5G Integrated gNodeB

Configuration Guide

BaiBNQ_2.5.x

Document version: 02

About This Document

This document describes the mainstream applications used for configuring and administering the Baicells Next Generation gNodeBs (gNBs). The scope of information includes the standard single carrier gNB Graphical User Interface (GUI). The target audience is network administrators responsible for configuring, monitoring, troubleshooting, and upgrading Baicells gNBs; configuring network interfaces; adding subscribers, and creating service plans.

Following products use the BNQ software platform.

- Aurora243
- Aurora249
- Stellar227

Copyright Notice

Disclaimer

All products, services, and features bought from Baicells Technologies are subject to the constraints of the company's business contract and terms. All or part of the products, services, or features described in this document might not be your specific Baicells network. Unless stated in the contract, Baicells Technologies does not make any explicit or default statement or guarantee about the contents of this document.

Unless stated otherwise, this document serves only as a user guide, and all descriptions/ information/ suggestions mean no guarantee, neither explicit nor implicit.

The information in this document is subject to change at any time without notice. For more information, please consult with a Baicells technical engineer or the support team. Refer to the “Contact Us” section.

Revision Record

Date	Version	Description
30 Dec., 2023	01	Initial released.
1 Feb., 2024	02	Modify default password strategy in “2.4 Login”.

Contact Us

	Baicells Technologies Co., Ltd.	Baicells Technologies North America, Inc.
	China	North America
Address	9-10F, 1st Bldg., No.81BeiqingRoad, Haidian District, Beijing, China	555 Republic Dr., #200, Plano, TX 75074, USA
Phone	400-108-0167	+1-888-502-5585
Email	contact@Baicells.com or support@Baicells.com	sales_na@Baicells.com or support_na@Baicells.com
Website	www.Baicells.com	https://na.Baicells.com

Contents

List of Figures

List of Tables

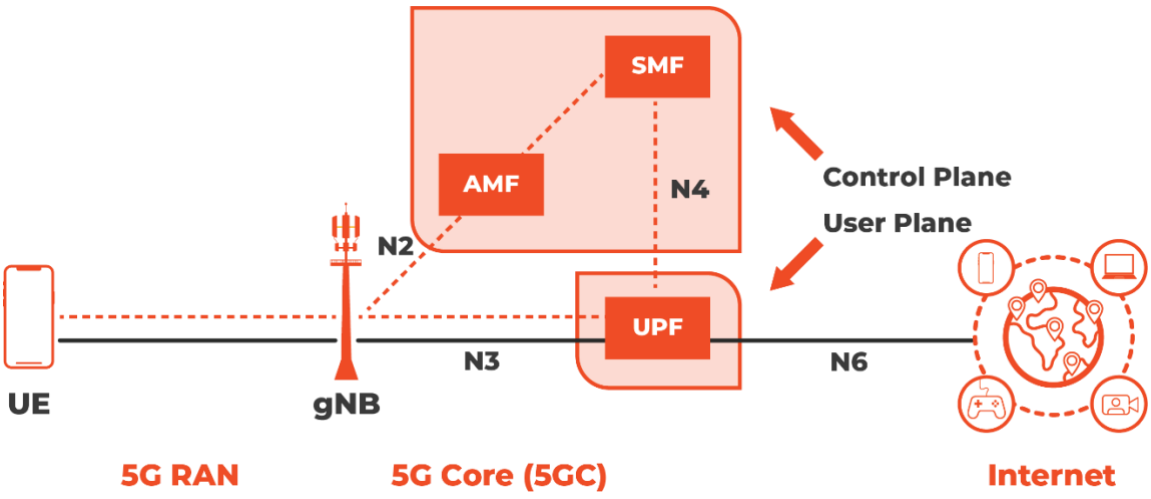
1. Introduction

The Baicells 5G base station is an advanced outdoor 5G sub-6 GHz integrated gNodeB (gNB) designed and developed based on the Qualcomm 5G System-on-a-Chip (SoC) solution. The gNB enables operators to enhance coverage performance, improve network capacity, and eliminate blind spots for their 5G networks while reducing overall system power consumption. The gNB has an integrated small cell form factor for quick and easy installation. The frequency bands for 5G New Radio (NR) are separated into two different frequency ranges, and the Aurora243, Aurora249 and Stellar227 operates in the frequency range 1 (FR1):

- n41 (2515 MHz–2675 MHz) / (2600 MHz–2690 MHz)
- n48 (3550 MHz–3700 MHz), which supports Citizens Broadband Radio Service (CBRS) and the shared Spectrum Access System (SAS)
- n77 (3800 MHz–4200 MHz), which includes sub-6 GHz bands
- n78 (3300 MHz–3600 MHz) / (3600 MHz–3800 MHz), which includes sub-6 GHz bands
- n79 (4400 MHz – 5000 MHz)

The Baicells products allow network operators to offer internet service to subscribers using 5G NR-based broadband wireless access.

Figure 1-1 Standard 5G NR Infrastructure



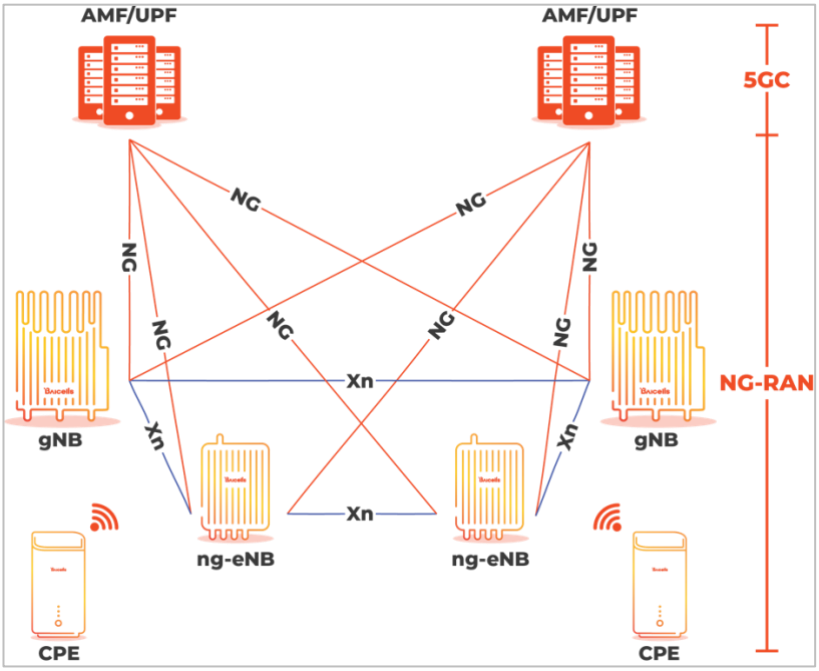
A 5G NR network is composed of a 5G Radio Access Network (RAN) and a 5G Core Network (5GC), as shown in Figure 1-1. The key components of a 5G RAN include User Equipment (UE), CPE, gNodeB (gNB), and ng-eNodeB (ng-eNB). The ng-eNB is an enhanced version of the LTE eNB and connects 5G CPEs to 5GC using the LTE air

interface.

The 5GC is the heart of the overall infrastructure, and it is designed to support the enhanced capabilities of 5G, including higher data rates, lower latency, massive connectivity, and network slicing. Some of the elements that manage and control the flow of data in a 5G network are Access and Mobility Management Function (AMF), Session Management Function (SMF), User Plane Function (UPF), Network Slice Selection Function (NSSF), and Authentication Server Function (AUSF).

- AMF – Responsible for managing a device's registration, reachability, connection, and mobility in the 5G network.
- SMF – Responsible for session establishment, QoS management, policy enforcement, traffic routing, billing, and interaction with the UPF.
- UPF – Handles data forwarding, traffic inspection and control, packet routing and encapsulation, and service-specific optimization, and interacts with other network functions to ensure efficient and reliable data transmission on the 5G network.
- NSSF – Responsible for selecting and assigning appropriate network slices to UE based on their specific requirements.
- AUSF – Handles user authentication and security-related function in the 5G network.

Figure 1-2 5G NR Overall Architecture



Two interfaces are used in the 5G NR network: NG interface and Xn interface. The NG interface exists between the 5GC and the base stations. The Xn interface exists

between the base stations (gNB to gNB, gNB to ng-eNB, and ng-eNB to ng-eNB) and is the network interface between NG-RAN nodes. Xn-U is the Xn user plane interface, and Xn-C is the Xn control plane interface. The gNB houses three functional modules: Central Unit (CU), Distributed Unit (DU), and Radio Unit (RU). The gNB CU handles mobility control, radio resource management, and session management. The gNB DU provides physical layer and Media Access Control (MAC) layer functionalities. The functionality split between CU and DU is implementation dependent. The gNB CUs and DUs use F1 interfaces to support signaling exchange and data transmission between the units.

5G is deployed in two modes, Non-Standalone Mode (NSA) and Standalone Mode (SA). NSA enables faster deployment and time-to-market for 5G, leveraging the existing 4G network and infrastructure. A 5G RAN can operate on a legacy 4G core network for connectivity in NSA. However, SA deployment involves a full-fledged 5G network with the 5GC and 5G RAN. As a result, SA offers the full benefits and capabilities of 5G, including advanced features like network slicing, ultra-low latency, and massive IoT support. In addition, SA provides a more future-proof and scalable solution, as it utilizes the native capabilities and performance of 5G fully.

The Aurora243/Auro249 operates in 5G SA mode, and a single channel can operate in a maximum of 100 MHz channel bandwidth, so there is no need for Carrier Aggregation (CA).

The available Operations, Administration, and Management (OAM) applications include an eNB GUI, a gNB GUI, a CPE GUI, the Baicells CloudCore Operations Management Console (OMC), and the Baicells CloudCore Business and Operation Support System (BOSS).

The eNB GUI, gNB GUI, and CPE GUI configure and manage individual devices. The CloudCore apps configure and manage the operator’s network devices across multiple sites through the OMC and all subscribers and service plans through BOSS. Baicells charges a monthly CloudCore usage fee based on the number of active users. Baicells also provides private network solutions such as Local core network and Local OMC+BOSS are also available.

Many of the equipment and network interface parameters are preconfigured with recommended default settings from the factory. However, this guide explains and illustrates every field and operation to allow each operator the flexibility to use the gNB GUI.

2. gNB GUI

This section describes the gNB GUI for the Baicells 5G gNB, which runs on BaiBNQ_2.5 software.

2.1 Computer Requirements

Refer to Table 2-1 for the minimum computer requirements needed to launch the gNB GUI.

Table 2-1 Computer Requirements

Item	Description
CPU	Above Intel Core 1GHz
Memory	Greater than 2G RAM
Hard Disk	No less than 100 MB space available
Ethernet Port	10/100/1000 adaptive Ethernet interface
Operating System	• Microsoft: Windows7 or Windows10 or higher • Mac: MacOSX10.5 or higher
Screen Resolution	Higher than 1024 x 768 pixels
Browser	Google Chrome 9+, Internet Explorer 7.0+, Mozilla Firefox 3.6+

2.2 Connect Web Client to Base Station

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

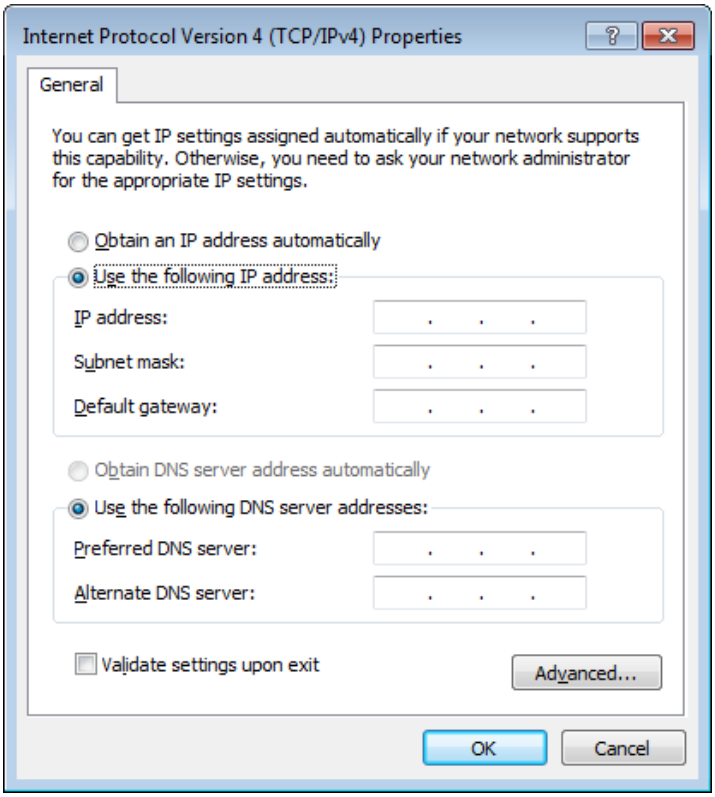
2.3 Set Up Client Computer

Before login 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 10 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 2-1.

Figure 2-1 Internet Protocol Version (TCP/IPV4)



5. Select “**Use the following IP address**”.

6. Input IP address of the Operation and Maintenance (OAM) interface, subnet mask, and default gateway, and then click “**OK**”.

   - IP address: 192.168.150. *XXX*: (xxx is a number from 100 to 254)

     Because the LAN interface of the gNB uses the IP address of 192.168.150.7, others should avoid using this address.

   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.150.1

   NOTE: The default OAM IP address is 192.168.150.7/24. If the gNB configures IP address in other segments, you should configure according to the actual networking.

7. Execute ping 192.168.150.xxx in the command dialogue window and check whether the connection between the local (client) computer and the server is working.

   If the ping command fails, contact network engineers to ensure network connectivity.

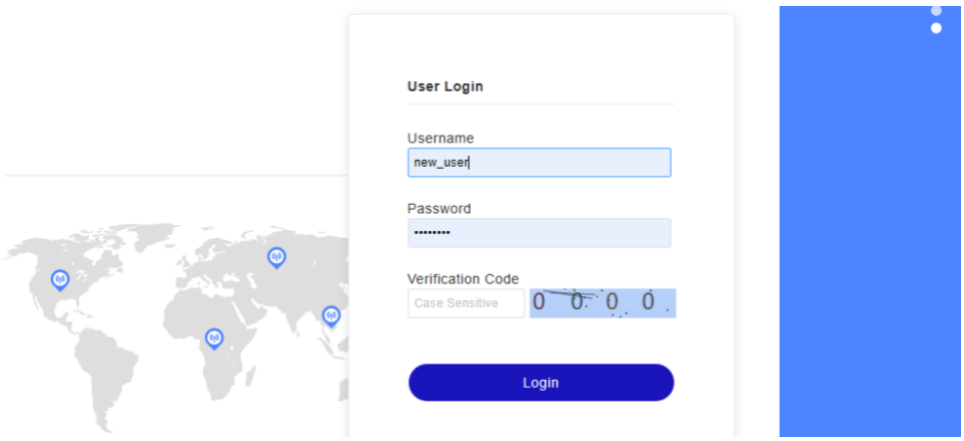
2.4 Login

1. Open a Web browser and enter *http://<OAM IP>*. The *OAM IP* is the IP address of the management port, and the default IP is 192.168.150.7.

2. Enter *new_user* as the *Username*, *gNB@a*b*c*d** as the *Password,* and then enter the random case-sensitive *Verification Code* at the *User Login* dialogue window, as shown in Figure 2-2.

   Each gNB has an exclusive default password, which is formatted as *gNB@a*b*c*d**, where * represents the last four digits of the gNB's Serial Number (SN). For example, if the last four digits of the gNB's SN are *1234*, then the default password for that gNB would be *gNB@a1b2c3d4*.

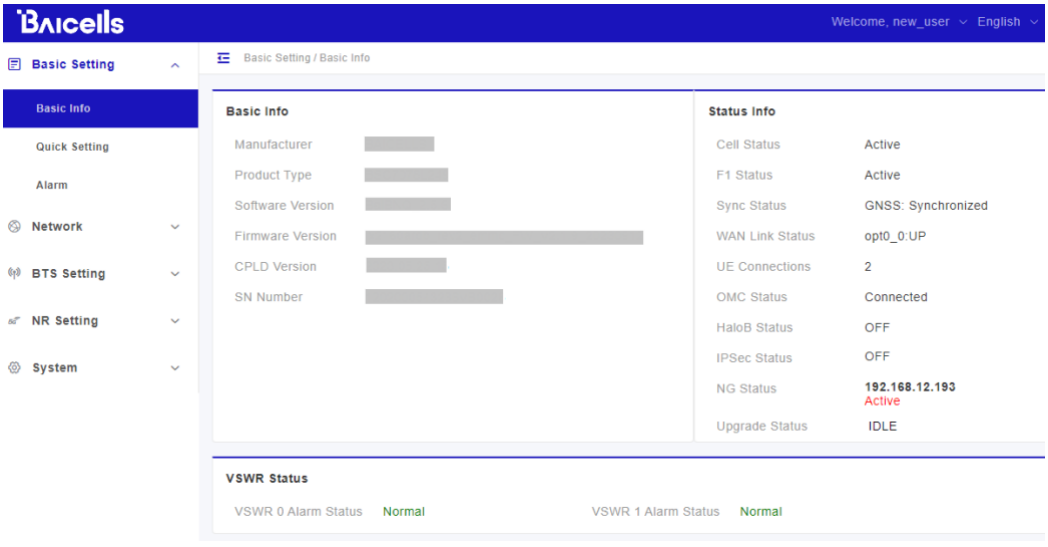
   Figure 2-2 GUI Login



   For security seasons, you should change the password after you first log in rather than leaving the default admin and password.

3. Click "**Login**" to enter the homepage, as shown in Figure 2-3.

   Figure 2-3 GUI Homepage



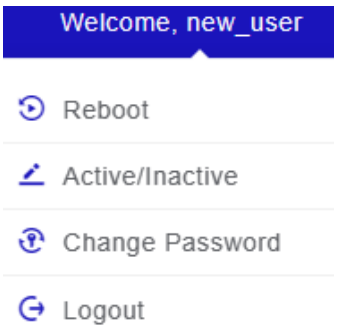
NOTE: The menus and information may vary by product type or software version.

The GUI homepage displays the **Basic Setting > Basic Info** sub-menu, which is like a dashboard for the device.

The navigation pane on the left side contains the main menu items *Basic Setting*, *Network*, *BTS Setting*, *NR Setting, and System*. The main menus and associated sub-menus may vary by hardware model, software version, and gNB operating mode. Use the vertical/horizontal scroll bars to see the displayed menu's fields. Vertical scroll bars are usually on the right side of the display. Horizontal scroll bars are usually at the bottom of the display.

On the top right corner of the window, where is the system operation menu. Click the *user name* (default is *new_user)* to pop up the system menu, as shown in Figure 2-4, which offers *Reboot*, *Active/Inactive*, *Change Password*, and *Logout* sub menu.

Figure 2-4 System Menu



On the top right corner of the window, click "English" and select "Chinese" to switch to the language to Chinese.

2.5 Reboot

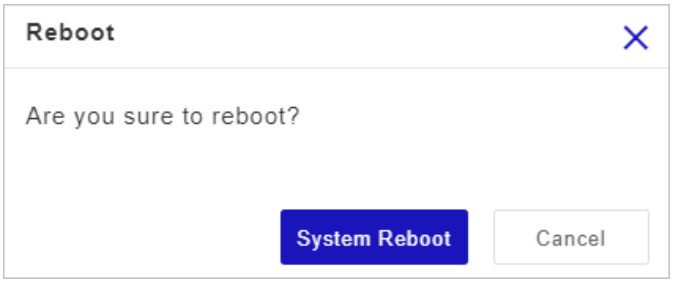
Caution: The reboot action will disrupt the gNB service.

NOTE:

1. When you need to reboot the gNB, Baicells recommends collecting logs on the gNB before you reboot it for troubleshooting.
2. In a lab test environment, you can disable GPS Sync to reduce the reboot time.

Go to the top right corner of the display and open the drop-down system menu. Then, select *Reboot*, as shown in Figure 2-5.

Figure 2-5 Reboot

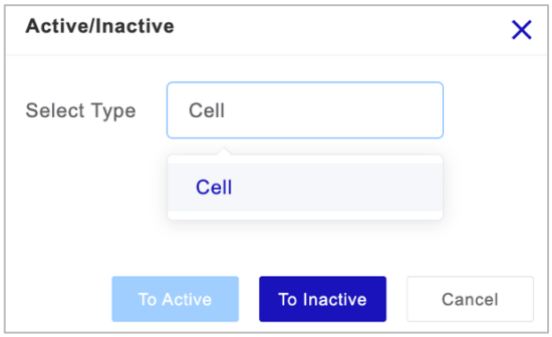


Click “System Reboot” to restart the gNB. Wait for a few minutes, the gNB will restart successfully and can access services.

2.6 Active/Inactive

Go to the top right corner of the display and open the drop-down system menu. Then, select *Active/Inactive* to pop up the Active/Inactive window, as shown in Figure 2-6.

Figure 2-6 Active/Inactive

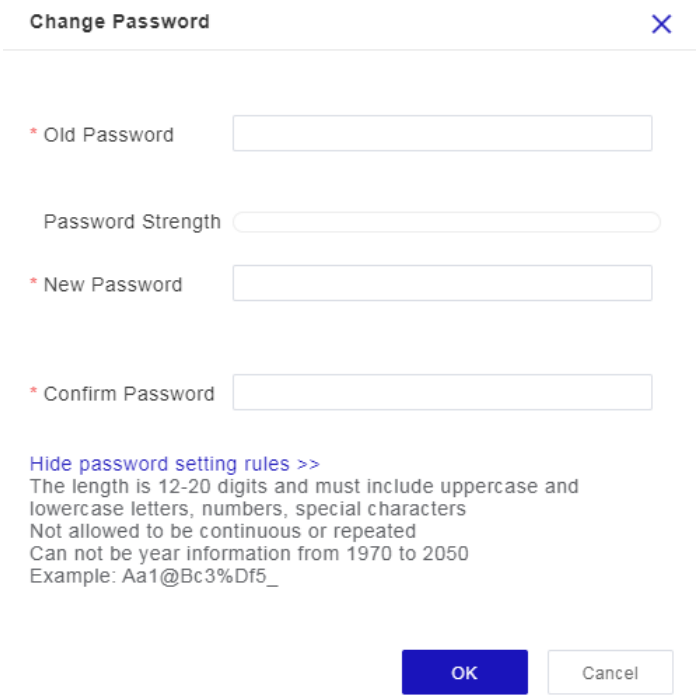


Select Type is set to *Cell* by default, and determine to which state you want to set the gNB. Next, click *To Active* to change the status of the gNB active, or click *To Inactive* to set the status as inactive.

2.7 Change Password

Go to the top right corner of the display and open the drop-down system menu. Then, select *Change Password* to pop up the Change Password window, as shown in Figure 2-7.

Figure 2-7 Change Password



The password is the gNB administrator's GUI password. First, enter your old password and then enter a new password. Then, re-enter the new password to confirm it and press *OK*. The passwords must be 12 to 20 characters each.

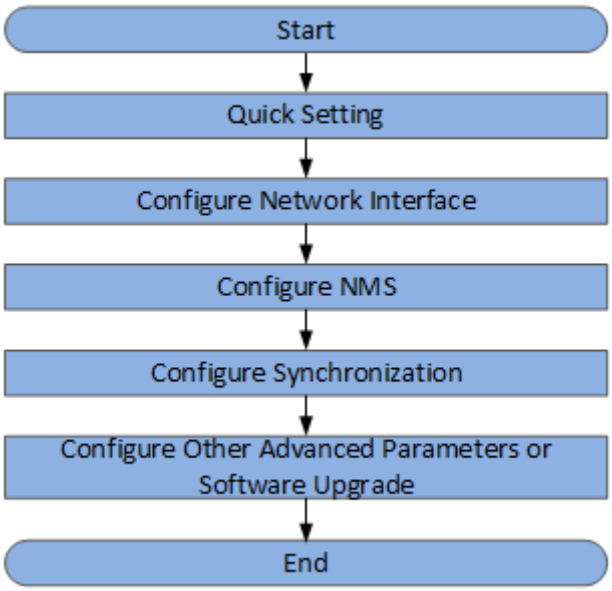
2.8 Logout

To log out of the gNB GUI, go to the top right corner of the display and open the drop-down system menu. Then, select *Logout*, and you are automatically logged out of the GUI and presented with the *Login* dialogue window.

3. Initial Configuration Flow

After the gNB is powered on, configure the gNB to start service and access UEs, providing voice and data service. When configuring a newly installed gNB, we recommend you follow the flow that is shown in Figure 3-1.

Figure 3-1 Initial gNB Configuration Flow



Before configuring the device's data, the 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 network parameters, cell parameters, protocol parameters, software version, etc.

4. Basic Setting

The *Basic Setting* menu is shown in Figure **4-1**, which is used to view basic information about the gNB, configure quick settings, and view information about active alarms and history alarms.

Figure 4-1 Basic Setting Menu

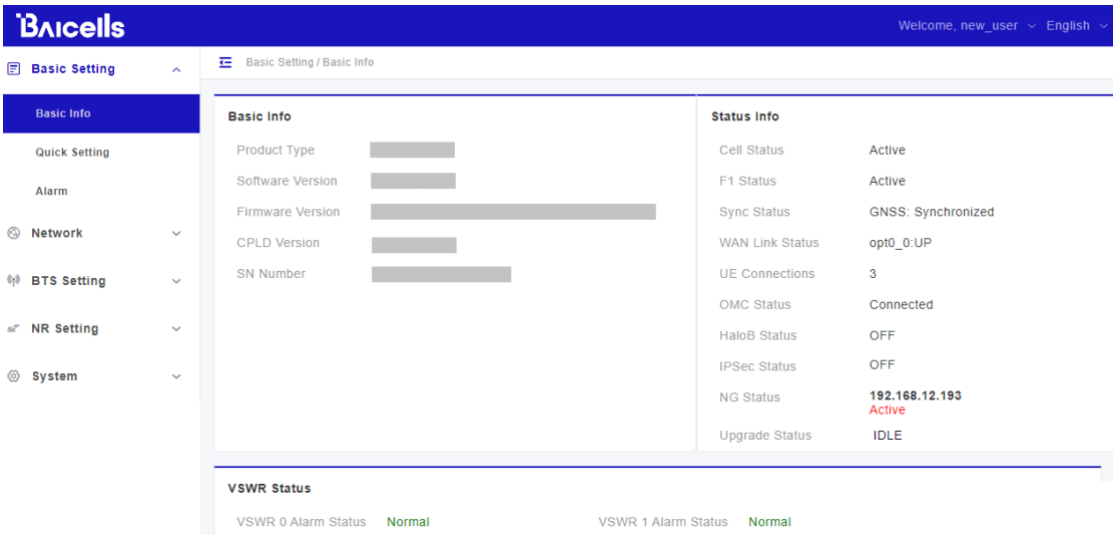
4.1 Basic Info

The *Basic Setting* > *Basic Info* sub-menu contains several fields that provide essential gNB operational information. The displayed fields depend on the hardware model, software version, and gNB operating mode. For example, if the cell is active, its status is reported as such in the *Status Info* pane.

Switching to a different operating mode requires a reboot of the gNB. A message displays stating to please wait while settings are applied. When the message displays confirming the configuration is successful, click *OK* to initiate the reboot.

The *Basic Info* window is shown in Figure **4-2**, and the fields are described in Table **4-1**.

Figure 4-2 Basic Info



NOTE: The gNB GUI refreshes the basic information every 15 seconds.

Table 4-1 Basic Info Fields

Field Name	Description
Basic Info	
Product Type	The model of the gNB.
Software Version	The version number of the operating software running on the gNB.
Firmware Version	The version of the firmware software.
CPLD Version	The version of Complex Programmable Logic Device (CPLD).
SN Number	Serial Number (SN) identifier for the gNB.
Status Info	
Cell Status	Active or Inactive. When the gNB is operating (transmitting and receiving signals), the status is active. If not, the status is reported as inactive.
F1 Status	Status of link between gNB CU and DU: Active (connected) or Inactive (not connected).
Sync Status	Status of GPS synchronization
WAN Link Status	Status of WAN link
UE Connections	Number of connected UEs.
OMC Status	Status of OMC connection: Connected or Disconnected.
HaloB Status	Status of HaloB: ON or OFF.
IPSec Status	Status of IPsec: OFF, Connected or Disconnected.
NG Status	Status of the NG interface. Active (connected) or Inactive (not connected).
Upgrade Status	Overall upgrade status of the gNB.
VSWR (Voltage Standing Wave Ratio) Status	
VSWR 0 Alarm Status	This alarm indicates a problem with the transmission line or antenna system of the network. If the status is *Normal,* no VSWR alarm is triggered.
VSWR 1 Alarm Status	This alarm indicates a problem with the transmission line or antenna system of the network. If the status is *Normal,* no VSWR alarm is triggered.

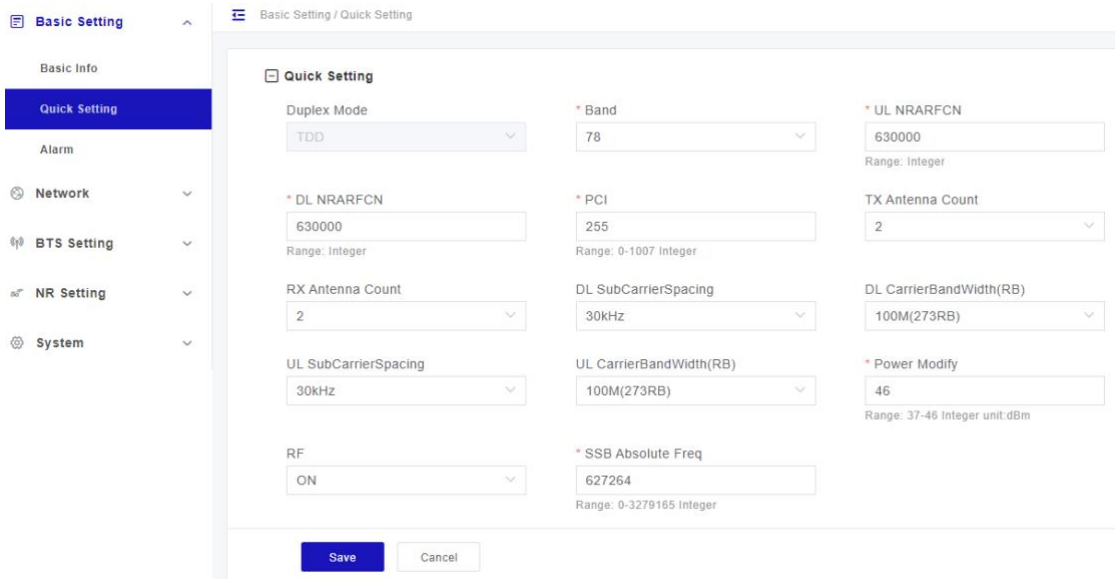
4.2 Quick Setting

The quick settings determine important Radio Frequency (RF) parameters, as well as connectivity to the 5GC. These parameters need to be planned in advance in the network planning stage.

