

Nova-227 OD 2x250mW TDD eNodeB Installation Guide

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About This Document

This document is intended for personnel who will be installing the Baicells Nova-227 Outdoor 2*250mW Time Division Duplexing (TDD) eNodeB (eNB). The information includes preparation of installation tools and materials, guidance on cell site location and other considerations, and procedures for properly installing the eNB. 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
30-Aug-2019	V1.5	Updated capacity info, specs, eNB RTS 3.3.x & OMC 5.0.7 screens, China v02	Jesse Raasch, Sonny May	Sharon Redfoot
31-Aug-2018	V1.4	Updated GUIs	NA	Sharon Redfoot
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17-Nov-2017	V1.1	Initial English version	Yang Yanan Cameron Kilton	Sharon Redfoot
13-Sep-2017	V1.0	Initial China IG	Yang Yanan	

Support Resources

- **Documentation** - Baicells product data sheets, this document, and other technical manuals may be found at Baicells > Resources > [Documentation](#).
- **BaiTips** - The BaiTips, under Baicells > Resources > [BaiTips](#) are where periodic suggestions about how to improve equipment performance are posted.
- **FAQs** - Take advantage of our most frequently asked questions by searching the database under Baicells > Resources > [FAQs](#).
- **Support** - How to open a support ticket or process an RMA, and the Support Forum are at Baicells > [Support](#).

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Safety Information

For the safety of installation personnel and for the protection of the equipment from damage, please read all safety warnings. If you have any questions concerning the warnings, before installing or powering on the eNB contact the Baicells support team.



Warning IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.



Warning Read the installation instructions before you connect the system to its power source.



Warning Installation of the equipment must comply with local and national electrical codes.

 **Warning** This product relies on the existing building or structure for short-circuit (overcurrent) protection. Ensure that the protective device is rated no greater than 20A.

 **Warning** Do not operate this wireless network device near unshielded blasting caps or in an explosive environment unless the device has been modified and qualified for such use.

 **Warning** In order to comply with the United States Federal Communications Commission (FCC) radio frequency (RF) exposure limits, antennas should be located at a minimum of 20 centimeters (7.9 inches) or more from the body of all persons.

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1 Overview

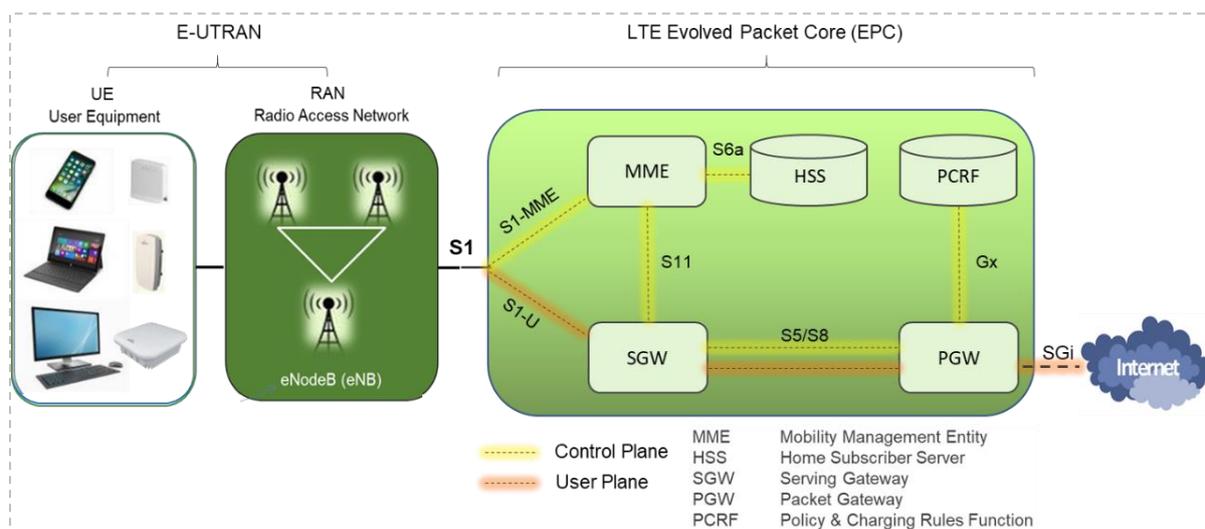
1.1 Introduction

The Baicells Nova-227 Outdoor 2*250mW Time Division Duplexing (TDD) eNodeB (eNB) is an outdoor micro base station that enables wired and wireless broadband access to Long-Term Evolution (LTE) backbone networks (Figure 1–1). The low-cost Nova-227 eNB supports high-speed broadband data and voice services, helping telecom operators, broadband operators, and enterprises to serve customers in locations that might otherwise be difficult to reach.

