Neutrino-430 Indoor eNodeB User Manual for pBS31010

Document version: 01

About This Document

This document describes the configuration of the Baicells dual carrier eNodeB. It guides the customer how to configure the eNodeB to access the network after installation.

This document is suitable for software version BaiBS_QRTB_2.4.x.

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Revision Record

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Contents

Figures

Tables

1. Product Overview

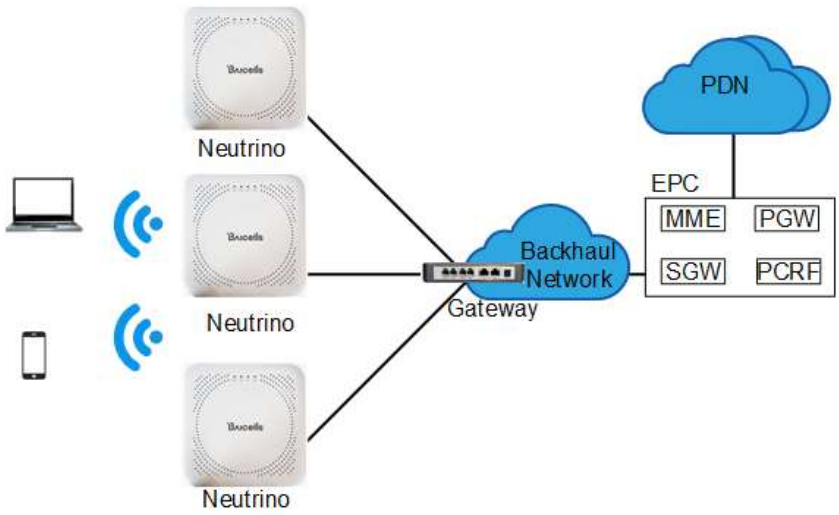
1.1 Introduction

Baicells Neutrino-430 is an advanced indoor dual carrier eNodeB that is compliant with 3GPP on LTE TDD technology. This 4x 250mW eNodeB is capable of operating in Dual Carrier (DC) split mode. It supports broadband data access, providing various data service transformation and transmission to realize the wireless coverage of indoor.

The Neutrino-430 makes use of the current transmission resources to reduce the operator investment, construct the LTE network with low cost, and enhance the indoor coverage. It can be widely used in telecom operators and broadband operators to promote the user experience in family, shopping mall, and so on.

The network structure of Neutrino-430 access to LTE network is shown in Figure 1-1.

Figure 1-1 Network Structure



1.2 Features

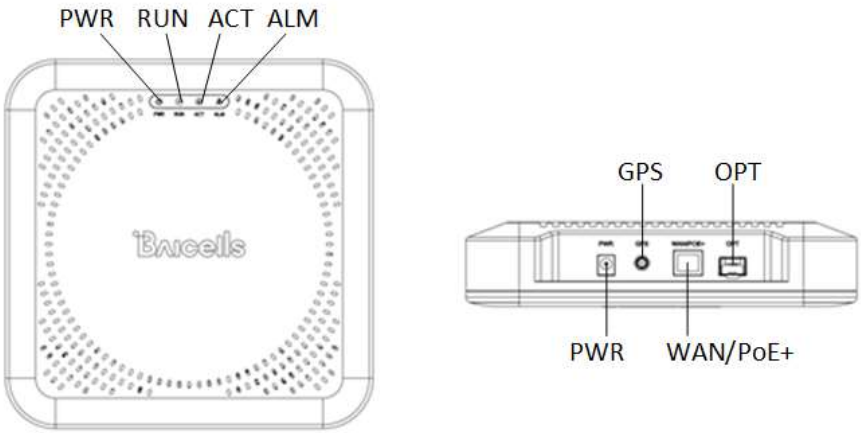
- Adopt the integration design of baseband and RF.
- Based on 3GPP LTE TDD technology; provide high speed data service.
- Support 10MHz/20MHz operation bandwidth.
- 64 concurrent users per carrier, 64+64 in DC mode.
- Peak rate 220Mbps@ Downlink, 56Mbps@Uplink with 2 x 20MHz spectrum.
- Fast networking, plug and play and flexible deployment.

- Support GPS synchronization.
- Integration as required, provide accurate coverage and improved network capacity rapidly.
- Integrated high gain internal antenna.
- Built-in DHCP Server, DNS Client and NAT functionality, providing a strong high speed routing ability.
- Rich security services to provide timely protection against potential security risks and illegal intrusion.
- Adopt Web management, convenient and simple.
- Support perfect network management function, which implement the management, monitor and maintenance.
- Small and exquisite, user friendly LED indicators are easy to monitor device status.

1.3 Appearance

The Neutrino-430 appearance and interfaces are shown in Figure 1-2.

Figure 1-2 Neutrino-430 Appearance and Interfaces



The Neutrino-430 interfaces are described in Table 1-1.

Table 1-1 Neutrino-430 Interface Description

Interface Name	Description
PWR	12V DC power supply interface
GPS	(Optional) external GPS antenna, SMA female.
WAN/PoE+	Gigabit Ethernet and PoE+ interface, used for debug and power supply.
OPT	Optical fiber interface, connect to external transmission

Interface Name	Description
	network, used for data backhaul.

The Neutrino-430 interface indicators are described in Table 1-2.

Table 1-2 Neutrino-430 Interface Indicators

Indicator	Color	Status	Description
PWR	Green	Steady On	Power On
		OFF	No Power Supply
RUN	Green	Steady On	Power On
		Fast flash: 0.125s on,0.125s off	Data is transmitting.
		Slow flash: 1s on,1s off	The cell has been activated.
ACT	Green	OFF	Reserved
ALM	Red	Steady On	Reserved
		Fast flash: 0.125s on,0.125s off	S1 alarm
		Slow flash: 1s on,1s off	Other alarms

1.4 Technical Specification

1.4.1 Hardware Specification

Item	Description
LTE Mode	LTE TDD
Frequency Bands [a]	Band48
Channel Bandwidth	10/20MHz
MAX Output Power	24 dBm per antenna
Receiving Sensitivity [b]	-100 dBm
Synchronization	GPS
Backhaul	1 x RJ-45 Ethernet interface (1 GE) 1 x optical interface (SFP)
MIMO	DL 2 x 2 on each carrier
Dimension	220mm (L) x 220mm (W) x 45mm (H)
Installation Type	Ceiling or wall mount
Antenna	3dBi, built-in omni antenna
Power Consumption	<= 20 W
Power Supply	48V DC, PoE+/12V 2A, IEEE 802.3at standard
Weight	About 1600g

[a] Different models support different frequency band.

[b] The test method of receiving sensitivity is proposed by the 3GPP TS 36.104, which is based on 5 MHz bandwidth, FRC A1-3 in Annex A.1 (QPSK, R=1/3, 25RB) standard.

1.4.2 Software Specification

Item	Description
LTE Standard	3GPP Release 12
Peak Rate	2x20 MHz: • SA1: DL 2x80 (160) Mbps, UL 2x28 (56) Mbps • SA2: DL 2x110 (220) Mbps, UL 2x14 (28) Mbps 2x10MHz: • SA1: DL 2x 40 (80) Mbps, UL 2x 14 (28) Mbps • SA2: DL 2x 55 (110)Mbps, UL 2x 7 (14) Mbps
User Capacity	64 concurrent users in single carrier mode 64+64 concurrent users in DC mode
QoS Control	3GPP standard Quality of Service Class Identifier (QCI)
Modulation	UL: QPSK, 16QAM, 64QAM DL: QPSK, 16QAM, 64QAM
Voice Solution	CSFB, VoLTE, eSRVCC
Traffic Offload	LIPA (Local IP Access) SIPTO (Selected IP Traffic Offload)
SON	Automatic setup ANR (Automatic Neighbor Relation) PCI confliction detection
Spectrum Scanning	Supported
UL Interference Detection	Supported
RAN Sharing	Supported
Network Management Interface	TR069 interface protocol
MTBF	≥ 150000 hours
MTTR	≤ 1 hour
Maintenance	Remote/local maintenance, based on SSH protocol
	Remote maintenance
	Online status management
	Performance statistics
	Failure management
	Configuration management
	Local or remote software upgrading and loading

Item	Description
	Logging
	Connectivity diagnosis
	Automatic start and configuration
	Alarm reporting
	KPI Recording
	User information tracing
	Signaling trace

1.4.3 Environment Specification

Item	Description
Operating Temperature	-5° C to 40° C
Storage Temperature	-10°C to 50°C
Humidity	5% to 95%
Atmospheric Pressure	70 kPa to 106 kPa

1.5 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 20cm between the radiator & your body.

2. Install Base Station

To get the signal coverage effect best, please place the Neutrino-430 in an unobstructed space.

The Neutrino-430 can be installed on ceiling or wall. The following separately introduces the tools, attentions and detailed installation steps.

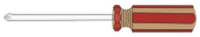
Note: Before installation, make sure the wiring has completed on installation site.

2.1 Packing List

Before opening the box, make sure the package is in good condition, undamaged and not wet. During the unpacking, avoid potential damaging impacts from hits or excessive force.

Once unpacked, check the contents to see if they are consistent with the packing list.

2.2 Installation Tool

			
Marker pen	Percussion drill	Cross screw driver	hammer

Note: Other accessories have been packed in the packing box.

2.3 Install on Ceiling or Wall

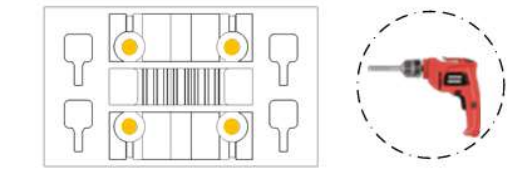
The Neutrino-430 can be installed on ceiling or wall, which installation steps are the same.

Attention:

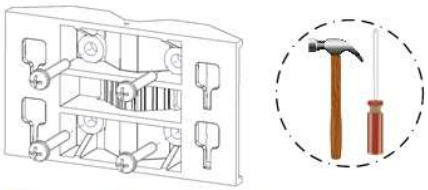
- The thickness of ceiling is not less than 18mm, and bearing weight is larger than 5kg. If the strength is not suitable, the device maybe fall off.
- If the ceiling is made of weak strength materials, such as gypsum ceiling, this installation method is not recommended. Because of the environment restriction this installation method must be used, please add one layer better panel under screws to make sure the device is fastness.

Installation steps is as follows:

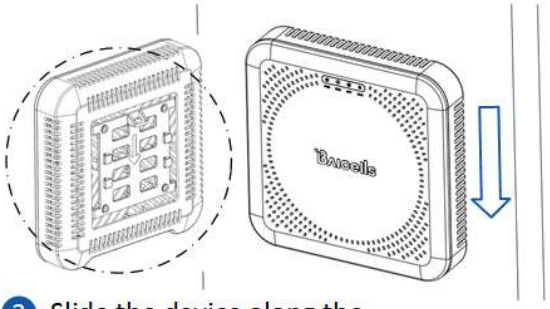
Note: The bracket on the device has been pre-installed.



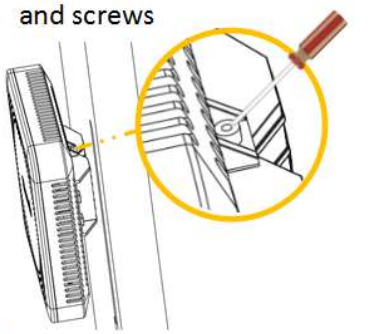
1 Put the bracket against the wall and marked the position, and then drill four holes



2 Install expansion pipes and screws



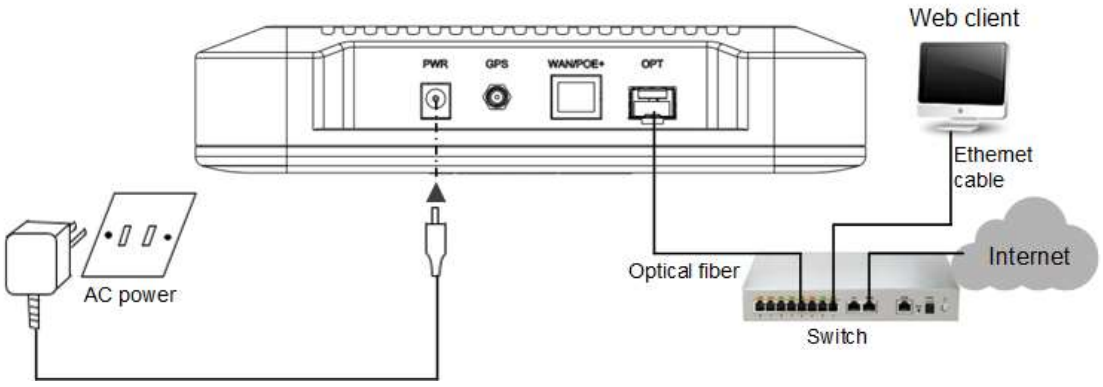
3 Slide the device along the arrow to fix it on the bracket



