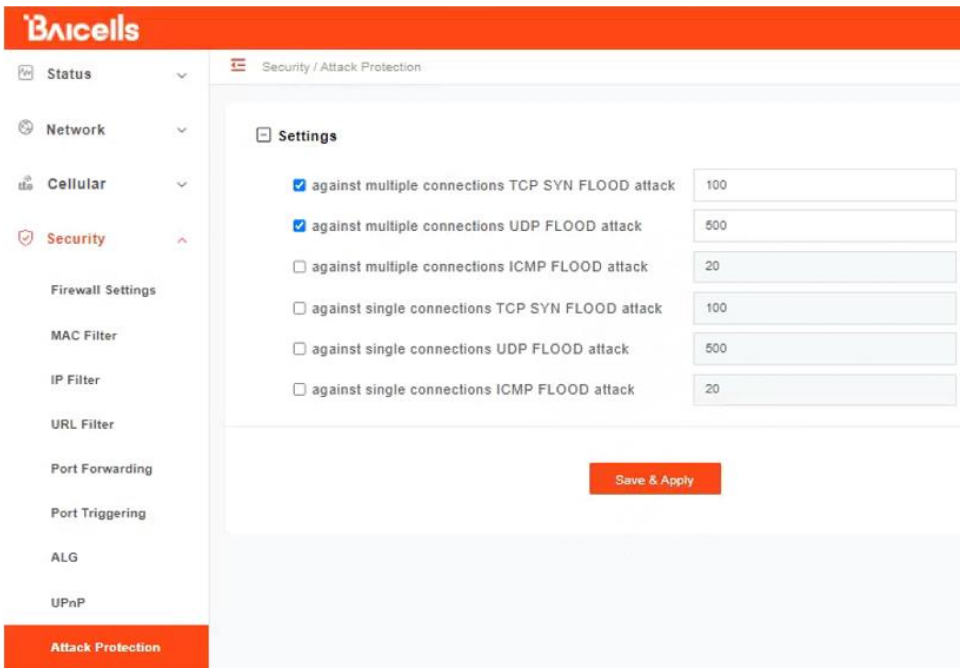



## 2.4.9 Attack Protection

The *Attack Protection* settings provide an additional security measure that helps prevent computer hacker attacks such as TCP SYN FLOOD, UDP FLOOD, and IMCP FLOOD for devices connected to the network through the CPE.

In the Security > Attack Protection window (Figure 2-28), select the check box next to the flood protection options you want to enable. When you click the check box, the field on the right becomes editable. Accept the default timer value, in seconds, or enter a value for each type of attack protection.

Figure 2-28 Attack Protection



# 2.5 VPN Menu

The Virtual Private Network (*VPN*) menu (Figure 2-29) enables you to configure a connection between the CPE and a VPN, e.g., to access a corporate network when telecommuting for work. You can enable a Layer 2 Tunneling Protocol (L2TP) gateway or a Layer 2 network connection to the VPN.

Figure 2-29 VPN Menu


## 2.5.1 IPSec

The IP security (IPSec) network protocol suite is used between 2 communication points across the IP network. The protocols provide data authentication, integrity, and confidentiality protection services. They are needed for secure key exchange and key management between the two network entities.

The top of the IPSec window is where you can add one or more security policies (Figure 2-30). The status of each policy you create will display in the lower half of the window.

Figure 2-30 IPSec


To configure an IPSec policy for this CPE, select the *ADD POLICY* button (Figure 2-31). Enter the policy name, remote gateway, local and remote subnets, and pre-shared key for the VPN connection. The *Advance Settings* offer additional parameters such as key exchange version, IKE encryption method, etc. Refer to Table 2-5.

Figure 2-31 IPSec

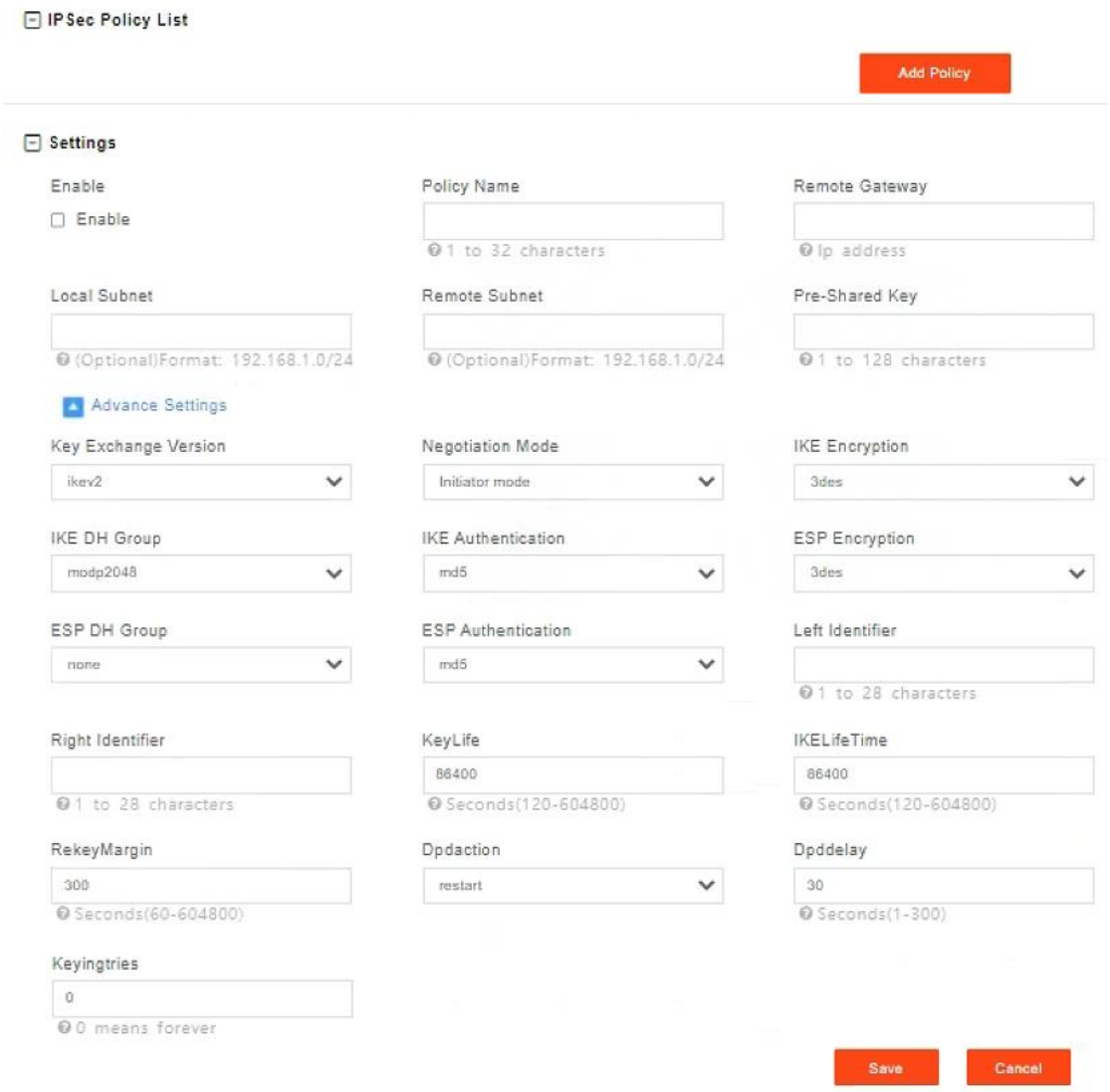



Table 2-5 IPSec

| Field Name | Description |
|---|---|
| Enable | Click on the check box to enable IPSec |
| Policy Name | Enter a policy name using up to 32 characters |
| Remote Gateway | IP address of the remote gateway |
| Local Subnet | Optional: IP address of the local subnet |
| Remote Subnet | Optional: IP address of the remote subnet |
| Pre-Shared Key | Up to 128 characters |
| Key Exchange Version | Internet Key Exchange (IKE) encryption method version 2 or version 1. IKE is a protocol used to ensure security for virtual private network (VPN) negotiation and remote host or network access. |
| Negotiation Mode | Initiator mode or Responder mode |
| IKE Encryption | des, 3des, aes128, aes192, or aes256 |

| | |
|---|---|
| IKE DH Group | modp768, modp1024, modp1536, modp2048, or modp4096 |
| IKE Authentication | md5, sha1, sha256, sha384, or sha512 |
| ESP Encryption | des, 3des, aes128, aes192, or aes256 |
| ESP DH Group | none, modp768, modp1024, modp1536, modp2048, or modp4096 |
| ESP Authentication | md5, sha1, sha256, sha384, or sha512 |
| Left Identifier | 1-28 characters |
| Right Identifier | 1-28 characters |
| KeyLife | 120-604800 seconds |
| IKELifeTime | 120-604800 seconds |
| RekeyMargin | 120-604800 seconds |
| Dpdaction | none, clear, hold, or restart |
| Dpddelay | 1-300 seconds |
| Keyingtries | 0 means forever |

### 2.5.2 OpenVPN

OpenVPN is an open-source, Virtual Private Network (VPN) encryption protocol. As well as being extremely secure, OpenVPN is highly customizable and can be implemented in a number of different ways. For that reason, using this VPN method requires significant networking experience to implement. The range of options includes remote access, site-to-site VPNs, Wi-Fi security, and enterprise-scale remote access solutions. The remote access solutions support robust capabilities such as load balancing, failover, and more granular access controls, e.g., articles, examples, security overview, and non-English languages.

OpenVPN implements OSI Layer 2 or 3 secure network extension using the industry standard SSL/TLS protocol. It supports flexible client authentication methods based on certificates, smart cards, and/or two-factor authentication, and allows user or group-specific access control policies using firewall rules applied to the VPN interface. Setting up OpenVPN involves configuring server and client settings. Refer to Figure 2-32, Figure 2-33 (server), and Figure 2-34 (client) configuration fields.

