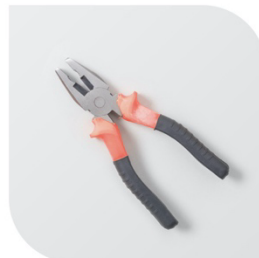


Aurora249

Outdoor 2x40W gNB

Installation Guide



About This Document

This document is intended for personnel who will be installing the Baicells Aurora249 Outdoor 2x40W 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.

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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
15 June,2024	01	Initial Released.	Zhang Zhongfen	Yang Yanan

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1. Overview

1.1 Introduction

The Baicells Aurora249 is an advanced outdoor 5G Sub-6G integrated base station (gNB), which is designed and developed based on Qualcomm 5G SoC solution. This 2x40W gNB is low power consumption, subminiature and easy to maintenance.

The gNB 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.

The gNB is easy to deploy and flexible to configure, which satisfies the outdoor wireless network capacity and coverage requirements well. It can be widely used in telecom operators, broadband operators, enterprises and other scenarios.

1.2 Highlights

- Standard NR Bands n40/n41/n78
- Comply with 3GPP Release 15 and Release 16
- GUI-based local and remote Web management
- Supports 100MHz bandwidth
- Peak rate: Up to DL 850Mbps and UL 660Mbps
- Supports 1200 users
- Supports Stand Alone (SA) mode
- Supports F1 setting*
- Supports SCTP control (IKE SCTP)
- Supports embedded 5G core (HaloB)
- Integrated small cell form factor for quick and easy installation
- Supports flexible xHaul
- Highly secured with equipment certification against potential intrusion risk

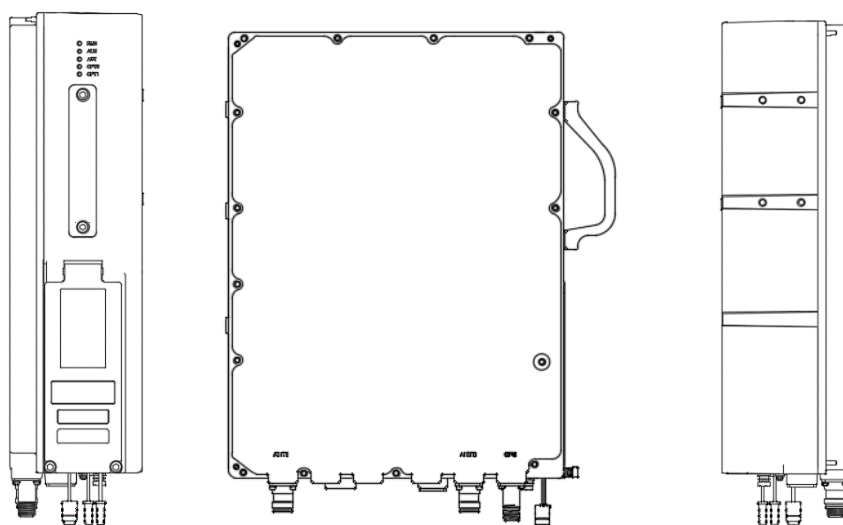
- Supports TR-069 network management interface
- Lower power consumption, which reduces OPEX, can be powered easily by Baicells compact outdoor smart UPS

* Planned for future release

1.3 Appearance

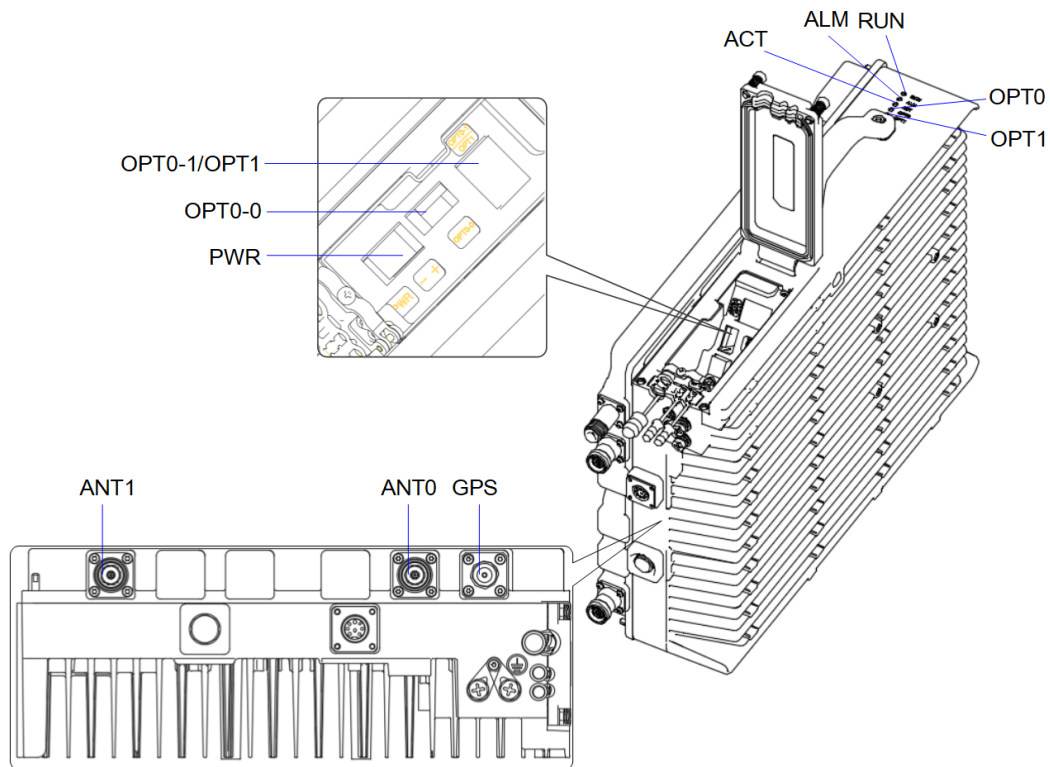
The appearance of Aurora249 is shown in Figure 1-1.

