



Atom 19.5dBi Outdoor CPE User Manual

August 2017

Version 1.3

About This Document

This document is intended for users and installers of the Baicells Atom 19.5dBi Outdoor Customer Premise Equipment (CPE). The information covers how to install, set up, and use the outdoor CPE for broadband wireless access to Long-Term Evolution (LTE) carrier networks.

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Revision Record

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10-Aug-2017	V1.1	Update		Sharon Redfoot
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1 Introduction

The Atom 19.5dBi Outdoor Customer Premise Equipment (CPE) is part of the Baicells broadband wireless access system that integrates with carrier networks based on 3G Time Division Duplex Long-Term Evolution (TDD-LTE) technology. The BaiCells system allows telecom operators, service providers, and enterprises to bring broadband data and voice services to customers or employees, even in challenging environments such as rural locations. Baicells has specifically designed the Atom CPE to provide the highest gain integrated antenna available on the LTE market to connect customers anywhere they may be.

The Atom CPE serves as a gateway between the user's computers or mobile devices and the carrier network by communicating wirelessly with TDD-LTE base stations at cell sites located in the region (Figure 1-1). The base stations communicate with the carrier network, providing the user with internet access.

Figure 1-1: Baicells Broadband Wireless Access System




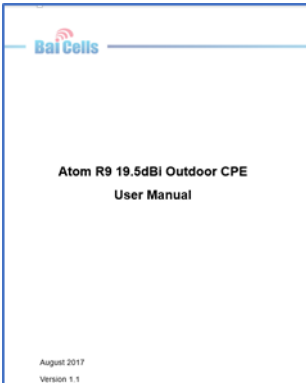
The user-friendly, plug-and-play design behind the Atom CPE makes it quick and easy to install, configure, and use. And because it is carrier-grade equipment, the CPE is built for endurance and the ability to adapt newer LTE technologies as they evolve.

2 Parts List

Refer to Table 2-1 for a list of the components that you should receive with the Baicells Atom 19.5 dBi Outdoor CPE. You will need standard tools, Ethernet cable, and RJ-45 connectors to cable the outdoor unit connection to the indoor LAN equipment. The cable length will depend on where the CPE will be placed externally.

Table 2-1: Parts

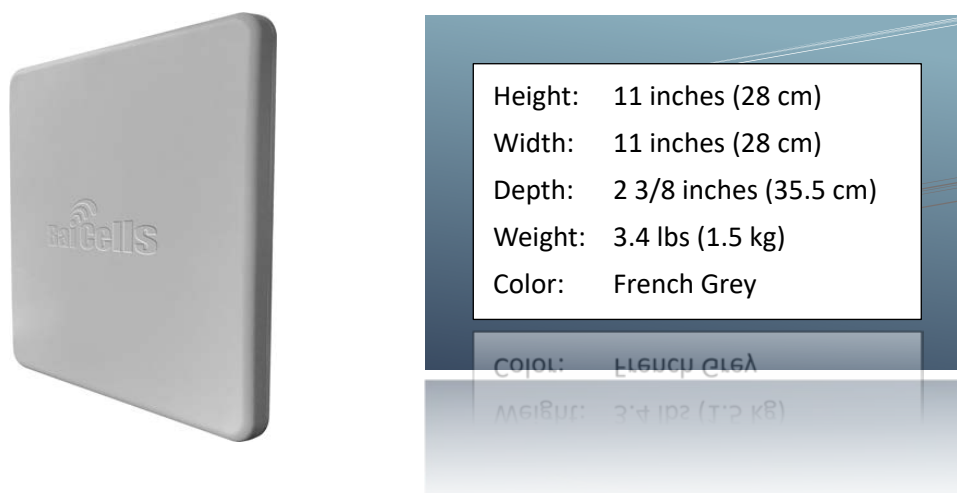
Item	Quantity	Picture
Atom 19.5 dBi Outdoor CPE	1	
12V/1A Adapter	1	
PoE Combiner	1	

<p>Mounting Brackets</p>	<p>1 each</p>	
<p>User Manual (this document)</p>	<p>1</p>	

3 Description

The Baicells Atom 19.5dBi Outdoor CPE is a powerful, standards-based device designed to connect seamlessly to any standard TD-LTE base station operating on the same band, 42/43. The hardware unit is a small, sleek device (Figure 3-1), yet ruggedized for the most challenging outdoor environments.