Figure 2-32 OpenVPN

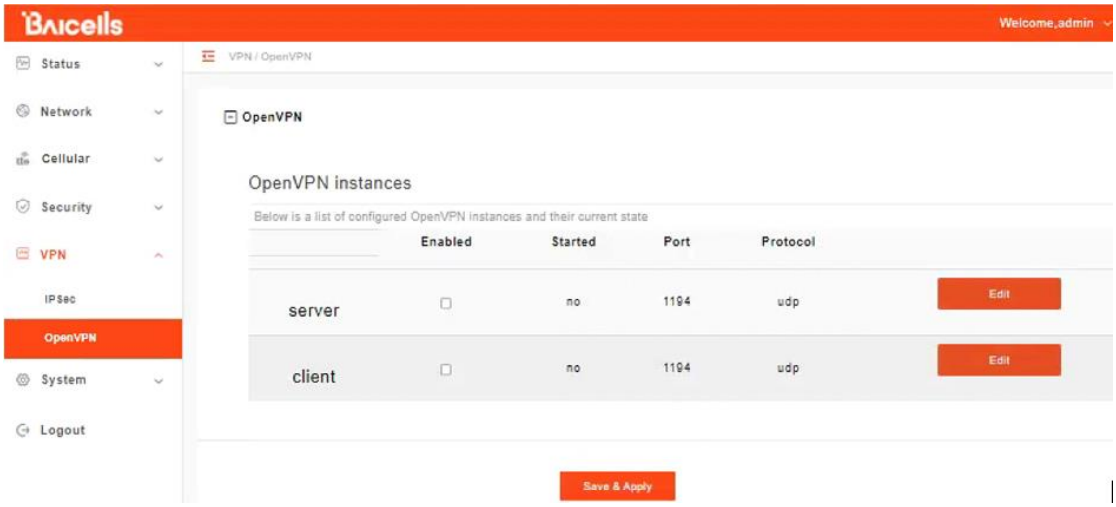



Figure 2-33 Server

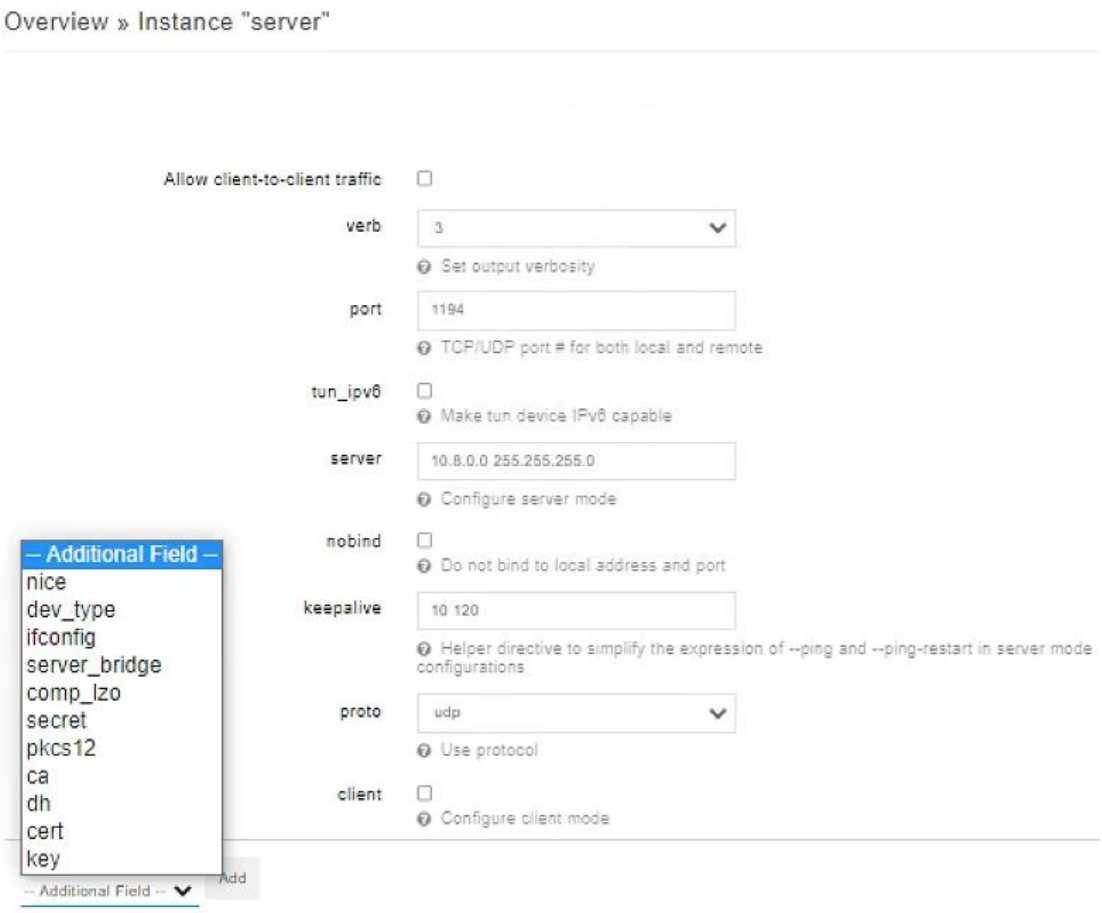
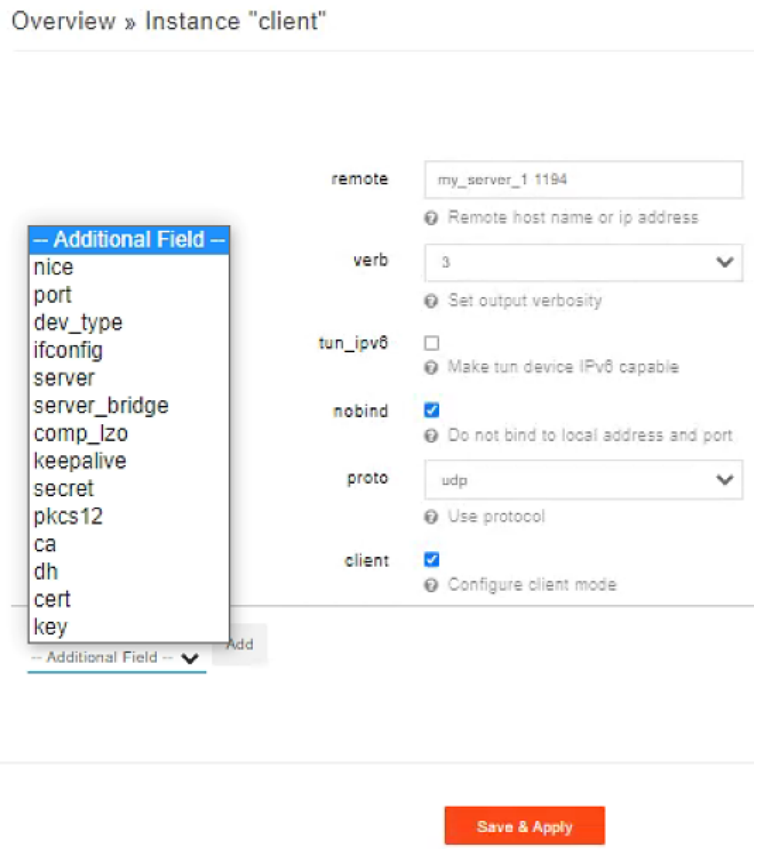


Figure 2-34 Client

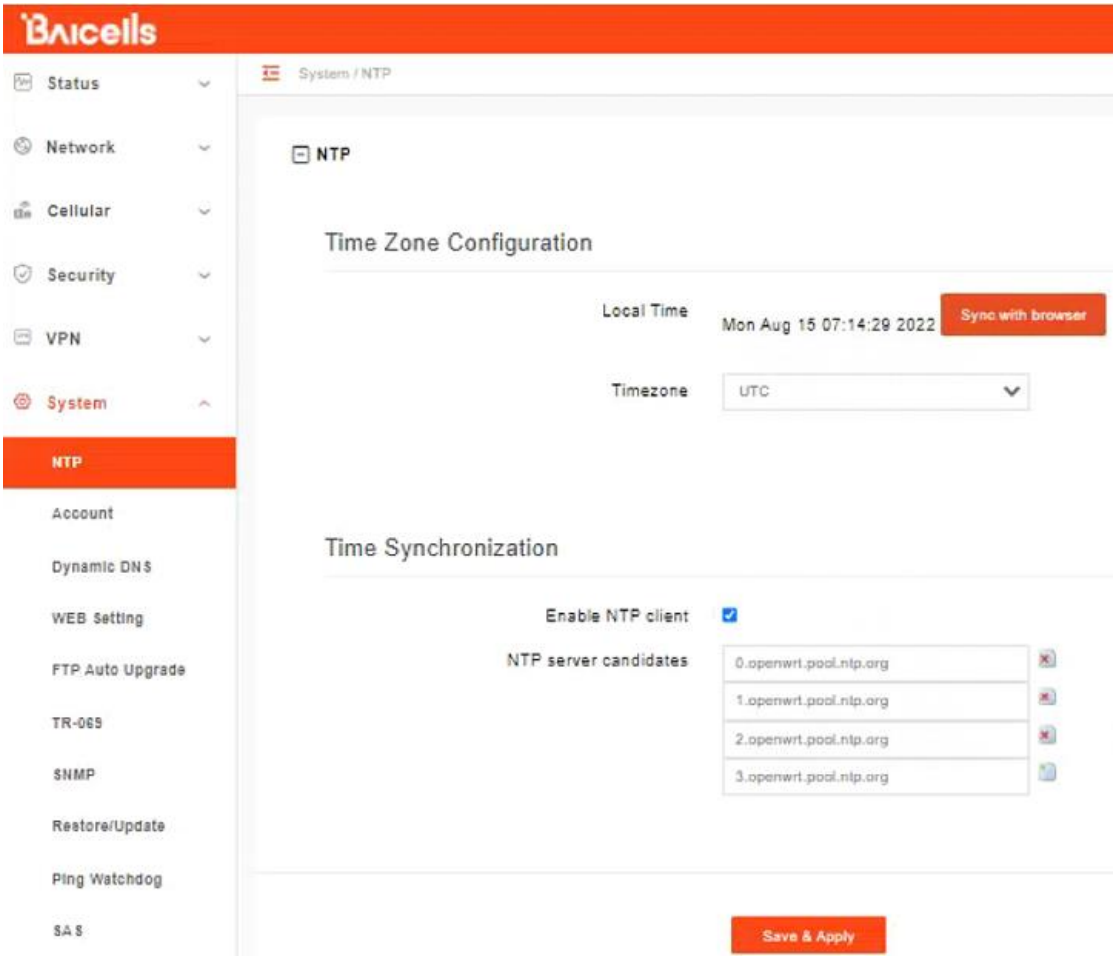



# 2.6 System Menu

## 2.6.1 NTP

The operator's network may use up to 4 Network Time Protocol (NTP) servers to provide correct time-of-day to network devices. In the CPE GUI you can refresh the local time display using the *SYNC WITH BROWSER* button; select the time zone that the CPE is in; and enable NTP client to use the default or specified NTP servers for synchronization (Figure 2-35).