Figure 1-1 Aurora249 Appearance



The interfaces and indicators Aurora249 are shown in Figure 1-2.

Figure 1-2 Aurora249 Interfaces and Indicators



The Aurora249 interfaces are described in Table 1-1.

Table 1-1 Aurora249 Interface Description

Interface	Description
OPT0-1	10GE Optical interface 1 (SFP+), connect to external transmission network, used for data backhaul.
OPT1	10GE Optical interface 1 (SFP+), used for cascading.
OPT0-0	1GE Optical interface 1 (SFP), connect to external transmission network, used for data backhaul.
PWR	Power interface: -48VDC (-40VDC to -57VDC)
ANT1	RF antenna interface 1, N type connector
ANT0	RF antenna interface 0, N type connector.
GPS	GPS antenna interface, N type connector

The Aurora249 interface indicators are described in Table 1-2.

Table 1-2 Aurora249 Interface Indicators

Identity	Color	Status	Description
RUN	Green	Steady ON	The device is powered on.
		Slow flash: 1s on, 1s off	The device operates normally.
		Fast flash: 0.125s on, 0.125s off	The device is starting up.
		OFF	No power supply or device fault
ALM	Red	Steady ON	The device exists alarm.
		OFF	No alarm.
ACT	Green	Steady ON	The device operates normally.
		Fast flash: 1s on, 1s off	The device is starting up. (The transmit channels do not work.)
OPT0	Green/Red	Steady ON (Green)	The data link is normal.
		Steady ON (Red)	The optical transceiver is abnormal, such as the optical fiber disconnection, optical module fault, etc.
		Slow flash: 1s on, 1s off (Red)	The data link is abnormal.
		OFF	The optical module is out of place or powered off.
OPT1	Green/Red	Steady ON (Green)	The data link is normal.
		Steady ON (Red)	The optical transceiver is abnormal, such as the optical fiber disconnection, optical module fault, etc.

		Slow flash: 1s on,1s off (Red)	The data link is abnormal.
		OFF	The optical module is out of place or powered off.

1.4 Technical Specification

1.4.1 Technology

Item	Description
Standard	5G NR TDD (3GPP R15 and R16 compliant)
TDD UL/DL Configuration	5ms periodicity ($\mu=1$): DDDDD+DDSUU 5ms periodicity ($\mu=1$): DDDDD+SUUUU 2.5ms dual periodicity ($\mu=1$): DDDSU+DDSUU 2.5ms single periodicity ($\mu=1$): DDDSU*, DSUUU
Frequency Band	n40 (2350 MHz – 2390 MHz) n41 (2515 MHz – 2615 MHz) / (2590 MHz – 2690 MHz) n78 (3400 MHz – 3500 MHz)/ (3500 MHz – 3600 MHz)/ (3700 MHz – 3800 MHz)
Channel Bandwidth	n40: 30/40MHz n41: 10/20/30/40/50/60/70/80/90/100 MHz n78: 10/20/30/40/50/60/70/80/90/100 MHz
Multiplexing	2x2 MIMO (DL: 2L, UL: 2L)
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 1GE optical interface (SFP) 2 x 10GE optical interface (SFP+)
Power Supply	-40VDC ~ -57VDC, nominal -48VDC
Protocols Used	IPv4/IPv6, UDP, TCP, ICMP, NTP, SSH, IPsec, TR-069, HTTP/HTTPs, DHCP
Network Management	IPv4/IPv6, HTTP/HTTPs, TR-069, SSH, Embedded 5GC
VLAN/VxLAN	802.IQ/VxLAN
LED Indicators	5 x status LED RUN/ACT/ALM/OPT0/OPT1
RF Antenna	2T2R external high gain antenna with N-Type connectors, or integrated antenna
GPS Antenna	External GPS antenna, N-Type connector