Figure 3-1: Atom 19.5 dBi Outdoor CPE



Looking further at the CPE (Figure 3-2) you will see user interface areas and LED indicators. The interfaces are described in Table 3-1, and the LEDs are explained in Table 3-2.

Figure 3-2: Interfaces



Table 3-1: Interfaces

Interface	Description
ETH RJ45	1 Local Area Network (LAN) port
RESET	Reset button – press the button for at least 10 seconds to restore the CPE to its factory settings
SIM CARD	Universal Subscriber Identity Module (SIM) card slot. Supports 1.8V/3.0V USIM cards.

Table 3-2: LEDs





LED	Description	Color	Status	Meaning
LAN	Ethernet LAN	Blue or Green	Off	Ethernet connection is not established
			Steady on	Ethernet connection is normal
			Blinking	Data is being transmitted on the Ethernet connection
LTE Signal	LTE network connection status and signal strength	Blue or Green	All off	No connection
			All blinking	Connecting
			1 steady on	Connected, signal is weak
			2 steady on	Connected, signal is medium
			3 steady on	Connected, signal is strong
PWR	Power	Blue or Green	Off	No power supply
			Steady on	Power is on

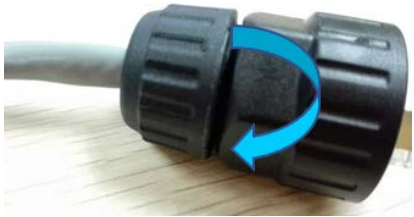


4 Installation

Follow the steps below to install the outdoor CPE.

1. Assemble the waterproof parts with the Ethernet cable and RJ-45 connectors, as described in Table 4-1.

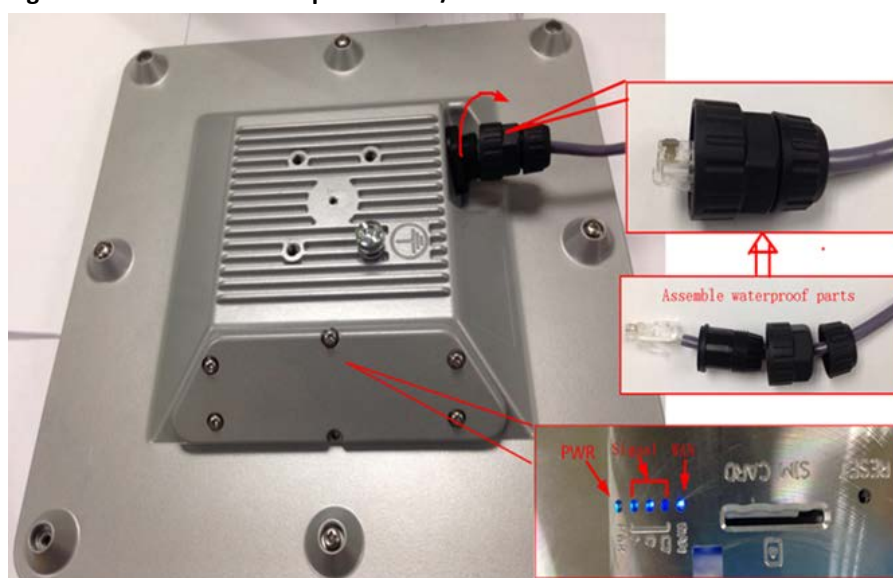
Table 4-1: Cable Installation

Substep	Action	Picture
1a)	On one end of the cable use crimping pliers to fix a crystal RJ-45 head.	
1b)	Unscrew the waterproof head.	
1c)	Slide the other end without the crystal head through the waterproof head. Align the crystal head with the gap on the waterproof head.	
1d)	Slide the crystal head to the end.	

