About This Document

This document is a user guide for the hardware installation of the base station mBS1100.

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Revision Record

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Description</th>
<th>Author</th>
</tr>
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<tr>
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<td>Jian Chunbing</td>
</tr>
</tbody>
</table>

Contact Us

E-mail: support@baicells.com
Phone: 86-10-62607100
Website: http://www.baicells.com/
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1. Out-of-Box Audit

1.1 Shipping List

Before opening the box, make sure the packaging cases are in good condition, undamaged and not soaked. During the unpacking, avoid potential damaging impacts from hits or excessive force. Once unpacked, check the quantity to see if it is consistent with that in the shipping list shown in Table 1-1.

Table 1-1 Shipping List

<table>
<thead>
<tr>
<th>Number</th>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mBS1100 base station</td>
<td>1</td>
<td>Check the device’s tag to see if it is consistent with the requirement</td>
</tr>
<tr>
<td>2</td>
<td>Power supply</td>
<td>1</td>
<td>100V ~ 277V AC to 48V DC adaptor</td>
</tr>
<tr>
<td>3</td>
<td>Loop rings</td>
<td>2</td>
<td>Fixing accessories</td>
</tr>
<tr>
<td>4</td>
<td>Water-proof connector</td>
<td>2</td>
<td>• DC Power connector: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Ethernet connector: 1</td>
</tr>
<tr>
<td>5</td>
<td>GPS antenna and N type cable</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>eNodeB mounting bracket</td>
<td>2</td>
<td>Fixed accessories</td>
</tr>
<tr>
<td>7</td>
<td>Handle</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>GPS mounting bracket</td>
<td>1</td>
<td>Fixed accessories</td>
</tr>
<tr>
<td>9</td>
<td>Lightning Protectors</td>
<td>3</td>
<td>• Antenna lightning protector: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• GPS lightning protector: 1</td>
</tr>
<tr>
<td>10</td>
<td>Ground terminals</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Waterproof tape</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Warranty</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Certification</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>User guide</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

Note:
During the unpacking, if the outer package is damaged or soaked, stop unpacking and find the cause. Report the issue to the vendor. For any shortage, miscarriage, or damage is identified, report the local vendor within 10 days.
1.2 Base Station Appearance

Figure 1-1 shows the appearance of mBS1100 base station.

Size: 330mm (length) x 220mm (width) x 105mm (height)
Weight: about 5kg

1.3 Base Station Accessories

Table 1-2 shows the accessories of the base station mBS1100.

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS antenna</td>
<td>GPS antenna</td>
</tr>
<tr>
<td>Accessory</td>
<td>Name</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>GPS antenna lightning protector</td>
<td></td>
</tr>
<tr>
<td>Antenna lightning protector</td>
<td></td>
</tr>
<tr>
<td>Loop ring</td>
<td></td>
</tr>
<tr>
<td>Power adaptor</td>
<td></td>
</tr>
<tr>
<td>Mounting bracket</td>
<td></td>
</tr>
<tr>
<td>Handle</td>
<td></td>
</tr>
<tr>
<td>Water-proof tape and daub</td>
<td></td>
</tr>
<tr>
<td>GPS mounting bracket</td>
<td></td>
</tr>
</tbody>
</table>
2. Installation Preparation

2.1 Supporting Materials

Prepare accordingly the following supporting materials, given as Table 2-1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power line</td>
<td>&lt; AWG16, e.g., AWG14 Shorter than 350m (1150 feet)</td>
</tr>
<tr>
<td>Antenna feeder</td>
<td>50 ohm feeder</td>
</tr>
<tr>
<td>Cable</td>
<td>CAT5, CAT5e</td>
</tr>
<tr>
<td>Antenna</td>
<td>Omnidirectional, or directional antenna</td>
</tr>
<tr>
<td>Ground wire</td>
<td>16mm² yellow/green wire</td>
</tr>
</tbody>
</table>

2.2 Installation Tools

The following tools are needed during the installation.
2.3 Installation Environment

2.3.1 Locational Requirements

Environments with high-temperature, dust, harmful gases, unstable voltage, big vibration, high noise or exposed to flammable, explosive, electromagnetic interference (large radar station, transmitting station, transformer substation) are not suitable for the operation of mBS1100, and thus should be avoided. Places prone to have impounded water, soaking, leakage, or condensation, should also be avoided.