1.4.3 Performance

Item	Description		
Peak Data Rate	100 MHz	DL (Mbps)	UL (Mbps)
	5ms periodicity (DDDDDD+DDSUU ,6:4:4)	850	230
	5ms periodicity (DDDDDD+SUUUU ,6:4:4)*	525	400
	2.5ms dual periodicity (DDDSU+DDSUU, 10:2:2)	720	330

Item	Description		
	2.5ms single periodicity (DDDSU, 10:2:2)*	850	230
	2.5ms single periodicity (DSUUU, 10:2:2)	380	660
User Capacity	Up to 1200 users		
MAX Deployment Range	5km		
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	37 to 46 dBm per channel (combined +43dBm, configurable) (1 dB interval)		
Quality of Service	Complied with 3GPP standard 5G QoS Identifier (5QI)		
ARQ/HARQ	Supported		
Synchronization	GPS		

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/EPS-FB
SON	Self-Organizing Network Automatic Neighbor Relation (ANR)

Item	Description
	• PCI confliction detection
Traffic Offload	Local breakout
Maintenance	• Local/Remote Web maintenance • Online status management • Performance statistics • Fault management • Local/Remote software upgrade • Logging • Connectivity diagnosis • Auto setup

1.4.5 Link Budget

Item	Description
VSWR	≤ 1.5
EIRP	Antenna gain = G $ERIP = (49 + G) \text{ dBm} / 100 \text{ MHz}$
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: $\pm 10 \text{ KA}$ Common mode: $\pm 20 \text{ KA}$

Item	Description
MTBF	≥ 150000 hours
MTTR	≤ 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
Humidity	5% to 95% RH
Atmospheric Pressure	70 kPa to 106 kPa
Power Consumption	Maximum 360W
Weight	34.2lbs/15.5kg
Dimensions (HxWxD)	16.5 x 12.4 x 4.8 inches/420 X 315 X 123 millimeters
Installation	Pole or wall mount

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 ± 1mm.
Optical module		SFP optical module

Item	Figure	Description
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 16mm ² cross section should be used. If the length of lead is less than 10 meters, a ground cable with 10mm ² cross section should be used.
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

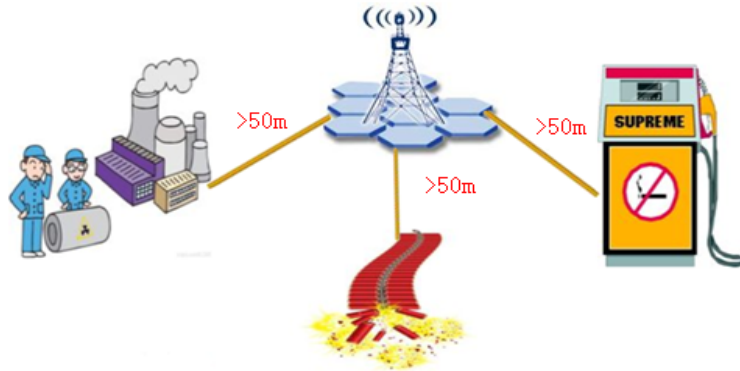
1. The installation personnel must master the basic safe operation knowledge, through the training, and having the corresponding qualifications.
2. Before installation, the installation personnel must be prepared with safety protection, such as: safety helmet, safety belt, reflective clothing, gloves, 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

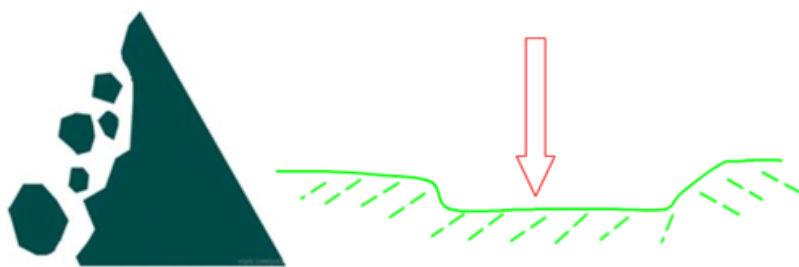
locations that fire and explosion are easy to happen during production. Do not install gNBs near dangerous industries and enterprises. Stay away from high voltage lines and railroads.



