BSC7048A243

Integrated gNB

Configuration Guide

Document version: 01

About This Document

This document describes the configuration of the integrated gNB for software version BaiBBU_QSS_1.1.x. It is a guide that how to configure the device after its installation completes.

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Revision Record

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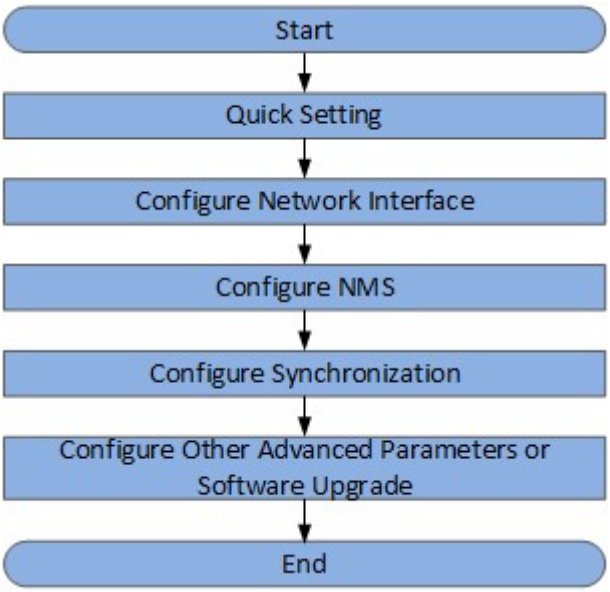
1. Configuration Flow

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

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 1-1.

Figure 1-1 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., as shown in Table 1-1.

Table 1-1 Data Planning

Item	Parameter	Description
IP Address	OAM IP	OAM uses a separate physical network interface
	AMF IP	Planned by the customer.
Cell	PLMN	Planned by the customer.

Item	Parameter	Description
Parameters	TAC	Planned by the customer.
	CellID	Planned by the customer.
	NREF(PointA, SSB)	Planned by the customer.
	Offset To PointA	Planned by the customer.
	Kssb	Planned by the customer.

2. Login Web Client

2.1 Web Client Environmental Requirements

Table 2-1 describes the requirements on computer of the client.

Table 2-1 Environmental Requirements of the Client

Item	Description
CPU	Above Intel Core 1GHz
Memory	Above 2G RAM
Hard disk	No less than 100 MB space available
Operating system	• Microsoft: Windows XP, Windows Vista, Windows7 or Windows10 • Mac: MacOSX10.5 or above
Screen resolution	Above 1024 x 768
Browser	Recommend to use Chrome 6 or higher

2.2 Connect Web Client to Base Station

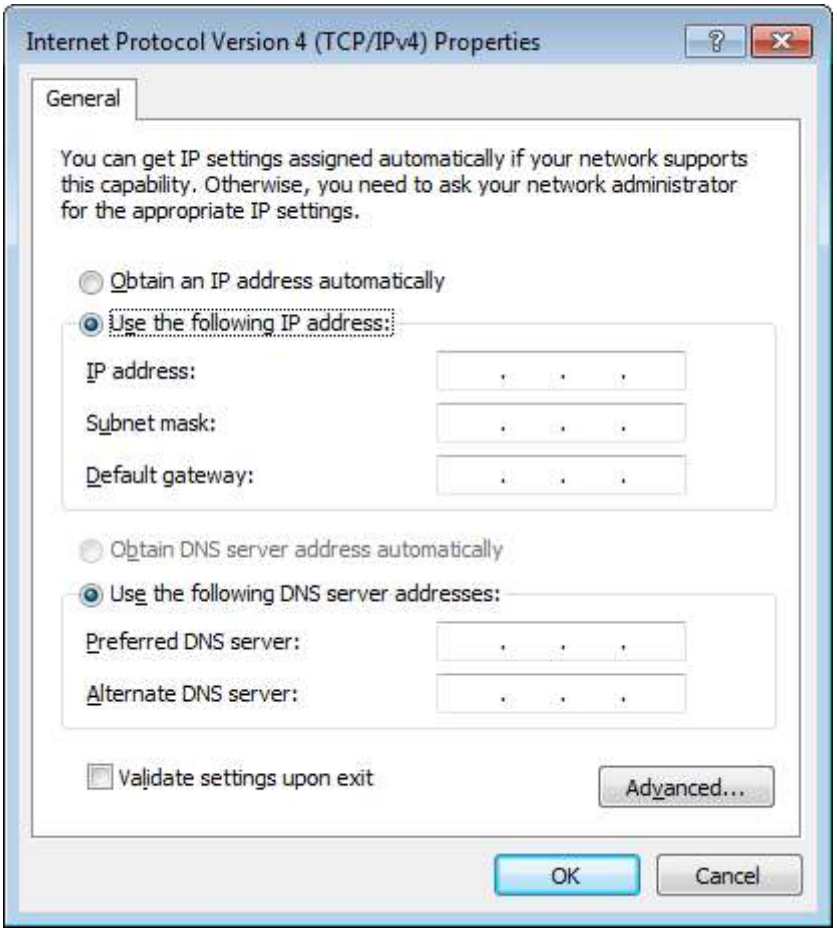
Connect the Ethernet interface of the computer to the network interface of the base station through the Ethernet cable.

2.3 Set Up Client Computer

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



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

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

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

5. Select "**Use the following IP address**".
6. Input IP address of the Operation and Maintenance (OAM) interface, subnet mask, and default gateway, and then click "**OK**".

   - IP address: 192.168.150. XXX: (recommended XXX: 100~254)

     Because the LAN interface of the base station uses the IP address of 192.168.150.1, others should avoid using this address.

   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.150.1

NOTE: The default OAM IP address is 192.168.150.1/24. If the eNB configures IP address in other segments, you should configure according to the actual networking.

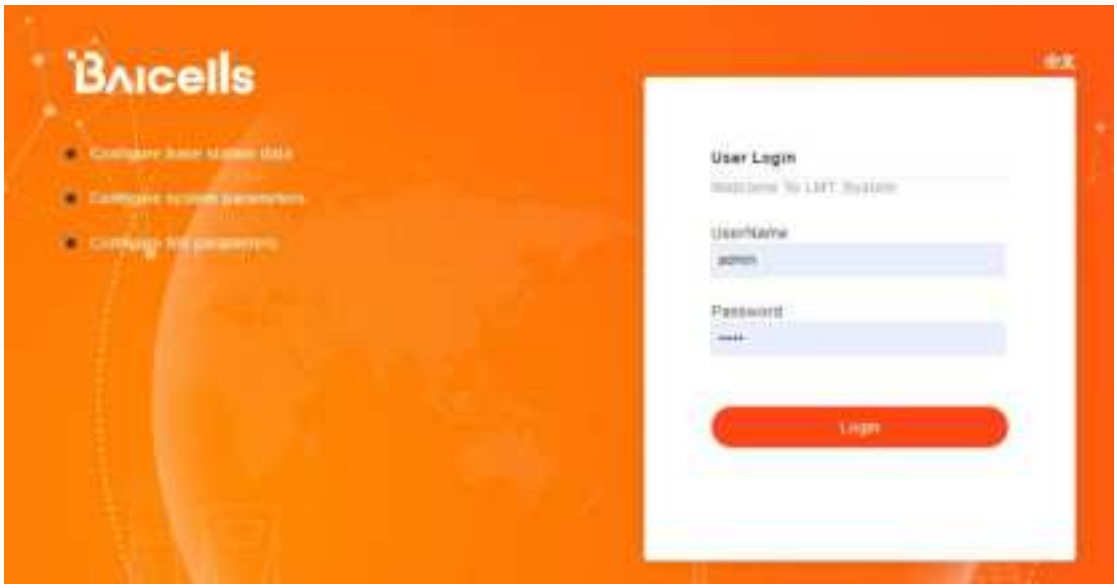
7. In the command window, execute ping 192.168.150.XXX and check whether the connection between the client computer and the server works.

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

2.4 Log In

1. Open a web browser, and enter https://<*OAM IP*>, as shown in Figure 2-2.

Figure 2-2 GUI Login



192.168.150.1 is the initial IP address. If the IP address is changed, log in through new IP address.

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

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

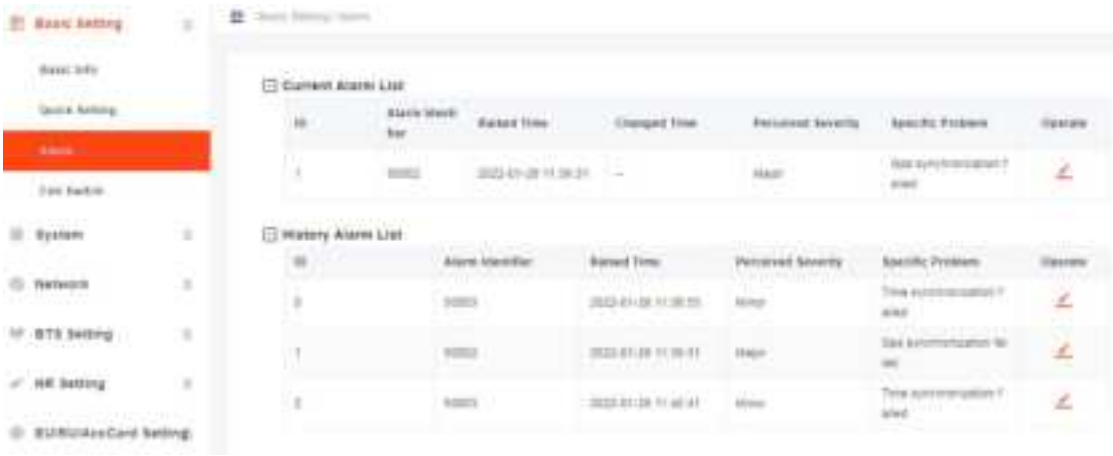
Figure 2-3 GUI Homepage

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

The homepage displays the navigation pane on the left, and shows the window for the first menu: **Basic Setting > Basic Info**. This window is like a dashboard for the device. The left of the window shows basic information such as the hardware version, software version, and serial number, etc. The right of the window shows the status information, such as cell status, F1 status, NG status, overall upgrade status, IPsec status, etc. If the cell status, F1 status, NG status all show Active, it indicates that the cell is normal. IPsec status is the IPsec status indicator, which is configured according the actual networking. Overall upgrade status is the upgrade status indicator.

"**Basic Setting > Alarm**" the menu displays the current alarms, as shown in Table 2-2.

Table 2-2 Alarm



3. Basic Setting

3.1 Quck Setting

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

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

Figure 3-1 Quick Setting

2. Input quick setting parameters, the parameter descriptions are given in Table 3-1.

Table 3-1 Quick Setting Parameter Description

Parameter	Description
Band	Operation frequency band, the current includes N41, N48, N78
UL NRARFCN	Uplink NR-ARFCN
DL NRARFCN	Downlink NR-ARFCN
PCI	Physical Cell ID (PCI) allocated by the operator. PCI is an essential Layer 1 cell identity for each cell site in the network. Planning PCIs is crucial for Qos. Range from 0 to 1007.
TX Antenna Count	Number of transmitting antennas. The eNB supports up to 2 TX antenna.
RX Antenna Count	Number of receiving antennas. The eNB supports up to 2 RX antenna.
DL SubCarrierSpacing	Downlink subcarrier spacing. The eNB supports

Parameter	Description
	30kHz in this version.
DL CarrierBandWidth(RB)	Downlink carrier bandwidth.
UL SubCarrierSpacing	Uplink subcarrier spacing. The eNB supports 30kHz in this version.
UL CarrierBandWidth(RB)	Uplink carrier bandwidth.
Power Modify	Transmit power. Range from 0 to 43dBm.