The eNB is a component of the operator’s cell site and includes an integrated Global Positioning System (GPS). Optionally, the operator may install external GPS antennas with each eNB. The operator selects and provides one omni or directional Radio Frequency (RF) antenna to install with each eNB. Each eNB comes pre-configured so that installation is simplified and connection to the core network is plug-and-play. The Nova-227 also supports Baicells HaloB, which is a license-based optional feature whereby the eNB can operate independently with no connection to the core. For information on HaloB operation, please refer to the [HaloB User Guide](#).

Baicells provides operators with local and Web-based Graphical User Interface (GUI) software applications to configure and manage individual eNBs and Customer Premise Equipment (CPE). Additionally, Baicells offers a Software-as-a-Service (SAAS) solution called CloudCore. CloudCore, also referred to as BaiCloud, handles the LTE Evolved Packet Core (EPC) network functions and provides operators an account to use the Operations Management Console (OMC) for managing multiple sites across the network and the Business and Operations Support System (BOSS) for subscriber management. Local versions of EPC and OMC+BOSS are also available. For information on these options, please contact your Baicells sales representative.

Figure 1–1: LTE Network Architecture



1.2 Features

Key features of the Nova-227 eNB include the following. Front and side drawings of Nova-227 are shown in Figure 1–2.

- Supports standard LTE TDD bands 41/42/43/48; customization may be requested
- Integrated design of baseband and RF processing, saving cost and optimizing power
- 5/10/15/20 MHz operating bandwidth (Model pBS2120 only supports 10/20 MHz)
- Throughput up to 112 Mbps downlink (DL) and as much as 20 Mbps uplink (UL) @ 20 MHz bandwidth. Refer to technical specifications in [Appendix A](#).
- 32 concurrent users; license for 96 users available upon request
- Internal antenna and GPS
- Any IP based backhaul can be used, including public transmission
- PoE+ power supply, requiring only one Ethernet cable for power and data transmission
- Security services to protect against risk and illegal intrusion
- Local and remote Web-based GUI management

Figure 1–2: Nova-227 eNB



2 Installation Preparation

2.1 Personnel & Network Design

Installation personnel should follow standard, industry safety precautions when installing a Baicells Nova-227 eNB. Installers should refer to the operator's network design plan for information about specific network components, RF coverage goals for the specific cell site, IP addressing, and configuration settings.

Before installing, clearly identify the structure on which the eNB equipment will be installed, the intended height where the antenna and eNB will be located, the degree of antenna down tilt, and other necessary specifications that may impact the success of the installation. Consult [regulatory rules](#) concerning output power limits specific to your region.

2.2 Materials & Tools

When determining which RF antenna to use, be sure to match the frequency range of the antenna with the supported frequency range of the eNB.

In addition to standard tools and materials normally used during an installation, refer to Table 2-1 describing cables that will be needed. The cables are available through [Baicells suppliers](#).

Table 2-1: Materials

Item	Description
Ethernet Cable	Outdoor CAT6, shorter than 330 feet (100 meters)
Ground Cable	16mm ² diameter yellow-green wire, minimum 14AWG

You will need a computer and the Ethernet cable to connect to the local maintenance terminal (LMT) on the Nova-227 unit. Through the LMT you can access the eNB GUI to enter basic configuration parameters and check the eNB status in software.

2.3 Form Factor

The Nova-227 eNB has a sleek form factor: 9.8 in (H) x 9.8 in (W) x 3.2 in (D) / 248mm (H) x 248mm (W) x 80mm (D). It weighs only 4.4 lbs (2 kg). Figure 2–1 shows the side LED indicators and interface. The LEDs are explained in Table 2-2, and the interfaces in Table 2-3.

Figure 2–1: LEDs & Interface



In this figure of the LEDs, the eNB is powered on and running but not yet active and has no alarms.

