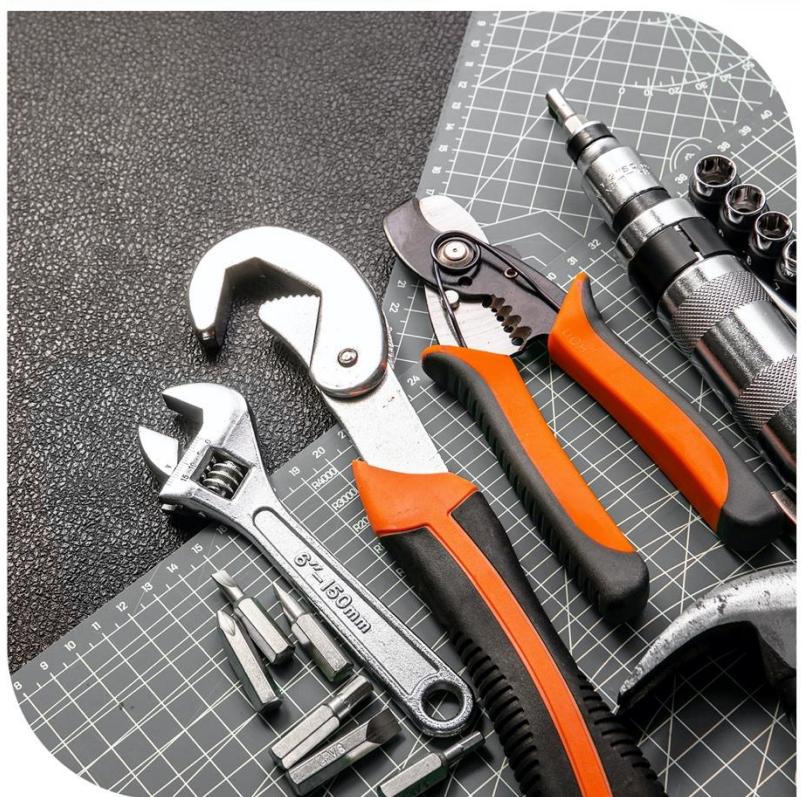
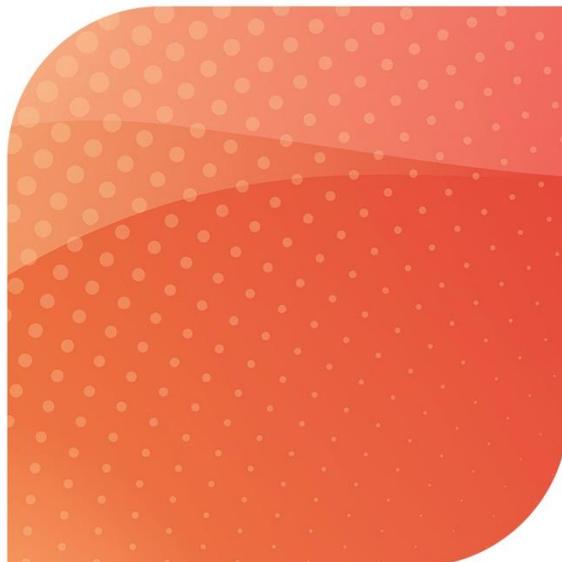




# Aurora454

Outdoor 4x60W gNB

## Installation Guide



## About This Document

This document is intended for personnel who will be installing the Baicells Aurora454 Outdoor 4x60W gNB product. This Baicells equipment is based on 3GPP Long-Term Evolution (LTE) technology. The product overview is followed by the procedures for properly installation. Please be advised that only personnel with the appropriate electrical skills and experience should install this device.

## Copyright Notice

Baicells Technologies, Inc., copyrights the information in this document. No part of this document may be reproduced in any form or means without the prior written consent of Baicells Technologies, Inc.

## Disclaimer

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.

### Disposal of Electronic and Electrical Waste



Pursuant to the WEEE EU Directive, electronic and electrical waste must not be disposed of with unsorted waste. Please contact your local recycling authority for disposal of this product.

## Revision Record

Date	Version	Description	SMEs/Contributors	Author/Editor
24 Feb.,2025	01	Initial Released.	Zheng Xinkun	Yang Yanan

## Contact Us

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

## Table of Contents

1. Overview .....	1
1.1 Introduction.....	1
1.2 Highlights.....	1
1.3 Appearance.....	2
1.4 Technical Specification .....	3
1.4.1 Technology .....	3
1.4.2 Interface .....	3
1.4.3 Performance .....	4
1.4.4 Features .....	5
1.4.5 Link Budget.....	5
1.4.6 Physical .....	5
1.5 FCC Compliance .....	6
2. Installation Preparation .....	7
2.1 Support Materials .....	7
2.2 Installation Tools .....	8
2.3 Construction Safety .....	9
2.4 Installation Environment .....	9
2.4.1 Location Requirements.....	9
2.4.2 Environmental Requirements.....	11
2.5 Lightening & Grounding Protection.....	11
2.6 Weatherproofing .....	11
3. Installation .....	12
3.1 Unpacking .....	12
3.2 Installation Procedure .....	12
3.3 Install GPS Antenna .....	12
3.4 Install on Pole .....	14
3.5 Install on Wall .....	16

---

3.6	Connect Cables .....	17
3.6.1	Cable Laying Requirements .....	17
3.6.2	Connect GPS Antenna Cable.....	18
3.6.3	Connect RF Cables .....	19
3.6.4	Connect Ethernet Cable.....	19
3.6.5	Connect Optical Cable .....	20
3.6.6	Connect Power Cable .....	20
3.6.7	Connect Ground Cable.....	21
3.7	Power on to Check LED Status.....	24
4.	Attentions .....	25
4.1	FAQ .....	25
4.2	Common Installation Errors.....	26
	Appendix A Terminology & Acronym .....	28

---

## List of Figures

Figure 1-1 Aurora454 Appearance .....	2
Figure 2-1 Weatherproofing .....	11
Figure 3-1 Installation Process.....	12
Figure 3-2 GPS Installation Requirements.....	13
Figure 3-3 GPS Antenna Installation.....	13
Figure 3-4 Installation Height .....	14
Figure 3-5 Wall Bracket .....	16
Figure 3-6 Connection Order for Ethernet Cable .....	19
Figure 3-7 Connection Order for Optical Cable .....	20
Figure 3-8 Connection Sequence for Power Cables.....	21
Figure 3-9 Power Terminal .....	21
Figure 3-10 Pole Grounding .....	22
Figure 3-11 Grounding Screws.....	23
Figure 3-12 GPS Grounding.....	24

## List of Tables

Table 1-1 Aurora454 Interface Description.....	2
Table 1-2 Aurora454 Interface Indicators .....	3
Table 2-1 Supporting Materials.....	7
Table 2-2 Environmental Requirements .....	11

# 1. Overview

## 1.1 Introduction

The Baicells Aurora 454 is an advanced outdoor 5G Sub-6G integrated ALL-IN -ONE base station (gNB), which is designed and developed based on Qualcomm up-to-date 5G SoC solution. This 4x60 watts gNB is low power consumption, subminiature and easy to maintenance.