For most *Quick Setting* parameter changes, you must reboot the gNB for the changes to take effect.

1. In the navigation column in the left, select "**Basic Setting > Quick Setting**" to enter the quick setting page, as shown in Figure 4-3.

Figure 4-3 Quick Setting



2. Input quick setting parameters, the parameter descriptions are given in Table 4-2.

Table 4-2 Quick Setting Parameter Description

Parameter	Description
Duplex Mode	The working mode, which is assigned automatically by the system.
Band	Operation frequency band, including 40, 41, 48, 77, 78, 79.
UL NRARFCN	In 5G, NR RF reference frequencies are designated by a New Radio Absolute Radio Frequency Channel Number (NRARFCN) on the global frequency raster. This field is used to define the Uplink NRARFCN.
DL NRARFCN	This field is used to define the Downlink NRARFCN.
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 Quality of Service (QoS). The range is from 0 to 1007. **NOTE**: Baicells does not use and does not work with PCI 0.
TX Antenna Count	Number of transmitting antennas. The gNB supports up to two TX antennas.
RX Antenna Count	Number of receiving antennas. The gNB supports up to two RX antennas.
DL SubCarrierSpacing	Downlink subcarrier spacing. The gNB supports 30kHz in this version.
DL CarrierBandWidth(RB)	Downlink carrier bandwidth resource block.
UL SubCarrierSpacing	Uplink subcarrier spacing. The gNB supports 30kHz in this version.
UL CarrierBandWidth(RB)	Uplink carrier bandwidth resource block.
Power Modify	Output power, typically left with the default values. Range is based on the product type. This field may be used in situations where you need to reduce the output power, such as testing the gNB before installing it on a tower; restricting the gNB output to reduce interference with other gNBs in the

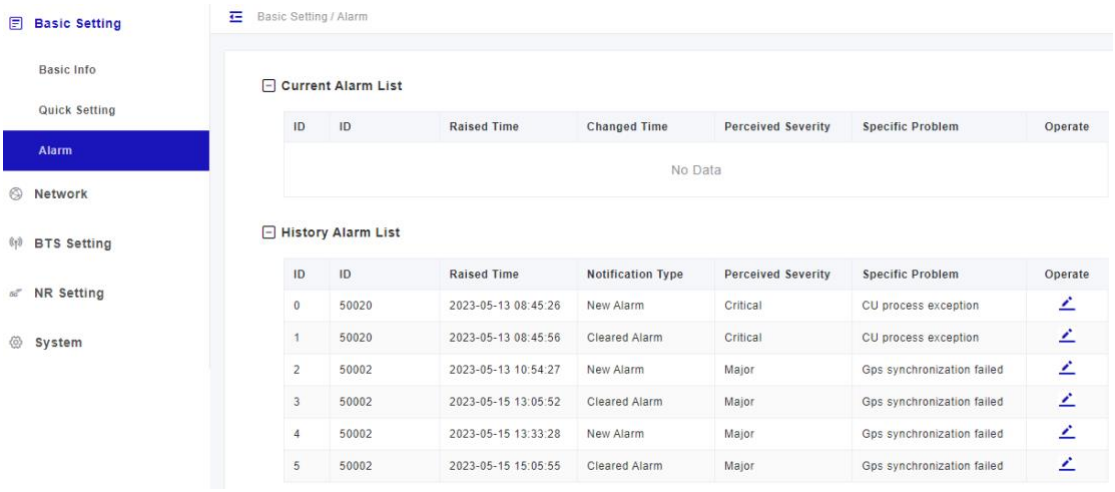
Parameter	Description
	same geographical area; or staying within Effective Isotropic Radiated Power (EIRP) rules. **NOTE**: If SAS is enabled, the power setting is assigned by the SAS vendor. Refer to the SAS Deployment Guide for more information.
RF	Enable or disable the radio frequency. If the parameter is set to ON, the antenna will transmit radio signal.
SSB Absolute Freq	Synchronization Signal Block (SSB) absolute frequency

3. Click "**Save**" to complete the quick settings of the gNB.

4.3 Alarm

In the navigation column in the left, select "**Basic Setting > Alarm**" the menu to show the current and history alarms, as shown in Table 4-3.

Table 4-3 Alarm



Click  to view the *Current Alarm Info* and *History Alarm Info*. Table 4-4 shows the description of the fields of current alarms and history alarms.

Table 4-4 Current Alarm Info and History Alarm Info Fields

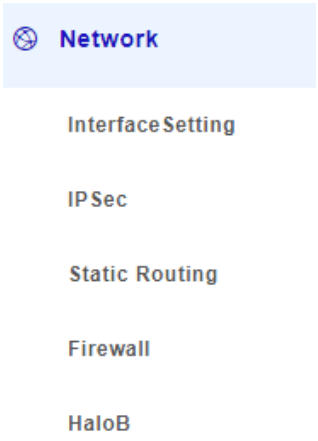
Field Name	Description
ID	Alarm ID
Perceived Severity	Severity of the alarm
Raised Time	The time the alarm was raised
Notification Type	The type of alarm notification
Event Type	The type of alarm event
Probable Cause	The cause of the alarm
Specific Problem	The description of the alarm

Field Name	Description
Managed Object Instance	It describes the specific element or aspect of the system. This allows administrators to easily distinguish and manage each instance.

5. Network Setting

The *Network* menu settings are where you configure the Wide Area Network (WAN) and Virtual Local Area Network (VLAN) network interfaces and static routes for the gNB, as shown in Figure **5-1**. You can also configure the IP Security (IPSec) interface, add static routes, firewall, and HaloB from the *Network* menu.

Figure 5-1 Network Menu



5.1 Configure Interfaces

The integrated gNB model includes Aurora243, Aurora249 and Stellar227.

- For Aurora243: Interfaces have **eth** and **opt**. **eth** is LAN interface by default and **opt** is the WAN interface by default.
- For Aurora249: Interfaces have **opt0_0**, **opt0_1** and **opt1**. **opt0_0** is LAN interface by default, **opt0_1** is WAN interface by default, and **opt1** is cascading interface by default.
- For Stellar227: Interfaces have **LAN**, **WAN**, and **SFP**. **LAN** is LAN interface by default, **WAN/SFP** is WAN interface by default.

By clicking "**WAN/LAN Interface Exchange**" to exchange WAN and LAN physical interfaces each other.

The WAN interface is an external communication portal (Internet connection) between the gNB's Network Management System (NMS) and the core network. The gNB's NMS may be the Baicells Operation and Maintenance Center (OMC) or other NMS. The Wide Area Network (WAN) interface supports the configuration of multiple Virtual Local Area Networks (VLANs), which the gNBs can use.

From the *Network* > *InterfaceSetting* sub-menu, you configure the IP interface protocol (IPv4 or IPv6) or VLANs based on the connection method needed for actual network

deployment.

The IPv4 interface protocol addressing types used are Dynamic Host Configuration Protocol (DHCP) or Static, and the addressing types used for IPv6 interface protocol are IPv6 Static and IPv6DHCP.

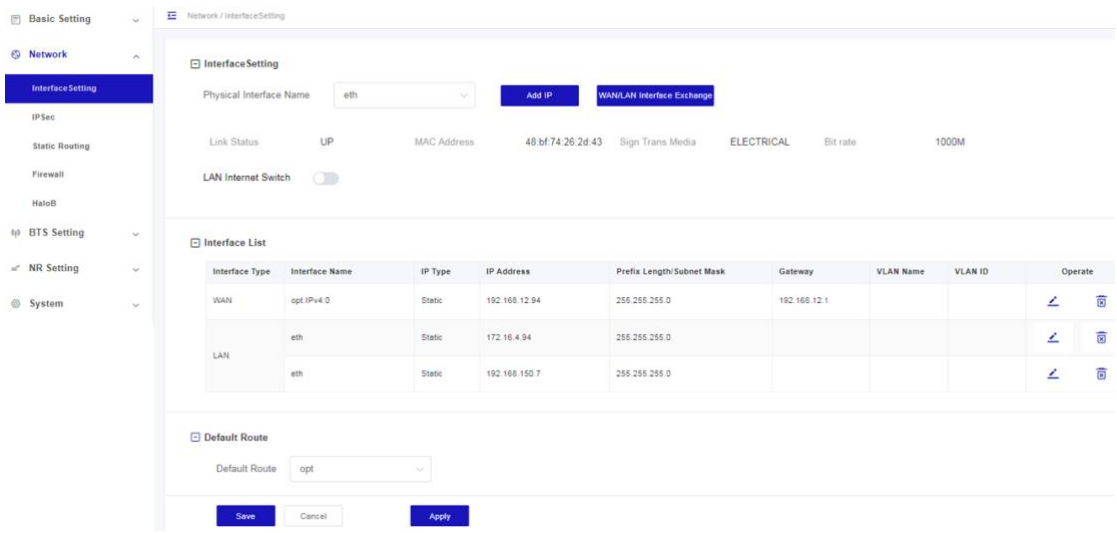
- *DHCP* – a network protocol automatically assigns IP addresses and other network configuration parameters to the gNB.
- *Static* – when this addressing type is selected, a static IP address is a fixed, permanent IP address assigned to a device or network node.
- *IPv6 Static* – a fixed IP address is manually assigned to a device or network node and remains fixed unless explicitly changed.
- *IPv6 DHCP* – used to automatically assign IPv6 addresses and other configuration parameters to devices on an IPv6 network.

All configured WAN and LAN interfaces display in the *Interface List* pane.

In the navigation column on the left, select "**Network > Interface Setting**" to enter the WAN interface and VLAN configuration page.

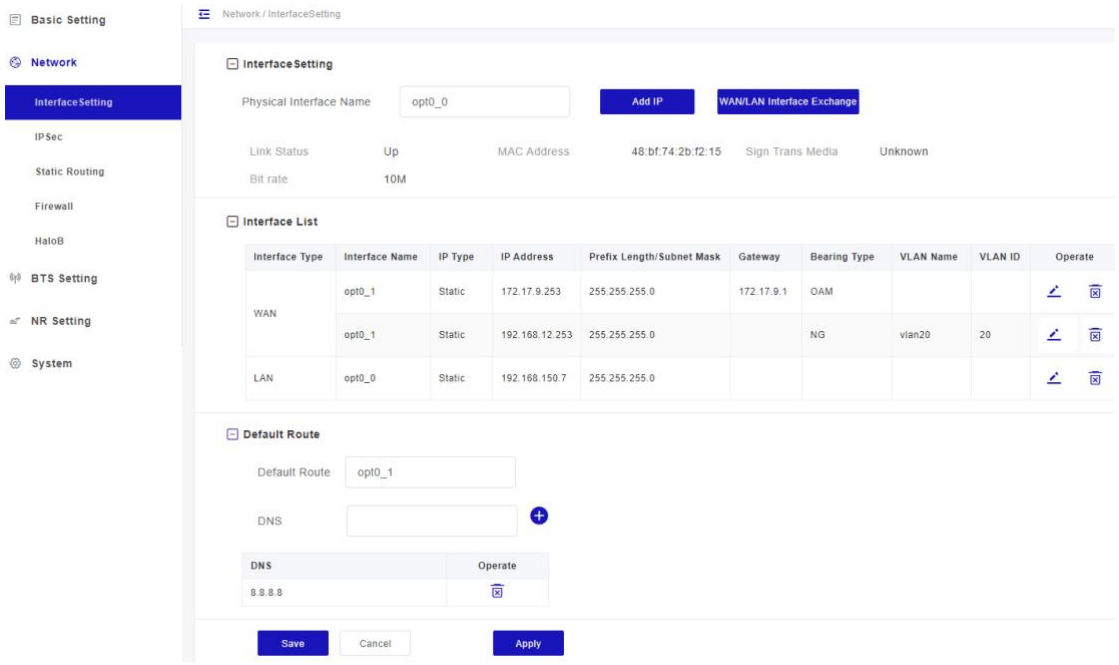
- Interface configuration of Aurora243, as shown in Figure 5-2.

Figure 5-2 Interface Configuration – Aurora243



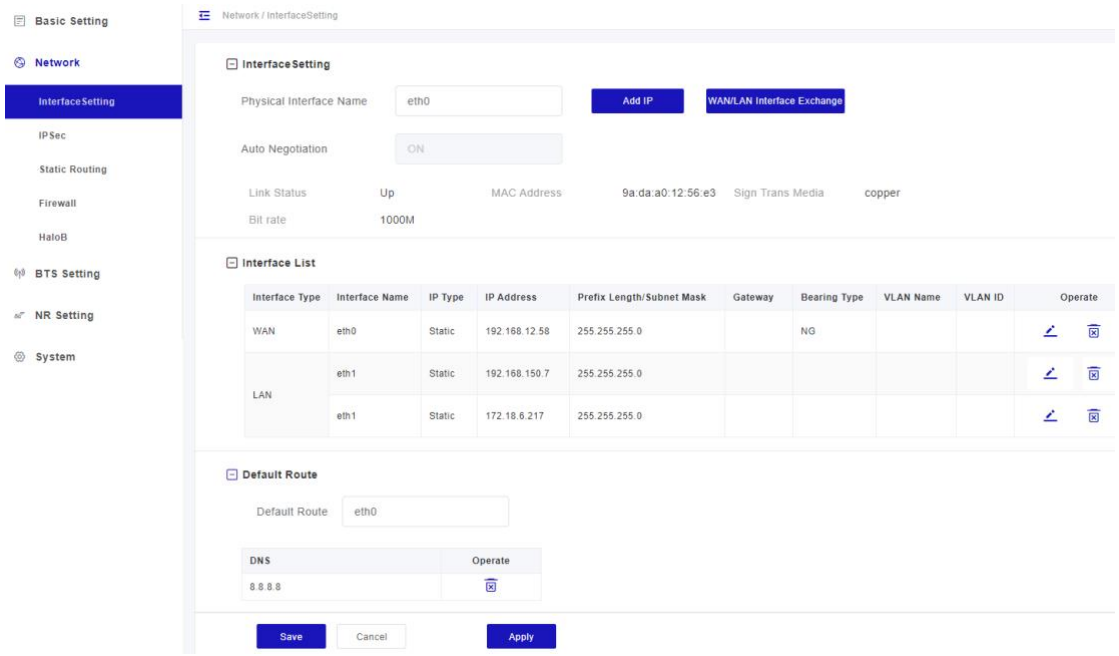
- Interface configuration of Aurora249, as shown in Figure 5-3.

Figure 5-3 Interface Configuration – Aurora249



- Interface configuration of Stellar227, as shown in Figure 5-4.

Figure 5-4 Interface Configuration – Stellar227



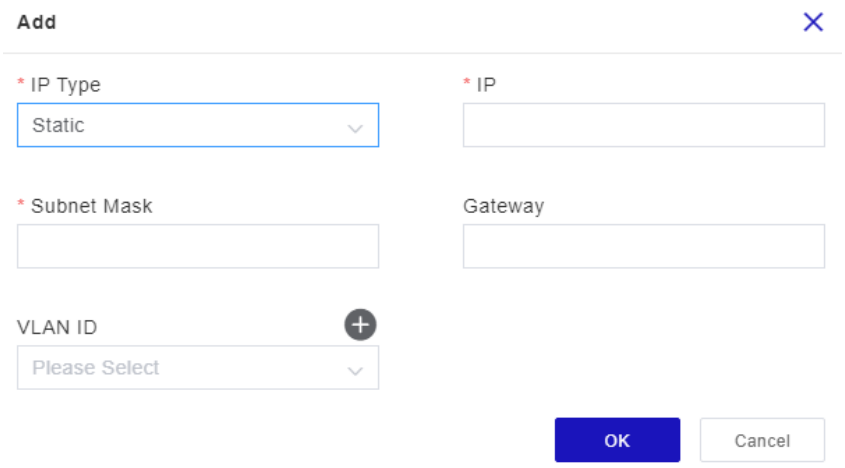
You can enable or disable the auto negotiation function.

5.1.1 WAN/VLAN

1. In the *Interface Setting* pane, select “Physical Interface Name” from drop-down list, the interface should be a WAN interface.

2. Click **Add IP** to pop up a dialogue box for adding WAN IP address, as shown in Figure 5-5.

Figure 5-5 Add WAN IP Address



NOTE: For different *IP Type*, the input parameters for the WAN interface differ.

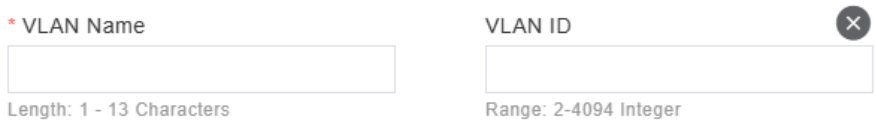
3. Input parameters of the WAN interface, as shown in Table 5-1.

Table 5-1 WAN Interface Parameter Description

Parameter	Description
IP Type	The interface protocol used by the WAN interface: • DHCP: If DHCP is selected, set the *Bearing Type* and *VLAN ID*. • Static: If Static is selected, the IP address, gateway and subnet mask should be configured. • IPv6 DHCP: If DHCP is selected, set the Bearing Type and VLAN ID. • IPv6 Static: If Static is selected, the IP address, prefix length, and gateway should be configured.
IP	The field displays when “IP Type” is set to “Static” or “IPv6 Static”, the parameter displays. IP address of the WAN interface.
Subnet Mask	The field displays when “IP Type” is set to “Static”, the parameter displays. Subnet mask address of the IP address.
Prefix Length	The field displays when “IP Type” is set to “IPv6 Static”, the parameter displays. The prefix length of the WAN interface.
Gateway	The field displays when “IP Type” is set to “Static” or “IPv6 Static”, the parameter displays. IP address of the default gateway.
VLAN ID	The VLAN identity. Range is 2–4094.

4. Click **+** at the right corner of VLAN ID filed to display VLAN configuration parameters, as shown in Figure 5-6.

Figure 5-6 Add a VLAN



5. Input VLAN configuration parameters, as shown in Table 5-2.

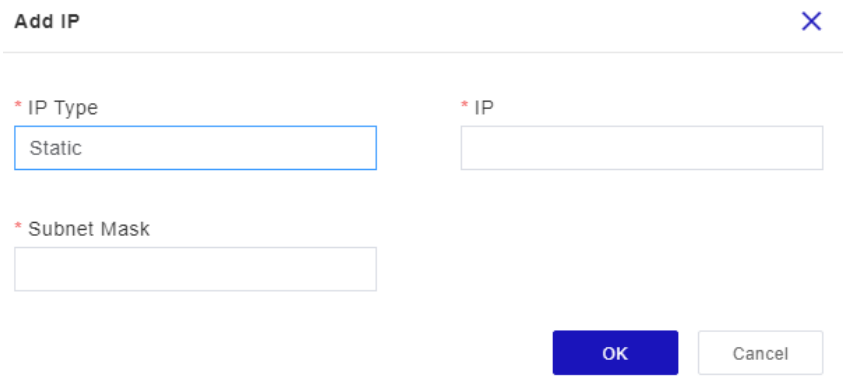
Table 5-2 VLAN Parameter Description

Parameter	Description
VLAN Name	The VLAN name. Range is 1–13 characters (using upper-case letters A–Z, lower-case letters a–z, and digits 0–9).
VLAN ID	The VLAN identity. Range is 2–4094.

5.1.2 LAN

1. In the *Interface Setting* pane, select “Physical Interface Name” from drop-down list, the interface should be a LAN interface.
2. Click **Add IP** to pop up a dialogue box for adding LAN IP address, as shown in Figure 5-7.

Figure 5-7 Add a LAN IP Address



3. Input parameters of the LAN interface, as shown in Table 5-3.

Table 5-3 LAN Interface Parameter Description

Parameter	Description
IP Type	The interface protocol used by LAN interface. Supports only Static.
IP	IP address of the LAN interface.
Subnet Mask	Subnet mask address of the IP address.

5.1.3 Default Route

A network configuration setting that specifies the path for outbound network traffic from a local network to reach destinations outside of the local network.

1. In the *Default Route* pane, select the interface for the default route.
2. Enter DNS address in the DNS textbox.
3. Click ⊕ to add this DNS to the DNS list.

5.2 Configure IPsec

The IPsec interface routes the control plane information between the gNB and the 5GC Security Gateway (SeGW) in the network and provides security protocol in the network layer to ensure message transmission safety.

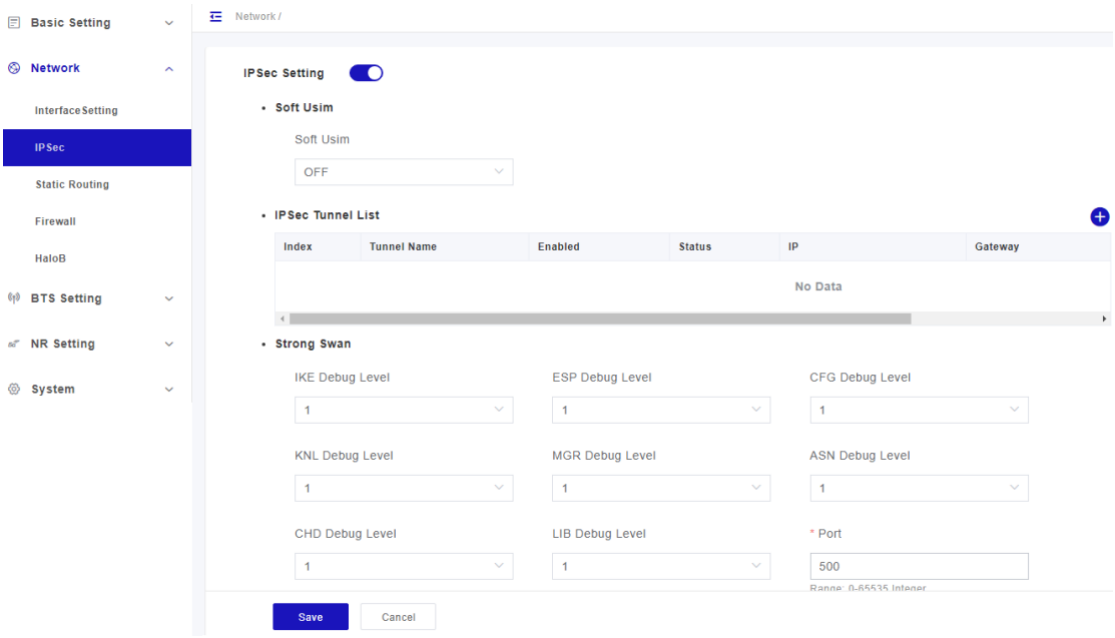
The gNB disables the IPsec by default. Therefore, if the operator has deployed the SeGW, the gNB needs to enable the IPSec function and establish a safe Virtual Private Network (VPN) channel between itself and the SeGW.

Up to three IPsec tunnels are supported.

NOTE: When the IPsec setting is disabled, no configuration parameters are displayed. Enable to see the parameters.

Select "**Network > IPSec**" to enter the IPsec configuration page, as shown in Figure 5-8.

Figure 5-8 Configure IPSec

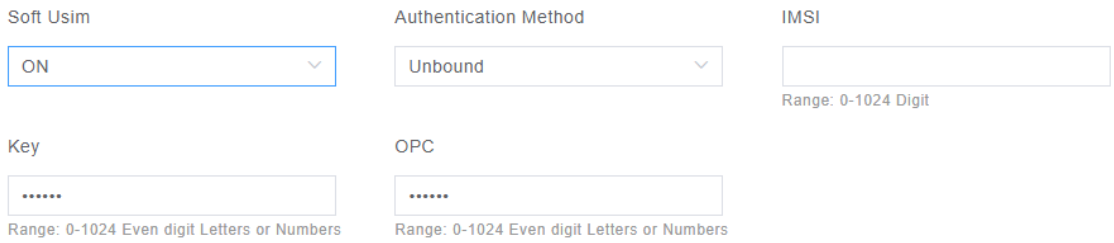


After the IPSec function is enabled, you can configure the Soft USIM, *IPSec Tunnel List* and *Strong Swan*.

5.2.1 Soft USIM

If “Soft Usim” is set to ON, following parameters display on this page, as shown in Figure 5-9.

Figure 5-9 Soft SIM



The soft Usim parameters are shown in Table 5-4. If disabled, the hard USIM will be adopted. Disabled by default.

Table 5-4 IPsec Function Parameter Description

Parameter	Description
Authentication Method	Select an authentication method. • Unbound • SN bound • MAC bound
IMSI	IMSI number.
Key	Key of the IMSI.
OPC	The operator’s code.

5.2.2 IPsec Tunnel

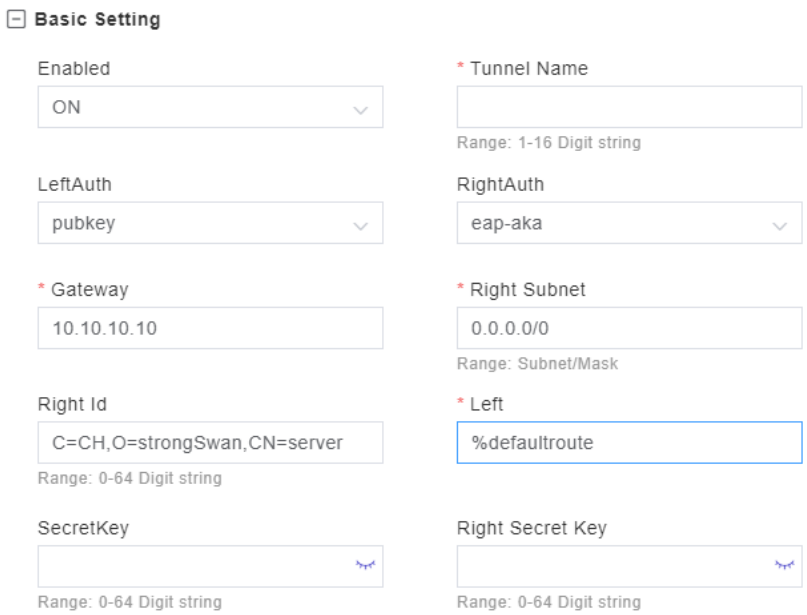
Notice the two types of setting you can configure: *Basic Setting* and *Advance Setting*.

- IPsc Tunnel – Basic Setting

  Click ⊕ to add an IPsec tunnel, as shown in Figure 5-10.

  NOTE: After an IPsec tunnel has been added, click ✎ in “**IPsec Tunnel List**” to edit the IPsec tunnel.

Figure 5-10 IPsec Tunnel -Basic Setting



The description of basic parameters is shown in Table 5-5.

Table 5-5 IPsec Tunnel - Basic Parameter Description

Parameter	Description
Enabled	Enable or disable this IPsec tunnel.
Tunnel Name	The tunnel name. (1–16 digit string)
LeftAuth	**CAUTION**: Change not recommended! Local authentication method of the IPsec server. Must be consistent with the security gateway side. Options are: • psk (default) • pubkey • eap-aka
RightAuth	**CAUTION**: Change not recommended! Peer authentication method of the IPsec. Must be consistent with the security gateway side. Options are: • psk (default) • pubkey • eap-aka
Gateway	IP address of the IPSec server (security gateway). Ensure the IP address input here matches the actual IP address on the security gateway side.
Right Subnet	IP address of the remote subnet (message within this address range will be packed as a tunnel). Ensure input here matches the security gateway side.
Right Id	Peer ID (server). Ensure input here matches the security gateway side. If absent from the security gateway, leave this field empty as well. Range is 0–64 digit string.
Left	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.
SecretKey	File name of private key. When the LeftAuth or RightAuth is set to psk or eap-aka, the value is the password of authentication.

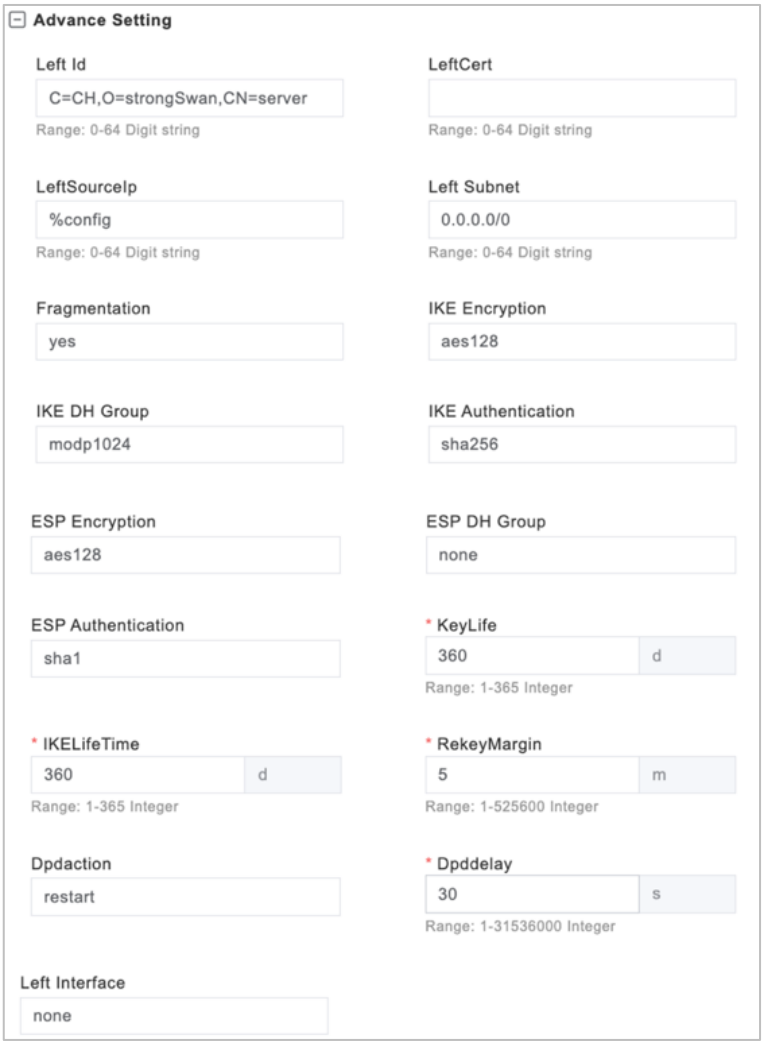
Parameter	Description
	Range is 0–64 digit string.
Right Secret Key	File name of private key of peer, the value is the password of authentication. Range is 0–64 digit string.

- IPsc Tunnel – Advanced Setting

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. The IPSec Tunnel List *Advance Setting* fields you can configure are shown in Figure 5-11.