Table 2-2: LEDs

Identity	Color	Status	Description
PWR	Green	Steady on	Power is on
		OFF	No power supply
ACT	Green	Steady on	The cell is activated
		OFF	The cell is not activated
RUN	Green	Fast flash: 0.125s on, 0.125s off	The board is loading
		Slow flash: 1s on, 1s off	The board is normal
		OFF	No power input, or board fault
ALM	Red	Steady on	Hardware alarm, e.g., VSWR
		OFF	No alarm

Table 2-3: Interfaces

Interface Name	Description
ETH/PoE+	RJ-45 interface, used for data configuration or data backhaul, and PoE+ power supply

2.4 Location & Environment

When determining where to place the eNB, you need to consider factors such as climate, hydrology, geology, the possibility of earthquakes, reliable electric power, and transportation access. Refer to the technical specifications in [Appendix A](#).

Avoid locating the eNB in areas where there may be extreme temperatures, harmful gases, unstable voltages, volatile vibrations, loud noises, flames, explosives, or electromagnetic interference (e.g., large radar stations, transformer substations). Avoid areas that are prone to impounded water, soaking, leakage, or condensation.

2.5 Grounding & Lightning Protection

You must protect the eNB, antenna, and GPS against lightning. All Nova eNBs use a floating ground on the power line. Following are guidelines concerning grounding.

- The yellow-green ground wire must be at least 16mm² 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 2–2).

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 2–2: Weatherproofing



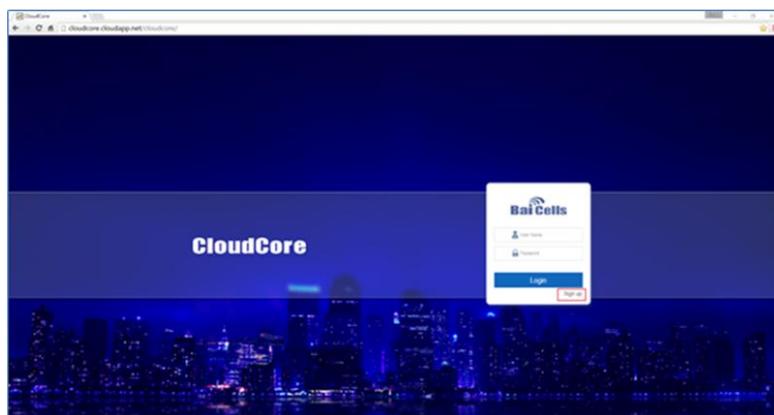
2.7 CloudCore Account

If you have not already set up a Baicells CloudCore account, do the following:

- Step 1: Open a web browser, and enter the CloudCore address (Figure 2–3):

<https://cloudcore.cloudapp.net/cloudcore/>

Figure 2–3: CloudCore Login



- Step 2: Click on the *Sign up* button.

- Step 3: Complete the mandatory fields, and again click on *Sign up*.

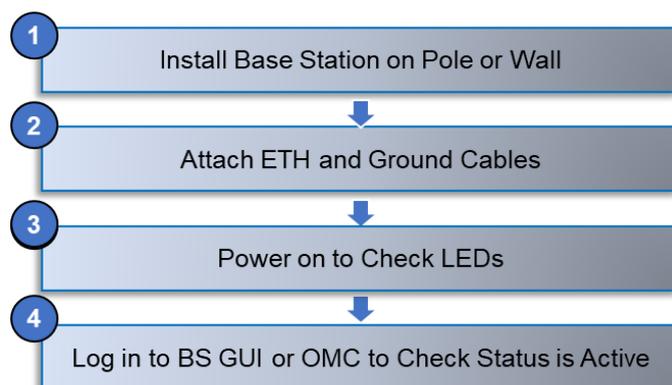
You will receive an email from Baicells. In the email, click on the CloudCore link to go to the login page. Enter your login user name (email address) and password to authenticate. You are all set to start using CloudCore!