This product helps operators to enhance the coverage performance of 5G networks effectively, improve the capacity of 5G networks and eliminate the blind district, meanwhile it also can help to reduce the system power consumption.

## 1.2 Highlights

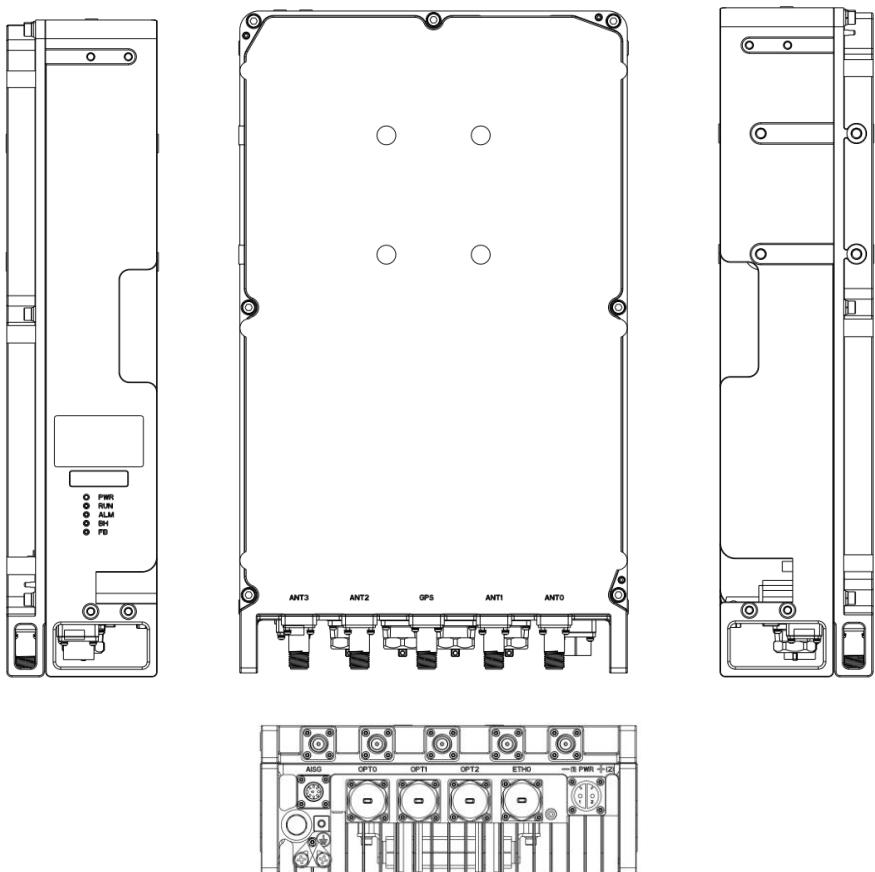
- Standard NR FR1 Bands n41
- Comply with 3GPP Release 16 and Release 17 RedCap\*
- GUI-based local and remote Web management
- Supports 100MHz carrier bandwidth and 2 carrier aggregation\*
- Peak rate: Up to DL 1500Mbps, UL 660Mbps
- Supports up to 1200 users
- Supports Stand Alone (SA) mode
- Supports SCTP control (IKE SCTP)
- Integrated small cell form factor for quick and easy installation
- Supports flexible xHaul
- Highly secured with equipment certification against potential intrusion risk
- Supports TR-069 network management interface
- Lower power consumption, which reduces OPEX, can be powered easily by Baicells compact outdoor smart UPS

\* Planned for future release

## 1.3 Appearance

The appearance of Aurora454 is shown in Figure 1-1.

Figure 1-1 Aurora454 Appearance



The Aurora454 interfaces are described in Table 1-1.

Table 1-1 Aurora454 Interface Description

Interface	Description
ANT0~ANT3	Connect to external antenna 0 to antenna 3, N type connector
GPS	GPS antenna interface, N type connector
AISG	RS485 interface, complied with AISG2.0 standard
OPT0	Optical interface 0 (SFP+)
OPT1	Optical interface 1 (SFP+)
OPT2	Optical interface 2 (SFP+)
ETH0	RJ-45 interface
PWR	Power interface: -48VDC (-40VDC to -57VDC)

The Aurora454 interface indicators are described in Table 1-2.

Table 1-2 Aurora454 Interface Indicators

Identity	Color	Status	Description
PWR	Green	Steady ON	Power on or device fault.
		OFF	No power supply.
RUN	Green	Steady ON	The device has been activated. (The device transmits power normally.)
		Slow flash: 1s on,1s off	The device has been deactivated. (The device does not transmit power.)
ALM	Red	Steady ON	The system exists alarm.
		OFF	No alarm, the device is normal.
BH	Green	Steady ON	Data link is normal.
		OFF	Data link is abnormal.
FB	Green	Steady ON	Data link is normal.
		OFF	Data link is abnormal.

## 1.4 Technical Specification

### 1.4.1 Technology

Item	Description
Standard	5G NR TDD (3GPP R16 and R17* compliant)
TDD UL/DL Configuration	5ms periodicity ( $\mu=1$ ): DDDDD+DDSUU 2.5ms dual periodicity ( $\mu=1$ ): DDSU+DDSUU 2.5ms single periodicity ( $\mu=1$ ): DSUUU
Model No.	BSQ7041A454
Frequency Band	n41 (2496 MHz – 2690MHz)
Channel Bandwidth	n41: 100MHz
Multiplexing	4x4 MIMO (DL: 4L, UL: SU 2L, and MU 4L*)
Security	Radio: Null/SNOW 3G/AES-128/ZUC Backhaul: IPsec (X.509 AES-128, AES-256, SHA-128, SHA-256)

### 1.4.2 Interface

Item	Description
Ethernet Interface	1 x 2.5GE RJ-45 3 x 10GE optical interface (SFP+)

Item	Description
Power Supply	-40VDC ~ -57VDC, nominal -48VDC
Protocols Used	IPv4/IPv6, UDP, TCP, ICMP, NTP, SSH, IPsec, TR-069, HTTP/HTTPPs, DHCP
Network Management	IPv4/IPv6, HTTP/HTTPPs, TR-069, SSH, Embedded 5GC*
VLAN/VxLAN	802.1Q/VxLAN
LED Indicators	5 x status LED RUN/ACT/ALM/BH/FB
RF Antenna	4T4R external high gain antenna with N-Type connectors, or integrated antenna*
GNSS Antenna	External GNSS antenna, N-Type connector