In the construction process, factors like climate, hydrology, geology, earthquake, electric power, and transportation should be taken into consideration so that a proper location can be chosen to meet the communication engineering environmental requirements, as well as the technical requirements of network planning and communication equipment.

2.3.2 Environmental Requirements

Table 2-2 gives the base station’s environmental requirements on temperature, humidity, and voltage.

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
<th>Typical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>-40°C ~ 55°C</td>
<td>25°C</td>
</tr>
<tr>
<td>Relative humidity (no condensation)</td>
<td>0% ~ 100%</td>
<td>5% ~ 95%</td>
</tr>
<tr>
<td>Safety voltage</td>
<td>42V ~ 58V</td>
<td>48V</td>
</tr>
</tbody>
</table>
3. Base Station Installation

3.1 Installation Schematic Diagram

Figure 3-1 is the schematic diagram for the installation of a base station.

Figure 3-1 Schematic diagram for installing mBS1100
3.2 Installation Procedure

The installation procedure of mBS1100 is given in Figure 3-2.

Figure 3-2 Installation Procedure of mBS1100

3.3 Installation Steps

3.3.1 Install Mounting Bracket and Handle

1. Use the M6*12 socket head screw to fix the bracket on both sides of the mBS1100, as shown in Figure 3-3.
2. Use the M6*12 socket head screw to fix the handle on right side of the mBS1100, as shown in Figure 3-4.

3. Figure 3-5 shows what it looks like when the installation of rack and handle is done.
3.3.2 (Optional) Install GPS Antenna

Installation requirements on GPS antenna:

- 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 in the south) is not blocked by any buildings.

- Avoid installing the GPS in the vicinity of any other transmitting and receiving devices. Avoid interference from other transmitting antennas to the GPS antennas.

- Should be installed within 45 degrees to the lightning rod.

- GPS antenna feeder lightning protector is required before connecting to the base station.

1. Prepare items for the GPS antenna installation

2. Install GPS rack

3. Install the GPS antenna in the upper right of the mBS1100 base station. Vertical installation is required.
4. Connect one end of the wire jumper to the RF port of the GPS antenna, fasten the connector and connect the other end to the GPS antenna feeder lightning protector.

5. Then, connect one end of the other wire jumper to the GPS antenna feeder lightning protector and the other end to the mBS1100 base station’s GPS port.

6. Ground the antenna feeder lightning protector.

Note:
The GPS antenna feeder lightning protector must be grounded.

7. Waterproofing measures need to be taken on GPS connector, GPS antenna feeder surge protective device connector, and the GPS antenna connector, using the waterproof daub and waterproof tape, refer to 3.3.3.3 Waterproof Protection.

### 3.3.3 Install Antenna Feeder System

There are two kinds of outdoor antennas, omnidirectional outdoor antennas and directional outdoor antennas, whose installation will be introduced in the following, respectively.
3.3.3.1 Install Omnidirectional Antennas

One should pay attention to the followings in the process of installing omnidirectional outdoor antenna:

- The diameter of the pole for omnidirectional outdoor antennas is required to be 35mm ~ 50mm. A typical case is to use the 50mm-diameter round-steel-made pole (with details depending on the specific antenna type).

- Make sure that the top of pole and the clamp beneath the antenna are at the same level, after installing the omnidirectional outdoor antenna on the pole.

- Make sure that the antenna is high enough to meet the coverage requirement, and that, the antenna top falls in the safety angle of 45 degrees towards the lightening rod, as shown in Figure 3-6. In principle, no lightening rod can be welded to pole (no metal object is allowed within 1m range in the horizontal direction of the omnidirectional antennas), when installing the omnidirectional antennas. Instead, an independent lightening rod should be settled between two poles, where the lightening rod must be high enough to keep all antenna tops under its protection cover.

![Figure 3-6 Omnidirectional Antenna Installation (1)](image)

In case that an independent lightening rod is impossible due to environmental limitation, the installation method as shown in Figure 3-7 can be adopted. Be aware that the pole supporting the lightening rod should be kept from the omnidirectional outdoor antennas for at least 1m away.
3.3.3.2 Install Directional Antennas

1. First, assemble the antennas, as shown in Figure 3-8.

   Figure 3-8 Assembling Procedure of Directional Antennas

2. To install it on the iron tower’s role, use pulley to transport the antenna assembled to the platform at the iron tower, as shown in Figure 3-9. Working at heights should strictly follow the safety rules.
3. Fix the pole vertically to the ground or concrete pillars on the rooftop using expansion screws, and fasten it with steel wires. Then, mount the omnidirectional outdoor antenna onto the pole using the installation rack, as shown in Figure 3-10.