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 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%

Item	Range	Typical value
Safety DC voltage	-57VDC to -42VDC	-48VDC

2.5 Lightning & 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 10mm² 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



CAUTION: Ensure the cold shrink tube remains intact and is not cut for use.

3. Installation

3.1 Unpacking

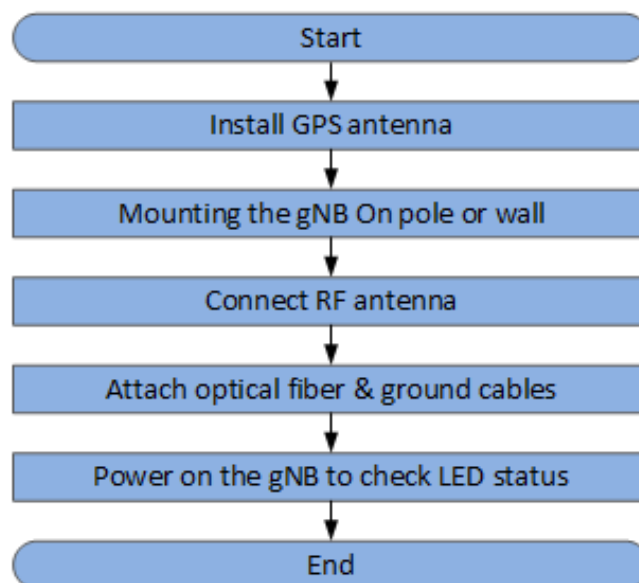
Before opening the box, make sure the package is in good condition, undamaged and not wet. During the unpacking, avoid potential damaging impacts from hits or excessive force.

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.

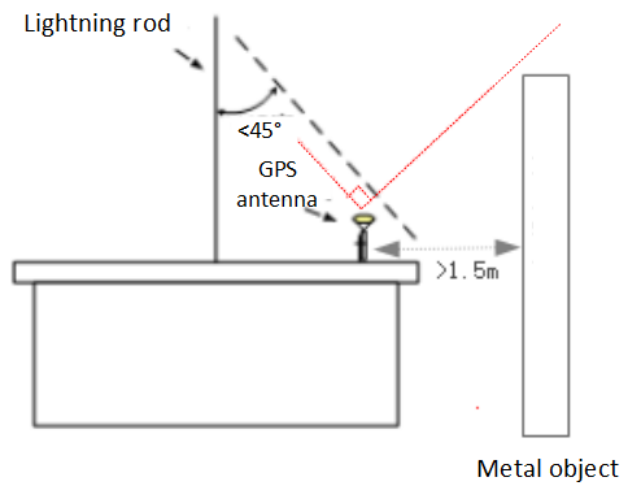
Figure 3-1 Installation Process



3.3 Install GPS Antenna

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

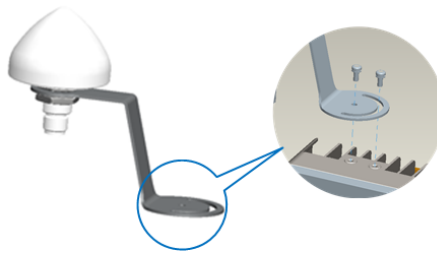
Figure 3-2 GPS Installation Requirements



- 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

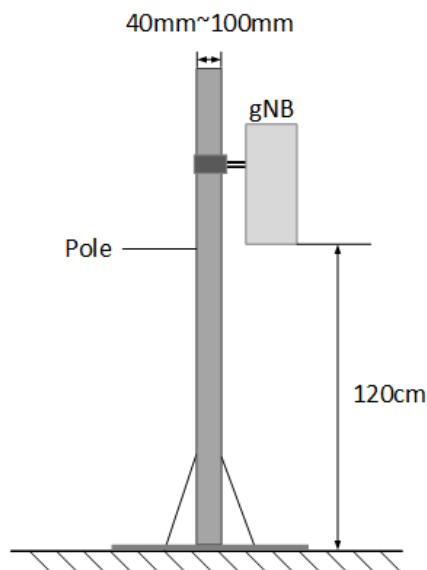


NOTE: The gNB may adopt different models of GPS antenna, so the GPS antenna may not be the same as above figure. But the installation steps that fix it on the gNB is the same.