3. Click “**Save**” to complete the quick settings for the gNB.

4. Configure System Parameter

4.1 Configure NTP

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

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

Figure 4-1 NTP Server Setting

The page displays the current date and time.

2. Select the Time Zone of the eNB locating.
3. Select whether enable the NTP function.
4. Input NTP server parameters, the parameter description is shown in Table 4-1.

Table 4-1 NTP Server Parameter Description

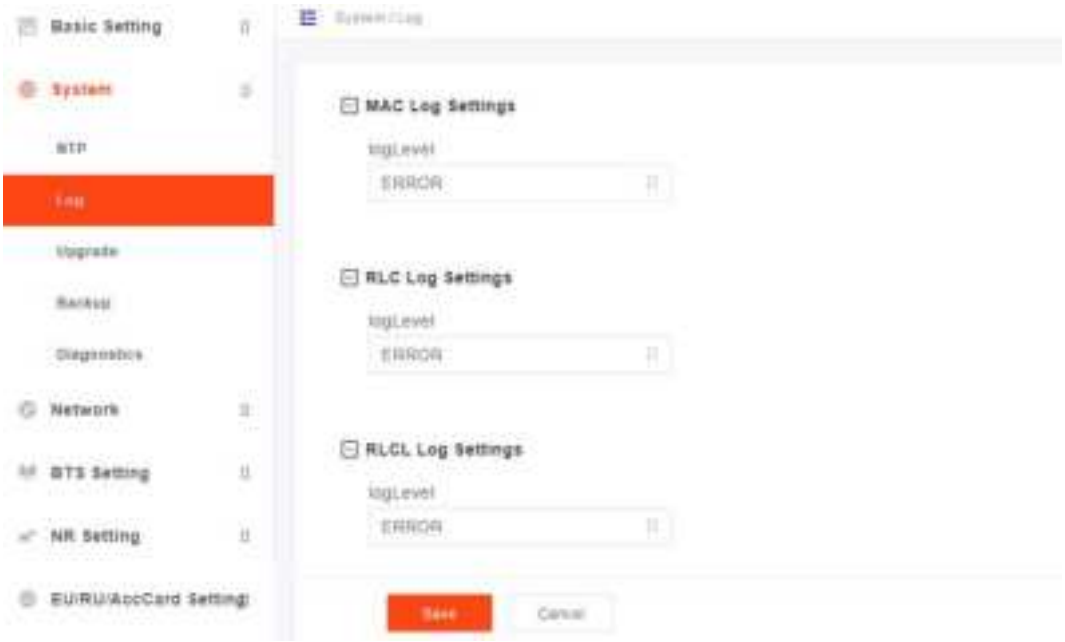
Parameter	Description
NTPServer1	Domain name or IP address of the master NTP server. Must be consistent with the other end.
NTPServer2	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
NTPServer3	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
NTPServer4	Domain name or IP address of the slave NTP server. Must be consistent with the other end.
NTPServer5	Domain name or IP address of the slave NTP server. Must be consistent with the other end.

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

4.2 Configure Log

In the navigation column on the left, select “**System > Log**” to enter the log level setting page, as shown in Figure 4-2.

Figure 4-2 Log Level Setting



The gNB supports the log level setting for Media Access Control (MAC) log, Radio Link Control (RLC) log and RLCL.

Following levels are supported:

- FATAL
- ERROR
- INFO
- BRIEF
- DETAILED
- DETAILED ALL

4.3 Upgrade

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

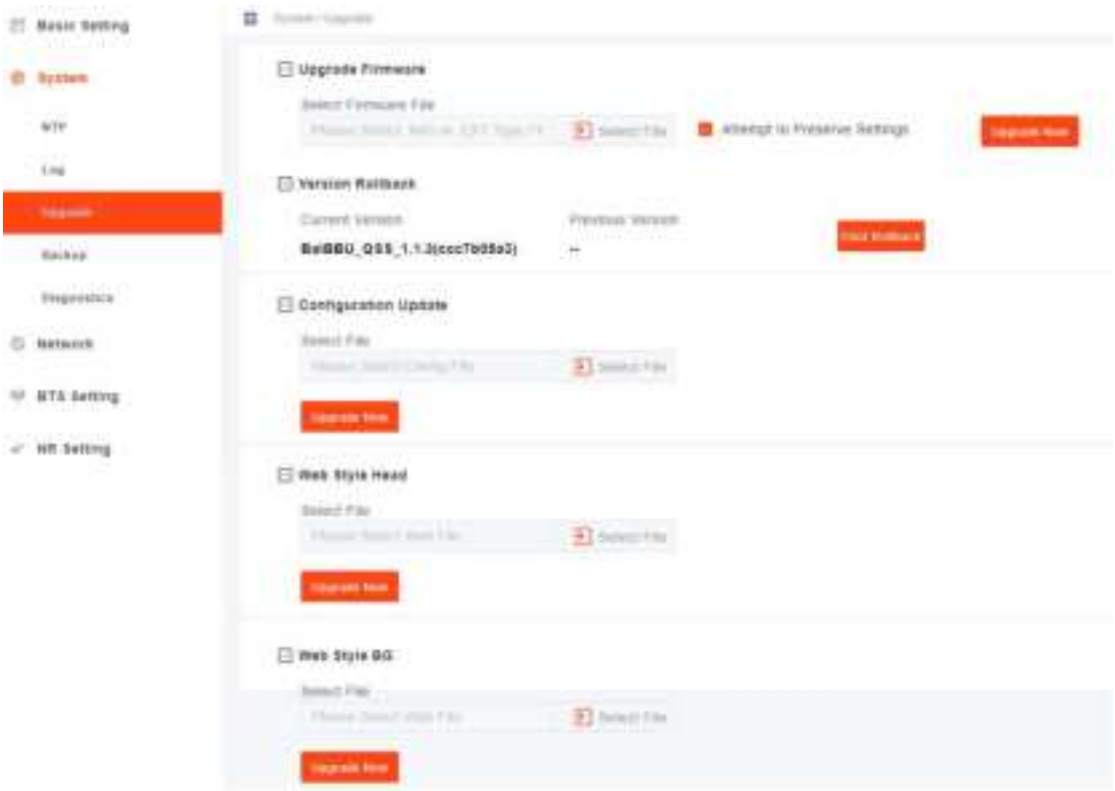
Caution:

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

4.3.1 Firmware Upgrade

1. In the navigation column on the left, select "**System > Upgrade**" to enter the upgrade management page, as shown in Figure 4-3.

Figure 4-3 Upgrade



2. The operator gets the firmware 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 firmware 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 “**PROCEED**”.

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

4.3.2 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 “**Click Rollback**”.
2. In the pop-up window click “**OK**”.

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

   In the “**Basic Setting > Basic Info**” page, the version after rollback will be displayed in “**Software Version**”.

4.3.3 Configuration Upgrade

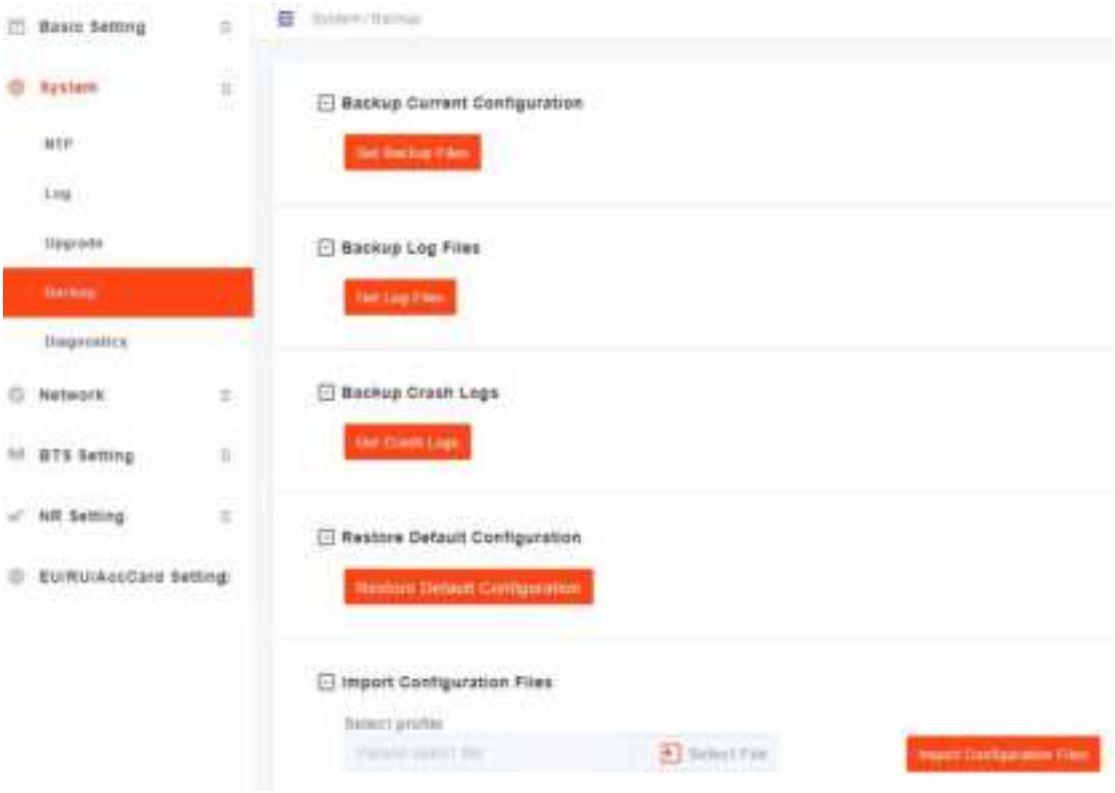
1. Click “**Select File**” to select the configuration file to upload.
2. Click “**Update Now**”.

Other file upgrades also follow these steps.

4.4 Backup

In the navigation column on the left, select “**System > Backup**” to enter the backup page, as shown in Figure 4-4.

Figure 4-4 System Backup



4.4.1 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.

4.4.2 Backup Log Files

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

4.4.3 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.

4.4.4 Restore Default Configuration

Attention:

After the restore operation, the eNB 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 base station will reboot completely.

4.4.5 Import Configuration File

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

4.5 Diagnostics

The gNB supports the tcpdump command to collect and analyze network data.

1. In the navigation column on the left, select "**System > Diagnostics**" to enter the diagnostics page, as shown in Figure 4-5.

Figure 4-5 Diagnostics

2. Input network diagnostics parameters, the parameter description is shown in

Table 4-2

Table 4-2 Parameter Description of tcpdump Command

Parameter	Description
Method of Diagnostics	The current version supports tcpdump command.
Command	Tcpdump command
Count of captured packets	The number of captured packets.

3. Click “**Start**” to run the tcpdump command.

   Click “**Stop**” to stop running.