1e)	Tighten the cable.	
1f)	Install the cable on the CPE, aligning the crystal head with the port direction.	
1g)	Tighten the external thread.	

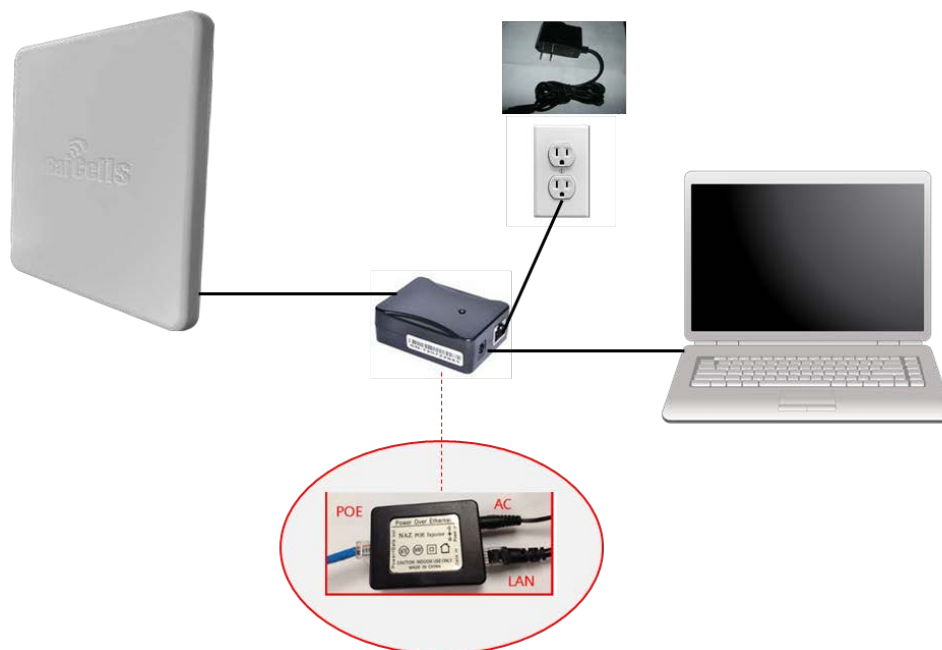
2. Plug the cable into the local connection (Figure 4-1).

Figure 4-1: Assemble Waterproof Parts / Connect Cable



3. Open the waterproof cover, and follow the instructions on the SIM card.
4. Connect the power adaptor, paying attention to the adaptor interface as shown in Figure 4-2.
5. Use the mounting brackets provided to attach the outdoor unit on a roof, wall, or other outside structure.

Figure 4-2: CPE Installation



5 Basic Configuration

To configure the outdoor CPE, you will access the CPE GUI application. Follow the steps provided in this section to log in and complete the minimal configuration requirements for the CPE to operate. For more detailed configuration information, refer to the *Baicells Configuration and Network Administration Guide* on the Baicells support website.

5.1 Log in and Change Password

Follow the steps below to access and log in to the CPE GUI application.

1. Turn the CPE power on.
2. Open a Web browser, and in the address bar type in <http://192.168.1.1> and then press **Enter**. The login window should appear as shown in Figure 5-1.

