Spectra LTE-U Outdoor FDD eNodeB

Installation Guide

December 2018

Version 1.7

About This Document

This document describes the Baicells Spectra Long-Term Evolution – Unlicensed (LTE-U) eNodeB product and how to install and configure it for operation. Information on the corresponding user equipment (UE) may be found in the *Baicells Spectra LTE-U OD FDD u4G-UE1000 User Manual* on the Support > Downloads web page.

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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. Refer to the "Contact Us" section below.

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
13-Dec-2018	V1.7 V1.6 V1.5 V1.4	Updated configuration	Jie Lewis Sun Yufei	Sharon Redfoot
26-Oct-2018	V1.3	Updated power supply information	Sun Yufei	Sharon Redfoot
4-Oct-2018	V1.2	Updates from China	Sun Yufei Jie Lewis	Sharon Redfoot
5-Sep-2018	V1.1	English draft	Sun Yufei	Sharon Redfoot

Related Documents

Other Baicells technical documents may be found on the Baicells support website:

User Equipment	• Atom 5dBi Indoor CPE User Manual • Atom 11dBi Outdoor CPE User Manual • Atom 19.5dBi Outdoor CPE User Manual • Atom ID04/06-3.5/6.5 & ID06-6.5 User Manual • Atom OD04/06-14/19.5 User Manual • Spectra LTE-U Outdoor FDD u4G-UE1000 User Manual
eNodeB Equipment	• Nova 1W ENB Installation Guide • Nova 1W Quick Start Guide • Nova 10W ENB Installation Guide • Nova 10W Quick Start Guide • Nova-227 Outdoor 2x250mW TDD eNB Installation Guide • Nova-227 Quick Start Guide • Nova-233 Outdoor 2x1WG2 FDD-TDD eNB Installation Guide • Nova-233 Quick Start Guide • Nova-243 Outdoor 2x10WG2 FDD-TDD eNB Installation Guide • Nova-243 Quick Start Guide • Nova-436 Outdoor 4x1W CCA TDD eNB Installation Guide • Nova-436 Quick Start Guide • Spectra LTE-U Outdoor FDD Installation eNodeB Guide (this document)
EPC, OAM, & System	• Configuration & Network Administration Guide • Handoff Configuration Guidelines (Beta trial) • BOSS API Manual • Operation, Maintenance, & Troubleshooting Guide • HaloB User Guide

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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. Introduction

1.1 Overview

The Baicells Spectra Long-Term Evolution – Unlicensed (LTE-U) 2x320mW eNodeB (eNB) enables smart devices to be served by unlicensed 5.8 GHz spectrum using Frequency Division Duplexing (FDD) technology.

The LTE-U eNB (Figure 1-1) and its accompanying user equipment (UE), the u4G-UE1000, work with the Baicells CloudCore to provide end-to-end LTE carrier network service. The products are designed to be plug-and-play right out of the box, and provide a way for wireless operators to increase network capacity and at the same time limit the CAPEX investment and eliminate spectrum licensing costs.

The Baicells Spectra LTE-U eNB is easy to deploy, providing a less expensive way for operators to expand their networks. It provides efficient power usage, guaranteed security authentication, and robust Quality of Service (QoS) for multiple users.

Figure 1-1: Spectra LTE-U eNB

Following are the key features of the Baicells Spectra LTE-U eNB.

Easy Deployment

- Slim design suitable for private and public deployments
- Any IP based backhaul can be used, including public transmission
- Supports GPS synchronization
- Low power consumption; can easily be integrated with solar power
- Plug-and-play with self-organizing network (SON) capabilities
- Integrated high-gain directional RF antenna and GPS antenna

Better Performance

- Peak rate of 150 Mbps DL, 75 Mbps UL with 20 MHz spectrum
- Maximum 32 concurrent users
- Supports 5/10/15/20 MHz bandwidth operation
- Supports eGW (optional) for S1 aggregation to reduce signaling load of MME. Supports local traffic offload and charging in cooperation with eGW.