   Click “**Get File**” to download the file to the local computer.

4.6 Reboot

 **Caution：**

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

1. On the left navigation, select “**Reboot**” to enter the reboot window.
2. Click “**Reboot**”, the gNB will reboot immediately.

5. Configure Network Interface

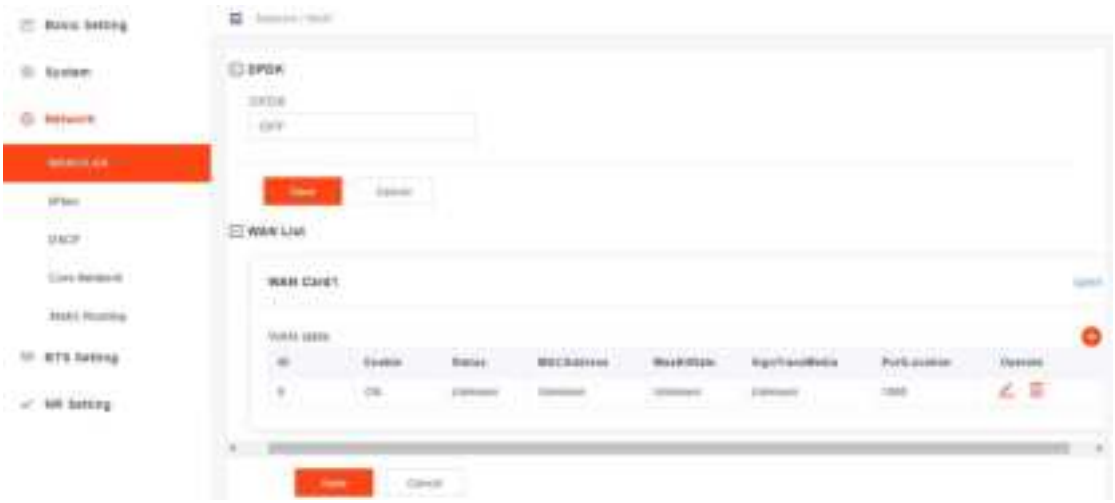
The configuration of the network interface includes the WAN interface, VLAN, IPsec, Differentiated Services Code Point (DSCP) and static route, etc.

5.1 Configure WAN/LAN Interface

The WAN interface is an external communication portal (Internet connection) the gNB's NMS and the core network. The gNB's NMS may be the Baicells Operation and Maintenance Center (OMC) or other NMS. The only option for the Interface name field is WAN. The WAN interface supports to configure multiple VLANs.

1. In the navigation column on the left, select "**Network > WAN/VLAN**" to enter the WAN interface and VLAN configuration page, as shown in Figure 5-1.

Figure 5-1 Configure WAN/VLAN



NOTE: In this software version, DPDK does not be supported.

2. Click  to add WAN card, as shown in Figure 5-2.

Figure 5-2 Add WAN Card

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

Table 5-1 WAN Card Parameter Description

Parameter	Description
Index	Index. Generated automatically.
Enable	Enable or disable the port.
Name	Name
UserLabel	User label
Max Bit Rate	Select maximum bit rate of the port from the drop-down list. The unit is Mbit/s. • 10 • 100 • 1000 • Auto
Max Bit Rate	Select the working mode of the port from the drop-down list. • Full • Half • Auto

4. Click “open” to display the attribute parameters of the WAN interface, as shown in Figure 5-3.

Figure 5-3 Configure WAN Interface Attribute

5. Configure IPv4, IPv6, or VLAN parameters based on the actual network deployment.

- IPv4

  Click on "WAN IPv4 table" zone to display the IPv4 configuration parameters, as shown in Figure 5-4

Figure 5-4 IPv4 Configuration Parameters

The description of IPv4 configuration parameters is shown in Table 5-2.

Table 5-2 IPv4 Parameter Description

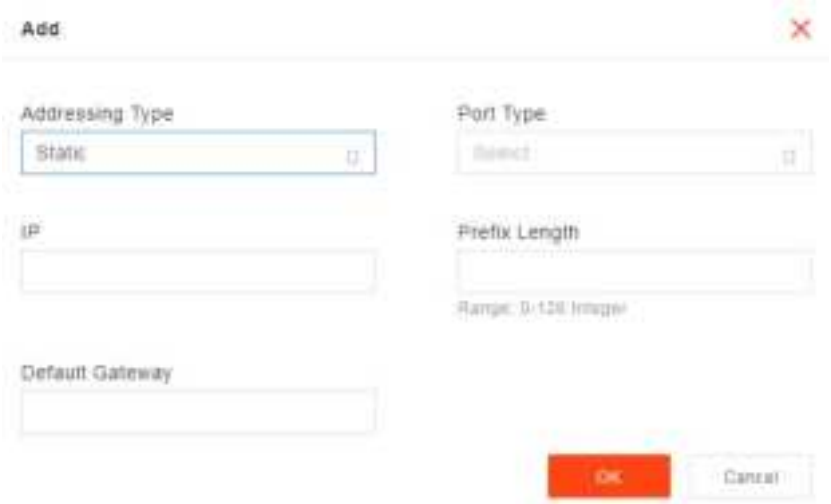
Parameter	Description
Addressing Type	The interface protocol used by WAN interface, include: • DHCP: If DHCP is selected, no other parameter needs to be configured. • Static: If Static is selected, the IP address, gateway and subnet mask should be configured.
Port Type	WAN port type. According to the network plan, specify the

Parameter	Description
	usage of the port. • Ng • Xn • Ng/Xn • S1 • X2 • S1/X2 • F1 • E1 • OAM • Other
IP	When “Addressing Type” is set to “static”, the parameter displays. IP address of the WAN interface.
Default Gateway	When “Addressing Type” is set to “static”, the parameter displays. IP address of the default gateway.
Subnet Mask	When “Addressing Type” is set to “static”, the parameter displays. Subnet mask address of the IP address.

- IPv6

Click  on “WAN IPv6 table” zone to display the IPv6 configuration parameters, as shown in Figure 5-5.

Figure 5-5 IPv6 Configuration Parameters



The description of IPv6 configuration parameters is shown in Table 5-3.

Table 5-3 IPv6 Parameter Description

Parameter	Description
Addressing Type	The interface protocol used by WAN interface, include: • DHCPv6: If DHCP is selected, no other parameter needs to be configured. • Static: If Static is selected, the IP address, prefix length, and gateway should be configured.
Port Type	WAN port type. According to the network plan, specify the usage of the port. • Ng • Xn • Ng/Xn • S1 • X2 • S1/X2 • F1 • E1 • OAM • Other
IP	When “Addressing Type” is set to “static”, the parameter displays. IP address of the WAN interface.
Prefix Length	When “Addressing Type” is set to “static”, the parameter displays. The prefix length of the WAN interface.
Default Gateway	When “Addressing Type” is set to “static”, the parameter displays. IP address of the default gateway.

- VLAN

  Click  on “WAN VLAN table” zone to display the VLAN configuration parameters, as shown in Figure 5-6.

Figure 5-6 VLAN Configuration Parameters

The description of VLAN configuration parameters is shown in Table 5-4.

Table 5-4 VLAN Parameter Description

Parameter	Description
Name	VLAN name.
ID	VLAN ID
Enable	Enable or disable the VLAN. • 0: Disable • 1: Enable

6. Click "**Save**" to complete the WAN and VLAN configuration.

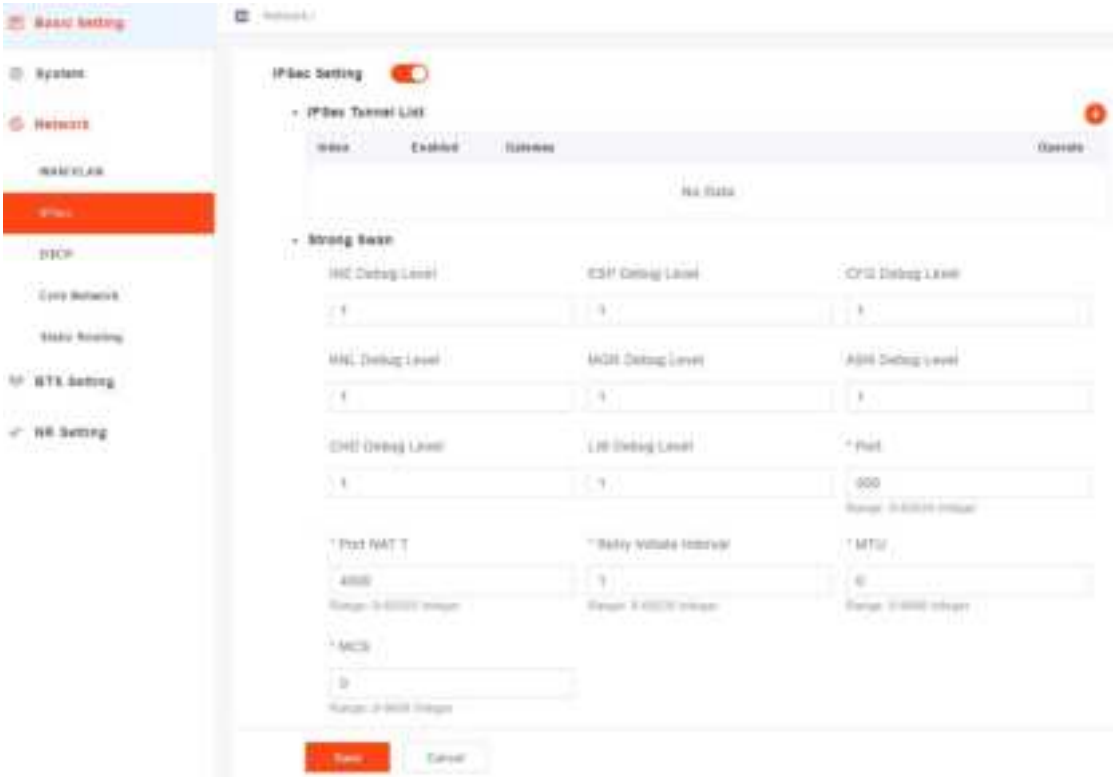
5.2 Configure IPsec

The security gateway (SeGW) in the network can provide security protocol in the network layer to ensure the safety for message transmission. If the operator has deployed the security gateway, the gNB needs to enable the IPsec function accordingly to establish a safe VPN channel between the gNB and the SeGW.

The gNB disables the IPsec by default.