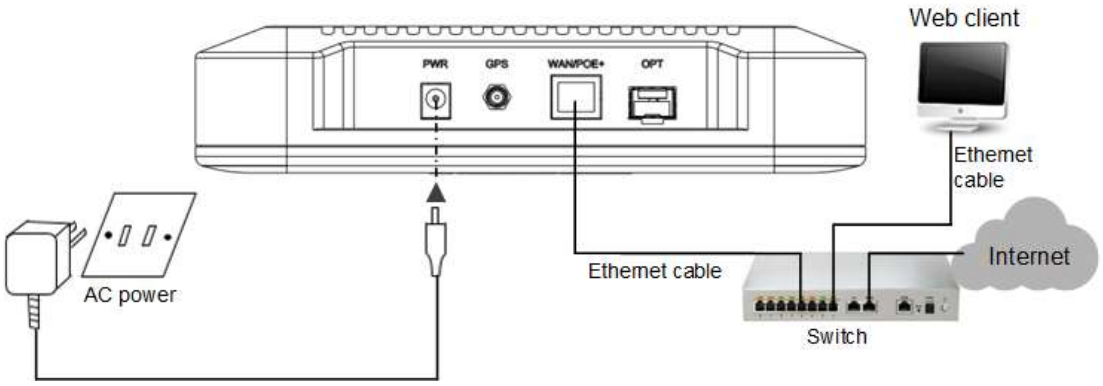
4 Fasten the screw on the top

2.4 Connect Cable

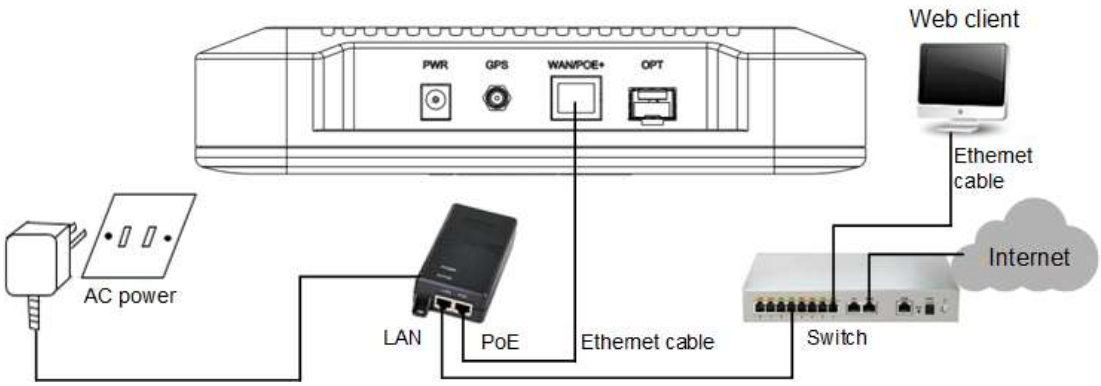
- **PWR** power supply, **OPT** backhaul



- **PWR** power supply, **WAN/PoE+** backhaul



- **WAN/PoE+** power supply and backhaul



2.5 Power On

After the Neutrino-430 is powered on, indicators can hint the status of the device, the meaning of LED indicators is shown in Table 1-2.

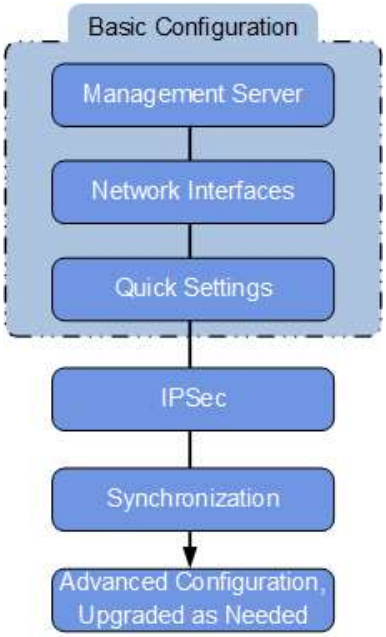
3. Initial Configuration

3.1 Configuration Overview

The Baicells eNodeB (eNB) is loaded with its own GUI for configuring its operating parameters. You can log in to the GUI either locally through the Local Maintenance Terminal (LMT), which is an Ethernet port, or remotely via IP address. You can also use the Baicells Operations Management Console (OMC) to configure the eNB; this document, however, focuses only on using the eNB GUI.

When configuring a newly installed eNodeB, we recommend you follow the flow that is shown in Figure 3-1.

Figure 3-1 Initial eNodeB Configuration Flow



NOTE: Before configuring the eNB's data, data planning needs to be done first. The data to configure includes local parameters and connecting parameters. These parameters are either provided by the user or determined after negotiation with the customers. The data to prepare include IP address, cell parameters, protocol parameters, software version, and so on.

For dual carrier eNodeB, the primary cell (Pcell) and secondary (Scell) need to be configured. First configure the primary cell, and then configure the secondary cell. Some parameters of the secondary cell is limited by the primary cell, the system has set these parameters to non-configurable.

In "**BTS Setting > Carrier Setting**", set the eNodeB is a single eNodeB or a dual carrier

eNodeB. After the carrier control mode is modified, reboot the eNB to take effort.

3.2 Login Web Client

3.2.1 Web Client Environmental Requirements

Table 3-1 describes the requirements on computer of the client.

Table 3-1 Environmental Requirements of the Client

Item	Description
CPU	Above Intel Core 1GHz
Memory	Above 2G RAM
Hard disk	No less than 100 MB space available
Operating system	• Microsoft: Windows XP, Windows Vista or Windows7 • Mac: MacOSX10.5 or above
Screen resolution	Above 1024 x 768
Browser	Chrome 6 or higher

3.2.2 Connect Web Client to Base Station

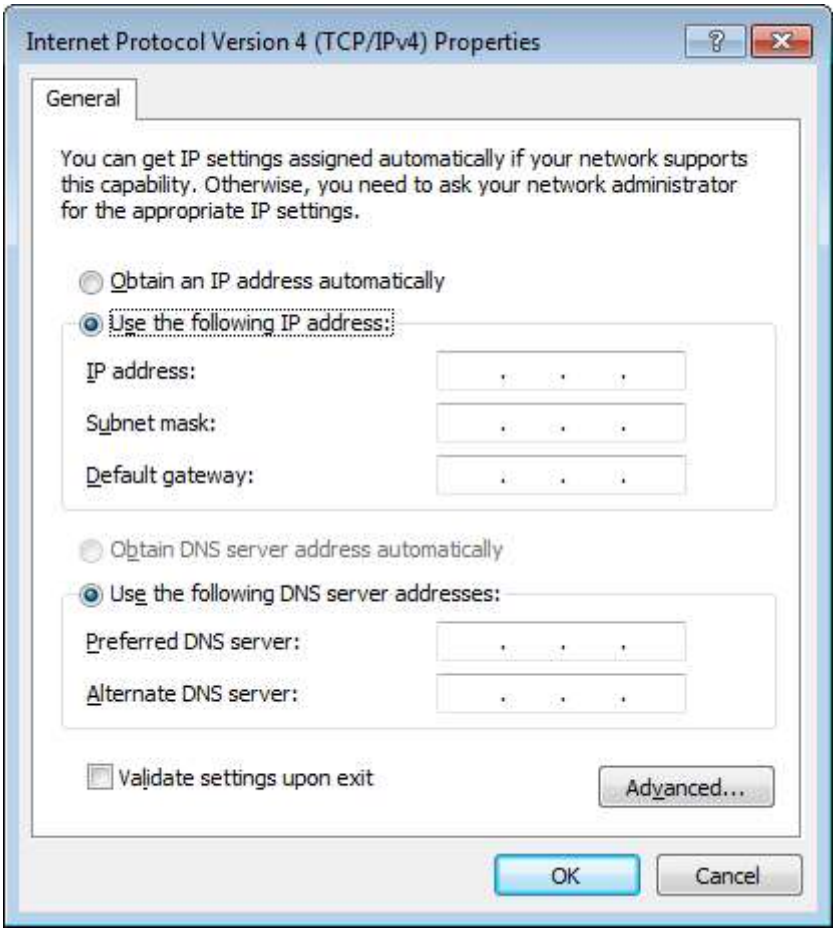
Connect the Ethernet interface of the computer to the LAN interface of the base station through the Ethernet cable.

3.2.3 Set Up Client Computer

Before logging into the Web client, the client computer's IP address needs to be set up first so that the connection between the client and the server is possible. Take Windows 7 as an example:

1. Click "**Start>Control Panel**" and later "**Network and Internet**" in the window that pops up.
2. Click "**View network status and tasks**" and later "**Local Connectivity**" in the window that pops up.
3. In "**Status of Local Connectivity**", click "**Properties**" to see the "**Properties of Local Connectivity**" pop-up window.
4. Select "**Internet Protocol Version (TCP/IPV4)**" and click "**Properties**" to see the pop-up window as Figure 3-2.

Figure 3-2 Internet Protocol Version (TCP/IPV4)



Select either "**Obtain an IP address automatically**" or "**Use the following IP address**":

- If "**Obtain an IP address automatically**" selected, go directly to step 7
- If "**Use the following IP address**" selected, follow step 5 ~ step 7

Note: In general, if the auto obtaining fails, one needs to set up the IP address manually.

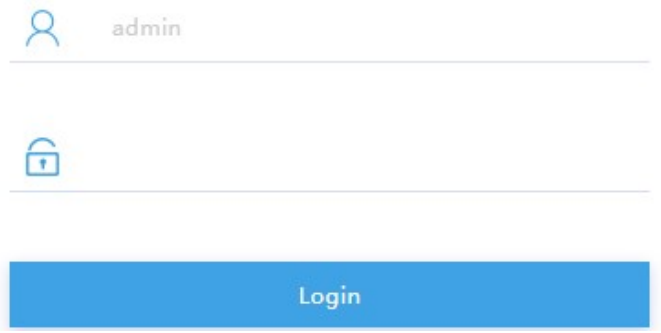
5. Select "**Use the following IP address**".
6. Input IP address, subnet mask, and default gateway, and then click "**OK**".
   - IP address: 192.168.150. XXX: (recommended XXX: 100~254)

     Because the LAN interface of the eNodeB uses the IP address of 192.168.150.1, others should avoid using this address.
   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.150.1
7. In the command window, execute ping 192.168.150.1 and check whether the connection between the client computer and the server works or not.

3.2.4 Log In

1. Open a web browser, and enter http://192.168.150.1, as shown in Figure 3-3.

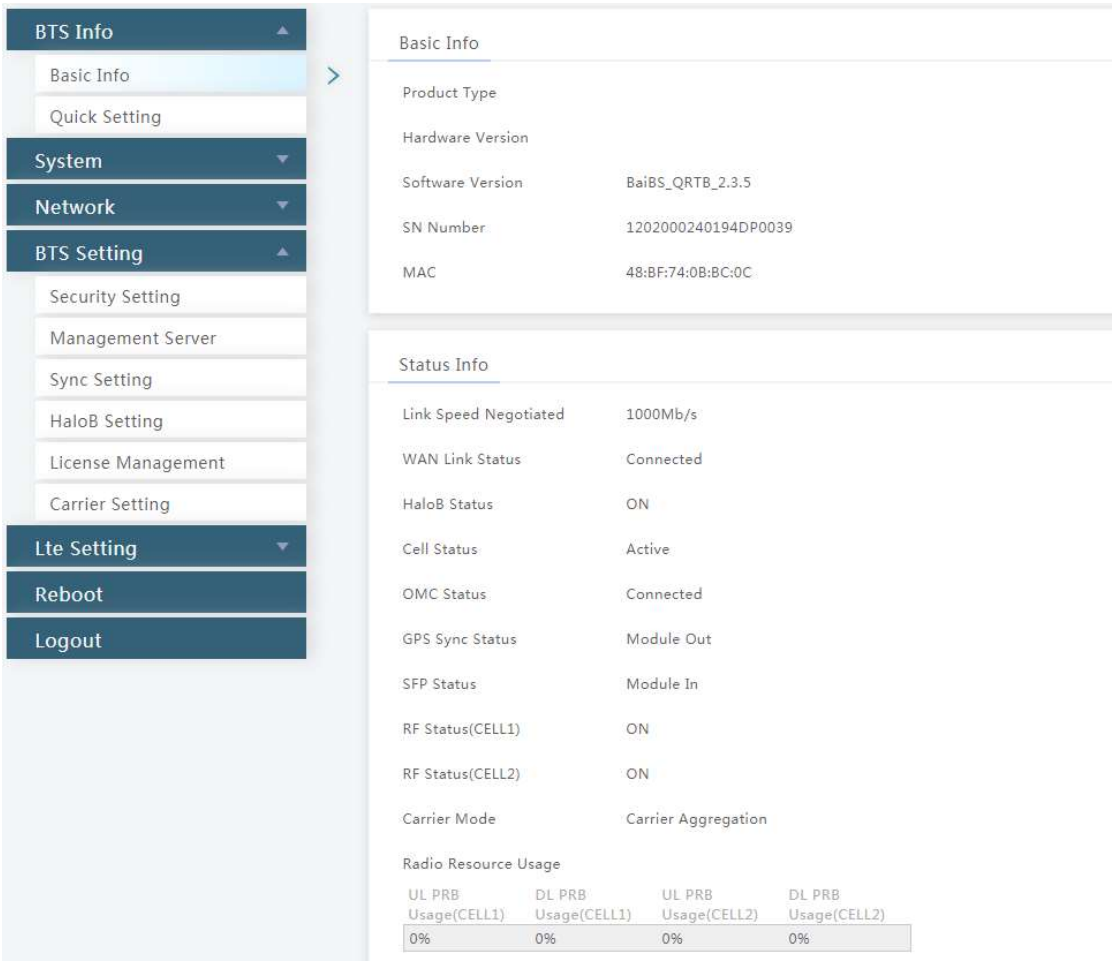
Figure 3-3 GUI Login



2. Input user name, password, and click "**Login**". The homepage is given in Figure 3-4.

   The default user name and password is *admin*. For security seasons, you should change the password after you first log in rather than leaving the default admin. Refer "3.4.4 Change Password" of this document.