Easy Management

- Efficient remote configuration, monitoring, and maintenance operations with Baicells network management system (NMS), BaiOMC
- Highly secured with equipment certification against potential intrusion risk

Smooth Evolution

- Abundant features achievable with software upgrade
- Smooth evolution to C-RAN architecture, which supports centralized scheduling for better networking performance, with Baicells central network unit (CNU)

1.2 Resources

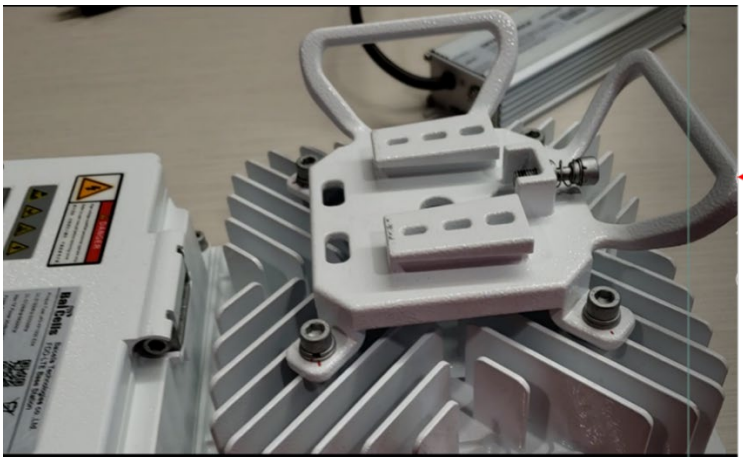
For technical specifications related to the Baicells Spectra LTE-U eNB and its accompanying UE, please refer to Appendix A. For more details about how to configure Baicells equipment, please refer to the *Baicells Configuration & Network Administration Guide*.

2. Installation

Follow the steps below to install the Baicells Spectra LTE-U eNodeB (eNB).

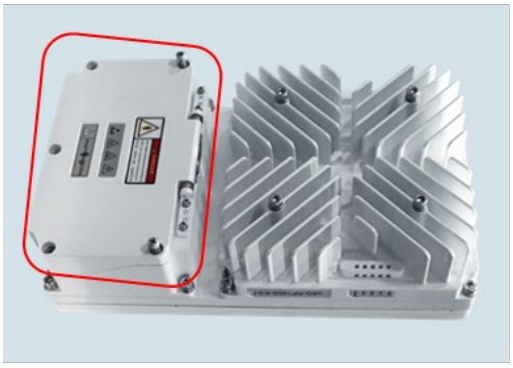
1. This step can be performed at any point in the installation process: Lay the eNB unit front side down on a protective surface, with the back side facing up. Attach the handle/mounting bracket to the upper half of the eNB using the 4 bolts already attached to the eNB frame (Figure 2-1).

Figure 2-1: Handle



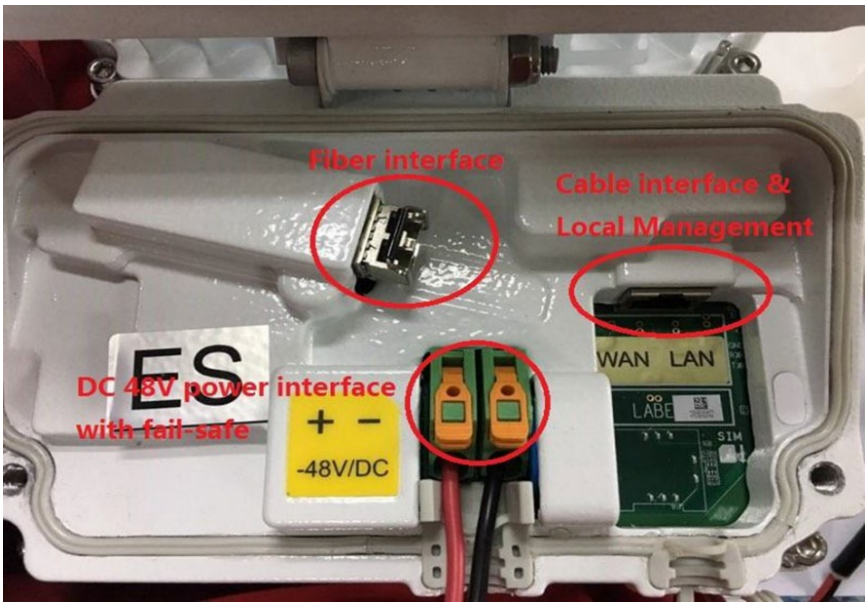
2. On the bottom of the eNB, use an Allen wrench to open the electronics cover (Figure 2-2). Lift the cover up until it opens securely.

Figure 2-2: Back Cover



Inside the cover are several components (Figure 2-3, clockwise): Fiber Interface, Cable Interface, Local Management Interface, and ±48VDC Power Interface with fail-safe closures.