1. Select "**Network > IPsec**" to enter the IPsec configuration page, as shown in Figure 5-7.

Figure 5-7 Configure IPsec



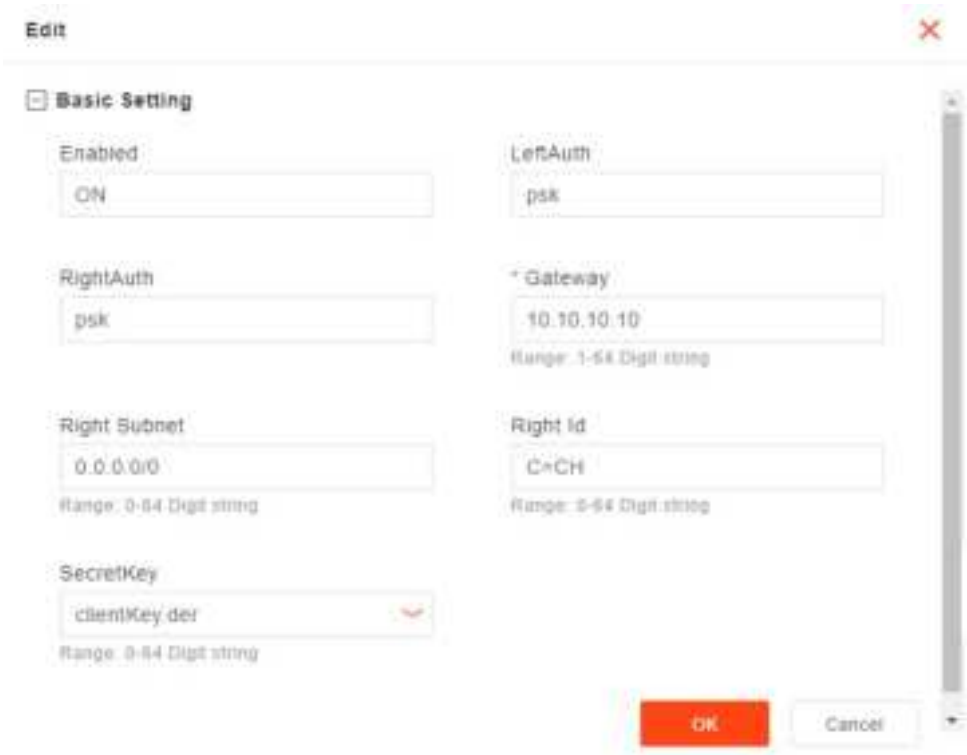
2. Select enable or disable the IPsec function.

   The IPsec function is enabled by default.

3. If the IPsec function is enabled, click ⊕ to add a IPsec tunnel.

4. In "**IPsec Tunnel List**" area, click ✎ to enter the edit dialog box, as shown in Figure 5-8.

Figure 5-8 Edit IPsec Tunnel



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.
LeftAuth	**Attention**: DO NOT recommend to change the value! Local authentication type of the IPsec. Must be consistent with the security gateway side. • PSK • PUBKEY
RightAuth	**Attention**: DO NOT recommend to change the value! Peer authentication type of the IPsec. Must be consistent with the security gateway side. • PSK • PUBKEY
Gateway	The security gateway (IPsec server) IP address. Make sure the IP address entered here matches the actual IP address

Parameter	Description
	on the security gateway side.
Right Subnet	IP address of the remote subnet, which must be consistent with the security gateway side. Message within this address range will be packed as a tunnel.
Right Id	Identification of the server end (0-48 digits string). It must be consistent with the security gateway side. If there is no security gateway right identifier, leave this field empty.
SecretKey	File name of private key. When the auth is set to *psk*, the value is the password of authentication.

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

Table 5-6 Advanced Parameter Description of IPsec Tunnel Mode

Parameter	Description
Left Id	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.
LeftCert	If set "**left Auth**" to "**pubkey**", the parameter needs to be set. Certificate name. On this 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 type of fragmentation. • YES • 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. • AES128 • AES256 • 3DES • DES

Parameter	Description
IKE DH Group	IKE Diffie-Hellman (DF) key computation, or exponential key agreement, to be used between two entities. • MODP768 • MODP1024 • MODP1536 • MODP2048 • MODP4096
IKE Authentication	Authentication algorithm • SHA1 • SHA1_160 • SHA256_96 • SHA256
ESP Encryption	Encapsulating Security Payload (ESP) – member of the IPsec protocol suite that provides origin authenticity, integrity, and confidentiality protection of packets. • AES128 • AES256 • 3DES • DES
ESP DH Group	ESP Diffie-Hellman (DF) key computation, or exponential key agreement, to be used between two entities. • MODP768 • MODP1024 • MODP1536 • MODP2048 • MODP4096
ESP Authentication	ESP Authentication algorithm • SHA1 • SHA1_160 • SHA256_96 • SHA256
Key Life	IPsec security association (SA) renegotiation time. Format: Seconds, Minutes, Hours or Days.
IKELifetime	IKE security association renegotiation time. Format: Seconds, Minutes, Hours or Days.
RekeyMargin	Renegotiation time before the expiry of IKE life time (negotiate the IKE security association time before the expiry of IKE life time). Format: Seconds, Minutes, Hours or Days.
Dpdaction	DPD stands for dead peer detection (DPD) protocol. Determines what action to take when a gateway exception occurs. • None

Parameter	Description
	• Clear • Hold • Restart
Dpddelay	Time interval for sending the DPD detection message. Format: Seconds, Minutes, Hours or Days.
Left Interface	The interface on the eNB side.

5. Input strong wan configuration parameters, as shown in Table 5-7.

Table 5-7 Strong Wan Parameter Description

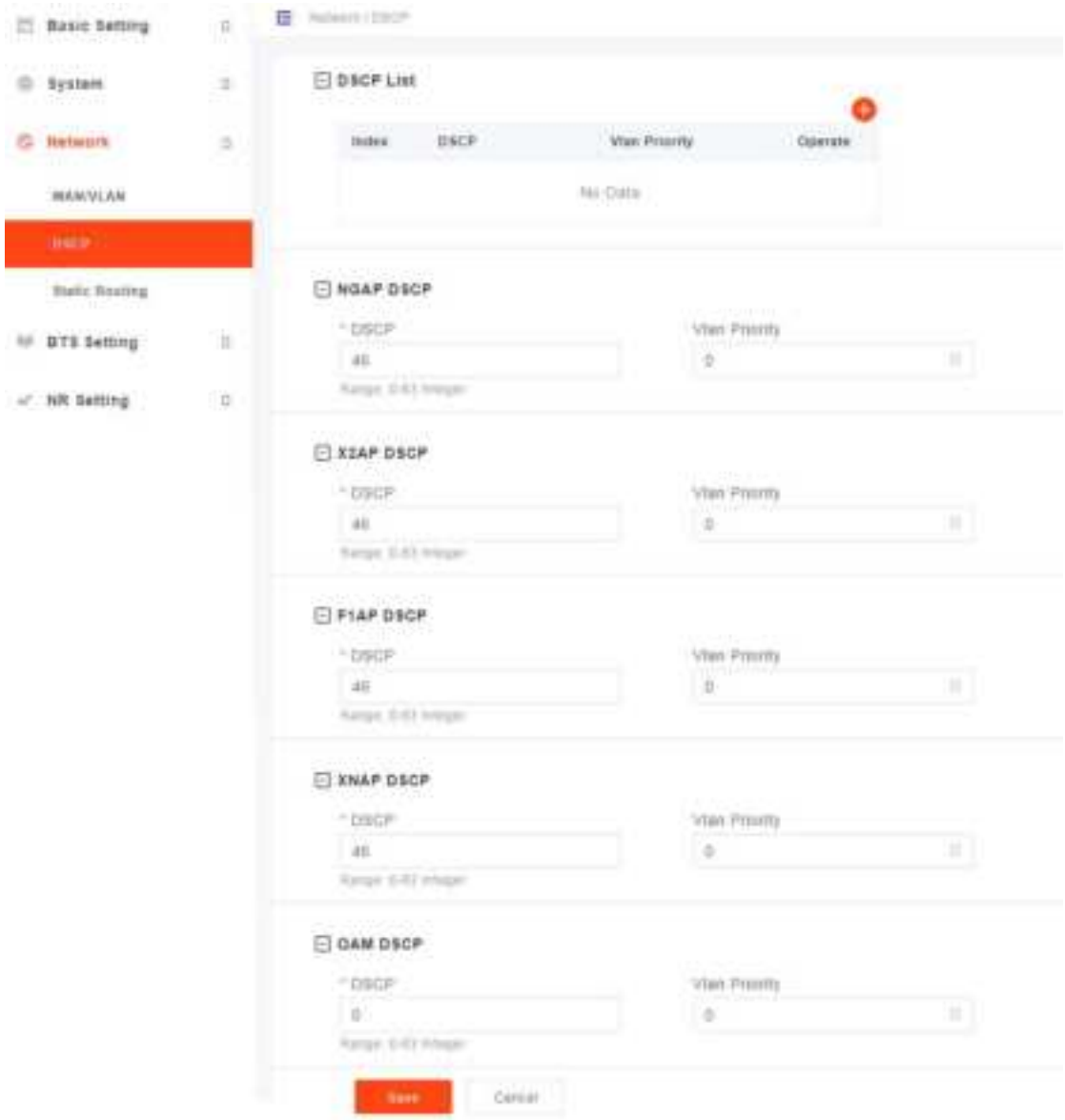
Parameter	Description
IKE Debug Level	IKE debug level. Range: -1,0,1,2,3,4。
ESP Debug Level	ESP debug level. Range: -1,0,1,2,3,4。
CFG Debug Level	CFG debug level. Range: -1,0,1,2,3,4。
KNL Debug Level	KNL debug level. Range: -1,0,1,2,3,4。
MGR Debug Level	MGR debug level. Range: -1,0,1,2,3,4。
ASN Debug Level	ASN debug level. Range: -1,0,1,2,3,4。
CHD Debug Level	CHD debug level. Range: -1,0,1,2,3,4。
LIB Debug Level	LIB debug level. Range: -1,0,1,2,3,4。
Port	Port number.
Port NAT T	NAT T port number.
Retry Initiate Interval	Retry initiate interval.
MTU	Maximum transmission unit. The maximum value is 9600 bytes.
MCS	MCS. Range: 0 ~ 9600 bytes

6. Click “**Save**” to complete the IPsec configuration.

5.3 Configure DSCP

1. In the navigation column on the left, select “**Network > DSCP**” to enter the DSCP configuration page, as shown in Figure 5-9.

Figure 5-9 Configure DSCP



2. Click  to display DSCP adding window as shown in Figure 5-10.

Figure 5-10 Add a DSCP

3. Input DSCP parameters, as shown in Table 5-8.

Table 5-8 DSCP Parameter Description

Parameter	Description
DSCP	DSCP code, which is used to differentiate the priority level. Range from 0 to 63 integer.
Vlan Priority	Vlan priority. Range from 0 to 7 integer.

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

On the lower of the page, you can specify DSCP value and VLAN priority for NGAP, X2AP, F1AP, XNAP and OAM.

5.4 Configure Core Network

This version does not support the this menu.

5.5 Configure Static Route

This function is for users configure the static route.

1. In the navigation column on the left, select “**Network > Static Routing**” to enter the static route configuration page, as shown in Figure 5-11.

Figure 5-11 Configure Static Route

This page displays the static route list.

2. Click  to display static configuration parameters, as shown in Figure 5-12.

Figure 5-12 Configure Static Route

3. Input the configuration parameters of static route, which are given in Table 5-9.

Table 5-9 Static Route Parameter Description

Parameter	Description
IP Address Version	• IPv4 • IPv6
Port Name	Port 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.
Subnet Mask	The subnet mask of target IP address.
Default Gateway	The gateway IP address of target IP address.

4. Click “**Save**” to complete the static route configuration.

6. Configure BTS Parameter

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 6-1.