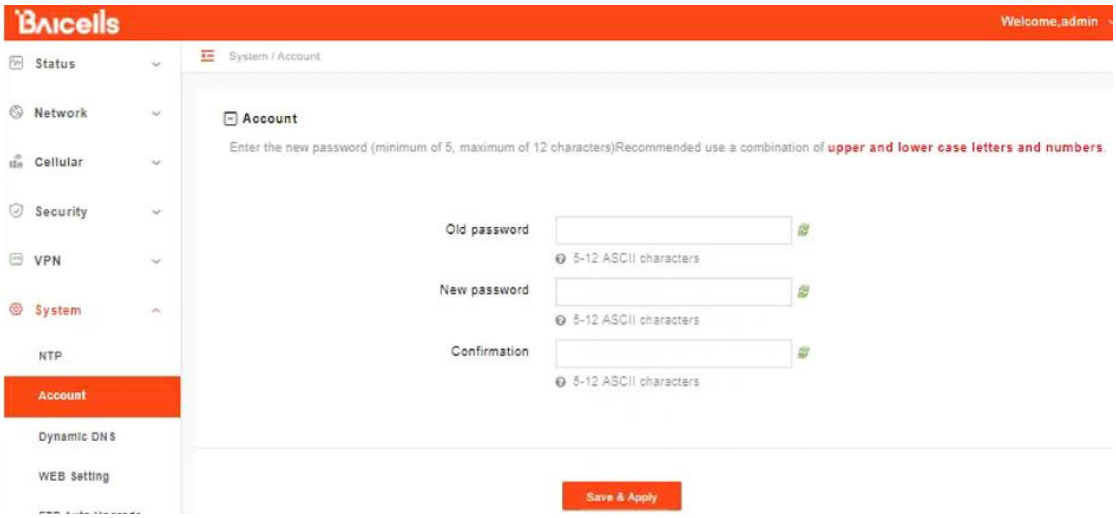
Figure 2-35 NTP




## 2.6.2 Account

This menu is used to change the login password for the CPE (Figure 2-36). The password must be 5 to 12 characters. Baicells recommends using a combination of upper- and lower-case letters and numbers.

Figure 2-36 Account




## 2.6.3 Dynamic DNS

The dynamic DNS function is to map the user's dynamic IP address to a fixed domain name resolution service. Each time the user connects to the network, the client program will transmit the dynamic IP address of the host to the server program located on the host of the service provider through information transmission. The server program is responsible for providing DNS service and realizing dynamic domain name resolution.

Figure 2-37 Dynamic DNS Overview

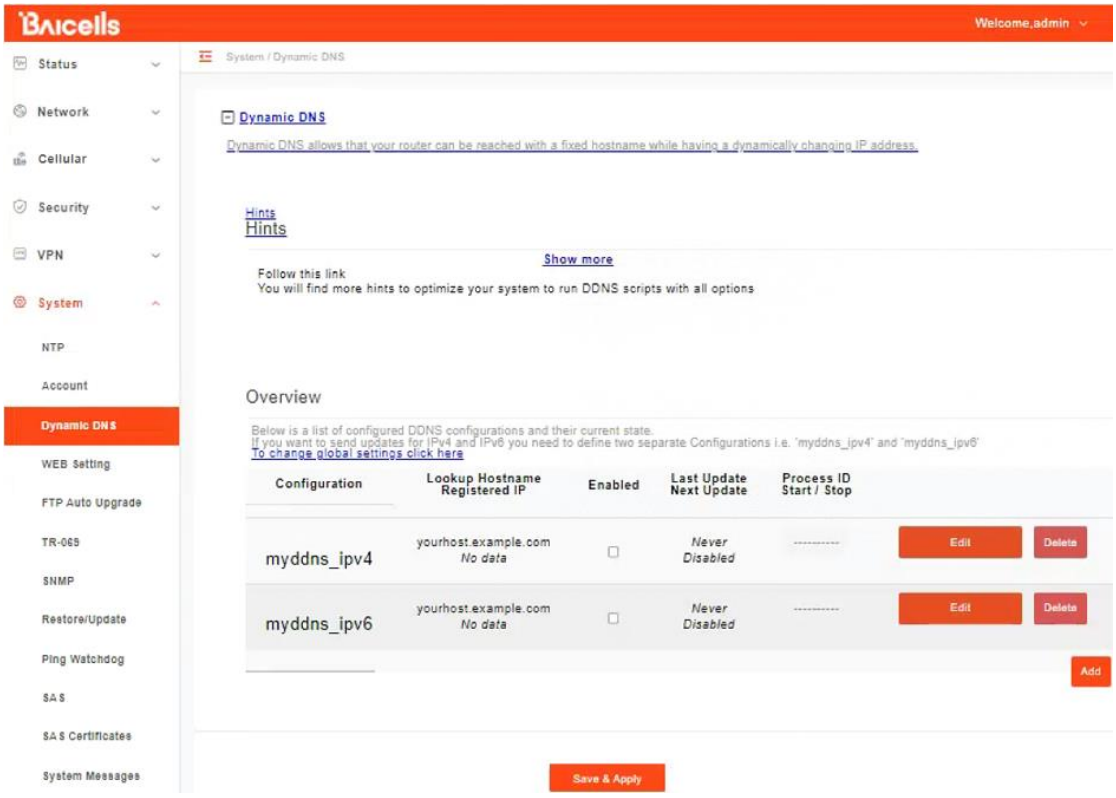


Figure 2-38 Dynamic DNS Global Settings

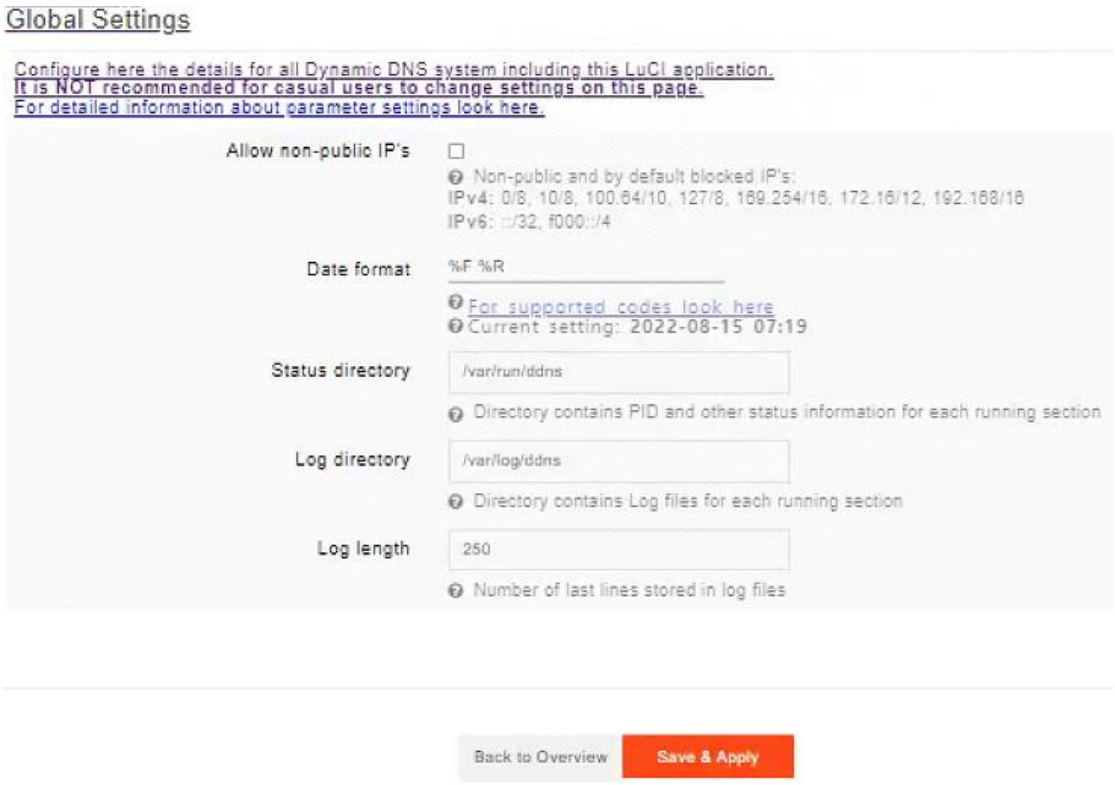


Figure 2-39 IPv4 DDNS configuration

Figure 2-40 IPv6 DDNS configuration


## 2.6.4 WEB Setting

WEB Setting provides the ability to configure and manage the CPE remotely (Figure 2-41). This is especially helpful when a user calls in for technical assistance. In “1.4 Log In”, you used this Web application with the default URL of http://192.168.150.1. Refer to Table 2-6 for a description of each field.