Figure 5-11 IPsec Tunnel -Advanced Setting



The description of advanced parameters is shown in Table 5-6.

Table 5-6 IPsec Tunnel -Advanced Parameter Description

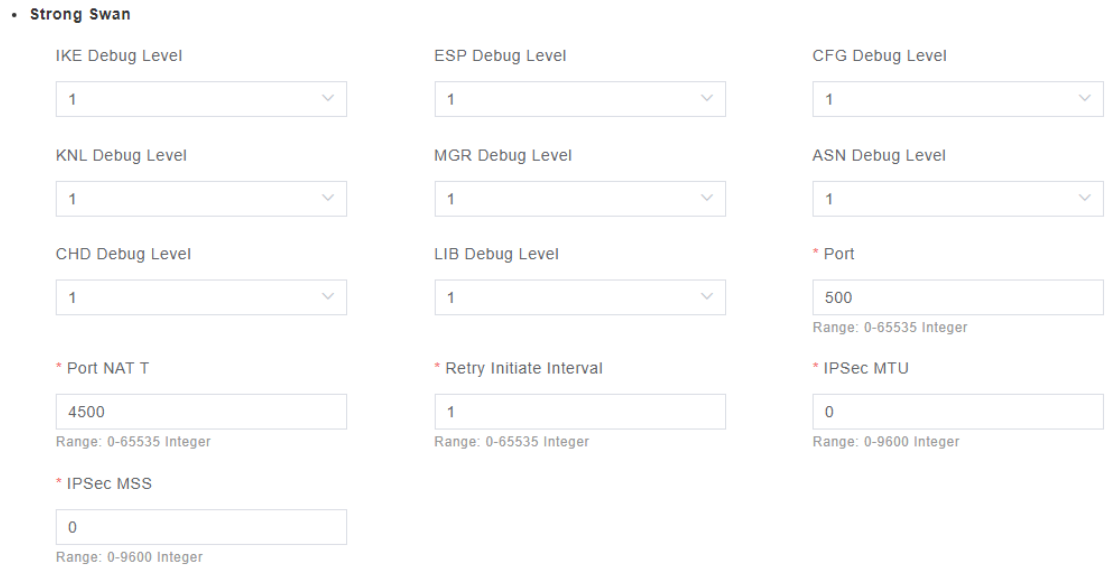
Parameter	Description
Left Id	Identification of the client end. Ensure input here matches the security gateway side. If absent from the security gateway, leave this field empty as well. Range is 0–64 digit string.
LeftCert	If set “left Auth” to “pubkey”, the parameter needs to be set. Certificate name. The Certificate name on this software version is clientCert.derpsk.
LeftSourceIp	Virtual address allocation assigned by the system. If absent, use the local IP address.
Left Subnet	IP address of the local subnet.
Fragmentation	The fragmentation type, options are: • Yes (default) • Accept • Force • No
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. Options are: • aes128(default) • aes256 • 3des
IKE DH Group	IKE Diffie-Hellman (DH) key computation, or exponential key agreement, to be used between two entities. Options are: • modp768 • modp1024(default) • modp1536 • modp2048 • mop3072 • modp4096 • ecp256 • none
IKE Authentication	Authentication algorithm. Options are: • sha1 (default) • sha1_160 • sha256_96 • sha256(default) • sha384
ESP Encryption	Encapsulating Security Payload (ESP) – member of the IPsec protocol suite that provides origin authenticity, integrity, and confidentiality protection of packets. Options are: • aes128 (default) • aes256 • 3des
ESP DH Group	ESP Diffie-Hellman (DF) key computation, or exponential key agreement, to be used between two entities. Options are: • modp768 • modp1024 (default) • modp1536 • modp2048 • modp4096 • none
ESP Authentication	ESP Authentication algorithm. Options are: • sha1 (default) • sha1_160

Parameter	Description
	• sha256_96 • sha256
Key Life	IPsec Security Association renegotiation time. Format: Seconds, Minutes, Hours, or Days. The default setting is 30 days. Ranges are: • 1–31536000 seconds • 1–525600 minutes • 1–8760 hours • 1–365 days
IKELifeTime	IKE security association renegotiation time. Format: Seconds, Minutes, Hours, or Days. The default setting is 30 days. Ranges are: • 1–31536000 seconds • 1–525600 minutes • 1–8760 hours • 1–365 days
RekeyMargin	Renegotiation time before the expiry of IKELifeTime (negotiate the IKE security association time before the expiry of IKELifeTime). Format: Seconds, Minutes, Hours, or Days. The default setting is 5 minutes. • 1–31536000 seconds • 1–525600 minutes • 1–8760 hours • 1–365 days
Dpdaction	DPD stands for dead peer detection (DPD) protocol. Determines what action to take when a gateway exception occurs. • None • Clear • Hold • Restart (default)
Dpddelay	Time interval for sending the DPD detection message. Format: Seconds, Minutes, or Days. The default setting is 30 days. Ranges are: • 1–31536000 seconds • 1–525600 minutes • 1–8760 hours • 1–365 days
Rekey	Enable or disable Rekey.
Right IKE Port	The port number of right IKE.
Left Interface	The interface on the gNB side.

5.2.3 Strong Swan

StrongSwan implements the IPSec protocol over a variety of platforms to provide strong security. Use the *Network* > *IPSec* sub-menu to configure strong swan interface connections, as shown in Figure 5-12.

Figure 5-12 Strong Swan Setting



Charon is the name of the IKE daemon used in the Strong Swan IPsec implementation. Charon debug relates to configuring and analyzing the debug output generated by the Charon IKE daemon during IPsec tunnel establishment and operation.

The debug output from Charon provides valuable information for troubleshooting and diagnosing issues related to IPsec configuration, key exchange, authentication, and encryption. By enabling Charon debug, you can obtain detailed logs that help identify potential problems or misconfigurations in the IPsec setup. All the acceptable values for the debug types and levels in the context of Strong Swan's Charon IKE are described in Table 5-7.

Table 5-7 Strong Wan Parameter Description

Parameter	Description
IKE Debug Level	Debug messages related to IKE protocol, including key exchange, negotiation, and authentication. Range is -1, 0, 1, 2, 3, or 4.
ESP Debug Level	Debug messages related to ESP processing. Range is -1, 0, 1, 2, 3, or 4.
CFG Debug Level	Debug messages related to the parsing and processing of configuration (CFG) files. Range is -1, 0, 1, 2, 3, or 4.
KNL Debug Level	Debug messages related to the kernel (KNL) interaction and network stack. Range is -1, 0, 1, 2, 3, or 4.
MGR Debug Level	Debug messages related to the configuration and management of the StrongSwan daemon manager (MGR). Range is -1, 0, 1, 2, 3, or 4.
ASN Debug Level	Debug messages related to Abstract Syntax Notation One (ASN.1) encoding and decoding. Range is -1, 0, 1, 2, 3, or 4.
CHD Debug Level	Debug messages related to Child SA handling and rekeying. Range is -1, 0, 1, 2, 3, or 4.
LIB Debug Level	Debug messages related to library (LIB) functions and operations. Range is -1, 0, 1, 2, 3, or 4.

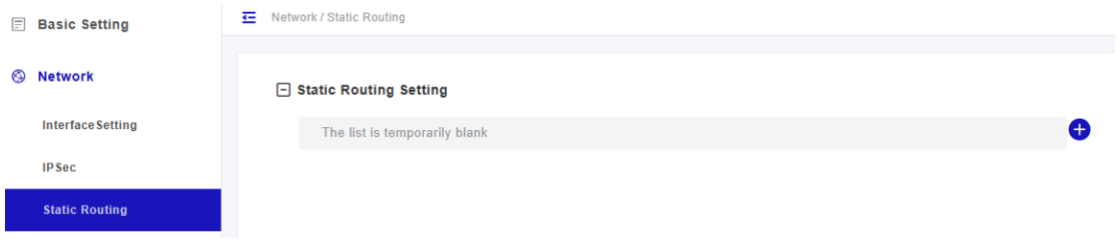
Parameter	Description
Port	Used to assign the port number. Range is 0–65535 integer.
Port NAT T	Used to assign the Network Address Translation Traversal (NAT T) port number. Range is 0–65535.
Retry Initiate Interval	Used to set the retry initiate interval. Range is 0–65535 integer.
IPsec MTU	MTU stands for Maximum Transmission Unit, and it refers to the maximum size of a single network packet that can be transmitted over a particular network interface without requiring fragmentation. Specifying the correct MTU for the network can help to improve data transmission efficiency. Range is 0–9600 integer.
IPsec MSS	Modulation Segment Scheme (MSS). Range is 0–9600 integer.

5.3 Configure Static Routing

To add Static IP routing addresses and monitor their status. Existing routes display in the *Static Routing List* pane. The system supports up to a maximum of four static routes.

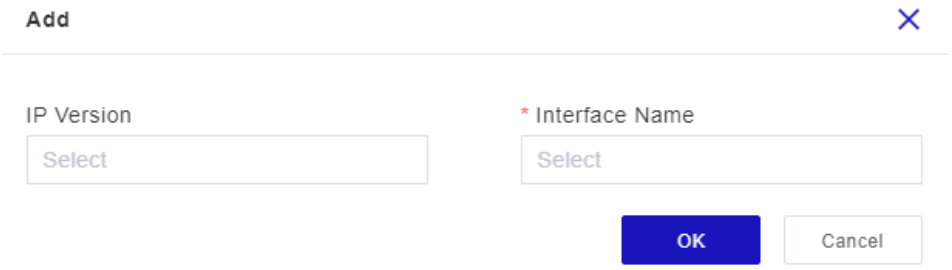
1. In the navigation column on the left, select "**Network > Static Routing**" to enter the static route configuration page, as shown in Figure 5-13.

Figure 5-13 Configure Static Routing



2. Click ⊕ to display static route configuration parameters, as shown in Figure 5-14.

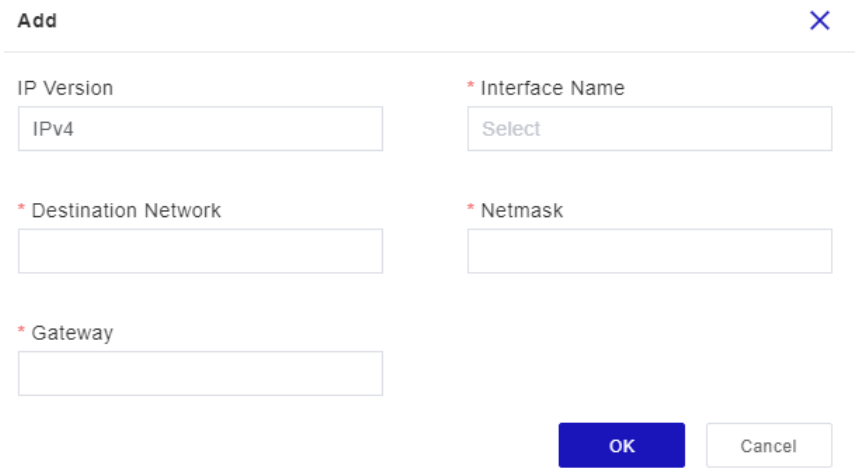
Figure 5-14 Configure Static Route



The gNB supports IPv4 and IPv6.

- When "IP Version" is set to "IPv4", configuration parameters are shown in Figure 5-15.

Figure 5-15 Configure Static Route – IPv4



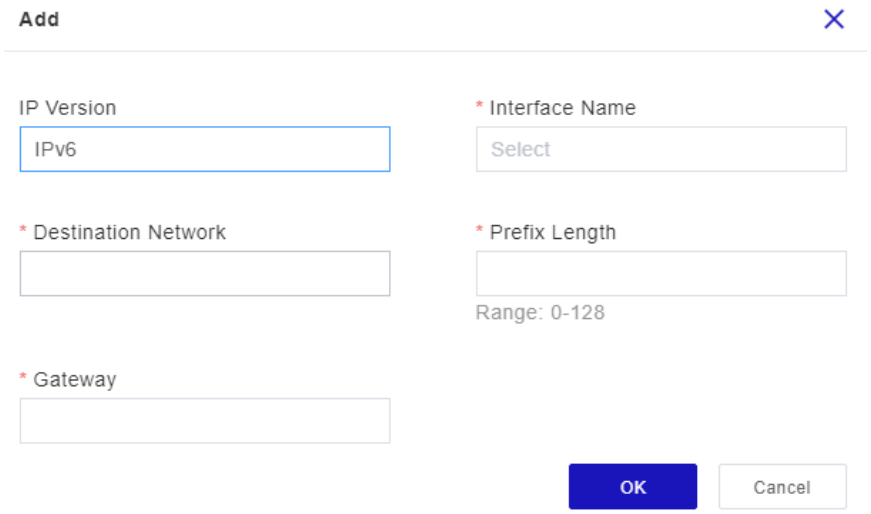
Input the configuration parameters of IPv4, which are given in Table 5-8.

Table 5-8 IPv4 Parameter Description

Parameter	Description
Interface Name	Interface Name
Destination Network	The destination IP address. **NOTE**: The target IP address must reachable from the original IP address of WAN interface or VLAN source port.
Netmask	The subnet mask of target IP address.
Gateway	The gateway IP address of target IP address.

- When “IP Version” is set to “IPv6”, configuration parameters are shown in Figure 5-16.

Figure 5-16 Configure Static Route – IPv6



Input the configuration parameters of IPv6, which are given in Table 5-9.

Table 5-9 IPv6 Parameter Description

Parameter	Description
Interface Name	• Aurora243: The default interface is opt. • Aurora249: The default interface is opt0_1.
Destination Network	The destination IP address. **NOTE**: The target IP address must reachable from the original IP address of WAN interface or VLAN source port.
Prefix Length	The IPv6 address' prefix for the WAN interface.
Gateway	The gateway IP address of target IP address.

After a static route is configured and saved, it will show in the static routing list.

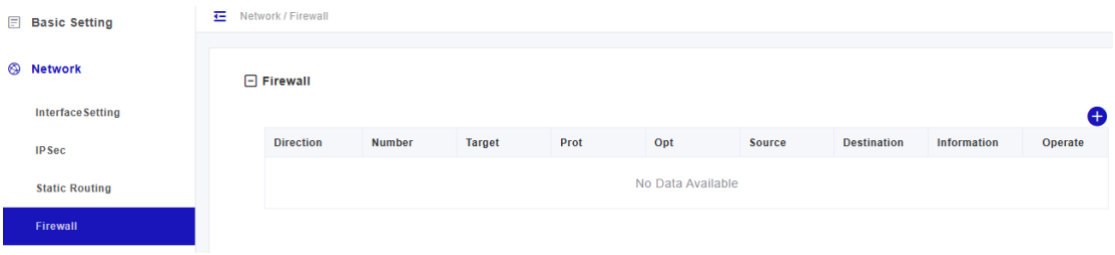
3. In the static routing list, select static routes and then click "**Apply**" to apply the static routes.

5.4 Configure Firewall

A firewall is network security software on the gNB to protect the network from unauthorized access, malicious activities, and potential threats. The firewall in a gNB performs similar functions to traditional firewalls but with specific considerations for the 5G network architecture.

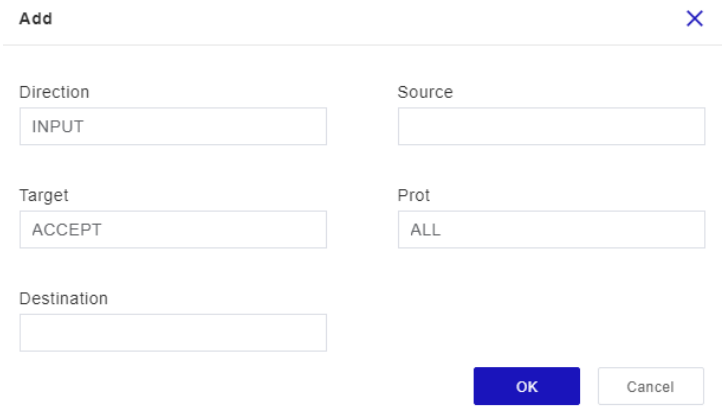
1. In the navigation column on the left, select "**Network > Firewall**" to enter the firewall configuration page, as shown in Figure 5-17.

Figure 5-17 Configure Firewall



2. Click ⊕ to display firewall configuration parameters, as shown in Figure 5-18.

Figure 5-18 Add a Firewall



3. Input the configuration parameters of firewall which are given in Table 5-10.

Table 5-10 Firewall Parameter Description

Parameter	Description
Direction	The direction of packets. • INPUT • OUTPUT • FORWARD
Source	The source IP address of the packets.
Target	Built-in target rules: • ACCEPT – Lets the packet through. • DROP – Filters the packet by dropping it. • REJECT – Filters the packet by rejecting it.
Prot	The internet protocol used for the packets. • TCP • UDP • ICMP • SCTP • ALL
Destination	The destination IP address of the packets.

4. Click "**OK**" to add the firewall rule.

   After a firewall is added, this firewall displays in the firewall list.

5.5 Configure HaloB

The *HaloB* function is used by operators who have a HaloB license for the gNB. First, the HaloB license must be imported into the gNB, refer to "8.8 License". There are two HaloB licenses:

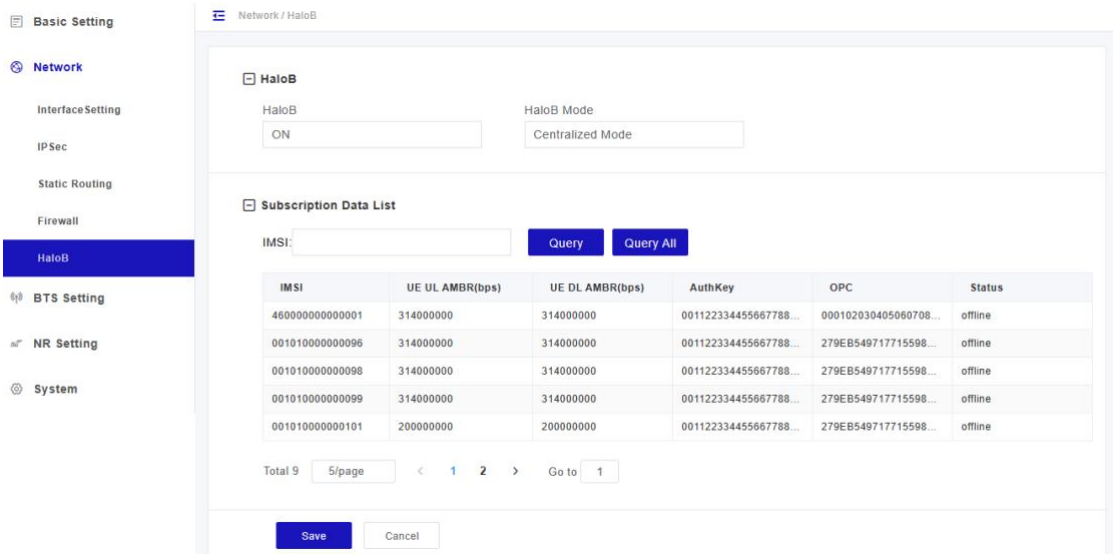
- FAP001: HaloB with centralized mode
- FAP002: HaloB with standalone mode

NOTE: The HaloB license also can be imported by the OMC.

HaloB is a proprietary technology with intellectual property rights. This technology is a lightweight onboard core network solution for communications service providers that integrates with gNBs, which sinks the basic functions of the 5GC into an gNB through which users can directly access the Internet.

1. In the navigation column on the left, select "**Network > HaloB**" to enter the HaloB configuration page, as shown in Figure 5-19.

Figure 5-19 Configure HaloB



If HaloB is set to OFF, following parameters do not display.

2. Select whether enable the HaloB function.

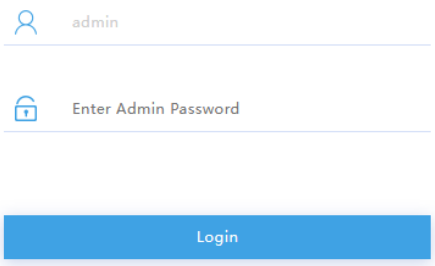
   ATTENTION: After the HaloB switch is modified, the gNB must be rebooted to take effort.

3. Select the HaloB mode is Single mode or Centralized mode.

   - Single mode: In the single mode, the client can maintain SIM Information locally. The administrator needs to import registration information and APN information from the LMT.
   - Centralized mode: In the centralized mode, the gNB needs to connect to the OMC which do as an agent to manage the subscription data.

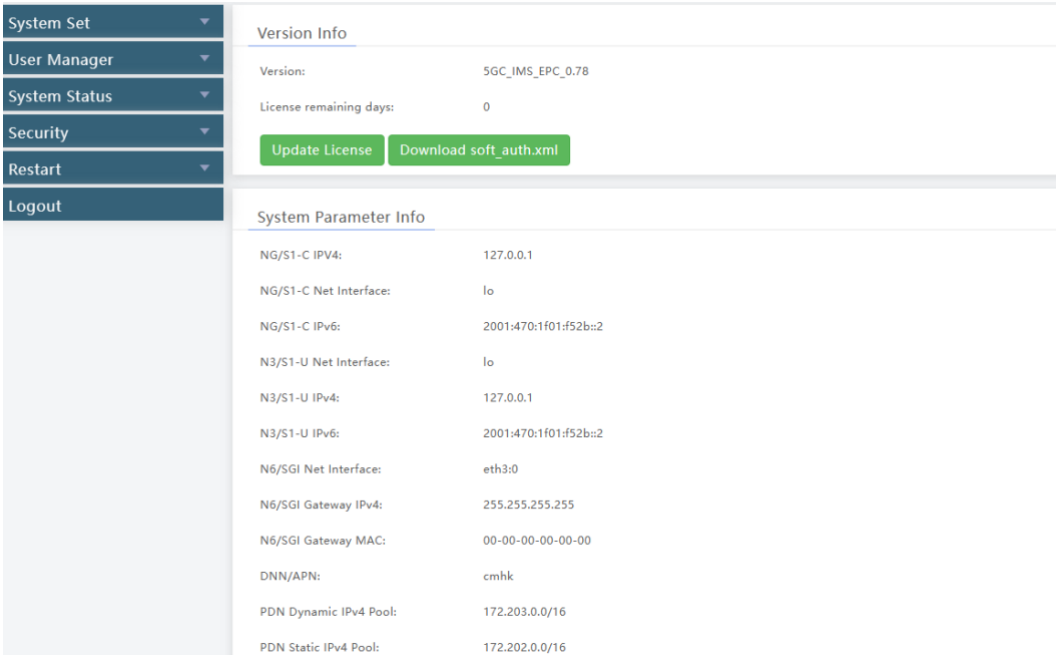
4. Enter *http://<OAM IP>:8082*, and then go to the HaloB login page. as shown in Figure 5-20.

Figure 5-20 Log in HaloB Configuration GUI



5. Enter *admin* as the *Username*, *admin* as the *Password*, and then click "**Login**" to enter the HaloB homepage, as shown in Figure 5-21.

Figure 5-21 HaloB GUI Homepage

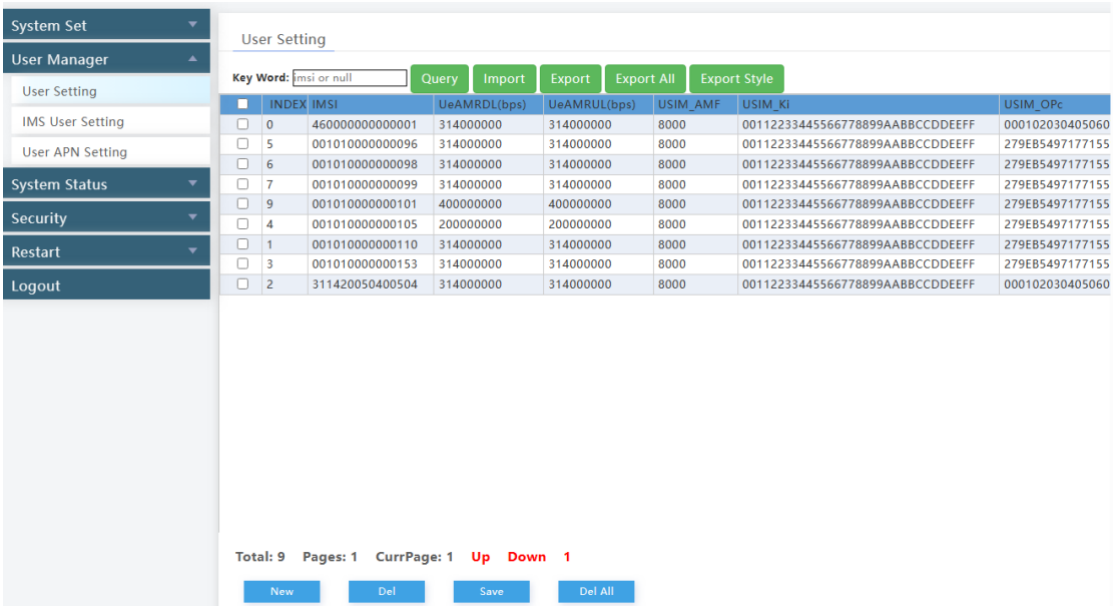


In general, HaloB parameters are configured automatically. **DO NOT** recommend to change the value of any parameters.

If any parameter is changed, reboot the gNB and check the cell status on the homepage of the gNB's GUI.

6. In the navigation column on the left, select "**User Manager > User Setting**" to add subscribers, as shown in Figure 5-22.

Figure 5-22 Add Subscribers



7. Click “New” to add a subscriber, the parameter description of the subscriber are shown in Table 5-11.

Table 5-11 Add a Subscriber

Parameter	Description
INDEX	User index, usually filled in auto, is automatically generated by the system.
IMSI	UE identification. This parameter is planned by the operator to uniquely identify a UE and consists of fifteen digits.
UE UL AMBR (bps)	The maximum downlink rate (in bits/s) for VoLTE type users, ranging from 1 to 1000000000, defaults to 31400000.
UE DL AMBR (bps)	The maximum uplink rate (in bits/s) for VoLTE type users, ranging from 1 to 1000000000, defaults to 31400000.
USIM_AMF	Authentication parameters, default to 8000
USIM Ki	• The authentication key for VoLTE type users, with a default value of 00112233445567788 99AABBCCDDEEFF • Authentication password for SIP registration of VoNR type users
USIM_OPC	VoLTE type user's OPc, default value 000102030405070 8090A0B0C0D0E0F

For multiple subscribers, you can click Import to bulk add subscribers.

For more HaloB configuration information, refer to “HaloB User Guide”.

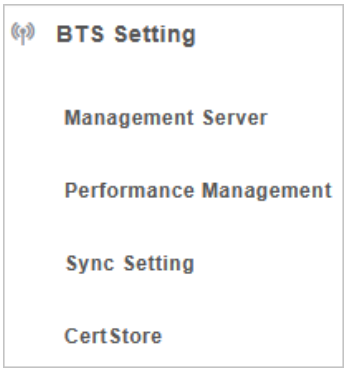
8. Enter *http://<OAM IP>*, go back the gNB GUI.

Subscribers display in Subscription Data List.

6. BTS Setting

The Base Transceiver Station (BTS) settings relate to management server, performance management, synchronization with other network elements, and certificate store, as shown in Figure 6-1.

Figure 6-1 BTS Setting Menu



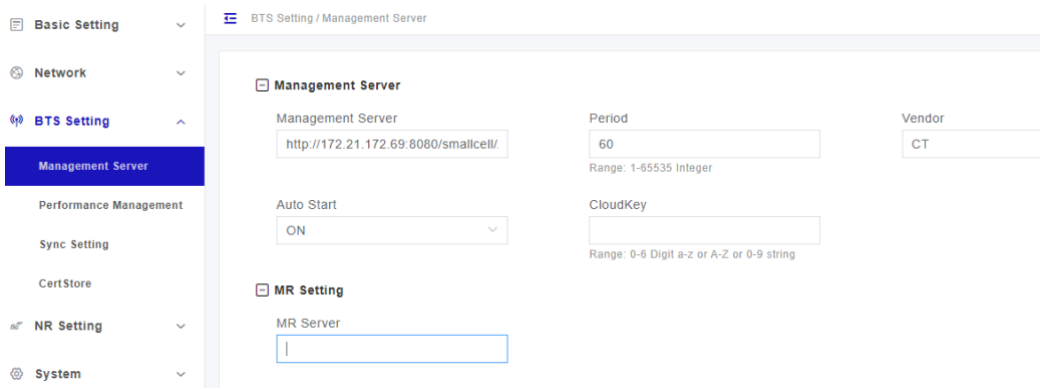
6.1 Configure Management Server

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 gNBs have been added or not. Once added, the gNB can be configured and managed on the NMS.

1. In the left navigation column, select "**BTS Setting > Management Server**" as shown in Figure 6-2.

Figure 6-2 Configure Network Management Server



NOTE: This software version does not support MR server.

2. Input the NMS parameters, which descriptions are given in Table 6-1.

Table 6-1 NMS Parameter Description

Parameter	Description
Management Server	The URL of the management server. e.g. http://*172.17.9.82:8080*/smallcell/AcsService When the NMS is cloud NMS, the domain name is also supported.
Period	The heartbeat period between the gNB and the NMS. Range is from 1 to 65535.
Vendor	The vendor that provides the NMS. Options are: • ST • CM • CU
Auto Start	Enable or disable auto start function.
CloudKey	If you are using the Baicells CloudCore OMC for your NMS, enter your unique operator CloudKey ID that you received from Baicells. The CloudKey is used as part of the plug-and-play aspect of the Baicells network elements. When you configure your CloudKey number in the device GUI (gNB and CPE), the first time the device is powered on it is automatically associated to your OMC account.

3. If the gNB manages by the third party NMS to report MR information, type in the MR server address

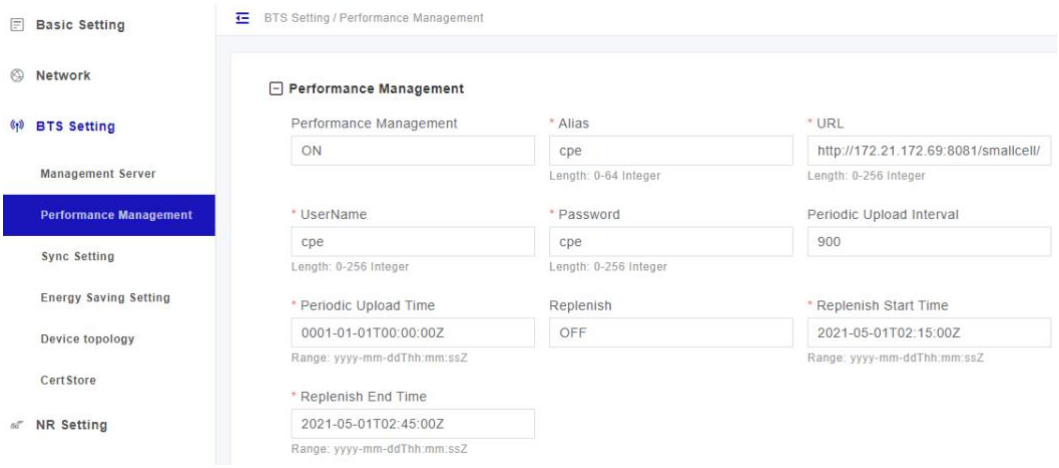
4. Click "**Save**" to complete the NMS configuration.