Figure 6-1 Configure Network Management Server

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

Table 6-1 Network Management Server Parameter Description

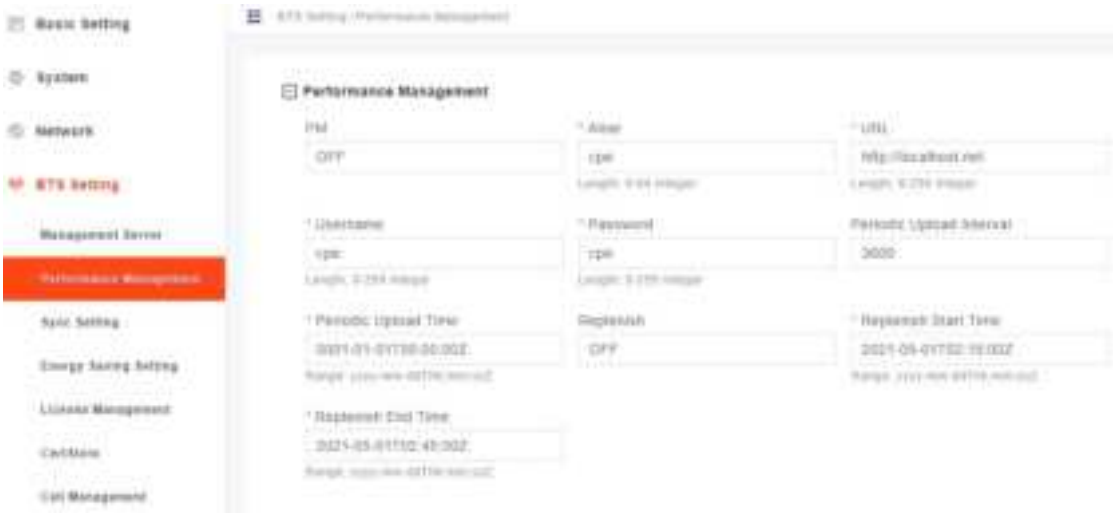
Parameter	Description
Management Server	The URL of the management server. e.g. http://*172.17.9.82:8080*/smallcell/AcsService When the NMS is cloud NMS, the domain name is also supported.
Period	The period of the gNB and the NMS, range from 1 to 65535. The unit is minute.
OMC Vendor	The vendor that provides the NMS.

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

6.2 Performance Management

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

Figure 6-2 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
PM	Enable or disable the performance management. ON: Enable OFF: Disable
Alise	The alise.
URL	http://localhost.net
Username	Username
Password	Password
Periodic Upload Interval	Periodic upload interval
Periodic Upload Time	Periodic upload time
Replenish	Enable or disable the replenish
Replenish Start Time	Replenish Start Time
Replenish End Time	Replenish End Time

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

6.3 Configure Synchronization

5G technology standard requires the time synchronization between adjacent gNBs. Synchronization between gNBs can help to reduce interference, optimize bandwidth utilization, and improve network capacity.

This gNB supports the GPS synchronization in this version.

1. In the left navigation column, select “**BTS Setting > Sync Setting**” to enter the synchronization configuration page, as shown in Figure 6-3.

Figure 6-3 Synchronization Mode Setting

2. Select GPS source.
   - GPS
   - GLONASS
   - BEIDOU
   - GALILEO
   - QZSS
3. Input PPS time offset. Range is from 0 to 5,000,000ns.
4. Click “Save” to complete the synchronization setting.

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

6.4 Configure Energy Saving

NOTE: In this software version, energy saving does not be supported.

6.5 License Management

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

1. In the left navigation column, select “**BTS Setting > License Management**” to enter the License management page, as shown in Figure 6-4.

Figure 6-4 License Management

Remain Time Indicates the remaining days of 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. Select the License file from the local computer.
3. Click "**Import License**" to upload the license file to the gNB.

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

6.6 Certificate Store

If the gNB wants to achieve some functions which need some authentication, this page supports to upload, view, export, or delete these certificates.

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.

This version does not supports the menu.

6.7 Cell Management

In the left navigation column, select "**BTS Setting > Device Topology**" to enter the device topology page, as shown in Figure 6-5.

Figure 6-5 Cell Management

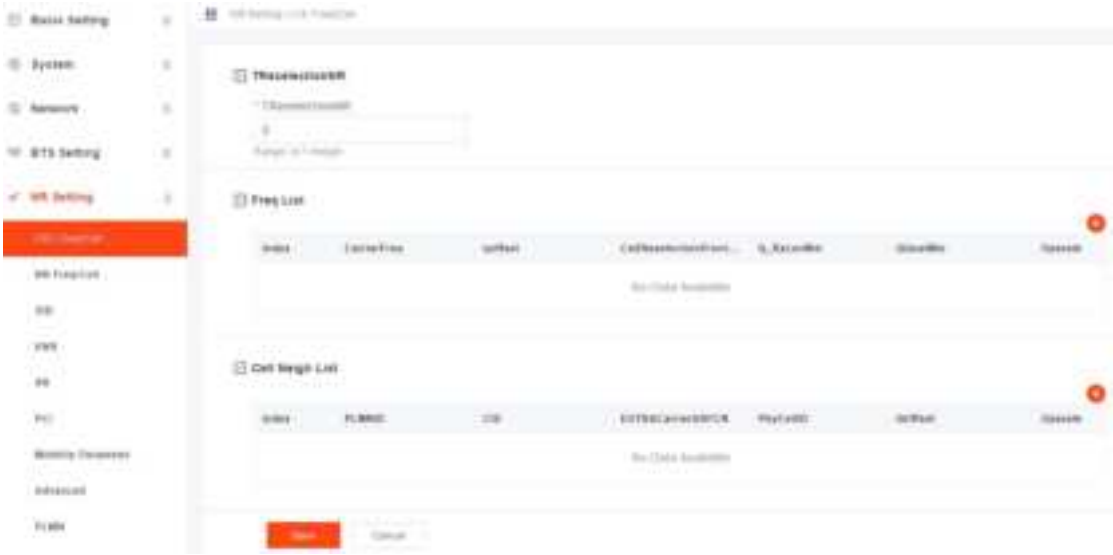
This version supports one cell.

7. Configure NR Parameter

7.1 Configure LTE Neighbor Frequency and Cell

1. 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 7-1.

Figure 7-1 LTE Neighbor Frequency/Cell Settings



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

2. Input TRSelectionNR. (Range from 0 to 7 integer)

LTE Neighbor Frequency

3. In the neighbor frequency list, click  to enter the page for adding a LTE neighbor frequency. The parameter descriptions are given in Table 7-1.

Table 7-1 LTE Neighbor Frequency Parameter Description

Parameter	Description
CarrierFreq	The carrier frequency, range is from 0 to 3279165 (integer).
AllowdMeasBandWidth	Allowed measurement bandwidth.
PresAntennaPort1	The current antenna port. Range is 0 or 1.
Q_OffsetRange	Indicates the difference in signal level between the serving and

Parameter	Description
	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.
ThreshXHigh	The cell reselection threshold for higher priority inter-band frequency. Represents the access threshold level, at which the UE will leave the serving cell and reselect another cell at the target frequency (assuming the target frequency cell has a higher reselection priority than the serving cell). Range is 0 to 31dB. A typical value is 18 dB.
ThreshXLow	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.
QRxLevMin	The minimum received signal level at which user equipment (UE) will detect a neighboring gNB's signal. Range is from -70 to -22.
QQualMin	The minimum received signal quality. Range is from -34 to -3.
PMaxEUTRA	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.
PLMNID	PLMN ID

LTE Neighbor Cell

4. In the neighbor cell list, click  to enter the page for adding a LTE neighbor cell, the parameter descriptions are given in Table 7-2.

Table 7-2 LTE Neighbor Cell Parameter Description

Parameter	Description
PLMNID	PLMN ID
CID	Unique identification number for the Cell.
EUTRACarrierARFC	Frequency point of the neighbor cell.

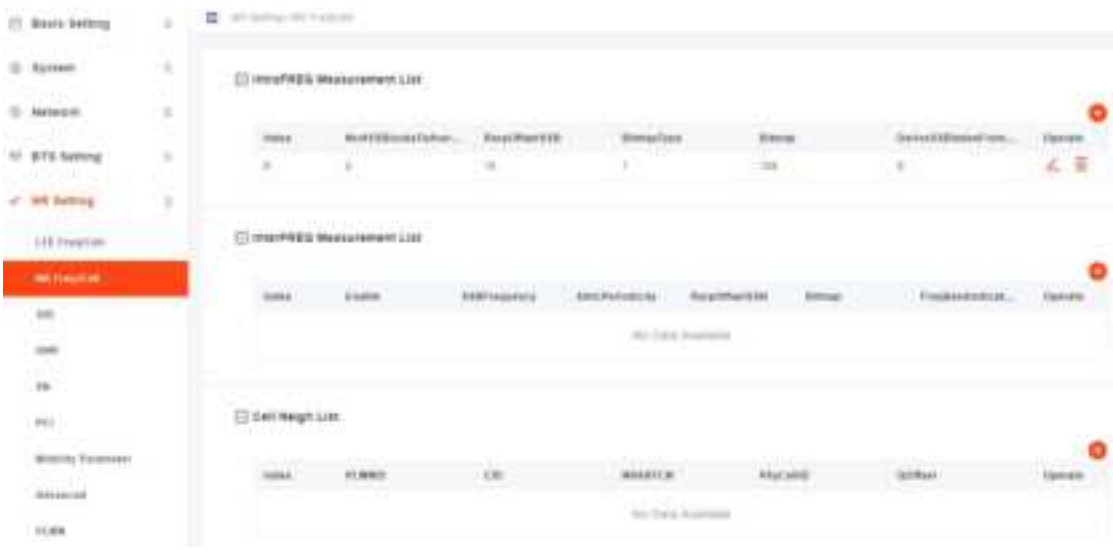
Parameter	Description
N	
PhyCellID	Physical Cell Identifier (PCI) of the neighbor cell.
QOffset	Frequency offset this neighbor cell. Indicates the difference in signal level between the serving and this neighboring eNB, as determined by the received signal level at the UE. If the received signal level is better from a neighboring eNB by at least this amount of difference in dB, the UE will reselect this cell. Range is +24 to -24. A typical value is 0dB.
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 VPLMN 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 eNB's cell offset, which is one of the variables used to determine which eNB will best serve a given UE. Range is +24 to -24. A typical value is 0dB.
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. Range is 0 or 1.
eNB ID	The global identity of the E-UTRAN cell. Range is from 0 to 1048575.
No Remove	No remove identity. ON or OFF.

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

7.2 Configure NR Neighbor Frequency and Cell

1. 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 7-2.

Figure 7-2 NR Neighbor Frequency/Cell Settings



Users can add, modify, and delete the NR neighbor frequency and cell.

Intra Frequency Measurement

2. In the IntraFREQ Measurement list, click to enter the page for adding an intra frequency measurement, the parameter descriptions are given in Table 7-3.

Table 7-3 Intra Frequency Measurement Parameter Description

Parameter	Description
SSBlocksConsolidationRsrp	The consolidation of Synchronization Signal and PBCH block (SSB) blocks of Reference Signal Receiving Power (RSRP). Range is from 0 to 127.
SSBlocksConsolidationRsrq	The consolidation of SSB blocks of Reference Signal Receiving Quality (RSRQ). Range is from 0 to 127.
SSBlocksConsolidationSinr	The consolidation of SSB blocks of Signal to Interference plus Noise Ratio (SINR). 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.