Figure 3-4 GUI Homepage



NOTE: The information may vary by product type or software version.

The homepage displays the navigation pane on the left, and shows the window for the first menu: **BTS Info > Basic Info**. This window is like a dashboard for the eNB. The top of the window shows basic information such as the product type, hardware and software version, serial number, and MAC address.

The Status Info section reports the status of connectivity to the backhaul, whether the cell is currently active or inactive, if the eNB has a connection to the MME in the core, OMC connectivity, IPSec tunnel connection, RF status, carrier mode, and GPS synchronization status, etc.

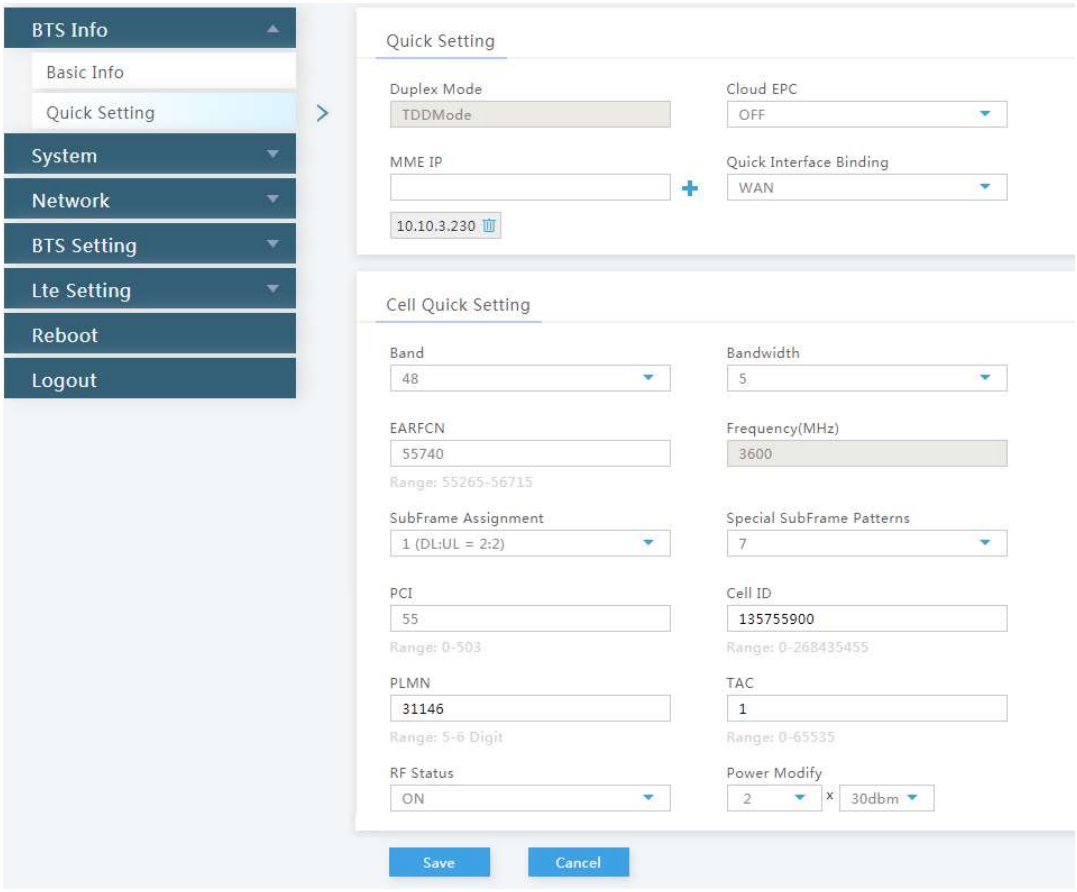
The settings for many of these fields are configured in other GUI menus. At the bottom, the window displays information about all user equipment (UE) attached to this eNB, such as aggregate number of connections, average throughput, and error rate, etc.

3.3 Quick Setting

The quick settings determine important RF parameters, as well as connectivity to Baicells ColudCore Evolved Packet Core (EPC). These parameters need to be planned in advance in the network planning stage.

1. In the navigation column in the left, select "**BTS Info > Quick Setting**" to enter the quick setting page, as shown in Figure 3-5.

Figure 3-5 Quick Setting



If the eNodeB is set to Single carrier, only one cell will be configured. If the eNodeB is set to Dual Carrier, two cells will be configured. You can change the carrier mode in “3.6.6 Configure Carrier Mode”.

2. The parameter descriptions of the quick setting are given in Table 3-2.

Table 3-2 Quick Setting Parameter Description

Category	Parameter	Description
Quick Setting	Duplex Mode	The system presets the parameter to **TDD mode** or **FDD mode** automatically depending on model.
	Cloud EPC	Whether the EPC is cloud EPC. If it is cloud EPC, parameters **Cell ID**, **PLMN**, and **TAC** are assigned automatically by the EPC. **NOTE**: This parameter will not appear in HaloB mode.
	MME IP	IP address of the cell’s associated MME, identical to the IP address of the MME at the core network side. IP MME Pool is set to Enabled, the parameter will not display. The IP address of MME is configured in “3.5.2.2 Configure MME Pool”.

Category	Parameter	Description
		NOTE: This parameter will not appear in HaloB mode.
	Quick Interface Binding	Assign the interface connected to the MME. The interface should be selected among the network interface already configured The interface has already been configured in the "3.5.1 Configure WAN/LAN Interface". The WAN interface is used by default, but the VLAN interface can also be used.
Cell Quick Setting	Band	The system selects the operating frequency band automatically according to the hardware board type. If SAS is enabled, the band will be assigned by the SAS vendor.
	Bandwidth	Select the uplink and downlink bandwidth. [Time Division Duplexing (TDD) products only]. • 5MHz • 10MHz • 15MHz • 20MHz
	EARFCN	The absolute radio frequency channel number, selected by the operator. Allocated by the operator.
	earfcnDl (MHz)	The eNodeB's operating frequency, selected by the operator. The range depends on the base station model and country code.
	SubFrame Assignment	Downlink (DL) and uplink (UL) subframe configuration. • 1 (DL:UL=2:2) transmission ratio • 2 (DL:UL=3:1) transmission ratio (default)
	Special Subframe Patterns	Special subfame pattern This is a standard LTE setting that pertains to synchronization of downlink and uplink timing. The guard period between switching from DL to UL or UL to DL determines the maximum supportable cell size. The guard period has to be large enough to cover the propagation delay of DL interferers. Range is 5 or 7. Default is 7.
	PCI	Physical Cell ID (PCI) allocated by the operator. PCI is an essential Layer 1 cell identity for each cell site in the network. Planning PCIs is crucial for Qos.

Category	Parameter	Description
		Range from 0 to 503. **NOTE**: Baicells does not use and does not work with PCI 0.
	Cell ID	Unique identification number for the Cell ID. The range is 0-268,435,455.
	PLMN	The numerical identifier for the operator's Public Land Mobile Network (PLMN) for this cell. Must be a 5- or 6-digit number.
	TAC	Tracking Area Code of the cell site where the eNB resides. The TAC is used to determine the range of the paging information.
	RF Status	Enable/disable the radio frequency emissions of the eNB. The default value is enabled. If the RF status is set to be disabled, the eNeB is no longer transmitting or receiving signals.
	Power Modify	The maximum output power on each port. Must be within regulatory guidelines for the region. This field may be used in situations where you need to reduce the output power, such as testing the eNB before installing it on a tower; restricting the eNB output to reduce interference with other eNBs in the same geographical area; or staying within Effective Isotropic Radiated Power (EIRP) rules.

3. Click "**Save**" to complete the quick settings for the base station.

   NOTE: In case of incorrect parameters found before the submission, click "**RESET**" to restore the data before the modification.

3.4 Configure System Parameter

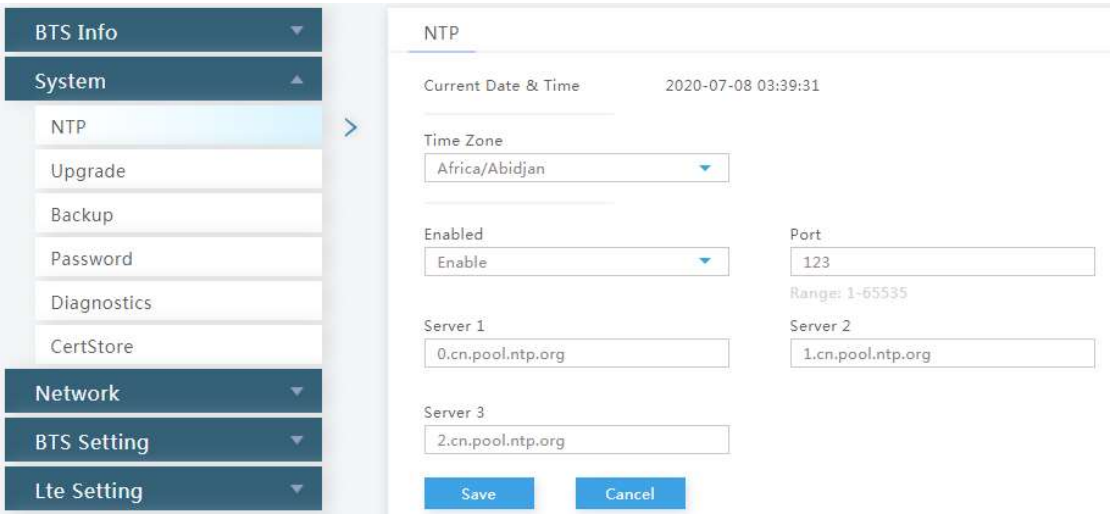
3.4.1 Configure NTP

This page includes the time zone and the NTP configuration, which are configured according to the actual needs. If the NTP is used by the base station as an external clock source, up to three NTP servers are supported, where one for master NTP service and the others for backup.

1. In the navigation column on the left, select "**System > NTP**" to enter the NTP

setting page, as shown in Figure 3-6.

Figure 3-6 NTP Server Setting



2. Descriptions of the parameters to configure the NTP server are given in Table 3-3.

Table 3-3 NTP Server Parameter Description

Class	Parameter	Description
Time Zone	TimeZone	Select the time zone that the base station located.
NTP Server	Enabled	Whether enable the NTP function.
	Port	Port number of the master NTP server. Must be consistent with the other end.
	Server1	Domain name or IP address of the master NTP server. Must be consistent with the other end.
	Server2	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
	Server3	Domain name or IP address of the slave NTP server. Must be consistent with the other end.

3. Click “**Save**” to complete the NTP server configuration.

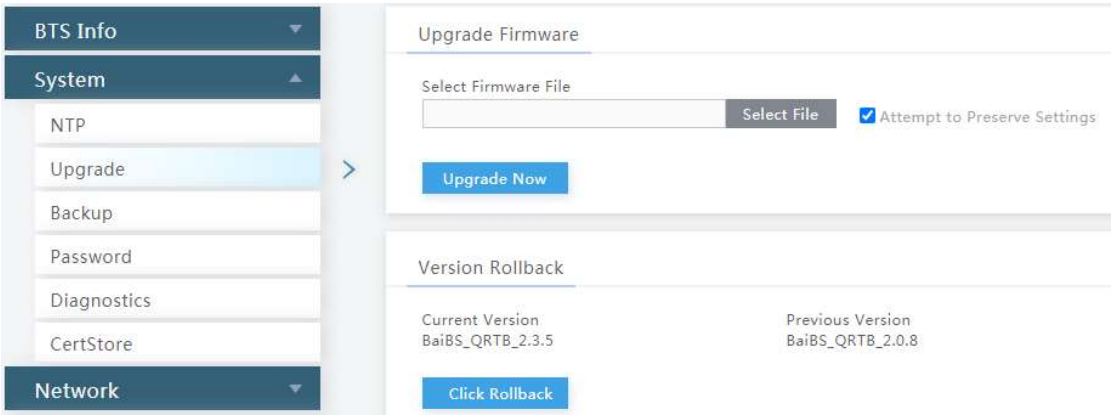
When the preset version does not meet the actual need, the software version need to be updated the latest version. The system support firmware version upgrade and rollback.

Caution:

Firmware upgrade may lead to the damage of the eNB file, contact the support engineer before upgrade. If necessary, the vendor will provide the technical support.

In the navigation column on the left, select "**System > Upgrade**" as shown in Figure 3-7.

Figure 3-7 Software Upgrade



3.4.2 Upgrade

3.4.2.1 Firmware Upgrade

1. The operator gets the firmware file of new version and save it in local computer.
2. Select whether to preserve the current settings.
3. Click "**Select File**" to select the firmware file.