3.4 Install on Pole

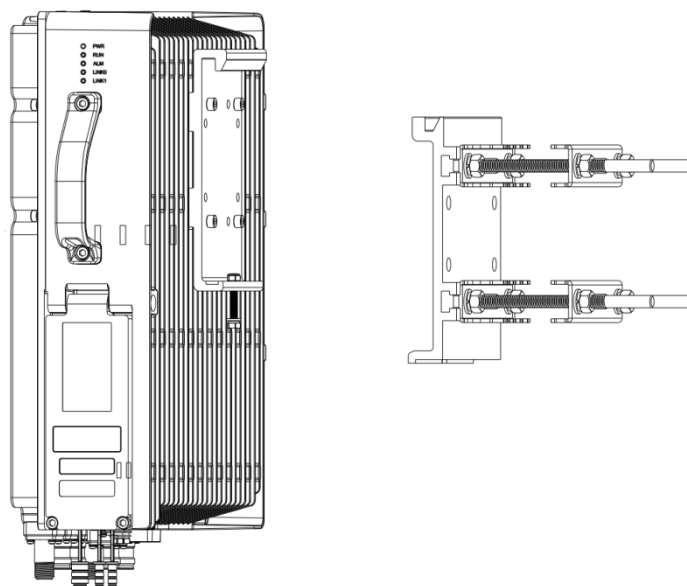
Check to ensure the diameter of the pole is in the range of 1.6 inches to 3.9 inches (40mm to 100mm). The position of the gNB on the pole should be at least 47 inches (120cm) in height, as shown in Figure 3-4.

Figure 3-4 Installation Height



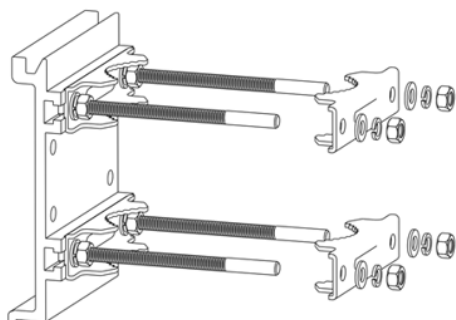
The brackets have been pre-assembled in manufacturing before packing. It includes two parts, one is pre-assembled on the back of the device. The other is for pole mounting or wall mounting, as shown in Figure 3-5.

Figure 3-5 Pre-assembled Device

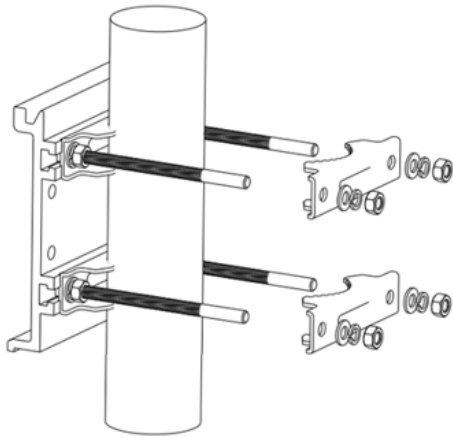


Following will introduce how to fix the pre-assembled gNB on a pole.

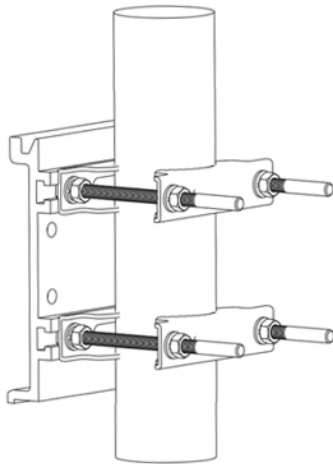
1. Take apart two clamps from the assembled bracket.



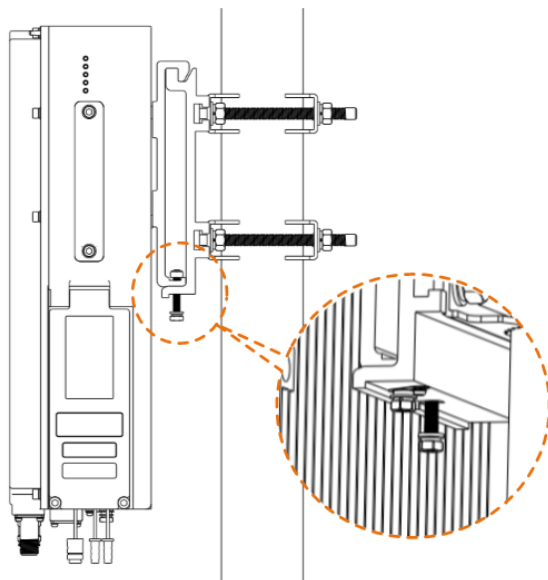
2. Put the bracket against the pole and assemble two clamps back, note that the sequence of flat washers, spring washers and nuts keep the same with original.



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 it. Next, plug the screw on the pole bracket into the hole on the joint and fasten it.