### 1.4.3 Performance

Item	Description		
Peak Data Rate	100 MHz	DL (Mbps)	UL (Mbps)
	5ms periodicity (DDDD+DDSUU, 6:4:4)	1500	230
	2.5ms dual periodicity (DDDSU+DDSUU, 10:2:2)	1400	330
	2.5ms single periodicity (DSUUU, 10:2:2)	750	660
User Capacity	Up to 1200 users		
MAX Deployment Range	15km (60km*)		
Latency	Round-trip delay (RTD) less than 10 milliseconds		
Receive Sensitivity	-95 dBm (per channel)		
Modulation	UL: MCS0 (QPSK) to MCS27 (256QAM) DL: MCS0 (QPSK) to MCS27 (256QAM)		
Transmit Power Range	38dBm to 47.78 dBm per channel (combined +54dBm, configurable) (1 dB interval)		
Quality of Service	Complied with 3GPP standard 5G QoS Identifier (5QI)		
ARQ/HARQ	Supported		
Synchronization	GNSS/IEEE 1588V2		

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

\* Planned for future release

#### 1.4.4 Features

Item	Description
Voice	VoNR/ViNR/EPS-FB
SON	Self-Organizing Network <ul style="list-style-type: none"> <li>Automatic Neighbor Relation (ANR)</li> <li>PCI confliction detection</li> </ul>
Traffic Offload	Local breakout
Maintenance	<ul style="list-style-type: none"> <li>Local/Remote Web maintenance</li> <li>Online status management</li> <li>Performance statistics</li> <li>Fault management</li> <li>Local/Remote software upgrade</li> <li>Logging</li> <li>Connectivity diagnosis</li> <li>Auto setup</li> </ul>

#### 1.4.5 Link Budget

Item	Description
VSWR	<=1.5
EIRP	Antenna gain = 17.9 dBi EIRP = (54+G)dBm/100MHz
Power Control	UL Open-loop/Closed-loop Power Control, DL Power Allocation (3GPP TS 36.213 compliant)

#### 1.4.6 Physical

Item	Description
Surge Suppression	Power interface: Differential mode: 2 KA; Common mode: 4 KA
Power Interface Lightning Protection	Differential mode: $\pm 10$ KA Common mode: $\pm 20$ KA
MTBF	$\geq 150000$ hours
MTTR	$\leq 1$ hour
Ingress Protection Rating	IP65
Operating Temperature	-40°F to 131°F / -40°C to 55°C
Storage Temperature	-58°F to 149°F / -50°C to 65°C

Item	Description
Humidity	5% to 95% RH
Atmospheric Pressure	70 kPa to 106 kPa
Power Consumption	Maximum 650W
Weight	18kg
Dimensions (HxWxD)	527 X 308X 120 millimeters
Installation	Pole or wall mount

## 1.5 FCC Compliance

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

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

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### 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 1100cm between the radiator & your body.

## 2. Installation Preparation

### 2.1 Support Materials

In addition to industry standard tools, you will need the materials described in Table 2-1 during the installation.

Table 2-1 Supporting Materials

Item	Figure	Description
AC cord		A DC power cable is provided with the device. If the length is insufficient, the customer needs to prepare it. It is suggested that AWG11 is used. The cord is three cores cable and the length is less than 100 meters.
DC cord		(Optional) If the power supply is AC, an AC power cable must be prepared. The diameter of power cable must be AWG11 or greater. The cord is two cores cable and the length is less than 100 meters.
RF antenna cable		50 ohm feeder, 1/2 jumper
Optical fiber		Optical fiber (armor) It is suggested that the diameter of the cable is $7 \pm 1\text{mm}$ .
Optical module		SFP optical module
RF antenna		Omni or directional dual polarized antenna When selecting an RF antenna, be sure to match the frequency range of the antenna with the gNB.
Ground cable		If the length of lead is more than 10 meters, a ground cable with $16\text{mm}^2$ cross section should be used. If the length of lead is less than 10 meters, a ground cable with $10\text{mm}^2$ cross section should be used.

Item	Figure	Description
Pole		The diameter of the pole is between 40mm to 100mm of hot-galvanized steel pipe. Channel steel and equal angle steel installation are also supported. The width of the channel steel is 50mm to 100mm; the length of side of the angle steel is 63mm to 80mm.
Distribution box		AC Air switch, socket, power grounding point, broadband access is all in the distribution box, which must be waterproofed.
Cold shrink tube		The waterproof protection material on the gNB side is provided with the device. But the customer need to prepare the waterproof protection material on the peer side.

**NOTE:** Other accessories have been packed in the packing box.

## 2.2 Installation Tools

The following standard tools may be needed during the installation.

				
Level bar	Marking pen	Knife	Vise	Wrench
				
Percussion drill and some drill heads	hammer	Cross screw driver	Cable vice	Tape measure
				
5mm L-shape allen wrench	T7 screwdriver head	Ladder	compass	fixed pulley

				
multimeter	Square crimping pliers			

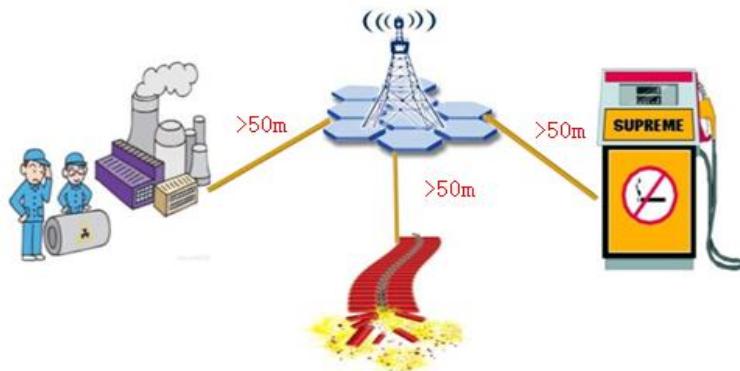
## 2.3 Construction Safety

1. The installation personnel must master the basic safe operation knowledge, through the training, and having the corresponding qualifications.
2. Before installation, the installation personnel must be prepared with safety protection, such as: safety helmet, safety belt, reflective clothing, gloves, and safety shoes, etc.
3. Before installation, the installation personnel must cross-check each other to ensure above preparations have done.