   NOTE: The file type is *.IMG.
4. Check whether the software version is correct again and then click "**Update Now**".
5. In the pop-up window click "**PROCEED**".

   Wait for about three mins, the base station will reboot completely.

   In the "**BTS Info > Basic Info**" page, the upgraded version will be displayed in "**Software Version**".

3.4.2.2 Rollback

Only one rollback operation is allowed for each upgrade. Under the rollback permission of the base station, the software can roll back to the version before upgrade.

After the rollback, a new rollback will not be permitted until an upgrade has taken place.

If the previous version is "-", there is no software version for rollback.

1. Click "**Click Rollback**".
2. In the pop-up window click "**OK**".

   Wait for about three mins, the base station will reboot completely.

   In the "**BTS Info > Basic Info**" page, the version after rollback will be displayed in "**Software Version**".

3.4.3 Backup

In the navigation column on the left, select "**System > Backup**" to enter the backup page.

3.4.3.1 Backup Current Configuration

1. Click "**Get Backup Files**".
2. In the pop-up download dialog box, select the file path to save the current configuration file to the local computer.

3.4.3.2 Backup Log Files

1. Click "**Get Log Files**".
2. In the pop-up download dialog box, select the file path to save the log files to the local computer.

3.4.3.3 Backup Crash Logs

1. Click "**Get Crash Logs**".
2. In the pop-up download dialog box, select the file path to save the crash log files to the local computer.

3.4.3.4 Backup Core File

1. Click "**Get Core File**".
2. In the pop-up download dialog box, select the file path to save the core files to the local computer.

3.4.3.5 Import Configuration File

1. Click "**Select File**" to select the configuration file from the local computer.
2. Click "**Upload**" to import the configuration file.
3. Click "**Import LTE configurations**" to import the file.

3.4.3.6 Restore Default Configuration

Attention:

After the restore operation, the base station will reboot immediately. Be careful to operate the "**Restore Default Configuration**" restore.

1. Click "**Restore Default Configuration**".
2. In the pop-up download dialog box click "**OK**", the eNodeB will reboot immediately.

   Wait for about three minutes, the eNodeB will reboot completely.

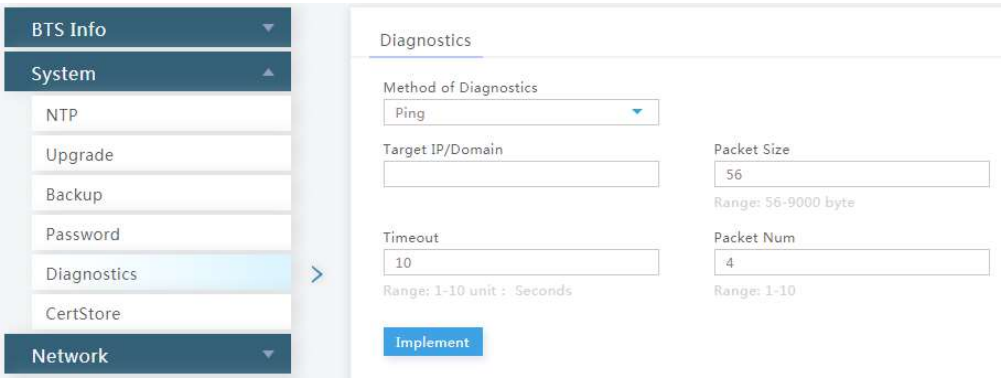
3.4.4 Change Password

1. In the navigation column on the left, select "**System > Password**" to enter the change password page.
2. Input the value of *Old Password*, *New Password* and *Confirm Password*.
3. Click "**Save**" to complete the change of the administrator password.

3.4.5 Diagnostics

1. In the navigation column on the left, select "**System > Diagnostics**" to enter the diagnostics page, as shown in Figure 3-8.

Figure 3-8 Diagnostics



2. Enter the parameter of diagnostics, the descriptions is shown in Table 3-4.

Table 3-4 Parameter Description of Diagnostics

Parameter	Description
Method of Diagnostics	Choose “ping” or “Traceroute”.
Target IP/Domain	The IP address or domain name of the destination.
Packet Size	The size of the packet.
Timeout	Set the timeout period.
Packet Num	The number of the packet.

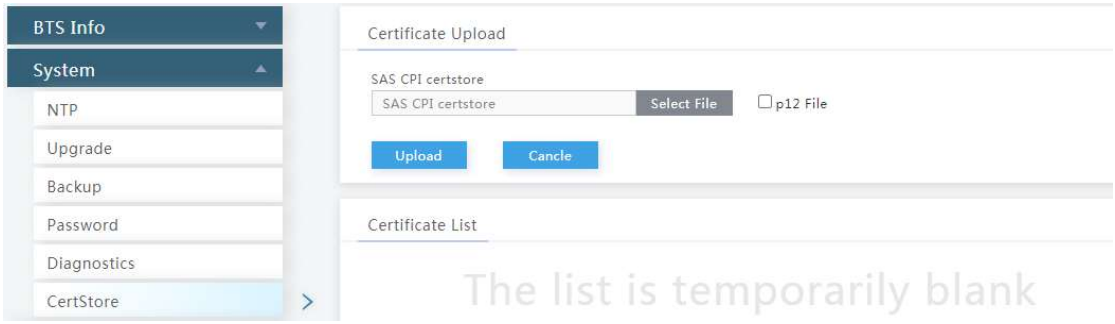
3. Click “**Implement**” to run the diagnosis operation.

3.4.6 Certificate

SAS CPI certificate is the certification for access to Spectrum Access System (SAS). If the operator requires to use certificate, who will provide the certificates. The file types of the certificate are **.pem* or **.der* generally.

1. Select “**System > CertStore**” to enter the certificate management page, as shown in Figure 3-9.

Figure 3-9 Certificate



2. Click “**Select File**”, select certificate from local computer.
3. Click “**Upload**” to upload the certificate file to the base station.

3.4.7 Reboot

Caution：

The reboot operation will interrupt the current service of the base station, be careful to operate this operation.

1. On the left navigation, select “**Reboot**” to enter the reboot window.
2. Click “**Reboot Now**” to reboot the base station.

Wait for three minutes, the base station will restart completely.

3.5 Configure Network Interface

The configuration of the network interface includes the LAN interface, WAN interface, and LGW.

The LAN interface is the internal maintenance interface used in initialization and will no longer be needed in normal operation. The WAN interface is an external communication portal (Internet connection) the eNB's NMS and the MME. The eNB's NMS may be the Baicells Operations Management Console (OMC) or LTE NMS. The only option for the Interface name field is WAN. The WAN interface supports to configure multiple VLANs.

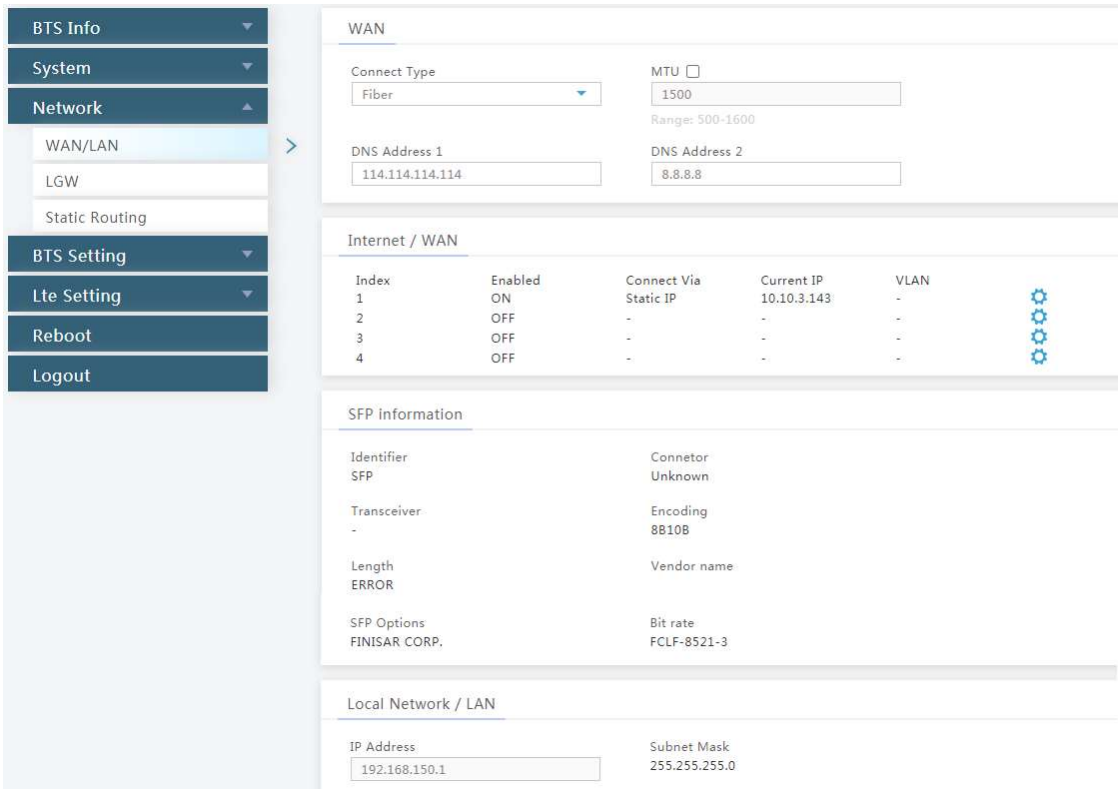
3.5.1 Configure WAN/LAN Interface

3.5.1.1 Configure WAN Interface

When the LGW function is enabled and "Connect Via" is set to "DHCP", if "Connect Via" is modified, because of the change of the MAC address, the IP address will also change at the same time. Therefore, the configuration of the static route also should be modified.

1. Select "**Network > WAN/LAN**" to enter the WAN interface configuration page, as shown in Figure 3-10.

Figure 3-10 Configure DNS and WAN Interface



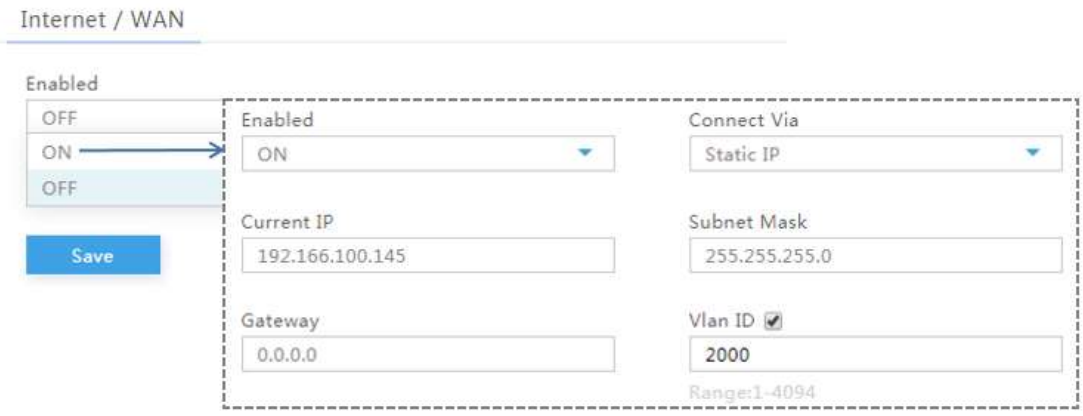
2. Input WAN interface type and DNS configuration parameters, the descriptions of the parameters are given in Table 3-5.

Table 3-5 WAN Interface Type and DNS Parameter Description

Parameter	Description
Connect Type	The eNodeB supports two types of connect types, **Copper** and **Fiber**, choose one according to the actual situation.
MTU	Maximum transmission unit, default is 1500 bytes. Setting the right MTU for the network can help to improve the transmission efficiency.
DNS Address 1	The IP address of the DNS 1.
DNS Address 2	The IP address of the DNS 2

3. Click to configure the WAN parameters, as shown in Figure 3-11.

Figure 3-11 Configure WAN Interface



4. Input the WAN configuration parameters, which are given in Table 3-6.

Table 3-6 WAN Interface Parameter Description

Parameter	Description
Enabled	Whether enable the interface. The eNodeB supports to configure four IP addresses at most.
Connect Via	The interface protocol used by WAN interface, include: • **DHCP**: If DHCP is selected, only option 60 the parameter needs to be configured. • **Static IP** • **IPv6 DHCP** • **IPv6 Static IP**
Current IP	IP address of the WAN interface. If DHCP is selected, the IP address acquired automatically.
option60	If set "**Connect Via**" to "**DHCP**", display this parameter. This is an identity to match with terminals to differentiate

Parameter	Description
	different terminals.
Subnet Mask	If set “**Connect Via**” to “**Static IP**”, display this parameter. Subnet mask address of the IP address.
prefix	If set “**Connect Via**” to “**IPV6 Static IP**”, display this parameter. Prefix of IPv6 address for WAN interface.
DefaultGW	If set “**Connect Via**” to “**Static IP**”, enter the gateway address. IP address of the default gateway.
Vlan ID	VAN ID. When the operator needs to transmit the data of multi types through separate channel, configure more IP addresses for WAN interface through VLAN, and assign them with different VLAN ID.