6.2 Configure Performance Management

Performance management involves continuous monitoring, optimizing, and analyzing the network performance of the gNB to assess the health and performance of the 5G network.

1. In the left navigation column, select "**BTS Setting > Performance Management**" as shown in Figure 6-3.

Figure 6-3 Performance Management



2. Input the performance management parameters, which descriptions are given in in Table 6-2.

Table 6-2 Performance Management Parameter Description

Parameter	Description
Performance Management	Enable or disable the performance management.
Alias	Alternate name.
URL	Configure the URL and port number of the local host.
UserName	Set a username. Range is 0–256.
Password	Set a password. Range is 0–256.
Periodic Upload Interval	A predefined time interval at which data or files are regularly uploaded to a destination.
Periodic Upload Time	Uploads are scheduled at fixed time intervals. Time format is yyyy-mm-ddThh:mm:ssZ.
Replenish	Enable or disable replenish.
Replenish Start Time	The specific time at which the replenish begins. Time format is yyyy-mm-ddThh:mm:ssZ.
Replenish End Time	The specific time at which the replenish ends. Time format is yyyy-mm-ddThh:mm:ssZ.

3. Click “**Save**” to complete the performance management configuration.

   When you click on *Save* to retain the settings, a pop-up message displays prompting you to reboot the gNB for the new settings to be applied. Click on *OK*.

6.3 Configure Synchronization

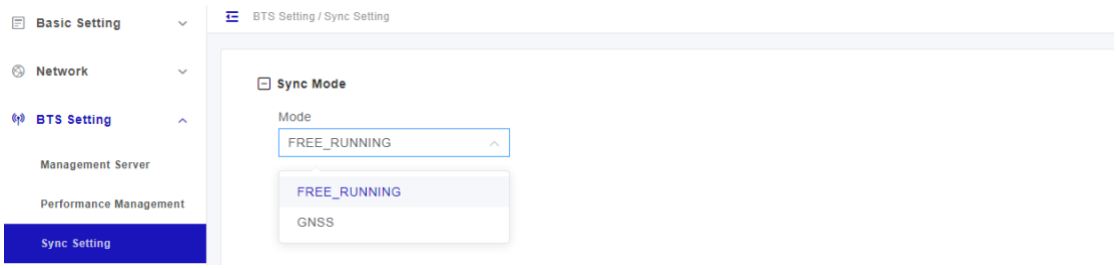
The 5G NR technology standards specify timing and synchronization requirements between adjacent gNBs. Synchronized transmissions help gNBs avoid interfering with one another, optimize bandwidth usage, and enhance network capacity.

The synchronization modes include:

- FREE_RUNNING – uses a crystal oscillator for synchronization.
- GNSS –GPS Pulse Per Second (PPS) time synchronization.

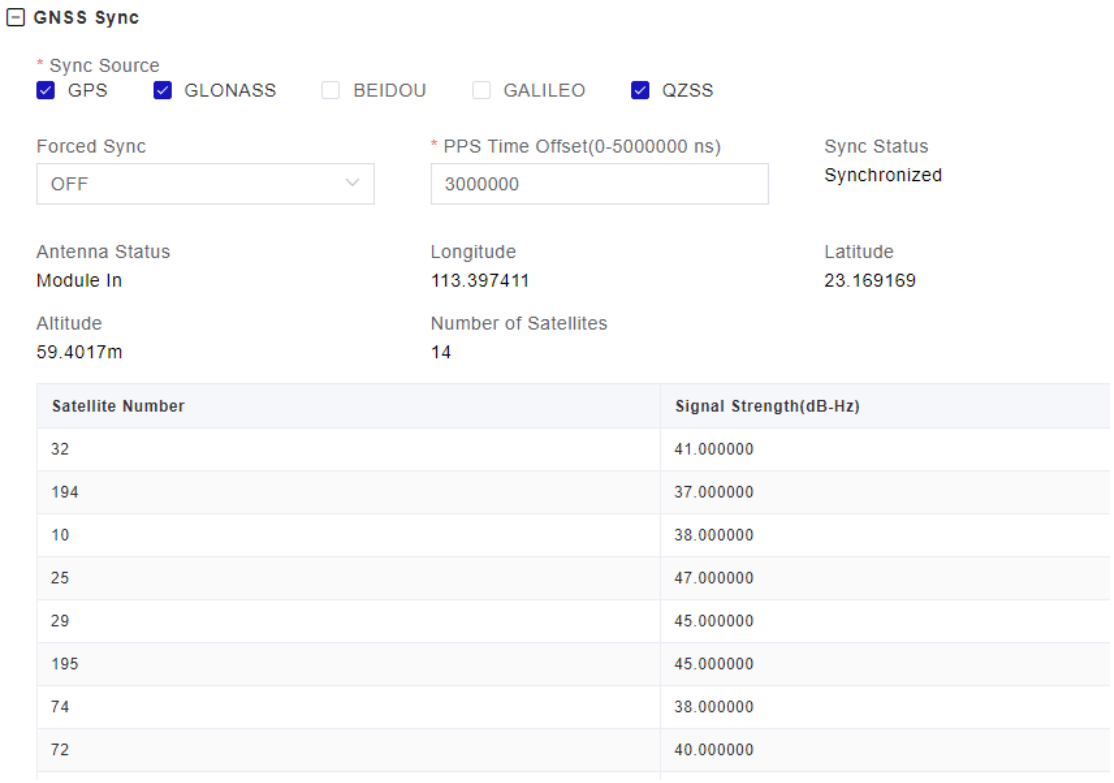
In the left navigation column, select “**BTS Setting > Sync Setting**” to enter the synchronization configuration page, as shown in Figure 6-4.

Figure 6-4 Synchronization Mode Setting



- If “Mode” the parameter is set to “GNSS”, configure following parameters, as shown in Figure 6-5.

Figure 6-5 Synchronization Mode - GNSS



a) Select sync source.

- GPS: Provides accurate position and timing information.
- GLONASS: Global Navigation Satellite System (GLONASS) is a satellite-based navigation system that provides time and frequency synchronization.
- GALILEO: Galileo can provide precise time synchronization information to ensure accurate coordination among network elements in 5G.
- BEIDOU: The Beidou Satellite Navigation System is a satellite navigation system independently constructed and operated by China, focusing on national security and economic and social development needs. It is an important national space infrastructure that provides global users with all-weather, all-time, high-precision positioning, navigation, and timing services.
- QZSS: Quasi-Zenith Satellite System (QZSS) a satellite-based augmentation system that provides positioning and timing

synchronization.

NOTE: The current number of satellites the GPS is tracking, as well as their signal strength, displays when sync source GPS and GLONASS is selected.

b) Select whether enable forced synchronization.

c) Type in “PPS time offset”. Range is from 0 to 5,000,000ns.

d) Click “**Save**” to complete the synchronization setting.

When you click on *Save* to retain the settings, a pop-up message displays prompting you to reboot the gNB for the new settings to be applied. Click on *OK*.

After the GPS synchronization is successful, the current synchronization source, GPS synchronization status, synchronization status, latitude, longitude, and number of satellites are shown in this page.

- If “Mode” the parameter is set to “FREE_RUNNING”, no more parameters are configured.

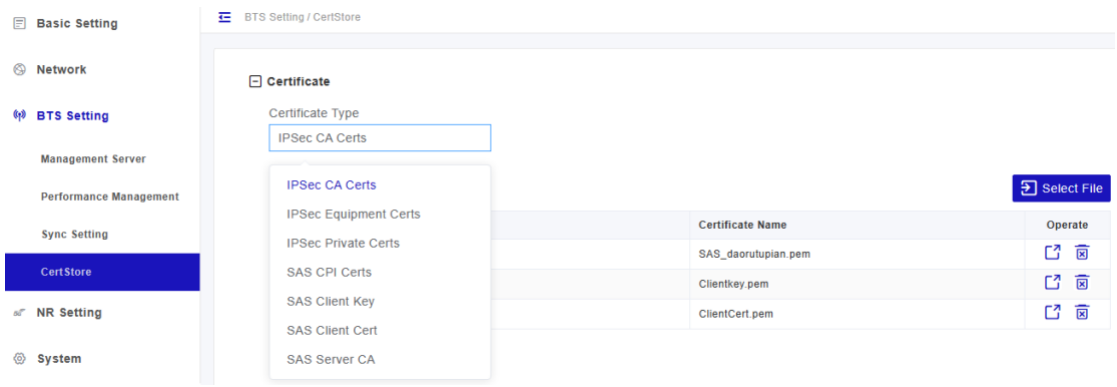
6.4 Certificate Store

If the gNB wants to achieve some functions which need some regulatory certificates, this page supports to upload, view, export, or delete these certificates. When imported, the files are stored in the gNB memory and shown in the *License List* pane

Attention: For IPsec private setting, only the **.der* files need to be operated. The **.bin* files are generated automatically and do not need to be operated.

1. Select “**BTS Setting > CertStore**” to enter the certificate management page, as shown in Figure 6-6.

Figure 6-6 Certificate Store



2. Select Certificate Type from the drop-down menu.

- IPSec CA Certs
- IPSec Equipment Certs
- IPSec Private Certs
- SAS CPI Certs
- SAS Client Key
- SAS Client Cert
- SAS Server CA
- TR069 Certs

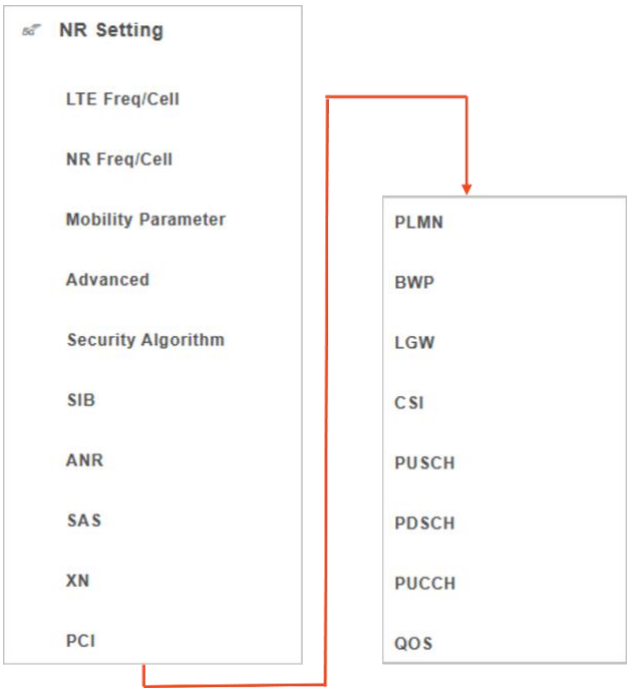
3. Click “**Select File**” to import the certificate file to the gNB.

   NOTE: You must manually refresh the page after you upload a license before it displays in the License List pane.

7. NR Setting

The *NR Setting* menu is shown in Figure 7-1. It contains several sub-menus related to mobility as well as other radio-related settings. Many 5G NR parameters are important for efficient wireless network operation. It's a good idea to review all of the information in this section to understand how the configuration settings relate.

Figure 7-1 NR Setting Menu



In 5G networks, handovers refer to the process of transferring an ongoing communication session from one gNB to another while maintaining seamless connectivity for the devices. Here are some common 5G mobility scenarios and handover types:

Intra-gNB Handover: This scenario involves a handover between different cells served by the same gNB. It can occur when a device (CPE or UE) moves within the coverage area of a gNB and switches from one cell to another. The handover process involves the gNB initiating the handover and coordinating the transfer of the UE's connection to the target cell.

Inter-gNB Handover: In this scenario, the handover occurs between cells served by different gNBs. It happens when a device moves from the coverage area of one gNB to another. The source gNB initiates the handover, and the target gNB takes over the communication with the devices.

When setting up mobility, you have to establish the neighboring gNBs operating in the

same geographical area as the gNB that you are configuring. This information is completed for each gNB so that the gNBs collectively work well with one another to handle mobile users and balance the traffic load.

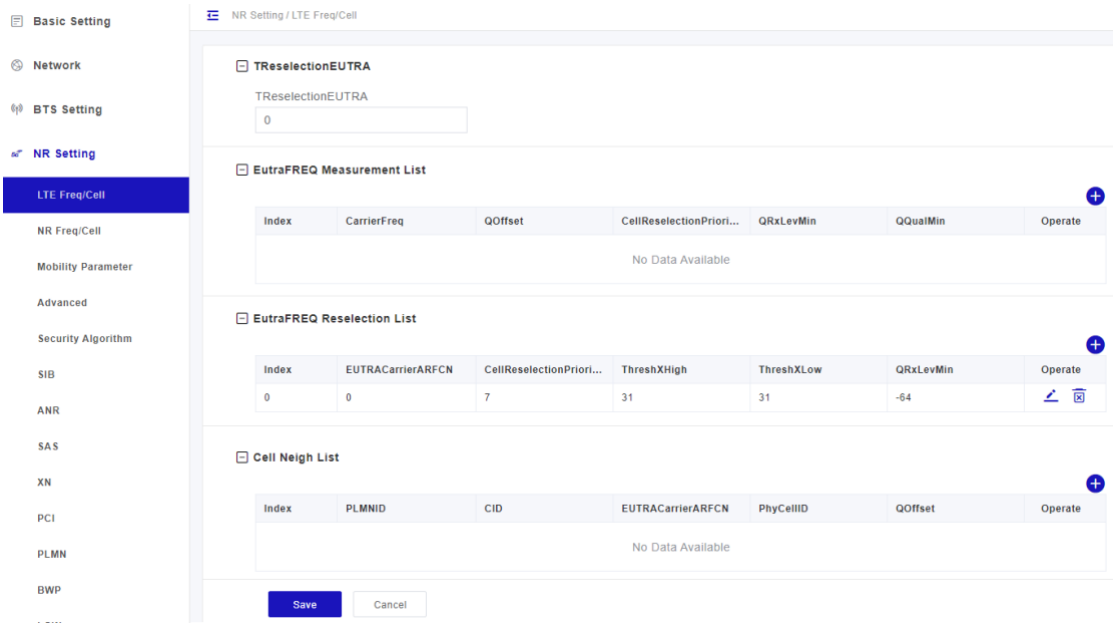
For each type of neighboring gNB, you first add the neighbor frequency settings via the *Cell Neigh Freq Table*, and then you add the cell information associated with the frequencies via the *Cell Neigh Cell Table*. You can configure the *Cell Neigh Cell Table* for inter-frequency (between different frequencies) and intra-frequency (within the same frequency) neighboring gNBs. For inter-frequency cells, you must add the neighbor inter-frequency settings in the *Cell Neigh Frequency Table* before you try to add the neighbor inter-frequency cell information. Conversely, if you need to delete a neighbor inter-frequency record, you must first delete the neighbor inter-frequency cells associated with it. For an intra-frequency neighbor cell, meaning a neighbor gNB operates on the same frequency as the gNB you are configuring, you do not need to configure the *Cell Neigh Freq Table*.

7.1 Configure LTE Neighbor Frequency and Cell

You can configure parameters related to how adjacent eNBs operating with LTE technology work with the Baicells gNB you are configuring. You define for the Baicells gNB how to deal with any neighboring LTE eNBs.

In the left navigation column, select "**NR Setting > LTE Freq/Cell**" to enter the LTE neighbor frequency and cell configuration page, as shown in Figure 7-2.

Figure 7-2 LTE Neighbor Frequency/Cell Settings



Users can add, modify, and delete the LTE neighbor frequency and cell. Up to eight LTE neighbor frequencies and 64 LTE neighbor cells can be set for one neighbor

frequency.

Input TReselectionNR, that is the cell reselection time. Range is from 0 to 7 integer.

7.1.1 EutraFREQ Measurement List

In the **EutraFREQ Measurement List** pane, click ⊕ to enter the page for adding a LTE measurement frequency. The parameter descriptions are given in Table 7-1.

Table 7-1 EutraFREQ Measurement Parameter Description

Parameter	Description
EARFCN	The frequency of the carrier wave. The range is 0 to 3279165(integer).
AllowdMeasBandWidth	Allowed measurement bandwidth. Options are: • mbw6 • mbw15 • mbw25 • mbw50 • mbw75 • mbw100
PresAntennaPort1	The current antenna port. Range is 0 or 1.
Q_OffsetRange	Indicates the difference in signal level between the serving and neighboring gNBs, as determined by the received signal level at the UE. If the received signal level is better from a neighboring gNB 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.
WideBandRsrqMeas	The RSRQ measurement of the bandwidth. Range is 0 or 1.
CellReselectionPriority	Priority of the cell reselection to cells at this frequency. Range is 0 to 7 (integer). A typical value is 4.
PLMN	PLMN ID. Range is 5–6 digit.

7.1.2 EutraFREQ Reselection List

In the **EutraFREQ Reselection List** pane, click ⊕ to enter the page for adding a LTE reselection frequency, the parameter descriptions are given in Table 7-2.

Table 7-2 EutraFREQ Reselection Parameter Description

Parameter	Description
EUTRACarrierARFCN	EARFCN stands for Evolved Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access (E-UTRA) Absolute Radio Frequency Channel Number. Used to set the absolute radio frequency channel number of the neighboring eNB's frequency. Range is 0–65535
TReselectionEUTRA	The cell reselection time. Range is 0 to 7.
CellReselectionPriority	Used to prioritize and determine the preference of neighboring eNBs during the cell reselection process. It assigns a priority value to each neighboring eNB relative to the serving eNB, indicating the order in which the device should consider and potentially select those cells for handover. Range is 0 to 7. A typical value is 4.

Parameter	Description
ThreshXHigh	The reselection threshold for higher priority inter-band frequency. This parameter defines a high threshold for signal measurement reports during handover and cell reselection processes. Range is 0 to 31dB. A typical value is 18 dB.
ThreshXLow	The reselection threshold for lower priority inter-band frequency. A parameter used to define a low threshold for signal measurement reports during handover and cell reselection processes Range is 0 to 31dB. A typical value is 13 dB.
QRxLevMin	Represents the minimum signal strength required by the device to maintain a stable connection with the serving gNB. Range is from -70 to -22.
QQualMin	Minimum Required Quality Level. Range is from -34 to -3.
PMaxEUTRA	Maximum Transmit Power for E-UTRA is the maximum power level at which a device can transmit signals to the gNB. Range is -30 to 33 dBm. A typical value is 23 dBm.
ThreshXHighQ	To define a high threshold for quality measurement reports during handover and eNB reselection processes. Range is 0 to 31dB. A typical value is 18 dB.
AllowdMeasBandWidth	Allowed measurement bandwidth. Options are: • mbw6 • mbw15 • mbw25 • mbw50 • mbw75 • mbw100
PresAntennaPort1	The current antenna port. Range is 0 or 1.
BlackPhysCellIdStart	The start number of the blacklisted PCI list. Range is 0–503.
BlackPhysCellIdRange	The range of the blacklisted PCI list. Range is 0–13. You can disable using OFF.

7.1.3 Cell Neighbor List

A cell neighbor list shows neighboring cells maintained by a wireless network. The purpose of the cell neighbor list is to provide information to the device about neighboring cells that can be potentially used for handover or cell reselection.

The cell neighbor list includes information about neighboring cells, such as their PCIs, frequencies, signal strengths, and other relevant parameters. This information allows the device to measure and evaluate the quality and strength of signals from neighboring cells, enabling it to make decisions regarding handover or cell reselection.

In the **Cell Neigh List** pane, click  to enter the page for adding a LTE neighbor cell, the parameter descriptions are given in Table 7-3.

Table 7-3 Cell Neigh List Parameter Description

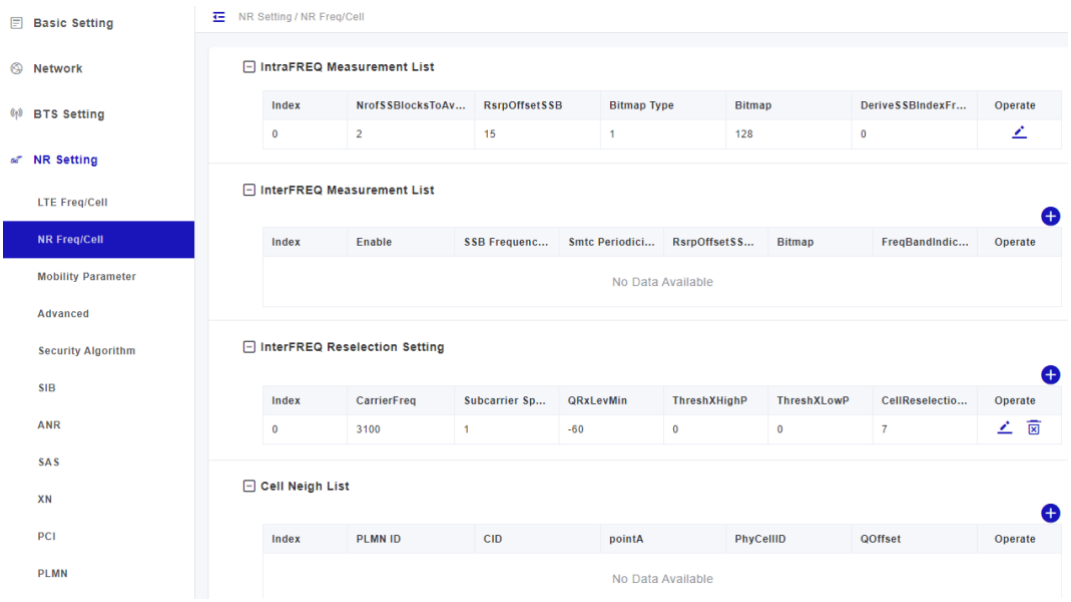
Parameter	Description
PLMNID	The PLMN ID. Range is 5–6 digit.
CID	Cell ID of the neighbor cell. Range 0–68719476735.
EUTRACarrierARFCN	Used to set the absolute radio frequency channel number of the neighboring eNB's frequency. Range is 0–3279165.

Parameter	Description
PhyCellID	Physical Cell Identifier (PCI) of the neighbor cell. Range is 0–503.
QOffset	Frequency offset this neighbor cell. Indicates the difference in signal level between the serving and this neighboring gNB, as determined by the received signal level at the UE. If the received signal level is better from a neighboring gNB 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.
QRxLevMinOffsetCell	Cell-specific Minimum Receive Level Offset adjusts the minimum required receive level for neighboring cells during cell selection processes triggered by periodic searches for high-priority PLMNs. Range is from 1 to 8.
QQualMinOffsetCell	Cell minimum received signal quality offset. This parameter represents the cell's minimum received signal quality offset. Range is from 1 to 8.
CIO	Cell Individual Offset (CIO) is this neighbor gNB's cell offset, which is one of the variables used to determine which gNB will best serve a given UE. Range is +24 to -24. A typical value is 0dB.
Blacklisted	Black list. Range is 0 or 1.
TAC	Tracking Area Code (TAC) of this neighbor cell. Range is from 0 to 16777215.
eNB Type	eNB type in LTE network, either Macro or Micro.
eNB ID	The global identity of the E-UTRAN cell. Range is from 0 to 1048575.
No Remove	Enable or disable no remove identity.

7.2 Configure NR Neighbor Frequency and Cell

In the left navigation column, select "**NR Setting >NR Freq/Cell**" to enter the NR neighbor frequency and cell configuration page, as shown in Figure 7-3.

Figure 7-3 NR Neighbor Frequency/Cell Settings



Users can add, modify, and delete the NR neighbor frequency and cell. Up to 8 NR neighbor frequencies and 64 NR neighbor cells can be set for one neighbor frequency.

7.2.1 IntraFREQ Measurement List

In the **IntraFREQ Measurement List** pane, click ⊕ to enter the page for adding an intra-frequency measurement, the parameter descriptions are given in Table 7-4.

Table 7-4 IntrFreq Measurement Parameter Description

Parameter	Description
SSBlocksConsolidationRsrp	The Reference Signal Receiving Power (RSRP) combination threshold of Synchronization Signaling Block (SSB). Range is from 0 to 127.
SSBlocksConsolidationRsrq	The Reference Signal Receiving Quality (RSRQ) combination threshold of SSB. Range is from 0 to 127.
SSBlocksConsolidationSinr	The Interference plus Noise Ratio (SINR) combination threshold of SSB. Range is from 0 to 127.
NrofSSBlocksToAverage	This parameter indicates the signal quality of a cell in NR measurement of SSB. Range is from 2 to 16.
RsrpOffsetSSB	The SSB offset of RSRP. Range is from 0 to 30.
RsrqOffsetSSB	The SSB offset of RSRQ. Range is from 0 to 30.
SinrOffsetSSB	The SSB offset of SINR. Range is from 0 to 30.
RsrpOffsetCsiRs	The CSI-RS offset of RSRP. Range is from 0 to 30.
RsrqOffsetCsiRs	The CSI-RS offset of RSRQ. Range is from 0 to 30.
SinrOffsetCsiRs	The CSI-RS offset of SINR. Range is from 0 to 30.
Bitmap Type	Bitmap type. Options are 0, 1, 2.
Bitmap	Bitmap. Range is from 0 to 18446744073709551615.
DeriveSSBIndexFromCell	Indicates that the frame boundaries of all cells at that frequency point are the same. Range is 0 or 1.
Smtc Periodicity	The time interval at which (SSB-based RRM Measurement Timing Configuration) SMTC are scheduled and repeated. • sf5 • sf10 • sf20 • sf40 • sf80 • sf160
Smtc Offset	The offset of SMTC. Range is from 0 to 4.
Smtc Duration	The duration time of SMTC.
PLMN	PLMN ID

7.2.2 InterFREQ Measurement

In the **InterFREQ Measurement List** pane, click ⊕ to enter the page for adding an inter frequency measurement, the parameter descriptions are given in Table 7-5.

Table 7-5 InterFREQ Measurement Parameter Description

Parameter	Description
Enable	Enable or disable the inter frequency measurement function.
SSB Frequency	The frequency of SSB. Range is from 0 to 3279165.
Subcarrier Spacing	The frequency spacing between adjacent subcarriers in the OFDM modulation scheme is used for data transmission. It determines the granularity of resource allocation and the data rate that can be achieved in each frequency bandwidth. Options are: • 15kHz • 30kHz • 60kHz • 120kHz • 240kHz This software version only supports 30kHz.
Smtc Periodicity	The time interval at which SMTC are scheduled and repeated. • sf5 • sf10 • sf20 • sf40 • sf80 • sf160
Smtc Offset	The offset of SMTC. Range is from 0 to 9 integer.
Smtc Duration	The duration time of SMTC. • sf1 • sf2 • sf3 • sf4 • sf5
SSBlocksConsolidation Rsrp	The Reference Signal Receiving Power (RSRP) combination threshold of Synchronization Signaling Block (SSB). Range is from 0 to 127.
SSBlocksConsolidation Rsrq	The Reference Signal Receiving Quality (RSRQ) combination threshold of SSB. Range is from 0 to 127.
SSBlocksConsolidationSinr	The Interference plus Noise Ratio (SINR) combination threshold of SSB. Range is from 0 to 127.
NrofSSBlocksToAverage	This parameter indicates the signal quality of a cell in NR measurement of SSB. Range is from 2 to 16.
RsrpOffsetSSB	The SSB offset of RSRP. Range is from 0 to 30.
RsrqOffsetSSB	The SSB offset of RSRQ. Range is from 0 to 30.
SinrOffsetSSB	The SSB offset of SINR. Range is from 0 to 30.
RsrpOffsetCsiRs	The CSI-RS offset of RSRP. Range is from 0 to 30.
RsrqOffsetCsiRs	The CSI-RS offset of RSRQ. Range is from 0 to 30.
SinrOffsetCsiRs	The CSI-RS offset of SINR. Range is from 0 to 30.
BitmapType	Bitmap type. Range is 0, 1, 2.
Bitmap	Bitmap. Range is from 0 to 18446744073709551615.
DeriveSSBIndexFromCell	Whether the frame boundaries of all cells at this frequency point are the same. Range is 0 or 1.
FreqBandIndicatorNR	The indicator of NR frequency bandwidth. Range is from 0 to 1024.
Offset To Point A	The offset of Point A. Range is from 0 to 2199.
SSB Sub Carrier Offset	The sub carrier offset of SSB. Range is from 0 to 31.

Parameter	Description
PLMN	PLMN ID. Range is 5–6 digit.

7.2.3 InterFREQ Reselection List

In the **InterFREQ Reselection Setting** pane, click ⊕ to enter the page for adding an inter frequency reselection item, the parameter descriptions are given in Table 7-5.

Table 7-6 InterFREQ Reselection Parameter Description

Parameter	Description
CarrierFreq	The carrier frequency, range is from 0 to 3279165 (integer).
NrofSSBlocksToAverage	Refers to the number of SSB measurements that are averaged to determine the signal quality of a cell in the 5G network. Range is 2 to 16.
ThresholdRSRP	The RSRP threshold. Range is from 0 to 127.
ThresholdRSRQ	The RSRQ threshold. Range is from 0 to 127.
ThresholdSINR	The SINR threshold. Range is from 0 to 127.
Subcarrier Spacing	The frequency spacing between adjacent subcarriers in the OFDM modulation scheme is used for data transmission. It determines the granularity of resource allocation and the data rate that can be achieved in each frequency bandwidth. Options are: • 15kHz • 30kHz • 60kHz • 120kHz • 240kHz This software version only supports 30kHz.
DeriveSSBIndexFromCell	Indicates that the frame boundaries of all cells at that frequency point are the same. Range is 0 or 1.
QRxLevMin	Represents the minimum signal strength required by the device to maintain a stable connection with the serving gNB. Range is from -70 to -22.
QQualMin	The minimum received signal quality. Range is from -43 to -12.
PMax	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.
TReselectionNR	The cell reselection time, range is from 0 to 7 integer.
ThreshXHighP	Represents the cell reselection threshold for higher priority inter-band frequencies. When a CPE or UE needs to reselect a cell in a different frequency band that has a higher reselection priority than the serving cell. Range is 0 to 31dB. A typical value is 18 dB.
ThreshXLowP	Represents the cell reselection threshold for lower priority inter-band frequencies. When a CPE or UE needs to reselect a cell in a different frequency band that has a lower reselection priority than the serving cell. Range is 0 to 31dB. A typical value is 13 dB.
ThreshXHighQ	Represents 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

Parameter	Description
	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.
ThreshXLowQ	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.
Cell Reselection Priority	Priority of the cell reselection to cells at this frequency. Range is 0 to 7 (integer). A typical value is 4.
Cell Reselection Sub Priority	Sub priority of the cell reselection to cells at this frequency. Range is 0 to 3 (integer). A typical value is 4.
QOffsetFreq	Indicates the difference in signal level between the serving and neighboring gNBs, as determined by the received signal level at the UE. If the received signal level is better from a neighboring gNB 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.
BlackPhysCellIdStart	The start number of the black PCI list. Range is 0–1007.
BlackPhysCellIdRange	The range of the black PCI list. Range is 0–14.
Smtc Periodicity	The time interval at which SMTC are scheduled and repeated. • sf5 • sf10 • sf20 • sf40 • sf80 • sf160
Smtc Offset	The offset of SMTC. Range is from 0 to 79 integer.
Smtc Duration	The duration time of SMTC. • sf1 • sf2 • sf3 • sf4 • sf5
FreqBandIndicatorNR	NR frequency indicator. Range is from 0 to 1024.