Parameter	Description
SSBFrequency	The frequency of SSB. Range is from 0 to 3279165.
SubcarrierSpacing	The space between subcarriers.
SmtcPeriodicity	The period of (SSB-based RRM Measurement Timing Configuration) SMTC. • sf5 • sf10 • sf20 • sf40 • sf80 • sf160
SmtcOffset	The offset of SMTC. Range is from 0 to 159.
SmtcDuration	The duration time of SMTC.
PLMN	PLMN ID

Inter Frequency Measurement

3. In the InterFREQ Measurement list, click  to enter the page for adding an inter frequency measurement, the parameter descriptions are given in Table 7-4.

Table 7-4 Inter Frequency Measurement Parameter Description

Parameter	Description
Enable	Enable or disable the inter frequency measurement function. • ON: Enable • OFF: Disable
SSBFrequency	The frequency of SSB. Range is from 0 to 3279165.
SubcarrierSpacing	The space between subcarriers.
SmtcPeriodicity	The period of SMTC. • sf5 • sf10 • sf20 • sf40 • sf80 • sf160
SmtcOffset	The offset of SMTC. Range is from 0 to 159.
SmtcDuration	The duration time of SMTC.
SSBlocksConsolidationRsrp	The consolidation of Synchronization Signal and PBCH block (SSB) blocks of Reference Signal Receiving Power (RSRP). Range is from 0 to 127.
SSBlocksConsolidationRsrq	The consolidation of SSB blocks of Reference Signal Receiving Quality (RSRQ). Range is from 0 to 127.

Parameter	Description
SSBlocksConsolidationSinr	The consolidation of SSB blocks of Signal to Interference plus Noise Ratio (SINR). 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.
PLMN	PLMN ID

NR Neighbor Cell

4. In the Cell Neigh list, click  to enter the page for adding a neighbor cell, the parameter descriptions are given in Table 7-5.

Table 7-5 Neighbor Cell Parameter Description

Parameter	Description
PLMNID	PLMN ID
CID	Unique identification number for the Cell.
NRARFCN	Frequency point of the neighbor cell.
SSBFrequency	The frequency of SSB. Range is from 0 to 3279165.
ReferenceSubcarrierSpacing	The space between reference subcarriers. Range is from 0 to 4.
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 eNB, as determined by the received signal level at the UE. If the received signal level is better from a neighboring eNB by at least this amount of difference in

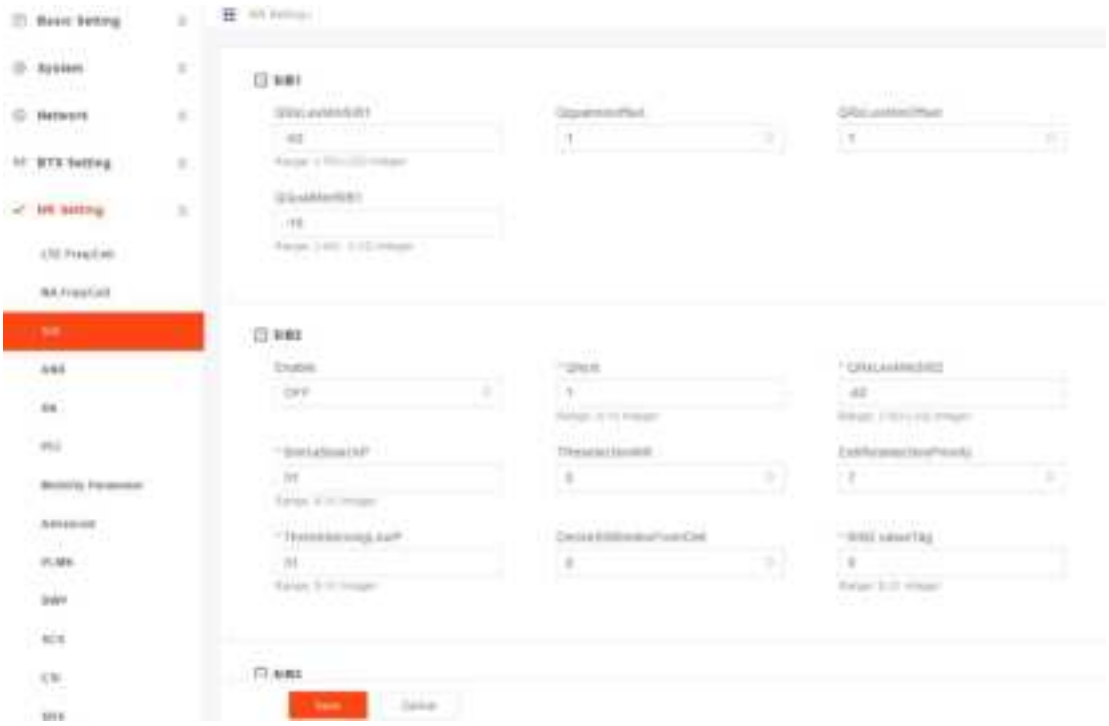
Parameter	Description
	dB, the UE will reselect this cell. Range is +24 to -24. A typical value is 0dB.
QRxLevMinOffsetCell	Cell minimum received level offset. This parameter represents the cell's minimum received level offset. It is used only when the UE resides in the VPLMN and cell selection is triggered 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 eNB's cell offset, which is one of the variables used to determine which eNB will best serve a given UE. Range is +24 to -24. A typical value is 0dB.
Blacklisted	Black list. Range is 0 or 1.
TAC	Tracking Area Code (TAC) of this neighbor cell. Range is from 0 to 16777215.
No Remove	No remove identity. ON or OFF.
gNBIdLength	The length of the gNB ID.

5. Click "**Save**" to complete the setting of the NR neighbor frequencies and cells.

7.3 Configure SIB

In the left navigation column, select "NR Setting >SIB" to enter the SIB configuration page, as shown in Figure 7-3.

Figure 7-3 SIB Setting



The gNB supports SIB1 to SIB5.

- SIB1

  The parameter description of SIB1 is shown in Table 7-6.

  Table 7-6 SIB1 Parameter Description

Parameter	Description
QRxLevMinSIB1	The minimum received level of SIB1. Range is from -70 to -22.
Qqualminoffset	Cell minimum received signal quality offset. This parameter represents the cell's minimum received signal quality offset. Range is from 1 to 8.
QRxLevMinOffset	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 VPLMN and cell selection is triggered due to periodic searches for high-priority PLMNS. Range is from 1 to 8.
QQualMinSIB1	-

- SIB2

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

Table 7-7 SIB2 Parameter Description

Parameter	Description
Enable	Enable or disable SIB2.
Qhyst	Delay time for re-selection. General the value of the parameter 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	The lower priority reselection threshold of serving frequency point. This parameter indicates the threshold when the serving frequency point moves to a lower priority inter-frequency or an Inter-RAT. It applies to the scenario 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.
SIB2 valueTag	The tag of SIB2 value. Range is from 0 to 31.

- SIB3

  The parameter description of SIB1 is shown in Table 7-8.

Table 7-8 SIB3 Parameter Description

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

- SIB4

  The parameter description of SIB1 is shown in Table 7-9.

Table 7-9 SIB4 Parameter Description

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

- SIB5

  The parameter description of SIB1 is shown in Table 7-10.

  Table 7-10 SIB5 Parameter Description

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

7.4 Configure ANR

1. In the left navigation column, select “NR Setting >ANR” to enter the ANR configuration page, as shown in Figure 7-4.

   Figure 7-4 ANR Settings

2. Input ANR parameters, the parameter description is shown in Table 7-11.

   Table 7-11 ANR Parameter Description

Parameter	Description
Enable	Enable or disable the function. • ON: Enable • OFF: Disable
InterFeqEnable	Enable or disable the inter-frequency. • ON: Enable • OFF: Disable

Parameter	Description
EUTRANEnable	Enable or disable the EUTRAN. • ON: Enable • OFF: Disable
BiNRCellEnable	Enable or disable the BiNR cell. • ON: Enable • OFF: Disable
MRTriggerType	MR trigger type. • Event • Period
AbsoluteThreshold	Absolute threshold. Range is from 0 to 127.
RelativeThreshold	Relative threshold. Range is from -30 to 30.
AbsEnable	Enable or disable the Abs. • ON: Enable • OFF: Disable
KPIPeriod	The period of KPI. Range is from 0 to 3279165.
AutoAdjustEnable	Enable or disable the auto adaptive. • ON: Enable • OFF: Disable
AutoRemoveEnable	Enable or disable the auto remove. • ON: Enable • OFF: Disable
AutoRemovePeriod	The period of auto remove. Range is from 0 to 3279165.
AutoRemoveMaxCell	The maximum cells of auto remove. Range is from 0 to 65535.
MaxHOtimes	The maximum handover time. Range is from 0 to 3279165.
MaxHOSuccess	The maximum successful handover time. Range is from 0 to 100.

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

7.5 Configure XN

1. In the left navigation column, select “NR Setting > XN” to enter the XN configuration page, as shown in Figure 7-5.

Figure 7-5 XN Settings

2. In the XN list, click  to pop up the XN configuration parameters.

3. Input XN parameters, the parameter description is shown in Table 7-12.

Table 7-12 XN Parameter Description

Parameter	Description
PLMNID	PLMN ID
RemoteAddress	The remote IP address.
XnLinkEnable	Enable or disable the XN link. • ON: Enable • OFF: Disable
XnHoEnable	Enable or disable the XN handover. • ON: Enable • OFF: Disable
BlackList IP	IP addresses of the black list.

4. Click “**OK**” to complete the XN setting.

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

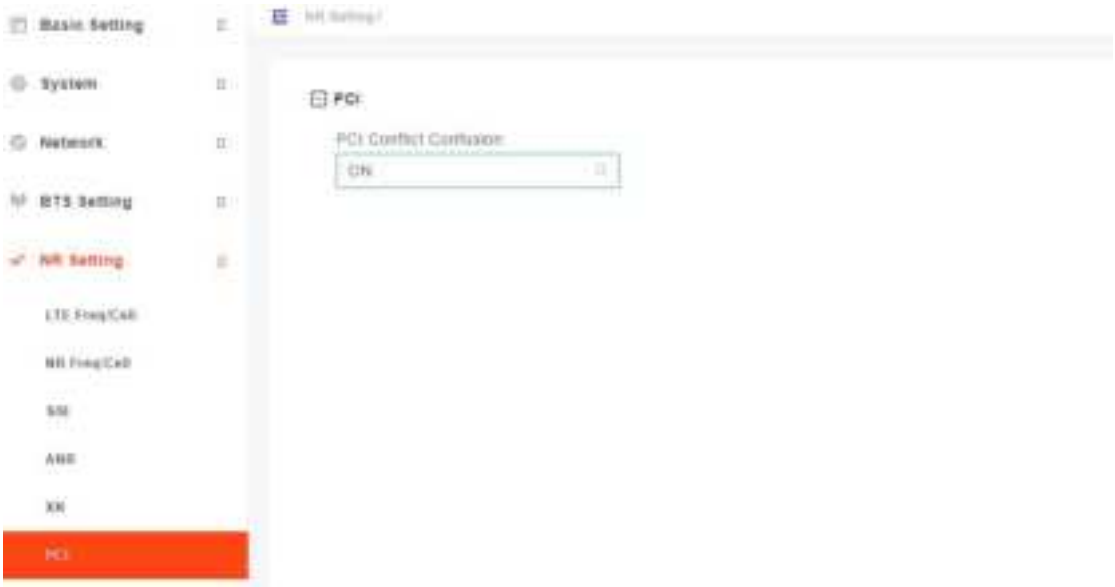
6. Input the IP addresses of the black list.