Figure 2-3: Components

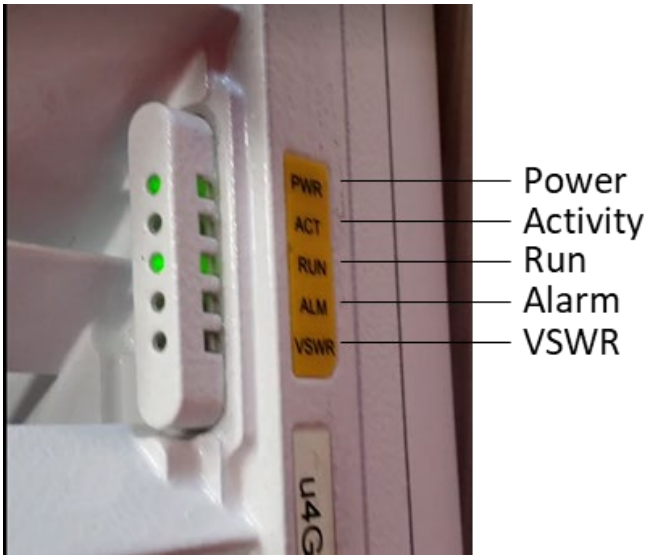


3. Connect the fiber optic cable to the Fiber Interface, and attach the other end to the backhaul component.
4. Connect the power cable to the ±48VDC Power Interface, and the other end to the power source.
5. Ground the unit by connecting the ground terminal on the side of the unit to Earth (Figure 2-4). The ground wire size should be greater than 13AWG.

Figure 2-4: Grounding Terminal

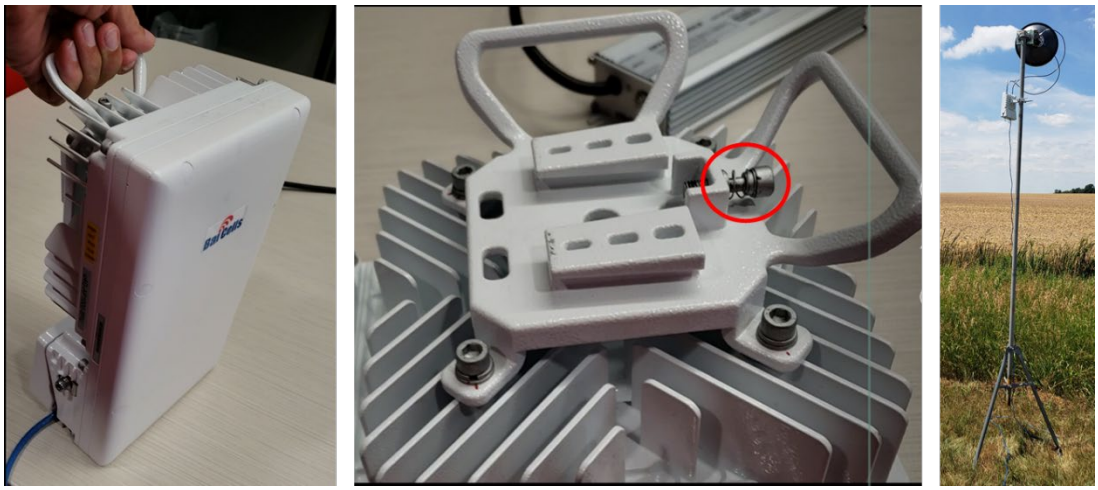
6. Power on the unit. Looking at the LED indicators on the side of the eNB unit (Figure 2-5), wait about 5 minutes until the RUN LED starts flashing, indicating initialization is finished.

Figure 2-5: LEDs



7. Pole or wall mount: Attach the saddle bracket that came with the eNB unit to the pole or wall where the eNB will be placed. Slide the handle/mounting bracket on the eNB into the saddle bracket, and tighten it securely using the tightening screw on the top of the mounting bracket (Figure 2-6).