4. Connect all cables and wires and fix them, when the base station has been installed in a proper position.

5. A lightning protector is mandatory in the connection between the mBS1100 base station and the antenna feeder. The N-type male connector of the lightning protector should be connected to the ANT port of the base station, as shown in Figure 3-11.
6. Ground the antenna feeder lightning protector.

   Note:
   The antenna feeder lightning protector must be grounded.

7. Do testing, and seal all the connections for waterproof protection after the testing is passed.

**3.3.3.3 Waterproof Protection**

Wrap the connections to protect with waterproof tapes and waterproof daub, as shown in Figure 3-12.
Be aware that at least three layers of tapes are needed, and make sure that the wrapping direction of the last layer is from the bottom up. The last layer should be in suitable tightness to keep it from cracking and also for good looking. The overall appearance after the waterproof processing is shown in Figure 3-13.

Figure 3-13 Antenna After Waterproof Processing
3.3.4 Install Base Station on Pole

Required diameter of the pole: 30mm ~ 125mm.

1. Put the loop ring through the installation bracket on the base station, with one loop ring for each of the two brackets.

2. Two persons required. Lift the base station, fix it to the pole using the loop rings, adjust the rings to a suitable position, and tighten the rings using the L-shape socket head screw wrench.

3. Picture when it is done.
3.3.5 Install on Wall

1. Put the base station on the wall to install, and mark the drilling locations.

2. Drill four holes in the wall of the size 4mm in diameter by following the locations marked.

3. Check the up/down direction of the installation rack, and then fix the base station to the wall using M6 expansion screws.
3.4 Wire Connection

3.4.1 Install Feeder

After the mBS1100 is installed, connect the antenna and the base station’s ANT1 and ANT2 ports with feeders.

3.4.2 Install Ethernet Connector

Waterproof connector is adopted for cables.

1. Put the cable through the waterproof connector from the behind. A click sound should be heard.

2. Connect the cable to the base station’s WAN port through its waterproof connector, and twist it 90 degrees, and tighten the connector, as shown in Figure 3-14.

Figure 3-14 Cable Connection

3.4.3 Install Ground Wire

Note about grounding:

- Ground wire adopts yellow-green wire that is no smaller than 16 mm².
- The ground interface of the base station is given in Figure 3-15.
- Grounding principle: as near as possible.
- The antenna feeder lightning protector and the GPS antenna feeder lightning
protector are connected via an M6 screw. If connected to an outdoor ground via another M6 screw, the connection needs to be tin-soldered.

- The connection of ground terminals and ground bar is need to be tightness and reliable. And the rustproof processing is needed, such as rust preventing paint, anti-oxidation coatings, grease, and so on.

![Figure 3-15 Grounding](image)

3.4.4 Install Power Connector

For installation of the power connector, please refer to the “Power Connector Installation Guide”

For waterproof power connector, A stands for 48V, while B for 0V.

The base station power system is explained as follows:

- Direct current power line adopted.

- For power adaptor, red power line adopted for +48V, while black for 0V.

- Power lines connect to the base station through special waterproof connector.

- The power line length is recommended to be controlled under 1150 feet.

- The power line is connected to the base station’s PWR port via a special power
connector. The connector needs to be tightened and correctly connected; otherwise, it would cause damage.

### 3.5 Base Station Power On

Power on the mBS1100, and the indicators will light up, as shown in Figure 3-16.

![Figure 3-16 LED Indicators](image)

The explanation of the indicator signal is given in Table 3-1.

<table>
<thead>
<tr>
<th>Type</th>
<th>Color</th>
<th>Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR</td>
<td>Green</td>
<td>ON</td>
<td>Have power input</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>No power input</td>
</tr>
<tr>
<td>RUN</td>
<td>Green</td>
<td>Fast blink: 0.125s on, 0.125s off</td>
<td>Single board loading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slow blink: 1s on, 1s OFF</td>
<td>Single board running well</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>No power input, or single board failure</td>
</tr>
<tr>
<td>ALM</td>
<td>Red</td>
<td>ON</td>
<td>Hardware warning status, e.g., cable connection failure warning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>No warning</td>
</tr>
<tr>
<td>ACT</td>
<td>Green</td>
<td>ON</td>
<td>Active cell</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>Inactive cell</td>
</tr>
</tbody>
</table>