Figure 2-41 WEB Setting

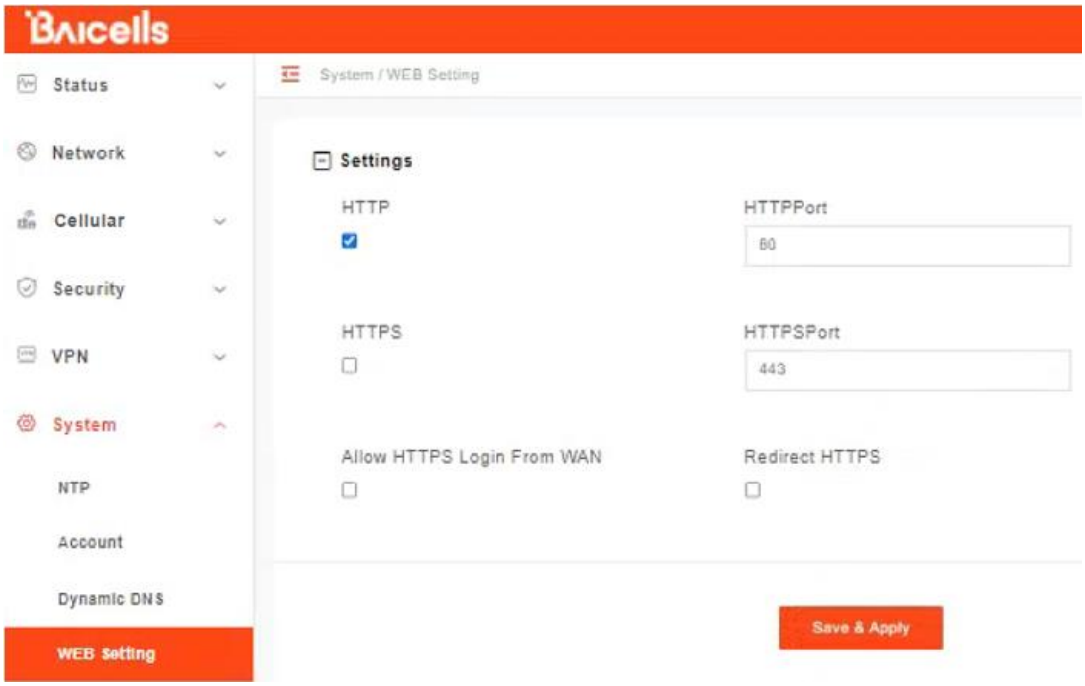



Table 2-6 WEB Setting

| Field Name | Description |
|---|---|
| HTTP | Select the check box next to Enable to log in to an HTTP Web address |
| HTTPPort | Enter the HTTP port number to be used. Range is 80 to 65,535. Default is port 80.<br>Note: Port cannot be set to 8080. Because 8080 is already occupied by the module port number. |
| HTTPS | Select the check box next to Enable to log in to an HTTPS Web address |
| Redirect HTTPS | Select the check box to allow HTTP addresses to be redirected to more secure HTTPS addresses |
| Allow HTTPS Login From WAN | Select the check box next to enable log in to an HTTPS Web address from the WAN |
| HTTPSPort | Enter the HTTPS port number to be used. Range is 80 to 65,535. Default is port 80.<br>Note: Port cannot be set to 8081. Because 8081 is already occupied by the module port number. |

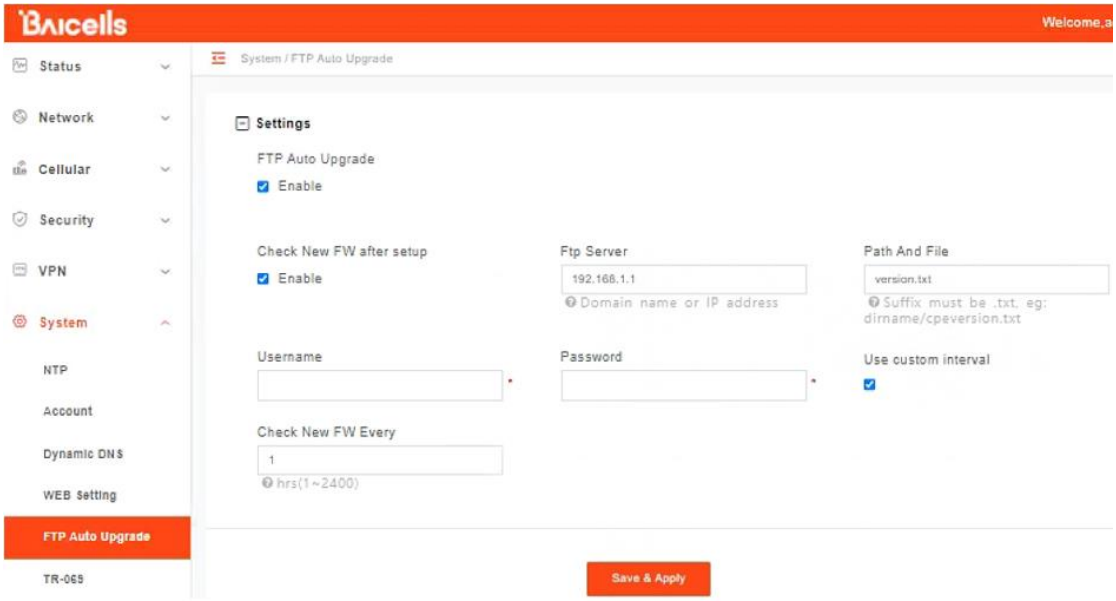
## 2.6.5 FTP Auto Upgrade

The FTP Auto Upgrade feature is used for over-the-air (OTA) upgrades. The CPE will

detect a new version of firmware on the dedicated FTP server, if available, and will automatically upgrade to the new version.

If you are using a dedicated FTP server for this purpose, select the *Enable* check boxes next to *FTP Auto Upgrade* and *Check New FW after setup* (Figure 2-42). Enter the FTP server IP address and the *Path And File* text suffix. If login permissions are required to access the server, enter the username and password. To configure a set interval for the CPE to check the server for new firmware, select the check box next to *Use custom Interval* and enter the interval time, in hours. The range is 1-2400 hours.

Figure 2-42 FTP Auto Upgrade




## 2.6.6 TR-069

If your network operates using a TR-069 auto-configuration server (ACS), the ACS will automatically provide the CPE configuration settings. Once you set up both the ACS and the CPE, you do not need to enter any other parameters through the CPE GUI. Use the *TR069* sub-menu to enable the TR-069 function for the CPE (Figure 2-43). Refer to Table 2-7 for a description of each field.

Figure 2-43 TR-069

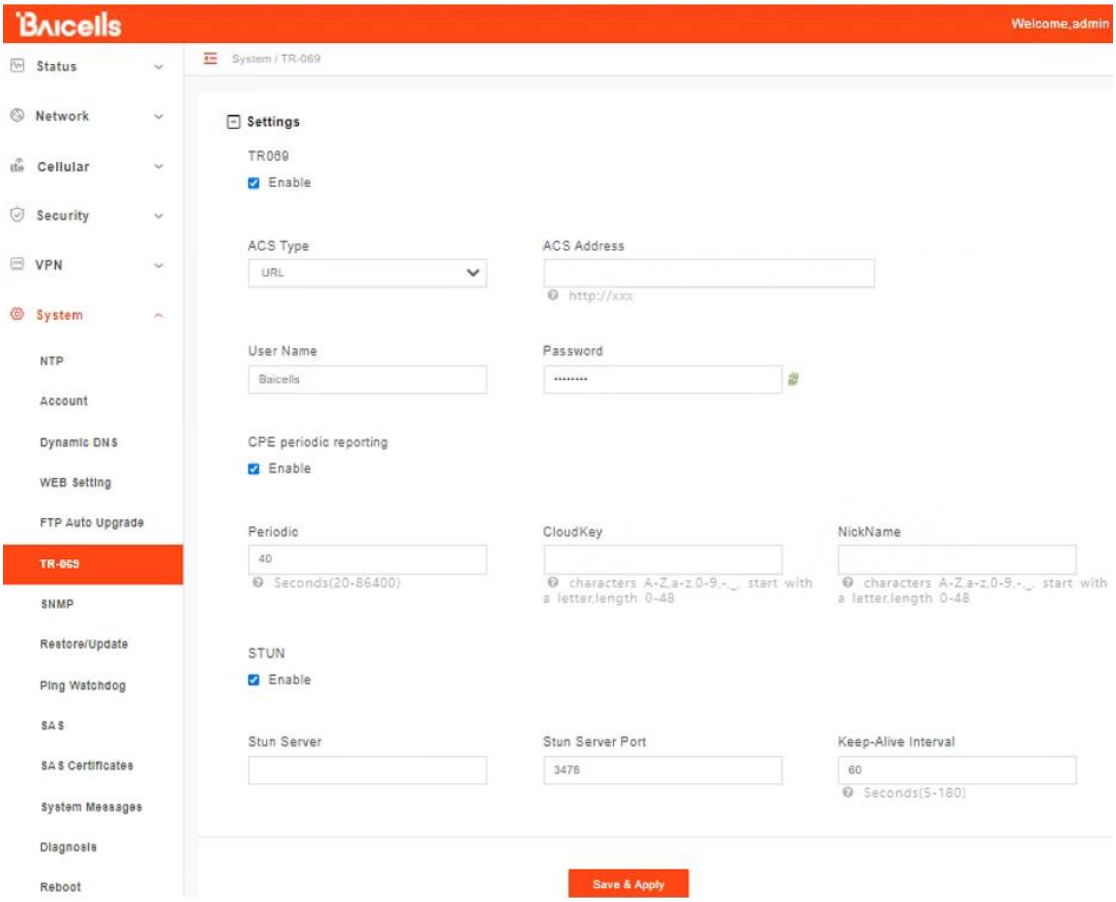



Table 2-7 TR-069

| Field Name | Description |
|---|---|
| TR069 | Select the check box next to Enable if using a TR-069 auto-configuration server (ACS) to configure the CPE |
| ACS Type | Select URL or DHCP to identify the source of the ACS server. When you select URL, the next field (ACS Address) appears. |
| ACS Address | Enter the server Web address |
| User Name | Enter the user name to access the ACS server |
| Password | Enter the password to access the ACS server |
| CPE periodic reporting | Select the check box next to Enable to enable the CPE to periodically check with the ACS server for new software |
| Periodic | If you enabled CPE periodic reporting, input how often the CPE should check the ACS server for new information. The range is 20 to 86,400 seconds. |
| CloudKey | If using the Baicells CloudCore, enter the operator's unique CloudKey. When the device powers up the first time it will automatically be added to the operator's OMC account. |
| NickName | Optional – enter a nickname to identify the server |

| Field Name | Description |
|---|---|
| STUN | TR069 supports NAT penetration, and OMC can send TR069 request to CPE |
| Stun Server | Nat penetration server address |
| Stun Server Port | Nat penetration server port |
| Keep-Alive Interval | Interaction cycle between CPE and NAT server |

## 2.6.7 SNMP

The Simple Network Management Protocol (SNMP) is used for connecting a device with a Network Management System (NMS) server. An operator's NMS can monitor and control the connected CPEs that have SNMP enabled. The NMS is able to collect event logs, alarm logs, and other data from those CPEs.

To enable SNMP, select the *Enable* check box (Figure 2-44). Complete the settings per the field descriptions in Table 2-8.