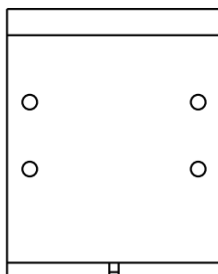


5. The installation is complete, and proceed to “3.6 Connect Cable”.

3.5 Install on Wall

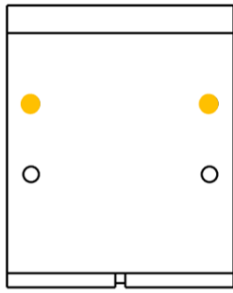
Take apart assembly bracket first, only remains the wall bracket, as shown in Figure 3-6.

Figure 3-6 Wall Bracket



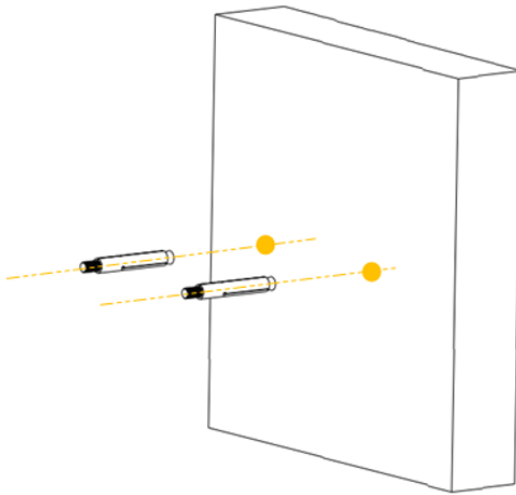
Following will introduce how to fix the pre-assembled gNB on a wall.

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

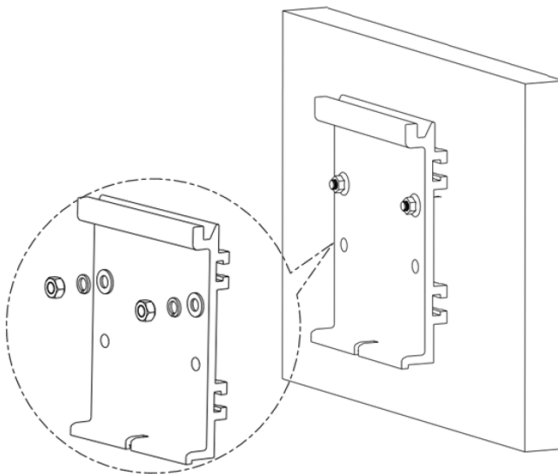


Caution that the groove of bracket is at the bottom.

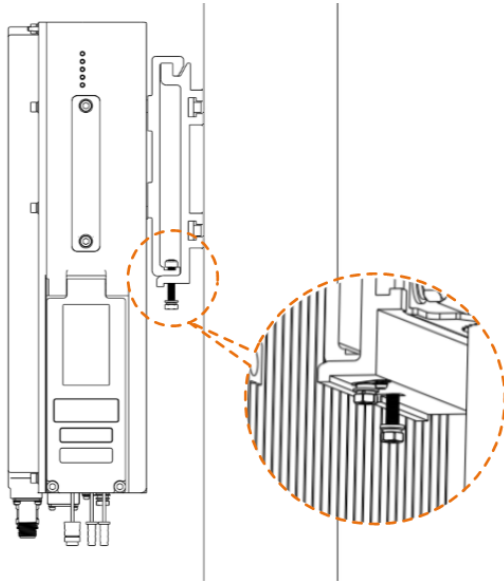
2. Drill two holes at the marked locations and install expansion bolts.



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 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" > 250mm, 4/5" > 380mm.
- Bending radius of jumper cable: 1/4" > 35mm, 1/2" (super soft) > 50mm, 1/2" (ordinary) > 127mm.
- Bending radius of power cable and grounding cable: > tripled of the diameter of the cable.
- The minimum bend radius of the optical fiber is the 20 times the diameter of the optical fiber.
- Bind the cables according 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 unwind the dedicated device.

Grounding laying requirements:

- The grounding cable must connect to the grounding point.
- The grounding cable must be separate with 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, and 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, and 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 **ANT1** interfaces.
2. Pass one end of the RF cable through a cold shrink tube.
3. Connect RF cables to the **ANT0** and **ANT1** interfaces on the gNB, and 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.

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

6. Connect the other end of the RF cables to the external antenna.
7. Push the cold shrink tube to the antenna connector, and pull out the strip.

3.6.4 Connect Optical Fiber Cable

The optical interface is located in the gNB's wiring cavity. First, you should unscrew screws on the cover of the gNB's wiring cavity and open the wiring cavity.

1. Connect the optical fiber to **OPT0-0**, **OPT0-1**, **OPT1** interface in the wiring cavity.
2. Lay the optical fiber along the wire groove, and stretch out the wiring cavity from optical fiber hole respectively.