5. Click “**Save**” to complete the WAN interface configuration.

3.5.1.2 Configure LAN Interface

The Local Network/LAN fields are used to configure the Local Maintenance Terminal (LMT) port on the eNB. The port may be used during initial eNB setup and configuration.

The default IP address of the LAN interface is **192.168.150.1**. In general, the initial value need not to be changed.

1. The LAN interface is enabled by default. If the “**IP address**” and “**Subnet mask**” need to be changed, input new values.
2. Click “**Save**” to complete the modification on the LAN interface.

   If the IP address of LAN interface is modified, the client will be interrupted immediately. You need to log in the client using the new IP address.

3.5.2 Configure IPSec/MME Pool

NOTE: When HaloB function is enabled, the menu does not display.

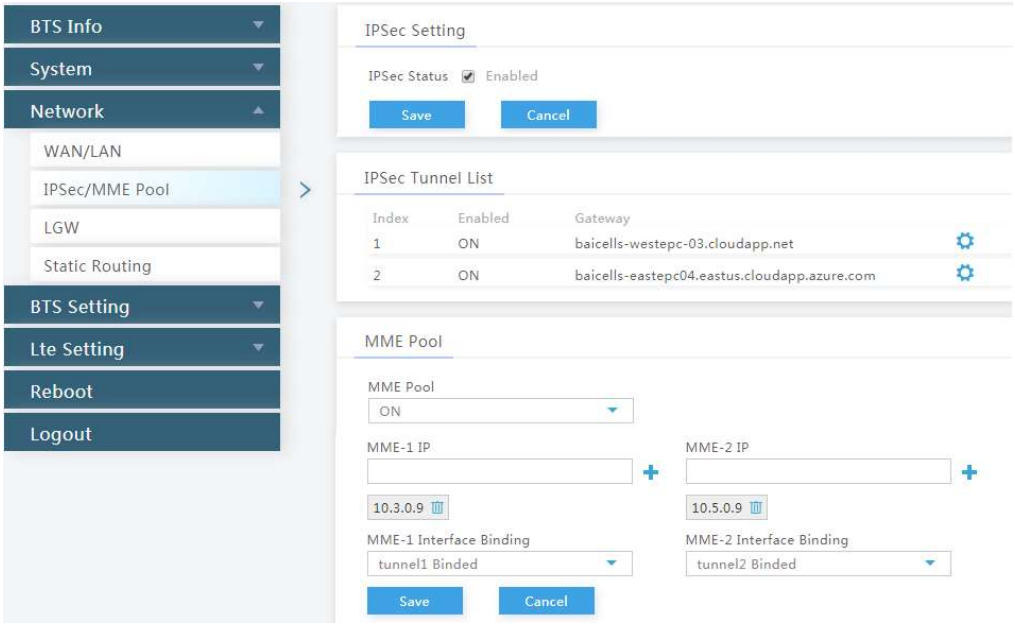
3.5.2.1 Configure IPSec

The IP Security (IPSec) interface is used to route the control plane information between the eNB and the EPC.

The security gateway in the network can provide security protocol in the network layer to ensure the safety for message transmission. If the operator have deployed the security gateway, the eNB need to enable the IPSec function accordingly.The eNB will enable the IPSec by default, up to two IPSec tunnels are supported.

1. Select “**Network > IPSec/MME Pool**” to enter the IPSec configuration page, as shown in Figure 3-12.

Figure 3-12 Configure IPSec



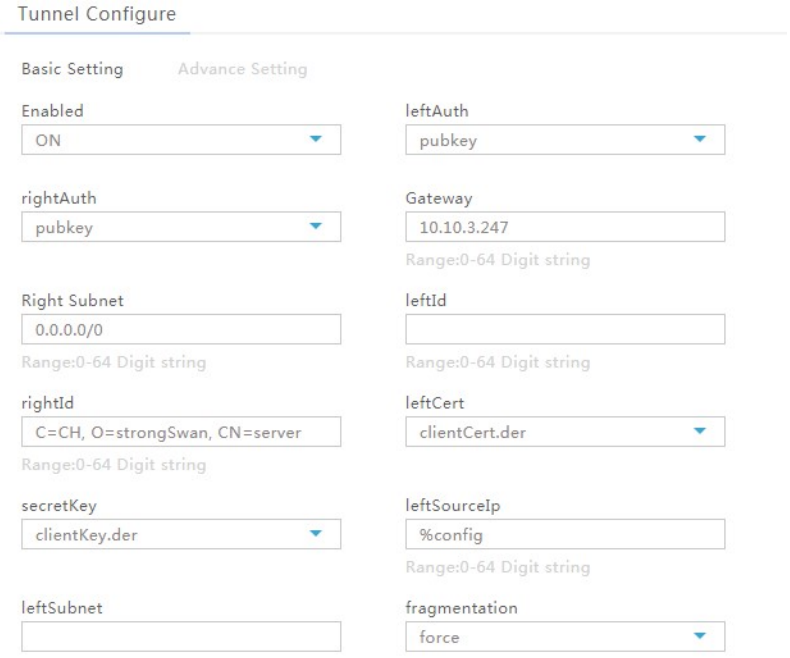
2. In the “**IPSec Setting**” area, select whether enable the IPSec function.

   In standard mode, the system will enable the IPSec gateway by default.

3. Click “**Save**” to save the IPSec setting.

4. In the “**IPSec Tunnel List**” area, click ⚙ to display the IPSec tunnel configuration page. First, configure the basic parameters of IPSec tunnel mode, as shown in Figure 3-13.

Figure 3-13 Basic Setting of IPSec Tunnel Mode



The description of basic parameters is shown in Table 3-7.

Table 3-7 IPSec Tunnel Basic Parameter Description

Parameter	Description
Enabled	Enable or disable the IPSec tunnel mode. The default value is enabled.
leftAuth	**Attention**: DO NOT recommend to change the value! Local authentication type of the IPSec. Must be consistent with the security gateway side. • psk • pubkey
rightAuth	**Attention**: DO NOT recommend to change the value! Peer authentication type of the IPSec. Must be consistent with the security gateway side. • psk • pubkey
Gateway	The security gateway (IPSec server) IP address. Make sure the IP address entered here matches the actual IP address on the security gateway side.
Right Subnet	IP address of the remote subnet, which must be consistent with the security gateway side. Message within this address range will be packed as a tunnel.
leftId	Identification of the client end (0-48 digits string). It must be consistent with the security gateway side. If there is no security gateway left identifier, leave this field empty.
rightId	Identification of the server end (0-48 digits string). It must be consistent with the security gateway side. If there is no security gateway right identifier, leave this field empty.
leftCert	If set "**leftAuth**" to "**pubkey**", the parameter need to be set. Certificate name. On this version is *clientCert.derpsk.*
secretKey	File name of private key. Default is clientKey.bin. When auth is *psk*, the value is the password of authentication.
leftSourceIp	Virtual address allocation assigned by the system. If absent, use the local IP address
leftSubnet	IP address of the local subnet.
fragmentation	The type of fragmentation. • yes • accept • force • no

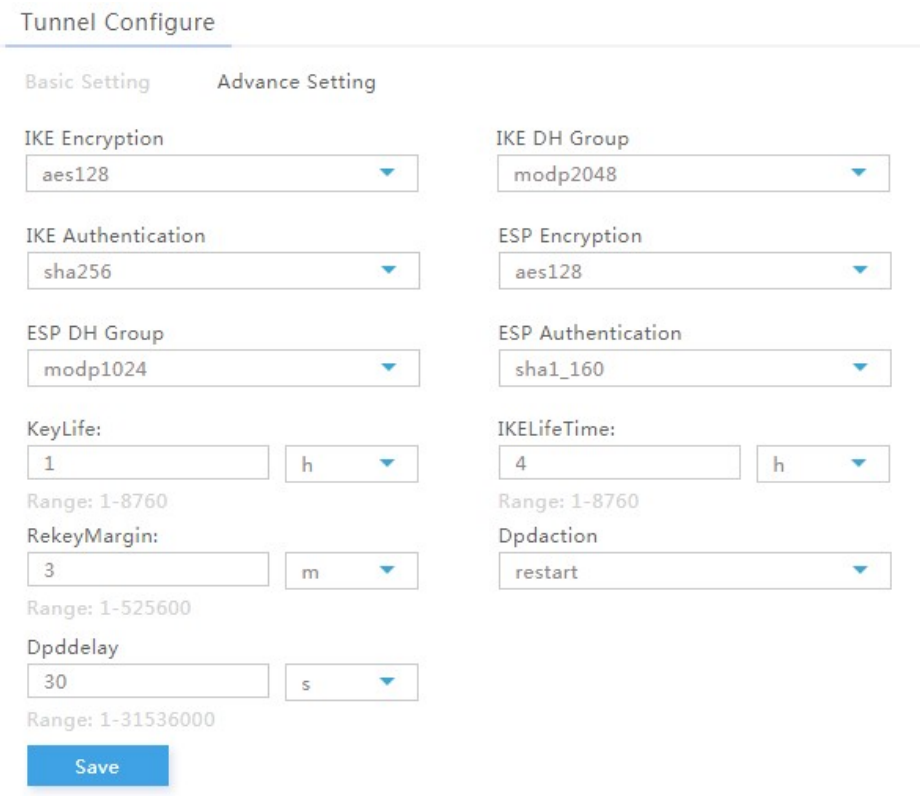
Caution:

It is highly recommended that for the *Advanced Setting* fields you use the default values. Improper changes may lead to system exception.

The *Advanced Setting* fields become particularly important to network operations as areas become denser the users.

5. Click the "**Advanced Setting**" tag to enter the advanced setting page, as shown in Figure 3-14.

Figure 3-14 Advanced Setting of IPSec Tunnel Mode



The description of advanced parameters is shown in Table 3-8.

Table 3-8 Advanced Parameter Description of IPSec Tunnel Mode

Parameter	Description
IKE Encryption	Internet Key Exchange (IKE) encryption method. IKE is a protocol used to ensure security for virtual private network (VPN) negotiation and remote host or network access. • aes128 • aes256 • 3des • des
IKE DH Group	IKE Diffie-Hellman (DF) key computation, or exponential key

Parameter	Description
	agreement, to be used between two entities. • modp768 • modp1024 • modp1536 • modp2048 • modp4096
IKE Authentication	Authentication algorithm • sha1 • sha1_160 • sha256_96 • sha256
ESP Encryption	Encapsulating Security Payload (ESP) – member of the IPSec protocol suite that provides origin authenticity, integrity, and confidentiality protection of packets. • aes128 • aes256 • 3des • des
ESP DH Group	ESP Diffie-Hellman (DF) key computation, or exponential key agreement, to be used between two entities. • modp768 • modp1024 • modp1536 • modp2048 • modp4096
ESP Authentication	ESP Authentication algorithm • sha1 • sha1_160 • sha256_96 • sha256
KeyLife	Ipsec security association (SA) renegotiation time. Format: Minutes, Hours or Days.
IKELifetime	IKE security association renegotiation time. Format: Minutes, Hours or Days.
RekeyMargin	Renegotiation time before the expiry of IkelifTime (negotiate the IKE security association time before the expiry of IkelifeTime). Format: Minutes, Hours or Days.
Dpdaction	DPD stands for dead peer detection (DPD) protocol. Determines what action to take when a gateway exception occurs. • none

Parameter	Description
	• clear • hold • restart
Dpddelay	Time interval for sending the DPD detection message. Format: Minutes, Hours or Days.

6. Click “**Save**” to complete the IPSec tunnel mode configuration.

   If more IPSec tunnel is needed, repeat step5 to step6 to set the second IPSec tunnel.

3.5.2.2 Configure MME Pool

1. In the “**MME Pool**” area (refer to Figure 3-12), input MME pool configuration parameters. The descriptions of these parameters is shown in Table 3-9.

   Table 3-9 MME Pool | Parameter Description

Parameter	Descriptions
MME Pool	Whether enable the MME pool function.
MME-1 IP	Configure the IP address of MME1.
MME-2 IP	Configure the IP address of MME2.
MME-1 Interface Binding	The interface binding with MME1.
MME-2 Interface Binding	The interface binding with MME2.

2. Click “**Save**” to complete the MME pool setting.

   The eNodeB supports to connect to two MMEs.

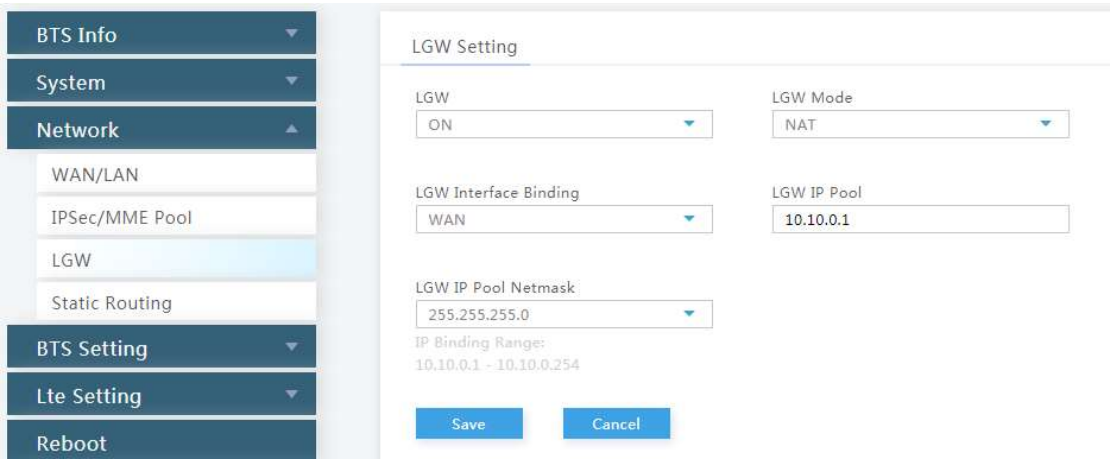
3.5.3 Configure LGW

The LGW should be configured when the Baicells cloudcore EPC is used. The eNodeB must be rebooted after the LGW configuration completed.