Figure 2-44 SNMP

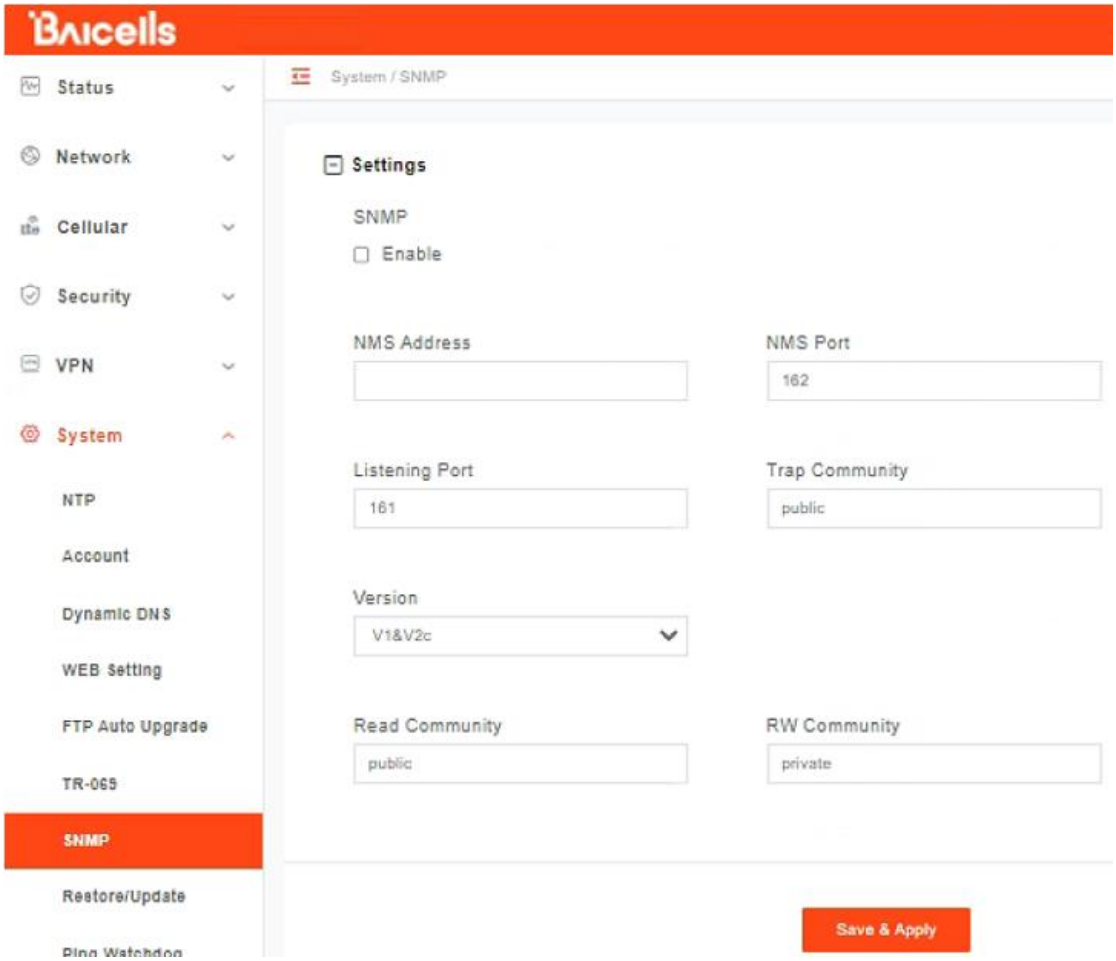


Table 2-8 SNMP

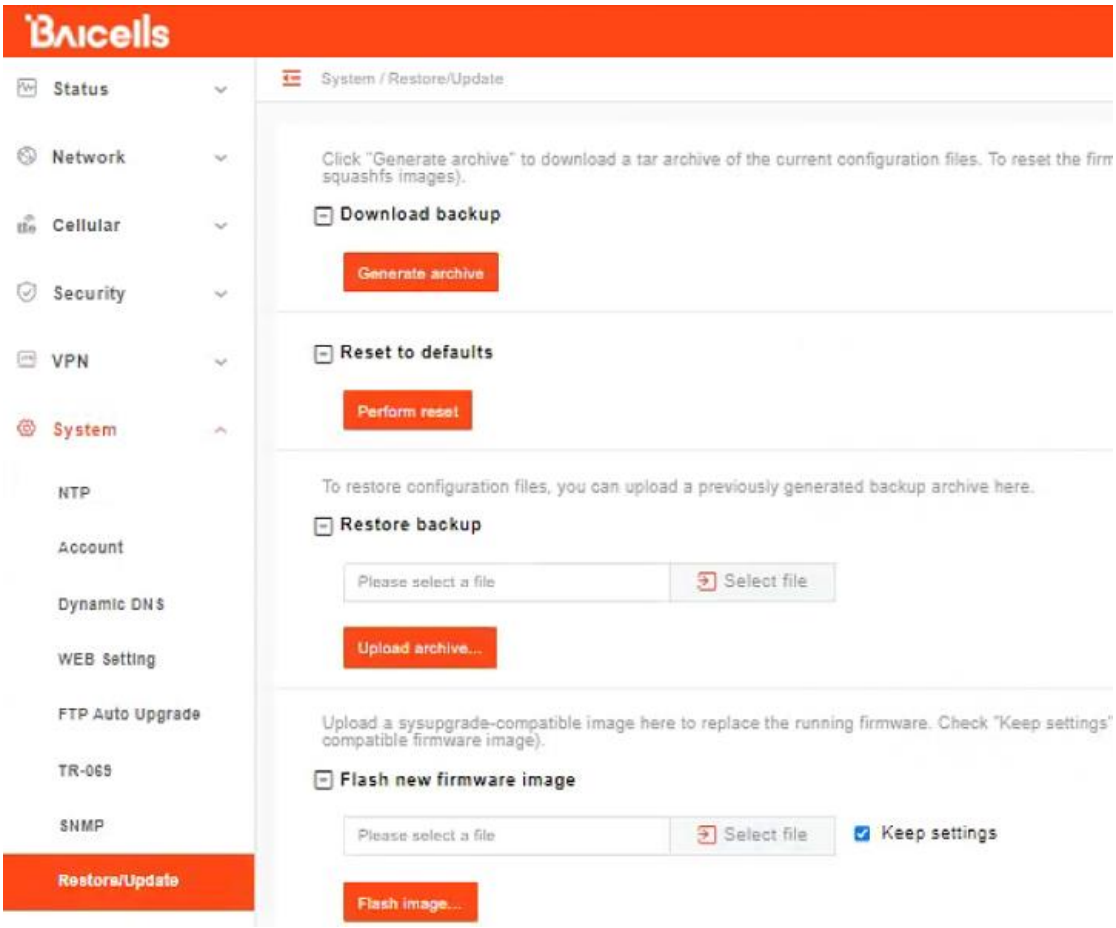
| Field Name | Description |
|---|---|
| SNMP | Enable the Simple Network Management Protocol by clicking the check box. |
| NMS Address | NMS server IP address |
| NMS Port | NMS server port number |
| Listening Port | CPE port number |
| Trap Community | Public or private - identifier to distinguish read/write permissions for data |
| Version | Select the SNMP version you are implementing - V1&V2c (for SNMPv1+SNMPv2c) or V3 (for SNMPv3) |
| Read Community | Public or private read-only community name |
| RW Community | Public or private read/write community name |

## 2.6.8 Restore/Update

Use the System > Restore/Update menu to reset the CPE to its factory default settings, to manually update the firmware, or to manually update a module within the firmware - meaning to apply a patch to the current firmware (Figure 2-45).

**Caution**: Performing a restore or update action will disrupt service.

Figure 2-45 Restore/Update




### 2.6.8.1 Restore

To initiate a restore action, click on the **PERFORM RESET** button. The CPE will automatically reset its configuration to the factory default values.

To back up current settings, click the **GENERATE ARCHIVE** button.

To restore configuration files, select backed up file on your computer, and then click the **UPLOAD ARCHIVE** button.

### 2.6.8.2 Update Firmware

**Caution**: Do not power off the CPE or disconnect it from the computer during an upgrade.

To update (upgrade) the CPE to a different firmware version (Figure 2-45):

1. Download the image file from the Baicells support website (Baicells > Support > Downloads), and save it to your computer.

2. Under *Flash new firmware image*, determine if you want to keep the current configuration settings on the CPE. If you do, select the check box next to **Keep settings**.
3. Click on **Choose File** to navigate to the new image file on your computer, and then click on **FLASH IMAGE** to initiate the upgrade.

After the upgrade, the CPE will restart automatically running the newer version of code.

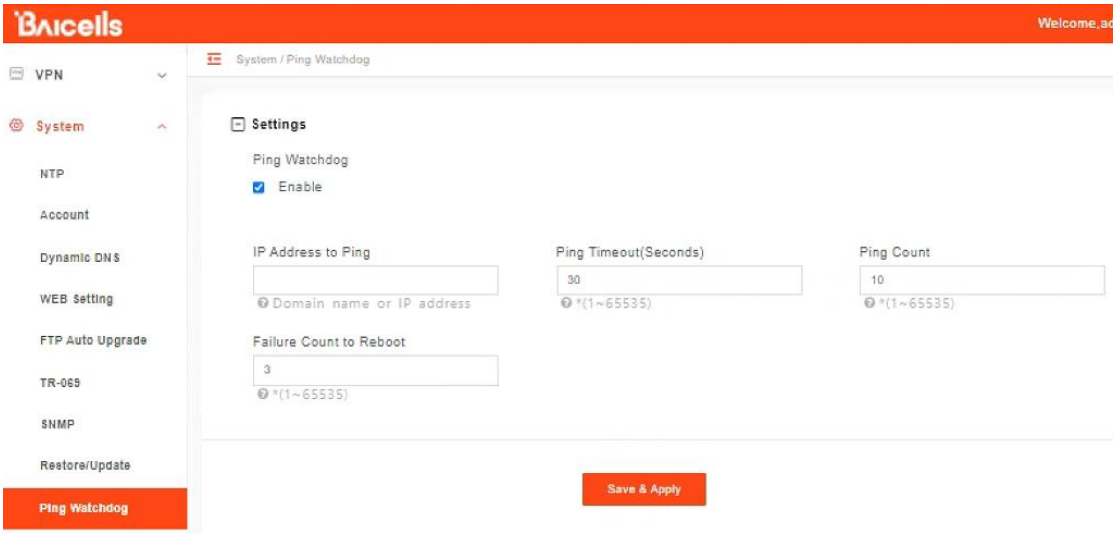
## 2.6.9 Ping Watchdog

Ping Watchdog is a feature used for detecting the Internet connection state of the CPE. If the CPE cannot connect to the Internet, if this feature is enabled it will reset the LTE module in the CPE firmware or reboot the CPE in an attempt to recover the connection.