3 Installation

3.1 Process Overview

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

Figure 3–1: Installation Process



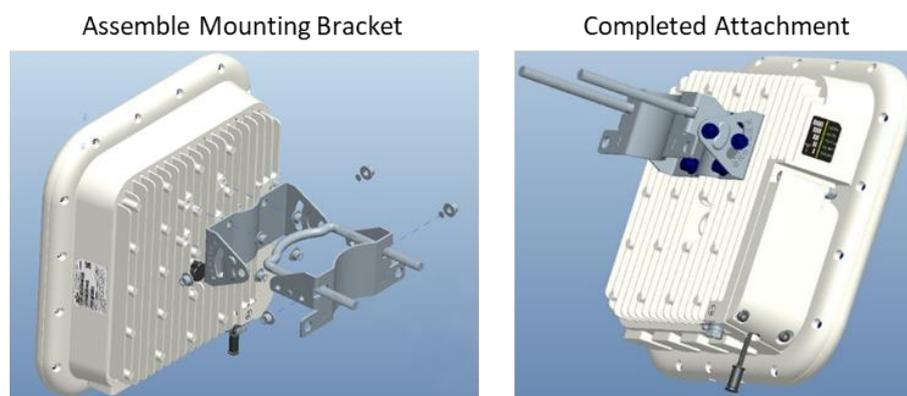
3.2 Install eNB on Pole or Wall

3.2.1 Install on Pole

Check to ensure the diameter of the pole is in the range of 1.6-3.9 inches (40-100 mm). Follow the steps below to install the eNB on a pole.

1. Assemble the mounting bracket, and attach and fasten the screws (Figure 3–2).

Figure 3–2: Mounting Bracket



2. Attach the eNB to the pole, passing the omega through the threaded rods and then loosely fastening the two nuts (Figure 3–3).

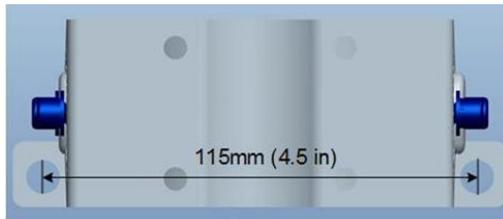
Figure 3–3: Pole Attachment

3. Adjust the eNB to the proper angle based on RF coverage goals, and tighten the screws.

3.2.2 Install on Wall

Ensure that the wall can bear at least 4 times the weight of the eNB. Follow the steps below to install the eNB on the wall.

1. Fit the eNB on the wall, and mark the drilling points (Figure 3–4).

Figure 3–4: Mark Drilling Points

2. Drill four .5 in/12mm diameter and 3.2 in/80mm deep holes in the wall at the marked locations.
3. Check the up/down direction of the installation bracket and then fix the eNB to the wall using M8*80 expansion screws. (The U-shape clamp is not used for wall installations.)
4. Fix the eNB on the bracket using the screws, and adjust it to the proper angle based on RF coverage goals for the site (Figure 3–5).

Figure 3–5: Fix eNB to Bracket, Adjust Angle

3.3 Connect Ethernet Cable

Follow these steps to attach the Ethernet cable to the eNB.

1. Unscrew 3 screws on the cover of the wiring cavity (Figure 3–6) using M4 cross screwdriver, and open the wiring cavity cover.

Figure 3–6: Wiring Cavity

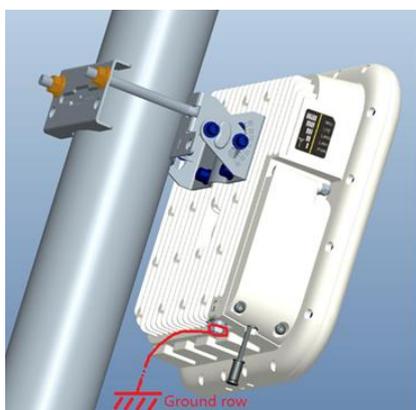


2. Connect the Ethernet cable to the **ETH** interface in the wiring cavity.
3. Lay Ethernet cable along the wire groove, stretching it outside the wiring cavity.
4. The other end of the Ethernet cable connects to the PoE port on the power adaptor. The LAN interface connects to a switch or other LAN device.

3.4 Connect Ground Cable

Prepare the grounding cable according to the actual requirements of the specific site. Refer to specifications given in [section 3.3 Materials and Tools](#). The grounding screw is located on the bottom of the eNB, as shown in Figure 3–7. Unscrew the grounding screw, connect one end of the grounding cable to the grounding screw, and fasten it again. The other end of the ground cable needs to connect to a good grounding point.