The Baicells eNB splits the data plane and the control plane, so there are two IP addresses per user equipment (UE). The data plane is sent out the local gateway (LGW), while the control plane is routed through an IPSec tunnel to the Cloud Envolved Packet Core (EPC).

1. Select “**Network > LGW**” to enter the LGW configuration page, as shown in Figure 3-15.

Figure 3-15 Configure LGW



2. Input the LGW configuration parameters, as shown in Table 3-10.

Table 3-10 LGW Parameter Description

Parameter	Descriptions
LGW Enabled	LGW function switch. Choose enable or disable the LGW function. The default is enable.
LGW Mode	LGW mode. Select according to the actual situation of the operator's network. • NAT: Packages from internal network to external network need NAT translation. • Router: select optimized route from the routing table. • Bridge: transfer in the data link layer.
LGW Interface Binding	The IP address LGW used for data unloading. Choose from the network interface having configured. The default value is the IP address of WAN. The interface has already been configured in the "3.5.1 Configure WAN/LAN Interface". Default is WAN interface, the VLAN interface can also be used to separate different links.
LGW IP Pool	The LGW will assign a local IP address for the accessed UE to manage the UEs, here configure the first IP address of the IP pool.
LGW IP Pool mask	For example, if the first IP address is 10.10.10.1, and the netmask is 255.255.255.0, the IP address pool includes 255 IP addresses.
Static Address	When "**LGW Mode**" is "**Router**", this parameter displays. Whether enable the static IP address.
First Address	When "**Static Address**" is "**Enable**", the parameter displays. The first IP address of the static IP address range.
Last Address	When "**Static Address**" is "**Enable**", the parameter displays.

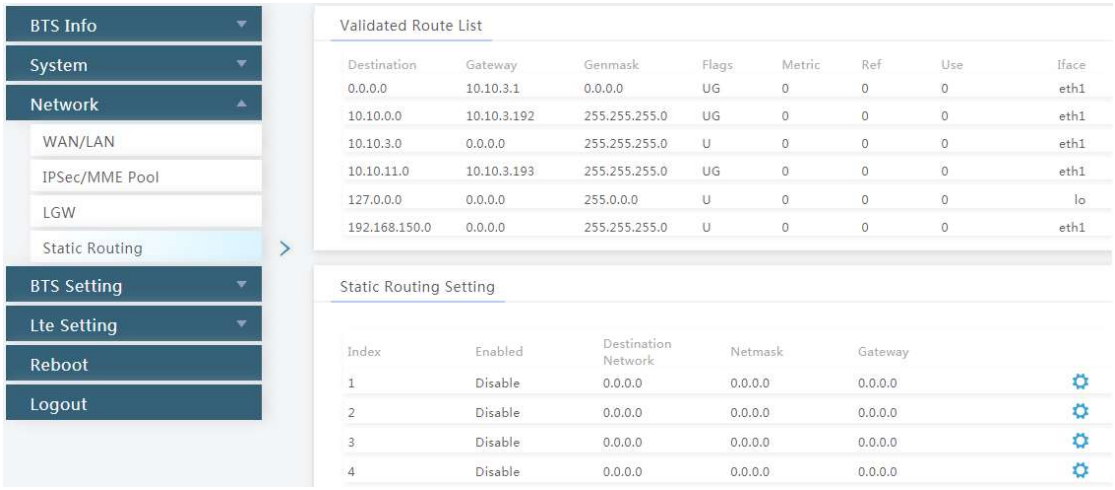
Parameter	Descriptions
	The last IP address of the static IP address range.
IMSI	When “**Static Address**” is “**Enable**”, the parameter displays. Bind IMSI and the IP address.
IP	When “**Static Address**” is “**Enable**”, the parameter displays. Bind IMSI and the IP address. After an IMSI and IP address is configured, click “➕” to add it.

3. Click “**Save**” to complete the LGW configuration.

3.5.4 Configure Static Route

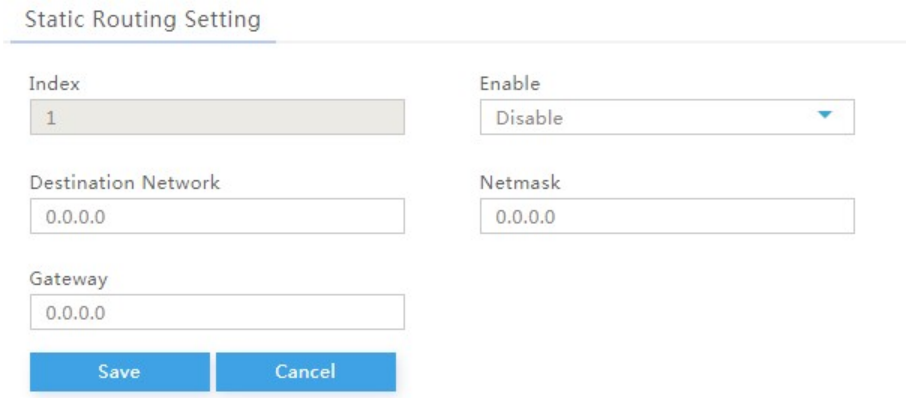
1. Select “**Network > Static Routing**” to enter the static route configuration page, as shown in Figure 3-16.

Figure 3-16 Configure Static Route



2. Click ⚙ to display static configuration parameters, as shown in Figure 3-17.

Figure 3-17 Configure Static Route



3. Input the configuration parameters of static route, which are given in Table 3-11.

Table 3-11 Static Route Parameter Description

Parameter	Description
Index	The index of the static route. Assigned automatically.
Enabled	Switch of route. Default is disabled.
Destination Network	The destination IP address. Note: The destination IP address must reachable from the original IP address of WAN interface or VLAN source port.
Netmask	The subnet mask of destination IP address.
Gateway	The gateway IP address of target IP address.

3. Click "**Save**" to complete the static route configuration.

The system supports configure six static routes at most, and at the bottom of the window, you can view the route table that configured.

3.6 Configure eNodeB Parameter

The base transceiver station (BTS), or base station, settings are related to security, management, and synchronization with other network elements.

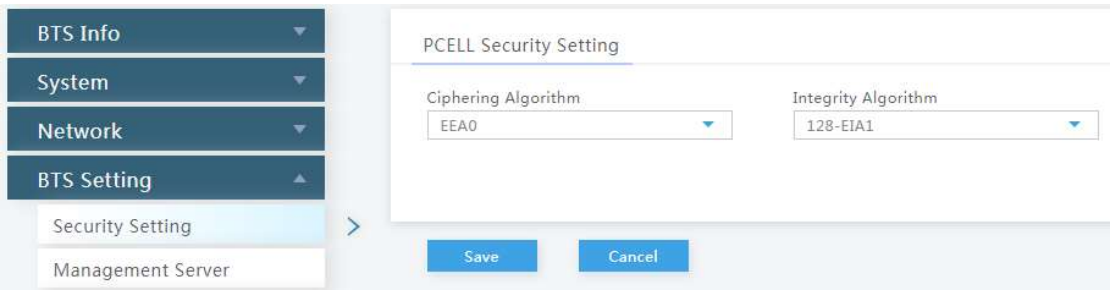
3.6.1 Configure Security

Caution:

DO NOT modify the value of the security parameters, keep the default value.

1. On the left navigation column, select "**BTS Setting > Security Setting**" to enter the security setting page, as shown in Figure 3-18.

Figure 3-18 Configure Security



2. Input the security parameters, which descriptions are given in Table 3-12.

Table 3-12 Security Parameter Description

Parameter	Description
Ciphering Algorithm	Encryption algorithm • EEA0（recommended） • 128-EEA1: 128-EEA1, EEA0 • 128-EEA2: 128-EEA2, EEA0 Default：EEA0
Integrity Algorithm	Integrity protection algorithm • 128-EIA1: 128-EIA1, EIA0 • 128-EIA2: 128-EIA2, EIA0 Default: 128-EIA1

3. Click “**Save**” to complete the security algorithm setting.

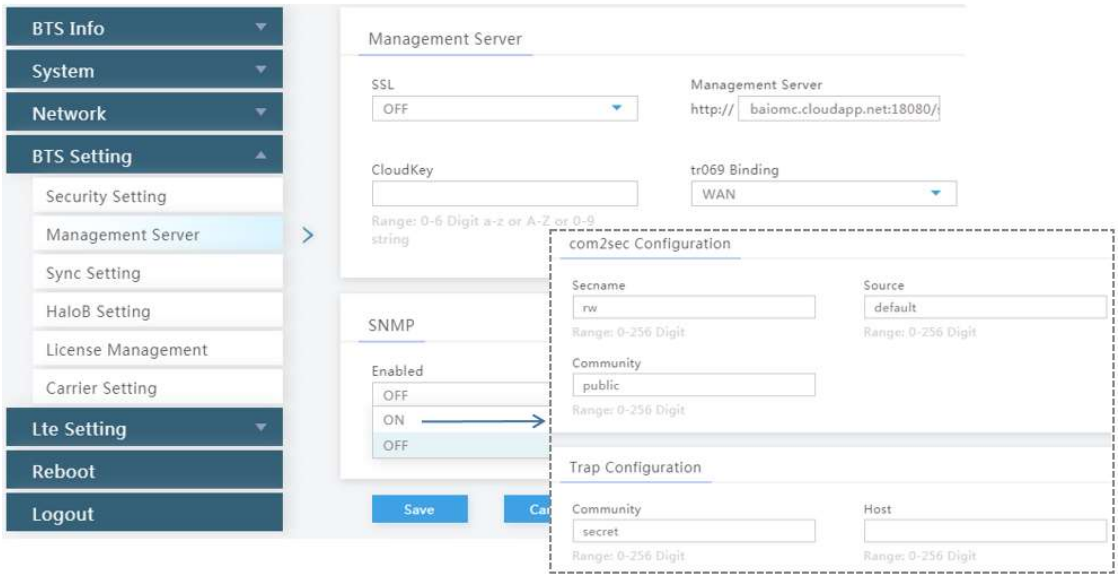
3.6.2 Configure Management Server

For the Network Management System (NMS), an operator has the option to use the Baicells Cloudcore OMC, a local OMC, or other their own management server.

After the NMS settings, you can login the NMS to check whether the eNBs have been added or not. Once added, the eNB can be configured and managed on the NMS.

1. In the left navigation column, select “**BTS settings > Management Server**” as shown in Figure 3-19.

Figure 3-19 Configure Network Management Server



2. Input the network management parameters, which descriptions are given in Table 3-13.

Table 3-13 Network Management Server Parameter Description

Parameter	Description
SSL	Whether to enable the SSL.
Management Server	IP address and port number of the NMS. When the NMS is cloud NMS, the domain name is also supported.
CloudKey	The NMS assign a unique cloudkey for each operator. When eNodeB registered to the NMS, the eNodeB can be identified by NMS. The default factory setting of CloudKey is none. When the eNodeB is registered to the NMS, it is assigned to the default group. The administrator needs to move the eNodeB to an operator. If the value of CloudKey is set to an invalid value, the NMS will deny the access of the eNodeB.

3. If the base station will report KPI information to the third party NMS, enable the SNMP function and configure corresponding parameters, as shown in Table 3-14.