7.2.4 Cell Neighbor List

In the **Cell Neigh List** pane, click ⊕ to enter the page for adding a neighbor cell, the parameter descriptions are given in Table 7-7.

Table 7-7 Cell Neighbor Parameter Description

Parameter	Description
PLMNID	PLMN ID. Range is 5–6 digit.
NCI	Unique identification number for the cell. Range is 1-68719476735
SSB Absolute	The frequency of SSB. Range is from 0 to 3279165.

Parameter	Description
Frequency	
SSB Sub carrier Spacing	The frequency spacing between adjacent subcarriers in the OFDM modulation scheme is used for data transmission. It determines the granularity of resource allocation and the data rate that can be achieved in each frequency bandwidth. Options are: • 15kHz • 30kHz • 60kHz • 120kHz • 240kHz This software version only supports 30kHz.
PhyCellID	Physical Cell Identifier (PCI) of the neighbor cell. Range is from 0 to 1007.
QOffset	Frequency offset this neighbor cell. Indicates the difference in signal level between the serving and this neighboring gNB, as determined by the received signal level at the UE. If the received signal level is better from a neighboring gNB 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.
QRxLevMinOffsetCell	Cell minimum received level offset. This parameter represents the cell's minimum received level offset. It is used only when the UE resides in the PLMN and cell selection is triggered due to periodic searches for high-priority PLMNS. Range is from 1 to 8.
QQualMinOffsetCell	Cell minimum received signal quality offset. This parameter represents the cell's minimum received signal quality offset. Range is from 1 to 8.
CIO	Cell Individual Offset (CIO) is this neighbor gNB's cell offset, which is one of the variables used to determine which gNB will best serve a given UE. Range is +24 to -24. A typical value is 0dB.
Blacklisted	Enable or disable blacklist. Range is 0 or 1.
TAC	TAC of this neighbor cell. Range is from 0 to 16777215.
No Remove	Enable or disable no remove identity.
gNB ID Length	The length of the gNB ID. Range is 22–32.
MOCN PLMN Switch	Enable or disable MOCN.

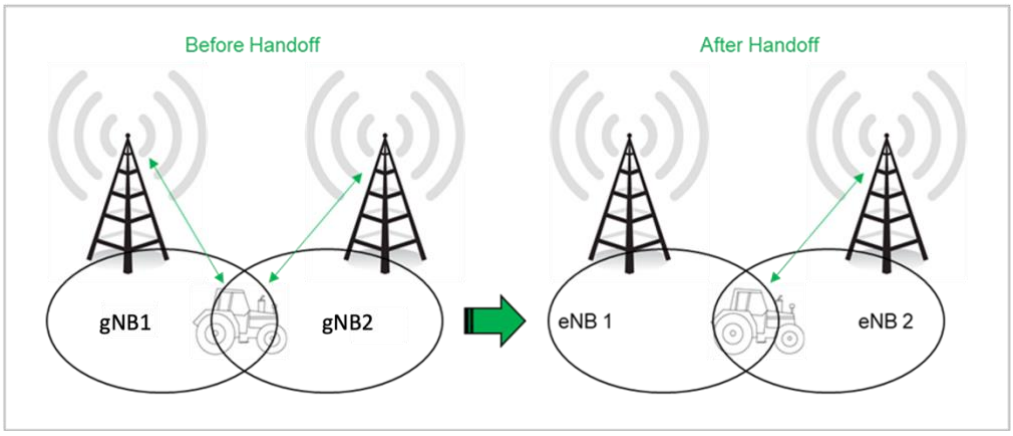
7.3 Configure Mobility Parameter

The *Mobility Parameter* menu pertains to how roaming UE sessions are handled between different gNBs in the same service area. When a UE is actively connected to a gNB is referred to as the serving gNB or cell. The other gNBs in the area are referred to as either neighbor or target gNBs or cells.

The process of a device moving from cell to cell and changing over from its serving gNB to a neighbor (target) gNB is called handoff or handover. The UE exchange information with its serving gNB to perform cell selection and reselection based on parameters which you will set for each gNB. Refer to Figure **7-4**.

NOTE: The terms handoff and handover are used interchangeably in LTE.

Figure 7-4 Handoff



What the UE measures that determine cell selection and reselection is the RSRP of the serving as well as neighboring gNBs. The measurements are sent periodically to the serving gNB, determining if an adjacent gNB would better serve the UE.

NOTE: The NR Setting > Mobility Parameter sub-menu settings described in this section are configurations that represent standard NR deployments. Any modification to these settings should be determined only by experienced wireless professionals.

To begin the mobility or roaming configuration, click “NR Setting > Mobility Parameter”. A1, A2, A3, A4, A5, B1, and B2 thresholds are used in the handover decision event and cell reselection procedures.

7.3.1 A1 Event Threshold

The A1 threshold is used to trigger handover when the received signal strength of the target cell exceeds the serving cell's signal strength by a certain amount. It ensures that the target cell provides a stronger signal for handover to occur. The A1 event is triggered when the serving cell’s RSRP is better than the A1 threshold. The A1 event can be used to turn off certain inter-cell measurements.

Trigger condition: Ms - Hys > Thresh

Cancellation Condition: Ms + Hys < Thresh

An explanation of the variables used in the formulas is as follows:

- Ms: The measurement results of the serving cell represent the RSRP of the serving cell as perceived by the UE.
- Hys: The hysteresis parameter associated with the A1 event. Hysteresis is a small offset value used to prevent frequent handovers or cell reselections due to small fluctuations in signal measurements. It ensures stability in the handover process by introducing a margin.

- Thresh: The threshold parameter associated with the A1 event. It represents a reference value determining the signal level at which the A1 event is triggered or released. If the serving cell's RSRP is better than the A1 threshold, the A1 event is triggered. Conversely, if the serving cell's RSRP exceeds the A1 threshold by a margin of Hys, the A1 event is released.

By comparing the serving cell's RSRP with the A1 threshold, the A1 event allows for control over inter-cell measurements and helps manage handover decisions in 5G networks. The hysteresis parameter adds a buffer to avoid frequent toggling between events due to small variations in signal measurements.

NOTE: The A1 threshold may vary depending on the specific network deployment scenario, cell characteristics, and network operator preferences. Network operators optimize these thresholds to provide efficient handover performance and improve the overall user experience in 5G networks.

In the A1 list, click ⊕ to display A1 event configuration parameters, which are shown in Table 7-8.

Table 7-8 A1 Event Threshold Parameter Description

Parameter	Description
A1	Enable or disable the A1 event.
Threshold Trigger Type	The trigger type of the A1 threshold, options are rsrp, rsrq, and sinr.
A1 Threshold RSRP	The RSRP threshold value for triggering A1 event. Range is from 0 to 127.
A1 Threshold RSRQ	The RSRQ threshold value for triggering A1 event. Range is from 0 to 127.
A1 Threshold SINR	The SINR threshold value for triggering A1 event. Range is from 0 to 127.
Report On leave	Enable or disable indicator of A1 event on leave. It indicates whether the UE initializes the measurement reporting process when cells in the Triggered List are in leaving state.
Hysteresis	This parameter Refers to the hysteresis (historical records) of the handover measurement event. The value is used to avoid the frequent triggering of cell handover evaluation due to the fluctuation in wireless signals. This setting tells the UE, if you hear another gNB with at least this amount of dB better, initiate a handover. The lower the number the sooner the handover is initiated. If set too low, it may cause the UE to ping-pong between gNBs. Such events are tracked by the gNB, but not by the gNB. Range is from 0 to 30dB.
Max Report Cells	The maximum cells of reported. Range is from 0 to 8.
Measure Purpose	Measurement purpose. It indicates the usage of configuring the A1 event. • Inter-frequency measurement • Inter-RAT EUTRA measurement
Report Amount	The number of reports. Options are 0, 2, 4, 8, 16, 32, or 64.
MaxNrofRSIndexToReport	The maximum number of RS measurement report. Range is from 1 to 32.
Report Interval	The report interval of A1 event triggering report. Options are 120, 240, 480, 640, 1024, 2048, 5120, 10240, 60000, 360000, 720000, 1800000.

Parameter	Description
Report Quantity	The quantity of the measurement report including rsrp, rsrq, sinr.
Report Quantity RS IDX	The RS measurement report of the A1 event, including rsrp, rsrq, and sinr.
Time To Trigger	Trigger time. Options are 0, 40, 64, 80, 100, 128, 160, 256, 320, 480, 512, 640, 1024, 1280, 2560, 5120.
RS Type	RS type, including ssb and csi-rs.
Include Beam Measurements	Enable or disable the beam measurement indicator.
PLMN	PLMN ID. Range is 5–6 digit.

7.3.2 A2 Event Threshold

The A2 event is triggered when the serving cell's RSRP becomes worse than the A2 threshold. The A2 event in mobility management is typically used to trigger a mobility event when a device moves toward the cell edge. A2 does not involve any neighbor cell measurements. Therefore, it triggers a blind mobility procedure or initiates neighbor cell measurements for a measurement-based mobility procedure.

1. In the A2 list, click ⊕ to display A2 event configuration parameters.
2. Enter the values of the A2 event, which are the same as the A1 event, refer to Table 7-8.
3. After entering the parameters, click "**OK**" to save the settings.

7.3.3 A3 Event Threshold

The A3 event in mobility management is triggered when the signal quality of a neighbor cell becomes better than the serving cell by a certain offset value. This offset value can be positive or negative, depending on the specific configuration.

1. In the A3 list, click ⊕ to display A3 event configuration parameters.
2. Enter the values of the A3 event, which are the same as the A1 event, refer to Table 7-8.
3. After entering the parameters, click "**OK**" to saved settings.

7.3.4 A4 Event Threshold

The A4 event in mobility management is triggered when the signal quality of a neighbor cell becomes better than the serving cell by a relative threshold value. This event is typically used for handover decisions based on coverage considerations, both within the same frequency and across different frequencies.

1. In the A4 list, click ⊕ to display A4 event configuration parameters.
2. Enter the values of the A4 event, which are the same as the A1 event, refer to Table 7-8.
3. After entering the parameters, click "**OK**" to saved settings.

7.3.5 A5 Event Threshold

The A5 event in mobility management is triggered when the serving cell's signal quality falls below a specified threshold (Threshold 1) while a neighbor cell's signal quality surpasses another specified threshold (Threshold 2). The A5 event is typically used to control handovers at the cell edge, facilitating handover out of the serving cell and handover into the neighbor cell.

1. In the A5 list, click ⊕ to display A5 event configuration parameters.
2. Enter the values of the A5 event, which are the same as the A1 event, refer to Table 7-8.
3. After entering the parameters, click "**OK**" to saved settings.

7.3.6 B1 Event Threshold

Event B1 can be used for inter-RAT handover scenarios, which does not depend on the coverage of the serving cell. In inter-RAT handover scenarios, the B1 event is triggered when the serving cell's signal quality falls below a certain threshold, indicating a deteriorating signal. This event allows the network to initiate measurements on neighboring cells of a different RAT, such as LTE, to assess if better cells are available for handover. The decision to perform an inter-RAT handover is typically based on factors like the signal strength and coverage of the target cell in the other RAT.

Additionally, the B1 event can be leveraged for load balancing purposes, where the network aims to distribute the traffic across different RATs or cells to optimize network resource utilization.

In the B1 list, click ⊕ to display B1 event configuration parameters, which are shown in Table 7-9.

Table 7-9 B1 Event Threshold Parameter Description

Parameter	Description
B1	Enable or disable the B1 event.
Threshold Trigger Type	The trigger type of the B1 threshold, including rsrp, rsrq, and sinr.
B1 Threshold1 EUTRA RSRP	The RSRP threshold value for triggering B1 event. Range is from 0 to 97.
B1 Threshold1 EUTRA RSRQ	The RSRQ threshold value for triggering B1 event. Range is from 0 to 34.
B1 Threshold1 EUTRA	The SINR threshold value for triggering B1 event.

Parameter	Description
SINR	Range is from 0 to 127.
Hysteresis	Refers to the hysteresis (historical records) of the handover measurement events. The value is used to avoid the frequent triggering of cell handover evaluation due to the fluctuation in wireless signals. This setting tells the CPE, if you hear another gNB with at least this amount of dB better, initiate a handover. The lower the number the sooner the handover is initiated. If set too low, it may cause the CPE to ping-pong between gNBs. Range is 0–30 dB. The recommended value is 1 dB.
Max Report Cells	The maximum cells of reported. Range is from 1 to 8.
Measure Purpose	Measurement purpose. It indicates the usage of configuring the A1 event. • Inter RAT EUTRA Data Measure • Inter RAT EUTRA Voice Measure
Report Amount	The number of reports. Options are 0, 2, 4, 8, 16, 32, or 64.
Report Interval	The report interval of B1 event triggering report. Options are 120, 240, 480, 640, 1024, 2048, 5120, 10240, 60000, 360000, 720000, 180000.
Time To Trigger	The quantity of the measurement report. Options are 0, 40, 64, 80, 100, 128, 160, 256, 320, 480, 512, 640, 1024, 1280, 2560, 5120.
Report Quantity	The RS measurement report of the B1 event, including rsrp, rsrq, and sinr.
Report On leave	Enable or disable the beam measurement indicator.
PLMN	PLMN ID. Range is 5–6 digit.

7.3.7 B2 Event Threshold

The B2 event thresholds are specific to TD-SCDMA and GSM adjacent cells and do not apply to adjacent LTE cells.

1. In the B2 list, click ⊕ to display B2 event configuration parameters.
2. Enter the values of the B2 event, which are the same as the B1 event, refer to Table 7-9.
3. After entering the parameters, click “**OK**” to save the settings.

7.3.8 Period Measurement Parameter

1. In the Period Measure list, click ⊕ to display period measurement configuration parameters, which are shown in Table 7-10.

Table 7-10 Period Measurement Parameter Description

Parameter	Description
Report Quantity	The RS measurement report of the B1 event • rsrp • rsrq • sinr

Parameter	Description
Max Report Cells	The maximum reported cells. Range is from 1 to 8.
Report Interval	The measurement event's report interval. Options are 120, 240, 480, 640, 1024, 2048, 5120, 10240, 60000, 360000, 720000, 1800000.
Report Amount	The measurement event's report amount. Options are 0, 2, 4, 8, 16, 32, 64.

2. Click "**OK**" to complete the period measurement setting.

7.4 Configure Advanced Parameters

CAUTION: Many, if not all, of the *Advanced* settings should be left with their default values. Any modifications should be determined only by experienced wireless professionals.

This menu is primarily used to fine-tune the RF settings and to configure special features.

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

7.4.1 CU

1. Click + in front of "**CU**" to show CU configuration parameters, as shown in Table 7-11.

Table 7-11 CU Parameter Description

Parameter	Description
T300	The timer is associated with RRC. When the gNB receives the RRCSetupRequest message, the timer starts.
T301	The timer is associated with RRC. When the gNB receives the RRCReestabilshmentRequest message, the timer starts.
T304	The timer is associated with RRC. When the gNB receives the RRC reconfiguration message with synchronization, the timer starts.
T310	The timer is associated with RRC. When the gNB receives out-of-sync message the timer starts.
T311	The timer is associated with RRC. When the RRC reestablishment is triggered, the timer starts.
N310	Maximum number of consecutive "out-of-sync" indications for the PCell received from lower layers.
N311	Maximum number of consecutive "in-sync" indications for the PCell received from lower layers.
T319	RRC timer. When the gNB receives the RRCResumeRequest message, the timer starts up.
F1AP Local IP	The CU IP address in control plane of F1 interface.
F1U IP	The CU IP address in user plane of F1 interface.

Parameter	Description
EgtPU Local IP	The local CU IP address of the NG interface. Click ⊕ to add multiple IP addresses.
AMF IP	The peer AMF IP address of the NG interface. Click ⊕ to add multiple IP addresses, including AMF IP, NGAP Local IP, PLMN and Default.

2. Set multi network element, the parameter description is shown in Table 7-12.

Table 7-12 Multi Network Element Parameter Description

Parameter	Description
NGAP Interface Binding	NGAP binding interface. Select from the dropdown list.
NGU Interface Binding	NGU binding interface. Select from the dropdown list.
tr069 Binding	TR069 binding interface. Select from the dropdown list.

7.4.2 DU

DU is a component of the 5G RAN architecture responsible for handling the lower-layer processing and functionality of the gNB.

Click + in front of "**DU**" to show DU configuration parameters, as shown in Table 7-13.

Table 7-13 DU Parameter Description

Parameter	Description
Offset To Point A	The offset to point A. The unit is RB. Range is from 0 to 2199.
SSB Sub Carrier Offset	The offset of SSB sub carrier. Range is from 0 to 31.
SSB Sub carrier Spacing	The SSB sub carrier spacing. Range is from 0 to 4.
TDD Slot Configuration	Select TDD slot configuration • 7:3-2.5ms(DDDSUDDSUU) • 4:1-2.5ms(DDDSU) • 2:3-2.5ms(DSUUU) • 8:2-5ms(DDDDDDDSUU) • 6:4-5ms(DDDDDSUUUU)
TDD Special Slot Configuration	Select TDD special slot configuration • SS6-4-4(6:4:4) • SS10-2-2(10:2:2)
Max DL HARQ ReTX	The maximum number of downlink Hybrid Automatic Repeat reQuest (HARQ) Retransmission (ReTX). Range is from 0 to 4.
DL LA	Enable or disable Downlink AMC auto adaptive switch.
Max UL HARQ ReTX	The maximum number of uplink HARQ retransmission. Range is from 0 to 4.
UL LA	Enable or disable the uplink AMC auto adaptive switch.
CSIRsReporting	Enable or disable the CSI report switch.
DU F1AP Local IP	The DU IP address in control plane of F1 interface.
DU F1U Local IP	The DU IP address in user plane of F1 interface.
DU F1C Remote IP	The Remote IP address in control plane of F1 interface.

7.4.3 SSB

Click + in front of "**SSB**" to show SSB configuration parameters, as shown in Table 7-14.

Table 7-14 PCI Range Parameter Description

Parameter	Description
SSB Mask	SSB mask. It is used to configure the number of SSB. Range is 8 digit integer.
SSB Periodicity	The period of SSB. The unit is millisecond. Range is from 0 to 5.
SSB Power	The transmission power of SSB. Range is from -60 to 50.
SSBResourceReserved	Enable or disable the reserved resource of SSB.
RLF Trigger Max DTX Received	Radio Link Failure (RLF) maximum Discontinuous Transmission (DTX) received. Range is 0–65534.

7.4.4 RRC

When Radio Resource Control (RRC) inactive state is enabled, the UE is actively connected to the network. However, when disabled, the UE is connected but not actively transmitting or receiving data.

7.4.5 DRX

Discontinuous Reception (DRX) is a power-saving mechanism used in 5G. DRX allows mobile devices to enter sleep or idle mode periodically, conserving power when no immediate data transmission or reception is required.

Click + in front of "**DRX**" to show Discontinuous reception (DRX) configuration parameters, as shown in Table 7-15.

Table 7-15 DRX Parameter Description

Parameter	Description
DRX On Duration Timer	The duration timer of DRX.
DRX Inactivity Timer	The inactivity timer of DRX.
DRX HarqRtt TimerDL	The number of symbols received in the downlink BWP transfer block. The retransmission of the downlink process will be scheduled after this timer ending. The scheduling window is within drX-RetransmissionTimerdl.
DRX HarqRtt TimerUL	The number of symbols received in the uplink BWP transfer block. The retransmission of the uplink process will be scheduled after this timer ending. The scheduling window is within drX-RetransmissionTimerUL. When the last symbol of PUSCH is sent, the drx-HARQ-RTT-TimerUL starts up.
DRX Retransmission Timer DL	The downlink retransmission timer of DRX.
DRX Retransmission	The uplink retransmission timer of DRX.

Parameter	Description
Timer UL	
Long DRX Cycle	Long DRX period.
DRX Start Offset	Specify the start sub frame of the DRX period. Range is from 0 to 10239.
Short DRX Cycle	Short DRX period.
Short Cycle Timer	The timer of DRX short period. Range is from 1 to 16. • If the value is set to 1, it means 1 * ShortDRXCycle. • If the value is set to 1, 2 * ShortDRXCycle And so forth.
DRX Slot Offset	DRX Slot offset. Range is from 0 to 31.

7.4.6 Voice

Voice over New Radio (VONR) refers to the capability of carrying voice calls over the 5G network using IP-based technologies. It enables voice services to be integrated into the 5G infrastructure, providing enhanced voice quality, improved efficiency, and advanced features.

Click + in front of "**Voice**" to show the voice configuration parameters, as shown in Table 7-16.

Table 7-16 Voice Parameter Description

Parameter	Description
VONR	Enable or disable the voice over NR.
Force VoNR	Enable or disable the force voice over NR.
EPS Fallback Type	Evolved Packet System (EPS) fallback type, includes five types: • EPS Fallback Blind Red – device falls back blindly to lower generation for voice service. • EPS Fallback Meas Red – measuring certain parameters of the target network (before initiating a fallback from LTE to a lower generation network for voice services. • EPS Fallback Meas HO – initiates handover to a different gNB before falling back to a lower generation for voice service

7.4.7 GNB

To edit and configure basic gNB parameters like gNB ID length, gNB name and gNB ID, click + in front of "GNB" to show the gNB configuration parameters, as shown in Table 7-17.

Table 7-17 GNB Parameter Description

Parameter	Description
GNB ID Length	The length of GNB ID. Range is from 22 to 32 digit integer.
GNB ID	The ID of the gNB.
GNB Name	GNB name. Range is from 0 to 150 bytes.

7.4.8 Multi PLMN

1. Click + in front of "**Multi PLMN**" to show multi PLMN configuration parameters.
2. Select whether enable multi PLMN function.

7.4.9 Mobility Strategy

1. Click + in front of "**Mobility Strategy**" to show the mobility strategy configuration parameter.
2. Set the NrToLtemigrateStgy (NR to LTE Mobility Strategy) as PS_MEAD_RED or PS_MEAS_HO.
   - PS Meas Red –determines whether to prioritize or modify Packet Switch (PS) data service.
   - PS Meas HO – initiates handover for PS data service.

7.4.10 CellDt

Click + in front of "**CellDt**" to show cell data trace configuration parameters, as shown in Table 7-18.

Table 7-18 Cell Data Trace Parameter Description

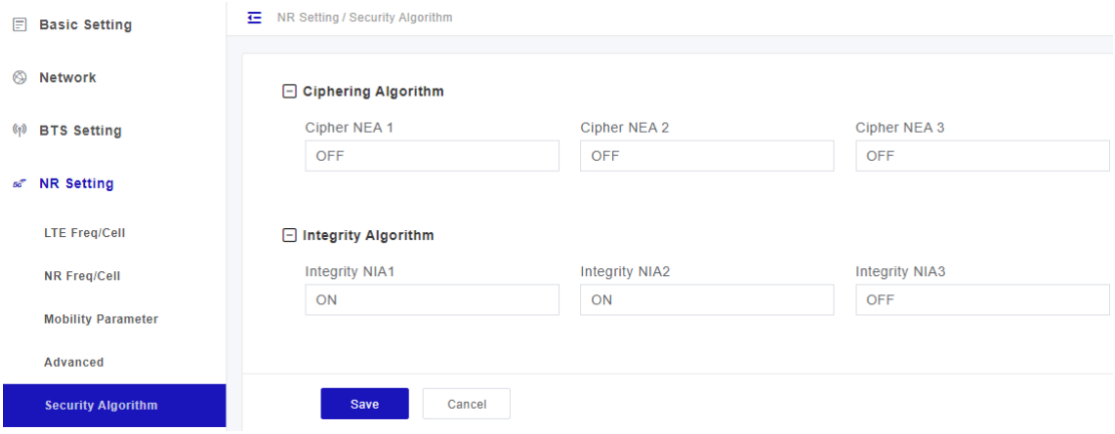
Parameter	Description
Switch	Enable or disable the cell data trace function.
Type	The type of the trace.
Value	Value. Range is 0–65535.
Trace No	Trace Number. Range is 0–99 characters.

7.5 Configure Security Algorithm

This menu pertains to the NR encryption algorithms used. The selection of ciphering algorithm used to encrypt user data and ensure confidentiality during transmission depend on the 5GC setup. 5G supports three ciphering and integrity protection algorithms, known as the New Radio Encryption Algorithm (NEA) and the New Radio Integrity Algorithm (NIA). NEA1 and NIA1 use the SNOW 3G cipher, NEA2 and NIA2 lean upon AES, and NEA3 and NIA3 rely on ZUC.

In the left navigation column, select "**NR Setting >Security Algorithm**" to enter the security algorithm configuration page, as shown in Figure 7-5.

Figure 7-5 Security Algorithm Setting



- Ciphering Algorithm

  The parameter description for ciphering algorithm are shown in Table 7-19.

  Table 7-19 Ciphering Algorithm Parameter Description

Parameter	Description
Cipher NEA 1	Enable or disable SNOW algorithm.
Cipher NEA 2	Enable or disable AES algorithm.
Cipher NEA 3	Enable or disable ZUC algorithm.

- Integrity Algorithm

  The parameter description of integrity algorithm are shown in Table 7-20.

  Table 7-20 Integrity Algorithm Parameter Description

Parameter	Description
Integrity NIA1	Enable or disable SNOW algorithm.
Integrity NIA2	Enable or disable AES algorithm.
Integrity NIA3	Enable or disable ZUC algorithm.

7.6 Configure SIB

System Information Block (SIB) in 5G NR plays a vital role in ensuring proper communication and coordination for the UE and CPE to operate and access the 5G network. SIBs contain various parameters and data elements necessary for the UE to access and operate within the network.

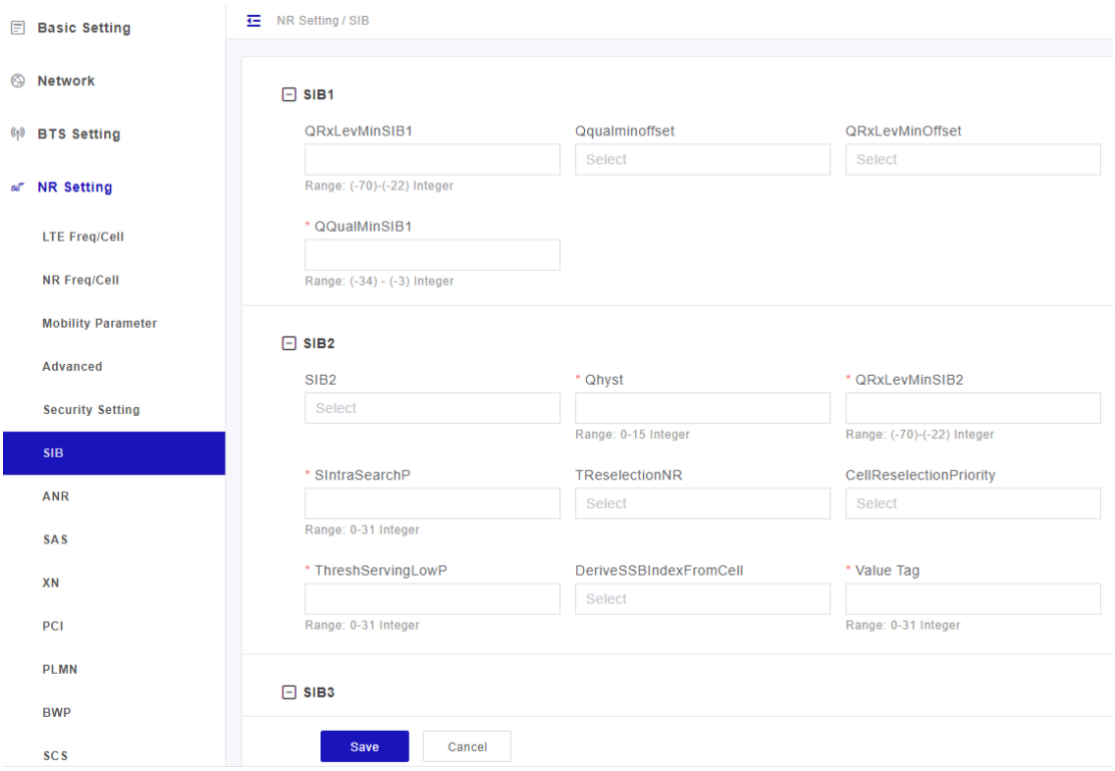
The gNB supports SIB1 to SIB5.

- SIB1 – SIB1 is the master information block containing cell identity, selection, and reselection.

- SIB2 – SIB2 provides detailed radio resource configuration information.
- SIB3 – SIB3 contains information about neighboring cells and their characteristics.
- SIB4 – SIB4 has information about other NR frequencies and inter-frequency neighboring cells relevant for cell re-selection.
- SIB5 – SIB5 has information about E-UTRA frequencies and E-UTRA neighboring cells relevant for cell re-selection.

In the left navigation column, select "**NR Setting >SIB**" to enter the SIB configuration page, as shown in Figure 7-6.

Figure 7-6 SIB Setting



- SIB1

  The parameter description of SIB1 is shown in Table 7-21.

Table 7-21 SIB1 Parameter Description

Parameter	Description
QRxLevMinSIB1	The minimum received level of SIB1. Range is from -70 to -22 integer.
Qqualminoffset	This parameter represents the gNB's minimum received signal quality offset. Range is 1 to 8.
QRxLevMinOffset	This parameter represents the gNB's minimum received level offset. Range is 1 to 8.

Parameter	Description
QQualMinSIB1	The minimum required quality level of SIB1. Range is -43 to -12.

- SIB2

The parameter description of SIB2 is shown in Table 7-22.