Figure 3–7: Grounding Screw



3.5 Power on to Check LEDs

Power on the eNB, and check that the LED indicators are lighting as expected (Figure 3–8): powered on, running, and active with no alarms. Refer to the LED descriptions in [Table 3-3](#).

Figure 3–8: Check LEDs



3.6 Check eNB Status in Software

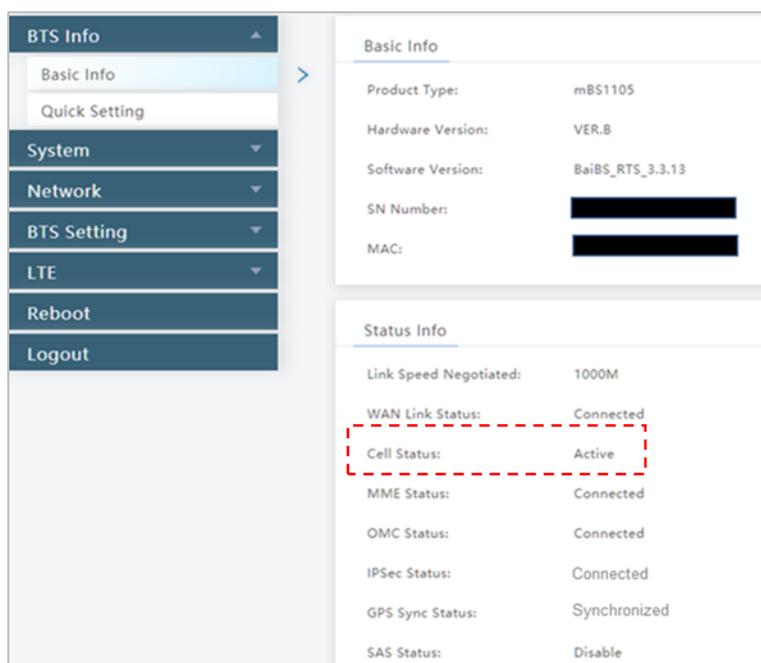
You will need to check that the eNB status is reported as active. There are 3 ways to do this: locally connect your computer to the eNB unit using an Ethernet cable to access the eNB GUI; remotely access the eNB GUI through the Web; or use your operator's account in the OMC. Each method is described below.

3.6.1 eNB GUI

Either locally connected through the LMT or using an Internet browser, go to <http://192.168.150.1>, using username **admin**, password **admin**. Go to the BTS Info > Basic Info window and check the *Cell Status* field, as shown in Figure 3–9. If the status is not reported as active, contact [Baicells support](#).

For additional information concerning the configuration GUI, please refer to the [Baicells Configuration and Network Administration Guide](#) on the Baicells website.

Figure 3–9: Active Status (eNB GUI)

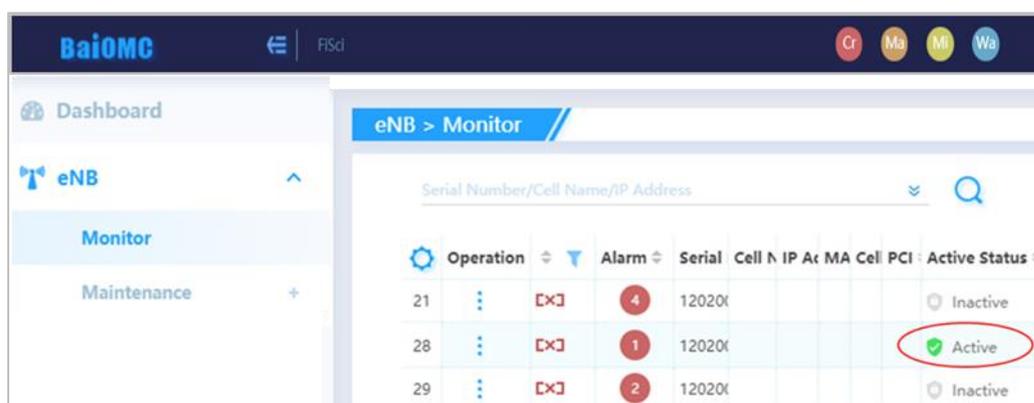


3.6.2 OMC

To check the eNB's status using OMC, follow the steps below.