## 2.4 Installation Environment

### 2.4.1 Location Requirements

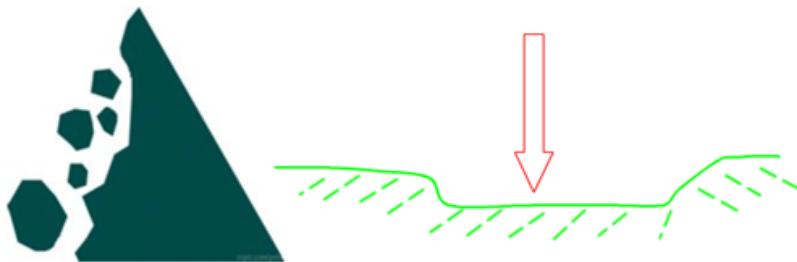
1. Avoid locations of warehouses and gas stations with flammable and explosive, and locations that fire and explosion are easy to happen during production. Do not install gNBs near dangerous industries and enterprises. Stay away from high voltage lines and railroads.



2. Under the premise of not affecting the layout of the gNB, the existing telecommunications building, post and telecommunication office or microwave station should be chosen as the site as far as possible. The existing machine room, power supply and tower facilities should be used sufficiently.



3. Avoid to install near high-power wireless transmitter stations, such as radar stations, television stations, etc. If the gNB must be installed in such locations, you should check whether there is mutual interference, and take measures to prevent it.
4. Avoid to install on mountains. The mountain interference range is large, therefore the frequency reuse will be affected. Install gNB on high mountains in rural areas is often not good for the coverage of towns and villages in small basins.



5. Avoid to install in the forest. If the gNB must be installed in such locations, the height of the gNB must be higher than the treetop.
6. It is strictly prohibited to install the gNB in the mining area and places where it is easy to be submerged by flood and landslide.
7. In urban area, for the macro gNB, the site should be selected that is higher than the average height of buildings but lower than the highest building. For the micro gNB, the site should be selected that is lower than the average height of buildings and the surrounding buildings are well shielded.
8. In urban area, the gNB should avoid obstructions caused by tall buildings near the front of the antenna or the reflection interferes the same frequency gNBs behind it.
9. Avoid selecting sites where new buildings may affect coverage or there are co-frequency interference.
10. As far as possible, the site of gNBs of the two communication network systems should be co-located or close.

## 2.4.2 Environmental Requirements

Table 2-2 provides typical environmental specifications for this gNB.

Table 2-2 Environmental Requirements

Item	Range	Typical value
Temperature	-40°C to 55°C	25°C
Relative humidity (no condensation)	0% to 100%	5% to 95%
Safety DC voltage	-57VDC to -42VDC	-48VDC

## 2.5 Lightening & Grounding Protection

You must protect the gNB and antenna against lightning. Following are guidelines concerning grounding.

- The yellow-green ground wire must be at least 10mm<sup>2</sup> in diameter.
- In principle, always place the grounding as near as possible to the equipment.
- Connect to a reliable outdoor grounding point (earth) using one ground screw.
- The connection of the grounding points and ground bar need to be tight and reliable. Rustproofing the terminals, e.g., with anti-oxidant coating or grease, is required.

## 2.6 Weatherproofing

To protect the connection points from weather and climate, clean each connection point before installing cold shrink tubes, per the following (Figure 2-1).

1. Insert the cable into the cold shrink tube.
2. Tighten the connector.
3. Push the cold shrink tube to the top joint, and pull out the strip.
4. Ensure the cold shrink tube is tightly fitted with the connection.

Figure 2-1 Weatherproofing



## 3. Installation

### 3.1 Unpacking

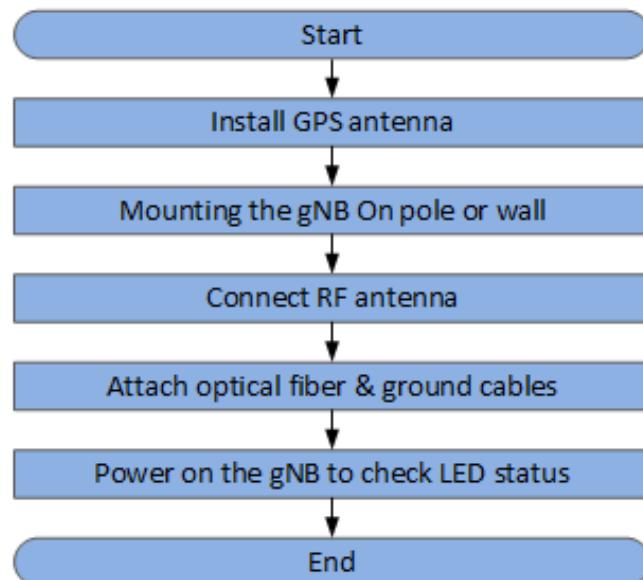
Before opening the box, make sure the package is in good condition, undamaged and not wet. During the unpacking, avoid potential damaging impacts from hits or excessive force.

Once unpacked, check whether the quantity is consistent with the packing list.

### 3.2 Installation Procedure

Figure 3-1 provides an overview of the installation process.

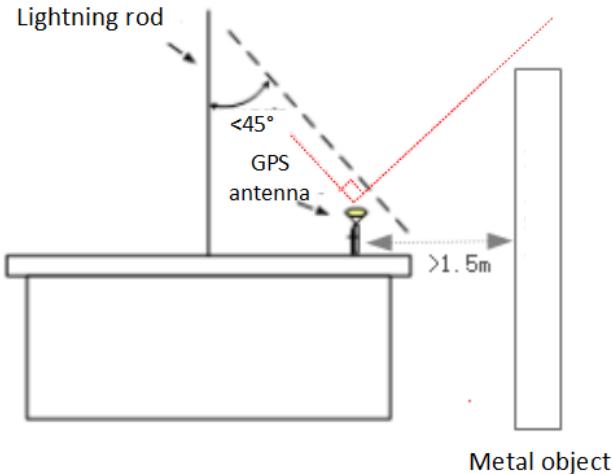
Figure 3-1 Installation Process



### 3.3 Install GPS Antenna

Read the following GPS antenna installation requirements before installing it on the gNB, as shown in Figure 3-2.

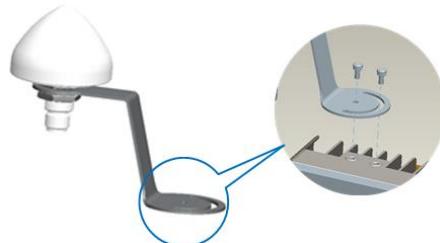
Figure 3-2 GPS Installation Requirements



- No major blocking from buildings in the vicinity. Keep the rooftop buildings a distance away from the GPS. Make sure the space atop within 90 degrees (at least 45 degrees) is not blocked by any buildings.
- Avoid installing the GPS in the vicinity of any other transmitting and receiving devices, such as under the microwave antenna or high voltage cable. Avoid interference from other transmitting antennas to the GPS antennas. Avoid the direction of radiation from other transmitting antennas to the GPS antenna
- The GPS antenna should be installed within 45 degrees to the lightning rod.
- When two or more GPS antennas are installed, it is recommended to keep the spacing of more than 2 meters and install multiple GPS antennas in different locations to prevent simultaneous interference.
- GPS antenna feeders cannot be grounded together with ground conductors of interfering equipment such as air conditioners, motors, and pump motors, etc. to prevent external interference from being introduced into the antenna system.