To enable the watchdog function (Figure 2-46):

1. Select the check box next to Enable and enter an IP address accessible by Internet for the CPE to try to ping.
2. Set the period of time, in seconds, for the ping to timeout. The range is 1-65535 seconds.
3. Enter the number of times to try to ping the address, in the range of 1-65535 times.
4. Enter the maximum number of times the CPE can try the ping but fail before the CPE initiates a reboot. The range is 1-65535 times.

Figure 2-46 Ping Watchdog




## 2.6.10 SAS

CPE realizes equipment registration, authentication and spectrum access license acquisition through SAS.

SAS menu provides SAS info and SAS settings, as shown in Figure 2-47.

Figure 2-47 SAS Menu

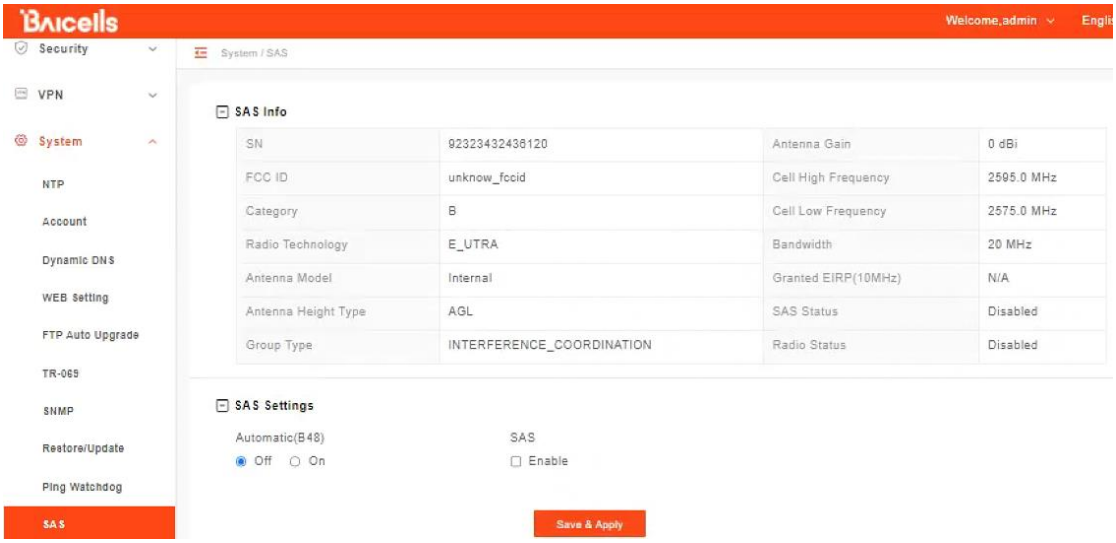



Table 2-9 SAS Info field description

| Field Name | Description |
|---|---|
| SN | Serial number of the product |
| FCC ID | FCCID of the product |
| Category | Product category (A or B) |
| Radio Technology | Antenna technology |
| Antenna Height Type | Antenna type |
| Group Type | SAS CPE Device Group Category |
| Antenna Gain | Antenna gain |
| Cell High Frequency | The highest frequency of the current LTE access band |
| Cell Low Frequency | The lowest frequency of the current LTE access band |
| Bandwidth | LTE current bandwidth |
| Granted EIRP(10MHz) | SAS server authorized power |
| SAS Status | SAS current status |
| Radio Status | Current RF status of LTE |

### 2.6.10.1 SAS Settings

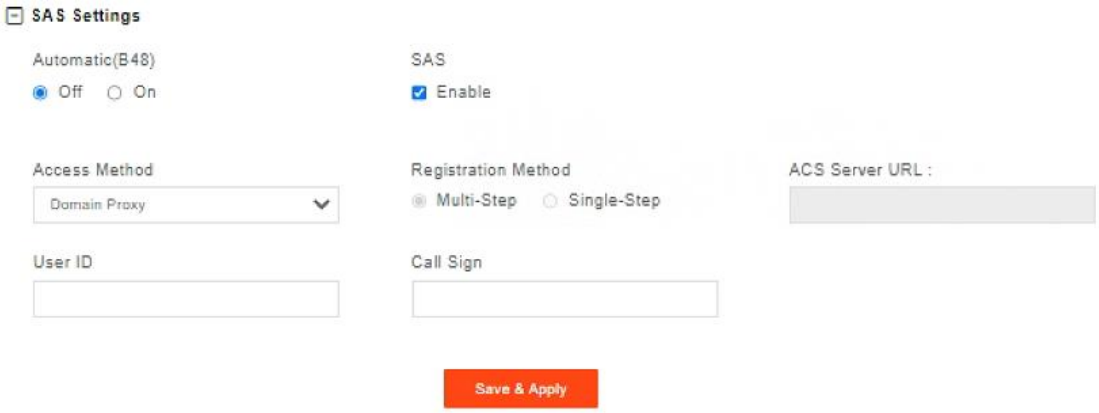
1. Select the enabling mode of SAS function.
   - Automatic (B48) select On, automatically turn on SAS (when the device is connected to band48, SAS will be turned on automatically; when the device is connected to non band48, SAS will be turned off automatically).

     Figure 2-48 Automatic SAS

   - Automatic (B48) select Off, turn on SAS manually (If enable is selected for SAS, it means the SAS function is turned on; if not selected, it means the SAS function is turned off).

     Figure 2-49 SAS Settings

2. Select SAS access mode.
   - Select Domain Proxy: SAS proxy. Implement SAS access through OMC.
   - Select Direct SAS: SAS direct connection. CPE is directly connected to SAS server.
3. In Direct SAS mode, you need to select SAS registration mode.
   - Select Multi-Step: multi step registration. This registration mode is used when the installation information of the device already exists on the SAS server.
   - Select Single-Step: single step registration. This registration mode is used when there is no installation information of the device on the SAS server.

4. Configure SAS parameters.

Table 2-10 SAS Settings

| Field Name | Description |
|---|---|
| ACS Server URL | Web address of the auto-configuration server (ACS). When the access method is **Domain Proxy**, the default DP server is the ACS URL configured on the TR069 page and cannot be edited manually. |
| SAS Server URL | The address of the SAS server in direct mode. When the access method is **Direct SAS**, you can manually change the URL. |
| User ID | Enter the user name to access the ACS server |
| Call Sign | Device identifier |

5. When Single-Step registration mode is selected, antenna parameters need to be configured.

Figure 2-50 Antenna Parameters

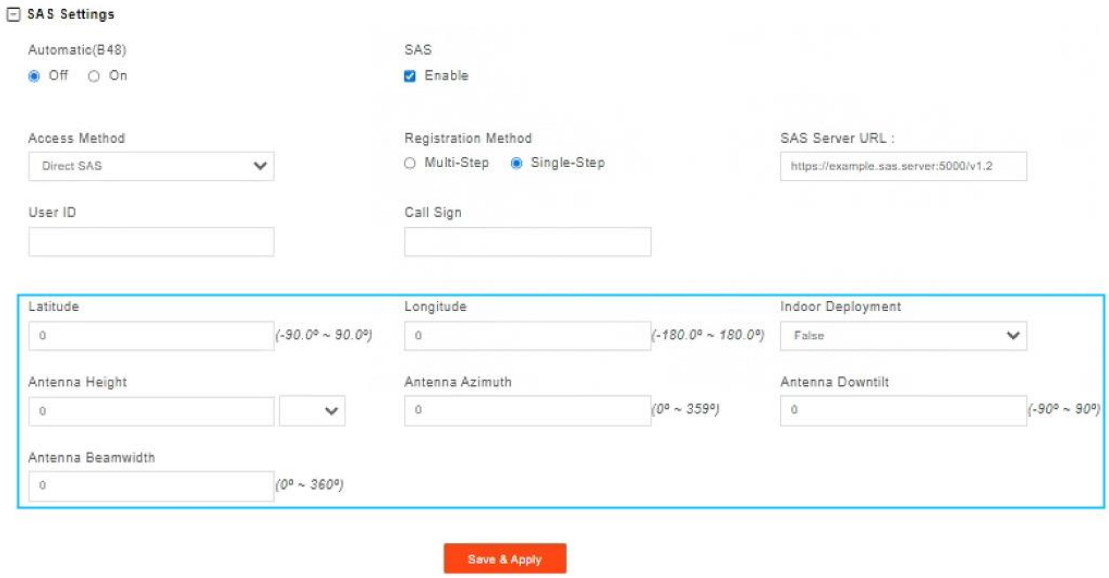



Table 2-11 Antenna Parameters

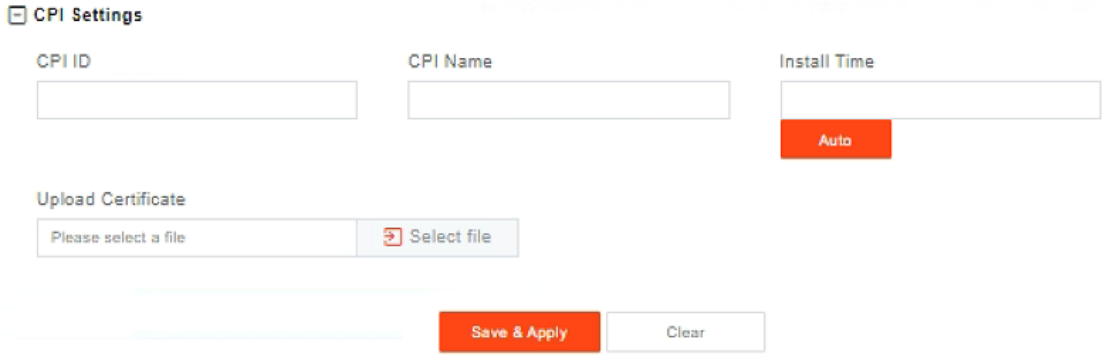
| Field Name | Description |
|---|---|
| Latitude | Latitude of the CPE antenna location in degrees |
| Longitude | Longitude of the CPE antenna location in degrees |
| Indoor Deployment | Whether the CPE antenna is indoor or not |
| Antenna Height | The CPE antenna height |
| Antenna Azimuth | Boresight direction of the horizontal plane of the antenna in degrees with respect to true north. |

| Field Name | Description |
|---|---|
| Antenna Downtitle | Antenna down tilt in degrees and is an integer |
| Antenna Beamwidth | The CPE antenna beamwidth |

### 2.6.10.2 CPI Settings

When Single-Step is selected for the registration method in SAS settings, the CPI settings area appears, as shown in Figure 2-51.