7. Click “**Save**” to complete the black list setting.

7.6 Configure PCI

1. In the left navigation column, select “NR Setting >PCI” to enter the PCI configuration page, as shown in Figure 7-6.

Figure 7-6 PCI Setting



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

7.7 Configure Mobility Parameter

In the left navigation column, select "**NR Setting > Mobility Parameter**" to enter the mobility parameter configuration page.

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 an 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.

7.7.1 A1 Event Threshold

The A1 event is triggered when the serving cell's Reference Signal Received Power (RSRP) is better than the A1 threshold. The A1 event can be used to turn off certain inter-cell measurements.

The conditions for entering A1 event are shown in formula 4.1, and the conditions for leaving A1 event are shown in formula 4.2.

$$Ms\text{-}Hys < Thresh \quad (4.1)$$

$$Ms+Hys<Thresh \quad (4.2)$$

Ms indicates the measurement results of the serving cell with no offset. ***Hys*** indicates the hysteresis parameter of the event. ***Thresh*** indicates the preset threshold.

1. In the A1 list, click  to display A1 event configuration parameters, which are shown in Table 7-13.

Table 7-13 A1 Event Threshold Parameter Description

Parameter	Description
A1	Enable or disable the A1 event. • ON: Enable • OFF: Disable
Threshold Trigger Type	The trigger type of the A1 threshold, including 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	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 • ON: Enable • OFF: Disable
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 indicate the usage of configuring the A1 event. Range is from 0 to 100. 1: Inter-frequency measurement

Parameter	Description
	2: Inter-RAT EUTRA measurement. The customized measurement event is from 10.
Report Amount	The number of report. Range is from 1 to 100.
MaxNrofRSIndexToReport	The maximum number of RS measurement report. Range is from 1 to 32.
Report Interval	The report interval of A1 event triggering report.
Report Quantity	The quantity of the measurement report.
Report Quantity RS IDX	The RS measurement report of the A1 event, including RSRP, RSRQ, and SINR.
Time To Trigger	Trigger time.
RS Type	RS type, including ssb and csi-rs.
Include Beam Measurements	Enable or disable the beam measurement indicator. • ON: Enable • OFF: Disable
PLMN	PLMN ID

2. Click “**Save**” to complete the A1 event threshold setting.

7.7.2 A2 Event Threshold

The A2 event is triggered when the serving cell’s Reference Signal Received Power (RSRP) is better than the A2 threshold.

1. In the A2 list, click  to display A2 event configuration parameters.
2. Input the value of A2 event, which is the same as A1 event, refer to Table 7-13.
3. Click “**Save**” to complete the A2 event threshold setting.

7.7.3 A3 Event Threshold

The A3 event is triggered when the neighbor cell becomes better than the serving cell by as much as the offset value. The offset can be either positive or negative.

1. In the A3 list, click  to display A3 event configuration parameters.
2. Input the value of A3 event, which is the same as A1 event, refer to Table 7-13.
3. Click “**Save**” to complete the A3 event threshold setting.

7.7.4 A4 Event Threshold

The A4 event is triggered when the neighbor cell becomes better than the serving cell by as much as the relative threshold value. A4 event is used to the handover based on coverage of intra-frequency and inter-frequency..

1. In the A4 list, click  to display A4 event configuration parameters.
2. Input the value of A4 event, which is the same as A1 event, refer to Table 7-13.
3. Click "**Save**" to complete the A4 event threshold setting.

7.7.5 A5 Event Threshold

The A5 event is triggered when the serving cell becomes worse than Threshold 1 while a neighbor cell becomes better than Threshold 2. A5 event can control the edge of handover out of the serving cell and the edge of handover in of the neighbor cell.

1. In the A5 list, click  to display A5 event configuration parameters.
2. Input the value of A5 event, which is the same as A1 event, refer to Table 7-13.
3. Click "**Save**" to complete the A4 event threshold setting.

7.7.6 B1 Event Threshold

The B1 Event Thresholds pertains the neighbor is better than the absolute threshold, which is used to measure the RAT cell with high priority.

1. In the B1 list, click  to display B1 event configuration parameters, which are shown in Table 7-14.

Table 7-14 B1 Event Threshold Parameter Description

Parameter	Description
B1	Enable or disable the B1 event. • ON: Enable • OFF: Disable
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 127.
B1 Threshold1 EUTRA RSRQ	The RSRQ threshold value for triggering B1 event. Range is from 0 to 127.

Parameter	Description
B1 Threshold1 EUTRA SINR	The SINR threshold value for triggering B1 event. Range is from 0 to 127.
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 indicate the usage of configuring the A1 event. Range is from 0 to 100. • 1: Inter-frequency measurement • 2: Inter-RAT EUTRA measurement. The customized measurement event is from 10.
Report Amount	The number of report. Range is from 1 to 100.
Report Interval	The report interval of A1 event triggering report.
Time To Trigger	The quantity of the measurement report.
Report Quantity	The RS measurement report of the V1 event, including RSRP, RSRQ, and SINR.
Report On leave	Enable or disable the beam measurement indicator. • ON: Enable • OFF: Disable
PLMN	PLMN ID

2. Click “**Save**” to complete the B1 event threshold setting.

7.7.7 B2 Event Threshold

The B2 Event Thresholds pertains only to TD-SCDMA and GSM adjacent cells, not to adjacent LTE cells.

1. In the B2 list, click  to display B2 event configuration parameters.

2. Input the value of B2 event, which is the same as B1 event, refer to Table 7-14.

3. Click “**Save**” to complete the B2 event threshold setting.

7.7.8 Period Measurement Parameter

1. In the Period Measure list, click  to display period measurement configuration parameters, which are shown in Table 7-15.

Table 7-15 Period Measurement Parameter Description

Parameter	Description
Report Quantity	The RS measurement report of the V1 event, including RSRP, RSRQ, and SINR.
Max Report Cells	The maximum cells of reported. Range is from 0 to 8.
Report Interval	The report interval of A1 event triggering report.
Report Amount	The report interval of A1 event triggering report. Range is from 0 to 64 (even number).

2. Click “**Save**” to complete the period measurement setting

7.8 Configure Advanced Parameter

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

7.8.1 CU

1. Click + in the front of “CU” to display CU configuration parameters, as shown in Table 7-16.

Table 7-16 CU Parameter Description

Parameter	Description
NR T300	RRC timer. When the gNB receives the RRCSetupRequest message, the timer starts up.
NR T301	RRC timer. When the gNB receives the RRCReestabilshmentRequest message, the timer starts up.
NR T304	RRC timer. When the gNB receives the RRC reconfiguration message with synchronization, the timer starts up.
NR T310	RRC timer. When the gNB receives the continuous “out-of-sync” message from the bottom layer, the timer starts up.
NR T311	RRC timer. When the RRC reestablishment is triggered, the timer starts up.
NR N310	This parameter is used to indicate that the Pcell receives the maximum continuous “out-of-sync” message from the bottom layer.

Parameter	Description
NR N311	This parameter is used to indicate that the Pcell receives the maximum continuous “in-sync” message from the bottom layer.
NR 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.
NGAP Local IP	The local CU IP address of the NG interface. Click ⊕ to all multiple IP addresses.
NGU IP	The IP address of the NGU. Click ⊕ to all multiple IP addresses.
AMF IP	The peer AMF IP address of the NG interface. Click ⊕ to all multiple IP addresses.

2. Click “**Save**” to complete the CU setting.

7.8.2 DU

1. Click + in the front of “DU” to display DU configuration parameters, as shown in Table 7-17.

Table 7-17 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.
ReferenceSubcarrierSpacing	The space of reference sub carrier. Range is from 0 to 4.
PAT1 DL UL Trans Periodicity	Subframe ratio. The Uplink and downlink transmission period of PAT1. Range is from 0 to 7.
PAT1 of Downlink Slots	Subframe ratio. The downlink time slot configuration of PAT1. Range is from 0 to 320.
PAT1 of Downlink Symbols	Subframe ratio. The special time slot downlink symbol configuration of PAT1. Range is from 0 to 13.
PAT1 of Uplink Slots	Subframe ratio. The uplink time slot configuration of PAT1. Range is from 0 to 320.
PAT1 of Uplink Symbols	Subframe ratio. The special time slot uplink symbol configuration of PAT1. Range is from 0 to 13.
PAT2 DL UL Trans Periodicity	Subframe ratio. The Uplink and downlink transmission period of PAT2. Range is from 0 to 7.
PAT2 of Downlink Slots	Subframe ratio. The downlink time slot configuration of PAT2. Range is from 0 to 320.

Parameter	Description
PAT2 of Downlink Symbols	Subframe ratio. The special time slot downlink symbol configuration of PAT2. Range is from 0 to 13.
PAT2 of Uplink Slots	Subframe ratio. The uplink time slot configuration of PAT1. Range is from 0 to 320.
PAT2 of Uplink Symbols	Subframe ratio. The special time slot uplink symbol configuration of PAT1. Range is from 0 to 13.
Max DL HARQ ReTX	The maximum number of downlink HARQ retransmission. Range is from 0 to 4.
DL LA	Downlink AMC auto adaptive switch. • ON: Enabled • OFF: Disabled
Max UL HARQ ReTX	The maximum number of uplink HARQ retransmission. Range is from 0 to 4.
UL LA	Uplink AMC auto adaptive switch. • ON: Enabled • OFF: Disabled
CsiRsReporting	CSI report switch. • ON: Enabled • OFF: Disabled
DU F1AP Local IP	The DU IP address in control plane of F1 interface.
DU F1U IP	The DU IP address in user plane of F1 interface.
DU F1AP Remote IP	The Remote IP address in control plane of F1 interface.
numForceGrant	(Reserved)
HealthTimeInterval	(Reserved)
PerfOptFlag	(Reserved)
CalcPaddingRateFlag	Calculate Padding rate flag.

2. Click “**Save**” to complete the DU setting.

7.8.3 SSB

1. Click + in the front of “SSB” to display SSB configuration parameters, as shown in Table 7-18.

Table 7-18 PCI Range Parameter Description

Parameter	Description
SSB Mask	SSB mask. It is used to configure the number of SSB.
SSB Periodicity	The period of SSB. The unit is ms. Range is from 0 to 5.
SSB Power	The transmission power of SSB. Range is from -60 to

Parameter	Description
	50.
SSB Absolute Freq	The frequency point of SSB. Range is from 0 to 3279165.
SsbResourceReserved	The reserved resource of SSB. • ON: Enabled • OFF: Disabled

2. Click “**Save**” to complete the SSB setting.

7.8.4 UL RSSI Measurement

NOTE: In this software version, UL RSSI does not be supported.