The redundant optical fiber should enwind neatly.

3. Connect the other end of the optical fiber to the optical distribution frame.

CAUTION: The optical fiber must be connected first, and then connect the power cable.

3.6.5 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.
- Both the length of the AC power cord and the DC 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 need 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 power plug should be self-prepared by the customer according to the local standards.

- If the DC power supply is adopted, assemble the plug according to the sign and instructions on the plug.
- If the AC power supply is adopted, the power adaptor must be used. The power plug of the power side is installed at the input direction. Refer to the labels on the power plug for connecting the live wire, neutral wire, and ground wire to the corresponding terminals separately, and tighten the screws.

The power adaptor is shown in the following figure.



ATTENTION: If the power adaptor is used, it must be connect to a surge arrester and grounding. It must be placed in a waterproof distribution box.

2. Assemble the power terminal on the gNB side.

The input voltage of the gNB is -48VDC. Refer to the labels on the power terminal for connecting the positive terminal (+) and negative terminal (-) to the

corresponding terminals separately, and tighten the screws.



Before connecting the live and neutral cables, arrange the live and neutral cables separately using VE6012 terminals, as shown in Figure 3-7. The brown terminal is used for the positive terminal (+), and the blue terminal is used for the negative terminal (-).

Figure 3-7 Crimping Cables



NOTE: If the power supply is AC, the power terminal on the gNB side is installed on the output direction of the adaptor.

3. Connect the power cable to the **PWR** interface in the wiring cavity.
4. The power cable lays along the lint slot, and stretch out the wiring cavity from the **PWR** hole.
5. (Optional) The input of the power adaptor connects to the outlet.

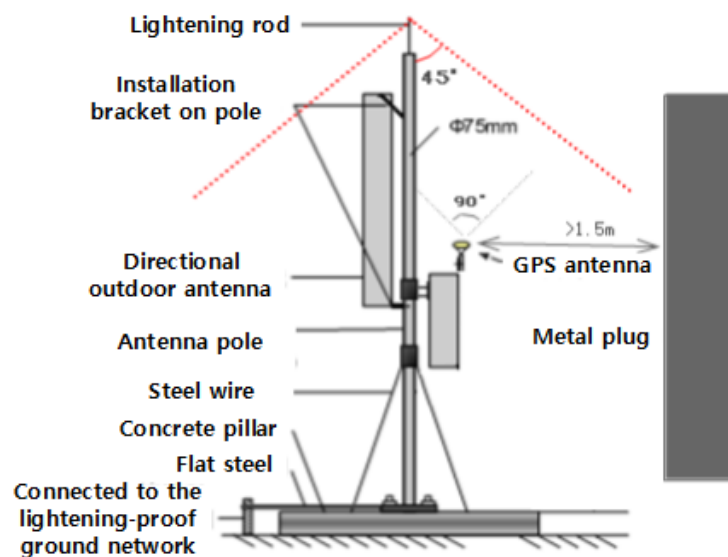
- If the outlet is indoors, place the power adaptor indoors.
 - If the outlet is outdoors, place the power adaptor in a waterproof box.
6. After the cable connection is complete in the wiring cavity, tighten the screws on the cover to close the wiring cavity using M4 cross screwdriver.

3.6.6 Connect Ground Cable

3.6.6.1 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 3-8.

Figure 3-8 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.

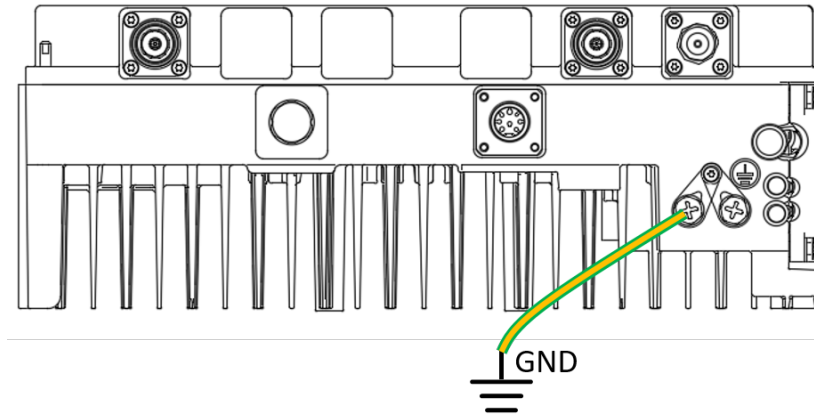
3. The grounding wire must be the whole wire material. When laying, it should be bound separately with other cables. All grounding wires should be fixed with wire code or binding tape with a fixed spacing of 0.3m. The appearance should be straight and beautiful.
4. The copper bar must be used for the 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.