Figure 2-51 CPI Settings




CPI (Certified Professional Installer) Settings is used to verify the information of the installer.

1. Enter CPI ID or CPI name.
2. Enter the Install Time or click the **Auto** button.
3. Click **Choose file** to select CPI certificate file from this computer.
4. Click **SAVE & APPLY** to make the configuration effective.

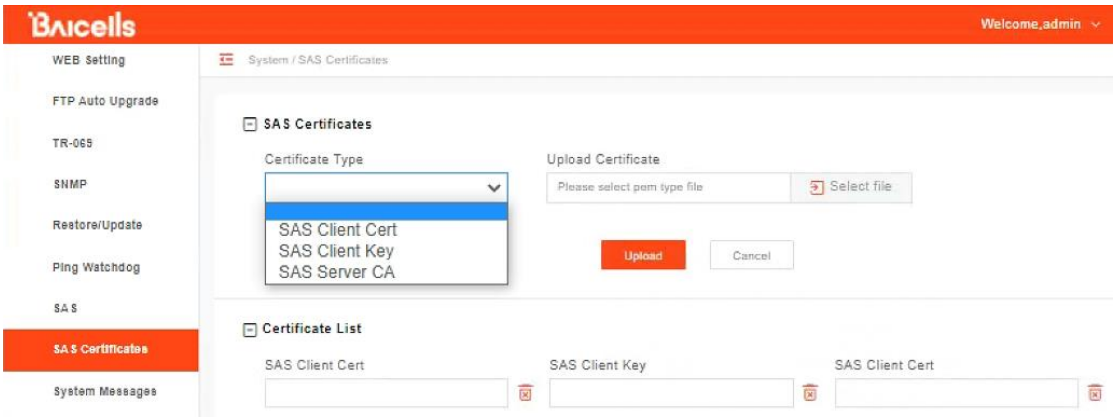
## 2.6.11 SAS Certificates

Upload the certificate required for CPE to connect with SAS server.

Three types of certificates can be uploaded: SAS Client Cert, SAS Client Key and SAS Server CA.

After the certificate is uploaded successfully, the certificate file name can be displayed in the Certificate List. If you need to replace the certificate, you can click the **Remove** button on the right side of the certificate to delete the certificate, and then upload the new certificate again.

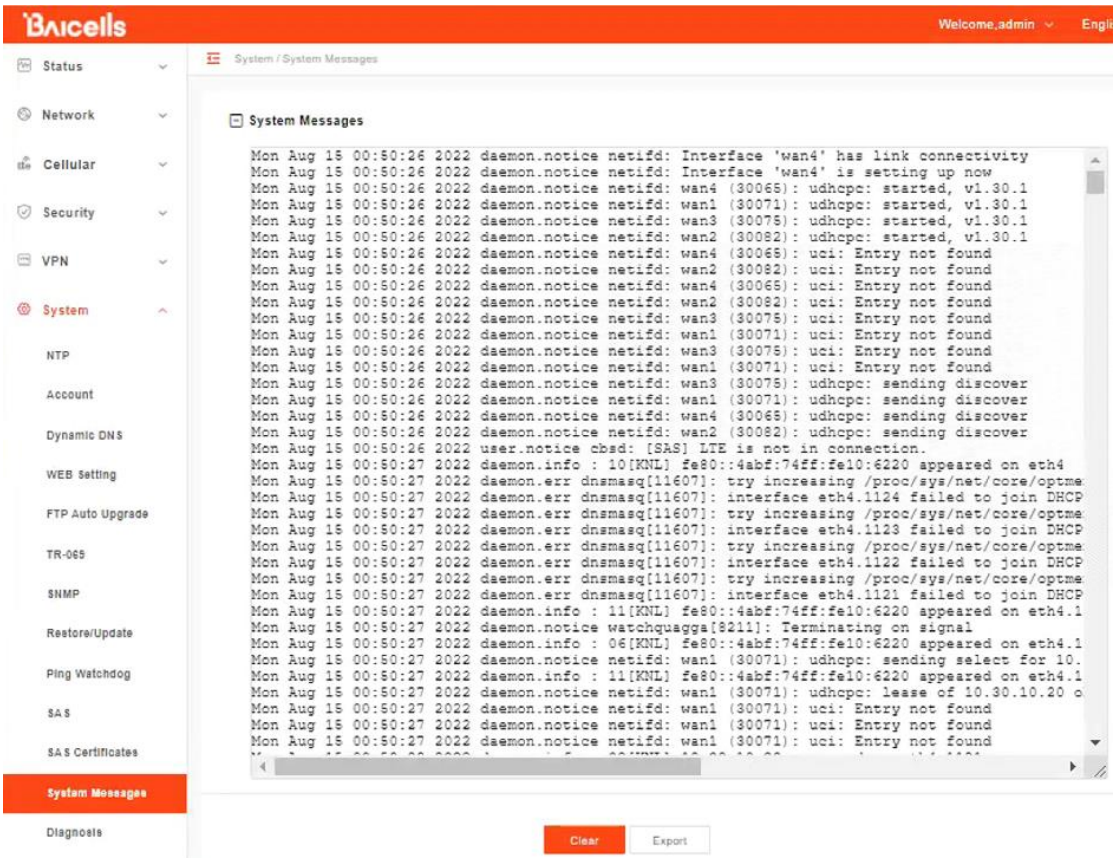
Figure 2-52 SAS Certificates




## 2.6.12 System Messages

Use this Web-GUI, you can Export System Message, collect real-time system information and transfer system message to PC.

Figure 2-53 System Messages

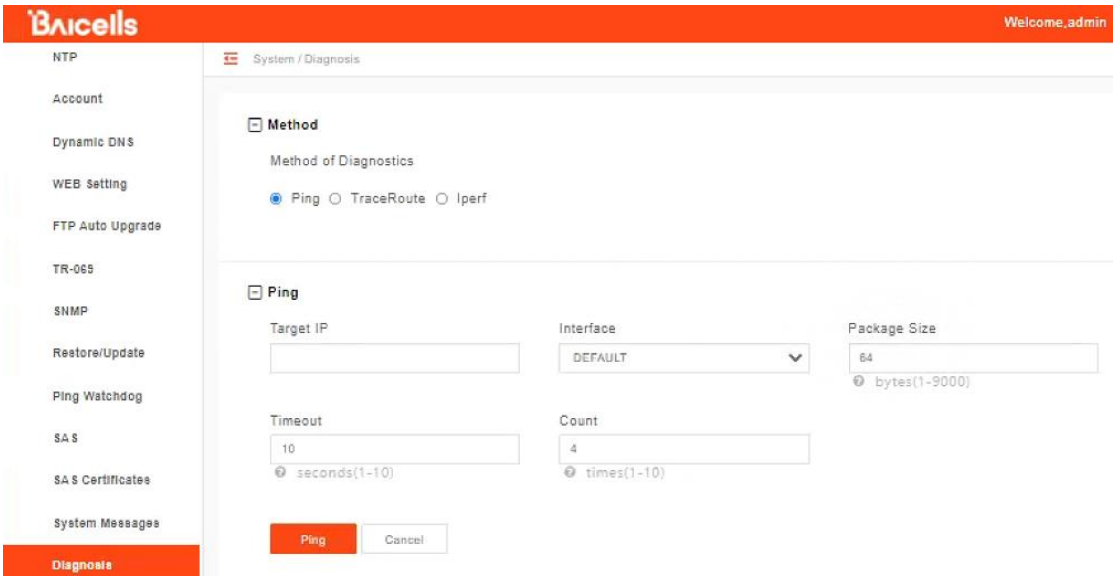



## 2.6.13 Diagnosis

The System > Diagnosis menu provides 3 types of diagnostic tests that may be used for

troubleshooting connection issues: Ping and Traceroute (Figure 2-54).

Figure 2-54 Diagnosis



### 2.6.13.1 Ping

Ping is used to manually initiate a ping test to check connection status. Running a ping test will send data packets of a specified size from the CPE over the network to a target IP address. The results of ping determine if there is a connection and if there is any packet loss.

Figure 2-55 Ping Diagnosis Settings

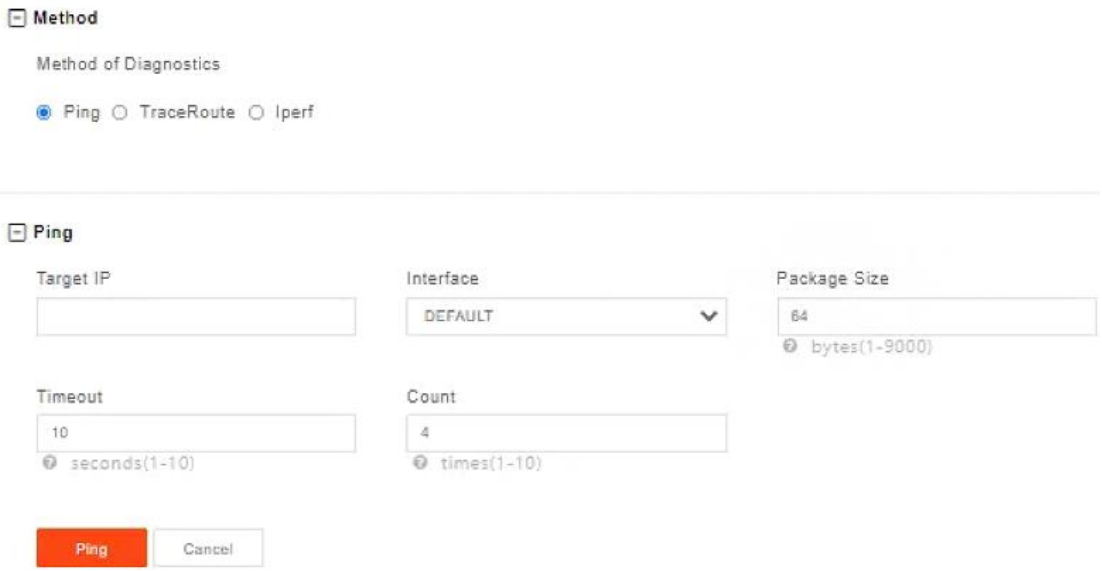



Table 2-12 Ping Diagnosis parameters

| Field Name | Description |
|---|---|
| Target IP | A target IP address for the CPE to ping |
| Interface | The interface the CPE should use, either DEFAULT (APN1) or APN 2, 3, or 4. |
| Package Size | The data packet size to be sent to the target IP address, in bytes. The range is 1-9000 bytes. |
| Timeout | A timeout period, in seconds. The range is 1-10 seconds. |
| Count | The number of times (Count) for the ping test to execute. The range is 1-10. |

### 2.6.13.2 Trace Route

Running a traceroute test will display the route a packet takes from the CPE to a target IP address. The test provides an indication of where there may be delays in the transmission of packets across the IP network.