Figure 2-6: Pole Mount Example



3. Configuration

Reference: *Baicells Configuration & Network Administration Guide*

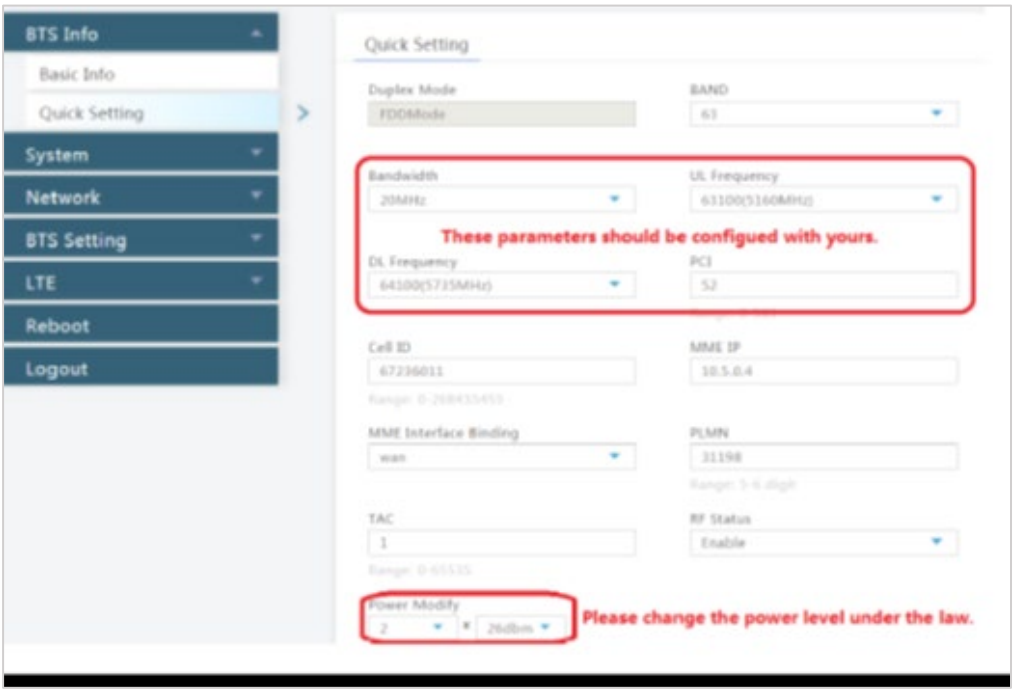
Follow the steps below the first time you configure the Baicells Spectra LTE-U eNodeB (eNB).

NOTE: The GUI screens may look different depending on which software version you are using.

1. Use an Ethernet cable to connect a computer to the Local Management interface inside the cover of the eNB unit (refer to Figure 2-3).
2. Open a Web browser, and input the eNB's default local management IP address of **192.168.150.1**.
3. At the GUI login page, enter the default admin name and password, which are **admin / admin**. Click on the **Login** button.
4. Go to BTS Info > Quick Setting, and configure the Bandwidth, UL and DL frequency, and PCI per your network design (Figure 3-1). Select **Save** to complete the Quick Setting configuration.

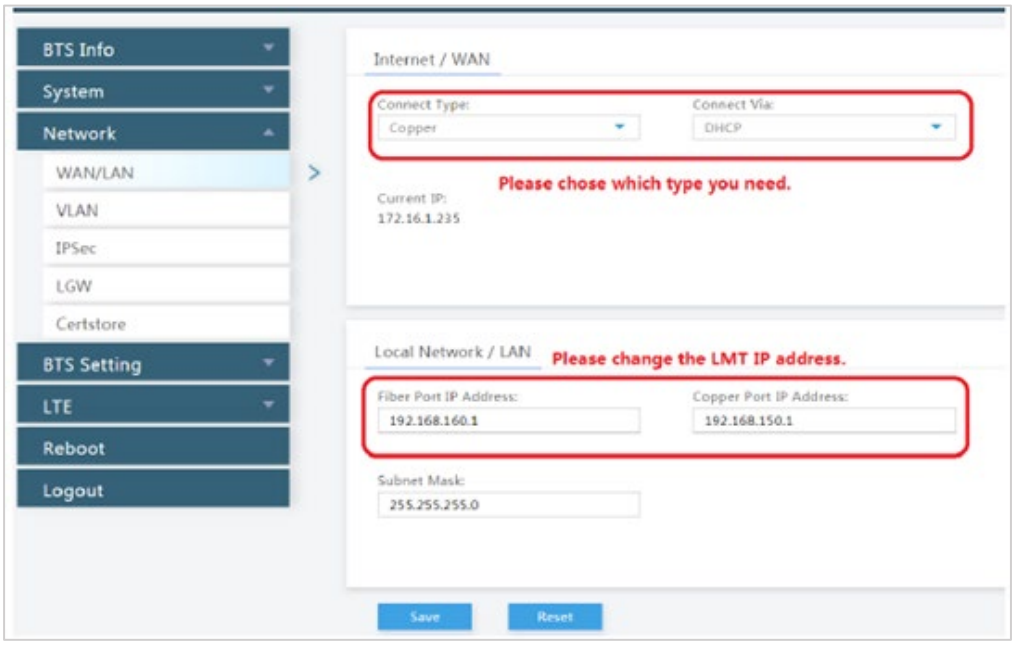
NOTE: Later versions of LTE-U eNB software will autofill the randomly-assigned Cell ID.