3.6.6.2 gNB Grounding

Prepare the grounding cable according to the actual measurements and requirements of

the specific installation site. The Aurora249 has two grounding screws located on the bottom of the unit (Figure 3-9). Follow the steps below the figure to connect the ground cable.

Figure 3-9 Grounding Screws



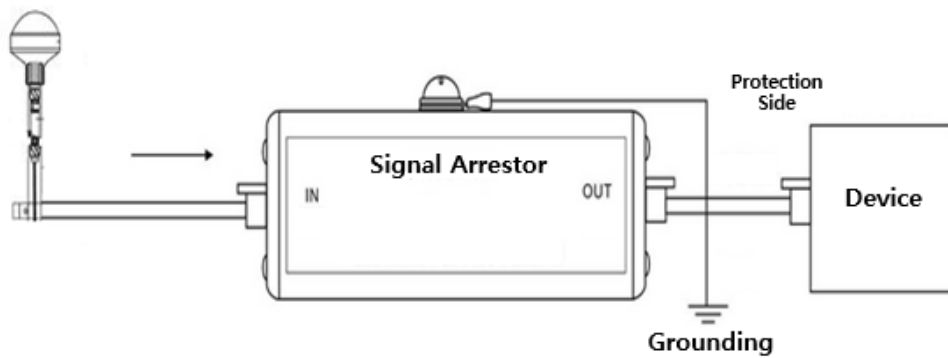
1. Unscrew one grounding screw, connect one end of the ground cable to the grounding screw, and fasten it again.
2. Repeat step 1 for the second grounding screw.

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

3.6.6.3 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 3-10.

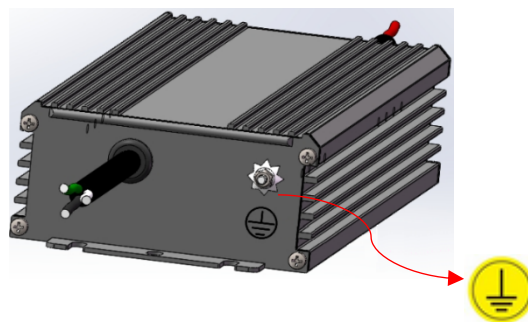
Figure 3-10 GPS Grounding



3.6.6.4 (Optional) Power Adapter Grounding

The adapter ground terminal is connected to the ground bar conforming to the local standard through the ground wire, as shown in Figure 3-11.

Figure 3-11 Power Adapter Grounding



3.7 Maintenance Chamber Waterproofing

When all the installation has been completed, it is necessary to close the maintenance chamber of the equipment and fasten screws to play the role of waterproof at the same time.

1. Clamp the power cord to the wire position and seal the wire diameter $9 \pm 1\text{mm}$.
2. Put the pigtail / network cable on the wire, and seal the wire diameter $7 \pm 1\text{mm}$.

3.8 Power on to Check LED Status

Power on the gNB, and 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 with 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 ANT1 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.
6. If a RET cable is used, no protection is required at the connector, and no cold shrink tube is needed.

4.2 Common Installation Errors

	
GPS antenna blocked	Disordered wiring



The holding pole lightning rod is not led to the ground bar



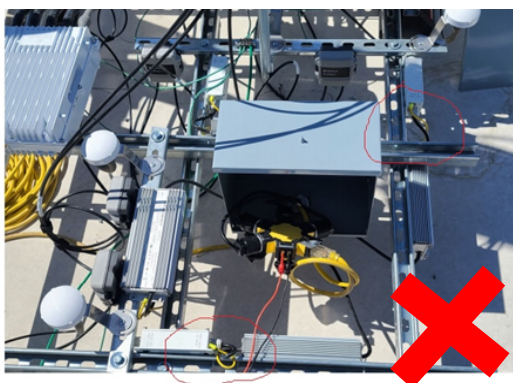
The GPS antenna is mounted on the front of the RF antenna

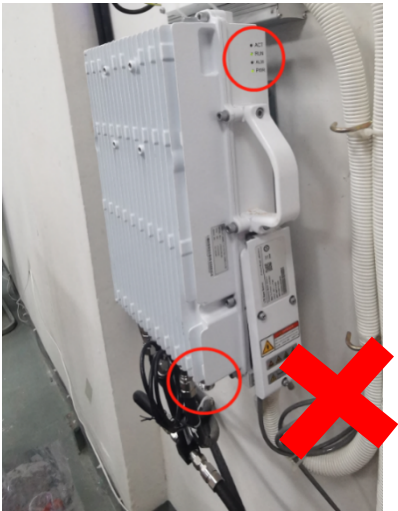


Without the lightning rod



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

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