Figure 2-56 Trace Diagnosis Settings

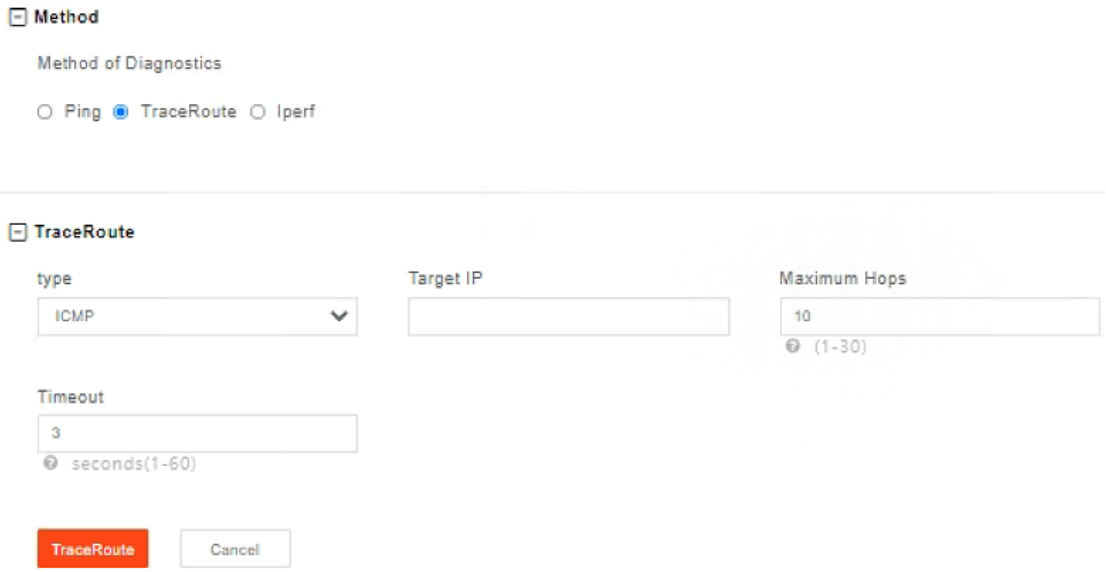



Table 2-13 Trace Diagnosis parameters

| Field Name | Description |
|---|---|
| Type | The protocol type is ICMP or UDP. |
| Target IP | A target IP address for the CPE to send packets to. |
| Maximum Hops | The maximum number of hops between network nodes you want the packets to take. If the traceroute hits that number, the test will end. |
| Timeout | A timeout period, in seconds. The range is 1-60 seconds. |

Results of the traceroute will appear at the bottom of the window, showing the target IP address, the maximum number of hops that it took from CPE to the destination, the packet size, and the time between hops.

### 2.6.13.3 Iperf

Iperf diagnostic debugging is used to test throughput.

Figure 2-57 Iperf Diagnosis Settings

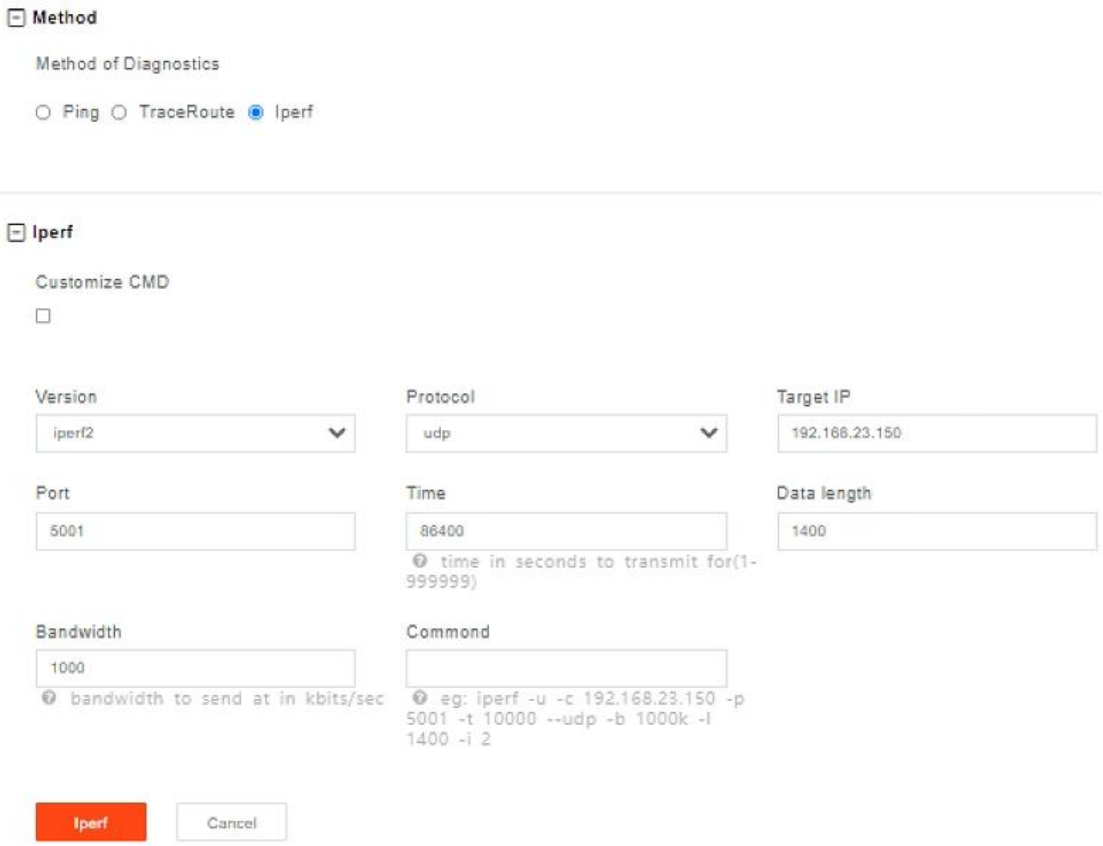



Table 2-14 Iperf Diagnosis parameters

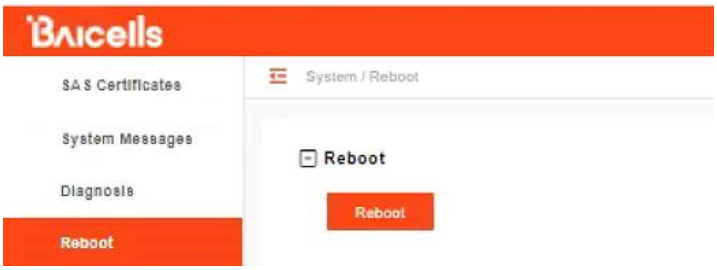
| Field Name | Description |
|---|---|
| Version | The version of iperf supports iperf2 and iperf3. |
| Protocol | TCP or UDP |
| Target IP | Specifies the destination IP for iperf diagnostics |
| Port | Specifies the port number for iperf diagnostics |
| Time | Iperf diagnostic time |
| Data length | Specify the data length of UDP protocol |
| Bandwidth | Specify the bandwidth of UDP protocol |

## 2.6.14 Reboot

Use the Reboot menu to perform a reboot of the CPE, as shown in Figure 2-58. It can take several minutes for the reboot to complete. After it reboots, the CPE GUI will display the login screen.

**Caution**: The reboot action will disrupt service.

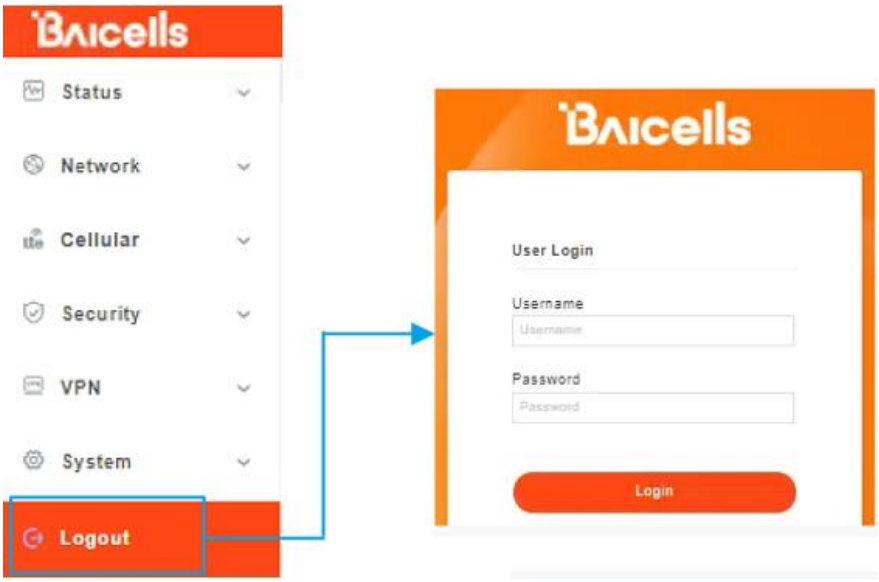
Figure 2-58 Reboot




## 2.7 Logout

When you click on the Logout menu, you are automatically logged out of the CPE and returned to the login screen (Figure 2-59).

Figure 2-59 Logout



# Appendix: Regulatory Compliance

## FCC Compliance

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.

Any 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.

Warning:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 30cm between the radiator & your body.

- FCC regulations restrict the operation of this device to indoor use only.
- The operation of this device is prohibited on oil platforms, cars, trains,

boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet in the 5.925-6.425 GHz band.

- Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.