7.8.5 DRX

1. Click + in the front of “DRX” to display Discontinuous reception (DRX) configuration parameters, as shown in Table 7-19.

Table 7-19 DRX Parameter Description

Parameter	Description
DRXOnDurationTimer	The duration timer of DRX.
DRXInactivityTimer	The inactivity timer of DRX.
DRXHarqRttTimerDL	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. Range is from 0 to 56.
DRXHarqRttTimerUL	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. Range is from 0 to 56.
DRXRetransmissionTimerDL	The downlink retransmission timer of DRX.
DRXRetransmissionTimerUL	The uplink retransmission timer of DRX.
LongDRXCycle	Long DRX period.
DRXStartOffset	Specify the start sub frame of the DRX period. Range is from 0 to 10239.

Parameter	Description
ShortDRXCycle	Short DRX period.
ShortCycleTimer	The timer of DRX short period. Range is from 0 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.
DRXSlotOffset	DRX Slot offset. Range is from 0 to 31.

2. Click “**Save**” to complete the DRX setting.

7.8.6 Voice

1. Click + in the front of “Voice” to display the voice configuration parameters, as shown in Table 7-20.

Table 7-20 Voice Parameter Description

Parameter	Description
VONR	Voice Over NR. • ON: Enabled • OFF: Disabled
EPS Fallback Type	EPS fallback type, including five types. • EPS Fallback Blind Red • EPS Fallback Meas Red • EPS Fallback Meas HO • PS Meas Red • PS Meas HO

2. Click “**Save**” to complete the voice setting.

7.8.7 GNB

1. Click + in the front of “GNB” to display the gNB configuration parameters, as shown in Table 7-21.

Table 7-21 GNB Parameter Description

Parameter	Description
GNB ID Length	The length of GNB ID. Range is from 22 to 32.
GNB ID	GNB ID. Range is from 0 to 4294967295.
GNB Name	GNB name. Range is from 0 to 150 bytes.

2. Click “**Save**” to complete the gNB setting.

7.8.8 Multi PLMN

1. Click + in the front of “Multi PLMN” to display multi PLMN configuration parameters.
2. Whether enable multi PLMN.
3. Click “**Save**” to complete the multi PLMN setting.

7.9 Configure PLMN

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

Figure 7-7 PLMN Settings

2. Click  to display PLMN configuration parameters, as shown in Table 7-22.

Table 7-22 PLMN Parameter Description

Parameter	Description
Cell ID	Cell ID. Range is from 0 to 68719476735.
TAC	TAC. Range is from 0 to 16777215.
Ranac	Ranac

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

7.10 Configure BWP

NOTE: In this software version, BWP does not be supported.

7.11 Configure SCS

1. In the left navigation column, select "**NR Setting > SCS**" to enter the Sub-carrier Space (SCS) configuration page, as shown in Figure 7-8.

Figure 7-8 SCS Setting

2. In the DL SCS list, click  to display the downlink SCS parameters, which description is shown in Table 7-23.

Table 7-23 DL SCS Parameter Description

Parameter	Description
SubcarrierSpacing	The sub carrier spacing is 30kHz.
CarrierBandwidth	The bandwidth of the carrier. Values are 25, 52, 79, 106, 133, 160, 216, 273.

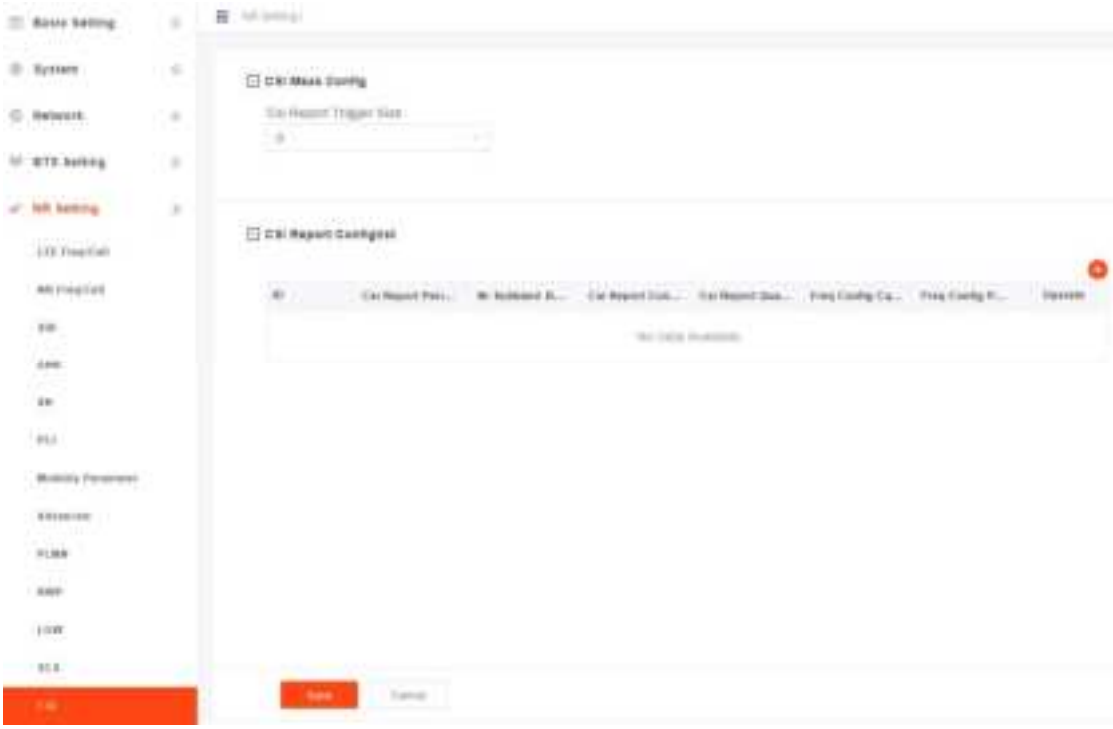
The configuration of UL SCS is the same as DL SCS configuration.

3. Click "**Save**" to complete the uplink/downlink SCS setting.

7.12 Configure CSI

1. In the left navigation column, select "**NR Setting > CSI**" to enter the CSI configuration page, as shown in Figure 7-9.

Figure 7-9 CSI Setting



2. Click  to display CSI configuration parameters, the configuration parameter description is shown in Table 7-24.

Table 7-24 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. • Periodic • SemiPersistentOnPUCCH • SemiPersistentOnPUSCH • Aperiodic
Csi Report Quantity	CSI report quantity.
Freq Config Cqi Format Ind	CQI format. • widebandCQI • subbandCQI
Freq Config Pmi	PMI format.

Parameter	Description
Format Ind	• widebandPMI • subbandPMI

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

7.13 Configure SRS

NOTE: In this software version, SRS does not be supported.

7.14 Configure PUSCH

1. In the left navigation column, select “**NR Setting > PUSCH**” to enter the PUSCH page, as shown in Figure 7-10.

Figure 7-10 PUSCH Setting

2. Input the value of “UlMcsLimit”. Range is from 0 to 28.
3. Click “**Save**” to complete the PUSCH setting.

7.15 Configure PDSCH

1. In the left navigation column, select “**NR Setting > PDSCH**” to enter the PDSCH page, as shown in Figure 7-11.

Figure 7-11 PDSCH Setting

2. Input PDSCH configuration parameters, which description is shown in Table 7-25.

Table 7-25 PDSCH Parameter Description

Parameter	Description
Power Control	Enable or disable the power control function. • ON: Enable • OFF: Disable
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.
DlMcsLimit	The limit of uplink MCS. Range is from 0 to 28.

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

7.16 Configure PUCCH

1. In the left navigation column, select “**NR Setting > PUCCH**” to enter the PUCCH page, as shown in Figure 7-12.

Figure 7-12 PUCCH Setting

2. Input PUCCH configuration parameters, which description is shown in Table 7-26.

Table 7-26 PUCCH Parameter Description

Parameter	Description
ClpcPucchEnable	Enable or disable Clpc PUCCH.

Parameter	Description
	• ON: Enable • OFF: Disable
ClpcPucchSinrEnable	Enable or disable Clpc PUCCH SINR. • ON: Enable • OFF: Disable
ClpcPucchBlerEnable	Enable or disable Clpc PUCCH BLER. • ON: Enable • OFF: Disable

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

7.17 Configure QoS

1. In the left navigation column, select “**NR Setting > QoS**” to enter the QoS configuration page, as shown in Figure 7-13.

Figure 7-13 QoS Setting

2. In the QoS list, click  to display the QoS configuration parameters, which description is shown in Table 7-27.

Table 7-27 QoS Parameter Description

Parameter	Description

Parameter	Description
Enable	Enable or disable QoS function.
MappingDrbIndex	Index
5QI	5QI Range is from 1 to 255.
Type	• GBR • Non-GBR
Priority	Priority Range is from 1 to 16.
MinBr	MinBr
IsDefault	Whether the QoS is default.
UeInactivityTimerConifg	UE inactivity Timer.
TReorderingPdcp	TReordering PDCP Range is from 0 to 35.
TReorderingUE	TReordering UE Range is from 0 to 35.
DiscardTimer	Discard timer.
StatusReportRequired	Enable or disable report status.
PdcpSnSizeUl	Uplink PDCP SN size.
PdcpSnSizeDl	Downlink PDCP SN size.
Dscp	DSCP
RlcMode	RLC mode. • UM • AM
SnFieldLengthAmDl	Range is from 0 to 35.
SnFieldLengthAmUl	Range is from 0 to 35.
SnFieldLengthUmDl	Range is from 0 to 35.
SnFieldLengthUmUl	Range is from 0 to 35.
UlConfig	Uplink configuration. • 0 • 1 • 2
EnableRohc	Enable or disable ROHC.
RohcProfile0x0001	ROHC profile.
RohcProfile0x0002	ROHC profile.
RohcProfile0x0006	ROHC profile.
PdcpDuplicationActivated	
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.

Parameter	Description
ShortDrxCycle	Short DRX cycle.
ShortDrxCycleTimer	Short DRX cycle timer.
DrbInactivityTimerConfig	DRB inactivity timer.

3. In the SST list, click  to display the SST configuration parameters, which description is shown in Table 7-28.

Table 7-28 SST Parameter Description

Parameter	Description
SST	Enable or disable SST.
SstResourceType	SST source type.
MaxResourceReserved	The maximum reserved resource. Range is from 0 to 273.
MinResourceReserved	The minimum reserved resource. Range is from 0 to 273.

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

7.18 Configure TestMAC

NOTE: In this software version, testMAC does not be supported.

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
GBR	Guaranteed Bit Rate
GPS	Global Positioning System
ICIC	Inter-cell Interference Coordination
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
PUCCH	Physical Uplink Control Channel
PUSCH	Physical Uplink Shared Channel
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
SINR	Signal to Interference plus Noise Ratio
SON	Self-Organized Network
SMTC	SSB-based RRM Measurement Timing Configuration
SNR	Signal-to-Noise Ratio
SSB	Synchronization Signal and PBCH block
SSH	Secure Shell
TAC	Tracking Area Code

Appendix B **FCC Compliance**

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

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

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 150cm between the radiator & your body.