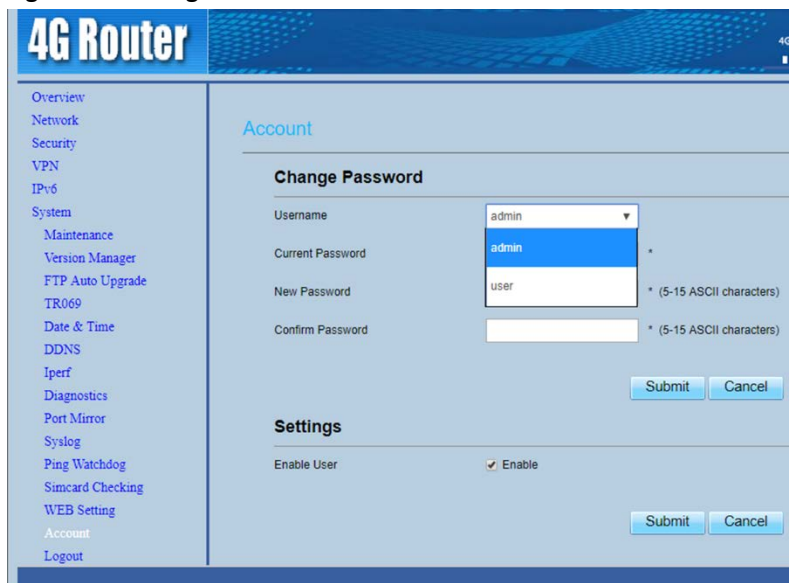
Figure 5-1: Log in to CPE GUI



The screenshot shows the login interface for the 4G Router. It features a blue header with the text "4G Router". Below the header, there are two input fields: "Username" and "Password". A "Login" button is positioned below the password field.

3. Enter the default user name (**admin**) and password (**admin**), and click on the **Login** button.
4. After you log in, you should change the default password to a secure password. You can find the account fields under **System > Account > Change Password** (Figure 5-2).

Figure 5-2: Change Account Information

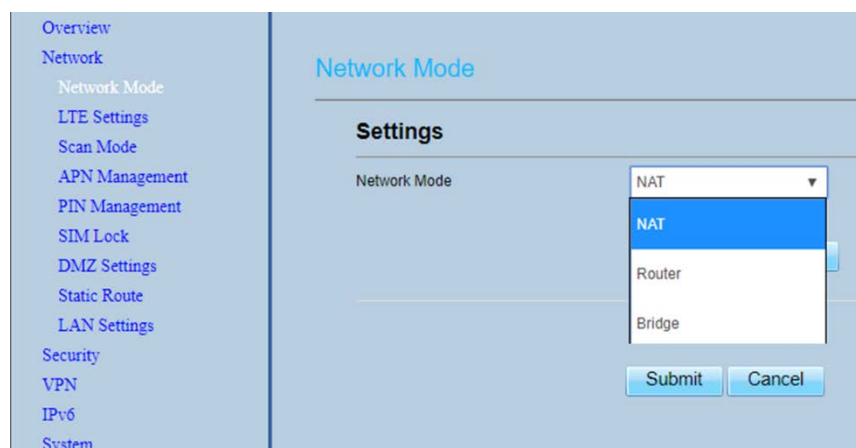


The screenshot displays the "Change Password" page within the 4G Router GUI. The page has a blue header with "4G Router" and a navigation menu on the left. The main content area is titled "Account" and contains a "Change Password" section. This section includes four input fields: "Username" (a dropdown menu with "admin" selected), "Current Password" (a text field with "admin" and a red asterisk), "New Password" (a text field with "user" and a red asterisk), and "Confirm Password" (a text field with a red asterisk). Below these fields are "Submit" and "Cancel" buttons. A "Settings" section below contains an "Enable User" checkbox that is checked and labeled "Enable", with "Submit" and "Cancel" buttons.

5.2 Configure Network Mode

1. Choose **Network > Network Mode**. Choose either Network Address Translation (NAT), Router, or Bridge mode (Figure 5-3) according to your LTE network setup.

Figure 5-3: Network Mode

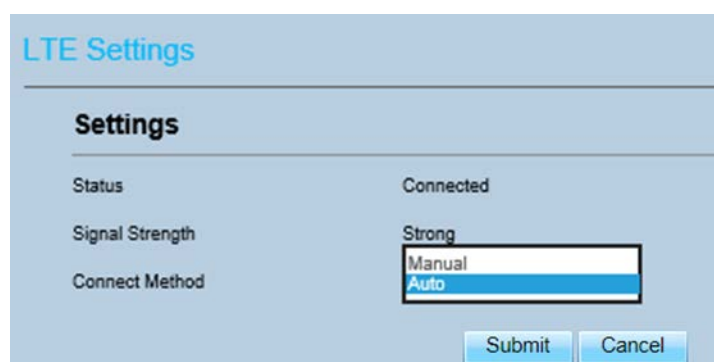


2. Click on **Submit** to save your selection.

5.3 Configure LTE Connection Setting

1. Choose **Network > LTE Settings** to choose the LTE connection setting for this CPE as either Auto connect or Manual connect (Figure 5-4) to the LTE network. If you choose Auto connect, click on **Submit** to save your selection. If you choose Manual connect, go to step 2.