Figure 3-1: Quick Setting



5. Go to Network > WAN/LAN. For the *Connect Type* field, select either fiber or copper (cable) based on your type of backhaul. Enter the other WAN/LAN parameters based on your network design. Figure 3-2 provides an example.

Figure 3-2: WAN/LAN

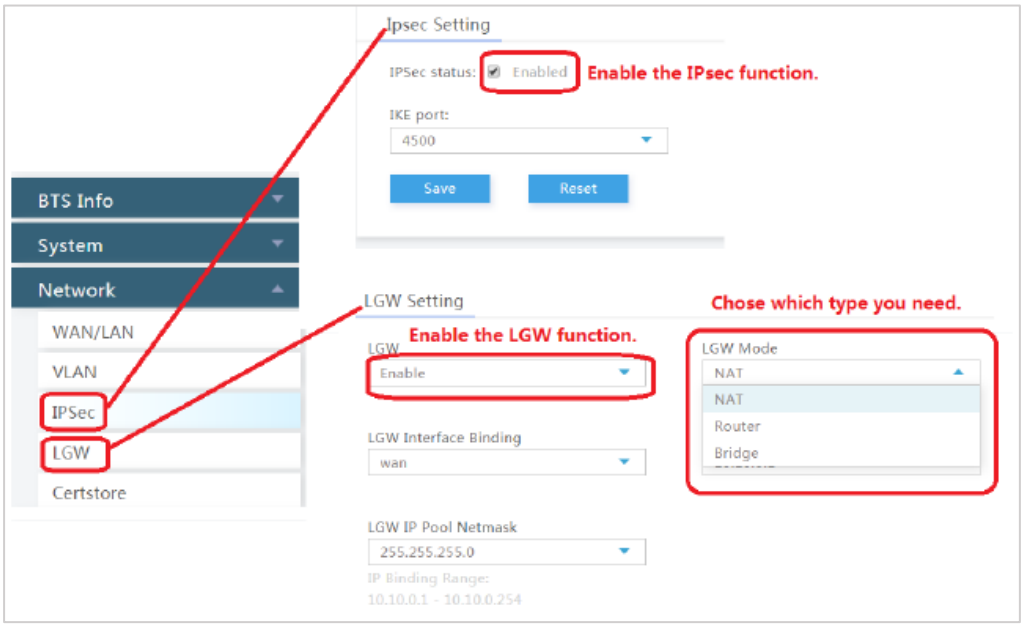


6. Referring to Figure 3-3:

   a. Go to Network > IPSec, and enable it. Select **Save**.

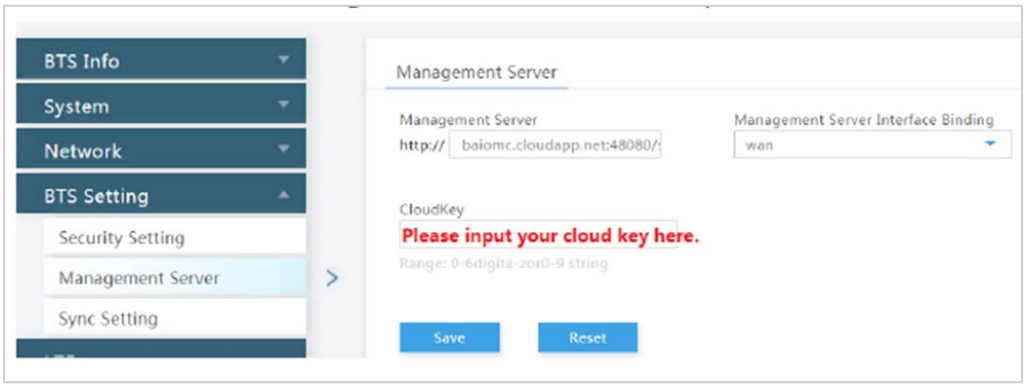
   b. Go to Network > LGW to set the local gateway mode, interface binding, and IP pool netmask.