1. Open a Web browser, and enter the CloudCore address:
<https://cloudcore.cloudapp.net/cloudcore/>
2. Go to eNB > Monitor, and check the *Active Status* field as shown in Figure 3–10. If the status is not reported as active, contact Baicells support.

Figure 3–10: Active Status (OMC)



For additional information concerning the configuration GUI, please refer to the [Baicells Configuration and Network Administration Guide](#) on the Baicells website.

Appendix A: Technical Specifications

For the latest technical specifications, refer to the data sheets on the [BaiCells website](#).

Hardware Specifications

Item	Description
LTE Mode	TDD
Frequency Bands	41/42/43/48
Channel Bandwidth	5/10/15/20 MHz (Model pBS2120 only supports 10/20 MHz)
Output Power	24 dBm / antenna
Power Supply	PoE+, IEEE 802.3at standard
Receive Sensitivity	-100 to -101 dBm
Synchronization	GPS
Backhaul	1 RJ-45 Ethernet backhaul interface (1 GE)
MIMO	DL: 2x2
Dimensions (H/W/D)	9.8 x 9.8 x 3.2 in 248 x 248 x 80 mm
Installation Method	Pole or wall mount
Antenna	13 dBi internal high-gain antenna <ul style="list-style-type: none"> Horizontal beamwidth: 65° Vertical beamwidth: 20° Polarization: ±45°
Antenna Gain	13.5 ±0.5 dBi
Overall Power	< 20 W
Weight	4.4 lbs (2.0 kg)

Note: Different models support different frequency bands.

Software Specifications

Item	Description
LTE Standard	3GPP Release 9
Peak Rate (up to)	20 MHz: SA1 – DL 80 Mbps, UL 20 Mbps SA2 – DL 112 Mbps, UL 14 Mbps
SA - Special Subframe Assignment (configurable parameter)	10 MHz: SA1 – DL 40 Mbps, UL 14 Mbps SA2 – DL 55 Mbps, UL 7 Mbps
User Capacity	32 concurrent users; license for 96 users available upon request
QoS Control	3GPP standard QCI
Modulation	UL: QPSK, 16QAM, 64QAM DL: QPSK, 16QAM, 64QAM
Voice Solution	VoLTE (planned)
Traffic Offload	Local IP Access (LIPA) Selected IP Traffic Offload (SIPTO)
SON	Self-Organizing Network <ul style="list-style-type: none"> Automatic setup Automatic Neighbor Relation (ANR) PCI confliction detection
RAN Sharing	Supported

Item	Description
Network Mngt Interface	TR-069 interface protocol
MTBF	≥ 150000 hours
MTTR	≤ 1 hour
Maintenance	Remote maintenance
	Online status management
	Performance statistics
	Fault management
	Local or remote software upgrade
	Logging
	Connectivity diagnosis
	Automatic start and configuration
	Alarm reporting
	KPI recording
	User information tracing
Signaling trace	

Environmental Specifications

Item	Description
Operating Temperature	-40°F to 131°F, -40°C to 55°C
Storage Temperature	-49°F to 158°F, -45°C to 70°C
Humidity	5% ~ 95%
Atmospheric Pressure	70 kPa ~ 106 kPa
Ingress Protection Rating	IP66

Global Part Numbers

pBS11004	<p>Nova-227 outdoor TDD eNodeB - LTE Release 9, 2x250mW (24 dBm), 2 port, 10.5 dBi integrated 65-degree antenna, 2.5 GHz, B41</p> <ul style="list-style-type: none"> FCC certification: 2AG32PBS11004 (2501-2685 MHz) IC certification: 20982-PBS11004 (2500-2690 MHz)
pBS2120	<p>Nova-227 outdoor TDD eNodeB - LTE Release 9, 2x250mW (24 dBm), 2 port, 13 dBi integrated 65-degree antenna, 3.5 GHz, B42/43/48</p> <ul style="list-style-type: none"> FCC certification: 2AG32PBS2120 (3655-3695 MHz) IC certification: 20982-PBS2120 (3650-3700 MHz)

Appendix B: Regulatory Compliance

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. 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 12 inches (30 cm) between the radiator & your body.

ISED Compliance

This device complies with Innovation, Science, and Economic Development Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d' Innovation, Science et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions

suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 30 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter, End-Users must be provided with transmitter operation conditions for satisfying RF exposure compliance.