Figure 5-4: LTE Settings



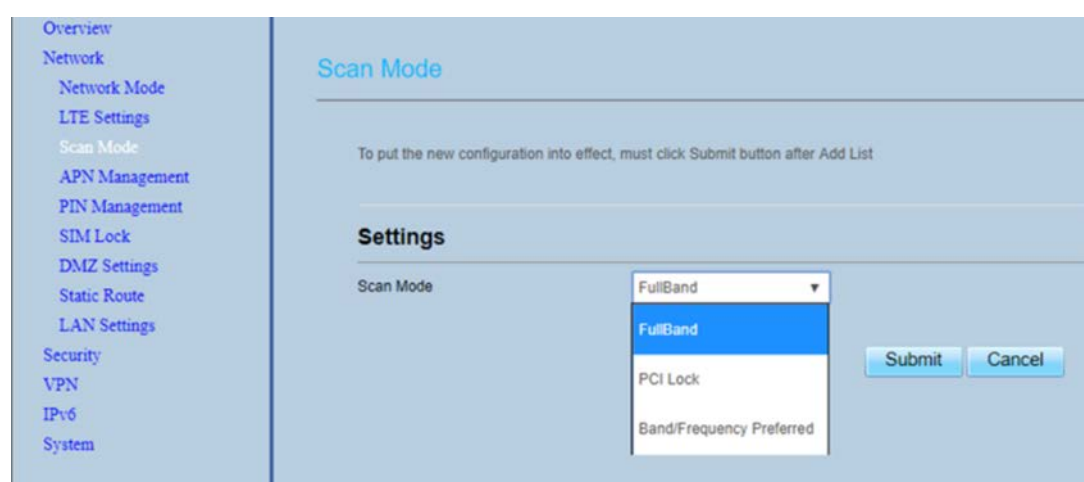
2. To manually connect the CPE to the LTE network, choose **Manual** connect and click on **PLMN** for Public Land Mobile Network to scan all available networks and to select a specific LTE network to connect to. Select **Connect** to connect the network. Use the Disconnect button to disconnect from the selected network.

5.4 Configure Scan Mode

The Scan Mode setting determines which frequencies the CPE's routine scan of available frequencies will cover. Scanning is a process of tuning to a specific frequency and measuring the simplest signal quality [e.g., Received Signal Strength Indication (RSSI)]. As part of the cell selection and reselection process, the CPE performs the scan first and then selects a small number of candidate cells to go through the next step of measuring and evaluating signals to select the best base station to serve it.

Go to **Network > Scan Mode**, and select either FullBand, PCI Lock, or Band/Frequency Preferred, as shown in Figure 5-5. The options are explained beneath the figure. Click on **Submit** to save the configuration.

Figure 5-5: Scan Mode



- FullBand – The CPE will routinely scan all channels in the band. The band is dependent on the model of CPE being used. Click on **Submit** after selecting this option.
- PCI Lock – Allows you to select the specific E-UTRA Absolute Radio Frequency Channel Number (EARFCN) and Physical Cell Identifier (PCI). After selecting PCI Lock, click on **Submit**. This will open the PCI Lock Settings window (Figure 5-6). After entering the information, click on **Add** to save the list. You can add more than one PCI Lock list. The CPE will scan the list for base stations with the PCI and EARFCN combination before locking on to one of them.
- Band/Frequency Preferred – You can specify which band(s) the CPE will scan. After selecting Band/Frequency Preferred, click on **Submit**. This will open a settings window (Figure 5-7). Select the band by checking the check box next to it, and click on **Add List**. The window will display the EARFCN field. Select the desired EARFCN from the drop-down list, and then click on **Add** to add the list.