The GPS antenna system is assembled in manufacturing before packing. The only installation step is to fix the GPS mounting bracket on the gNB with the M4\*14 screws (Figure 3-3).

Figure 3-3 GPS Antenna Installation



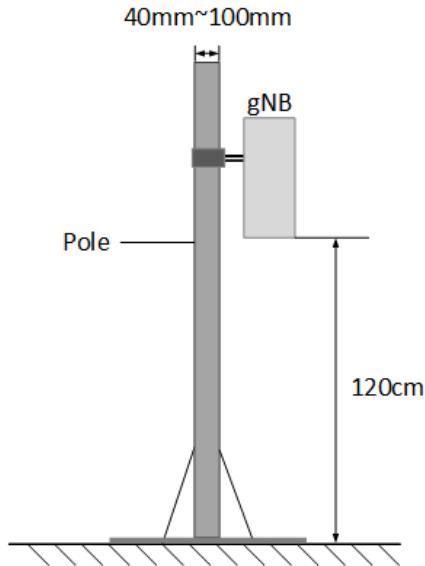
**NOTE:** The gNB may adopt different models of GPS antenna, so the GPS antenna may not be the same

as above figure. But the installation steps that fix it on the gNB is the same.

### 3.4 Install on Pole

Check to ensure the diameter of the pole is in the range of 1.6 inches to 3.9 inches (40mm to 100mm). The position of the gNB on the pole should be at least 47 inches (120cm) in height, as shown in Figure 3-4.

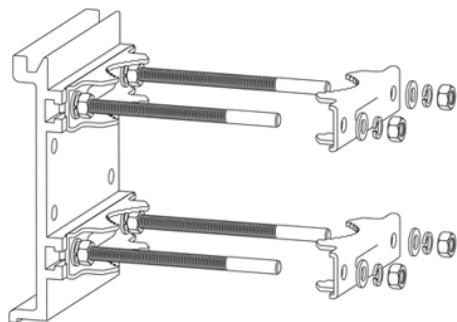
Figure 3-4 Installation Height



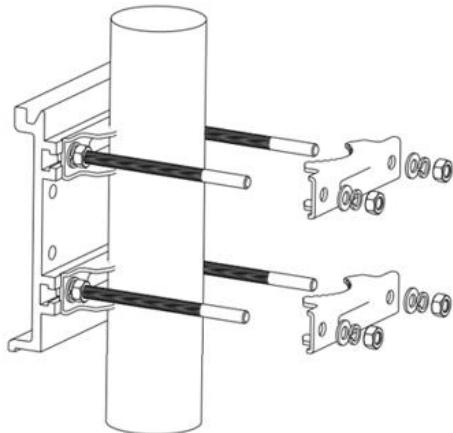
The brackets have been pre-assembled in manufacturing before packing. It includes two parts, one is pre-assembled on the back of the device.

Following will introduce how to fix the pre-assembled gNB on a pole.

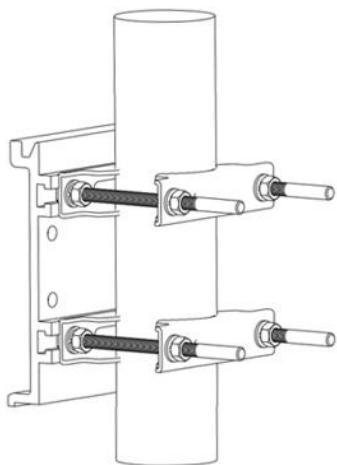
1. Take apart two clamps from the assembled bracket.



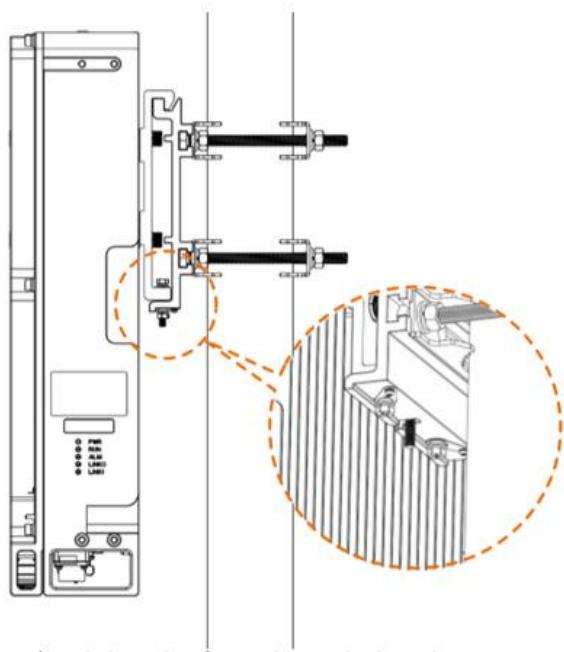
2. Put the bracket against the pole and assemble two clamps back, note that the sequence of flat washers, spring washers and nuts keep the same with original.



3. Fasten the pole bracket to ensure the bracket is firmly fixed on the pole.



4. Hang the gNB (with bracket) on the pole bracket. Ensure the screw on the bottom of the bracket clip into the groove on the pole bracket and fasten screws on both sides

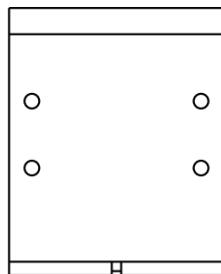


5. The installation is complete, and then proceed to “3.6 Connect Cable”.

### 3.5 Install on Wall

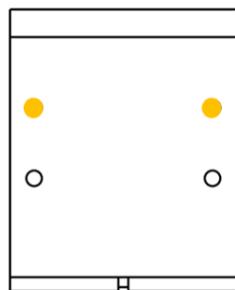
Take apart assembly bracket first, only remains the wall bracket, as shown in Figure 3-5.

Figure 3-5 Wall Bracket



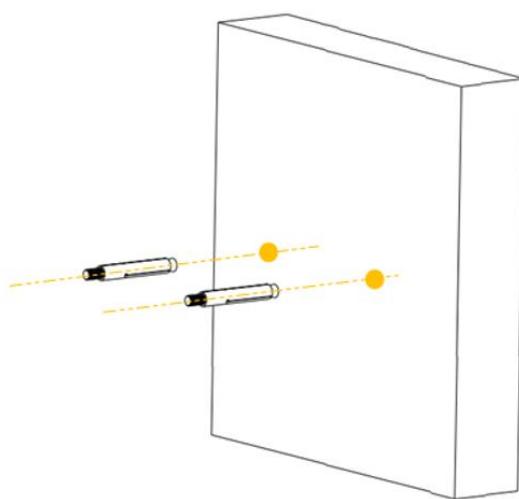
Following will introduce how to fix the pre-assembled gNB on a wall.