Figure 3-3: IPSec & LGW Example



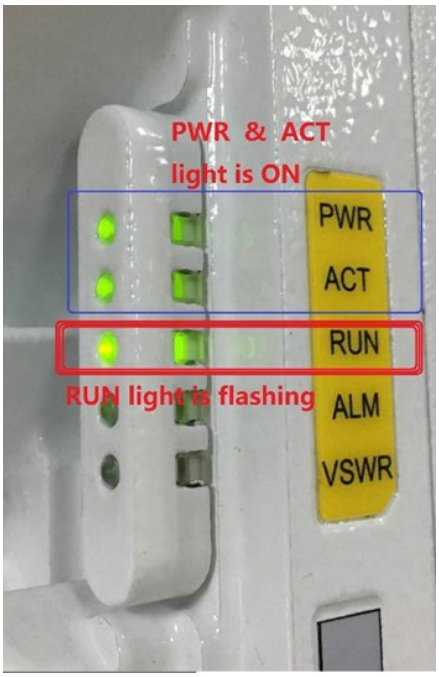
7. Go to BTS Setting > Management Server (Figure 3-4), and enter the CloudCore Management Server address, http://baiomc.cloudapp.net:48080/smallcell/AcsService, the interface binding (WAN), and your CloudKey.

Figure 3-4: Management Server



8. Reboot the eNB.
9. After the eNB finishes rebooting, check the LEDs: The PWR and ACT lights should be on, and the RUN LED will flash once per second (Figure 3-5). This means the cell is on and active.

Figure 3-5: LEDs After Reboot



Appendix A: Technical Specifications

Hardware Specifications

LTE Mode	FDD
Frequency Bands	UL: 5150-5250 MHz DL:5725-5825 MHz and customized
Channel Bandwidth	5/10/15/20 MHz
Max Output Power	27 dBm / antenna
Receive Sensitivity*	-102 dBm per antenna
Synchronization Mode	GPS (comes with the eNB)
Backhaul Mode	1 standard optical (SFP) and 1 RJ-45 Ethernet interface (1 GE with PoE+)
MIMO	DL: 2x2
Dimensions (HxWxD)	10.2 x 7.5 x 3.6 inches 260 x 190 x 90 millimeters
Installation Method	Pole or wall mount
Antenna	• Internal directional antenna: 15±1 dBi, • Horizontal beamwidth: 45°±3 • Vertical beamwidth: 13°±3 • Polarization: ±45°, Isolation > 25 dB • Efficiency > 80%
Power Consumption	< 65W
Max Power Supply	+/-48V DC 1.5A (maximum) PoE+ (802.3bt standard)
Weight	8.8 lbs (4 kg)

*Test method for Receive Sensitivity follows 3GPP TS 36.104, which is based on 5 MHz bandwidth, FRC A1-3 in Annex A.1 (QPSK, R=1/3, 25RB) standard.

Software Specifications

LTE Standard	3GPP Release 9
Peak rate	20 MHz: DL 150 Mbps, UL 75 Mbps
Max User Capacity	32 concurrent users
QoS Control	3GPP standard QCI
Modulation	UL: QPSK, 16QAM, 64QAM DL: QPSK, 16QAM, 64QAM
Traffic Offload	• Local IP Access (LIPA) • Selected IP Traffic Offload (SIPTO)
SON	Self-organizing network: • Automatic setup • Automatic Neighbor Relation (ANR) • PCI confliction detection
RAN Sharing	Supported
Network Management Interface	TR069 interface protocol
MTBF	≥ 150000 hours
MTTR	≤ 1 hour
Maintenance	Remote/local 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

Operating Temperature	-40°F to 131°F -40°C to 55°C
Storage Temperature	-49°F to 176°F -45°C to 80°C
Humidity	5%~95%
Atmospheric Pressure	70 kPa to 106 kPa
Ingress Protection Rating	IP65
Power Interface Lightning Protection	Differential mode: ±10 KA Common mode: ±20 KA

Global Part Number

u4G-AP1000	u4G-AP1000 (FDD Outdoor Micro cell, unlicensed frequency, DL: 5725-5825 MHz / UL 5150-5250 MHz, 2T2R, 27 dBm, 48V DC, PoE+, American standards)

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.

ISEDC 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 inter ference, and (2) This device must accept any interference, including interference that m ay 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.

Appendix C: FAQs

If you have questions, please check the list of frequently asked questions (FAQs) on the Baicells support website or the Facebook support forum.

- Baicells support website - https://na.Baicells.com/support/
- Baicells support forum on Facebook - https://www.facebook.com/groups/Baicellsoperatorsupportgroup/