Figure 5-6: PCI Lock Settings

The screenshot shows the 'Scan Mode' configuration page. On the left is a navigation menu with categories: Overview, Network (Network Mode, LTE Settings, Scan Mode, APN Management, PIN Management, SIM Lock, DMZ Settings, Static Route, LAN Settings), Security (VPN, IPv6, System). The main content area is titled 'Scan Mode' and includes a note: 'To put the new configuration into effect, must click Submit button after Add List'. Under the 'Settings' section, 'Scan Mode' is set to 'PCI Lock'. There are 'Submit' and 'Cancel' buttons. Below this is the 'PCI Lock' section with an 'Add List' button. A table with columns 'Index', 'EARFCN', 'PCI', and 'Operation' is present but empty. Another 'Settings' section has input fields for 'EARFCN' and 'PCI' (with a range of 0-503), and 'Add' and 'Cancel' buttons.

Figure 5-7: Band/Frequency Preferred Settings

The screenshot shows the 'Band/Frequency Preferred' configuration page. The navigation menu is the same as in Figure 5-6. The main content area is titled 'Scan Mode' with the same note. Under the 'Settings' section, 'Scan Mode' is set to 'Band/Frequency Prefer'. There are 'Submit' and 'Cancel' buttons. Below is the 'Band/Frequency Preferred' section with 'Band Select' options for 'Band 42' (checked) and 'Band 43'. 'Band Display' is set to '42'. There is an 'Add List' button. A table with columns 'Index', 'EARFCN', and 'Operation' is present but empty. Another 'Settings' section has an 'EARFCN' dropdown menu set to '41590' and 'Add' and 'Cancel' buttons.

5.5 Configure APN Management

Under **Network > APN Management**, you will configure up to 4 base stations with which this CPE may connect. APN is an acronym for Access Point Name. An access point, in this case, is another term for a base station. Refer to Figure 5-8 and Table 5-1 concerning the parameters. Click on **Submit** to save your data.