1. Put the wall bracket against the wall and mark two drilling locations with a marker pen.

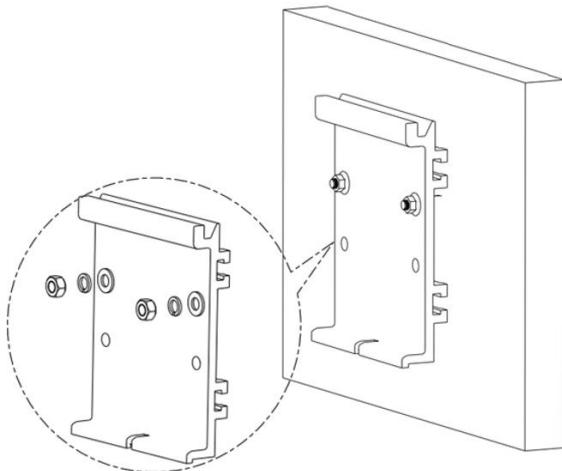


**Caution** that the groove of bracket is at the bottom.

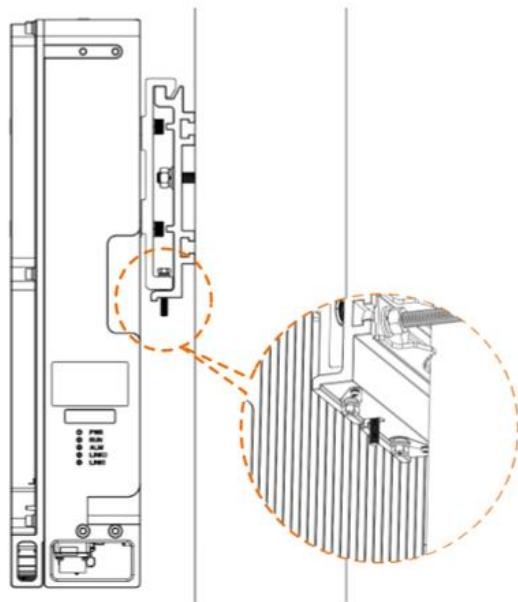
2. Drill two holes at the marked locations and install expansion bolts.



3. Hang the wall bracket on expansion bolts, and fasten with flat washers, spring washers and nuts.



4. Refer pole mounting steps to hang the gNB on the wall bracket.



5. The installation is complete, and then proceed to “3.6 Connect Cable”.

## 3.6 Connect Cables

### 3.6.1 Cable Laying Requirements

#### General requirements:

- Bending radius of feeder cable:  $7/8" > 250\text{mm}$ ,  $4/5" > 380\text{mm}$ .
- Bending radius of jumper cable:  $1/4" > 35\text{mm}$ ,  $1/2" \text{ (super soft)} > 50\text{mm}$ ,  $1/2" \text{ (ordinary)} > 127\text{mm}$ .
- Bending radius of power cable and grounding cable:  $>$  tripled of the diameter of the cable.

---

- The minimum bend radius of the optical fiber is 20 times the diameter of the optical fiber.
- Bind the cables according to the type of the cable, intertwining and crossing are forbidden.
- An identification label should be attached after the cable is laid.

**Optical fiber laying requirements:**

- Avoid circling and twisting during the laying.
- Avoid binding on a turn.
- Avoid pulling and weighing down the optical fiber.
- The redundant optical fiber must be wound around the dedicated device.

**Grounding laying requirements:**

- The grounding cable must connect to the grounding point.
- The grounding cable must be separated from the signal cables, of enough distance to avoid signal interference.

### 3.6.2 Connect GPS Antenna Cable

The top of the GPS antenna should avoid the frontal position of the directional antenna as far as possible. In the case of obstruction, it is recommended to pull away and install the GPS antenna, that is, the GPS antenna be installed in an open and lightning protected position.

1. Pass the GPS jumper through a cold shrink tube.
2. Connect one end of the GPS jumper to the GPS interface and fasten.
3. Push the cold shrink tube to the top joint, then pull out the strip.
4. Take out another cold shrink tube, and pass through the GPS jumper from the other end.

**NOTE:** Baicells does not provide the waterproof materials for the peer, therefore customers need to prepare and carry out the waterproof operation by themselves.

5. Connect the other end of the GPS jumper to the GPS antenna and fasten.
6. Push the cold shrink tube to the GPS antenna joint, then pull out the strip.

### 3.6.3 Connect RF Cables



#### CAUTION:

It is strictly prohibited to activate the cell and transmit RF if the antenna feed system is not connected properly. The wireless signal transmission power of the outdoor gNBs is large, if the gNB transmits without the antenna feed system, which may cause injury to the body of the construction personnel and the damage of RF power amplifier devices.

1. Take off dust caps of the **ANT0** and **ANT3** interfaces.
2. Pass one end of the RF cable through a cold shrink tube.
3. Connect RF cables to the **ANT0** and **ANT3** interfaces on the gNB, then tighten them with wrench.
4. Push the cold shrink tube to the top joint and pull out the strip.
5. Take out another cold shrink tube, and pass through the RF cable from the other end.
6. Connect the other end of the RF cables to the external antenna.
7. Push the cold shrink tube to the antenna connector, then pull out the strip.

**NOTE:** The external antenna side interface at the other end of the feeder also needs waterproof treatment. Baicells does not provide the waterproof materials for this part, so customers need to prepare and carry out waterproof operation by themselves.

### 3.6.4 Connect Ethernet Cable

Based on network planning, choose to use the optical port (OPT0) or the network port (ETH0) to connect to the core network for data backhaul.

1. The Ethernet cable uses weatherproof connector for protection. Pass the Ethernet cable through the components of the waterproof connector, the connection order is shown in Figure 3-6.

Figure 3-6 Connection Order for Ethernet Cable



2. Connect the other end of the network cable to the switch.

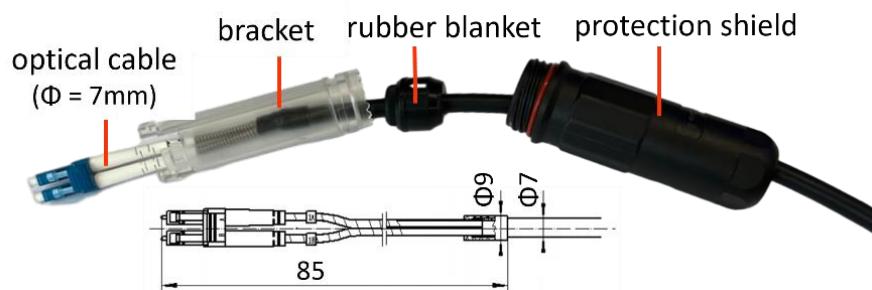
**CAUTION:** The connection sequence of optical fibers/network cables and power cables must be strictly the same as that of optical fibers and then power cables.