Table 7-22 SIB2 Parameter Description

Parameter	Description
SIB2	Enable or disable SIB2.
Qhyst	This parameter will overestimate the signal strength of the serving cell to delay the cell reselection. The default value is 2. Range is from 0 to15. This parameter will overestimate the signal strength of the serving cell to delay the cell reselection.
QRxLevMinSIB2	The minimum received level of SIB2. Range is from -70 to -22.
SIntraSearchP	The threshold of intra frequency measurement. Range is from 0 to 31.
TReselectionNR	Cell reselection timer for NR. Range is from 0 to 7.
CellReselectionPriority	Priority of the cell reselection to cells at this frequency. Range is 0 to 7 (integer).
ThreshServingLowP	This parameter indicates the threshold when the serving frequency point moves to a lower priority inter-frequency or an Inter-Radio Access Technology (RAT). For example, when the UE moves to a lower priority inter-frequency or an Inter-RAT Range is from 0 to 31.
DeriveSSBIndexFromCell	Whether the frame boundaries of all cells at this frequency point are the same. Range is 0 or 1.
Value Tag	The tag of SIB2 value. Range is from 0 to 31.

- SIB3

The parameter description of SIB3 is shown in Table 7-23.

Table 7-23 SIB3 Parameter Description

Parameter	Description
SIB3	Enable or disable SIB3.
Value Tag	The tag of SIB3 value. Range is from 0 to 31.

- SIB4

The parameter description of SIB4 is shown in Table 7-24.

Table 7-24 SIB4 Parameter Description

Parameter	Description
SIB4	Enable or disable SIB4.
Value Tag	The tag of SIB4 value. Range is from 0 to 31.

- SIB5

  The parameter description of SIB5 is shown in Table 7-25.

  Table 7-25 SIB5 Parameter Description

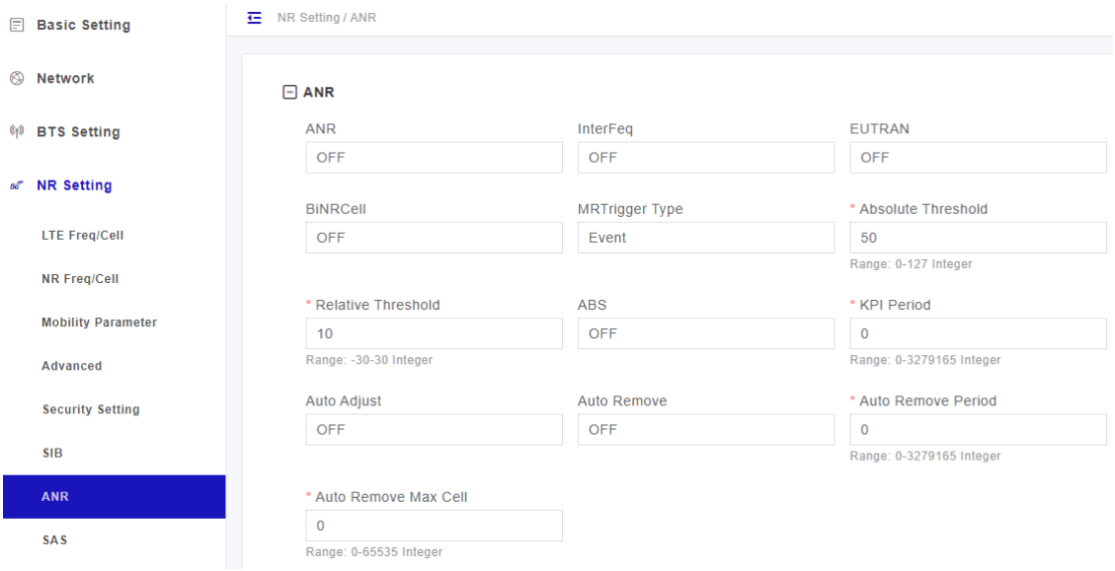
Parameter	Description
SIB5	Enable or disable SIB5.
Value Tag	The tag of SIB5 value. Range is from 0 to 31.

7.7 Configure ANR

Automatic Neighbor Relation (ANR) is a feature or functionality that automatically manages and optimizes neighbor-cell relationships.

1. In the left navigation column, select "**NR Setting >ANR**" to enter the Auto Neighbor Relation (ANR) configuration page, as shown in Figure 7-7.

   Figure 7-7 ANR Settings



2. Input ANR parameters, the parameter description is shown in Table 7-26.

   Table 7-26 ANR Parameter Description

Parameter	Description
IntraFreq ANR	Enable or disable the intra frequency ANR.
InterFreq ANR	Enable or disable the inter frequency ANR.
EUTRAN ANR	Enable or disable the Evolved Universal Terrestrial Radio Access Network (EUTRAN) ANR.
Bidirectional NR Cell	Enable or disable the bidirectional NR cell.
MRTrigger Type	Measurement Report (MR) trigger type: Event or Period. • Event • Period

Parameter	Description
ABS	Enable or disable the Absolute (ABS).
Absolute Threshold	Absolute threshold. Range is from 0 to 127.
Relative Threshold	Relative threshold. Range is from 0 to 127.
KPI Period	The period of KPI. Range is from 0 to 3279165.
Auto Adjust	Enable or disable the auto adaptive function.
Auto Remove	Enable or disable the auto removement function.
Auto Remove Period	The period of auto removement. Range is from 0 to 3279165.
Auto Remove Max Cell	The maximum cells of auto remove. Range is from 0 to 65535.
Expected PLMN	Expected PLMN. Click **+** to add multiple PLMNs.

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

7.8 Configure SAS

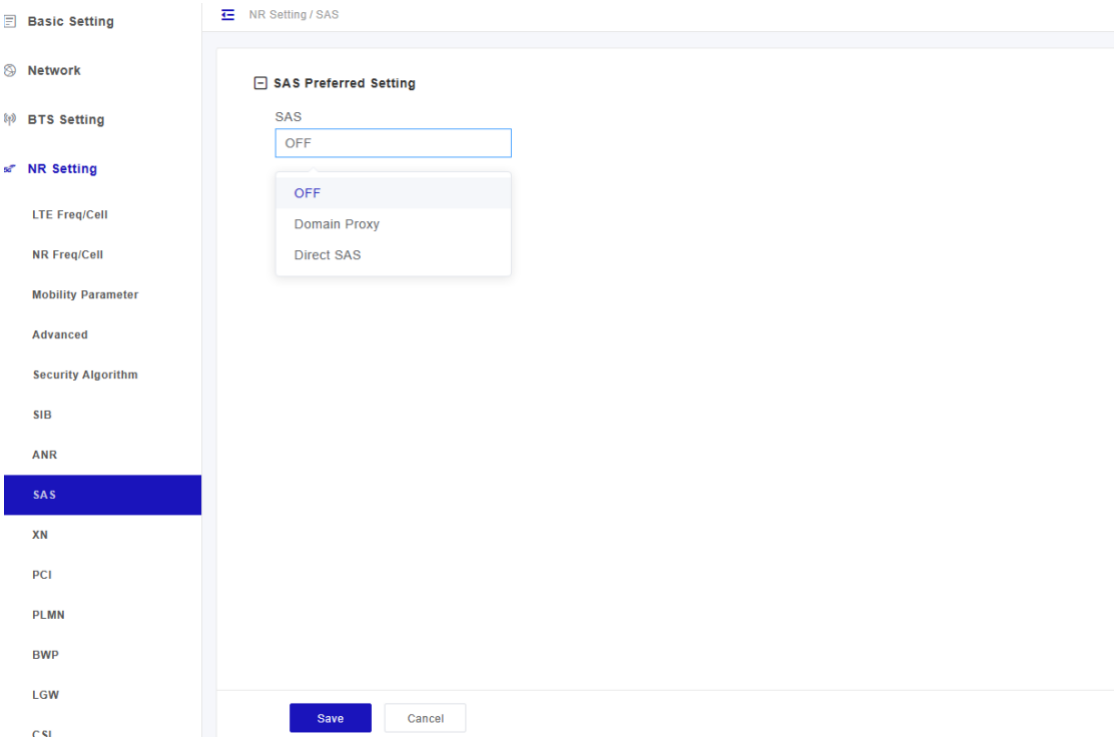
Bacells 5G gNB supports band n48, also known as the Citizens Broadband Radio Service (CBRS) band is available only in the United States. The n48 CBRS band operates within the frequency range of 3550 MHz to 3700MHz. It is part of the shared spectrum in the CBRS band, which means it is available for use by authorized users such as Incumbent, Priority Access License (PAL), and General Authorized Access (GAA) in a variety of applications, including private LTE/5G networks, industrial IoT, fixed wireless access, and more.

In the CBRS framework, the SAS acts as a dynamic spectrum coordinator that oversees the allocation and usage of available frequencies within the 3550-3700 MHz range. The SAS is responsible for managing the shared spectrum in the CBRS band and ensuring efficient and interference-free operation among authorized users.

The CBRS SAS solution requires a working knowledge of SAS, preparation of personnel and equipment, and coordinated configuration across device GUIs, the OMC, and the selected SAS vendor's portal. The following information provides a brief overview only.

In the left navigation column, select "**NR Setting > SAS**" to enter the SAS configuration page, as shown in Figure 7-8.

Figure 7-8 SAS Setting



First, set “SAS” the parameter.

- OFF

  Disable the SAS function. The gNB works in normal mode. There is no other parameters displays.

- Direct SAS

  The gNB communicates with the SAS server directly.

- Domain Proxy

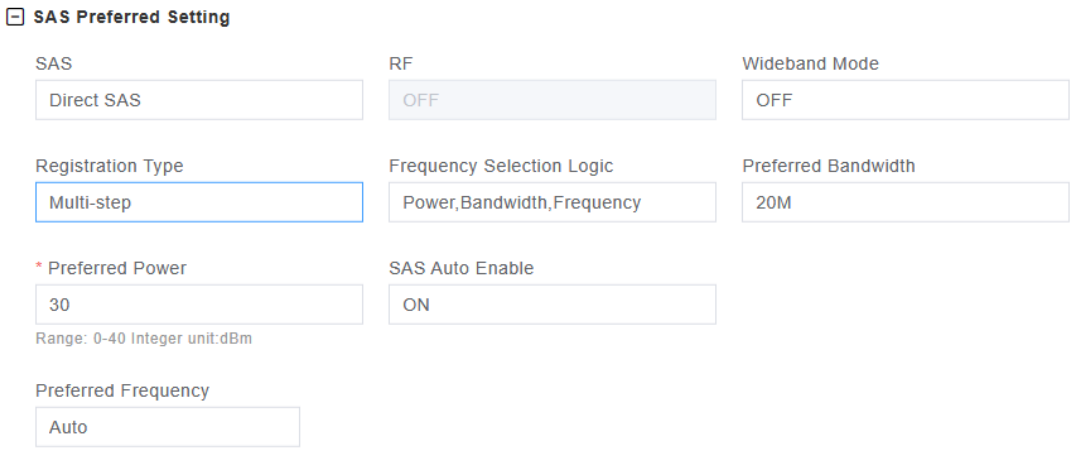
  The gNB communicates with the SAS server through the OMC.

In the two SAS modes, configuration parameters are different, following will introduce configuration steps separately.

7.8.1 SAS Preferred Setting

When the “**SAS**” is set to “**Direct SAS**” or “**Domain Proxy**”, the SAS preferred setting parameters are shown in Figure 7-9.

Figure 7-9 SAS Preferred Setting



The parameter descriptions of the SAS preferred setting are given in Table 7-27.

Table 7-27 SAS Preferred Setting Parameters Description

Parameter	Description
RF	Enable or disable Radio Frequency (RF).
Wideband Mode	Enable or disable wideband mode.
Registration Type	Select Single-Step or Multi-Step method to register the gNB with the SAS vendor.
Frequency Selection Strategy	Used to configure preferred frequencies, channel bandwidth, and power when SAS is enabled. After receiving channel availability from SAS, the DP uses the frequency selection logic setting to calculate CBRS channel selection based on the order of importance identified. The default is Power, Bandwidth, Frequency.
Preferred Bandwidth	The preferred bandwidth for the gNB. Options are: • 10MHz • 20MHz • 30MHz • 40MHz
Preferred Power	Used to set the preferred power for the gNB. The preferred power is the total TX power (in dBm) being transmitted per carrier. The power can be set to the maximum transmitting power supported by the gNB in increments of 1 dBm. For Aurora243, range is from 0 to 40 dBm. For Aurora249, range is from 37 to 46 dBm.
SAS Auto Enable	When the SAS is set to “**Direct SAS**”, this parameter displays. Select the SAS registration method. • ON: The SAS registration is initiated by the gNB automatically. • OFF: The SAS registration is initiated manually.
Preferred Frequency	The central frequency of the cell. Auto or choose one frequency from the drop-down list.

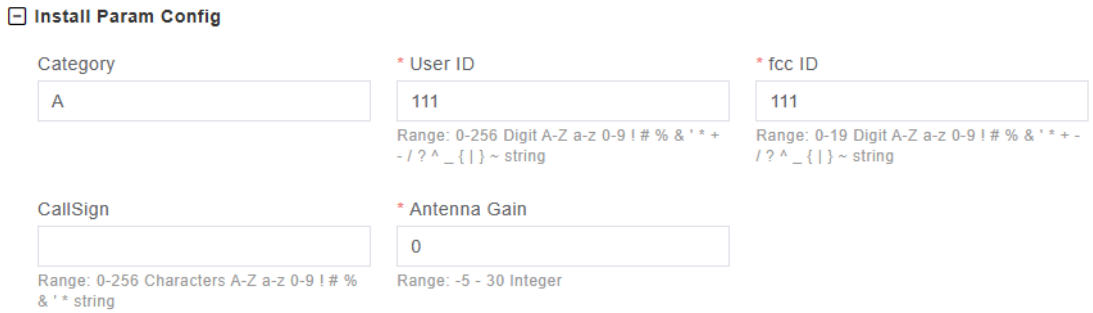
7.8.2 Install Parameter Configuration

Following introduces the install parameter configuration steps in “Multi-step” mode and

“Single-step” mode separately.

- If some information is stored in the SAS, set “**SAS Registration Type**” to “**Multi-step**”, the installation parameters for multi-step mode are shown in Figure 7-10.

Figure 7-10 Install Parameters Configuration - Multi-step



The install parameter description of multi-step modes is given in Table 7-28.

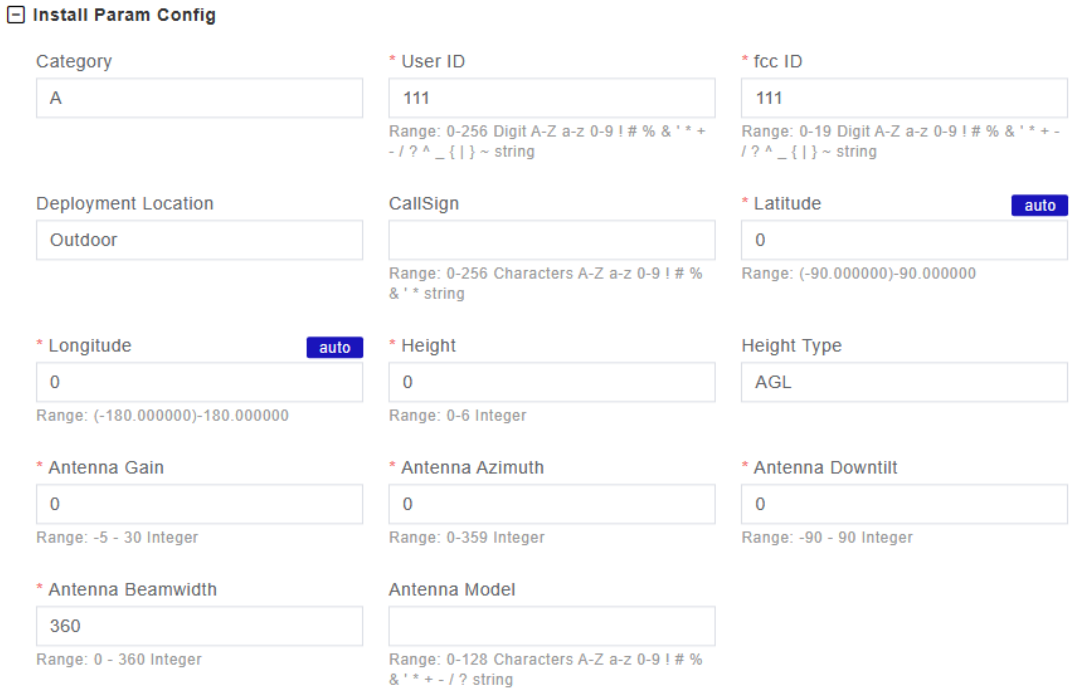
Table 7-28 Installation Parameter Description - Multi-step

Parameter	Description
Category	The gNB type. A: Indoor or lower power CBRS device (CBSD) or B: Outdoor or higher power CBSD. The main difference between these categories is the power limit. The Aurora243/249 gNB is Category B.
User ID	Enter a user ID, which is provided by your SAS vendor and is associated with this SAS enabled gNB. The range is 0–256 characters (using upper-case letters A–Z, lower-case letters a–z, and digits 0–9).
fcc ID	The gNB’s FCC certification number.
CallSign	Optional: Parameter that is useful to identify the PAL license under which the operator is deploying a CBSD. The parameter is not necessary to configure for the GAA spectrum (3550–3700 MHz). The range is 0 to 256 characters (using upper-case letters A–Z, lower-case letters a–z, and digits 0–9).
Antenna Gain	Set the gNB’s antenna gain. Range: -5–30 dBi..

- If no gNB information is stored in SAS, set “**SAS Registration Type**” to “**Single-step**”. Installation parameters, CPI information and CPI certificates should be configured.

The installation parameters for single step mode are shown in Figure 7-11.

Figure 7-11 Install Configuration Parameters - Single-Step



The parameter description of install parameter configuration in single-step mode are given in Table 7-29.

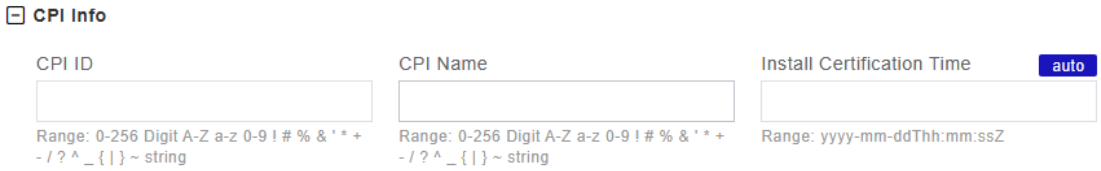
Table 7-29 Installation Configuration Parameter Description – Single step

Parameter	Description
Category	The gNB type. A: Indoor or lower power CBRS device (CBSD) or B: Outdoor or higher power CBSD. The main difference between these categories is the power limit. The Aurora243/249 gNB is Category B.
User ID	Enter a user ID, which is provided by your SAS vendor and is associated with this SAS enabled gNB. The range is 0–256 characters (using upper-case letters A–Z, lower-case letters a–z, and digits 0–9).
fcc ID	The gNB's FCC certification number.
Deployment Location	Select the gNB deployment location. Indoor or Outdoor
CallSign	Optional: Parameter that is useful to identify the PAL license under which the operator is deploying a CBSD. The parameter is not necessary to configure for the GAA spectrum (3550–3700 MHz). The range is 0 to 256 characters (using upper-case letters A–Z, lower-case letters a–z, and digits 0–9).
Latitude	Latitude of the gNB's location. Select Auto to autofill the latitude based on GPS data; otherwise, enter the latitude. Range: -90.000000 to 90.000000).
Longitude	Longitude of the gNB's location. Select Auto to autofill the longitude based on GPS data; otherwise, enter the longitude. Range: -180.000000 to 180.000000).
Height	Enter the antenna height in meters. When selecting CategoryA, Outdoor, and AGL, the range is from 0 to 6 (integer);

Parameter	Description
	In other situations, the range is from 0 to 8848 (integer).
Height Type	Above Ground Level (AGL) or Above Mean Sea Level (AMSL)can be selected.
Antenna Gain	Set the gNB's antenna gain. Range: -5–30 dBi..
Antenna Azimuth	Enter the antenna azimuth, in degrees. Default is 180°. Range: 0–359°.
Antenna Downtilt	Enter the degrees of antenna down tilt. Default is 5°. Range: -90°–90°.
Antenna Beamwidth	Enter the degrees of antenna beamwidth. Default is 65°. Range: 0–360°.
Antenna Model	Enter the antenna model. The range is 0–128 characters.

CPI info pane displays only when Single -step registration type is selected, which is shown in Figure 7-12.

Figure 7-12 CPI Information Certificate



The CPI information parameters are shown in Table 7-30

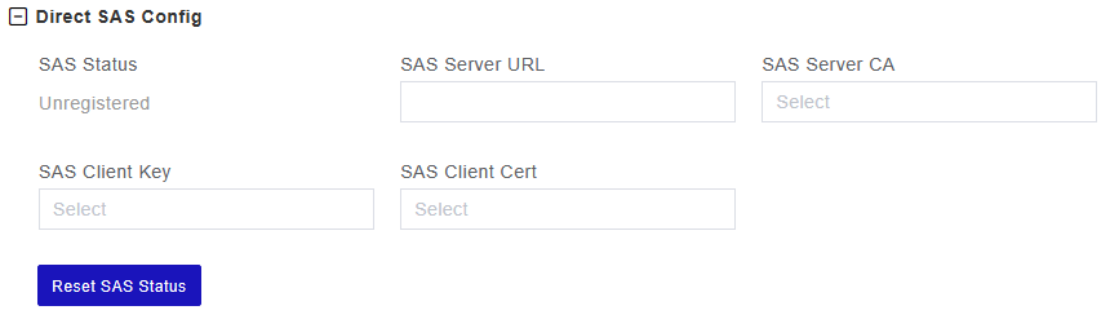
Table 7-30 CPI Information Parameter Description –Single step

Parameter	Description
CPI ID	Enter the Certified Professional Installer's identification number.
CPI Name	Enter the Certified Professional Installer's name. Use an underscore to separate first and last names; you cannot use a space in this field.
Installation Certification Time	Select Auto to enter the date and time of installation automatically: yyyy-mm-ddThh:mm:ssZ

7.8.3 Direct SAS Configuration

When the SAS" is set to "**Direct SAS**", the direct SAS configuration parameters are shown in Figure 7-13.

Figure 7-13 Direct SAS Configuration



The descriptions of direct SAS configuration parameters are given in Table 7-31.

Table 7-31 Direct SAS Setting Parameters Description -

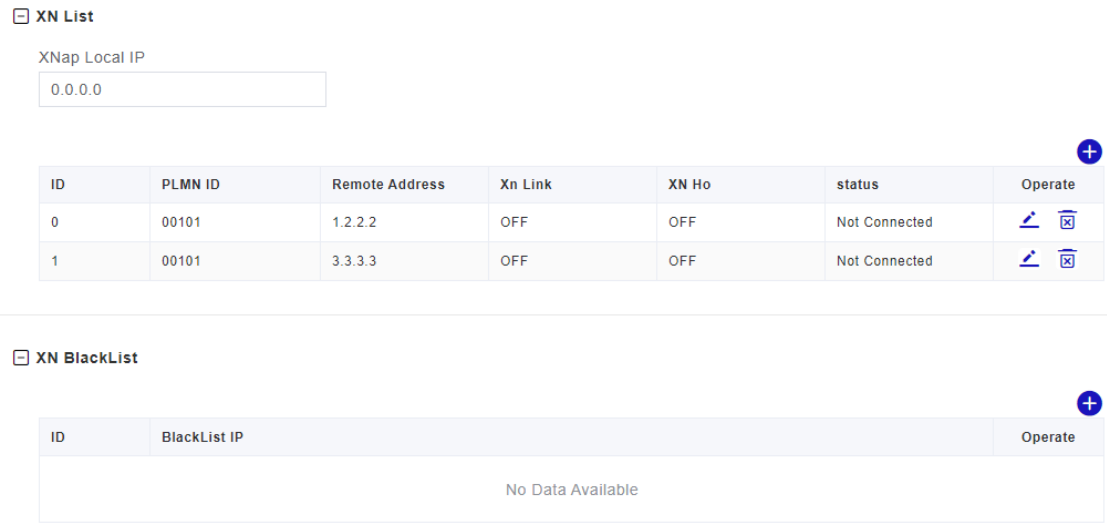
Parameter	Description
SAS Status	This field displays the SAS registered status, including unregistered, registered, granted, authorized. Click “Rest SAS Status” to update this filed.
SAS Server URL	The URL of the SAS server. The URL is given by the SAS vendor.
SAS Server CA	The CA certificate of the SAS server. It must be imported in “6.4 Certificate Store” in advance.
SAS Client Key	The key certificate of the SAS client. It must be imported in “6.4 Certificate Store” in advance.
SAS Client Cert	The certificate of the SAS client. It must be imported in “6.4 Certificate Store” in advance.

7.9 Configure XN

The Xn interface is a key interface in the 5G network architecture that connects the gNB with the 5GC. Xn enables communication and exchange of control plane and user plane information between the gNB and the 5GC.

1. In the left navigation column, select “**NR Setting > XN**” to enter the XN configuration page, as shown in Figure 7-14.

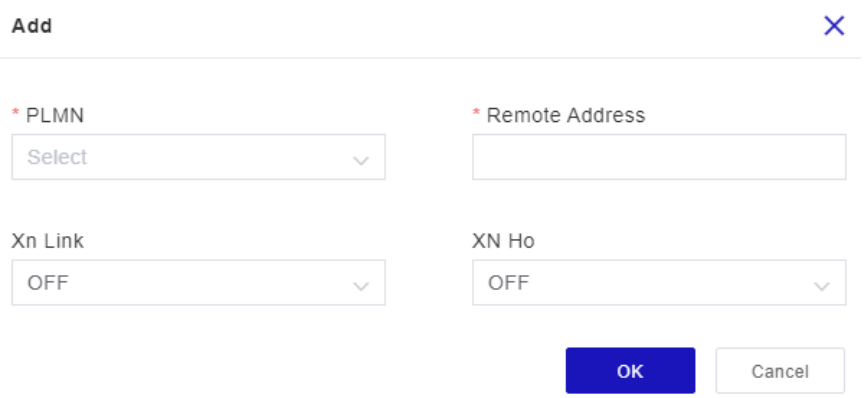
Figure 7-14 XN Settings



2. Type the local IP address for XN application interface.

3. In the XN list, click ⊕ to pop up the XN configuration parameters, as shown in Figure 7-15.

Figure 7-15 Add XN



Input XN parameters, the parameter description is shown in Table 7-32.

Table 7-32 XN Parameter Description

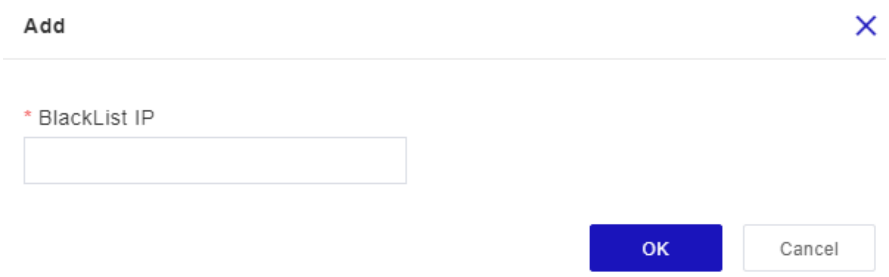
Parameter	Description
PLMN	PLMN ID
Remote Address	The remote IP address.
Xn Link	Enable or disable the XN link.
Xn Ho	Enable or disable the XN handover.

4. Click "**OK**" to add the IP address for XN interface.

5. In the XN black list, click ⊕ to pop up the black configuration parameter, as

shown in Figure 7-16.

Figure 7-16 Add XN Black IP



6. Input the IP addresses of the black IP.
7. Click "**OK**" to add the IP address to the black list.
8. Click "**Save**" to complete the XN interface setting.

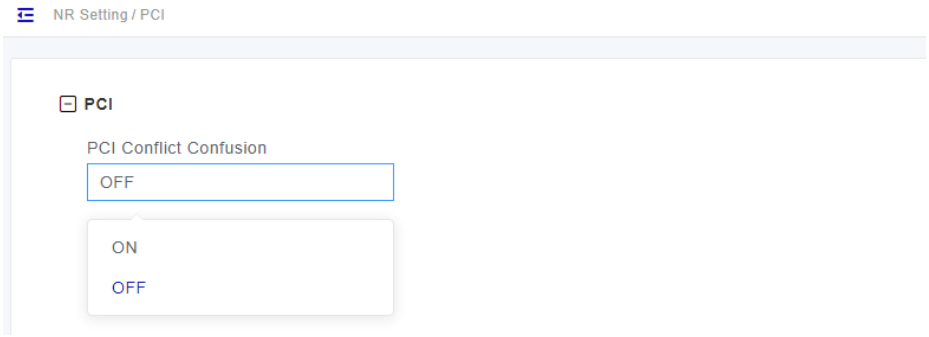
7.10 Configure PCI

PCI planning is one of the most important steps in 5G to avoid PCI conflict, where two or more adjacent gNBs have the same PCI. The PCI is a unique identifier assigned to each gNB within a network, and it is used to differentiate and communicate with individual gNBs.

When multiple gNBs share the same PCI, it can lead to interference and disruptions in the network. The UE and CPEs may have difficulty distinguishing between the overlapping gNBs, resulting in degraded signal quality, reduced throughput, and potential call drops or connection failures.

1. In the left navigation column, select "**NR Setting >PCI**" to enter the PCI configuration page, as shown in Figure 7-17.

Figure 7-17 PCI Setting



2. Select whether enable the PCI conflict detection function.
3. Click "**Save**" to complete the PCI setting.

7.11 Configure PLMN

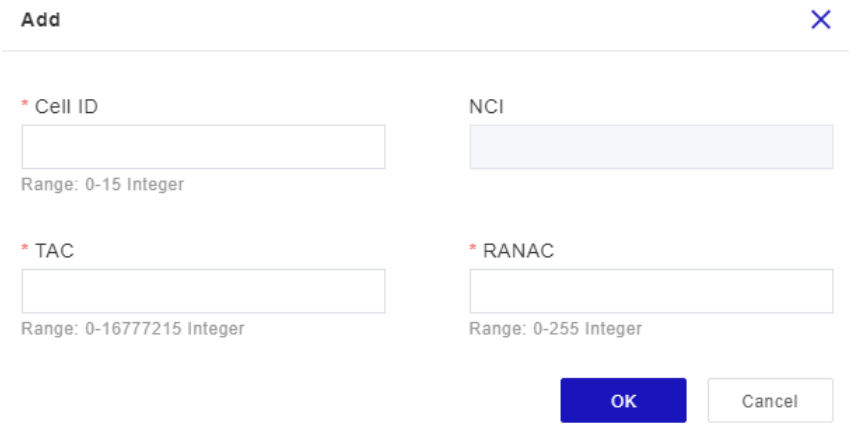
PLMN is a combination of Mobile Country Code (MCC) and Mobile Network Code (MNC). The MCC identifies the country or geographic region, while the MNC identifies the specific MNO within that country or region.