Figure 5-8: APN Management Settings

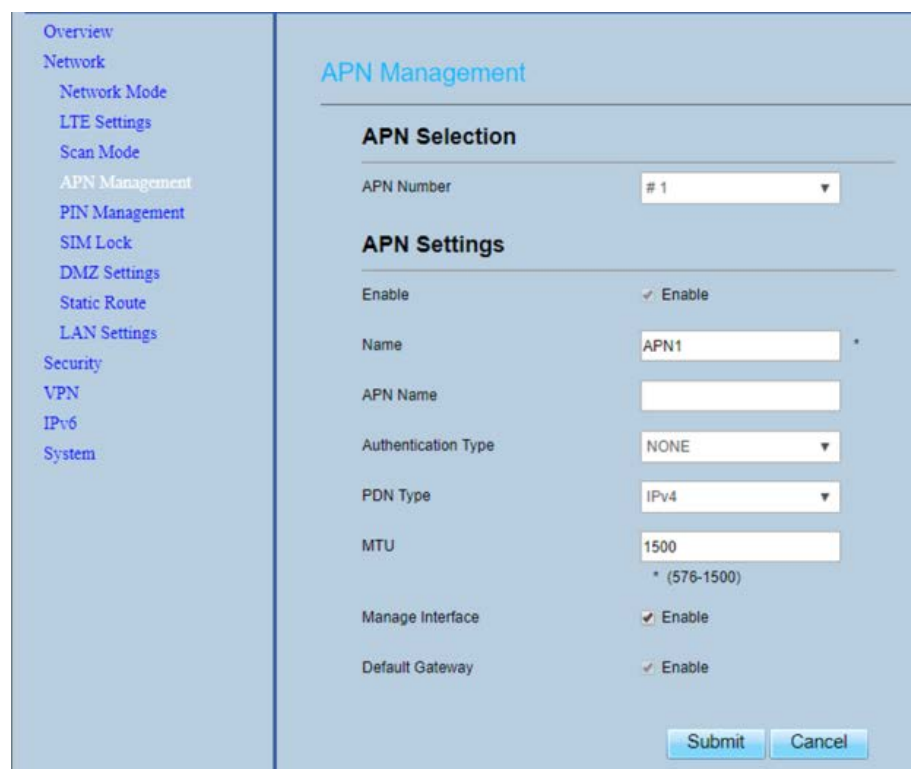


Table 5-1: APN Management Settings

Field Name	Description
APN Selection	
APN Number	Select the APN number – 1, 2, 3, or 4
APN Settings	
Enable	Select the check box next to Enable to enable this APN
Name	Required field: Enter a name for this APN
APN Name	Enter the name of this APN, as defined in the base station configuration
Authentication Type	Select the type of authentication required for this base station: <ul style="list-style-type: none"> • None – the base station is not required to authenticate itself to the CPE • PAP – stands for Password Authentication Protocol,

	<p>where the base station will authenticate itself to the CPE using a static user name and password</p> <ul style="list-style-type: none">• CHAP – stands for Challenge-Handshake Authentication Protocol, where the base station will authenticate itself to the CPE through an authenticating entity
PDN Type	Select the type of Packet Data Network (PDN) the base station can use when communicating with this CPE: IPv4, IPv6, or IPv4v6
MTU	Required field: Enter the Maximum Transmit Unit (MTU), which is the size of the largest network layer protocol data unit (PDU) that the base station can communicate in a single transaction. The range is 576 to 1500 bytes
Manage Interface	To enable a management interface to this base station, select the check box next to Enable.
Default Gateway	To enable a default gateway to this base station, select the check box next to Enable.

Appendix A: Technical Specifications

Basic Specifications

Item	Description
LTE Standard	3GPP Release 9
Ethernet LAN Port	One RJ-45 port 10/100 auto-sensing, auto-MDX, 24V PoE
LED Indicators	Power/LTE signal/LAN
USIM	Supports 1.8V/3V 2FF
Restore Button	Tactile button – press for at least 10 seconds to restore the CPE to its factory settings
Power Supply	Input: Universal range 100V to 240V AC Output: 12V 1A
Dimensions	11 in (H) x 11 in (W) x 2 3/8 in (D) 28 cm x 28 cm x 35.5 cm
Weight	3.4 lbs (1.5 kg)
Color	Pantone white C

RF Specifications

Item	Description
LTE Mode	TDD LTE
Channel Bandwidth	5 MHz /10 MHz /15 MHz /20 MHz
MAX Output Power	23 dBm (200mW)
Frequency Band	42 (3400 MHz ~ 3600 MHz)
Frequency	3.5 GHz
Antenna Gain	19.5 dBi, ±45°
Receive Sensitivity	-94 dBm
Max Throughput	DL 110 Mbps, UL 20 Mbps

Software Specifications

Item	Description
Language Settings	English
Network Mode	Bridge / NAT
SIM	<ul style="list-style-type: none"> PIN management SIM lock
Network Connection Setup	<ul style="list-style-type: none"> Create, delete, and edit APNs Set up dial-up connection automatically Set up dial-up connection manually

Item	Description
LTE Scan Mode	<ul style="list-style-type: none"> • Full band • Cell lock • Band / Frequency preferred
VPN	<ul style="list-style-type: none"> • Support VPN passthrough • Support PPTP tunnel mode
NAT	<ul style="list-style-type: none"> • Port forwarding • Port trigger • DMZ • UPnP
Statistics	<ul style="list-style-type: none"> • LAN Link status • Transmit / Receive traffic • Run time

Device Management Specifications

Item	Description
Maintenance	<ul style="list-style-type: none"> • Date and time settings • Reset • Restore factory settings • Restore/Back up configuration file • Local upgrade • FOTA upgrade
TR069	Enable or disable TR069 Management
Port Mirror	Enable or disable the port mirror function
Syslog	Syslog function - can send logs to the PC via LAN
Diagnostics	Ping and trace route

Environmental Specifications

Item	Description
Operating Temperature	-40°F to 131°F / -40°C to 55°C
Storage Temperature	-40°F to 158°F / -40°C to 70°C
Operating Humidity	5% to 95%
Drop	0.8m
Environmental Protection Level	IP67, operating input voltage range 9 to 28 VDC

Appendix B: 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/>