Table 3-14 SNMP Configuration Parameter Description

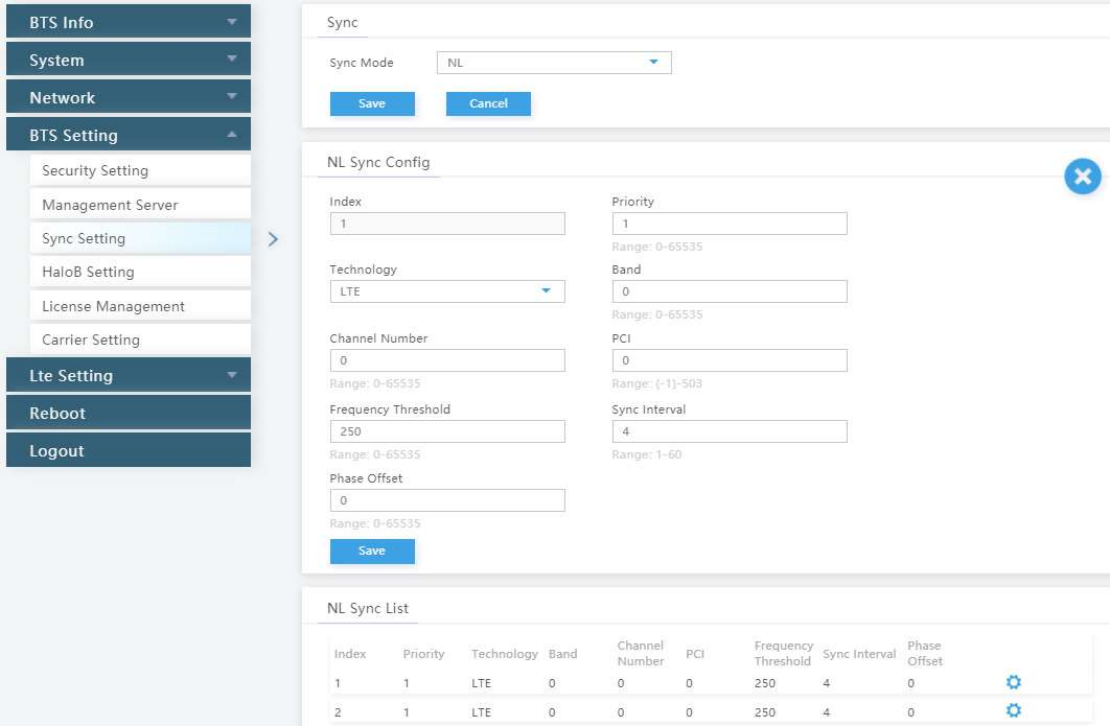
Class	Parameter Name	Description
com2sec Configuration	Secname	The name of security community.
	Source	The source address of acquiring information.
	Community	Define a community, default is public.
Trap Configuration	Community	Define a community, default is secret.
	Host	The IP address of host.

4. Click “**Save**” to complete the NMS and SNMP configuration.

3.6.3 Configure Synchronization

1. In the left navigation column, select “**BTS Setting > Sync Setting**” to enter the synchronization configuration page, as shown in Figure 3-20.

Figure 3-20 Synchronization Mode Setting



2. Set synchronization mode, the value is FREE_RUNNING, GNSS or NL.

   NOTE: For GNSS mode, only GPS is supported.

3. If **NL** sync mode is selected, display the network listening parameters, as shown in Table 3-15.

Table 3-15 Network Listening Parameter Description

Parameter Name	Description
Index	Network listening identity.
Priority	The priority of this synchronizing source.
Technology	Network mode. • LTE • UMTS • GSM
Band	The frequency of the synchronizing band.
Channel Number	The frequency point of the synchronizing band.
PCI	The PCI of the synchronizing band.
Frequency Threshold	The frequency threshold of the synchronizing band.
Sync Interval	Interval of synchronizing measurement.
Phase Offset	Phase offset.

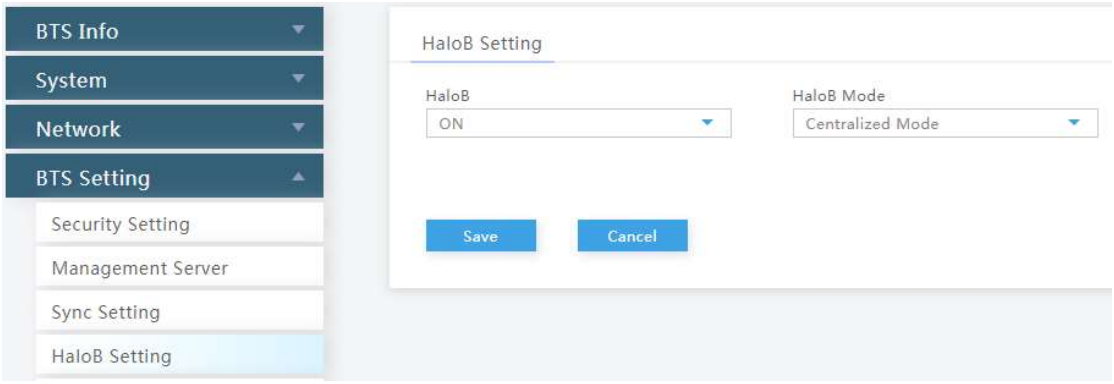
4. Click “**Save**” to complete the synchronization setting.

3.6.4 Configuration HaloB Function

The *HaloB setting* menu is used by operators who have a HaloB license for the eNB. This menu is used to enable/disable the eNB to operate in HaloB mode.

1. In the left navigation column, select "**BTS Settings > HaloB Setting**" to enter the HaloB function configuration page, as shown in Figure 3-21.

Figure 3-21 HaloB Setting



2. Input HaloB parameters, as shown in Table 3-16.

Table 3-16 HaloB Parameter Description

Parameter	Description
HaloB	Enable or disable the HaloB function.
HaloB Mode	Select HaloB mode. Centralized mode or Single mode.

3. Click "**Save**" to complete the HaloB setting.

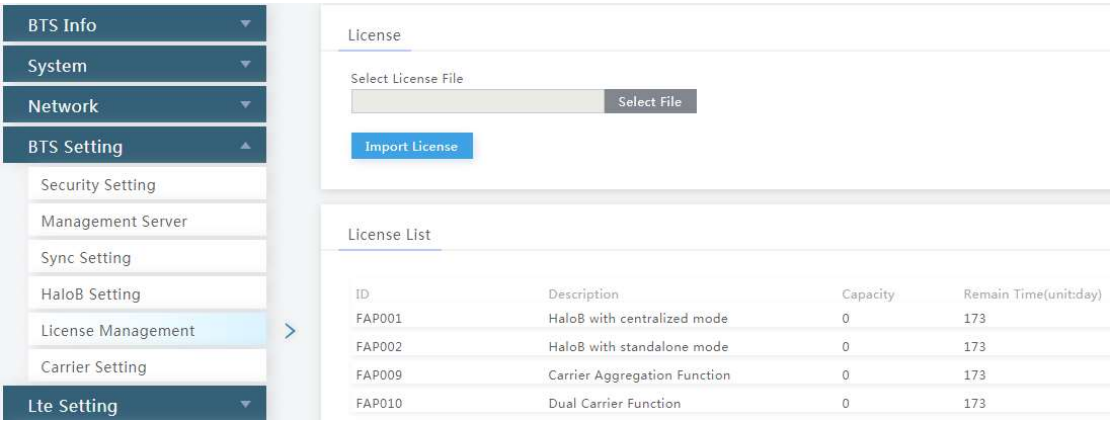
3.6.5 License Management

The *License Management* menu may be used to import license files for optional features, such as HaloB or regulatory certificates of authorization to operate. When imported, the files are stored in the eNB memory and shown in the License List area of this window.

The bottom half of the window pertains licenses for using one or more 1588v2 servers for transmission timing synchronization.

1. In the left navigation column, select "**BTS Settings > License Management**" to enter the License management page, as shown in Figure 3-22.

Figure 3-22 License Management



2. Select the License file from the local computer.

3. Click "**Import License**" to upload the license file to the eNodeB.

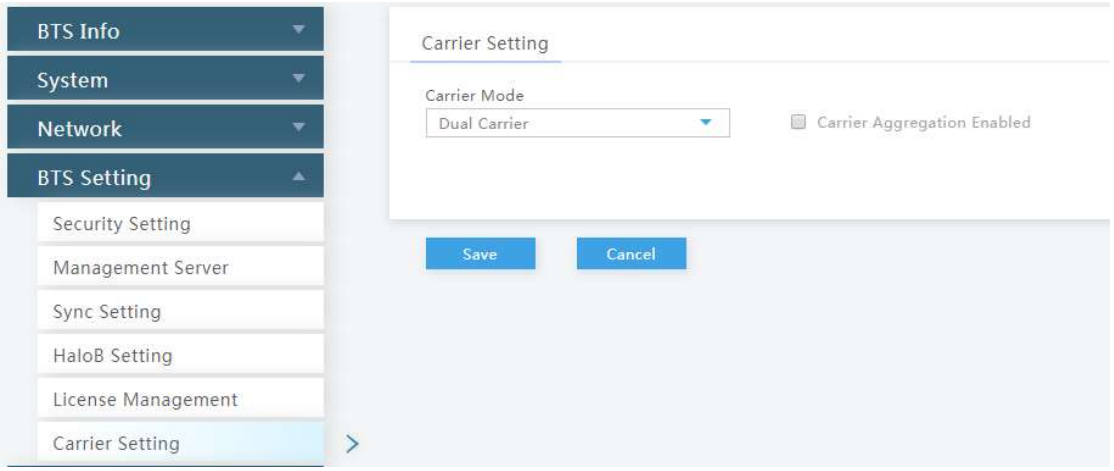
   After the License file is uploaded, it will display in the license list.

3.6.6 Configure Carrier Mode

The eNodeB supports single carrier or dual carriers. When the eNodeB is set to single carrier, it can configure one cell. When the eNode is set to Dual Carrier, it supports to configure two cells.

1. In the left navigation column, select "**BTS Settings > Carrier Setting**" to enter the carrier mode configuration page, as shown in Figure 3-23.

   Figure 3-23 Carrier Mode Configuration



2. Select "**Single Carrier**" or "**Dual Carriers**".

   When Carrier Mode is set to "**Dual Carriers**", check the box "Carrier Aggregation Enabled" to enable CA mode.

3. Click “**OK**” to complete the carrier mode setting.

3.7 Configure LTE Parameter

Caution:

It is not recommended to modify the advanced LTE parameters for common operators. It is better to keep the default values. For senior experts in need, please treat it with great caution.

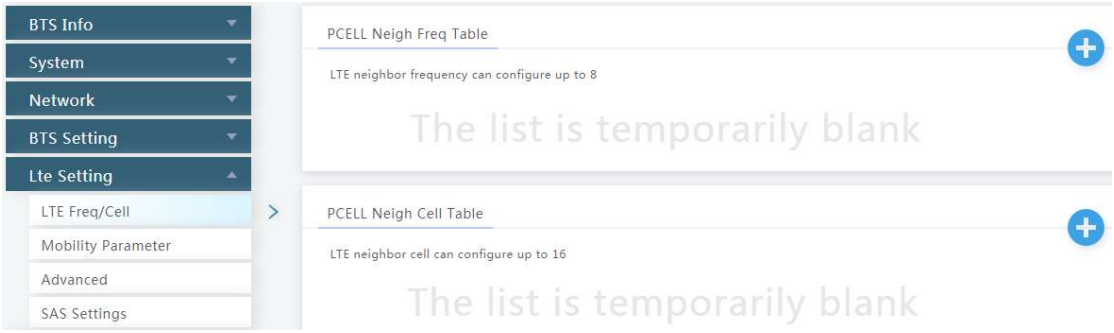
The *LTE* menu contains several sub-menus related to mobility as well as other radio-related settings. Many LTE parameters are important for efficient wireless network operations.

For intra-frequency cell, only the neighbor cell needs to be configured. For intra-frequency cell, only the neighbor cell needs to be configured. For inter-frequency cell, configure the neighbor frequency first, and then configure the neighbor cell.

3.7.1 Configure LTE Neighbor Frequency and Cell

1. Select “**LTE > LTE Freq/Cell**” to enter the LTE neighbor frequency and cell configuration page, as shown in Figure 3-24.

Figure 3-24 LTE Neighbor Frequency/Cell Settings



Users can add, modify, and delete the LTE neighbor frequency and cell. Up to eight LTE neighbor frequencies and 16 LTE neighbor cells can be set.

LTE Neighbor Frequency

2. In the neighbor frequency list, click ⊕ to enter the page for adding a LTE neighbor frequency. The parameter descriptions are given in Table 3-17.

Table 3-17 LTE Neighbor Frequency Parameter Description

Parameter	Description
EARFCN	In short, this is the frequency point of the neighboring eNB’s frequency. Range from 0 to 65,535. EARFCN stands for

Parameter	Description
	Envolved Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access (E-UTRA) Absolute Radio Frequency Channel Number.
Q-RxLevMin	The minimum received signal level at which user equipment (UE) will detect a neighboring eNB's signal. Only the received signal power measured by the UE is higher than this threshold, the UE can camp on this cell. A typical value is -62, which equals -124 dBm.
Q-OffsetRange	Indicates the difference in signal level between the serving and neighboring eNBs, as determined by the received signal level at the UE. If the received signal level is better from a neighboring eNB by at least this amount of difference in dB, the UE will reselect the other cell. The range is -24 to +24. A typical value is 0dB.
Resel Timer	Determines when the cell reselection time expires. Range is 0 to 7 seconds. A typical value is 0 second.
Resel Prior	Priority of the cell reselection to cells at this frequency. Range is 0 to 7 (integer). A typical value is 4.
Resel Thresh High	The cell reselection threshold for higher priority inter-band frequency. Represents the access threshold level, at which the UE will leave the serving cell and reselect another cell at the target frequency (assuming the target frequency cell has a higher reselection priority than the serving cell). Range is 0 to 31dB. A typical value is 18 dB.
Resel Thresh Low	The cell reselection threshold for lower priority inter-band frequency. Represents the access threshold level at which the UE will leave the serving cell and reselect another cell at the target frequency (assuming the target frequency cell has an absolute priority lower than the serving cell). Range is 0 to 31dB. A typical value is 13 dB.
P-Max	The maximum transmit power that UEs in this cell are allowed to use in the uplink. Range is -30 to 33 dBm. A typical value is 23 dBm.