1. In the left navigation column, select "**NR Setting > PLMN**" to enter the PLMN configuration page, as shown in Figure 7-18.

Figure 7-18 PLMN Setting

2. Click ⊕ to display PLMN configuration parameters, as shown in Figure 7-19.

Figure 7-19 Add PLMN



3. Input parameters, which are shown in Table 7-33.

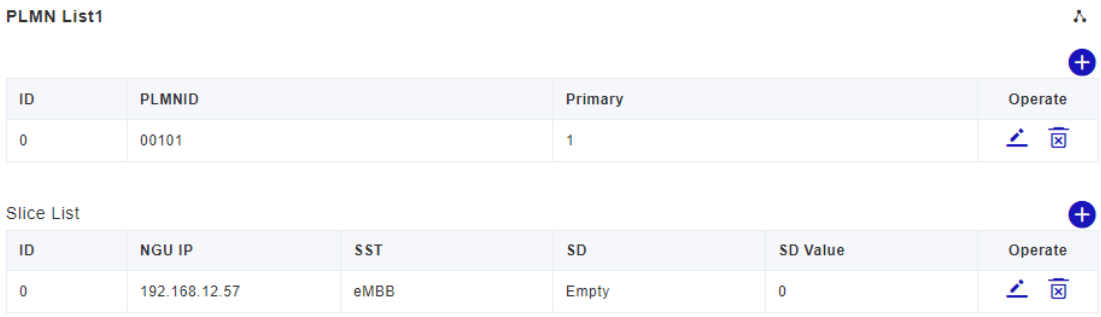
Table 7-33 PLMN Parameter Description

Parameter	Description
Cell ID	The cell ID of the neighbor cell. Range is from 0 to 15 integer.
NCI	NR Cell Identity (NCI), assigned by the system automatically.
TAC	TAC for where the gNB is located. The TAC is used to determine the range of the paging information. Range is from 0 to 16,777,215.
RANAC	RAN access point. Range is from 0 to 255 integer

3. Click "**OK**" to add the PLMN to the PLMN list.

Click *Open/Folded* to unfold or fold the PLMN list. After click *Open*, and then click on the right of the window, the PLMN list shows, as Figure 7-20.

Figure 7-20 PLMN List



7.12 Configure BWP

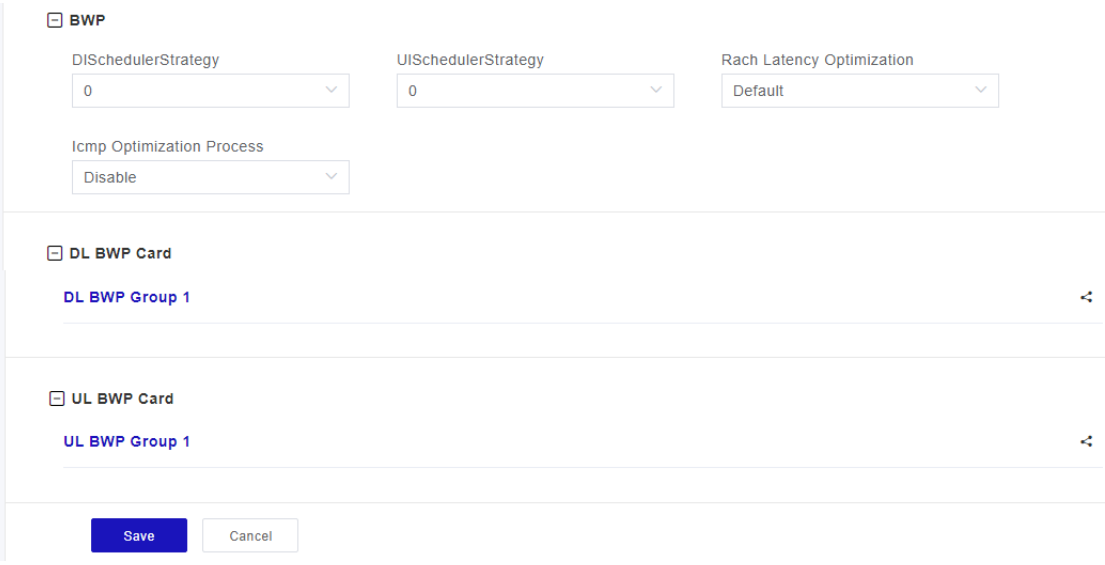
Bandwidth parts (BWPs) are a 5G NR feature allowing flexible bandwidth configuration in a 5G NR carrier. A BWP is a contiguous set of PRBs configured for data transmission or reception. BWPs in the UL or DL direction can be of any size, up to the maximum bandwidth supported by the 5G NR carrier.

BWPs support different data rates, different types of traffic, and different levels of QoS. BWPs improve the performance of 5G NR in areas with high interference or low signal strength.

The network operator can change the BWP dynamically as needed allowing the network operator to optimize the bandwidth usage in the 5G NR network to meet the changing demands of users.

1. Select "**NR Setting > BWP**" to enter the BWP configuration page, as shown in Figure 7-21.

Figure 7-21 Configure BWP



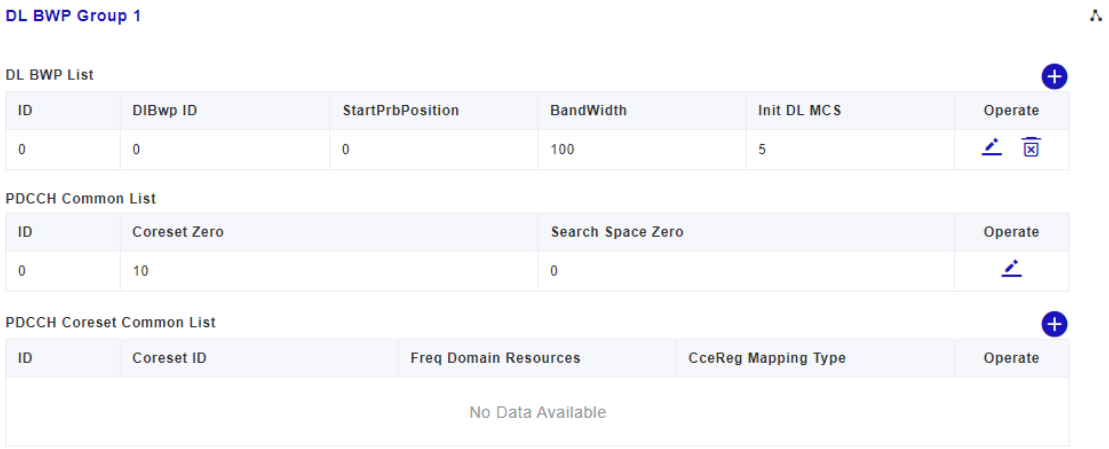
2. Input the BWP configuration parameters, as shown in Table 7-34.

Table 7-34 BWP Parameter Description

Parameter	Descriptions
DlSchedulerStrategy	Enable or disable downlink schedule strategy
UlSchedulerStrategy	Enable or disable uplink schedule strategy
Rach Latency Optimization	Enable or disable RACH latency optimization.
Icmp Optimization Process	Enable or disable ICMP optimization process

Click on the right of the window, the DL/UL BWP list shows, as Figure 7-22.

Figure 7-22 DL/UL BWP List



NOTE: Take DL BWP group as an example.

3. Click "**Save**" to complete the BWP configuration.

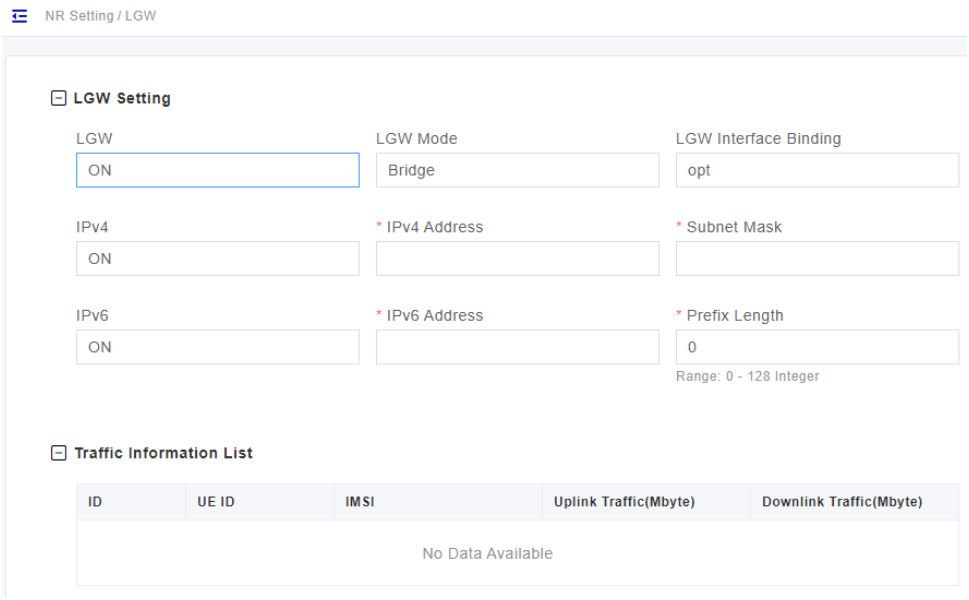
7.13 Configure LGW

LGW needs to be configured when the user plane data of the gNB is directly unloaded through the WAN port without passing through the core network.

The control plane data of the gNB is sent to the core network, and the user plane data is sent to the local server through LGW.

1. Select "**NR Setting > LGW**" to enter the LGW configuration page, as shown in Figure 7-23.

Figure 7-23 Configure LGW



2. Input the LGW configuration parameters, as shown in Table 7-35.

Table 7-35 LGW Parameter Description

Parameter	Descriptions
LGW	Enable or disable the LGW function. The default is enabled.
LGW Mode	LGW mode. This version only NAT mode. In NAT m6de, packages from internal network to external network need NAT translation.
LGW Interface Binding	Select the binding interface from configured network interfaces.
IPv4	Enable or disable IPv4.
IPv4 Address	If “IPv4” is set to “ON”, this parameter displays. 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.
Subnet Mask	If “IPv4” s is set to “ON”, this parameter displays. For example, if the first IP address is 10.10.10.1, and the netmask is 255.255.254.0, the IP address pool includes 255 IP addresses.
IPv6	Enable or disable IPv6.
IPv6 Address	If “IPv6” is set to “ON”, this parameter displays. 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.
Prefix length	If “IPv6” s is set to “ON”, this parameter displays. Prefix length

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

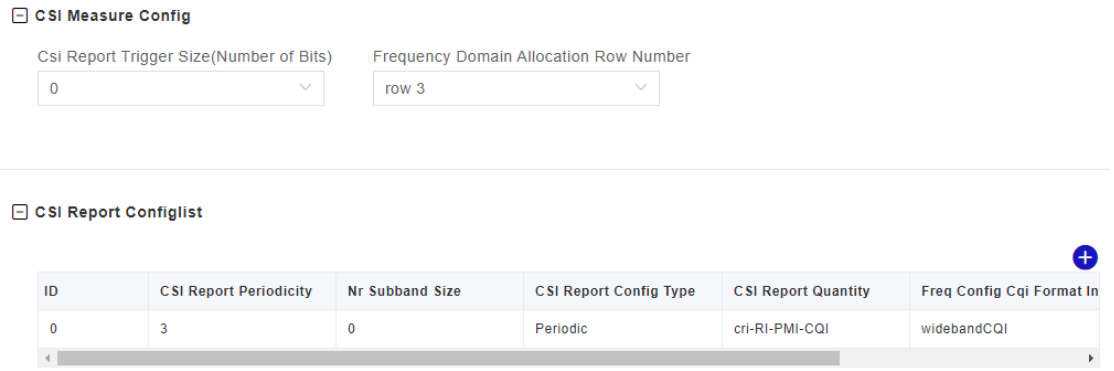
7.14 Configure CSI

Channel State Information (CSI) plays a vital role in optimizing the performance of the

wireless communication system by providing accurate and timely information about the channel conditions between the device and the gNB.

1. In the left navigation column, select "**NR Setting > CSI**" to enter the Channel State Information (CSI) configuration page, as shown in Figure 7-24.

Figure 7-24 CSI Setting



2. Select "Csi Report Trigger Size (Number of Bits)" from the drop-down list. Options are 0. The unit is bit, and "Frequency Domain Allocation Row Number", default is "row3".

3. Click ⊕ to display CSI configuration parameters, the configuration parameter description is shown in Table 7-36.

Table 7-36 CSI Parameter Description

Parameter	Description
CSI Report Periodicity	CSI report period
Nr Subband Size	NR sub-band size.
CSI Report Config Type	The configuration type of the CSI report. This only supports Periodic.
CSI Report Quantity	CSI report quantity.
Freq Config Cqi Format Ind	Channel Quality Indicator (CQI) format. • widebandCQI • subbandCQI
Freq Config Pmi Format Ind	Precoding Matrix Indicator (PMI) format. • widebandPMI • subbandPMI
Codebook N1-N2	• 2TX Codebook Subset Restriction

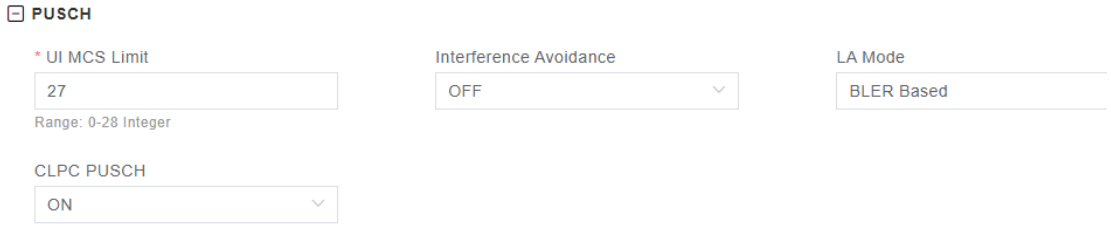
3. Click "**Save**" to complete the CSI setting.

7.15 Configure PUSCH

PUSCH is used for transmitting user data from the device to the gNB. PUSCH uses MCS to transmit the data efficiently.

1. In the left navigation column, select “**NR Setting > PUSCH**” to enter the PUSCH page, as shown in Figure 7-25.

Figure 7-25 PUSCH Setting



2. Input PUSCH configuration parameters, which description is shown in Table 7-37.

Table 7-37 PUSCH Parameter Description

Parameter	Description
UI MCS Limit	Range is from 0 to 28 integer.
Interference Avoidance	Enable or disable the interference avoidance function. • OFF • Static • Dynamic
Start RB	If “Interference Avoidance” is set to “Static”, this parameter displays. Start RB. Range is from 0 to 272.
End RB	If “Interference Avoidance” is set to “Static”, this parameter displays. End RB. The value must be greater than the value of “Start RB”. Range is from 0 to 272.
LA Mode	LA Mode • BLER Based • OLLA Based
CLPC PUSCH	Enable or disable CLPC PUSCH

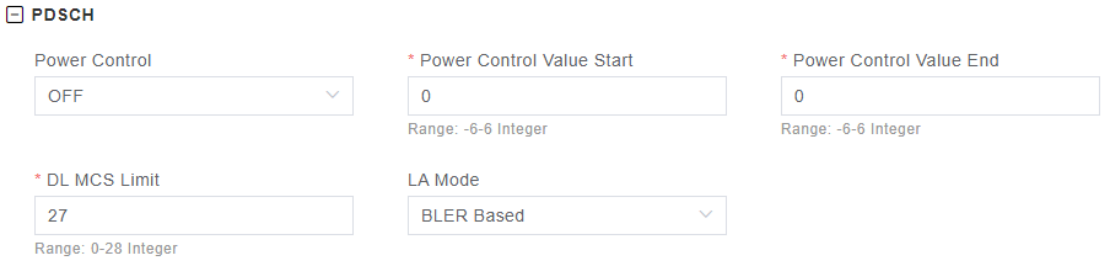
3. Click “**Save**” to complete the PUSCH setting.

7.16 Configure PDSCH

PDSCH carries user data and DCI that provides instruction to the device regarding resource allocation.

1. In the left navigation column, select “**NR Setting > PDSCH**” to enter the PDSCH page, as shown in Figure 7-26.

Figure 7-26 PDSCH Setting



2. Input PDSCH configuration parameters, which description is shown in Table 7-38.

Table 7-38 PDSCH Parameter Description

Parameter	Description
Power Control	Enable or disable the power control function.
Power Control Value Start	The start value of power control. Range is from -6 to 6.
Power Control Value End	The end value of power control. Range is from -6 to 6.
DL MCS Limit	The limit of downlink MCS. Range is from 0 to 28.
LA Mode	LA Mode. This version only supports *BLER Based* mode.

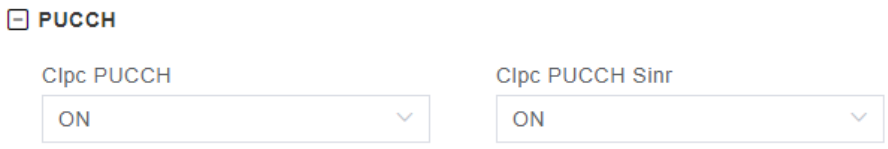
3. Click "**Save**" to complete the PDSCH setting.

7.17 Configure PUCCH

PUCCH is used to carry Uplink Carrier Information (UCI).

1. In the left navigation column, select "**NR Setting > PUCCH**" to enter the PUCCH page, as shown in Figure 7-27.

Figure 7-27 PUCCH Setting



2. Input PUCCH configuration parameters, which description is shown in Table 7-39.

Table 7-39 PUCCH Parameter Description

Parameter	Description
Clpc PUCCH	Enable or disable Closed Loop Power Control (CLPC) PUCCH.
Clpc PUCCH Sinr	Enable or disable Clpc PUCCH Signal to Noise Ratio (SINR).

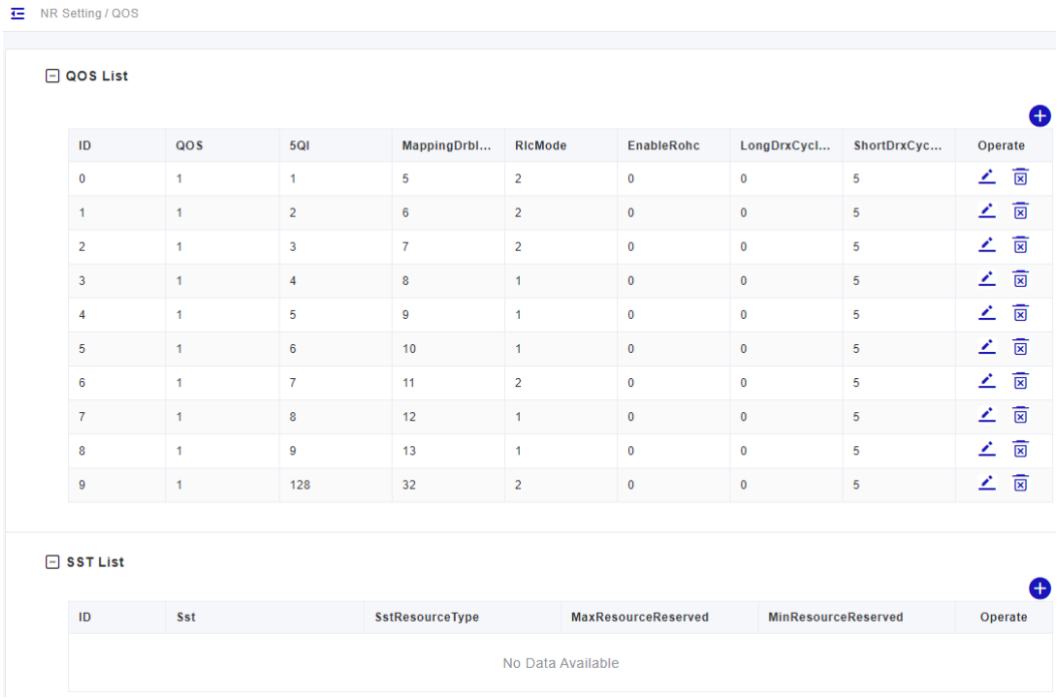
3. Click "**Save**" to complete the PUCCH setting.

7.18 Configure QoS

QoS refers to the set of performance characteristics and parameters that define the level of service delivered to CPEs, UEs, and applications over the 5G network. QoS in 5G NR ensures the network can meet the diverse requirements of different services and applications, catering to various use cases.

In the left navigation column, select "**NR Setting > QOS**" to enter the Quality of Service (QoS) configuration page, as shown in Figure 7-28.

Figure 7-28 QoS Setting



7.18.1 QoS List

5G NR defines various QoS parameters that can be configured to ensure the desired service quality. These parameters include data rate, latency, reliability, availability, priority, and packet error rate.

In QoS List pane, click ⊕ to display the QoS configuration parameters, which description is shown in Table 7-40.

Table 7-40 QoS Parameter Description

Parameter	Description
QOS	Enable or disable the QoS function.
MappingDrbIndex	Data Radio Bearer (DRB) Mapping Index is used to establish mapping between devices and gNB. Range is 5 – 32.
5QI	5G QoS Indicator (5QI) is used to classify and differentiate the QoS levels for different types of traffic or services in 5G. Range is from 1 to 255. Each value represents a

Parameter	Description
	specific QoS profile or set of QoS parameters defined by the operator.
Type	Bearer type • GBR – Guaranteed Bit Rate (GBR) guarantees minimum bit rate for service. • Non-GBR – does not provide a specific guaranteed bit rate but allows for variable bit rates.
Priority	QoS Priority refers to the relative importance or precedence assigned to different data flows or services within a network. Range is from 1 to 16.
MinBr	Minimum bit rate
IsDefault	Enable or disable whether the QoS is default or not.
UeInactivityTimerConifg	The UE inactivity Timer.
TReorderingPdcp	PDCP t-reordering is the receiving timer used to detect loss of PDCP. Range is from 0 to 35.
TReorderingUE	PDCP t-reordering is the receiving timer to detect loss of UE. Range is from 0 to 35.
DiscardTimer	Transmitter discard timer
StatusReportRequired	Enable or disable report status.
PdcpSnSizeUl	Uplink PDCP SN size.
PdcpSnSizeDl	Downlink PDCP SN size.
Dscp	DSCP
RlcMode	RLC mode. UM or AM
SnFieldLengthAmDl	The length of SN for downlink AM mode. Range is from 0 to 255.
SnFieldLengthAmUl	The length of SN for uplink AM mode. Range is from 0 to 255.
SnFieldLengthUmDl	The length of SN for downlink UM mode. Range is from 0 to 255.
SnFieldLengthUmUl	The length of SN for uplink UM mode. Range is from 0 to 255.
UlConfig	Uplink configuration. Options: 0, 1, 2
EnableRohc	Enable or disable ROHC.
RohcProfile0x0001	ROHC profile.
RohcProfile0x0002	ROHC profile.
RohcProfile0x0006	ROHC profile.
PdcpDuplicationActivated	(Reserved)
PrimaryPathDl	Downlink primary path.
PrimaryPath	Whether the path is primary.
UlDataSplitThreshold	Uplink data split threshold.
DlDataSplitThreshold	Downlink data split threshold.
AllowedIntegrityAlgo	Allowed integrity algorithm.
LongDrxCycle	Long DRX cycle.
ShortDrxCycle	Short DRX cycle.
ShortDrxCycleTimer	Short DRX cycle timer.
DrbInactivityTimerConfig	DRB inactivity timer.

7.18.2 SST List

Network slicing is a key feature in 5G that allows creating multiple virtual networks, known as slices, on a shared physical infrastructure. Each network slice is designed to cater to specific service requirements and use cases. The Slice Service Type (SST) is a parameter used to classify and differentiate network slices based on their service characteristics, service type, and requirements.

SST helps differentiate between slices dedicated to different service categories, such as enhanced mobile broadband (eMBB), massive machine-type communications (mMTC), and ultra-reliable low-latency communications (URLLC).

In the SST List pane, click  to display the SST configuration parameters, which description is shown in Table 7-41.

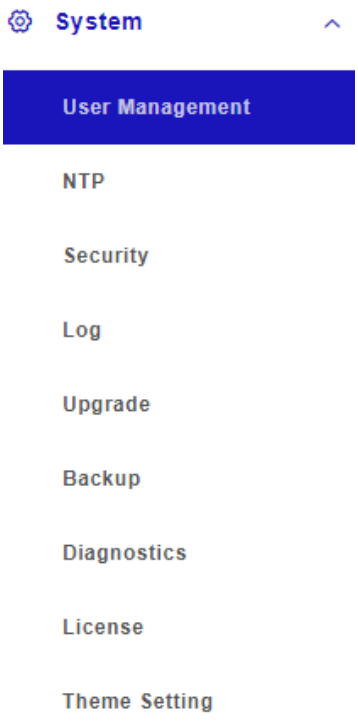
Table 7-41 SST Parameter Description

Parameter	Description
SST	SST type is a classification parameter associated with network slices. Range is from 0 to 3. • Sst value 1 – eMBB • Sst value 2 – URLLC • Sst value 3 – mMTC
SstResourceType	Resource allocation type specifies the way in which the scheduler allocates resource blocks for each transmission. Allocation Type 0 or 1, therefore the range is 0 or 1.
MaxResourceReserved	The maximum reserved resource. Range is 0 to 273.
MinResourceReserved	The minimum reserved resource. Range is 0 to 273.

8. Configure System Parameter

The *System* menu is shown in Figure **8-1**. It is used to configure Network Time Protocol (NTP), set log levels reported, perform software upgrade/rollback, backup files and logs, backup current configurations, update configurations or restore default configurations, and perform diagnostics.

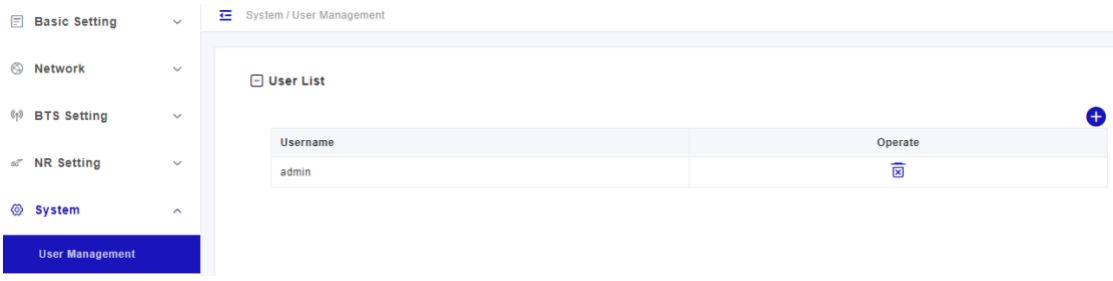
Figure 8-1 System Menu



8.1 User Management

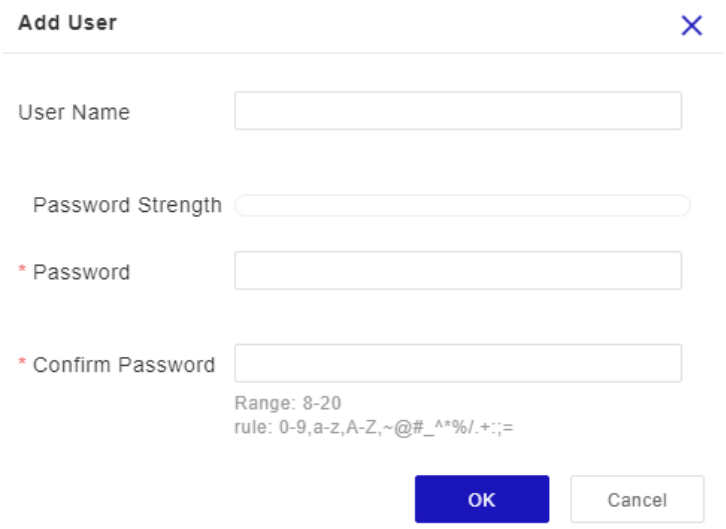
1. In the navigation column on the left, select "**System > User Management**" to enter the user management page, as shown in Figure 8-2.

Figure 8-2 User Management



2. Click ⊕ to pop up adding user dialog box, as shown in Figure 8-3.

Figure 8-3 Add a User



3. Input user name and password.

4. Click "**OK**" to complete the user management configuration.

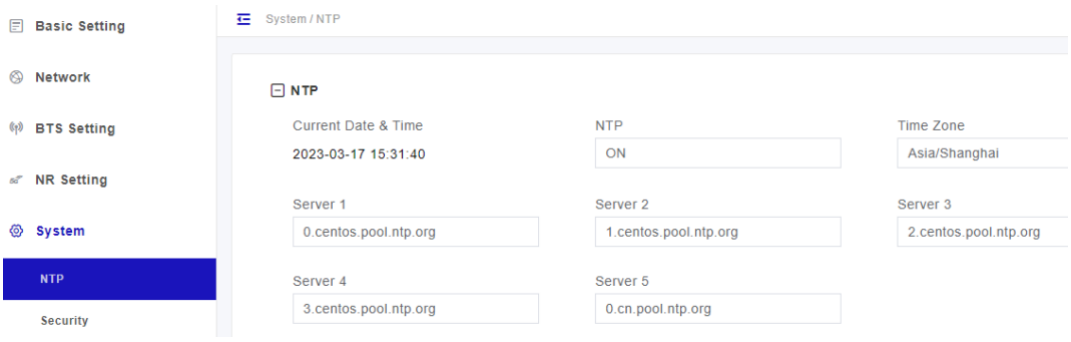
8.2 Configure NTP

This menu is used to provide synchronized time-of-day to the gNB. If the NTP is used by the gNB as an external clock source, up to five NTP servers are supported, where one is for the master NTP service, and the others are for backup.

NOTE: All the servers must be consistent end-to-end.

1. In the navigation column on the left, select "**System > NTP**" to enter the NTP setting page, as shown in Figure 8-4.

Figure 8-4 NTP Server Setting



The page shows the current date and time.

2. Input NTP server parameters, the parameter description is shown in Table 8-1.

Table 8-1 NTP Server Parameter Description

Parameter	Description
NTP	Enable or disable the NTP synchronization.