### 3.6.5 Connect Optical Cable

Based on network planning, choose to use the optical port (OPT0) or the network port (ETH0) to connect to the core network for data backhaul.

1. The optical cable uses weatherproof connector for protection. Pass the optical cable through the components of the waterproof connector, the connection sequence is shown in Figure 3-7.

Figure 3-7 Connection Order for Optical Cable



The redundant optical cable should enwind neatly.

2. The other end connector the optical fiber rack.

### 3.6.6 Connect Power Cable

The power cable must meet the following requirements.

- It is recommended to install an air switch in the distribution box for lightning protection and leakage protection, or a socket or plug with a fuse.
- The power cord needs to be protected by a hose sleeve or wiring tube.
- The distribution box should be grounding and have leakage protection.
- The length of power cord must be kept below 330 ft/100m.

Since the length of cable needed for power supply varies from site to site, the customer needs to make the power cable according to the actual measurements of the installation site. Strip .47in/12mm insulating layer with a wire stripper to reserve the conductor for connection.

The connection steps for the power cable are as follows.

1. Assemble the power plug on the power supply side.

The eNB adopts -48VDC power supply. The power plug should be self-prepared by the customer according to the local standards. Refer to the sign and instructions on the plug assemble the plug.

## 2. Assemble the power plug on the eNB side.

- The power cable uses weatherproof connector for protection. Pass the power cable through the components of the waterproof connector, the connection sequence is shown in Figure 3-8..

Figure 3-8 Connection Sequence for Power Cables



There are two types of waterproof rubber gasket. 14mm~16mm is suitable for AWG11 and above cable. When the power adapter is used, use 10mm~13mm waterproof rubber gasket, because the power adapter outlet cable is thinner.

- Refer to Figure 3-9 to connect the positive wire and negative wire.

Figure 3-9 Power Terminal



## 3. Connect the power cable to the **PWR** interface in the wiring cavity.

### 4. The other end connects to a reliable DC power supply.

If the power plug is outdoors, note that above requirements for power distribution box.

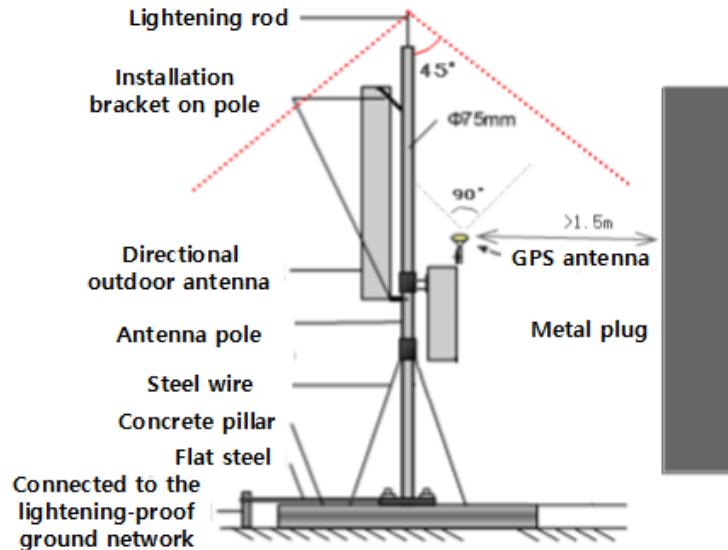
## 3.6.7 Connect Ground Cable

### 3.6.7.1 Pole Grounding

The purpose of the pole grounding is to protect the equipment in the station from the damage of lightning overvoltage as far as possible. However, the interfaces between the gNB and the outside world mainly include power system, grounding system, antenna

feeder and lightning receiving device, and signal line. Therefore, the damage caused by lightning mainly comes from the voltage difference between the equipment in the gNB and one or more of the four interfaces. The pole grounding is shown in Figure 3-10.

Figure 3-10 Pole Grounding



1. The installation position of the grounding bar shall meet the design requirements. The holding pole and tower body must be connected to the lightning protection network or grounded with a separate lead.
2. The diameter of the grounding wire meets the design requirements. The copper nose must be used for grounding, and the grounding resistance is required to be less than 10 ohms. If the resistance of the public network communication equipment placed in other systems is less than 10 ohms, the grounding network of the system should be overlapped.
3. The grounding wire must be the whole wire material. When laying, it should be bound separately with other cables. All grounding wires should be fixed with wire code or binding tape with a fixed spacing of 0.3m. The appearance should be straight and beautiful.
4. The copper bar must be used for the grounding bar, and the specification of the grounding bar shall meet the design requirements. If there are no specific requirements in the design, 300mm × 40mm × 4mm and fixed with expansion bolts.
5. The grounding wire must be made of the whole cable material, the intermediate joint is strictly prohibited, and the excess length should be cut. The skin shall be complete, and the insulation resistance of the core wire to the ground (or metal isolation layer) shall meet the technical requirements of the cable.
6. The grounding wire shall be connected to the integrated grounding bar of the building. If it is impossible to connect to the integrated grounding bar of the building,

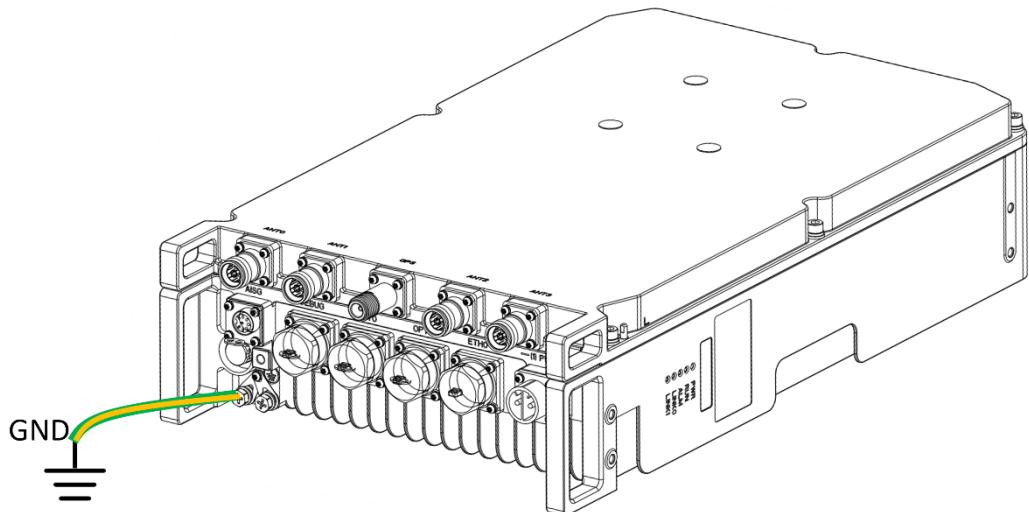
the appropriate grounding point can be selected according to the integrated grounding situation of the indoor building. The selection of grounding point must be higher than the grounding grid, and the feeder grounding shall be towards the downward direction of the feeder, never upward.