3. Click "**Save**" to complete the LTE neighbor frequency setting.

LTE Neighbor Cell

4. In the neighbor cell list, click  to enter the page for adding a LTE neighbor cell, the parameter descriptions are given in Table 3-18.

Table 3-18 LTE Neighbor Cell Parameter Description

Parameter	Description
PLMN	The 5-6 digit PLMN that the neighbor cell belongs to.
Cell ID	Unique identification number for the Cell.
EARFCN	Frequency point of the neighbor cell.
PCI	Physical Cell Identifier (PCI) of the neighbor cell.
QOFFSET	Frequency offset this neighbor cell. Indicates the difference in signal level between the serving and this neighboring eNB, as determined by the received signal level at the UE. If the received signal level is better from a neighboring eNB by at least this amount of difference in dB, the UE will reselect this cell. Range is +24 to -24. A typical value is 0dB.
CIO	Cell Individual Offset (CIO) is this neighbor eNB's cell offset, which is one of the variables used to determine which eNB will best serve a given UE. Range is +24 to -24. A typical value is 0dB.
TAC	Tracking Area Code (TAC) of this neighbor cell.
eNodeB Type	eNodeB Type. Macro or Home.

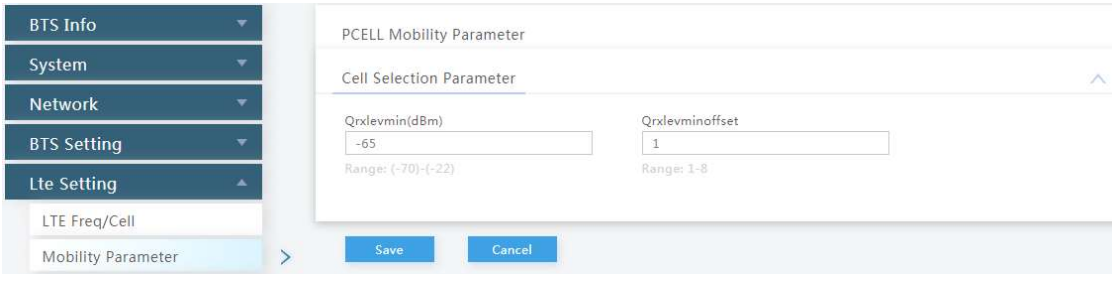
5. Click "**Save**" to complete the setting of the LTE neighbor cells.

3.7.2 Configure Mobility Parameter

The current version only support to configure the cell selection parameters. When the UE selects a PLMN, it will select an appropriate cell to residence.

1. On the left navigation column, select "**LTE > Mobility Parameter**" to enter the mobility parameter configuration page, as shown in Figure 3-25.

Figure 3-25 Mobility Parameter Settings



2. Click "**Cell Selection Parameter**" to display the cell selection parameters configuration parameters, which descriptions are given in Table 3-19.

Table 3-19 Cell Selection Parameter Description

Parameter	Description
Qrxlevmin (dBm)	The minimum acceptable signal level at the UE before cell selection. The unit is dBm. By defining this parameter, it will avoid the UE to access the cell with low receiving signal level. The value of this parameter needs to take factors such as cell size, cell coverage and background noise into comprehensive consideration. Reducing the parameter value will expand the allowable access range of the cell, but it may result in poor call quality.
Qrxlevminoffset	The minimum level offset (difference) in RSRP at the UE needed for cell selection. When the UE residing on a VPLMN periodically searches for a higher level cell, the minimum threshold value is offset to prevent ping-pong effect.

3. Click "**Save**" to complete the cell selection parameters setting.

3.7.3 Configure Advanced Parameter

On the left navigation column, select "**LTE Setting > Advanced**" to enter the advanced parameter configuration page.

3.7.3.1 Power Control Parameters

1. Click "**Power Control Parameters**" to display the power control configuration parameters, which descriptions are given in Table 3-20.

Table 3-20 Power Control Parameter Description

Parameter	Description
p-Max	The maximum transmit power of the UE.
Reference Signal Power	Transmit power of the reference signal.
Power Ramping	Step size of the PRACH's power ramping
Preamble Init Target Power	Initial power of PRACH
$P_{o\_nominal\_pusch}$	Initial transmit power of PUSCH
$P_{o\_nominal\_pucch}$	Initial transmit power of PUCCH
Alpha	Alpha parameter which control the terminal power.
Max Pathloss	The maximum of the path loss.
Target ul sinr	The uplink target SNR corresponding the max pass

Parameter	Description
	loss.
$P_{o\_ue\_pusch}$	Initial transmit power of PUSCH that UE assigned.
$P_{o\_ue\_pucch}$	Initial transmit power of PUCCH that UE assigned.
PA	The PDSCH power offset of the reference signal and the symbol with no reference signal.
PB	The PDSCH power offset of the symbol with reference signal and the symbol with no reference signal.

2. Click "**Save**" to complete the power control parameters setting.

   If the transmit power is set to fixed, the value is set single. If the transmit power management (TPM) is set to enabled, the base station can adjust transmit power automatically, you need to set two values for top and bottom bound, separate with comma.

   If the reference signal power need to be calculated by total power, the formula is as follows:

   Total power is P_{TX} (mW), bandwidth is Bw (MHz), then the reference signal power p_{CRS}(dBm) is:

   $p_{CRS} = 10 * lg(P_{TX}) – 10 * lg(12 * 100 * Bw / 20) + 10 * lg(1 + P_B)$

   - **Bw** is the parameter "carrierBwMhz" set in quick setting
   - **P_B** is power parameter of PDSCH, which is the parameter "pb" set in power control parameters, default is 1.

3.7.3.2 Random Access Parameters

1. Click "**Random Access Parameters**" to display the random access configuration parameter, which descriptions are given in Table 3-21.

   Table 3-21 Random Access Parameter Description

Parameter	Description
Preamble Format	The preamble format when UE random accesses. • 0: send prach on normal subframe, the farthest covered distance is 14km. • 4: send prach special subframe, the farthest covered distance is 1km.
Prach-Configuration Index	PRACH configuration index, broadcasted to the UE via SIB2 Range from 0 to 63.
Zero Correlation Zone Config	prach cycle shift, used to generate the preamble sequence.

Parameter	Description
	Range from 0 to 63.
PRACH Freq Offset	Set the frequency offset range.

2. Click “**Save**” to complete the random access parameters setting.

3.7.3.3 RRC Status Parameters

1. Click “**RRC Status Parameters**” to display the RRC status configuration parameters, which descriptions are given in Table 3-22.

Table 3-22 RRC Status Parameter Description

Parameter	Description
Ue Inactivity Timer	Expire time of the UE inactive status timer (s)
Max Expiry Count	Maximum number of the UE inactive status timer’s expiries

UE inactive status duration = RRC Inactive Timer * Max Expiry Count

2. Click “**Save**” to complete the RRC status parameters setting.

3.7.3.4 Scheduling Algorithm

Scheduling is an important insurance for the good operation of the wireless data service. Scheduling algorithms have a general impact on key performance indicators like the cell throughput, cell edge user throughput, VoIP capacity, and QoS of data service.

RR: Allocate the resource and opportunities to all terminals equally. QoS not taken into account, and memory not used.

1. Click “**Random Access Parameters**” to display the random access configuration parameter, which descriptions are given in Table 3-23.

Table 3-23 Scheduling Algorithms Parameter Description

Parameter	Description
UL Schd Type	MAC uplink scheduling algorithm Default: RR
DL Schd Type	MAC downlink scheduling algorithm Default: RR

2. Click “**Save**” to complete the scheduling algorithm setting.

3.7.3.5 Link Activation State Detector

1. Click “**Link Activation State Detector**” to display the link activation state detector configuration parameter, which descriptions are given in Table 3-24.

Table 3-24 Link Activation State Detector Parameter Description

Parameter	Description
Link Keep Alive	Whether to enable the link keep alive.
Link Keep Alive Timer	When “**Link Keep Alive**” is set to “**Enable**”, the timer is need to set.

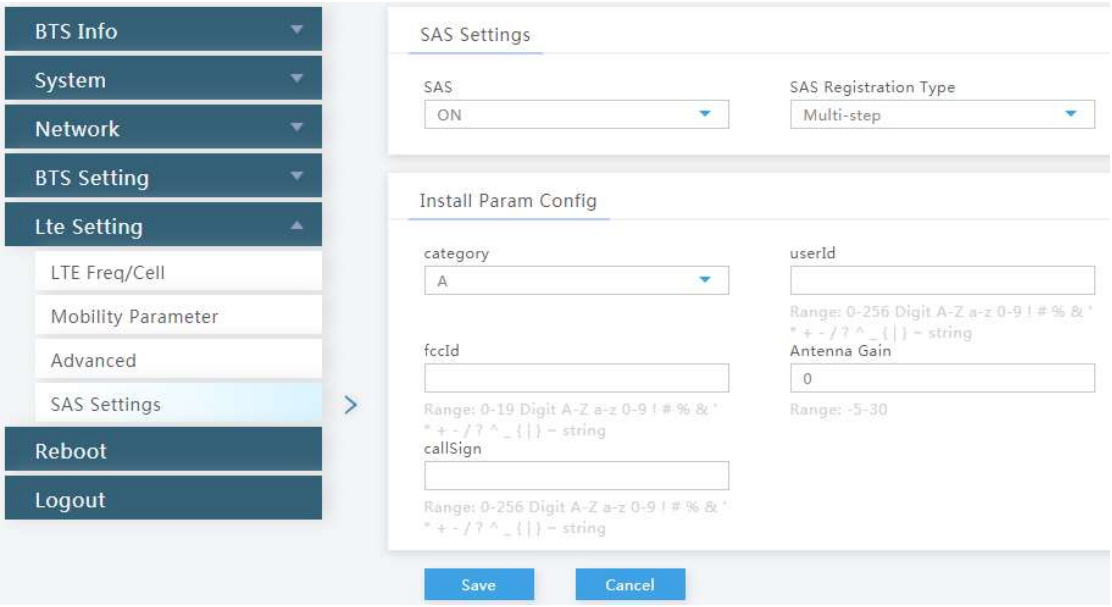
2. Click “**Save**” to complete the link activation state detector setting.

3.7.4 Configure SAS Parameter

Spectrum Access System (SAS) is responsible for the management of the Citizens Broadband Radio Service Device (CBRD) and spectrum assignment. The registration, authentication, spectrum assignment and power of the CBRD is determined by SAS. Therefore, when the eNodeB need to access into a CBRS system, it will connect to the SAS and report parameters to the SAS.

1. Select “**LTE > SAS Settings**” to enter the SAS configuration page, as shown in Figure 3-26.

Figure 3-26 SAS Settings



2. If enabled the SAS function, you should set different parameters according to the value of “**SAS Registration Type**”.

a) When some information has been stored in the SAS, set "**SAS Registration Type**" to "**Multi-step**", the parameter description is given in Table 3-25.

Table 3-25 Antenna Installation Parameter Description (Multi-step)

Parameter	Description
Category	The type of the eNodeB. • A: home eNodeB • B: macro eNodeB
userId	User ID.
fccId	FCC ID.
Antenna Gain	The antenna gain of the eNodeB.
callSign	call sign.

b) Set "**SAS Registration Type**" to "**Single-step**", the parameter description is given in Table 3-26.

Table 3-26 Antenna Installation Parameter Description (Single-step)

Parameter	Description
Category	The type of the eNodeB. • A: home eNodeB • B: macro eNodeB
userId	User ID.
fccId	FCC ID.
latitude	The latitude of eNodeB, which is acquired automatically.
longitude	The longitude of eNodeB, which is acquired automatically.
height	The height of the eNodeB.
heightType	The height type is AGL.
indoorDeployment	Select the eNode type. • Indoor • Outdoor
Antenna Gain	The antenna gain of the eNodeB.
LowFreq	The low frequency of the antenna.
HighFreq	The high frequency of the antenna.
MaxEIRP	The maximum of EIRP.
antennaAzimuth	The azimuth of the antenna.
antennaDowntilt	The downtilt of the antenna.
antennaBeamwidth	The beamwidth of the antenna.
callSign	call sign.
groupType	The group type.
groupId	The group ID.

And you also should configure the information of the professional installation

personal and import the certificate, the parameter description is given in Table 3-27.

Table 3-27 CPI Parameter Description

Parameter	Description
cpiId	CPI ID.
cpiName	CPI name.
installCertificationTime	The certification time.

3. Click “**Save**” to complete the SAS setting.

Appendix A **Terminology & Acronym**

Acronym	Full Name
CHAP	Challenge Handshake Authentication Protocol
CSFB	Circuit Switched Fallback
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
GPS	Global Positioning System
IKE	Internet Key Exchange
MME	Mobility Management Entity
MOCN	Multi-Operator Core Network
NTP	Network Time Protocol
PAP	Password Authentication Protocol
PCI	Physical Cell Identifier
PLMN	Public Land Mobile Network
PPPOE	Point to Point Protocol over Ethernet
PRACH	Physical Random Access Channel
PUCCH	Physical Uplink Control Channel
PUSCH	Physical Uplink Shared Channel
RAT	Radio Access Technologies
RRC	Radio Resource Control
RSRP	Reference Signal Receiving Power
SON	Self-Organized Network
TAC	Tracking Area Code

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 50cm between the radiator & your body.