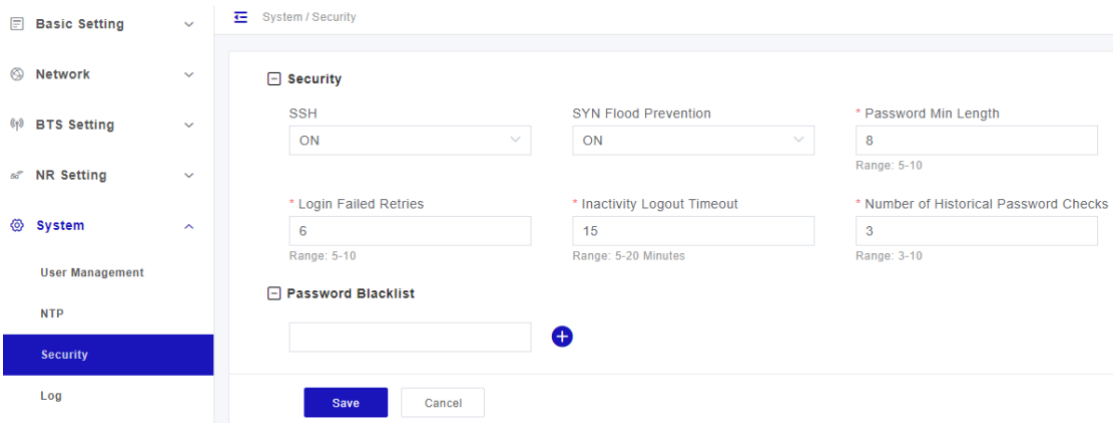
Parameter	Description
Time Zone	Set the Time Zone of the gNB located
Server 1	Domain name or IP address of the master NTP server. Must be consistent with the other end.
Server 2	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
Server 3	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
Server 4	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
Server 5	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.

8.3 Configure Security

1. In the navigation column on the left, select "**System > Security**" to enter the security setting page, as shown in Figure 8-5.

Figure 8-5 Security Setting



2. Input security parameters, the parameter description is shown in Table 8-2.

Table 8-2 Security Parameter Description

Parameter	Description
SSH	Enable or disable the SSH login. After the SSH is enabled, the login address is https://<*OAM IP*> Default is set to ON.
SYN Flood Prevention	Enable or disable flood prevention.
Password Min Length	Minimum password length. Range is from 5 to 10.
Login Failed Retries	Maximum login failed retries. Range is from 5 to 10.
Inactivity Logout Timeout	Inactivity logout timeout. Range is from 5 to 20 minutes.
Number of Historical Password Checks	Number of historical password checks. Range is from 3 to 10.

3. If need to set black password, type in, and then click ⊕ to add.

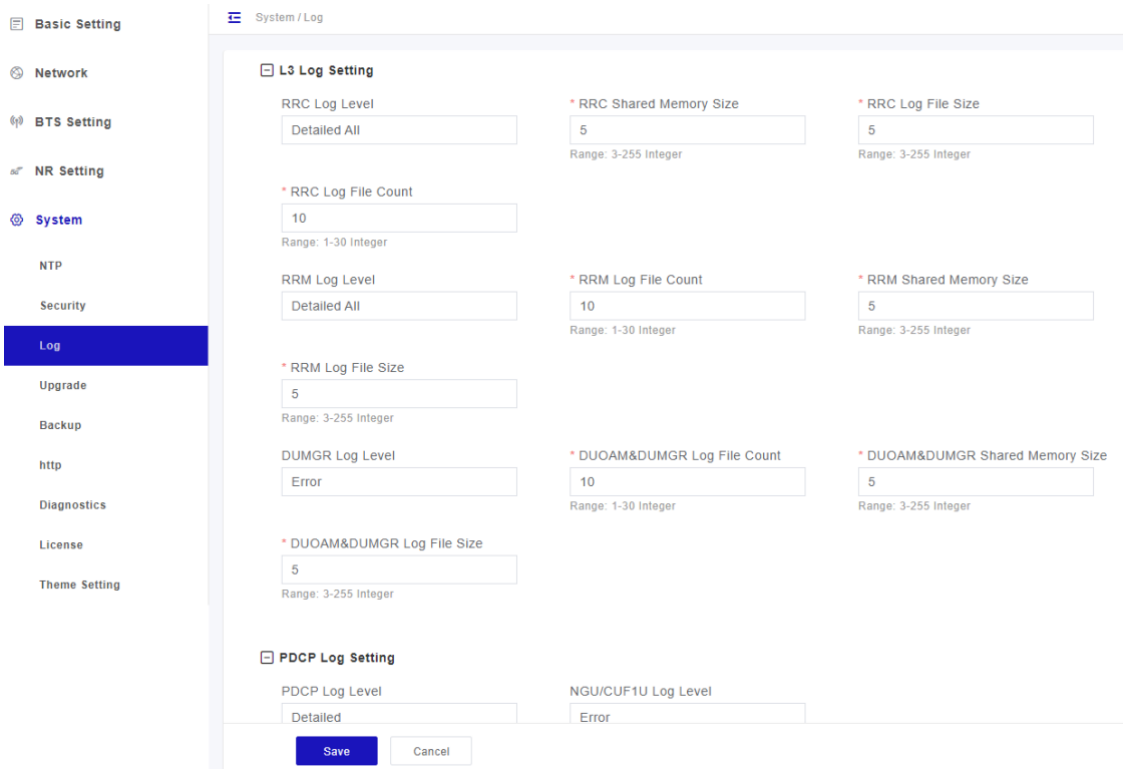
4. Click “**Save**” to complete the security setting.

8.4 Configure Log

This menu is used to configure log settings for Layer 3 (L3) logs, Packet Data Convergence Protocol (PDCP) logs, Media Access Control (MAC) logs, Radio Link Control (RLC) logs, and OAM logs.

In the navigation column on the left, select “**System > Log**” to enter the log level setting page, as shown in Figure 8-6.

Figure 8-6 Log Level Setting



The gNB supports the log level setting for Layer 3 (L3), Packet Data Convergence Protocol (PDCP), Media Access Control (MAC) log, Radio Link Control (RLC) log and OAM.

The following log levels are supported: FATAL, ERROR, INFO, BRIEF, DETAILED, and DETAILED ALL.

- FATAL: This level is used to log critical errors that may lead to the termination of the application or significant malfunctioning. It represents the highest level of severity.
- ERROR: This level is used to log errors that may affect the normal operation of

the system but do not require immediate termination.

- WARNING: This level is used to record errors that may affect the normal operation of the system and require attention.
- INFO: This level is used for logging informational messages that provide status updates and general information about the system's operation.
- BRIEF: This level is a more detailed log level that provides additional information beyond the basic information provided by the INFO level.
- DETAILED: This level provides even more detailed logs than the BRIEF level, including extensive information about the system's operation, protocol messages, and events.
- DETAILED ALL: This is the highest level of log verbosity and includes all available information and logs related to the specified component.

8.5 Upgrade

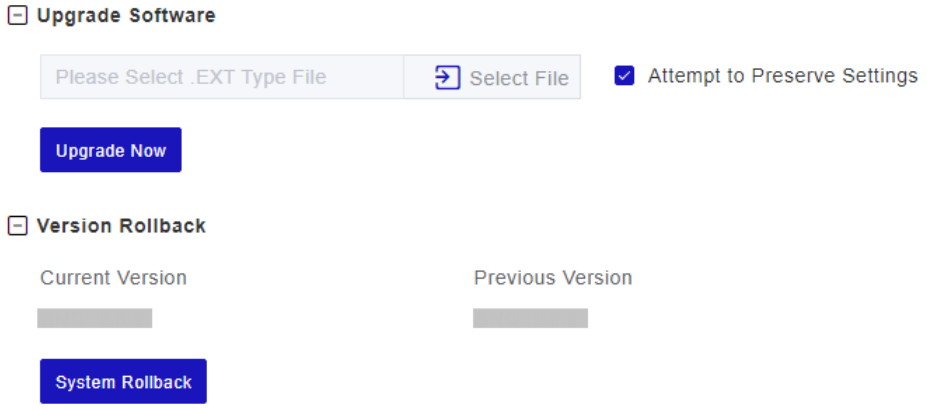
When the preset version does not meet the actual need, the software version needs to be updated the latest version. The gNB supports software version upgrade and rollback.

Caution: The software version upgrade will reboot the gNB, resulting in service interruption. Contact technical support before performing an upgrade.

8.5.1 Software Upgrade

1. In the navigation column on the left, select "**System > Upgrade**" to enter the upgrade management page, as shown in Figure 8-7.

Figure 8-7 Software Upgrade



2. The operator gets the software file of new version and save it in local computer.
3. Select whether to preserve the current settings.
4. Click “**Select File**” to select the software file to upload.

   NOTE: The file type is *.EXT.

5. Check whether the software version is correct again and then click “**Update Now**”.
6. In the pop-up window click “**OK**”.

   CAUTION: The reboot action disrupts gNB service.

   In the “**Basic Setting > Basic Info**” page, the upgraded version will be shown in “**Software Version**".

8.5.2 Rollback

Only one rollback operation is allowed for each upgrade. Under the rollback permission of the BBU, 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 “**System Rollback**”.
2. In the pop-up window click “**OK**”.

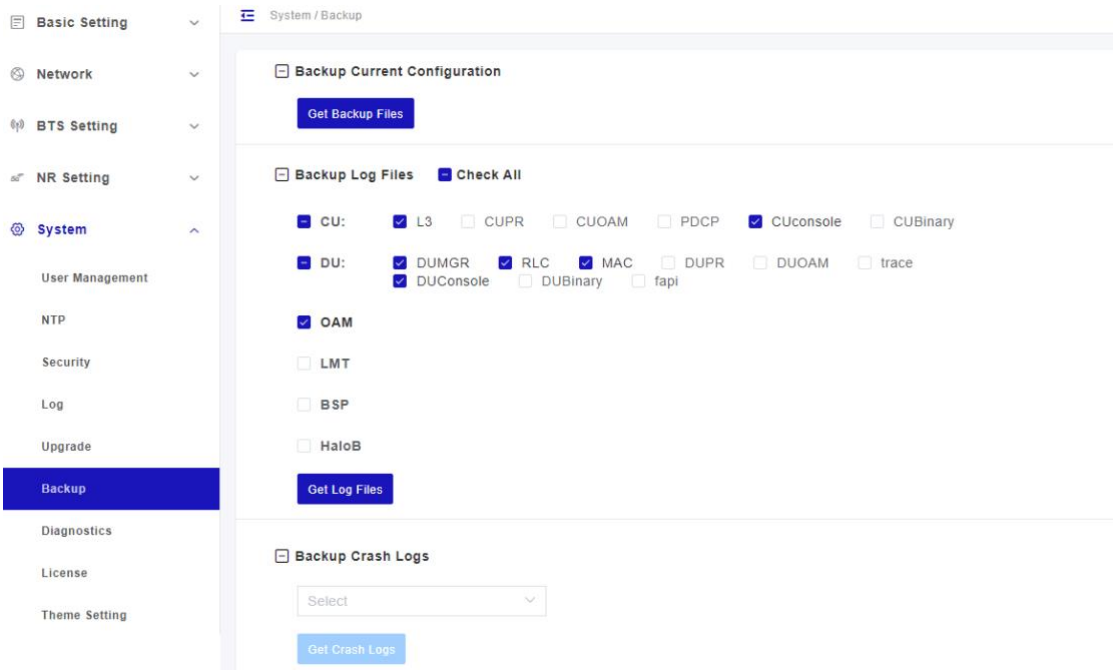
   CAUTION: The reboot action disrupts gNB service.

   Wait for about three minutes, the base station will reboot completely. In the “**Basic Setting > Basic Info**” page, the upgraded version will be shown in “**Software Version**".

8.6 Backup

In the navigation column on the left, select “**System > Backup**” to enter the backup page, as shown in Figure 8-8.

Figure 8-8 System Backup



8.6.1 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.

8.6.2 Backup Log Files

1. Select the type of log files for backup. Multiple types are supported, such as CU, DU, OAM, etc.
2. Click “**Get Log Files**”.
3. In the pop-up download dialog box, select the file path to save the log files to the local computer.

8.6.3 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.

8.6.4 Restore Default Configuration

CAUTION: The Restore Default Configuration action disrupts gNB service.

After the restore operation, the gNB will reboot immediately. Be careful to operate the "**Restore Default Configuration**" restore. It will disrupt the current service.

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

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

8.6.5 Restore Calibration File

1. Click "**Restore Calibration File**".
2. In the pop-up download dialog box click "**OK**", the base station will reboot immediately.

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

8.6.6 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 Configurations Files**" to import the configuration file.
4. Reboot the gNB to make the configuration take effort.

8.7 Diagnostics

Diagnostics menu supports the setting for diagnostics, MTU detection, wireless maintenance mode, and SFP detection.

8.7.1 Diagnostics

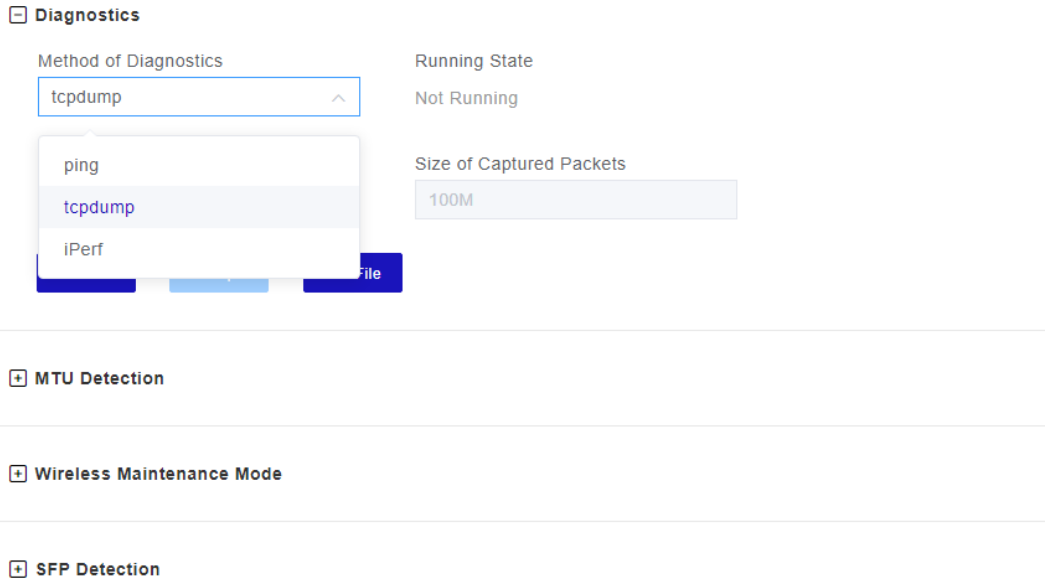
The gNB supports three types of network diagnosis methods.

- **Ping**: Ping command is used to check whether the network connection from the gNB to the destination IP address is normal.

- **Tcpdump**: tcpdump command is used to collect and analyze network data.
- **Iperf**: Iperf command is used to check the network performance.

In the navigation column on the left, select "**System > Diagnostics**" to enter the diagnostics page, as shown in Figure 8-9.

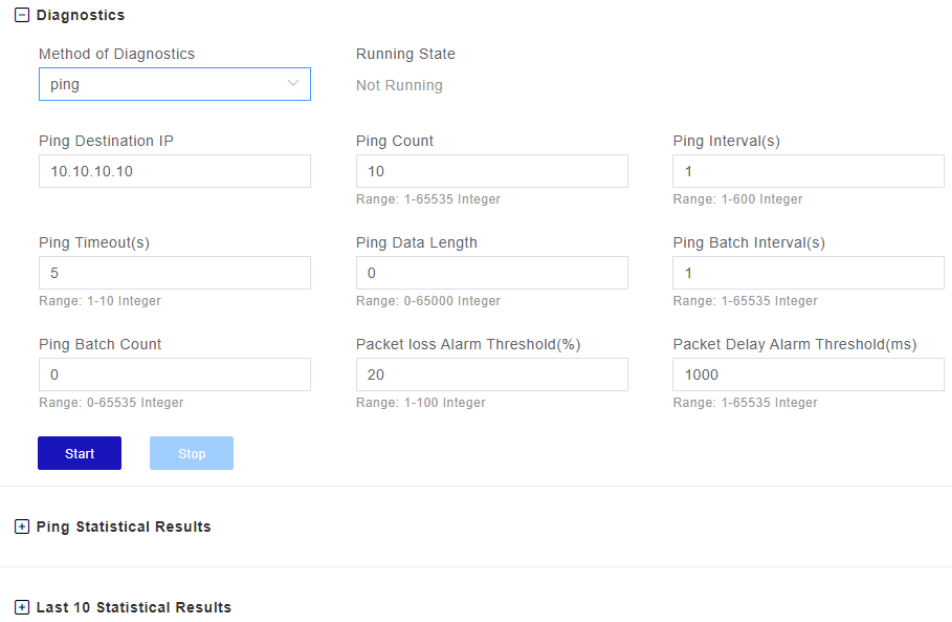
Figure 8-9 Diagnostics



Following will introduce three diagnostics methods separately.

- "**Method of Diagnostics**" select "**Ping**", the parameters show in Figure 8-10.

Figure 8-10 Diagnostics - ping



The parameter description of ping command is shown in Table 8-3.

Table 8-3 Parameter Description of Ping Command

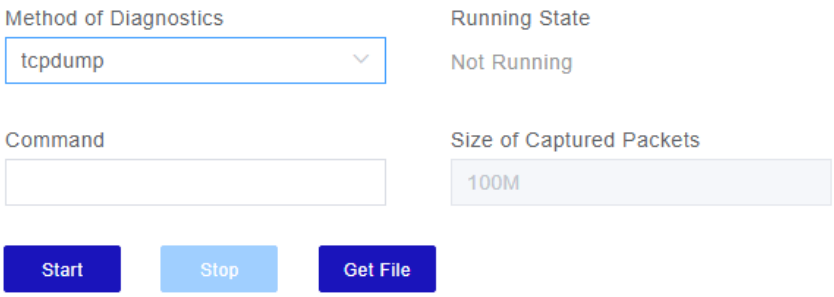
Parameter	Description
Ping Destination IP	The IP address of the destination.
Ping Count	The count of the packet. Range is from 1 to 65535.
Ping Interval(s)	The ping interval. The unit is second. Range is from 1 to 600.
Ping Timeout(s)	Timeout period. The unit is second. Range is from 1 to 10.
Ping Data Length	The size of the packet. Range is from 0 to 65535.
Ping Batch Interval(s)	The interval between batches. The unit is second. Range is from 0 to 65535.
Ping Batch Count	Total ping batch count. Range is from 1 to 65535.
Packet loss Alarm Threshold(%)	Threshold of ping loss alarm. Range is from 1 to 100.
Packet Delay Alarm Threshold(ms)	Threshold of ping delay alarm. Range is from 1 to 65535.

Click "**Start**" to start ping detection to view the ping results.

Click "**Stop**" to stop ping detection.

- "**Method of Diagnostics**" select "**tcpdump**", the parameters show in Figure 8-11.

Figure 8-11 Diagnostics – tcpdump



The parameter description of tcpdump command is shown in Table 8-4.

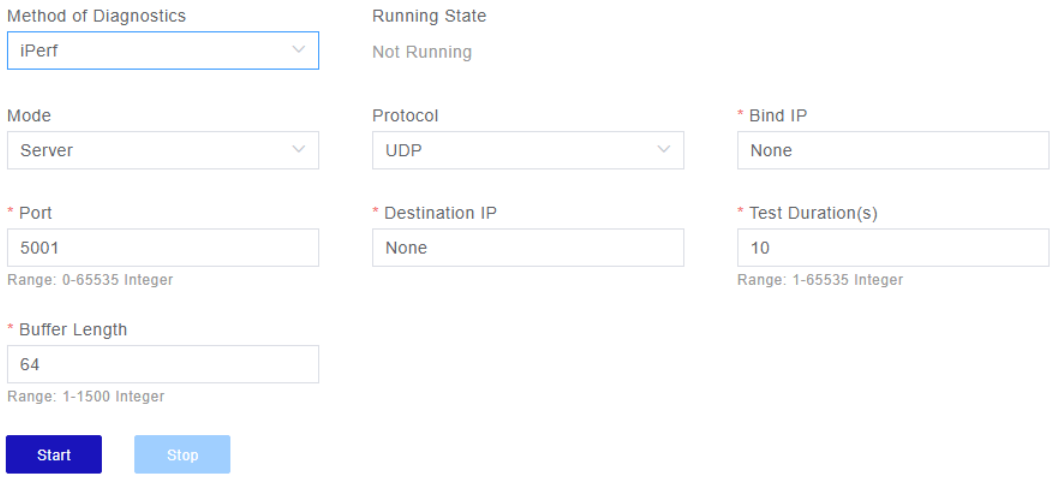
Table 8-4 Parameter Description of tcpdump Command

Parameter	Description
Command	Tcpdump command
Size of captured packets	The size of captured packets. Only 100M is supported.

Once you have started and stopped the Tcpdump diagnostics command, click "**Get File**" to download the file to the local computer.

- "Method of Diagnostics" is set to "Iperf", the parameters show in Figure 8-12.

Figure 8-12 Diagnostics – iperf



The parameter description of iperf command is shown in Table 8-5.

Table 8-5 Iperf Parameter Description of Diagnostics

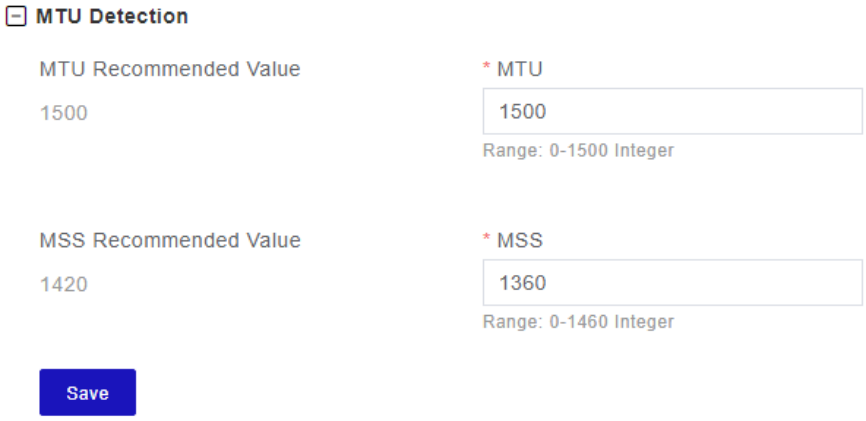
Parameter	Description
Mode	Iperf Mode is set to Client or Server.
Protocol	Protocols are UDP or TCP.
Bind IP	IP Address bound with Iperf diagnostics.
Port	Port used by Iperf diagnostics.
Destination IP	Destination IP address used by Iperf diagnostics.
Test Duration(s)	Test duration. The unit is second. Range is from 1 to 65535.
Buffer Length	When “Mode” is set to “Server”, the parameter displays. Buffer length. Range is from 1 to 1500.
UDP Bandwidth (Mbps)	When “Mode” is set to “Client” and “Port” is set to “UDP”, the parameter displays. UDP bandwith. Range is from 1 to 1000.
Message Length	When “Mode” is set to “Client” and “Port” is set to “UDP” or “TCP”, the parameter displays. Message Length. Range is from 1 to 1500.
TCP Window	When “Port” is set to “TCP”, the parameter displays. TCP Window. Range is from 1 to 1000.

Click “**Start**” to run the iperf command, the following will display the diagnostics result.

8.7.2 MTU Detection

In the MTU detection zone, click **+** to display MTU detection parameters, as shown in Figure 8-13.

Figure 8-13 MTU Detection

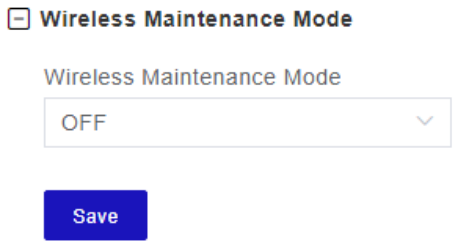


Set MTU and MSS based on the actual network environment. The recommend value of MTU is 1500 bytes. The recommend value of MSS is 1420 bytes.

8.7.3 Wireless Maintenance Mode

In the Wireless Maintenance Mode zone, click **+** to display wireless maintenance mode parameter, as shown in Figure 8-14.

Figure 8-14 Wireless Maintenance Mode

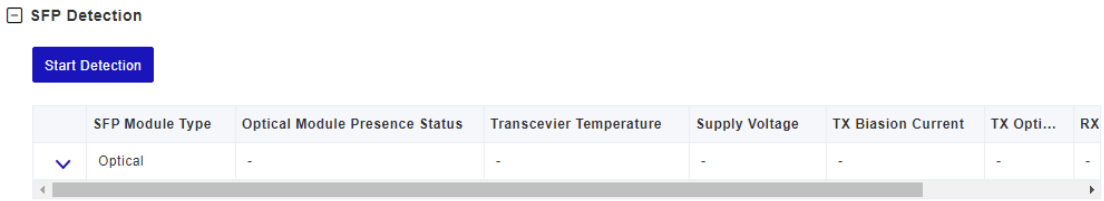


Enable or disable wireless maintenance mode.

8.7.4 SFP Detection

In the SFP detection zone, click **+** to display SFP detection parameters, as shown in Figure 8-15.

Figure 8-15 SFP Detection



Click “**Start Detection**” to view the status of SFP interface, including SFP Module Type, Optical Module Presence Status, Transcevier Temperature, Supply Voltage, TX Biasion Current, TX Optical Output Power, and RX Optical Output Power.

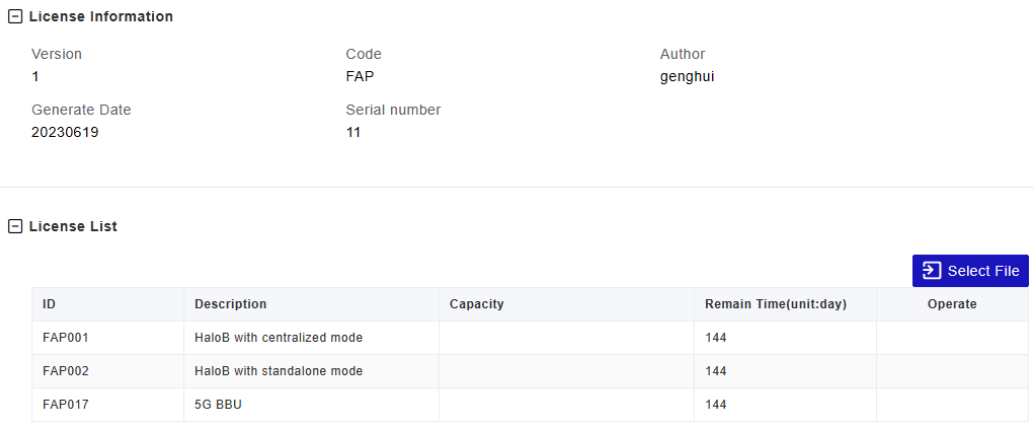
8.8 License

The *License Management* menu may be used to import license files. After the gNB has been deployed, the License must be imported to activate the gNB and access services. Please contact Baicells technical support to acquire the License file.

If some optional features has to be applied, the License also should be applied and imported. When imported, the files are stored in the gNB memory and shown in the License List area of this window.

1. In the left navigation column, select “**System > License**” to enter the License management page, as shown in Figure 8-16.

Figure 8-16 License Management



Remain Time Indicates the remaining days for the License. If 0 is displayed, apply for a License and upload it to update it as soon as possible. Otherwise, the cell cannot be activated or user access is restricted.

2. Click “**Select File**” to upload the license file to the gNB.

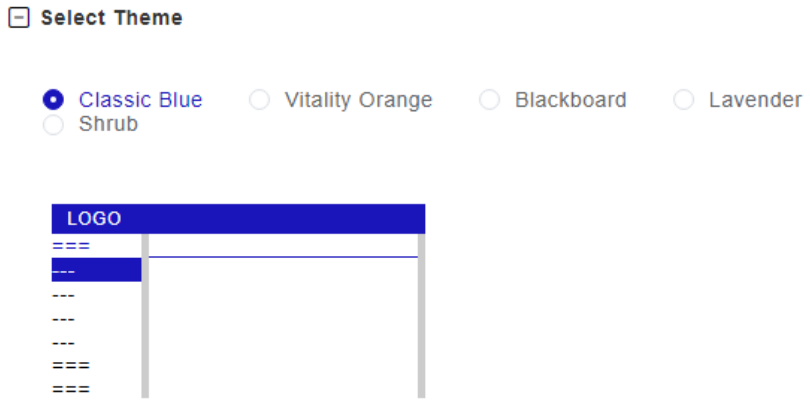
   After the License file is uploaded, it will be shown in the License List.

8.9 Theme Setting

The GUI supports theme customization. You can select any of the following color themes Classic Blue, Vitality Orange, Blackboard, Lavender, and Shrub for the GUI. Click Save to complete the customization.

In the left navigation column, select “**System > Theme Setting**” to enter the theme management page, as shown in Figure 8-17.

Figure 8-17 Theme Setting



Appendix A **Terminology & Acronym**

Acronym	Full Name
AGL	Above Ground Level
ARP	Address Resolution Protocol
CBRS	Citizen Broadband Radio Service
CBRD	CBRS Service Device
CHAP	Challenge Handshake Authentication Protocol
CPI	Certified Professional Installer
CSFB	Circuit Switched Fallback
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DRX	Discontinuous Reception
DSCP	Differentiated Services Code Point
ECI	E-UTRAN Cell Identity
EIRP	Effective Isotropic Radiated Power
ESP	Encapsulating Security Payload
EUTRA	Evolved-UMTS Terrestrial Radio Access
GBR	Guaranteed Bit Rate
GPS	Global Positioning System
IKE	Internet Key Exchange
IPsec	Internet Protocol Security
MME	Mobility Management Entity
NAS	Non-Access Stratum
NTP	Network Time Protocol
PAP	Password Authentication Protocol
PCI	Physical Cell Identifier
PDSCH	Physical Downlink Shared Channel
PLMN	Public Land Mobile Network
PPPOE	Point to Point Protocol over Ethernet
PRACH	Physical Random Access Channel
PRB	Physical Resource Block

Acronym	Full Name
PUCCH	Physical Uplink Control Channel
PUSCH	Physical Uplink Shared Channel
QoS	Qulity of Service
RRC	Radio Resource Control
RSRP	Reference Signal Receiving Power
RSRQ	Reference Signal Receiving Quality
RSSI	Received Signal Strength Indicator
SAS	Spectrum Access System
SFR	Single Frequency Reuse
SIB	System Information Block
SINR	Signal to Interference plus Noise Ratio
SON	Self-Organized Network
SMTC	SSB-based RRM Measurement Timing Configuration
SNR	Signal-to-Noise Ratio
SRS	Sounding Reference Signal
SSB	Synchronization Signal and PBCH block
SSH	Secure Shell
TAC	Tracking Area Code