7. The grounding electrode of the self-built grounding grid for the outdoor antenna of the tunnel must meet the design requirements. The buried depth of the grounding electrode and the welding quality of the flat iron meet the specification requirements. In principle, the buried depth of the grounding electrode shall not be less than 0.7m. The non-self-built grounding network shall be connected to the grounding network of the owner.
8. The gNB grounding, power adapter grounding, distribution box grounding and feeder grounding must be connected to the grounding bar independently, and the grounding bar must have a path from the lead to the earth.

### 3.6.7.2 gNB Grounding

Prepare the grounding cable according to the actual measurements and requirements of the specific installation site. The Aurora454 has two grounding screws located on the bottom of the unit (Figure 3-11). Follow the steps below the figure to connect the ground cable.

Figure 3-11 Grounding Screws



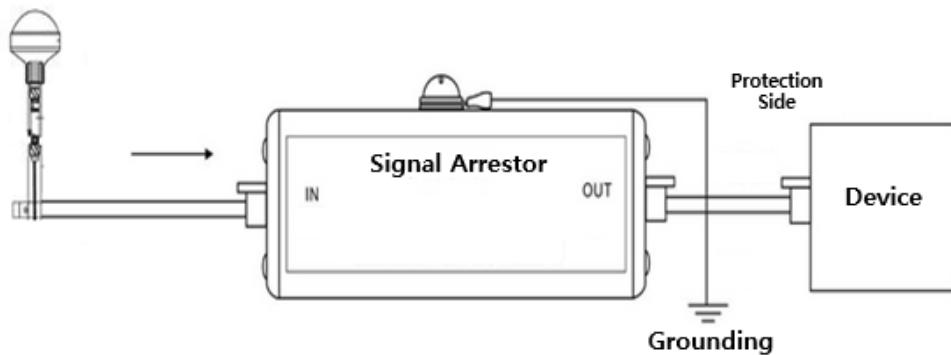
1. Unscrew one grounding screw, connect one end of the ground cable to the grounding screw, and fasten it again.
2. Repeat step 1 for the second grounding screw.

Once the gNB is installed at the outdoor location, the other end of the ground cable needs to connect to a good grounding point.

### 3.6.7.3 GPS Antenna Grounding

If the length of GPS antenna is more than 5 meters, it is recommended to extend the installation distance. It is suggested to carry out lightning protection of GPS antenna, add lightning protector, and connect the lightning protector to the grounding bar, as shown in Figure 3-12.

Figure 3-12 GPS Grounding



## 3.7 Power on to Check LED Status

Power on the gNB, then wait a few minutes while the gNB boots up. Per the previous Table 1-2 in “1.3 Appearance”, check that the LED indicators are lighting as expected.

## 4. Attentions

### 4.1 FAQ

1. After the device is connected to the power line, the PWR of the device will not be displayed when it is powered on.
  - 1) Maybe the power line is not connected well, and the contact is poor.
  - 2) There is no power in the circuit.
  - 3) Reverse connection of DC wire.
  - 4) The adapter does not work.
  - 5) Poor contact of equipment power interface.
2. How to connect the antenna feeder
  - 1) ANT0 is the main channel and ANT3 is the secondary channel.
3. GPS has been out of sync
  - 1) The antenna is not installed in an open place.
  - 2) The antenna is blocked, which affects the search.
  - 3) There are strong interference sources around the installation location, such as large transformer station and high-power motor fan.
  - 4) Installed under the front cover of wireless antenna, strong signal interference and so on.
  - 5) GPS satellite search is slow and takes a long time. The number of satellites and signal strength can be observed in the maintenance page.
4. How to choose the position of holding pole in the roof
  - 1) Not near the edge.
  - 2) The position of non-bearing beam cannot be selected.
  - 3) Do not choose the side close to the barrier, you need to choose the most open position.
5. The coverage of gNB signal is not ideal after opening
  - 1) Check if the power is full in the base station configuration.
  - 2) Check whether the equipment has standing wave alarm. If there is any alarm, please handle it in time.

---

- 3) Check whether the RF frequency band of the equipment is consistent with that of the antenna.
- 4) Check whether the dip angle planning of the base station is reasonable.
- 5) Whether there is blocking in antenna coverage direct vision.

## 4.2 Common Installation Errors

 A close-up photograph of a white rectangular electronic device mounted on a wall. A blue cable is connected to it. A large red 'X' is overlaid on the image, indicating a mistake.	 A photograph showing a bundle of black cables and wires connected to a white cylindrical antenna. A large red 'X' is overlaid on the image, indicating a mistake.
GPS antenna blocked	Disordered wiring
 A photograph of a metal pole standing in a construction area with debris on the ground. Two red circles highlight the base of the pole and a lightning rod. A large red 'X' is overlaid on the image, indicating a mistake.	 A photograph of a tall metal pole with multiple white rectangular antennas mounted on it. A large red 'X' is overlaid on the image, indicating a mistake.
The holding pole lightning rod is not led to the ground bar	The GPS antenna is mounted on the front of the RF antenna

	
Without the lightning rod	Disordered wiring of distribution box
	
Power line and signal cable are crossed	Multiply the grounding point
	
The RF feed system does not connect, the cell is activated and RF transmits signal	

## Appendix A Terminology & Acronym

Acronym	Full Name
ANR	Automatic Neighbor Relations
ARQ	Automatic Repeat Request
CA	Carrier Aggregation
CC	Component Carriers
CSFB	Circuit Switched Fallback
DC	Dual Carrier
EPC	Evolved Packet Core network
GPS	Global Positioning System
HARQ	Hybrid Automatic Repeat Request
IPsec	Internet Protocol Security
MIMO	Multi Input Multi Output
MME	Mobility Management Entity
MOCN	Multi-Operator Core Network
NLOS	Non-Line-of-Sight
OPEX	Operating Expense
PAP	Password Authentication Protocol
PCI	Physical Cell Identifier
PLMN	Public Land Mobile Network
QAM	Quadrature Amplitude Modulation
QCI	QoS Class Identifiers
QoS	Quality of Service
QPSK	Quadrature Phase Shift Keying
RSRP	Reference Signal Receiving Power
SSH	Secure Shell

Acronym	Full Name
SON	Self-Organized Network
TAC	Tracking Area Code